



TCEQ Core Data Form

TCEQ Use Only

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided)			
<input type="checkbox"/> New Permit, Registration or Authorization (Core Data Form should be submitted with the program application)			
<input type="checkbox"/> Renewal (Core Data Form should be submitted with the renewal form)		<input checked="" type="checkbox"/> Other MSW Permit 1422 Modification	
2. Attachments Describe Any Attachments: (ex. Title V Application, Waste Transporter Application, etc.)			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Optimized Evapotranspiration Cover Permit Modification Application			
3. Customer Reference Number (if issued)		4. Regulated Entity Reference Number (if issued)	
CN 600126262		RN 100210095	

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)			
6. Customer Role (Proposed or Actual) – as it relates to the Regulated Entity listed on this form. Please check only one of the following:			
<input type="checkbox"/> Owner		<input type="checkbox"/> Operator	
<input type="checkbox"/> Occupational Licensee		<input type="checkbox"/> Responsible Party	
<input checked="" type="checkbox"/> Owner & Operator		<input type="checkbox"/> Voluntary Cleanup Applicant	
<input type="checkbox"/> Other: _____			
7. General Customer Information			
<input type="checkbox"/> New Customer		<input type="checkbox"/> Update to Customer Information	
<input type="checkbox"/> Change in Legal Name (Verifiable with the Texas Secretary of State)		<input type="checkbox"/> Change in Regulated Entity Ownership	
		<input checked="" type="checkbox"/> No Change**	
**If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.			
8. Type of Customer:			
<input type="checkbox"/> Corporation		<input type="checkbox"/> Individual	
<input type="checkbox"/> City Government		<input type="checkbox"/> County Government	
<input type="checkbox"/> Other Government		<input type="checkbox"/> General Partnership	
		<input type="checkbox"/> Limited Partnership	
		<input type="checkbox"/> Sole Proprietorship- D.B.A	
		<input type="checkbox"/> State Government	
		<input type="checkbox"/> Other: _____	
9. Customer Legal Name (If an individual, print last name first: ex: Doe, John)			End Date:
10. Mailing Address:			
City			
State			
ZIP			
ZIP + 4			
11. Country Mailing Information (if outside USA)		12. E-Mail Address (if applicable)	
13. Telephone Number		14. Extension or Code	
() -		() -	
16. Federal Tax ID (9 digits)		17. TX State Franchise Tax ID (11 digits)	
18. DUNS Number (if applicable)		19. TX SOS Filing Number (if applicable)	
20. Number of Employees			21. Independently Owned and Operated?
<input type="checkbox"/> 0-20 <input type="checkbox"/> 21-100 <input type="checkbox"/> 101-250 <input type="checkbox"/> 251-500 <input type="checkbox"/> 501 and higher			<input type="checkbox"/> Yes <input type="checkbox"/> No

SECTION III: Regulated Entity Information

22. General Regulated Entity Information (If 'New Regulated Entity' is selected below this form should be accompanied by a permit application)			
<input type="checkbox"/> New Regulated Entity		<input type="checkbox"/> Update to Regulated Entity Name	
<input type="checkbox"/> Update to Regulated Entity Information		<input checked="" type="checkbox"/> No Change** (See below)	
**If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.			
23. Regulated Entity Name (name of the site where the regulated action is taking place)			

24. Street Address of the Regulated Entity: (No P.O. Boxes)							
	City		State		ZIP		ZIP + 4
25. Mailing Address:							
	City		State		ZIP		ZIP + 4
26. E-Mail Address:							
27. Telephone Number	28. Extension or Code		29. Fax Number (if applicable)				
() -			() -				
30. Primary SIC Code (4 digits)	31. Secondary SIC Code (4 digits)	32. Primary NAICS Code (5 or 6 digits)		33. Secondary NAICS Code (5 or 6 digits)			
34. What is the Primary Business of this entity? (Please do not repeat the SIC or NAICS description.)							

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:					
36. Nearest City	County		State	Nearest ZIP Code	
37. Latitude (N) In Decimal:	38. Longitude (W) In Decimal:				
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

<input type="checkbox"/> Dam Safety	<input type="checkbox"/> Districts	<input type="checkbox"/> Edwards Aquifer	<input type="checkbox"/> Industrial Hazardous Waste	<input type="checkbox"/> Municipal Solid Waste
<input type="checkbox"/> New Source Review – Air	<input type="checkbox"/> OSSF	<input type="checkbox"/> Petroleum Storage Tank	<input type="checkbox"/> PWS	<input type="checkbox"/> Sludge
<input type="checkbox"/> Stormwater	<input checked="" type="checkbox"/> Title V – Air	<input type="checkbox"/> Tires	<input type="checkbox"/> Used Oil	<input type="checkbox"/> Utilities
	2865			
<input type="checkbox"/> Voluntary Cleanup	<input type="checkbox"/> Waste Water	<input type="checkbox"/> Wastewater Agriculture	<input type="checkbox"/> Water Rights	<input type="checkbox"/> Other:

SECTION IV: Preparer Information

40. Name:	Lilia Lenhart	41. Title:	Solid Waste Program Manager
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(915) 568-5724		(915) 568-1333	lilia.a.lenhart.civ@mail.mil

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form instructions for more information on who should sign this form.)

Company:	U.S. Army Fort Bliss	Job Title:	Director of Public Works
Name (In Print):	Alfredo J. Riera, P.E.	Phone:	(915) 568-6200
Signature:		Date:	7/10/14



U.S. Army Corps of Engineers, Fort Worth District

819 Taylor Street, Fort Worth, TX 76102

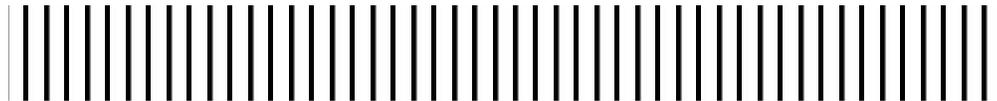
Permit Modification Application Fort Bliss Municipal Solid Waste Landfill Permit 1422

July 31, 2014

Previous Modifications:

March 2008 Application (issued March 11, 2009)

October 2011 Application (issued July 5, 2012)



Infrastructure · Water · Environment · Buildings

Prepared By:

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04675026.0000

ARCADIS U.S., Inc.
TX Engineering License # F-533

Engineering Certification

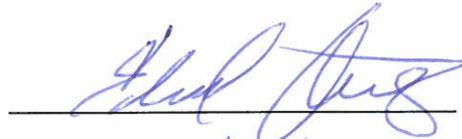
I attest that this Application has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Chapter §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Application.

Certifying Engineer: Eduardo Quiroz, P.E.

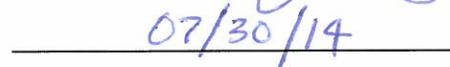
State: Texas

Registration Number: 85559

Signature:



Certification Date:



Engineering Seal:



TCEQ Core Data Form

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- G. Airport Notifications
- H. Evaluation of Location Restrictions
- I. Slope Stability & Settlement Analysis
- J. Stormwater Certification
- K. Government Review Requests
- L. Facility Surface Water Draining Report
- M. Soil and Liner Quality Control Plan
- N. 1993 Geotechnical Investigation
- O. Closure Plan
- P. Post-Closure Care Plan
- Q. Evapotranspiration Cover Design Report
- R. Post-Closure Use Report

Acronym List

ADC	Alternate Daily Cover
BRAC	Base Realignment and Closure
C&D	Construction and Demolition
DPW-ED	Directorate of Public Works – Environmental Division
EAD	Echelons Above Decision
FAA	Federal Aviation Administration
MPH	Miles Per Hour
msl	mean sea level
MSW	Municipal Solid Waste
MSWLF	Municipal Solid Waste Landfill Facility
RACM	Regulated Asbestos Containing Material
SOP	Site Operating Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPDES	Texas Pollutant Discharge Elimination System
USAFB	United States Army Fort Bliss
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Executive Summary

Background and Description of Proposed Change

The Fort Bliss Municipal Solid Waste Landfill is an approximately 106 acre facility consisting of several cells as follows:

- § An active 10.5-acre Subtitle D Type I Cell;
- § A closed 3-acre Non-Subtitle D Type I Cell (Texas Commission on Environmental Quality (TCEQ) closure approval received February 24, 1999);
- § An active 5-acre Non-Subtitle D Type IV Construction and Demolition (C&D) Cell;
- § Approximately 80 acres of 1970's era previously filled with interim cover placed; and Approximately 7 acres designated for landfill roads, access areas, and guard shack/scale house, etc.

This permit modification application is intended to seek approval for an optimized evapotranspiration (ET) final cover system for the final closure construction of the facility.

Optimized ET Final Cover Design

Both the active Subtitle D Type I cell and the active Non-Subtitle D Type IV C&D cell are nearing capacity and are scheduled to cease accepting waste in 2015. In addition, the facility permit does not allow further placement of waste within the 1970's era inactive areas. According to the March 1995 Final Closure Plan and Cost Estimate, interim cover has been placed over these 80 acres. An optimized ET final cover will be placed over the active landfill cells and the inactive 1970's era areas.

The Non-Subtitle D Type I (Cell 2) was closed in 1999 with a non-Subtitle D final cover that complied with the closure plan for that cell and for which TCEQ closure approval was obtained in 1999. As a result, this cell is not proposed to be capped with the optimized ET cover system.

Fort Bliss is considering post-closure land use for solar power, and seeks to adjust permitted grades to maximize southern and western exposure. Fort Bliss is seeking a permit modification to provide an optimized ET final cover system to replace the final cover systems for those parts of the landfill that have not already received a permitted final cover (i.e., all landfill cells except the non-subtitle D cell (Cell 2) that was capped/closed in 1999).

The proposed optimized ET Final Cover System will consist of a 3-foot optimized soil layer overlying the waste. The intent is to utilize on-site silty sand (SM) and clayey sand (SC) soil for the optimized cover. These soils will be capable of storing moisture, which will then be removed by evaporation and transpiration from the vegetation growing on the cover. A minimum of ten percent coverage of vegetation will be established upon completion of the optimized cover construction.

The TCEQ Municipal Solid Waste (MSW) Permitting Program uses a 25-inch average annual precipitation line as defined by Title 30 of the Texas Administrative Code (TAC) Rule §330.5(b)(1)(D)) to delineate areas of the State defined as arid. El Paso lies to the west of the 25-inch average annual precipitation line and therefore has been deemed arid for the purposes of considering an optimized landfill design and modeling without calibration.

The optimized ET landfill cover final grading plan also alters the final grades presented in the currently permitted ET cover system (October 2011 MOD) to allow the final grades to generally conform to the grades developed during filling operations to provide more easily constructible ridges, swales, and slopes and a more uniform surface for installation and maintenance of the ET cap. In addition, the grading minimizes the relocation of waste and also provides slopes that maximize the southern and western orientation for the potential future Photo-Voltaic (PV) development on the final cover system. The permit modification also proposes to extend the landfill buffer along the northern side, eastern end of the landfill to address the existing waste limit in Cell 4 that has encroached on the permitted boundary. Rather than relocate the waste, since Fort Bliss owns the surrounding lands, the cap has been extended in this area and a new 50 foot buffer to the limit of waste will be established as part of the closure activities.

The final grading and drainage plan remains consistent with the previously approved MODs. Final drainage patterns at the landfill will consist mostly of overland flow paths and shallow concentrated flow leading off the optimized ET cover landfill side slopes. Swales provide flow paths for internal watersheds to the existing landfill perimeter swales. Surface water runoff flows off the landfill into the existing shallow perimeter drainage swales that discharge to the natural flow patterns of the surrounding area, generally towards the southwest and southeast corners of the landfill.

Conventional landfill covers typically include a gas collection layer and passive gas vents to relieve landfill gas pressures on the overlying impermeable geomembrane and minimize slope stability concerns. Gas monitoring wells that monitor the potential for landfill gas migration were installed at the site in 1998, and these existing gas monitoring wells are being preserved as part of the closure design, with some modifications. The permit drawings identify gas monitoring wells that need to be extended as well as gas monitoring wells that will be abandoned and then re-installed because they conflict with

proposed drainage features. However, because the optimized ET landfill cover will only consist of course-grained permeable soil; no additional passive gas venting system is proposed as part of the final ET landfill cover design. Rather, the optimized ET cover soil will naturally and effectively vent landfill gas, similar to the existing conditions and the daily/intermediate cover soil at the site. Additionally, the microbes in the optimized ET cover soil will oxidize some of the methane as it vents, creating more environmentally friendly emissions. Based on the operational and regulatory history of the landfill (83 acres of 1970's era waste), significant future landfill gas generation is not expected. Should excessive methane concentrations be detected in the existing perimeter landfill gas monitoring wells or ambient landfill air during routine landfill gas monitoring, corrective venting and reporting procedures are outlined in the Fort Bliss Guidance Document titled Procedures Following a Methane Exceedance.

Purpose of Change and Provision Under Which Modification is Sought

The purpose of the proposed optimized ET Final Cover System is to provide a more cost effective closure that offers equivalent environmental protections as those provided by the closure design previously approved. Accordingly, per Title 30 TAC §305.70(k)(10), the purpose of this permit modification application is to request approval of an optimized ET Final Cover System as an alternative final cover system for closure of the Fort Bliss Landfill.

Permit Modification Application Organization and Structure

In accordance with Title 30 TAC §305.70(e), this permit modification application consists of a TCEQ Core Data form and a new TCEQ Part I form, a description of the proposed permit changes, revisions to existing applicable permit documents (including strikeout and clean copies), and an updated landowners map and landowners list as required under Title 30 TAC §330.59(c)(3). We have included a matrix of changes to the permit package to assist in the application review process, following the Part I form.

This application is organized to follow the layout of the 2008 permit application. Changes to elements of the 2008 permit application are identified as tracked changes and/or complete section revisions as applicable.

Appendix Q provides the equivalent optimized ET cover design.

Appendix R provides details of the potential future use (PV Development) and revised Closure and Post Closure Care Plan that incorporate the PV Development, as required under Title 30 TAC §330 Subchapter T.

Post Closure Potential Future Use

The potential future land use after closure is described in detail in the new Appendix R Post-Closure Use Report. As previously noted, the potential post-closure future use of the area over the landfill is PV development. Fort Bliss has a Net Zero goal and is actively developing alternative energy systems to offset the current utility based energy usage. The closed landfill cover system is being permitted for the potential development of non-penetrating, self-ballasting PV panels on the landfill cover and supporting systems located at the adjacent area beyond the landfill boundary. The beneficial use of the landfill cover to support the PV development is considered desirable as it puts the landfill footprint to productive use and it does not consume currently undeveloped land that may be put to other use.

It is anticipated that the PV development will occur in phases, as funding and incentive programs provide the financial resources for PV development. The Post-Closure Use Report provides the current assumptions and approach to the PV development, to obtain TCEQ approval of the future-use concept on the closed landfill areas.

1. Part I of the Application

1.1. Part I Permit Application

A Part I permit application form for the proposed optimized Evapo-Transpiration (ET) alternative landfill closure design at the Fort Bliss Municipal Solid Waste Landfill (MSWLF) follows this page.



Facility Name: Fort Bliss Municipal Solid Waste Landfill
Permittee/Registrant Name: U.S. Army Air Defense Artillery and Fort Bliss
(USAADACENFB)
MSW Authorization #: 1422
Initial Submittal Date:
Revision Date:



Texas Commission on Environmental Quality

Permit/Registration Modification and Temporary Authorization Application Form for an MSW Facility

1. Reason for Submittal

- Initial Submittal Notice of Deficiency (NOD) Response

2. Authorization Type

- Permit Registration

3. Application Type

- Modification with Public Notice Modification without Public Notice
 Temporary Authorization (TA) Modification for Name Change/Transfer

4. Application Fees

- Pay by Check Online Payment

If paid online, e-Pay Confirmation Number: **582EA000171596**

5. Application URL

Is the application submitted for a permit/registration modification with public notice?

- Yes No

If the answer is "Yes", enter the URL address of a publicly accessible internet web site where the application and all revisions to that application will be posted in the space provided: <http://www.bliss.army.mil/DPW/Environmental/EISDocuments2.html>

6. Confidential Documents

Does the application contain confidential documents?

- Yes No

If "Yes", cross-reference the confidential documents throughout the application and submit as a separate attachment in a binder clearly marked "CONFIDENTIAL."

7. General Facility Information

Facility Name: **Fort Bliss Municipal Solid Waste Landfill**
MSW Authorization No.: **1422**
Regulated Entity Reference No.: **RN100210095**
Physical or Street Address (if available): **Section 6, Township 2, Block 80**
City: **Fort Bliss** County: **El Paso** State: **TX** Zip Code: **79916-0058**
(Area code) Telephone Number: **915-568-5919**
Latitude: **N 31 deg 52.70'** Longitude: **W 106 deg 22.60'**

8. Facility Type(s)

<input checked="" type="checkbox"/> Type I	<input checked="" type="checkbox"/> Type IV	<input type="checkbox"/> Type V
<input type="checkbox"/> Type I AE	<input type="checkbox"/> Type IV AE	<input type="checkbox"/> Type VI

9. Description of the Revisions to the Facility

Provide a brief description of all revisions to the permit/registration conditions and supporting documents referred by the permit/registration, and a reference to the specific provisions under which the modification/temporary authorization application is being made. Also, provide an explanation of why the modification/temporary authorization is requested: **A permit modification is being requested for approval of a monolithic evapotranspiration (ET) Final Cover System as an alternative final cover for closure of the Fort Bliss Landfill, under Title 30 TAC §305.70(k)(10).**

Revisions are being made to the permit conditions and supporting documents presented in Table 1-1.

This section is intentionally left blank; please continue to the next page.

10. Facility Contact Information

Site Operator (Permittee/Registrant) Name: U.S. Army Fort Bliss

Customer Reference No. (if issued)*: **CN600126262**

Mailing Address: **1733 Pleasonton Road, Building 677**

City: **Fort Bliss** County: **El Paso** State: **TX** Zip Code: **79916**

(Area Code) Telephone Number: **915-568-6200**

Email Address: **alfredo.j.riera.civ@mail.mil**

TX Secretary of State (SOS) Filing Number:

*If the Site Operator (Permittee/Registrant) does not have this number, complete a TCEQ Core Data Form (TCEQ-10400) and submit it with this application. List the Site Operator (Permittee/Registrant) as the Customer.

Operator Name¹: Same as Site Operator (Permittee/Registrant)

Customer Reference No. (if issued)*:

Mailing Address:

City: County: State: Zip Code:

(Area Code) Telephone Number:

Email Address:

Charter Number: **N/A**

¹If the Operator is the same as Site Operator/Permittee type "Same as "Site Operator (Permittee/Registrant)".

*If the Operator does not have this number, complete a TCEQ Core Data Form (TCEQ-10400) and submit it with this application. List the Operator as the customer.

Consultant Name (if applicable): ARCADIS

Texas Board of Professional Engineers Firm Registration Number:

Mailing Address: **2929 Briarpark Dr., Suite 300**

City: **Houston** County: **Harris** State: **Texas** Zip Code: **77042**

(Area Code) Telephone Number: **713.953.4814**

E-Mail Address: **Edward.Quiroz@Arcadis-us.com**

Agent in Service Name (required only for out-of-state): N/A

Mailing Address:

City: County: State: Zip Code:

(Area Code) Telephone Number:

E-Mail Address:

11. Ownership Status of the Facility

Is this a modification that changes the legal description, the property owner, or the Site Operator (Permittee/Registrant)?

Yes No

If the answer is "No", skip this section.

Does the Site Operator (Permittee/Registrant) own all the facility units and all the facility property?

Yes No

If "No", provide the information requested below for any additional ownership.

Owner Name:

Street or P.O. Box:

City: County: State: Zip Code:

(Area Code) Telephone Number:

Email Address (optional):

Charter Number:

Signature Page

I, Alfredo Riera, _____ Director of Public Works,
(Site Operator (Permittee/Registrant)'s Authorized Signatory) (Title)

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: [Handwritten Signature]

Date: 7/28/14

TO BE COMPLETED BY THE OPERATOR IF THE APPLICATION IS SIGNED BY AN AUTHORIZED REPRESENTATIVE FOR THE OPERATOR

I, Alfredo J. Riera, hereby designate Alfredo S. Riera
(Print or Type Operator Name) (Print or Type Representative Name)

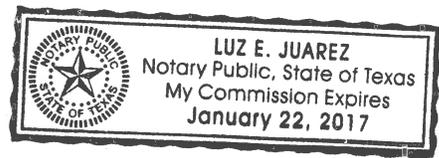
as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

Alfredo J. Riera
Printed or Typed Name of Operator or Principal Executive Officer

[Handwritten Signature]
Signature

SUBSCRIBED AND SWORN to before me by the said Alfredo J. Riera
On this 28 day of July, 2014
My commission expires on the 22 day of JAN, 2017

Luiz Juarez
Notary Public in and for El Paso
El Paso County, Texas
(Note: Application Must Bear Signature & Seal of Notary Public)



Facility Name: Fort Bliss Municipal Solid Waste Landfill
MSW Authorization #: 1422

Initial Submittal Date:
Revision Date:

Permit/Registration Modification with Public Notice

(See Instructions for P.E. seal requirements.)

Required Attachments

Attachment No.

Land Ownership Map	1
Land Ownership List	2
Marked (Redline/Strikeout) Pages	3
Unmarked Revised Pages	4

Additional Attachments as Applicable- Select all those apply and add as necessary

- Signatory Authority
- Fee Payment Receipt
- Confidential Documents

Facility Name: Fort Bliss Municipal Solid Waste Landfill
MSW Authorization #: 1422

Initial Submittal Date:
Revision Date:

Permit/Registration Modification without Public Notice or TA

(See Instructions for P.E. seal requirements.)

Required Attachments (for Modifications only)

Attachment No.

Marked (Redline/Strikeout) Pages

Unmarked Revised Pages

Additional Attachments as Applicable- Select all those apply and add as necessary

- Signatory Authority
- Fee Payment Receipt
- Confidential Documents

Permit/Registration Name Change/Transfer Modification

(See Instructions for P.E. seal requirements.)

Required Attachments

Attachment No.

TCEQ Core Data Form(s)

Property Legal Description

Property Metes and Bounds Description

Metes and Bounds Drawings

On-Site Easements Drawing

Land Ownership List

Land Ownership Map

Property Owner Affidavit

Verification of Legal Status

Evidence of Competency

Additional Attachments as Applicable- Select all those apply and add as necessary

- Signatory Authority
- Fee Payment Receipt
- Confidential Documents
- Final Plat Record of Property, if platted
- Assumed Name Certificate

Table 1-1

Fort Bliss Municipal Solid Waste Landfill – Permit 1422

Matrix of Changes from the March 2008 Permit Application as Updated by the 2012 Permit Modification

Changes are noted below – No changes were made to permit documents not listed

Referenced Section	Section Description	Description of Change	Action to be Taken
	Permit Modification Application Text	Redline changes as noted below	Replace text and retain existing tables, figures and appendices unless otherwise noted
NA	TCEQ Core Data Form	This data has been updated to reflect this current permit modification application	Replace in its entirety – New Core Data Form has been provided
NA	Executive Summary	The executive summary has been updated to reflect the current permit modification application	Replace in its entirety – Executive summary has been revised for this permit modification application
1.1	Part I Permit Application	The TCEQ Part 1 form has been revised to reflect the current permit modification application. Minor edits to introduction text.	Replace in its entirety – New Part 1 Form has been provided.
2.1	Existing Conditions Summary	Minor edits	Redline changes noted in text
2.2.1.3	Landfill: Maximum Annual Acceptance Rate	Text revisions	Redline changes noted in text
2.2.2	Qualifications for Registration	Minor edits	Redline changes noted in text
2.3.4	Schools, Licensed Day-cares, Churches, Residential/Commercial/Recreational areas	Edits	Redline changes noted in text
2.4.1	Outline of Units	Minor edits	Redline changes noted in text
2.4.3	Monitoring Wells	Minor edits	Redline changes noted in text
2.4.5	Proposed Construction Sequence	Edit referenced drawing numbers	Redline changes noted in text
2.4.9.1	Sectors	Edit referenced drawing numbers	Redline changes noted in text
2.4.9.3	Dimensions of Cells or Trenches	Revisions made to reference Limit of Waste Investigation (LOWI)	Redline changes noted in text
2.4.9.4	Maximum Waste Elevations and Final Cover	Edit referenced drawing numbers	Redline changes noted in text

Referenced Section	Section Description	Description of Change	Action to be Taken
2.8.4	Proximity of Residences and Other Uses	Updated to reflect current conditions	Redline changes noted in text
2.16	Council of Governments and Local Government Review Request	Updated with current contact information	Redline changes noted in text
Table 2-1	Public Areas within One Mile	Table has been updated	Replace in its entirety
3.4	Waste Management Unit Design	Minor edits	Redline changes noted in text
3.4.4.4	Calculations of Estimated Solid Waste Deposition and Operating Life	Updated to recent airspace data	Redline changes noted in text
Appendix B	Landfill Modification and Closure Design Drawings	Replacement of previous permit application drawings detailing proposed monolithic ET cover system	Replace appendix in its entirety
Appendix I	Slope Stability & Settlement Analysis	Replacement of previous appendices in its entirety as analysis performed by ARCADIS	Replace appendix in its entirety
Appendix L	Facility Surface Water Draining Report	Replacement of previous appendices in its entirety as analysis was revised based on revised grading plan and as prepared by ARCADIS	Replace appendix in its entirety
Appendix O	Closure Plan	Edits to incorporate new monolithic ET cover system	Redline changes noted in text
Appendix P	Post-Closure Plan	Edits to incorporate new monolithic ET cover system	Redline changes noted in text
Appendix Q	Evapotranspiration Cover Design Report	Replacement of previous appendices in its entirety as analysis for monolithic cover was performed by Weaver Boos	Replace appendix in its entirety
Appendix R	Post-Closure Use Report	New document to present potential future use of landfill area	Added as new appendix

Part I Attachment

1/4 Mile Landownership Information





Proposed Permit Limit Extended to Maintain Waste Setback



Legend

- ▭ Properties within 1/4 Mile of Landfill Boundary
- ▭ El Paso County Parcels
- ▭ 1/4 Mile Radius of Revised Landfill Boundary
- ▭ Existing Fort Bliss Landfill Boundary
- ▭ Proposed Permit Limit Extended to Maintain Waste Setback

Permit Modification Application
Fort Bliss Municipal Solid Waste
Landfill Permit 1422

**FORT BLISS MUNICIPAL SOLID
WASTE LANDFILL - PROPERTIES WITHIN
1/4 MILE OF LANDFILL BOUNDARY**

ARCADIS

FIGURE

Document Path: U:\projects\FortBliss\ArcMap\FortBliss_Adjacent_Landowners.mxd User Name: jarr1 Date Saved: 7/23/2014 10:10:17 AM

Landowners Cross-Referenced to Landowners Map

Map ID	Parcel Size (acres)	Owner Name	Address	City	State
1	60.0000	JANUS ASSOCIATES & I	515 MADISON AVE RM 3304	NEW YORK	NY
2	3.6089	APODACA RICHARD C	4833 VILLA ENCANTO	EL PASO	TX
3	1.6378	PULLEY PROPERTIES LP	5124 ANCHORAGE AVE	EL PASO	TX
4	2.0000	GUTIERREZ RICARDO	5438 GATEWAY BLVD E	EL PASO	TX
5	0.1150	CITY OF EL PASO	300 N CAMPBELL	EL PASO	TX
6	9.4907	RAILROAD WAREHOUSING LLC	3880 DONIPHAN DR	EL PASO	TX
7	0.0853	RAILROAD WAREHOUSING LLC	3880 DONIPHAN DR	EL PASO	TX
8	3.8266	PEDRO A & LINDA FERNANDEZ REVOCABLE TRUST	3838 BOGAS AVE NE	ALBUQUERQUE	NM
9	5.8994	SL BA INDUSTRIAL LLC	9606 N MOPAC EXPY STE 880	AUSTIN	TX
10	0.2295	PAGE DAVID R & LOIDA R	9548 BLUE WING DR	EL PASO	TX
11	0.2163	DICK CAMERON L & QUINTANA SANDRA	9544 BLUE WING DR	EL PASO	TX
12	0.1730	SPARKS KIM S	9540 BLUE WING DR	EL PASO	TX
13	0.1505	BOSSIE KENNETH L	9536 BLUE WING DR	EL PASO	TX
14	0.1446	PALOMARES JAVIER & FE DE LA CRUZ	9532 BLUE WING DR	EL PASO	TX
15	0.1446	SOLORIO SILPA & JAIME A	9528 BLUE WING DR	EL PASO	TX
16	0.1446	HUNTLEY KATHY L	9524 BLUE WING DR	EL PASO	TX
17	0.1446	BRADLEY JOSEPHINE M	9520 BLUE WING DR	EL PASO	TX
18	0.1446	ROSALES MARIA D C	9516 BLUE WING DR	EL PASO	TX
19	1.4058	LUGO GUSTAVO E F & CHIBLI GUSTAVO F	5939 FALCON AVE	EL PASO	TX
20	0.1446	PUENTE DAVID T	11264 SIGNAL RIDGE DR	EL PASO	TX
21	0.1446	LAING JESSICA A	9508 BLUE WING DR	EL PASO	TX
22	0.1446	PARRA JOSUE & BLANCA	9504 BLUE WING DR	EL PASO	TX
23	0.1808	BODEY AMELIA L	9500 BLUE WING DR	EL PASO	TX
24	0.1423	CASTILLO RICARDO A & MARTHA E	5932 FALCON AVE	EL PASO	TX
25	0.1400	ARIZPE OSCAR & DORA	5936 FALCON AVE	EL PASO	TX
26	0.2385	TORRES EUNICE	5861 BOBWHITE AVE	EL PASO	TX
27	1.3480	DELTA UNLIMITED INC	5869 WAYCROSS AVE	EL PASO	TX
28	0.7610	NEW BEGINNING MISSIONARY	9491 RAILROAD DR	EL PASO	TX
29	0.0000	CITY OF EL PASO	300 N CAMPBELL	EL PASO	TX
30	0.4530	DELTA UNLIMITED INC	5869 WAYCROSS AVE	EL PASO	TX
35	2.6330	EAGLE LEASING INC	PO BOX 397	MIDLAND CITY	AL
31	1.6626	CHIBLI GUSTAVO F & I	5924 FALCON AVE	EL PASO	TX
32	2.0700	NEVAREZ ALFONSO	10825 TOM KITE CT	EL PASO	TX
33	2.6774	SL BA INDUSTRIAL LLC	9606 N MOPAC EXPY STE 880	AUSTIN	TX
34	8.8838	SL BA INDUSTRIAL LLC	9606 N MOPAC EXPY STE 880	AUSTIN	TX
36	2.7439	ZIMET M J (ET AL)	9700 RAILROAD DR	EL PASO	TX
37	2.4720	CITY OF EL PASO	300 N CAMPBELL	EL PASO	TX
38	1.6392	CALVILLO LAW FIRM PLLC	6316 N 10TH ST BLDG B STE 200	MC ALLEN	TX

2. Part II of the Application

2.1. Existing Conditions Summary

§330.61(a)

The Fort Bliss military installation is located within the extraterritorial jurisdiction of the City of El Paso and extends into unincorporated portions of El Paso County, Texas, and the counties of Dona Ana and Otero in New Mexico. Currently the primary missions of the installation are: home of 1st Army Division, senior noncommissioned officers training, administrative and logistical support of tenant activities, and provision of training facilities for reserve components.

The MSWLF is located northwest of Biggs Army Airfield and 300 feet east of the Southern Pacific Railroad tracks in El Paso County, Texas. The MSWLF is about 1,200 feet east of the nearest occupied structure. Occupied structures include commercial and residential areas located on the west side of the MSWLF. An all-weather road is accessible to the MSWLF year round. A 10-foot-high chain link fence with barbed wire outriggers surrounds the entire perimeter of the MSWLF. A 6-foot 4-inch by 12-foot 4-inch by 10-foot-high enclosed guard shack/scale house is located on the MSWLF near the entrance. No buried utilities are within the perimeter of the MSWLF.

The Fort Bliss MSWLF includes active Subtitle D Type I and Type IV landfill cells that are currently in use to serve the United States Army Fort Bliss (USAFB). The landfill has been managed and operated by private contractors since January 1974. The landfill area comprises five distinct areas:

- § 1970's-era inactive cells that cover 80-acres and are unlined and without leachate collection. The permit does not allow further placement of MSW in these cells. According to the March 1995 Final Closure Plan and Cost Estimate, these 80 acres are considered interim closed.
- § A 3-acre Type 1 cell with final cover in place (non-Subtitle D) that complies with the 1995 closure plan and TCEQ closure requirements. TCEQ approval was received February 24, 1999.
- § A 10.5-acre Type 1 active cell meeting Subtitle D requirements (Subtitle D cell). This cell is lined and has a leachate collection system. A 5-acre active Type IV construction and demolition (C&D) debris cell. This cell is unlined and without leachate collection.
- § Approximately 7 acres designated for landfill roads, access areas, guard shack/scale house, etc.

This modification is for consideration of a 3-foot thick optimized Evapo-Transpiration (ET) alternative final landfill cover design, a revised landfill closure design, and the corresponding modifications to the landfill Closure Plan. Existing conditions are not significantly affected by these changes, as demonstrated in the remaining sections of this application. Fort Bliss does not have any site-specific conditions that require special design consideration or possible mitigation of conditions identified in 30 TAC §330.61(h)-(o).

2.2. Waste Acceptance Plan

2.2.1. Sources and Characteristics of Wastes

2.2.1.1. Description of general sources and generation areas

§330.61(b)(1)(A)

The MSWLF serves the military operations within the USAFB. Permitted types of solid wastes disposed of at the MSWLF are non-hazardous solid wastes from military operations, bulky items, grass and tree trimmings, refuse from litter cans, construction debris, classified waste (dry), dead animals, Regulated Asbestos Containing Material (RACM), and empty oil cans (1-quart and 5-gallon sizes). The MSWLF does not receive hazardous waste nor does it recover incoming waste.

2.2.1.2. Transfer Stations

§330.61(b)(1)(B)

This section is not applicable; the Fort Bliss MSWLF does not contain a transfer station.

2.2.1.3. Landfill: Maximum Annual Acceptance Rate

§330.61(b)(1)(C)

Based on the approved 1995 final landfill contours, the total permitted waste capacity of the Fort Bliss MSWLF is 5.9 million cubic yards. As of 2008, the current volume of in-place waste was about 5.1 million cubic yards. The 2008 permit modification for the 10-foot height increase in the Subtitle-D cell added an additional 180,000 cubic yards of landfill capacity. The optimized ET landfill cover final grading plan does not significantly alter the final grades presented in the 2008 permit modification; rather, the optimized ET landfill cover final grading plan generally conforms to the grades developed during filling operations (based on the 2010 topographic survey) to provide more easily constructible ridges, swales, and slopes. The grading has been further optimized to reduce the extent of waste relocation and to utilize existing soils covering the waste as part of the optimized cover system. The grades also optimize the southern and western orientation of the south and west facing landfill slopes to support potential future Photo-Voltaic (PV) development over the closed landfill. The potential future use for the facility is described in Appendix R.

2.2.2. Qualification for Registration

§330.61(b)(2)

The Fort Bliss MSWLF is authorized under a permit (MSW Permit No. 1422). The facility is seeking a modification requiring notice to its permit, pursuant to 30 TAC §305.70(k).

2.3. General Location Maps

2.3.1. Prevailing Wind Direction with a Wind Rose

§330.61(c)(1)

The prevailing wind direction at the MSWLF is from the north during the winter months and from the south during the summer months with an overall southeasterly prevailing wind. Dust storms and wind storms are frequent during the months of March and April. Wind speeds can occasionally reach up to 35 miles per hour (mph) during intense weather events. Figure 2-1 provides an annual wind rose map for the northern El Paso area.

El Paso experiences three prevailing wind change regimes with a dominant northerly wind flow in the cooler seasons of October through February (see Figure 2-2), a shift to west-southwest in the spring, March into early June (see Figure 2-3), and another distinct shift to prevailing southeast winds in July through mid-September (see Figure 2-4).

2.3.2. Known Water Wells

§330.61(c)(2)

Two groundwater production wells with the Texas Water Development Board well designation as “located wells” are located about 350 feet north of the MSWLF. The well location maps in the “*Geohydrologic Site Characterization of the Municipal Solid Waste Landfill Facility, U.S. Army Air Defense Artillery Center and Fort Bliss, El Paso County, Texas*” U.S. Geological Survey, Water-Resources Investigations Report 95-4217 (Abeyta, 1996, Appendix D) show the location of the two water wells within 500 feet (ft) of the permitted boundary. The first well, W-3, has been in existence for many years, while W-3A was constructed circa 1995 and is located adjacent to the older well. These wells are used as groundwater production wells and are owned by the U.S. Army. The geohydrologic report also provides the location and description of both groundwater wells. Well W-3 is 826 feet deep, and well W-3A is 940 feet deep. The regional topographic gradient of the groundwater flow in the area is generally to the south and southwest towards the Rio Grande River. Precise groundwater flow direction at specific locations is difficult to determine due to City of El Paso and U.S. Army production well pumping and the geometric configuration of the groundwater aquifers.

2.3.3. Structures and Inhabitable Buildings

§330.61(c)(3)

A guard shack/scale house located in the southwest corner of the MSWLF at the entrance to the landfill facing west is the only inhabitable structure within 500 feet of the facility. A water tank located just west of the guard shack/scale house is the only other structure within 500 feet of this unit (see Figure 2-5)

2.3.4. Schools, Licensed Day-cares, Churches, Residential/ Commercial/ Recreational areas

§330.61(c)(4)

No hospitals, cemeteries, ponds or lakes exist within one mile of the facility. The General Location Map (Figure 2-6), provides locations of the schools, licensed day-care facilities, churches, and residential, commercial, and recreational areas within one mile of the MSWLF. A list of public areas located within the one mile radius is provided in Table 2-1. The list of schools, churches, day care facilities, residential, commercial, and recreational areas are current as of June 2014 as provided determined by a Global Information System (GIS) search of tax parcel records

2.3.5. Roads Within One mile

§330.61(c)(5)

Roads within a one mile radius used for accessing the facility are shown on Figure 2-7. The access road to the landfill entrance is asphalt concrete. The internal access roads to the active fill areas are caliche-based roads. Roads used by the Fort Bliss MSWLF for entering or leaving the facility are located on, owned by and operated by the Fort Bliss military installation. The unlabeled roads are known as “tank trails” and are not named.

2.3.6. Latitude and Longitude

§330.61(c)(6)

The coordinates of the Fort Bliss MSWLF are as follows:

Latitude: N 31° 52' 42"
Longitude: W 106° 22' 36"
Elevation: 3930 feet above mean sea level (msl)

2.3.7. Area Streams

§330.61(c)(7)

No perennial or ephemeral streams are on or in the vicinity of the Fort Bliss MSWLF.

Surface water flow occurs perennially in the Rio Grande River with occasional additional stream flows into the Rio Grande about two miles from the MSWLF during periods of intense precipitation. Surface outflow is negligible due to absence of surface streams.

2.3.8. Airports

§330.61(c)(8)

Airports located within 6 miles of the MSWLF are:

- § Biggs Army Airfield, 11210 CSM. E. Slewitzke Drive, Fort Bliss, TX 79916 (2.2 miles)
- § El Paso International Airport, 6701 Convair Rd, El Paso, TX 79925 (5.06 miles)

2.3.9. Property Boundary

§330.61(c)(9)

The Fort Bliss MSWLF property boundaries are outlined in red on Figure 2-5. The property boundaries defined in the legal description of the original permit application can be provided upon request.

As further shown in Appendix B, Permit Drawings, the limit of waste in Cell 3 and Cell 4 are within 50 feet of the permitted boundary. Rather than relocate waste as part of the final closure construction, the final cover will be extended over these areas. Since Fort Bliss owns the lands surrounding the landfill, the permit boundary will be modified to maintain the 50 foot buffer between the boundary and the limit of waste. Upon approval of the permit application, the new permit boundary will be established and as part of the final closure construction, the perimeter fence will be relocated to the new permit boundary limit.

2.3.10. Drainage, Pipeline, Utility Easements

§330.61(c)(10)

No drainage or pipelines are located within the MSWLF (See Figure 2-5). Three green bollards are location in the Northwest corner of the MSWLF (See Figure 2-5) indicating the location of the electric utility easement on the property. Utility easement holders are as follows:

El Paso Electric	El Paso Water Utilities
P.O. Box 982	P.O. Box 511
El Paso, TX 79960	El Paso, TX 79961-001

Texas Gas Service
7117 Florida Blvd
Baton Rouge, LA 70806

Union Pacific Railroad Company
1400 Douglas Street- Stop 1690
Omaha, NE 68179-1690

2.3.11. Facility Access Control Factors

§330.61(c)(11)

General public access is restricted since the landfill is on a military installation. Access to the actual landfill is also restricted through use of fencing, gates, and the guard shack. Only authorized vehicles have access beyond the guard shack or facility entrance. Authorized vehicles consist of:

- § Any government-owned commercial or military vehicle
- § Any government contractor whose truck is sent to the disposal area with disposal material and who has a valid landfill permit
- § Contractor's vehicle used to collect solid waste from Fort Bliss, not including family housing, is also an authorized vehicle

Government vehicles must have government license plates. Signage provides direction to customers to the entrance to the landfill.

The Site Operating Plan (Appendix A, March 2008) describes the perimeter fencing, vehicle access procedures, and vehicle transport within the MSWLF. The perimeter fencing, guard shack, and vehicle access roads are shown on Figure 2-5.

2.3.12. Archaeological Sites, Historical Sites, Sites with Exceptional Aesthetic Qualities

§330.61(c)(12)

No archaeological sites, historical sites, or sites with exceptional aesthetic qualities are located adjacent to the MSWLF. The request for the Texas Historical Commission review letter is provided in Appendix E. Please note that the Fort Bliss MSWLF is a fully developed, permitted, operational site.

2.4. Facility Layout Maps

2.4.1. Outline of Units

§330.61(d)(1)

The Fort Bliss MSWLF includes active Subtitle D Type I and Type IV landfill cells and is currently in use to serve the USAFB. The landfill has been managed and operated by private contractors since January 1974. The landfill area is comprised of five distinct areas:

- § 1970's-era inactive cells that cover 80-acres and are unlined and without leachate collection. The permit does not allow further placement of MSW in these cells. According to the March 1995 Final Closure Plan and Cost Estimate, these 80 acres are considered closed.
- § A 3-acre Type 1 cell with final cover in place (non-Subtitle D) that complies with the 1995 closure plan and TCEQ closure requirements. TCEQ approval was received February 24, 1999.
- § A 10.5-acre Type 1 active cell meeting Subtitle D requirements (Subtitle D). This cell is lined and has a leachate collection system. This cell is nearing permitted capacity.
- § A 5-acre active Type IV C&D debris cell. This cell is unlined and without leachate collection.
- § Approximately 7 acres designated for landfill roads, access areas, guard shack/scale house, etc.

This modification is for consideration of an optimized alternative final landfill cover design, a revised landfill closure design, and the corresponding modifications to the landfill Closure Plan. Existing conditions are not significantly affected by this change, as demonstrated in the remaining sections of this application. Fort Bliss does not have any site-specific conditions that require special design consideration or possible mitigation of conditions identified in 30 TAC §330.61(h)-(o).

Landfill units are marked on Sheet C-1 of Appendix B.

2.4.2. Roadways

§330.61(d)(2)

Interior roadways are shown on Figure 2-5.

2.4.3. Monitoring Wells

§330.61(d)(3)

This section is not applicable. The TCEQ approved Fort Bliss' request for groundwater monitoring suspension on May 22, 1996 (see Appendix F). One existing monitoring well located on the west side of Cell 1 does exist and will be abandoned as part of the final cover construction activities.

2.4.4. Locations of Buildings

§330.61(d)(4)

The only inhabitable structure within 500 feet of the MSWLF is the guard shack/scale house shown on Figure 2-5. No other buildings are located within the MSWLF boundary.

2.4.5. Proposed Construction Sequence

§330.61(d)(5)

The MSWLF is already constructed. Filled and active areas are depicted on Sheet C-1 of Appendix B. The final grading plan is shown on Sheets C-2 and C-3 in Appendix B.

2.4.1. Fencing

§330.61(d)(6)

Perimeter fencing depicts the outline of the MSWLF as shown in red on Figure 2-5.

2.4.2. Wind Breaks

§330.61(d)(7)

This section is not applicable; there are no natural wind breaks located at the MSWLF nor plans for screening the facility from public view. The MSWLF is located entirely within the military installation and away from public view.

2.4.3. Entrance Roads

§330.61(d)(8)

All access roads to the MSWLF are located on the Fort Bliss military installation (See Figure 2-7), and are not public access roads. The access road to the landfill entrance is asphalt concrete and useable during wet weather conditions. The operator will maintain internal roads to promote drainage and limit ponding during wet weather conditions. Fort Bliss is located in an arid climate so that wet weather is not a major concern at the MSWLF.

2.4.4. Landfill Units

2.4.4.1. Sectors

§330.61(d)(9)(A)

The landfill area comprises five distinct areas (Refer to Sheet C-1 in Appendix B):

- § 1970's-era inactive cells that cover 80-acres and are unlined and without leachate collection. The permit does not allow further placement of MSW in these cells. According to the March 1995 Final Closure Plan and Cost Estimate, these 80 acres are considered closed.

- § A 3-acre Type 1 cell with final cover in place (non-Subtitle D) that complies with the 1995 closure plan and TCEQ closure requirements. TCEQ approval was received February 24, 1999.
- § A 10.5-acre Type 1 active cell meeting Subtitle D requirements (Subtitle D cell). This cell is lined and has a leachate collection system. This cell is nearing permitted capacity.
- § A 5-acre active Type IV construction and demolition (C&D) debris cell. This cell is unlined and without leachate collection.
- § Approximately 7 acres designated for landfill roads, access areas, guard shack/scale house, etc.

2.4.4.2. Sequence of Filling Operations

§330.61(d)(9)(B)(c)

The filling operations currently used are fill methods. The solid waste will:

- § Be placed in a single two-foot layer each day
- § Be protected with six inches of soil (daily cover)
- § Continue with a single two-foot layer throughout the cell from the edge of the previous day's activities. An additional two-foot layer will be started when the first layer is complete.

Final cover will be applied when the landfill elevation reaches the permitted elevation.

2.4.4.3. Dimensions of Cells or Trenches

§330.61(d)(9)(D)

The only requested modifications to the physical conditions of the facility are minor changes to the final grading plan of the landfill based on the alternative cover design and to provide more easily constructible ridges, swales, and slopes based on the existing landfill grades at the site. The permit modification is based on data obtained from a Limit of Waste Investigation (LOWI) that was performed as part of the feasibility analysis to evaluate and select the preferred cover method for which approval is being sought. Refer to Sheet C-1 in Appendix B for the existing limits of waste determined as part of the LOWI.

2.4.4.4. Maximum Waste Elevations and Final Cover

§330.61(d)(9)(E)

The proposed final contours for maximum waste elevations and cover are shown on Sheets C-2 and C-3 of Appendix B. The maximum waste elevations are shown on Sheet 5

of Appendix B. These contours are tied into the MSWLF contours approved by the TCEQ in 1995.

2.5. General Topographic Maps

§330.61(e)

General topographic maps of the MSWLF are provided in Appendix B. Figure 2-8 provides the United States Geological Survey (USGS) 7 ½-minute quadrangle sheet or equivalent, at a scale of one inch equal to 2000 feet.

2.6. Aerial Photograph

2.6.1. General

§330.61(f)(1)

Aerial photographs that are approximately 9 inches by 9 inches with a scale within a range of one inch equals 1,667 feet to one inch equals 3,334 feet and showing proximity to at least a one-mile radius of the MSWLF site boundaries are provided as Figures 2-9 through 2-14.

2.6.2. Growth Trends

§330.61(f)(2)

A series of aerial photographs ranging from 1967 to 2003 are used to show growth trends of the one mile area around the MSWLF as shown on Figures 2-9 to 2-14. The photographs show rapid commercial and residential building growth in areas outside the Fort Bliss military installation including the area directly west of the MSWLF.

At this time, the land nearest the MSWLF beyond the Fort Bliss boundary is fully developed. The land adjacent to the MSWLF is owned by Fort Bliss with no current plans for development.

2.6.3. Historical Aerial Photographs

n Historical Aerial Photograph for Northwest El Paso dated 1967

The MSWLF does not exist in the 1967 photograph, Figure 2-9. The site of the MSWLF consists of undeveloped land owned by Fort Bliss. Limited commercial and residential development appears in the areas to the west and north of the present day landfill boundaries.

▫ **Historical Aerial Photograph for Northwest El Paso dated 1974**

The boundaries of the MSWLF are visible as outlined in the 1974 photograph, Figure 2-10. Commercial and residential development increases are evident in the area west of the landfill.

▫ **Historical Aerial Photograph for Northwest El Paso dated 1988**

The boundaries of the landfill facility are visible as outlined in the 1984 photograph, Figure 2-11. Significant residential and commercial development occurs west of the MSWLF. To the southeast, Biggs Army Airfield is visible.

▫ **Historical Aerial Photograph for Northwest El Paso dated 1991**

The MSWLF boundaries are shown in the 1991 photograph, Figure 2-12. Residential development dominates the photograph. All surrounding areas to the west of the facility show increased population as compared to the 1984 photograph.

▫ **Historical Aerial Photograph for Northwest El Paso dated 1996**

Increased development of multiple commercial and industrial buildings opposite the roadway directly bordering the MSWLF to the west is noted in the 1996 photograph Figure 2-13. No other significant changes from the 1991 aerial photograph exist.

▫ **Historical Aerial Photograph for Northwest El Paso dated 2003 (Appendix F)**

The development of the area to the west of the landfill appears to have stabilized as indicated by the 2003 photograph, Figure 2-14. There are no significant changes visible as compared to the 1996 aerial photograph.

2.7. Land-Use Map

§330.61(g)

Figure 2-6 shows the boundary of the MSWLF and the land uses surrounding the property and actual uses within one mile of the MSWLF. The map shows the location of residences, commercial establishments, schools, licensed day-care facilities, and recreational areas within one mile of the MSWLF boundary. No churches, cemeteries, ponds or lakes are located within one mile of the MSWLF boundary. Figure 2-5 shows that pipelines are located outside of the landfill and three green bollards in the Northwest corner of the MSWLF indicate the only electric utility easement. Figure 2-5 also depicts access roads serving the MSWLF.

2.8. Impact on Surrounding Area

2.8.1. Published Zoning Map

§330.61(h)(1)

Published zoning maps are not available for the MSWLF. The MSWLF does not have a nonconforming use nor does it require a special permit from the local government having jurisdiction.

2.8.2. Character of Surrounding Land

§330.61(h)(2)

The adjacent properties to the MSWLF within one mile are undeveloped lands within the military installation. The MSWLF is about 1,200 feet from the nearest commercial areas. Residential areas exist to the west of the MSWLF past the commercial section. Biggs Army Airfield is approximately two miles to the southeast of the MSWLF.

2.8.3. Growth Trends

§330.61(h)(3)

The land within five miles of the MSWLF beyond the military installation boundary is fully developed. A majority of the land within five miles of the MSWLF is owned by Fort Bliss. Construction activities due to BRAC are ongoing or planned for portions of the installation, but none will encroach upon the MSWLF footprint. A registered composting facility (Registration No. 42038), utilized for the biological composting of petroleum contaminated soils, is located immediately to the south of the MSWLF. Beyond the northeast corner of the MSWLF boundary is a set of railway tracks. Across the tracks are industrial buildings. Beyond the industrial buildings are residential housing, churches, and schools as shown in Figure 2-6.

2.8.4. Proximity of Residences and Other Uses

§330.61(h)(4)

The MSWLF is about 1,200 feet from the nearest commercial and residential areas. No cemeteries, historic structures and sites, archaeologically significant sites or sites having exceptional aesthetic quality are located within one mile of the facility. Schools located within one mile of the MSWLF are listed in Table 2-1.

§ Approximate Number of Residences: 2500

§ Approximate Number of Commercial Establishments: 50

2.8.5. Wells

§330.61(h)(5)

The only known wells within 500 feet of the MSWLF are groundwater production wells W3 and W3a, located approximately 350 feet north of the MSWLF. A detailed description and discussion of these wells may be found in Appendix D.

2.9. Transportation

2.9.1. Entrance Roads

§330.61(i)(1)

All access roads to the MSWLF are located on the Fort Bliss property, owned by the U.S. Army. The access road to the landfill entrance is asphalt concrete and useable by military and government personnel during all weather. The internal access roads to the active fill areas are caliche-based roads useable during wet weather conditions. The operator maintains these internal roads to promote drainage and limit ponding during wet weather conditions. Internal roads are used only during facility operating hours. When not in operation, the facility gate is closed and locked.

2.9.2. Vehicular Traffic Volume

§330.61(i)(2)

Traffic volume is minimal as only authorized vehicles are allowed to access the site. The current licensed vehicle use occurs from delivery of MSW, construction and demolition debris, and RACM material to the MSWLF. BRAC-related activities will increase disposal of construction and demolition material and RACM; representing the only expected intermittent increase in vehicular volume.

2.9.3. Expected Vehicular Traffic Volume

§330.61(i)(3)

Due to BRAC activities, a daily increase of two additional trucks from licensed Army vehicles or contractors' vehicles using the MSWLF may result. BRAC-related activities will include increased amounts of construction and demolition debris and RACM material. Traffic volume data are not maintained by Fort Bliss.

2.9.4. Proposed Public Roadway Improvements

§330.61(i)(3)

The MSWLF and the roadways accessing the MSWLF are located on the Fort Bliss military installation. No public roadways exist to the MSWLF. All roadways are owned and improved by the U.S. Army, Fort Bliss. The Army is not required to coordinate with the Texas Department of Transportation.

2.9.5. Airport

§330.61(i)(5)

The MSWLF demonstrates compliance related to landfill operations impact upon airports within six miles of the MSWLF in accordance with §330.545 (relating to Airport Safety) as discussed in sections 2.9.5.1 and 2.9.5.2 below.

2.9.5.1. Impact of Facility upon Airports

30 TAC §330.545(a), requires that MSWLF permit modifications demonstrate no bird hazards for airport runway end used by piston type aircraft located within 5,000 feet of the landfill and turbojet aircrafts within 10,000 feet. No piston-type aircraft runways within 5,000 feet (0.95 miles) of the MSWLF exist. A turbo aircraft runway end used by Biggs Army Airfield is located 10,929 feet from the MSWLF.

The MSWLF is designed and operated so the unit does not pose a bird hazard to aircraft. Construction and demolition debris comprises the majority of MSWLF refuse. Subsequently, minimal bird populations exist in the surrounding area.

2.9.5.2. Airport Review Letter

30 TAC §330.545(d) requires the MSWLF to notify general public or small general service airports within six miles of all modifications to the facility. The MSWLF must also notify all large general public airports within five miles. Airport review letters sent to Biggs Army Airfield, El Paso International Airport and the Federal Aviation Administration (FAA) as well as available response letters are located in Appendix G.

2.10. General Geology and Soils Statement

2.10.1. General

§330.61(j)(1)

The MSWLF is underlain by Hueco Bolson deposits of Tertiary age and typically are composed of unconsolidated to slightly consolidated interbedded sands, clay, list, gravel, and caliche. Individual beds are not well defined and range in thickness from a fraction of an inch to about 100 feet.

The general geology and soils details for the MSWLF site are located in Appendix D (Abeyta, 1996).

2.10.2. Fault Areas

§330.61(j)(2)

The MSWLF is not located within 200 feet of a fault. A Fault Area Map is provided as Figure 5 of the document “Evaluation of Location Restrictions for the Fort Bliss Municipal Solid Waste Landfill (Permit #1422)” by Cardenas-Salcedo and Associates,

Inc. prepared for the U.S. Army Corps of Engineers, Fort Worth District, March 1995 (Appendix H).

2.10.3. Seismic Impact Zones

§330.61(j)(3)

According to the Seismic Zones Map from the United States Environmental Protection Agency (USEPA) “*Solid Waste Disposal Facility Criteria Technical Manual;*” EPA530-R93-017; November 1993, the MSWLF is located outside the seismic zones (Cardenas-Salcedo, 1995, Figure 4 of Appendix H).

2.10.4. Unstable Areas

§330.61(j)(4)

Appendix H contains the 1995 certification by John C. Karlsruher, P.E., Cardenas-Salcedo and Associates, Inc., stating that the Fort Bliss MSWLF is not located on unstable areas. In addition, slope stability and settlement analyses for the alternative final cover design are provided in Appendix I.

2.11. Groundwater and Surface Water

2.11.1. Groundwater Conditions

§330.61(k)(1)

The primary source of groundwater in the MSWLF area is the unconsolidated and semi-consolidated Hueco Bolson deposits. These deposits range between 600 and 1,200 feet below the surface and supply the City of El Paso, Ciudad Juarez (Chihuahua, Mexico) Fort Bliss Military Reservation, private industries, and agricultural areas. A thick, unsaturated layer approximately 300 ft deep lies above the Hueco Bolson deposits near the MSWLF. No known perched water tables in the vicinity of the MSWLF exist at present.

Groundwater monitoring requirements under 30 TAC §330.403 (relating to Groundwater Monitoring Systems), §330.405 (relating to Groundwater Sampling and Analysis Requirements), §330.407 (relating to Detection Monitoring Program for Type I Landfills), and §330.409 (relating to Assessment Monitoring Program) were suspended by the executive director on May 22, 1996, based on Fort Bliss’ demonstrating that no potential exists for migration of hazardous constituents from the MSWLF unit to the uppermost aquifer as defined in 30 TAC §330.3 of this title (relating to Definitions) during the active life and the closure and post-closure care period of the unit. The groundwater monitoring suspension approval is located in Appendix F.

2.11.2. Surface Water

§330.61(k)(2)

No surface water bodies exist at or near the MSWLF as noted in the 2005 Storm Water Pollution Prevention Plan. The MSWLF is located in West Texas where desert conditions exist. Daytime summer temperatures range between 90 and 105 degrees Fahrenheit (°F) and winter temperatures range from 55 to 60 °F. The surrounding area receives less than 10 inches of rain per year and relative humidity is very low. Depending upon the intensity and duration of each precipitation event, the water delivered by the occurrence may infiltrate into the soil or become surface water runoff. The infiltrated water may percolate downward to the water table or return to the atmosphere via evapotranspiration. The surface water runoff may flow downstream to the stormwater retention basin located approximately two miles south of the landfill (Figure 2-15). This pond retains runoff temporarily and releases it slowly. As mentioned previously the MSWLF is located where desert conditions exist; therefore, surface water flow in the vicinity of the MSWLF is limited.

The Rio Grande is the only perennial water body in the vicinity of the MSWLF. Runoff from the Franklin Mountains flows into the Rio Grande Basin approximately two miles west of the MSWLF.

2.11.3. TPDES Storm Water Permit

2.11.3.1. Certification Statement

§330.61(k)(1)(A)

Fort Bliss complies with all applicable Texas Pollutant Discharge Elimination System (TPDES) storm water permitting and Clean Water Act requirements. The required certification statement is located in Appendix J.

2.11.3.2. Individual Wastewater Permit

§330.61(k)(1)(B)

The MSWLF does not require coverage under an individual wastewater permit.

2.12. Abandoned Oil and Water Wells

2.12.1. Location of Existing and Abandoned Water Wells

§330.61(l)(1)

Not Applicable. No existing or abandoned water wells are located within the facility boundary.

2.12.2. Location of Oil Wells

§330.61(1)(2)

Not Applicable. No existing or abandoned oil wells are located within the facility boundary.

2.13. Floodplains and Wetlands Statement

2.13.1. Data on Floodplains

§330.61(m)(1)

The Flood Insurance Rate Map (Figure 2 of Appendix H) shows that the MSWLF is located outside the 100-year floodplain but within the 500-year flood area.

2.13.2. Wetlands Determination

§330.61(m)(2)

Figure 3 in Appendix H, from Mr. Robert Purdon, District Conservationist, United States Department of Agriculture (USDA) Soil Conservation Service dated August 1994 indicates no designated wetlands are located within the MSWLF and the surrounding area.

2.13.3. Wetlands Located Within the Facility

§330.61(m)(3)

No designated wetlands are located within the MSWLF and the surrounding area (see Section 13.2 Wetlands Determination above).

2.14. Endangered or Threatened Species

2.14.1. Impact Upon Endangered or Threatened Species

§330.61(n)(1)

No threatened or endangered species (federally listed) or critical habitat are located in the MSWLF area (*Fort Bliss Integrated Natural Resource Management Plan*, U.S. Army, 2001; *Fort Bliss Texas and New Mexico and Master Plan Draft Supplemental Environmental Impact Statement*, U.S. Army, 2006). The landfill is surrounded by mesquite coppice dune habitat. The MSWLF itself is disturbed during daily operations. The Texas horned lizard (*Phrynosoma cornuta*), a state threatened reptile in Texas, may re-populate the area over time. Cells capped approximately five years ago at this MSWLF show establishment of at least 20 species of plants. The soil has also been repopulated by several animal species such as the Chihuahua whiptail lizard (*Cnemidophorus exsanguis*), termites (a gallery ever 34 square meters), and a number of species of ants including the genus *Pogonomermix sp.* which is the primary food source for this reptile. However, no mounds were located during Fort Bliss's studies. According

to Fort Bliss documents, it is likely that upon closure the MSWLF area will gradually return to Texas horned lizard habitat.

2.14.2. Compliance Demonstrations

§330.61(n)(2)

Table 2-2 provides the specific data relating to endangered and threatened species in the El Paso region. The proposed height increase does not affect the facility footprint or otherwise change previous compliance demonstrations.

2.15. Texas Historical Commission Review

§330.61(o)

Appendix E contains the request for a review letter from the Texas Historical Commission documenting compliance with the Natural Resources Code, Chapter 191, Texas Antiquities Code. The letter of review will be kept on file at Fort Bliss. Please note that the Fort Bliss MSWLF is a fully developed, permitted, operational site.

2.16. Council of Governments and Local Government Review Request

§330.61(p)

The following council of governments and local government agencies have received a copy of Part I and II of this permit modification package for their review for compliance with regional solid waste plans. Documentation that a review letter was requested from local government agencies is provided in Appendix K. The letters of review will be kept on file at Fort Bliss.

1. International Boundary and Water Commission, U.S. Section, 4171 N Mesa St Ste C-310, El Paso, TX 79902-1422
2. El Paso City-County Health & Environmental District., 5115 El Paso Dr, El Paso, TX 79905-2818
3. Environmental Services, 7968 San Paulo, El Paso, TX 79907
4. Rio Grande Council of Governments, 8037 Lockheed Drive, Suite 100
El Paso, TX 79925
5. El Paso County Judge, Suite 301, 500 E San Antonio Ave., El Paso, TX 79901-2419

6. State Representative Joe Pickett, Texas House of Representatives, District 79 Room (915) 590-4349, Austin, TX 78768
7. State Senator Jose Rodriquez, Texas Senate District 29 P.O. Box 12068, Austin, TX 78711 (915) 351-3500

**Table 2-1
Public Areas within One Mile**

Day Care Facilities		
Children's Academy	5529 Treadgill Ave	El Paso, TX
Kid's Corner Preschool	9797 Mc Combs St	El Paso, TX
Open Gate Church (Day Care)	9821 Mc Combs St	El Paso, TX
Wee Care Childcare Center	9821 Mc Combs St	El Paso, TX
Recreational		
Student Memorial Park	9425 Vicksburg	El Paso, TX
Dolphin Park	5900 Marlin	El Paso, TX
Boys and Girls Club	5628 Eisenhower	El Paso, TX
Northeast YMCA	5509 Will Ruth Ave	El Paso, TX
Schools		
Northeast Christian Academy	9899 Mc Combs St	El Paso, TX
Parkland Middle School	6045 Nova Way	El Paso, TX
Irvin High School	9465 Roanoke Dr.	El Paso, TX
Dolphin Terrace Elementary School	9070 Pickereel Dr.	El Paso, TX
Schuster Elementary School	5515 Will Ruth Ave	El Paso, TX
Churches		
Sun Valley Baptist	9901 Mc Combs St	El Paso, TX
Centro Biblica La Luz	5733 Bagdad Way	El Paso, TX
Open Gate Worship Center	9821 Saluki St	El Paso, TX
Praise Temple Baptist	9609 Rutlage	El Paso, TX
Baptist Church	5521 Threadgill Ave	El Paso, TX
Pentecostal Church	5505 Threadgill Ave	El Paso, TX
New Beginning Missionary Church	9491 Railroad Dr.	El Paso, TX
Tobin Park United Methodist	5501 Wren	El Paso, TX
Open Gate Worship Center	9821 Mc Combs St	El Paso, TX

Templo Christiano Shalom	9629 Mc Combs St	El Paso, TX
World Life Ministries	9613 Mc Combs St	El Paso, TX
Bread of Life Ministries	5735 Will Ruth Ave	El Paso, TX
Mision Apostolica	5631 Saluki Dr.	El Paso, TX
Commercial		
Warehouse	5821 Lexington Rd	El Paso, TX
A&A Millwork	5904 Threadgill Ave	El Paso, TX
Toro Company	9445 and 9650 Railroad Dr.	El Paso, TX
Boeing Company	9526 & 9566 Railroad Dr.	El Paso, TX
Boeing Company	6055 Threadgill Ave	El Paso, TX
Realty Office	9620 Roanoke Dr.	El Paso, TX
The Final Touch	5600 Will Ruth Ave	El Paso, TX
Independent Truck Co	5600 Will Ruth Ave	El Paso, TX
Gas Station	5710 Railroad	El Paso, TX
A+ Auto Repair	9200 Mc Combs	El Paso, TX
Veterinary Clinic	9204 Mc Combs St	El Paso, TX
Northeast Professional Center	9220 Mc Combs	El Paso, TX
Parking Lot	9220 Mc Combs	El Paso, TX
A1 Welding	9278 Mc Combs	El Paso, TX
EC Transmissions	9280 Mc Combs	El Paso, TX
Tow NE Mini Warehouse	5819 Lexington Rd	El Paso, TX
TA & V Tire & Auto Service	9300 Mc Combs St	El Paso, TX
Cardenas Grocery	9224 Mc Combs St	El Paso, TX
Dairy Queen	9332 Mc Combs St	El Paso, TX
Tony Lewis Auto Body Shop	9400 Mc Combs St	El Paso, TX
Chevron Station	9404 Mc Combs St	El Paso, TX
Perry Cleaners	9408 Mc Combs St	El Paso, TX
Auto Repair	9418 Mc Combs St	El Paso, TX
Skyline Shopping Center	9440 Mc Combs St	El Paso, TX
Galaxy In Print Inc.	5939 Railroad	El Paso, TX
Peter W Dahl Co	5869 Waycross Ave	El Paso, TX
Autoparts Unlimited	5843 Waycross	El Paso, TX
Skyline Auto	5847 Waycross	El Paso, TX
El Paso Truss	9831 Railroad Dr	El Paso, TX
Daniels Moving	9700 Railroad Dr	El Paso, TX
Dust-Tex	5906 Threadgill Ave	El Paso, TX
Gas Station	9635 Mc Combs St	El Paso, TX
Restaurant	9633 Mc Combs St	El Paso, TX
Beauty Salon	9613 Mc Combs St #B	El Paso, TX
Car Wash	9609 Mc Combs St	El Paso, TX
Bakery/Donut Shop	9601 Mc Combs St	El Paso, TX



Appliance Repair	5604 Will Ruth #A	El Paso, TX
Archery Shop	5604 Will Ruth #B	El Paso, TX
Professional Automated Controls	5604 Will Ruth #C	El Paso, TX
Colonial Storage Center	5717 Will Ruth	El Paso, TX
Doggie Day Care	9795 Mc Combs St	El Paso, TX
Goodtime Store	9787 Mc Combs St	El Paso, TX
Dutch Trading Company	9787 Mc Combs St	El Paso, TX
Jerry's Video	9787 Mc Combs St	El Paso, TX
Paola's Fashion	9787 Mc Combs St	El Paso, TX
Encore Thrift Store	9787 Mc Combs St	El Paso, TX
Cornerstone	9787 Mc Combs St	El Paso, TX
Safety Clean	9696 Railroad Dr.	El Paso, TX
Skyline Shopping Center	9420-9440 Mc Combs St	El Paso, TX
Skyline Shopping Center	5837 Waycross Ave	El Paso, TX
Tony Lewis Body Shop	Mc Combs St	El Paso, TX
Storage	5823 Lexington Rd	El Paso, TX



Table 2-2
Endangered Species List



U.S. Fish & Wildlife Service

Endangered Species List

◀ Back to Start

List of species by county for Texas:

Counties Selected: El Paso

Select one or more counties from the following list to view a county list:

- Anderson
- Andrews
- Angelina
- Aransas
- Archer

[View County List](#)

El Paso County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
least tern	<i>Sterna antillarum</i>	Birds	E				
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Birds	T				
northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	Birds	E				
Sneed pincushion cactus	<i>Coryphantha sneedii</i> var. <i>sneedii</i>	Flowering Plants	E				
southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Birds	E				
yellow-billed Cuckoo	<i>Coccyzus americanus</i>	Birds	C				

Figure 2-1: Wind Rose Yearly Average

No change to this Figure



Figure 2-2: Wind Rose December Average

No change to this Figure



Figure 2-3: Wind Rose May Average

No change to this Figure



Figure 2-4: Wind Rose September Average

No change to this Figure



Figure 2-5: Access Roads & Existing Structures

No change to this Figure



Figure 2-6: General Location Map

No change to this Figure



Figure 2-7: Roads Within One Mile

No change to this Figure



Figure 2-8: Topographic Map

No change to this Figure



Figure 2-9: 1967 USGS Aerial Photograph

No change to this Figure



Figure 2-10: 1974 USGS Aerial Photograph

No change to this Figure



Figure 2-11: 1988 USGS Aerial Photograph

No change to this Figure



Figure 2-12: 1991 USGS Aerial Photograph

No change to this Figure



Figure 2-13: 1996 USGS Aerial Photograph

No change to this Figure



Figure 2-14: 2003 USGS Aerial Photograph

No change to this Figure



3. Part III of the Application

3.1. Site Development Plan

§330.63(a)

The Site Development Plan provides for the safeguarding of the health, welfare, and physical property of the people and the environment through consideration of geology, soil conditions, drainage, land use, zoning, adequacy of access roads and highways, and other considerations as the specific facility dictates. The Site Development Plan encompasses the items listed in this Section. Please note that the Fort Bliss MSWLF is a fully developed, permitted, operational site. This permitting action is to request approval of an optimized ET Final Cover System as an alternative final cover system for closure of the Fort Bliss Landfill.

3.2. General Facility Design

3.2.1. Facility Access

§330.63(b)(1)

The MSWLF perimeter chain link fencing with barbed wire protects the public from exposure to potential health and safety hazards and discourages unauthorized entry or uncontrolled disposal of solid waste or hazardous materials by providing a physical barrier. Further discussions of facility access are provided in Part II of the Application.

3.2.2. Waste Movement

Only municipal solid waste, C&D debris, and RACM are accepted at the MSWLF. The two active cells are shown on Sheet 2 of Appendix B.

3.2.2.1. Flow Diagrams

§330.63(b)(2)(A)

The storage, processing, and disposal sequences for the various types of wastes and feedstocks received are shown on Figure 3-1.

3.2.2.2. Schematic View Drawings

§330.63(b)(2)(B)

The various phases of collection, separation, processing, and disposal applicable for the types of wastes and feedstocks received at the facility are shown on Figure 3-2.

3.2.2.3. Ventilation and Odor Control

§330.63(b)(2)(C)

No ventilation or odor control measures are needed for the MSWLF. The wastes received are generally inert and conditions are arid. All operations are outside.

3.2.2.4. Construction Details of all Storage And Processing Units and Ancillary Equipment

§330.63(b)(2)(D)

Not Applicable. No storage and processing units or ancillary equipment for these processes are used at the MSWLF.

3.2.2.5. Slab and Subsurface of Storage and Processing Components

§330.63(b)(2)(E)

Not Applicable. No storage and processing units are used at the MSWLF.

3.2.2.6. Containment Dikes or Walls

§330.63(b)(2)(F)

Not Applicable. No storage and processing units or loading and unloading areas with containment dikes or walls are used at the Fort Bliss MSWLF.

3.2.2.7. Storage of Grease, Oil and Sludge

§330.63(b)(2)(G)

Not Applicable. No storage of grease, oil, or sludge is performed at the Fort Bliss MSWLF.

3.2.2.8. Disposition of Effluent from Processing Operations

§330.63(b)(2)(H)

Not Applicable. No effluent from processing operations is disposed of at the Fort Bliss MSWLF.

3.2.2.9. Transfer Stations

§330.63(b)(2)(I)

Not Applicable. No transfer stations are located at the Fort Bliss MSWLF.

3.2.3. Sanitation

§330.63(b)(3)

Not Applicable. Solid waste processing is not performed at the MSWLF.

3.2.4. Water Pollution Control from Processing

§330.63(b)(4)

Not Applicable. No processing units are located at the MSWLF, and liquids are not generated.

3.2.5. Endangered Species Protection

§330.63(b)(5)

Not applicable. No threatened or endangered species (federally listed) or critical habitat are located in the MSWLF area (see Part II of the Application, Section 2.14).

3.3. Facility Surface Water Drainage Report

3.3.1. Drainage Analysis

§330.63(c)(1)(A)

Appendix L provides the facility surface water drainage report which complies with 30 TAC §330.63 and §330.303. The following information is provided:

- § Drawings and Calculations
- § Design of Drainage Facilities
- § Sample Calculations
- § Description of Hydrologic Methods and Calculations

3.3.2. Flood Control and Analysis

§330.63(c)(2)

This section is not applicable; Appendix H provides a flood insurance rate map showing that the MSWLF is located outside the 100-year floodplain but within the 500-year flood plain.

3.4. Waste Management Unit Design

Previous approved permit modifications included a 10-foot height increase to the permitted maximum cover elevation of 3945 feet above mean sea level for the Subtitle D landfill area as shown on the closure design drawings in Appendix B. The proposed maximum elevation of waste is 3951.4 feet and the proposed maximum elevation of the final cover is 3954.4 as a result of the proposed 10-foot height increase indicated on the cross-sections on Sheet 5 of the revised closure design drawings.

The landfill operations for this modification will remain consistent with the 2007 Site Operating Plan (Appendix A) and the proposed Closure Plan (Appendix O).

Site features such as existing perimeter gas monitoring points, passive vent wells and locations of soil borings collected during a geotechnical investigation program (Anderson, 1993) for the Subtitle D landfill cell construction are shown on Sheet 2 in Appendix B.

The approved Soil Liner Quality Control Plan for the Subtitle D cell is provided in Appendix M for reference.

3.4.1. Storage and Transfer Units

§330.63 (d)(1)

Not Applicable. No storage or transfer units exist at the MSWLF.

3.4.2. Incineration Units

§330.63 (d)(2)

Not Applicable. No incineration units exist at the MSWLF.

3.4.3. Surface Impoundments

§330.63 (d)(3)

Two surface impoundments are located within the MSWLF. The first impoundment is the leachate pond. The leachate pond was designed to accept excess leachate from the leachate collection system and contaminated water from the bermed daily working area of the Subtitle D cell and allow it to evaporate. The leachate pond volume calculation is provided in Figure 3-3. A plan view and cross-section of the leachate pond are provided in Figure 3-4. In accordance with §330.63(d)(3)(A) and (B), the leachate pond includes:

- § Minimum freeboard: approximately 3.5 feet as show below
 - The leachate pond was designed to contain the volume of leachate generated in a 5-year period and the contaminated water collected in the bermed daily working area from a 24-hr, 25-year storm event. This combined volume is extremely liberal in that most of the leachate is sprayed onto the face of the active landfill area over several days. The pumped volume has averaged 2,800 gallons per quarter for the last 17 quarters (over four years). According to the leachate pumping records, a total of 8,400 gallons of leachate were pumped into the leachate pond for evaporation during the period from January 26 through May 12, 1998. The records indicate that this was the only period during which leachate was pumped to the leachate pond. Any leachate pumped to the leachate pond would evaporate quickly.

- The contaminated water volume of 3,703 ft³ as calculated in the 1995 Leachate and Contaminated Water Plan is for a contaminated area of 24,000 ft². The actual daily working area of 40' x 40' or 1,600 ft² would produce approximately 2,000 gallons or 272 ft³ of contaminated water. This is considerably less than the original design volume of 27,697 gallons or 3703 ft³.
 - The operational records indicate that a more realistic design approach would be to combine the volume of leachate generated in one quarter (2,800 gallons) with the volume of water generated in the bermed daily working area from a 24-hr, 25-year storm event (2,000 gallons). This combined volume amounts to 4,800 gallons or approximately 640 ft³. This volume is 5% of the available volume of the leachate pond and leaves a freeboard of more than 3.5 feet.
- § Basis of design to prevent overtopping resulting from normal or abnormal operations: the leachate pond is designed with excess volume
- § Prevention of overfilling: the leachate pond is designed with excess volume
- § Description of wind and wave action: minimal, because the leachate pond has minimal inflows as described above
- § Run-on: a berm around the perimeter of the leachate pond prevents run-on from entering the pond
- § Malfunctions of level controllers, alarms, and other equipment: not applicable – no equipment
- § Human error: the leachate pond is designed with excess volume

The second impoundment is the bermed daily working area. The bermed daily working area is the 40' x 40' area that is used to dispose of and cover the waste that is accepted in one day. It is surrounded by a two-foot berm. The rainfall that falls within this bermed area and collects in excessive quantities is considered contaminated water. The Leachate and Contaminated Water Plan (1995, Attachment 1), approved by the TCEQ on December 27, 1995, calls for this contaminated water to be removed using a vacuum truck and transported to the leachate pond for evaporation. A typical plan view of the bermed daily working area is provided in Figure 3-5. In accordance with §330.63(d)(3)(A) and (B), the bermed daily working area includes:

- § Minimum freeboard: approximately 1.4 feet. The depth of water within the bermed area resulting from a 24-hour 25-year storm will be about to 0.6 ft, but the Leachate and Contaminated Water Plan calls for a two-foot berm around the daily working area.

- § Basis of design to prevent overtopping resulting from normal or abnormal operations: the bermed daily working area is designed to retain the runoff from the 24-hr, 25-year storm event
- § Prevention of overfilling: the bermed daily working area is designed to retain the runoff from the 24-hr, 25-year storm event
- § Description of wind and wave action: minimal due to size of daily working area (40' x 40')
- § Malfunctions of level controllers, alarms, and other equipment: not applicable – no equipment
- § Human error: the berm around the daily working area is designed to provide excess volume

The original design inflow and volume computations for the leachate and contaminated water volumes and the leachate pond volume as provided in the Leachate and Contaminated Water Plan are as follow:

- § Leachate generated over a 5-year period = 55,000 gal x 0.1337 ft³/gal = 7353.5 ft³
- § Contaminated water volume (based on 24-hr, 25-year storm event = 2.04 inches) = 27,697.25 gal x 0.1337 ft³/gal = 3703.12 ft³
- § Leachate + contaminated water volume = 7353.5 ft³ + 3703.12 ft³ = 11,056.62 ft³
- § Leachate pond volume = 17,082 ft³ (Figure 3-3)

3.4.4. Landfill Units

3.4.4.1. Provisions for All-Weather Operation

§330.63(d)(4)(A)

The access road to the landfill entrance is asphalt concrete and useable during all weather conditions. The internal access roads to the active fill areas are caliche-based roads useable during wet weather conditions. The operator will maintain these internal roads to promote drainage and limit ponding during wet weather conditions.

The paved entrance road and caliche-based roads will provide mud control for the waste hauling vehicles prior to exiting the MSWLF and returning to public access roads. Site personnel will physically remove mud accumulations on roads.

3.4.4.2. Landfill Method Proposed

§330.63(d)(4)(B)

The below grade areas at the MSWLF were filled using a trench or area fill method. Older sections were trenched. The currently active cells will be filled using area fill methods.

3.4.4.3. Elevations

§330.63(d)(4)(C)

Current and proposed landfill elevations are illustrated on the Appendix B drawings.

3.4.4.4. Calculations of Estimated Solid Waste Deposition and Operating Life

§330.63(d)(4)(D)

Calculations performed in August of 2013 show an estimated 51,800 cy of airspace remaining in the Subtitle D cell and 8,160 cy of airspace remaining in the C&D cell. In Fiscal Year 2013 (September 1, 2012 to August 31, 2013) there was very minor landfilling of MSW waste at the Subtitle D cell (reportedly 50.8 cy) and approximately 5,560 cy of C&D placed at the C&D cell.

3.4.4.5. Landfill Cross-Sections

§330.63(d)(4)(E)

Sheet 5 in Appendix B shows the landfill unit cross section.

3.4.4.6. Construction and Design Details

§330.63(d)(4)(F)

The MSWLF is a mature landfill. The MSWLF was permitted in 1982 and comprises 106 acres, of which approximately 80 acres are closed or inactive. Construction and design details are shown on Sheet 5 of Appendix B.

3.4.4.7. Liner Quality Control Plan

§330.63(d)(4)(G)

Appendix M contains the approved Soil and Liner Quality Control Plan.

3.4.5. Arid Exemption Landfill Unit Criteria

§30 TAC 330.63 (d)(5)

Not applicable to the Fort Bliss MSWLF. Landfill units do not meet arid exemption criteria.

3.4.6. Type V Mobile Liquid Waste Processing Units

§30 TAC 330.63(d)(6)

Not applicable. No Type V mobile liquid waste processing units are located at the MSWLF.

3.4.7. Type IX Energy, Material, Gas Recovery, or Landfill Mining Waste Processing Units

§30 TAC 330.63(d)(7)

Not applicable. No Type IX waste processing units are located at the MSWLF.

3.4.8. Compost Units

§30 TAC 330.63(d)(8)

Not applicable. No compost units or operations occur at the MSWLF. A composting facility has been constructed adjacent to the MSWLF, but is located outside the MSWLF permitted boundary.

3.4.9. Type VI Waste Processing Demonstration Facilities

§30 TAC 330.63(d)(9)

Not applicable. No Type VI waste processing demonstrations units or facilities are located at the MSWLF.

3.5. Geology Report

3.5.1. Regional Geology

3.5.1.1. Geologic Map with Text

§330.63(e)(1)(A)

The geologic map of the region with text describing the stratigraphy and lithology of the map unit is provided on Figure 9 of the Geohydrologic Site Characterization Report (Geohydrologic Report)(Abeyta, 1996) in Appendix D.

3.5.1.2. Stratigraphic Column in the Facility Area

§330.63(e)(1)(B)

The MSWLF is underlain by Hueco Bolson deposits of locally derived materials. The Hueco Bolson is a clastic-filled graben extending from a few miles north of the New Mexico-Texas border to several miles south into Mexico. Hueco Bolson deposits are of Tertiary age and primarily include fluvial and lacustrine deposits, but alluvial-fan material and Aeolian sediments also are present. Hueco Bolson deposits are reported to have a maximum thickness of about 9,000 feet within a deep structural trough paralleling the east base of the Franklin Mountains.

Hueco Bolson deposits typically are composed of fine- to medium-grained sand with interbedded lenses of clay, silt, gravel, and caliche. These deposits range from unconsolidated to slightly consolidated. Sand fragments are composed primarily of chert, granite, and porphyry. Individual beds are not well defined and range in thickness from a fraction of an inch to about 100 feet.

Consolidated igneous and sedimentary rocks ranging in age from Precambrian to Tertiary are exposed in the Franklin and Hueco mountains. Igneous rocks are predominately granitic and are composed of coarse grains of quartz and feldspar. These granitic rocks are easily weathered and are a primary source material of the bolson deposits.

(More detailed discussion is provided in Appendix D).

3.5.2. Geologic Processes Activity

§330.63(e)(2)

Discussions of fault areas, seismic impact zones and unstable areas (see Appendices D and H) provide the information about faulting and subsidence required by §330.555(b) and §330.559 (relating to fault areas and unstable areas).

3.5.3. Regional Aquifers

§330.63(e)

The regional aquifers are discussed in the Geohydrologic Report in Appendix D. This report contains the following information regarding regional aquifers:

n Aquifer Name

The Hueco Bolson aquifer exists in the Fort Bliss region.

n Composition of the Aquifer

A relatively thick vadose zone of approximately 300 feet overlies the aquifer of the Hueco Bolson deposits in the vicinity of the MSWLF. A deep water table prevails for all of the Fort Bliss area. Whether perched water zones exist below the MSWLF is unknown.

n Hydraulic Properties of Aquifer

Hydraulic characteristics of the Hueco Bolson vary significantly as a result of the nonuniform nature of the beds.

n Water Table or Artesian Conditions

The Hueco Bolson is an underground water table.

n Hydraulically Connected Aquifers

The Hueco Bolson intermontane valley was produced by numerous diverse faults and folds and is divided into two distinct parts. The northern extension of the Hueco Bolson is referred to as the Tularosa Basin; the southern extension is referred to as the Hueco Bolson proper, thereafter referred to as the Hueco Bolson. The Tularosa Basin and Hueco Bolson are divided indefinitely a few miles north of the New Mexico-Texas border. The Tularosa Basin has no external drainage; the Hueco Bolson is partly drained by the Rio Grande.

n Map of Aquifer

A map of the Hueco Bolson aquifer is shown on Figure 5 of the Geohydrologic Report (Appendix D).

n Rate of Groundwater Flow

Transmissivities of Hueco Bolson deposits under water-table conditions in the El Paso area are estimated to range from 1,340 to 37,500 feet squared per day (10,000 to 280, 000 gallons-per-day per foot).

n TDS Content of Groundwater

Concentrations of dissolved solids in water from the Hueco Bolson fluvial deposits (Figure 11 of the Geohydrologic Report) range from 300 parts per million to more than 1,500 parts per million; concentrations of dissolved solids in water from underlying lake deposits are as much as 50,000 parts per million. El Paso Water Utilities reports that dissolved-solids concentrations in the MSWLF vicinity range from 297 to 625 milligrams per liter (wells JL-49-05-904 and JL-49-05-915 respectively) but concentrations have been measured as high as 1,312 milligrams per liter (well JL-49-05-914, April 7, 1992)(Table 5, Appendix D).

n Aquifer Recharge

The Hueco Bolson aquifer underlying the MSWLF is recharged primarily by inflow from mountainous areas to the north, west, and east. Recharge resulting from direct infiltration of precipitation is minor due to the high evaporation and low precipitation rates.

n Groundwater Drawn from Aquifer

The city-operated Sherman Well Field, located north of the MSWLF, is a primary source of ground water for the City of El Paso. The test-pumping rate of well JL-49-05-914 (the well nearest to the MSWLF having test-pumping data) was 1,972 gallons per minute on July 20, 1992; the static water level prior to pumping was 317.54 feet below land surface. El Paso Water Utilities reports that the pumping level after eight hours of pumping was 367.80 feet below land surface, resulting in a drawdown of 50.26 feet, transmissivity of 22, 200 feet squared per day (166,000 gallons-per-day per foot), and specific capacity of 39.2 gallons per minute per foot of drawdown. After the pump was shut off, the well recovered to a static water level of 317.46 feet below land surface on July 21, 1992.

3.5.4. Boring Log

§330.63(e)(4)

The geotechnical investigation along with subsurface soil exploration at the MSWLF is described in the 1993 report provided by Danny R. Anderson, P.E. Consultant, Inc. to Cardenas Salcedo and Associates, Inc. (see Appendix N). The report contains information for four borings; surface elevation location coordinates; columnar section with text showing the elevation of all contacts between soil and rock layers, description of each layer using the unified soil classification, color, degree of compaction, and moisture content. A key explaining the symbols used in the boring logs and the classification terminology for soil type, consistency, and structure are provided. The locations of the boring sites are provided in the report and are shown on Sheet 2 of Appendix B. The report provides information on the following:

n **Geotechnical Properties of the Soils and Rocks Beneath the MSWLF**

§330.63(e)(4)(H)

Four borings were drilled to establish subsurface stratigraphy and to determine geotechnical properties of the soils beneath the facility. Soil stratification analysis and consistencies were determined based on laboratory tests of the soils extracted and classified from the borings. Testing of soils was performed in the laboratory to determine penetration resistance, compressive strength, and soil type. Detailed numerical results of the laboratory testing are provided in Appendix N (Anderson, 1993).

n **Identification of the Uppermost Aquifer or any other Lower Level Aquifers Hydraulically Connected**

The primary groundwater in the El Paso area consist of the Hueco Bolson, Mesilla Bolson, and Rio Grande Alluvian Deposits. The un-consolidated and semi-unconsolidated sedimentary deposits of the Hueco Bolson comprise the only groundwater aquifers in the immediate vicinity of the MSWLF. The Hueco Bolson deposits are between 600 and 1200 feet deep, limiting the potential for seepage from the MSWLF to reach the aquifer. The extent to which underlying aquifers exist below the Hueco Bolson deposits is unknown.

Groundwater wells located near the MSWLF indicate that groundwater depth is much further below the landfill surface than the geotechnical boring sample depths. Groundwater wells within the vicinity are listed in the report provided in Appendix N. The majority of the wells indicate groundwater depth from the surface is over 300 feet. Geotechnical boring descended only 51.5 feet below the surface. No groundwater was encountered and no after-equilibrium measurements were made as a result of the depth to water (Anderson, 1993).

n **Field Exploration Method**

Subsurface soil strata and existing conditions at the MSWLF were visually inspected or taken from four test borings made with an 8.5 inch hollow stem auger drilled to 51.5 feet. Samples were field extracted, classified, and identified based on depth and boring number (see Appendix N).

n **Installation, Abandonment, and Plugging of the Borings**

Installation, abandonment and plugging of the boring was performed in accordance with rules of the commission (Anderson, 1993).

n **Number and Depth of Borings Modified**

The extent to which the number or depth borings were modified in 1993 is unknown. No additional boring information is available for the MSWLF. Previous number and depths of the borings at the MSWLF are discussed in Appendix N.

n **Electrical Resistivity**

Not applicable. Electrical resistivity was not utilized during soil boring operations at the MSWLF.

n **Cross-sections of the Borings**

Cross-sections were prepared from the borings depicting the generalized strata at the facility. See Appendix N (Anderson, 1993).

n **Investigator's Interpretations**

A narrative that describes the investigator's interpretations of the subsurface stratigraphy based upon the field investigation is provided in Appendix N.

3.5.5. Geotechnical Data

§330.63(e)(5)(A)-(F)

An investigation was conducted to assess the MSWLF soils for geotechnical characteristics linked to the use and operations of the MSWLF. Subsurface soil strata and existing conditions at the MSWLF were visually inspected or taken from the four borings. Soil samples were field extracted, classified, and identified based on depth and boring number (Appendix N, Anderson, 1993).

n **Laboratory Report of Soil Characteristics**

Soil stratification analysis and consistencies were determined based on laboratory tests of the soil samples. Testing of soils was performed in the laboratory to determine penetration resistance, compressive strength, and soil type. Detailed numerical results of the laboratory testing are provided in the report located in Appendix N (see Anderson, 1993).

n Permeability Tests on Undisturbed Soil Samples

Soil permeability tests were performed to determine the material best suited for a liner material for the Subtitle D section of the MSWLF. The stratified soil samples obtained from the boring holes were tested by a standard Flexible Wall Permeameter to determine acceptable Saturated Porous Material conductivity for MSWLF soils. Atterberg limits, Moisture-Density Relations, and Sieve Analysis tests were also performed on soil material. Hydraulic conductivities and physical properties are documented and tabulated in the report (see Appendix N).

n Groundwater Depths and After-Equilibrium Measurements from Soil Boring Encounters

Groundwater wells located near the MSWLF indicate that groundwater depth is much further below the ground surface than the boring depths. Groundwater wells within the MSWLF vicinity are listed in Appendix D. The majority of the wells indicate groundwater depth from the surface is over 300 feet. Geotechnical borings descended to 51.5 feet below the surface. No groundwater was encountered, and no after-equilibrium measurements were made as a result of the depth to water (Abeyta, 1996).

n Records of Water-Level Measurements

Relevant groundwater level depths from wells located near the MSWLF are recorded in the geohydrologic report located in Appendix D. The Texas well identification code, location, use, owner, well depth, and elevation of water level above MSL are provided. No other records than those provided in Appendix D exist for the areas surrounding the MSWLF. The files are compiled by the El Paso Water Utilities and USGS files (Abeyta, 1996).

n Tabulation of All Relevant Groundwater Monitoring Data from Well on Site or Adjacent

All relevant groundwater monitoring data are tabulated on Figure 5 of Appendix D.

n Hydraulically Connected Aquifers

The primary sources of ground water in the area consist of the Hueco Bolson, Mesilla Bolson, and Rio Grande Alluvian Deposits. The un-consolidated and semi-unconsolidated sedimentary deposits of the Hueco Bolson comprise the only groundwater aquifer in the immediate vicinity of the MSWLF. The Hueco Bolson deposits are between 600 and 1200 feet deep, limiting the potential for seepage from the MSWLF to reach the aquifer. The extent to which underlying aquifers exist below the Hueco Bolson deposits is unknown (Abeyta, 1996).

3.5.6. Arid Exemption

§330.63(e)(6)

Not applicable. Fort Bliss is not seeking an Arid Exemption for the MSWLF.

3.6. Groundwater Sampling and Analysis Plan

§330.63(f)

Groundwater monitoring requirements under 30 TAC §330.403 (relating to Groundwater Monitoring Systems), §330.405 (relating to Groundwater Sampling and Analysis Requirements), §330.407 (relating to Detection Monitoring Program for Type I Landfills), and §330.409 (relating to Assessment Monitoring Program) were suspended by the executive director on May 22, 1996. The TCEQ approved the groundwater monitoring suspension based on demonstration by Fort Bliss of no potential for migration of hazardous constituents from the MSWLF unit to the uppermost aquifer as defined in 30 TAC §330.3 (relating to Definitions). The suspension approval is provided in Appendix F.

3.7. Landfill Gas Management Plan

§330.63(g)

In accordance with Subchapter I of Chapter 330, all gases will be monitored at the MSWLF as described in its 1994 “*Workplan for Methane Monitoring at the Municipal Solid Waste Landfill Facility*, U.S. Army Air Defense Artillery Center and Fort Bliss, El Paso, Texas.” This Workplan was approved by TCEQ on June 9, 1995. Quarterly methane monitoring provisions are in place. The required reports and other submittals to the TCEQ are retained by the Fort Bliss Directorate of Public Works – Environmental Division (DPW-ED) in the operating record.

Conventional landfill covers typically include a gas collection layer and passive gas vents to relieve landfill gas pressures on the overlying impermeable geomembrane and minimize slope stability concerns. The optimized ET landfill cover will only consist of course-grained permeable soil; therefore, no passive gas venting system is proposed as part of the final optimized ET landfill cover design. Rather, the ET cover soils will naturally and effectively vent landfill gas, similar to the existing conditions and the daily/intermediate cover soil at the site. Additionally, the microbes in the ET cover soil will oxidize some of the methane as it vents, creating more environmentally friendly emissions. While the venting of the landfill gas may impact vegetative growth on the landfill cover, the ET cover system was designed to be effective with only 10% vegetative coverage. Based on the operational and regulatory history of the landfill (83 acres of 1970’s era waste), significant landfill gas generation is not expected. Should excessive methane concentrations be detected in perimeter landfill gas monitoring probes or ambient landfill air during routine landfill gas monitoring, corrective venting and

reporting procedures are outlined in the Fort Bliss Guidance Document titled *Procedures Following a Methane Exceedance*.

3.8. Closure Plan

§330.63(h)

The approved 2008 Closure Plan has been updated to reflect the proposed final optimized ET cover design, cost estimates, and 30 TAC §330 requirements. The updated plan is located in Appendix O.

3.9. Post-Closure Plan

§330.63(i)

The March 2008 Post-Closure Care Plan prepared by Malcolm Pirnie, Inc. has been updated and meets the requirements of 30 TAC §330.463. The updated Post-Closure Care Plan is located in Appendix P.

3.10. Cost Estimate for Closure and Post-Closure Care

§330.63(j)

As an agency of the Federal Government, Fort Bliss is not required to complete financial assurance mechanism requirements. Therefore, a closure cost estimate is not required per 30 TAC §330.5.

Figure 3-1: Waste Flow Diagram

No change to this Figure



Figure 3-2: Disposal Schematic

No change to this Figure



4. Part IV of the Application

4.1. Site Operating Plan

§300.65(a)

A Site Operations Plan (SOP) has been previously submitted. The current permit application modification does not propose any changes to the SOP.

4.2. EMS and NEPT

§330.65(b)

This section is not applicable. The MSWLF does not participate in the National Environmental Performance Track program. The installation does have an Environmental Management System that meets ISO-14001 standards but has not received approval/certification under 30 TAC §90.32.

4.3. Procedures for Recirculating Leachate or Gas Condensate into a Landfill Unit

§330.65(c)

Methane gas is managed in accordance with the current Methane Gas Management Plan. Gas condensate recirculation does not apply to the MSWLF Landfill. The leachate will be monitored and measured through the leachate monitoring pipe at least quarterly during the landfill active period and annually during the landfill post closure care period. If the leachate is more than 12 inches (30 centimeters) deep in the landfill, it is pumped out through the leachate transfer pipe and spread back in the Subtitle D cell.

4.4. Grease Trap Waste, Grit Trap Waste or Septage Processing Facilities

§330.65(d)

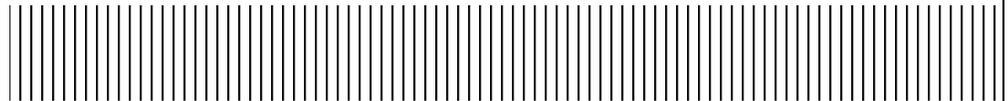
This section is not applicable. The MSWLF does not handle grease trap waste, grit trap waste, or septage.



U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102

Appendix B – Landfill Modification and Closure Design Drawings Fort Bliss Municipal Solid Waste Landfill Permit 1422

July 2014



Infrastructure · Water · Environment · Buildings

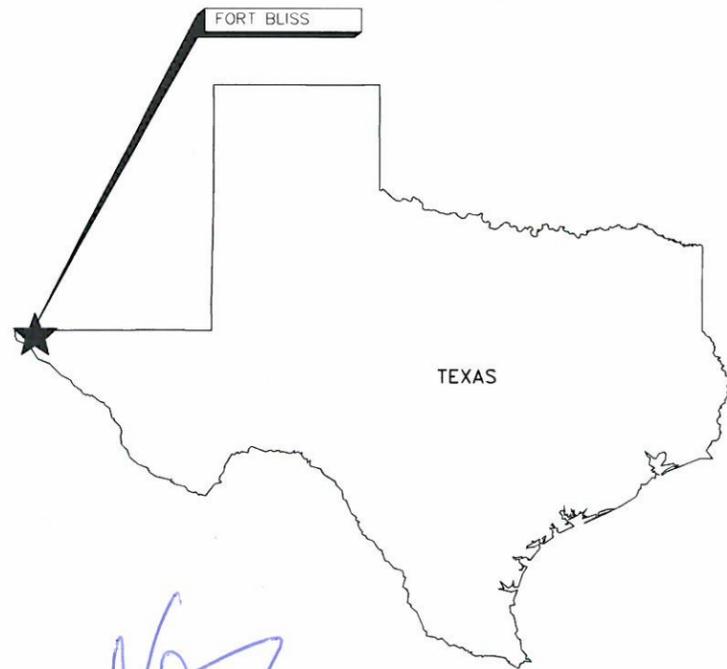
Prepared By:

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2929 Briarpark Drive
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04675026.0000

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TX Engineering License # F-533

PERMIT MODIFICATION APPLICATION- OPTIMIZED EVAPO-TRANSPIRATION (ET) ALTERNATIVE COVER SYSTEM FORT BLISS MUNICIPAL SOLID WASTE LANDFILL EL PASO, EL PASO COUNTY, TEXAS



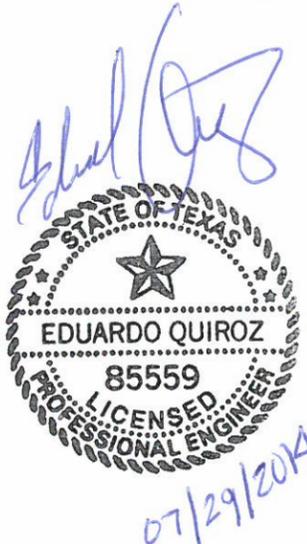
VICINITY MAP

NOT TO SCALE



LOCAL VICINITY MAP

NOT TO SCALE



CLIENT:

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ARCADIS US, INC
TX ENGINEERING LICENSE No. F-533

SHEET INDEX:

- G-1 COVER SHEET
- T-1 SURVEY OF EXISTING CONDITIONS I
- T-2 SURVEY OF EXISTING CONDITIONS II
- C-1 FINAL COVER CAPPING PLAN
- C-2 FINAL COVER GRADING PLAN I
- C-3 FINAL COVER GRADING PLAN II
- C-4 FINAL COVER STORM WATER COLLECTION PLAN I
- C-5 FINAL COVER STORM WATER COLLECTION PLAN II
- C-6 FINAL COVER LANDFILL CROSS SECTIONS
- C-7 TYPICAL CAP & DRAINAGE DETAILS
- C-8 TYPICAL SITE DETAILS
- C-9 EROSION CONTROL DETAILS

LIST OF ABBREVIATIONS:

- @ = AT
- A.D. = ALGEBRAIC DIFFERENCE
- ASTM = AMERICAN SOCIETY FOR TESTING AND MATERIALS
- BM = BENCHMARK
- BP = BEGIN POINT
- BVCE = BEGINNING OF VERTICAL CURVE ELEVATION
- BVCS = BEGINNING OF VERTICAL CURVE STATION
- CL = CENTERLINE
- DIA = DIAMETER
- E = EAST OR EASTING
- EG = EXISTING GRADE ELEVATION
- ELEV = ELEVATION
- EP = END POINT
- ET = EVAPOTRANSPIRATION COVER SYSTEM
- EVCE = END OF VERTICAL CURVE ELEVATION
- EVCS = END OF VERTICAL CURVE STATION
- FFE = FINISH FLOOR ELEVATION
- FG = FINISH GRADE ELEVATION
- FL = FLOW LINE ELEVATION
- INV = INVERT ELEVATION
- K = VERTICAL CURVE K-VALUE
- LF = LINEAR FEET
- LT = LEFT
- MAX = MAXIMUM
- MIN = MINIMUM
- MUTCD = MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
- N = NORTH OR NORTHING
- N.E.C. = NATIONAL ELECTRICAL CODE
- N.T.S. = NOT TO SCALE
- O.C. = ON CENTER
- PC = POINT OF CURVE
- PB = PULL BOX
- P.E. = PROFESSIONAL ENGINEER
- PI = POINT OF INTERSECTION
- PLS = PROFESSIONAL LAND SURVEYOR
- PNM = PUBLIC SERVICE COMPANY OF NEW MEXICO
- P.S.I. = POUNDS PER SQUARE INCH
- PT = POINT OF TANGENT
- PVC = POLYVINYL CHLORIDE
- PVI = POINT OF VERTICAL INTERSECTION
- R = RADIUS LENGTH
- RE = REFERENCE
- RT = RIGHT
- SF = SQUARE FEET
- STA = STATION
- S = SOUTH
- TC = TOP OF CURB ELEVATION
- TF = TOP OF FOOTING ELEVATION
- TW = TOP OF WALL ELEVATION
- TYP = TYPICAL
- UE = UNDERGROUND ELECTRIC
- VC = VERTICAL CURVE LENGTH
- VOR = VILLAGE OF RUIDOSO
- W = WEST

"Sealed for Permitting Purposes Only"

THIS DOCUMENT RELEASED FOR PERMIT APPROVAL UNDER THE AUTHORITY OF EDUARDO QUIROZ, P.E. LICENSE NO. 85559 ON DATE: JULY 2014. IT IS NOT TO BE USED FOR CONSTRUCTION OR BIDDING PURPOSES



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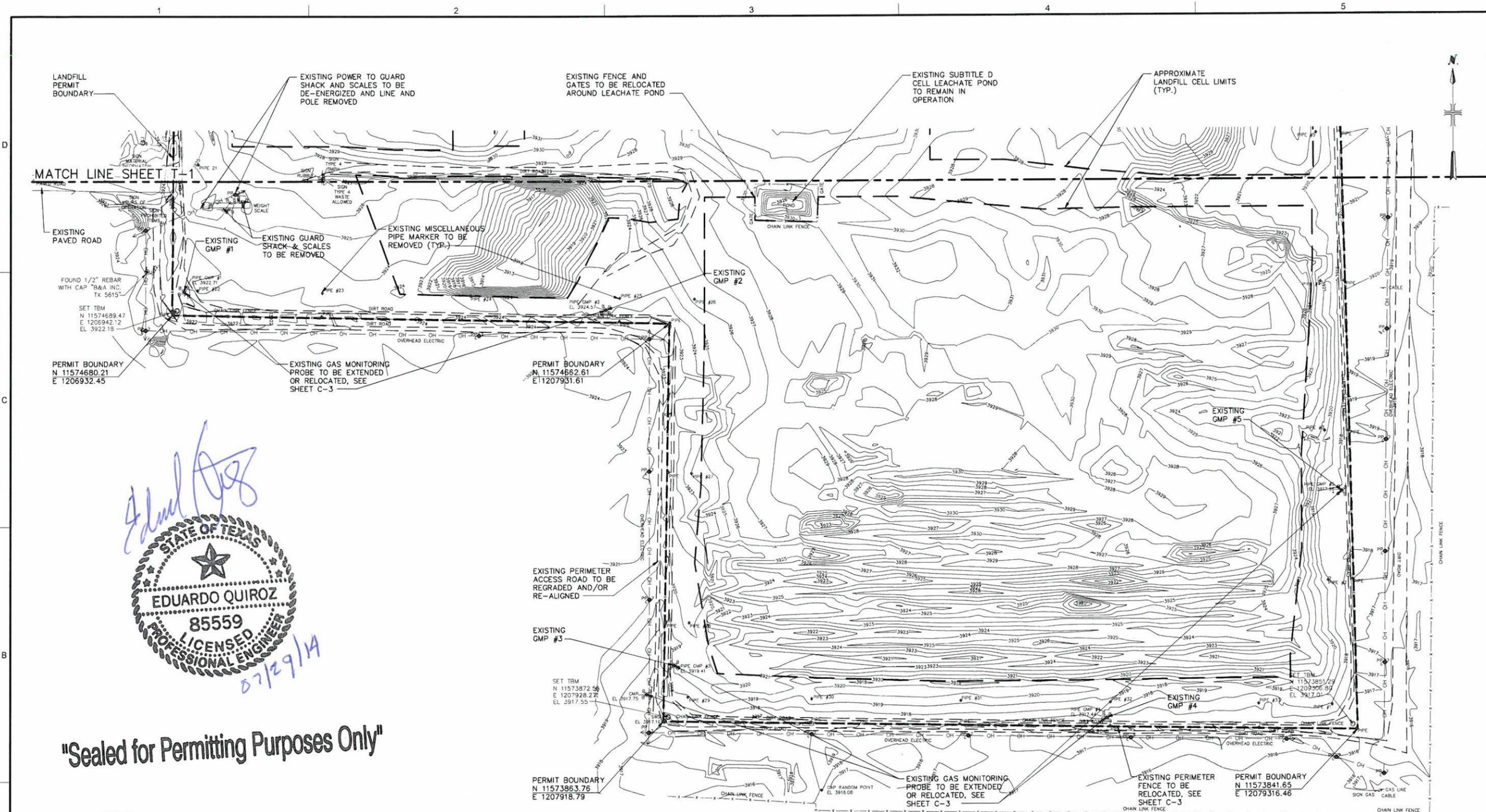
MARK	DESCRIPTION	DATE
B	REVISED FOR TCEQ SUBMISSION	07/29/14
A	PRELIMINARY REVIEW	07/11/14

DESIGNED BY: TAM	DATE: JULY 2014	SOLICITATION NO.:	
DWN BY: TAM	CKO BY: TAM	SOLICITATION NO.:	
SUBMITTED BY:	FILE NO.:	CONTRACT NO.:	
PLOT SCALE:	PLOT DATE:	FILE NUMBER:	
SIZE:	FILE NAME:	FILE NUMBER:	
ANSI:	DATE:	FILE NUMBER:	

U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT
FORT WORTH, TEXAS
ARCADIS
2929 BRIARPARK DRIVE, SUITE 300
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SHEET IDENTIFICATION
G-1

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Eduardo Quiroz
 STATE OF TEXAS
 EDUARDO QUIROZ
 85559
 LICENSED PROFESSIONAL ENGINEER
 07/29/14

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NOTES:

- SOURCE OF MAP, "TOPOGRAPHIC IMPROVEMENT SURVEY", CREATED FROM A SURVEY PERFORMED BY PRECISION LAND SURVEYORS, EL PASO, TEXAS, JANUARY 2013.
- BEARING BASIS AND COORDINATE VALUES ARE UNIVERSAL TRANSVERSE MERCATOR, ZONE 13 NORTH, NORTH AMERICAN DATUM OF 1983. ALL DISTANCES SHOWN HEREON ARE GRID DISTANCES AND ARE REPRESENTED IN U.S. SURVEY FEET. TO CONVERT TO SURVEY DISTANCES, DIVIDE BY THE COMBINED SCALE FACTOR 0.999632 AS DERIVED FROM THE SOUTHWEST CORNER OF THE PROJECT.
- VERTICAL DATUM NAVD 88 AS DERIVED USING GPS METHODS VIA RTK NETWORK ESTABLISH WESTERN DATA, EL PASO ISLAND.
- UNDERGROUND UTILITY LOCATIONS ARE APPROXIMATED BY ON SITE EVIDENCE. CONTRACTOR HAS TO CONDUCT A LINE SPOT.
- THIS IS NOT A BOUNDARY SURVEY.
- ELEVATION CONTOUR LINES IN ARE BASED IN JANUARY 2013 SURVEY AND MATERIAL MAY HAVE BEEN REMOVED SINCE, FOR USE AS COVER FOR ACTIVE CELL AREA.
- NO GROUNDWATER WELLS ARE REQUIRED

LEGEND

- PIPE MARKER
- * LFG MONITORING PROBES
- UNPAVED ACCESS ROAD
- EXISTING 5' TOPOGRAPHIC CONTOUR
- EXISTING 1' TOPOGRAPHIC CONTOUR
- - - EXISTING FENCE
- - - APPROXIMATE EXISTING LANDFILL CELL LIMITS
- LANDFILL PERMIT BOUNDARY



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EDUARDO QUIROZ P.E. # 85559

MARK	DESCRIPTION	DATE
B	REVISED FOR TCEQ SUBMISSION	07/29/14
A	PRELIMINARY REVIEW	07/11/14

DESIGNED BY: TAM
 DRAWN BY: TMM
 SUBMITTED BY: TT
 PLOT SCALE: 7/22/2014
 FILE NAME: 04675026-PERMIT-102

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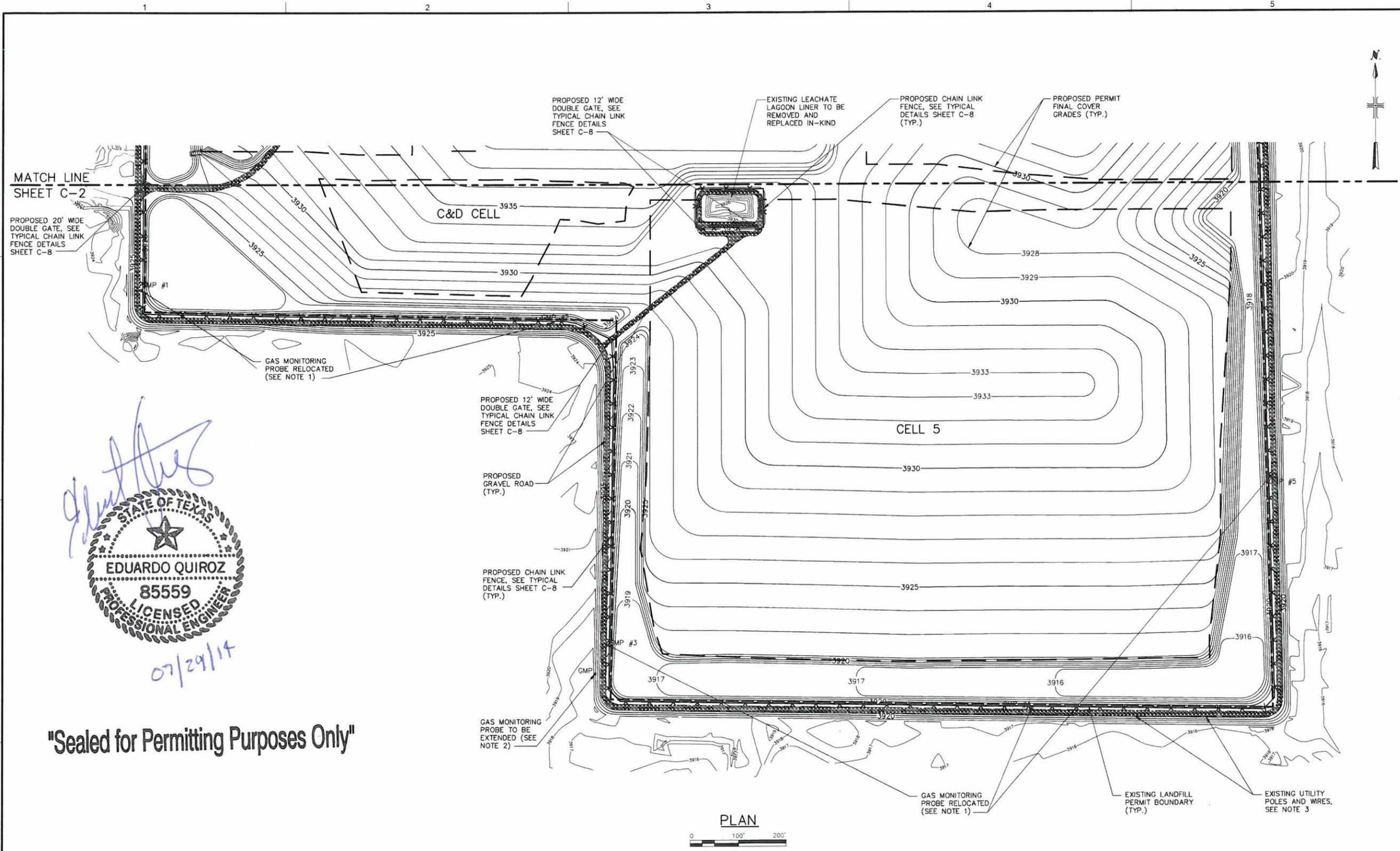
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 2929 BRANBARK DRIVE, SUITE 300
 HOUSTON, TEXAS 77042

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 PERMIT MODIFICATION APPLICATION (ET)
 OPTIMIZED EVAFO-TRANSPARATION SYSTEM
 ALTERNATIVE COVER SYSTEM

SURVEY OF EXISTING CONDITIONS II

SHEET IDENTIFICATION
T-2
 SHEET 3 OF 13

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Eduardo Quiroz
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 07/29/14

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LEGEND

-----3924-----	EXISTING TOPOGRAPHIC CONTOUR
-----	APPROXIMATE EXISTING LANDFILL CELL LIMITS
-----	LANDFILL PERMIT BOUNDARY
-----3930-----	PROPOSED 5' PERMIT FINAL COVER GRADES
-----3924-----	PROPOSED 1' PERMIT FINAL COVER GRADES
-----	PROPOSED GRAVEL ROAD
-----X X X-----	PROPOSED CHAIN LINK FENCE

- NOTES:**
1. GAS MONITORING PROBES RELOCATED TO ALLOW ACCESS TO GAS MONITORING UPON FINAL CLOSURE.
 2. EXISTING GAS MONITORING PROBE TO BE EXTENDED AS REQUIRED BY PROPOSED FINAL COVER GRADES.
 3. RELOCATION, REMOVAL, OR FILLING AROUND EXISTING UTILITY POLES AND WIRES FOR CLOSURE GRADES SHALL BE COORDINATED WITH UTILITY OWNER AS PER OWNER'S RECOMMENDATIONS.

US Army Corps of Engineers

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EDUARDO QUIROZ P.E. # 85559

DATE	07/29/14	DESCRIPTION
MARK	A	PRELIMINARY REVIEW
MARK	B	REVISED FOR TCEC SUBMISSION

DESIGNED BY: TAM
 DWN BY: TAM
 SUBMITTED BY: TAM
 CHECKED BY: TAM
 DATE: 7/22/2014
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 FORT WORTH DISTRICT
 FORT WORTH, TEXAS

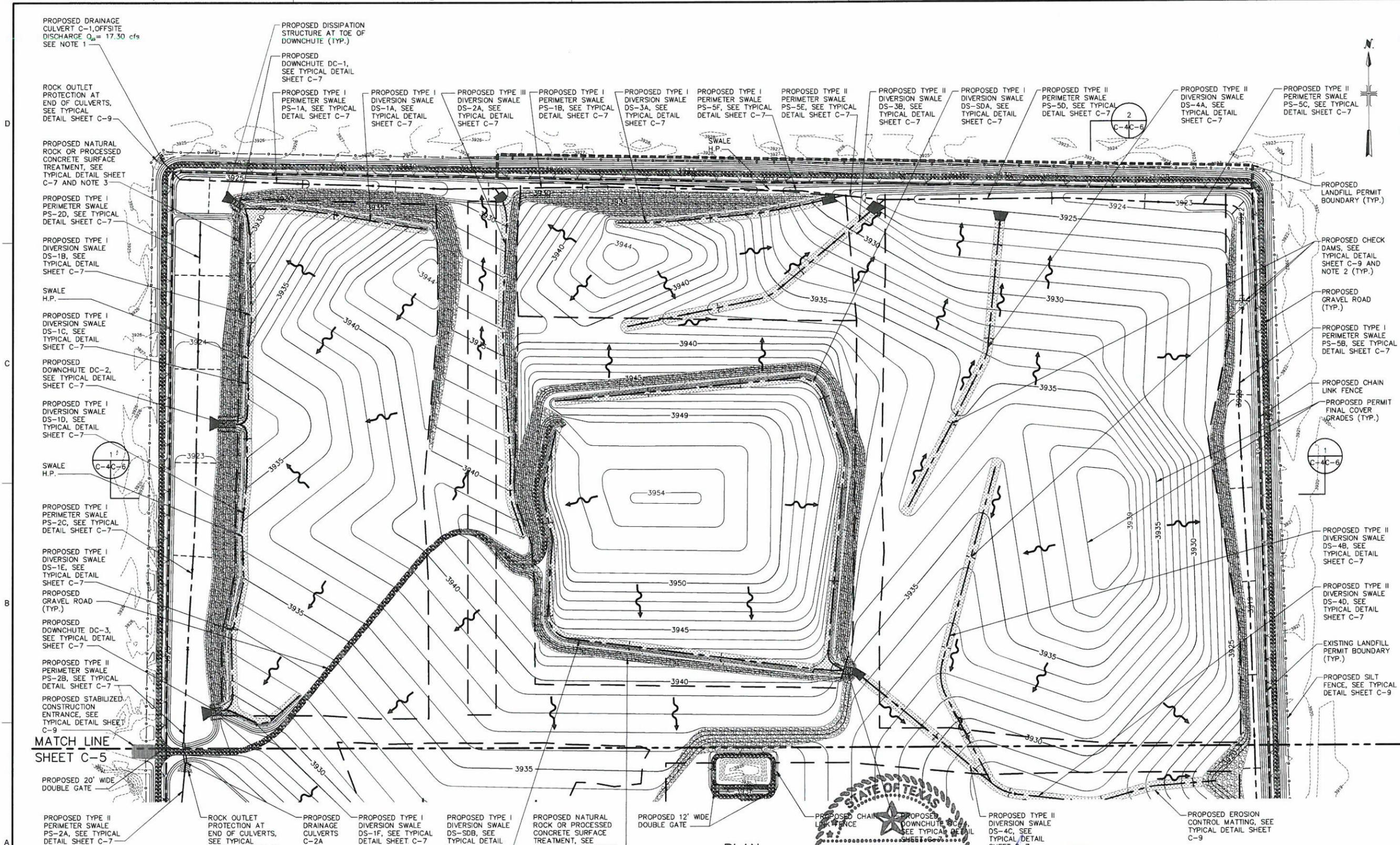
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FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 PERMIT MODIFICATION APPLICATION (ET)
 OPTIMIZED EVAPO-TRANSPIRATION (ET)
 ALTERNATIVE COVER SYSTEM

FINAL COVER
 GRADING PLAN II

SHEET IDENTIFICATION
C-3
 SHEET 5 OF 12

User: Ttl Spec: PIRNIE STANDARD File: I:\ENVCAD\WhitePlans-NY\ACT\04675026\Fort Bliss Autocad Files\PERMIT MODIFICATION\DWGS\04675026-PERMIT-C04.DWG Scale: 1:1 Date: 06/17/2014 Time: 11:26 Layout: Layout1



LEGEND

--- 3924 ---	EXISTING TOPOGRAPHIC CONTOUR	---	PROPOSED DIVERSION/PERIMETER SWALE
- - - - -	EXISTING LANDFILL PERMIT BOUNDARY	→	PROPOSED STORMWATER FLOW DIRECTION
- - - - - 3924	PROPOSED LANDFILL PERMIT BOUNDARY	▒	PROPOSED NATURAL STONE OR PROCESSED CONCRETE SURFACE TREATMENT LINED SLOPE
- - - - - 3924	PROPOSED 5' PERMIT FINAL COVER GRADES	▒	PROPOSED NATURAL STONE OR PROCESSED CONCRETE RIP-RAP FILLED GABION MATTRESSES
▒	PROPOSED 1' PERMIT FINAL COVER GRADES	▒	PROPOSED EROSION CONTROL MATTING
▒	PROPOSED GRAVEL ROAD	▒	PROPOSED CHECK DAM
X X X	PROPOSED CHAIN LINK FENCE		
- - - - -	APPROXIMATE EXISTING LANDFILL CELL LIMITS		

PLAN
0 100' 200'

NOTES:

- DRAINAGE STRUCTURES SHALL BE SIZED DURING FINAL DESIGN.
- CHECK DAMS SHALL BE INSTALLED IN ALL SWALES AT A SPACING OF APPROXIMATELY 200' O.C.
- PROPOSED NATURAL ROCK OR PROCESSED CONCRETE SURFACE TREATMENT SHALL BE INSTALLED ON TOP OF FINAL COVER GRADES AS SHOWN IN DETAIL.

STATE OF TEXAS
EDUARDO QUIROZ
85559
LICENSED PROFESSIONAL ENGINEER

Eduardo Quiroz

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07/29/14

US Army Corps of Engineers

ARCADIS US, INC.
REGISTERED PROFESSIONAL ENGINEER
LICENSE NO. F-553

EDUARDO QUIROZ P.E. # 85559

DATE	DESIGNED BY	DATE	DESIGNED BY
JULY 2014	TAM		
SOLICITATION NO.	CD BY	SOLICITATION NO.	CD BY
	TAM		
CONTRACT NO.	SUBMITTED BY	CONTRACT NO.	SUBMITTED BY
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FILE NUMBER	FILE NUMBER	FILE NUMBER	FILE NUMBER
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B	REVISED FOR TCEG SUBMISSION		
A	PRELIMINARY REVIEW		

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FORT WORTH, TEXAS

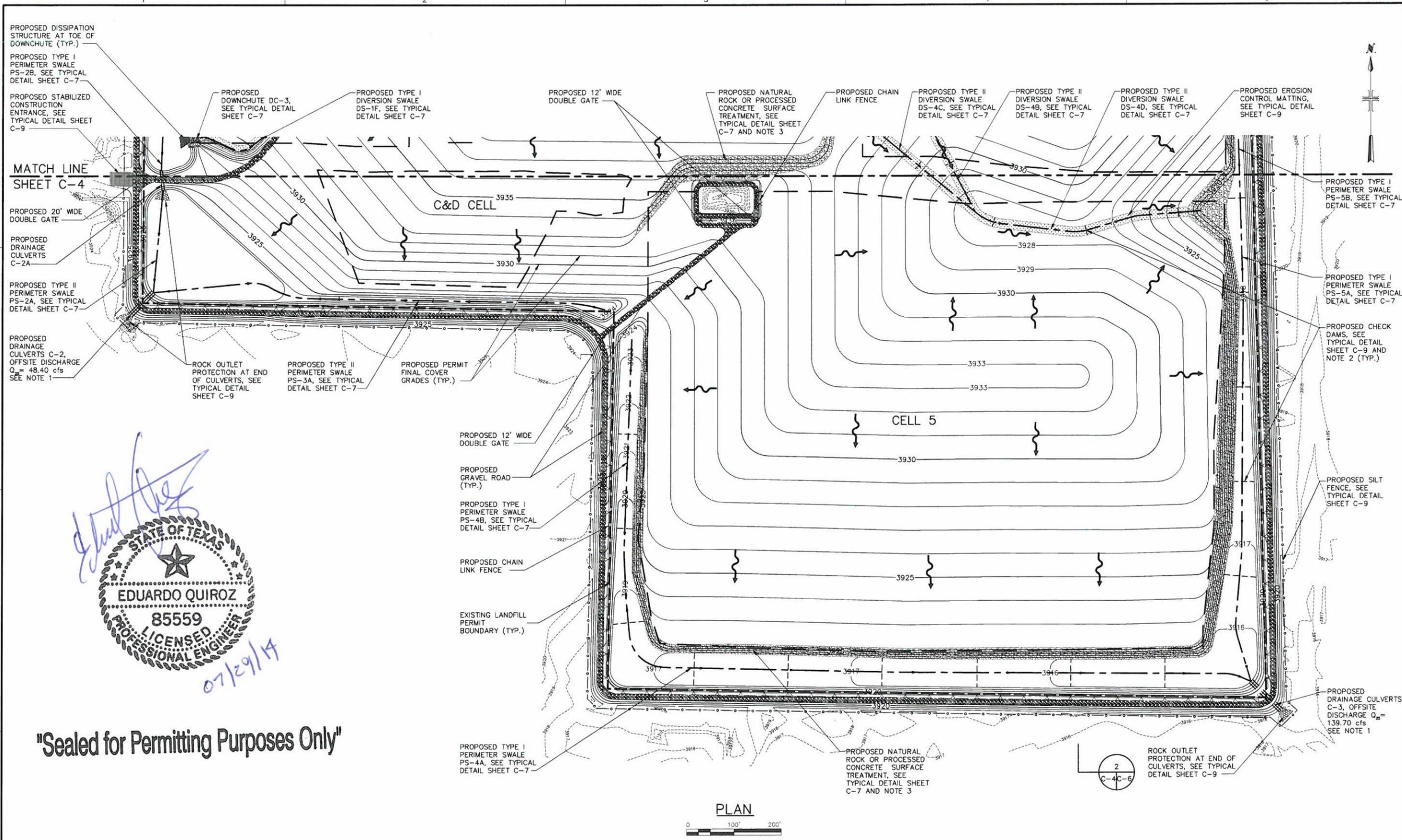
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2929 BRIARPARK DRIVE, SUITE 300
HOUSTON, TEXAS 77042

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
PERMIT MODIFICATION APPLICATION (ET)
OPTIMIZED EWAPO-TRANSPARATION (ET)
ALTERNATIVE COVER SYSTEM

FINAL COVER
STORM WATER COLLECTION PLAN I

SHEET IDENTIFICATION
C-4
SHEET 7 OF 12

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Eduardo Quiroz
 STATE OF TEXAS
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 LICENSED PROFESSIONAL ENGINEER
 07/29/14

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LEGEND	
--- 3924 ---	EXISTING TOPOGRAPHIC CONTOUR
- - - 3924 - - -	EXISTING LANDFILL PERMIT BOUNDARY
— 3924 —	PROPOSED 5' PERMIT FINAL COVER GRADES
— 3924 —	PROPOSED 1' PERMIT FINAL COVER GRADES
▨	PROPOSED GRAVEL ROAD
× × ×	PROPOSED CHAIN LINK FENCE
—	APPROXIMATE EXISTING LANDFILL CELL LIMITS
—	PROPOSED DIVERSION/PERIMETER SWALE
→	PROPOSED STORMWATER FLOW DIRECTION
▨	PROPOSED NATURAL STONE OR PROCESSED CONCRETE SURFACE TREATMENT LINED SLOPE
▨	PROPOSED NATURAL STONE OR PROCESSED CONCRETE RIP-RAP FILLED GABION MATTRESSES
▨	PROPOSED EROSION CONTROL MATTING
—	PROPOSED CHECK DAM

- NOTES:**
- DRAINAGE STRUCTURES SHALL BE SIZED DURING FINAL DESIGN.
 - CHECK DAMS SHALL BE INSTALLED IN ALL SWALES AT A SPACING OF APPROXIMATELY 200' O.C.
 - PROPOSED NATURAL ROCK OR PROCESSED CONCRETE SURFACE TREATMENT SHALL BE INSTALLED ON TOP OF FINAL COVER GRADES AS SHOWN IN DETAIL.

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LICENSING NO. F-553

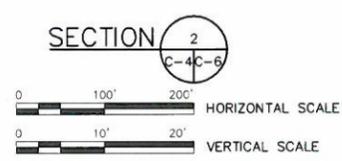
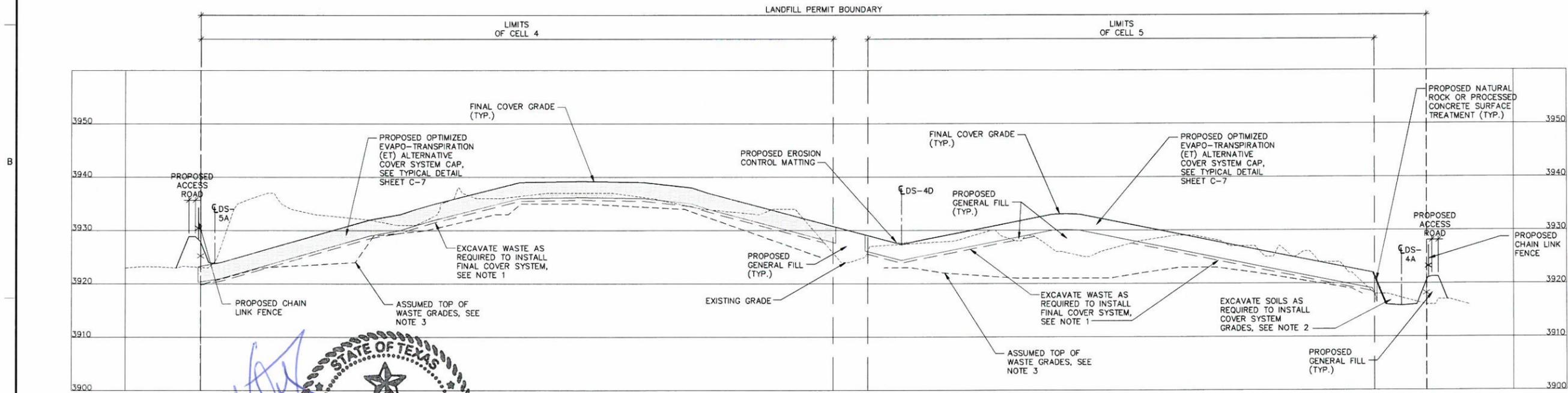
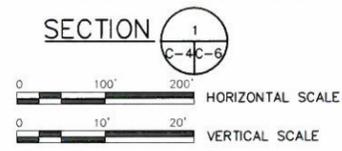
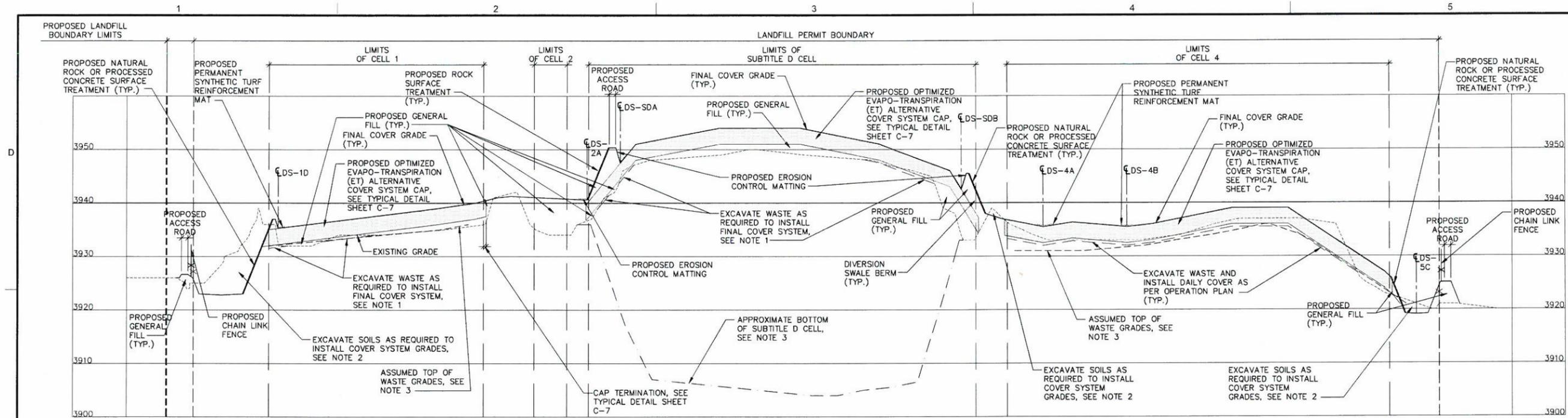
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DESIGNED BY:	DATE:	SOLICITATION NO.:	JULY 2014
DRAWN BY:	CHKD BY:	SUBSCRIPTION NO.:	
IT	TAM	CONTRACT NO.:	
SUBMITTED BY:	FILE NUMBER:	FILE NUMBER:	
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FINAL COVER
STORM WATER COLLECTION PLAN II

SHEET IDENTIFICATION
C-5
SHEET 8 OF 12

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Eduardo Quiroz
STATE OF TEXAS
EDUARDO QUIROZ
85559
LICENSED PROFESSIONAL ENGINEER
07/29/14

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NOTES:

1. WASTE EXCAVATED TO INSTALL FINAL COVER SYSTEM SHALL BE RELOCATED WITHIN LANDFILL LIMITS AND COVERED WITH COVER SOILS IN ACCORDANCE WITH OPERATING PERMIT PRIOR TO PLACEMENT OF FINAL COVER SYSTEM SOILS.
2. SOILS EXCAVATED OUTSIDE LANDFILL CELLS NOT CONTAINING WASTE MAY BE USED FOR GENERAL FILL IF APPROVED BY CONTRACTING OFFICER'S REPRESENTATIVE OR DISPOSED OF WITHIN LANDFILL LIMITS AND COVERED WITH COVER SOILS IN ACCORDANCE WITH OPERATING PERMIT PRIOR TO PLACEMENT OF FINAL COVER SYSTEM SOILS.
3. BOTTOM OF SUBTITLE D CELL SHOWN IS APPROXIMATE. IN OTHER AREAS WITHIN LANDFILL CELL LIMITS SHOWN THE WASTE WAS DEPOSITED BY TRENCH AND COVER METHODS. ASSUMED TOP OF WASTE WAS DETERMINED BY TEST PIT INVESTIGATION.

US Army Corps of Engineers

ARCADIS US, INC.
TX, ENGINEERING
LICENS# NO. F-533

EDUARDO QUIROZ P.E. # 85559

DATE	DESCRIPTION	DATE
07/29/14	REVISOR FOR TCEC SUBMISSION	07/29/14
07/17/14	PRELIMINARY REVIEW	07/17/14

DESIGNED BY: TAM	DATE: JULY 2014
DRAWN BY: TT	SOLICITATION NO.:
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FORT WORTH, TEXAS

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2828 BRIARPARK DRIVE, SUITE 300
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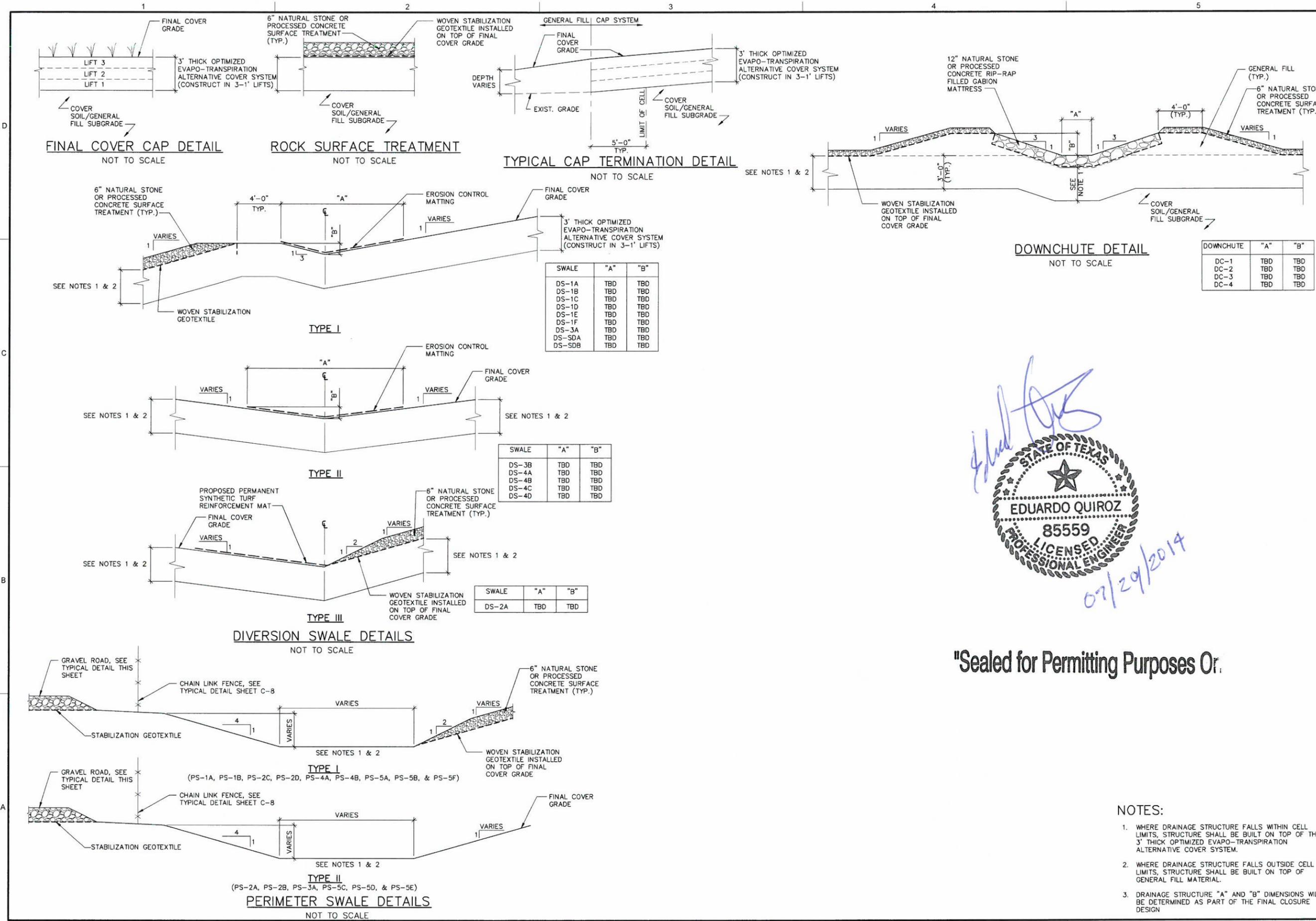
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PERMIT MODIFICATION APPLICATION -
OPTIMIZED EVAPO-TRANSPARATION (ET)
ALTERNATIVE COVER SYSTEM

FINAL COVER
LANDFILL CROSS SECTIONS

SHEET IDENTIFICATION
C-6

SHEET 3 OF 12

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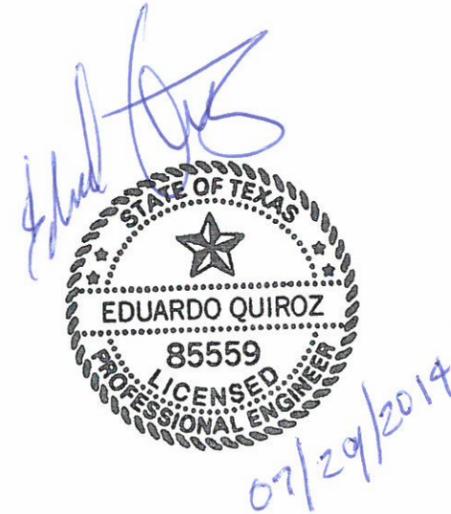


SWALE	"A"	"B"
DS-1A	TBD	TBD
DS-1B	TBD	TBD
DS-1C	TBD	TBD
DS-1D	TBD	TBD
DS-1E	TBD	TBD
DS-1F	TBD	TBD
DS-3A	TBD	TBD
DS-SDA	TBD	TBD
DS-SDB	TBD	TBD

SWALE	"A"	"B"
DS-3B	TBD	TBD
DS-4A	TBD	TBD
DS-4B	TBD	TBD
DS-4C	TBD	TBD
DS-4D	TBD	TBD

SWALE	"A"	"B"
DS-2A	TBD	TBD

DOWNCHUTE	"A"	"B"
DC-1	TBD	TBD
DC-2	TBD	TBD
DC-3	TBD	TBD
DC-4	TBD	TBD



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- NOTES:**
- WHERE DRAINAGE STRUCTURE FALLS WITHIN CELL LIMITS, STRUCTURE SHALL BE BUILT ON TOP OF THE 3' THICK OPTIMIZED EVAPO-TRANSPIRATION ALTERNATIVE COVER SYSTEM.
 - WHERE DRAINAGE STRUCTURE FALLS OUTSIDE CELL LIMITS, STRUCTURE SHALL BE BUILT ON TOP OF GENERAL FILL MATERIAL.
 - DRAINAGE STRUCTURE "A" AND "B" DIMENSIONS WILL BE DETERMINED AS PART OF THE FINAL CLOSURE DESIGN.

US Army Corps of Engineers

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TX ENGINEERING
LICENSE NO. F-533

EDUARDO QUIROZ P.E. # 85559

MARK	DESCRIPTION	DATE
B	REVISED FOR TCEG SUBMISSION	07/25/14
A	PRELIMINARY REVIEW	07/11/14

DESIGNED BY: TAM	DATE: JULY 2014
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SUBMITTED BY: TAM	CONTRACT NO.: 04675026
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FORT WORTH DISTRICT
FORT WORTH, TEXAS

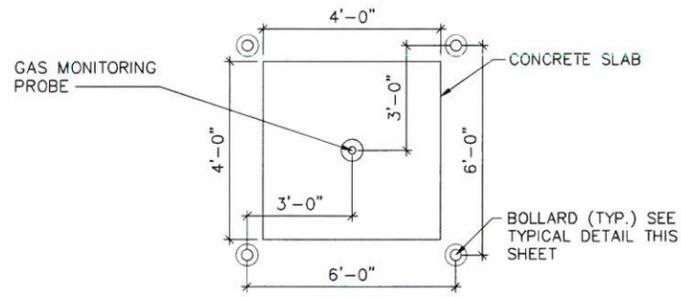
ARCADIS
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HOUSTON, TEXAS 77042

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
PERMIT MODIFICATION APPLICATION-
OPTIMIZED EVAPO-TRANSPIRATION (ET)
ALTERNATIVE COVER SYSTEM

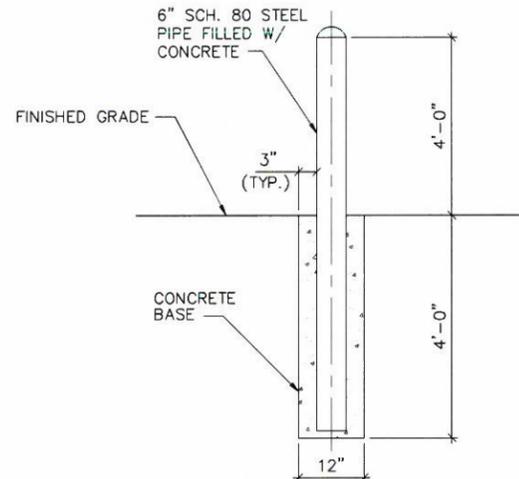
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C-7
SHEET 10 OF 12

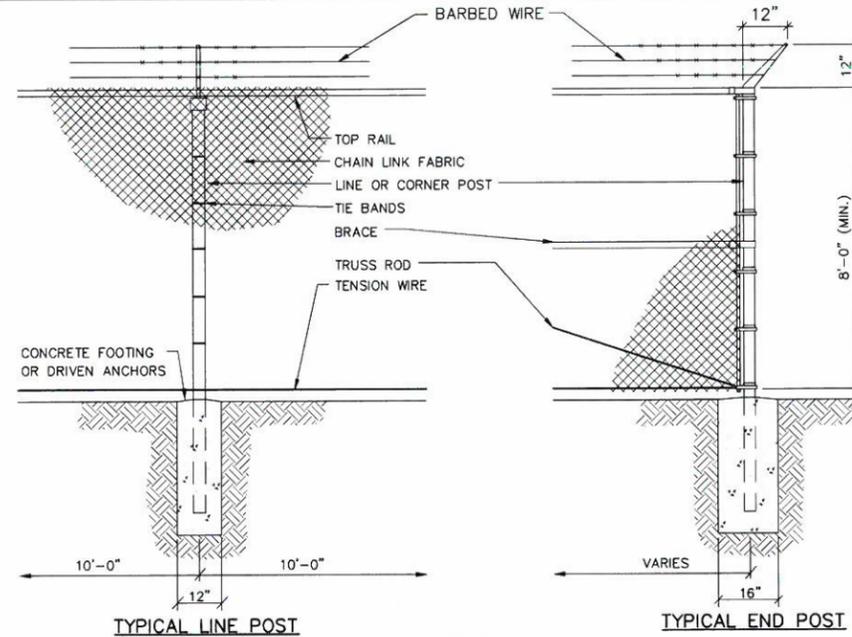
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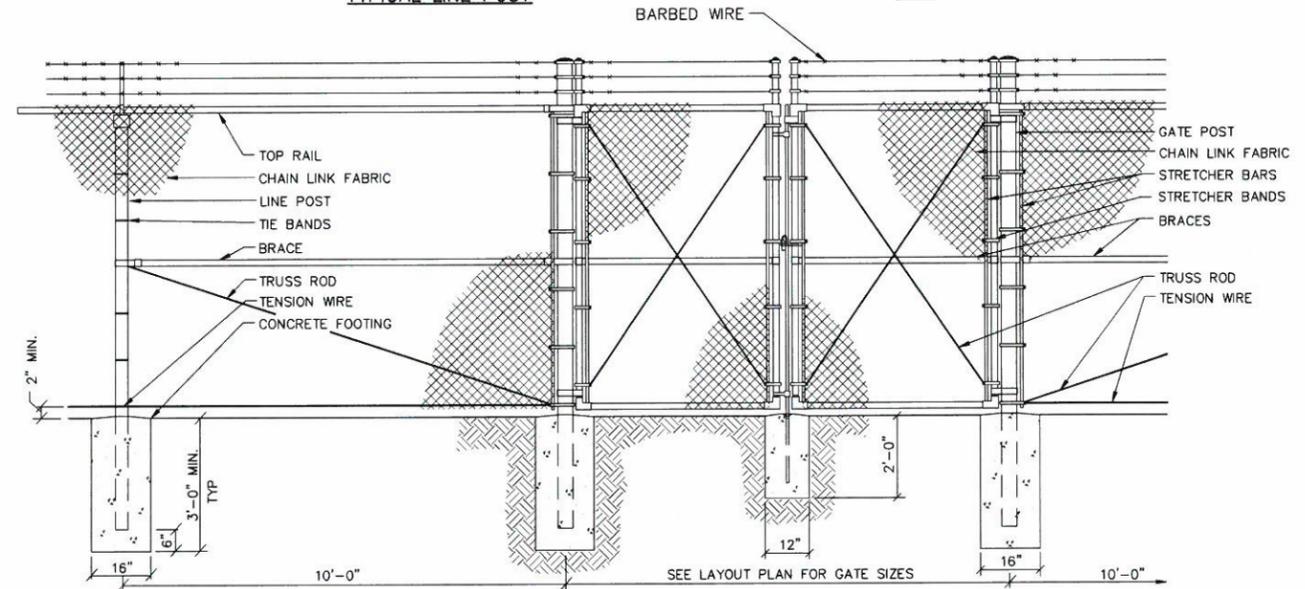
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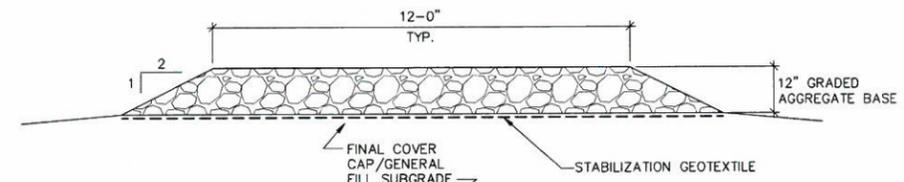
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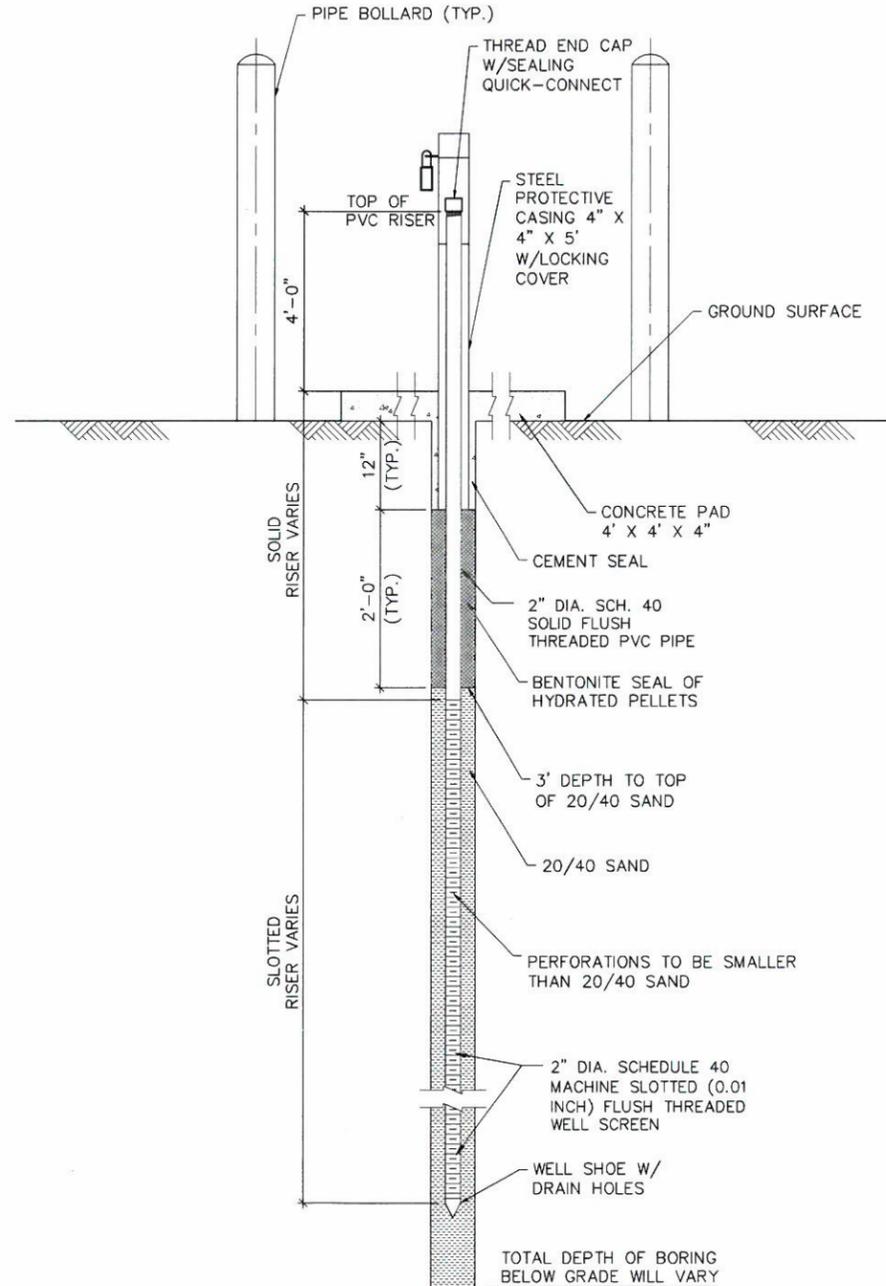
TYPICAL LINE POST **TYPICAL END POST**



TYPICAL DOUBLE GATE
TYPICAL CHAIN LINK FENCE DETAILS
NOT TO SCALE



TYPICAL GRAVEL ROAD DETAIL
NOT TO SCALE



GAS PROBE DETAIL
NOT TO SCALE

NOTE:
1. REPLACEMENT PROBES SHALL BE INSTALLED WITH THE SAME OVERALL DEPTH AND SCREENING INTERVAL AS THE EXISTING MONITORING WELLS BEING REPLACED.



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LICENSE NO. F-553

MARK	DESCRIPTION	DATE
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A	PRELIMINARY REVIEW	07/11/14

DESIGNED BY: TAM	DATE: JULY 2014
DWN BY: TAM	SOLICITATION NO.:
SUBMITTED BY: TAM	CONTRACT NO.:
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FORT WORTH DISTRICT
FORT WORTH, TEXAS

ARCADIS
2929 BRIARPARK DRIVE SUITE 300
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FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
PERMIT MODIFICATION APPLICATION
OPTIMIZED EVAPO-TRANSPIRATION (ET)
ALTERNATIVE COVER SYSTEM

TYPICAL SITE DETAILS

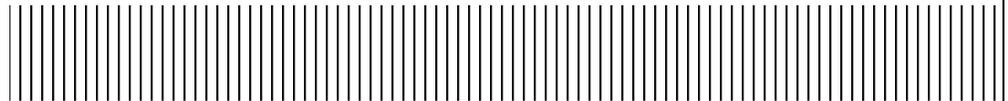
SHEET IDENTIFICATION
C-8
SHEET 11 OF 12



U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102

Appendix I – Slope Stability and Settlement Analysis Fort Bliss Municipal Solid Waste Landfill Permit 1422

July 2014



Infrastructure · Water · Environment · Buildings

Prepared By:

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2929 Briarpark Drive
Suite 300
Houston, Texas 77042 Tel 713 953 4800
Fax 713 977 4620

04675026.0000

ARCADIS U.S., Inc.
TX Engineering License # F-533

Engineering Certification

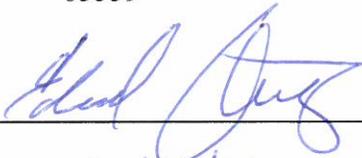
I attest that this Application has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Chapter §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Application.

Certifying Engineer: Eduardo Quiroz, P.E.

State: Texas

Registration Number: 85559

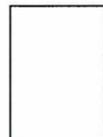
Signature:



Certification Date:

07/30/14

Engineering Seal:



1. Introduction	1-1
2. Slope Stability Analysis	2-1
3. Settlement Analysis	3-1
4. References	4-1

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Table 3-3 Estimated Range of Differential Settlement	3-3

Figures

- Figure 1: Site Plan
- Figure 2: Proposed Sections A-A' & B-B'
- Figure 3: Proposed Sections C-C' & D-D'
- Figure 4: Proposed Section E-E'

Attachments

- Attachment 1: Slope Stability Analyses
- Attachment 2: Settlement Calculations

Acronym List

C&D	Construction and Demolition
MSW	Municipal Solid Waste
MSWLF	Municipal Solid Waste Landfill Facility
RACM	Regulated Asbestos Containing Material
TCEQ	Texas Commission on Environmental Quality



1. Introduction

This report presents the results of our slope stability and settlement analysis performed for the Municipal Solid Waste Landfill (MSWLF) of Fort Bliss as part of the permit application for the proposed optimized Evapo-Transpiration (ET) alternative landfill closure design at the MSWLF.

The MSWLF is located northwest of Biggs Army Airfield and 300 feet east of the Southern Pacific Railroad tracks in El Paso County, Texas.

The Fort Bliss MSWLF includes active Subtitle D Type I and Type IV landfill cells that are currently in use to serve the entire U.S. Army Fort Bliss area. The landfill has been managed and operated by private contractors since January 1974. The landfill area comprises five distinct areas:

- § 1970's-era inactive cells (Cell 1, 2, 4 and 5) that cover 80-acres and are unlined and without leachate collection.
- § A 3-acre Type 1 cell (Cell 3) with final cover in place (non-Subtitle D) that was closed in 1999.
- § A 10.5-acre Type 1 active cell meeting Subtitle D requirements (Subtitle D cell). This cell is lined and has a leachate collection system. This cell is anticipated to reach capacity in 2014.
- § A 5-acre active Type IV construction and demolition (C&D) debris cell. This cell is unlined and without leachate collection. This cell is anticipated to reach capacity in 2014.
- § Approximately 7 acres designated for landfill roads, access areas, guard shack/scale house, etc.

2. Slope Stability Analysis

Several Sections are cut across the site to evaluate the slope condition and soil profile and select critical cross sections for stability analysis. The locations of the Sections are shown on Figures 1A and 1 B.

Stability analysis was performed on two selected cross sections in order to determine the factor of safety (FOS) for the proposed closure configuration. The selection of the cross sections analyzed was based on the most critical sections considering slope heights and slope inclination for the proposed final landfill grading plan and anticipated subgrade condition that occur through the Subtitle D landfill area. The two selected cross sections are from stationing 5+00 to 10+00 and from stationing 12+00 to 17+00 in Section E-E' (Figure 4). Section E-E runs from northeast to southwest across the landfill site and Subtitle D cell as shown on Figures 1A and 1B.

The analysis was based on the generalized soil stratigraphy of existing subgrade, existing liner, waste fill material, and the proposed cover cap system. Based on available information and our experience with similar materials, the following material parameters were assumed:

Table 2-1 Assumed Material Characteristics

Soil/Material Type	Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degree)
Native Subgrade	120	0	32
Existing Liner	120	0	16
Waste Fill	65	0	32
Cover Cap	120	0	30

The friction angle of existing liner is selected by recognizing that the strength of the liner is dominated by the soil-geosynthetic interface friction angle in the liner layer.

The referenced documentation indicates that the ground water elevation is located 300 feet or more in depth at the site. At this depth, ground water does not affect the slope stability and therefore it was not considered in the analysis.

Slope/W (Geo-Slope 2013) was used to perform the slope stability analysis. The analysis indicates that the slope is stable with a FOS of 3.25 or greater.

Graphical presentations of the results are provided in Attachment 1.

3. Settlement Analysis

Settlement analysis was performed for selected cross sections (from Section C-C', D-D' as shown on Figure 3, and Section E-E' as shown on Figure 4) for the proposed closure design. The purpose of the settlement analysis is to evaluate the effect of settlement to the designed 2% slope. The desired grade is between 2% and 5% slope at the end of the 30-year post closure period.

The inactive cells have been closed for 15 years (Cell 3) to 30 plus years (Cell 1, 2, 4 and 5). It is reasonable to assume that the majority of the long-term settlement in those areas has occurred. The native soil near ground surface in landfill roads and access areas mainly consists of medium dense to dense sand. The settlement in the areas of the inactive cells and landfill roads and access areas due to the proposed final grading is judged to be insignificant comparing to the anticipated settlement in the active cells. Therefore, the settlement analysis of this study was focused on settlement in the active cells.

The settlement in the active cells comprises settlement associated with consolidation of the native soil underlying the landfill cells (referred as landfill foundation settlement) and settlement associated with consolidation of the waste material (referred as landfill waste settlement). The former is judged to be negligible comparing to the latter. Malcom Pirnie (2008) estimated landfill foundation settlement at less than 0.021 inches.

The landfill waste settlement calculations are based on classical soil mechanics consolidation theory and include primary consolidation and secondary consolidation. The time of primary consolidation of the landfill waste was assumed to be about 3 months (from Oweis and Khera et al 1998) for this study. The cover construction is currently scheduled to start in October 2015 or later. It is our understanding that by July 2015, the majority of the active cells will be at or near designed full capacity. From this estimate, we can assume that the final cover will only be subjected to the primary consolidation from the cover and the secondary consolidation that will occur during post-construction.

The landfill waste settlement was estimated using Sower's model (Sower 1973). The model can be expressed as

$$DH = HC_c \log((s_0 + Ds)/s_0) + HC_a \log(t_2/t_1)$$

Where DH =settlement due to primary and secondary consolidation; H =initial thickness of the waste layer; C_c =primary compression index; s_0 =existing overburden pressure

acting at midlevel of the layer; D_s =increment of overburden pressure acting at midlevel of the layer; C_a =secondary compression index; t_1 =time for completion of initial (primary) consolidation; and t_2 =ending time period for which long-term settlement of layer is desired. The ranges of primary and secondary compression index for landfill waste were selected based on published data and literatures on MSW landfills and presented in the following Table 3-1:

Table 3-1 Assumed Compression Indices

Range	Primary Compression Index C_c	Secondary Compression Index C_a
Lower Bound	0.15	0.02
Upper Bound	0.25	0.07

Estimated settlements were made at various locations along the length of the cross sections as shown on Figure 3 and Figure 4. Based on the discussion above, the total settlement is controlled by the thickness of the landfill waste. The selection of the locations was based on the variations of the landfill waste thickness and the designed grading. For example, point b is at the top of the active Subtitle D cell where the thickness of the landfill waste (and the anticipated settlement) is the largest; Point a is at the location where the designed cell bottom slope (and the landfill thickness) is about to change significantly; Point a' is at the cell limit where the landfill waste thickness (and the anticipated settlement) is negligible.

Secondary settlement calculations of the landfill waste were performed for one year, fifteen years, and thirty years after the final cover placement. For these calculations, it was estimated that primary settlement occurred over 3 months. A summary of the analysis results of the settlement is presented in the following Table 3-2:

Table 3-2 Settlement Summary

Point	Landfill Waste Thickness (ft)	Range	Primary Settlement (ft)	Secondary Settlement in 30 years (ft)	Total Settlement in 30 years (ft)
a	38	Lower Bound	1.04	1.58	2.62
		Upper Bound	1.73	5.53	7.26
b	42	Lower Bound	1.07	1.75	2.82
		Upper Bound	1.79	6.11	7.90
c	36	Lower Bound	1.02	1.50	2.52
		Upper Bound	1.70	5.24	6.94
d	38	Lower Bound	1.04	1.58	2.62
		Upper Bound	1.73	5.53	7.26

Point	Landfill Waste Thickness (ft)	Range	Primary Settlement (ft)	Secondary Settlement in 30 years (ft)	Total Settlement in 30 years (ft)
e	44	Lower Bound	1.09	1.83	2.92
		Upper Bound	1.81	6.40	8.22
f	38	Lower Bound	1.04	1.58	2.62
		Upper Bound	1.73	5.53	7.26
g	36	Lower Bound	1.02	1.50	2.52
		Upper Bound	1.70	5.24	6.94
h	46	Lower Bound	1.10	1.91	3.02
		Upper Bound	1.84	6.69	8.53
i	36	Lower Bound	1.02	1.50	2.52
		Upper Bound	1.70	5.24	6.94
j	32	Lower Bound	0.98	1.33	2.31
		Upper Bound	1.63	4.66	6.29
k	32	Lower Bound	0.98	1.33	2.31
		Upper Bound	1.63	4.66	6.29

Based on the estimated total settlement above, the resulting differential settlement across the cap were calculated and shown in the Table 3-3 below:

Table 3-3 Estimated Range of Differential Settlement

Points	Range	Differential Settlement (ft)	Distance (ft)	Change of Grade (%)
a-b	Lower Bound	0.20	250	0.08
	Upper Bound	0.64		0.26
b-c	Lower Bound	0.30	250	0.12
	Upper Bound	0.96		0.38
d-e	Lower Bound	0.30	250	0.12
	Upper Bound	0.96		0.38
e-f	Lower Bound	0.30	250	0.12
	Upper Bound	0.96		0.38
g-h	Lower Bound	0.50	350	0.14
	Upper Bound	1.59		0.45
h-i	Lower Bound	0.50	350	0.14
	Upper Bound	1.59		0.45
j-k	Lower Bound	0.00	100	0.00
	Upper Bound	0.00		0.00

These differential settlement will not adversely affect the cross slope across the cap. The designed slope of 2% should stay more or less intact. The settlements are expected to taper gradually when approaching the cell limits. At cell limits (point a', c', d', f', g', i', j', and k'), the settlement is assumed to be negligible comparing to the magnitude of estimated total settlements in table above. The grade around Subtitle D cell limit will likely still maintain positive with minimum slope of 2% as the waste in the cell will be stacked up 15-20 feet above surrounding ground and the designed outboard grade is about 3 (horizontal) :1 (vertical) near the cell limits. However, the active C&D cell will likely see less than 2% grade near the south cell limit (point k to k'). Grading modification is recommended in this area. **To account for the anticipated settlement in the active C&D area, the slopes were increased to a 5 percent slope.**

The proposed Photovoltaic (PV) system will add additional load to the cover and the soil beneath. The load was estimated at 1.5 psi (210 psf). Based on the shape and size of the ballast, Boussinesq stress contour chart for infinitely long footings was used to compute pressure distribution underneath the ballast induced by this additional load. The additional settlement due to the load of PV system was estimated at less than 2 inch. This amount of settlement will not cause negative disruption to the cap such as ponding of storm water runoff.

Sample settlement calculations are available in Attachment 2.

4. References

Babu, G.L.S. and Reddy, K.R. et al. 2010. *Prediction of Long-Term Municipal Solid Waste Landfill Settlement Using Constitutive Model*. Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management, ASCE. April 2010, 133-150.

Bjarngard, A and Edgers, L. 1990. *Settlement of Municipal Solid Waste Landfills*, Proc. 13th Annual Madison Waste Conference, Madison, WI, 192-205.

Abeyta, C. 1996. Geohydrologic Site Characterization of The Municipal Solid Waste Landfill Facility, US Army Air Defense Artillery Center and Fort Bliss, El Paso County, Texas. U.S. Geological Survey, Water-Resources Investigations Report 95-4217. 1996.

Danny R. Anderson Consultants, Inc. (DRA). 1993. *Geotechnical and Subsurface Soil Investigation for the Design of the Modifications to the Fort Bliss Landfill*. December 22, 1993.

Ducan, J.M. and Wright S.G. 2005. *Soil Strength and Slope Stability*, Wiley. January 2005. ISBN: 978-0-471-69163-1

Geo-Slope International. 2013. *Slope/W, GeoStudio 2007*. Released November 12, 2013.

Malcolm Pirnie. 2008. *Slope Stability & Settlement Analysis, Fort Bliss Municipal Solid Waste Landfill*. March 2008.

NAVFAC DM 7.1M. 1986. *Soil Mechanics*. United States Navy, Naval Facilities Engineering Command, Design Manual 7.1. September 1986.

NAVFAC DM 7.3M. 1983. *Soil Dynamics, Deep Stabilization and Special Geotechnical Construction*. United States Navy, Naval Facilities Engineering Command, Design Manual 7.3. April 1983.

Oweis, I and Khera, R et al. 1986. *Criteria for Geotechnical Construction on Sanitary Landfills*. International Symposium on Environmental Geotechnology, Volume I, Edited by Hsai-Yang Fang, Lehigh University. Enviro Publishing Company, Inc.

Oweis, I and Khera, R et al. 1998. *Geotechnology of Waste Management*. Second Edition.

Sharma, H.D. and De, A. 2007. *Municipal Solid Waste Landfill Settlements: postclosure perspectives*, J. of Geotechnical and Geoenvironmental Engineering, 133(6), 619-629.

Sowers, G. 1973. *Settlement of Waste Disposal Fills*. Proc. 8th Intl. Conference on Soil Mechanics and Foundation Engineering. Moscow, Vol. 2(2), 207-210.

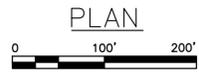
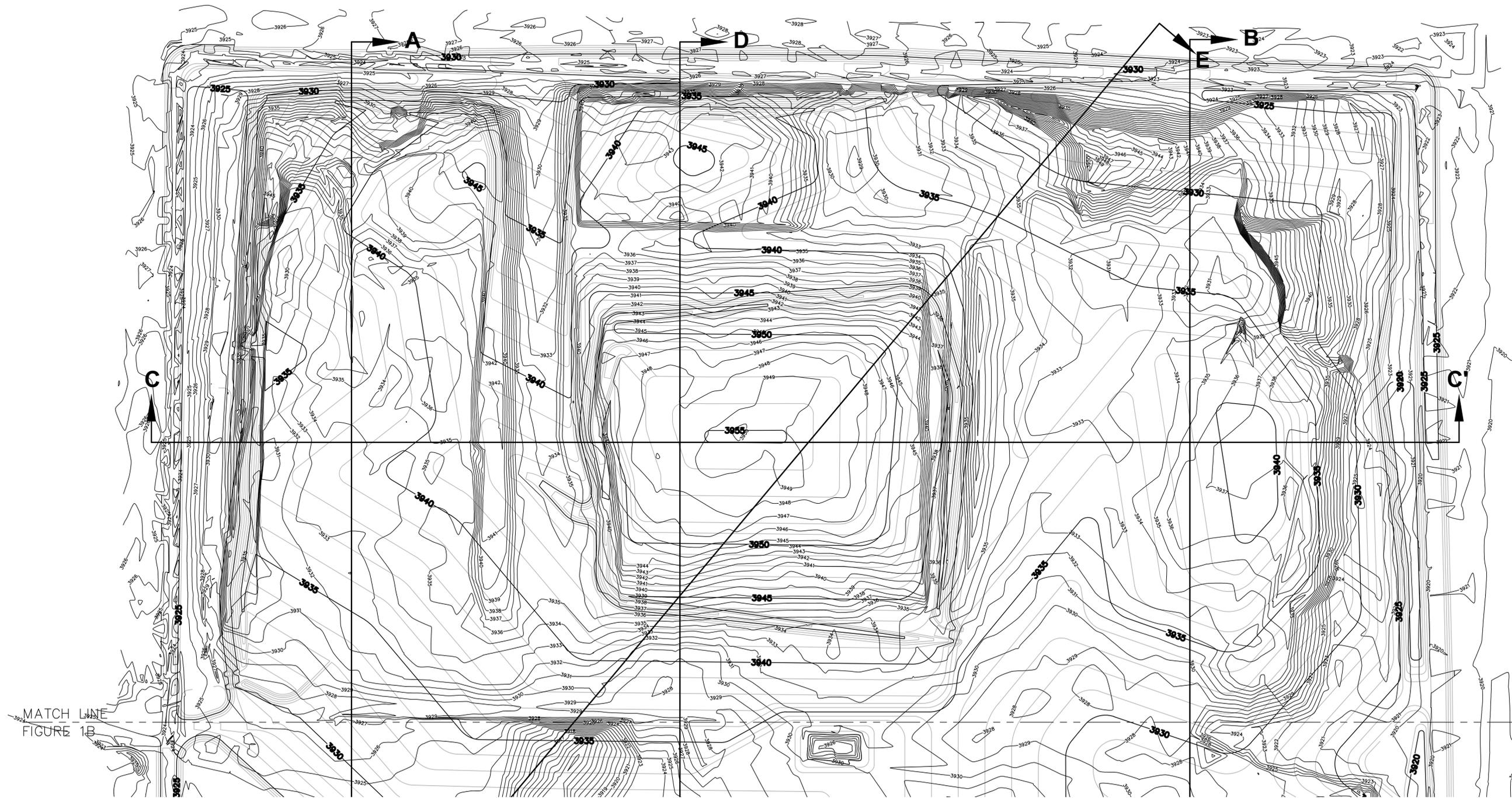
Terracon. 2011. *Slope Stability and Settlement Calculations, Fort Bliss Design and Permit Modification Application*. April 2011.

Yee, I.K. 1999. *Upgrading of Existing Landfills by Dynamic Consolidation A Geotechnical Aspect*. Master Builders Journal, September 1999.



Figures





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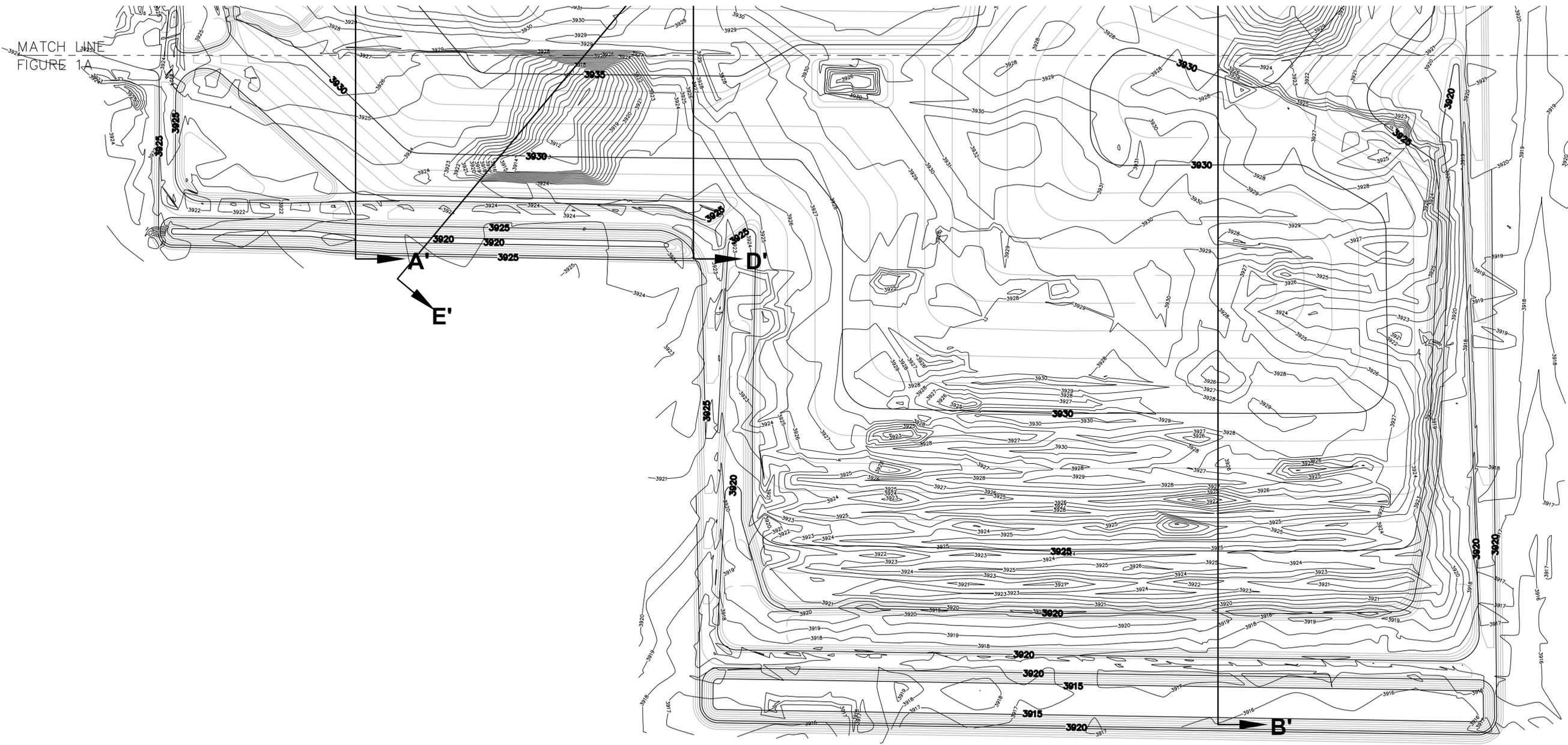


UNITED STATES ARMY CORPS OF ENGINEERS
 FORT WORTH DISTRICT
SLOPE STABILITY AND SETTLEMENT ANALYSIS

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 LANDFILL FINAL COVER DESIGN
SITE PLAN
 SCALE: AS SHOWN

JULY 2014

FIGURE 1A



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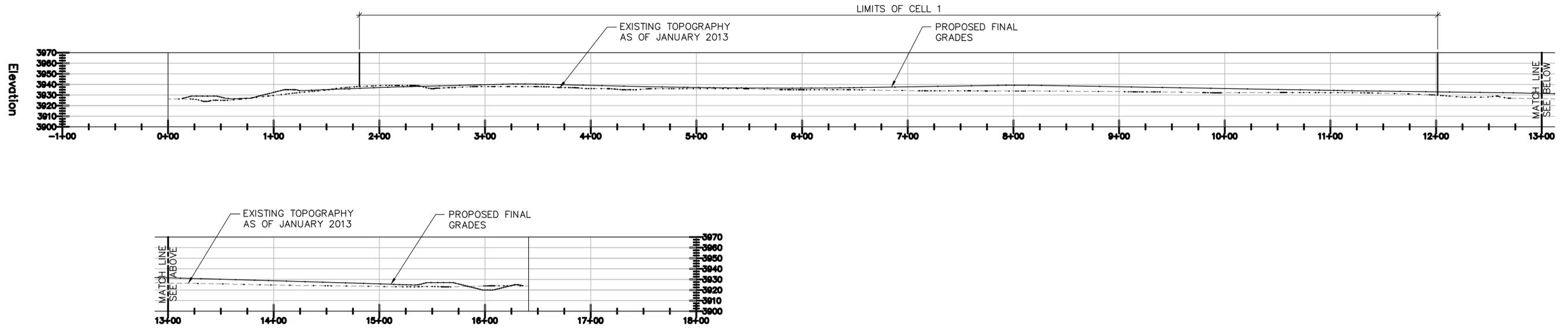
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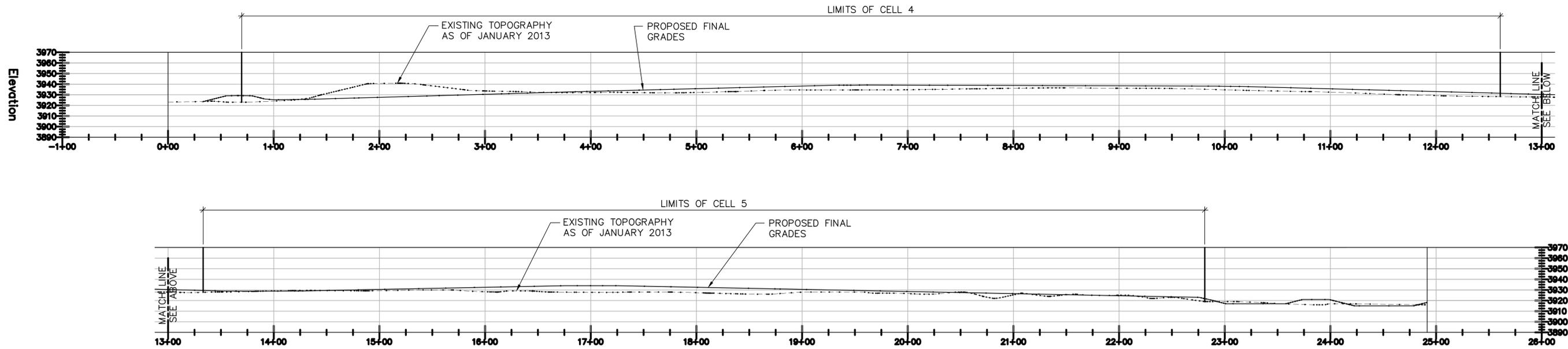
UNITED STATES ARMY CORPS OF ENGINEERS
 FORT WORTH DISTRICT
SLOPE STABILITY AND SETTLEMENT ANALYSIS

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 LANDFILL FINAL COVER DESIGN
SITE PLAN
 SCALE: AS SHOWN

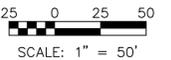
JULY 2014
FIGURE 1B



SECTION A-A'



SECTION B-B'



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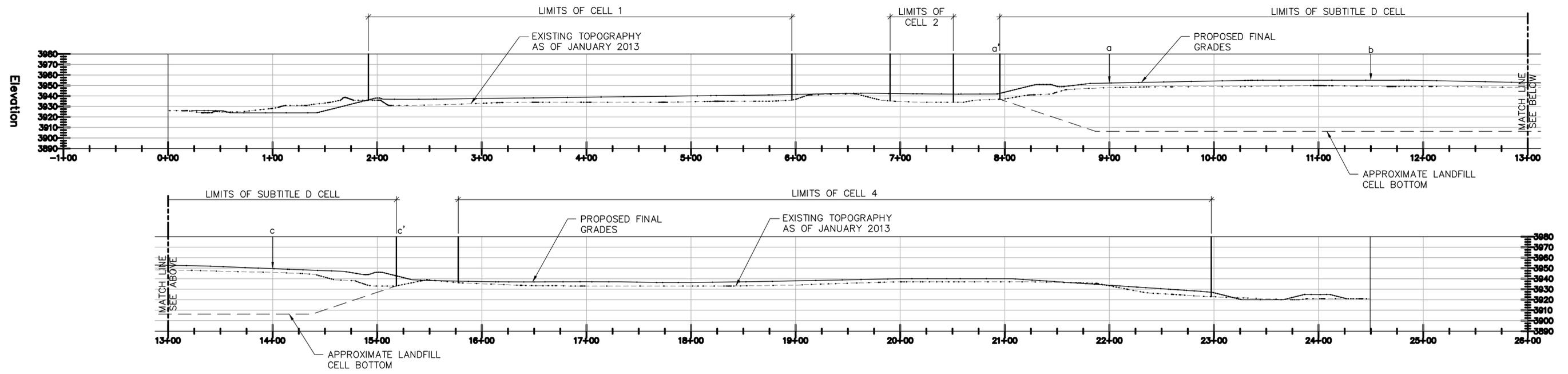


UNITED STATES ARMY CORPS OF ENGINEERS
 FORT WORTH DISTRICT
 SLOPE STABILITY AND SETTLEMENT ANALYSIS

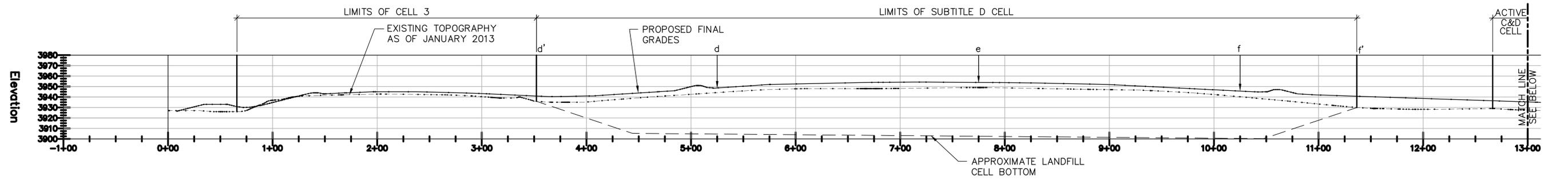
FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 LANDFILL FINAL COVER DESIGN
 PROPOSED SECTIONS A-A' & B-B'
 SCALE: AS SHOWN

JULY 2014

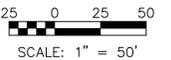
FIGURE 2



SECTION C-C'



SECTION D-D'



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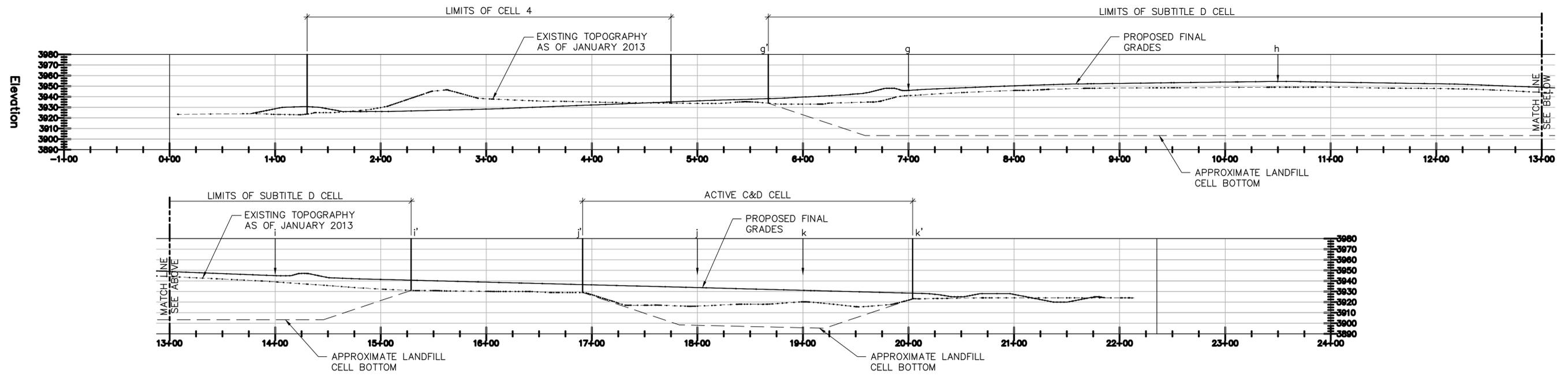


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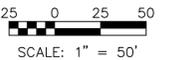
FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 LANDFILL FINAL COVER DESIGN
PROPOSED SECTIONS C-C' & D-D'
 SCALE: AS SHOWN

JULY 2014

FIGURE 3



SECTION E-E'



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UNITED STATES ARMY CORPS OF ENGINEERS
 FORT WORTH DISTRICT
SLOPE STABILITY AND SETTLEMENT ANALYSIS

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 LANDFILL FINAL COVER DESIGN
PROPOSED SECTION E-E'
 SCALE: AS SHOWN

JULY 2014

FIGURE 4

Attachment 1

Slope Stability Analyses



U.S. Army Corps of Engineers, Fort Worth District
Appendix I – Slope Stability and Settlement Analysis – Fort Bliss
Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014

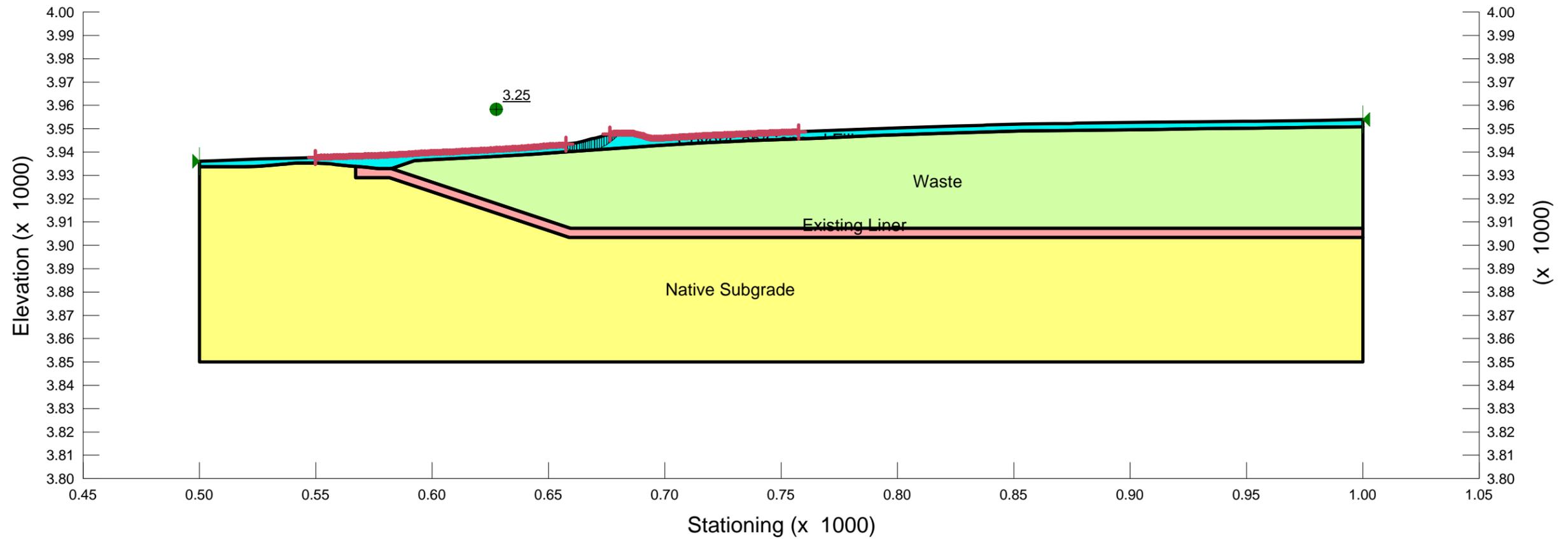


File Name: CrossSection5+00-10+00.gsz
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 Analysis Type: Spencer
 Cross Section 5+00 to 10+00
 Seismic Load: 0g
 Analysis View: 2D

Material Number, Description, Unit Weight, Cohesion, Friction Angle
 Material #1: Native Subgrade; Unit Weight: 120 pcf; Cohesion: 0 psf; Friction Angle: 32 degrees
 Material #2: Existing Liner; Unit Weight: 120 pcf; Cohesion: 0 psf; Friction Angle: 16 degrees
 Material #3: Waste ; Unit Weight: 65 pcf; Cohesion: 0 psf; Friction Angle: 32 degrees
 Material #4: Cover/Cap/General Fill; Unit Weight: 120 pcf; Cohesion: 0 psf; Friction Angle: 30 degrees

E

E'



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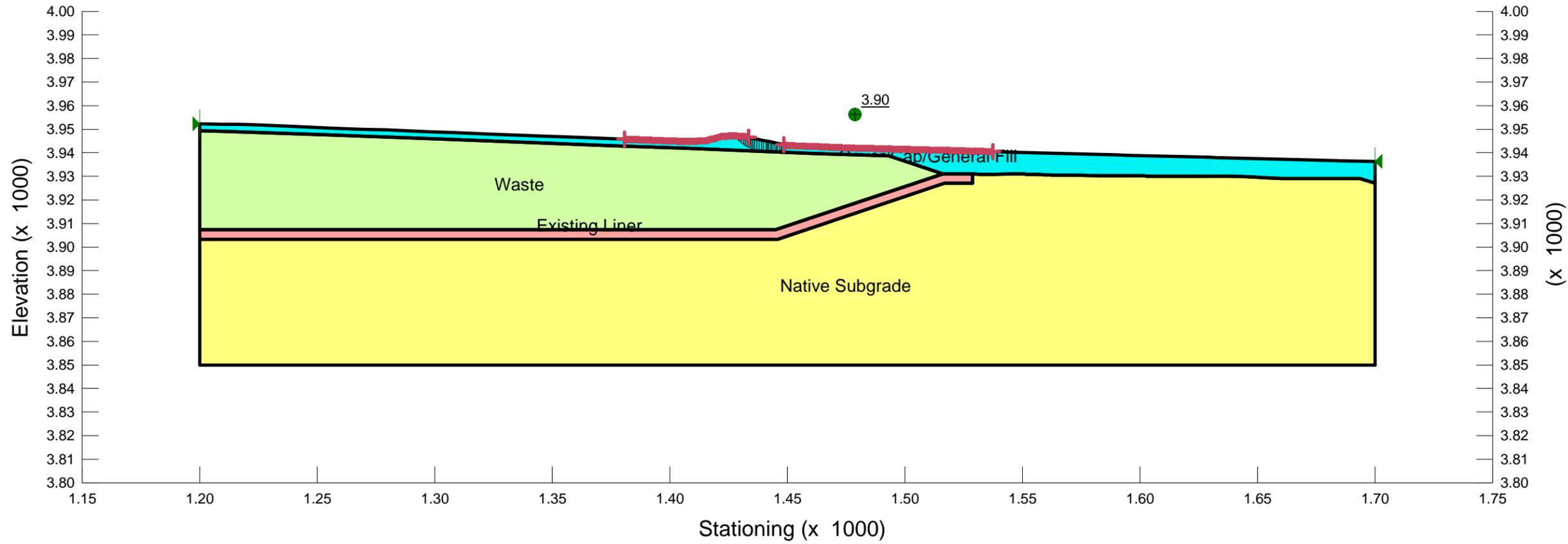
Scale 1 inch = 50 feet	Project Number 04575026.0000	Analyzed J. Hu	Municipal Solid Waste Landfill Fort Bliss, Texas	Cross Section 5+00 to 10+00 Section E-E'	Slope Stability Analysis Result	Attachment 1 Page 1/2
	Date 6/12/2014	Checked Staff				

File Name: CrossSection12+00-17+00.gsz
Last Saved Date: 6/12/2014
Analysis Type: Spencer
Cross Section 12+00 to 17+00
Seismic Load: 0g
Analysis View: 2D

Material Number, Description, Unit Weight, Cohesion, Friction Angle
Material #1: Native Subgrade; Unit Weight: 120 pcf; Cohesion: 0 psf; Friction Angle: 32 degrees
Material #2: Existing Liner; Unit Weight: 120 pcf; Cohesion: 0 psf; Friction Angle: 16 degrees
Material #3: Waste ; Unit Weight: 65 pcf; Cohesion: 0 psf; Friction Angle: 32 degrees
Material #4: Cover/Cap/General Fill; Unit Weight: 120 pcf; Cohesion: 0 psf; Friction Angle: 30 degrees

E

E'



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Scale 1 inch = 50 feet	Project Number 04575026.0000	Analyzed J. Hu	Municipal Solid Waste Landfill Fort Bliss, Texas	Cross Section 12+00 to 17+00 Section E-E'	Slope Stability Analysis Result	Attachment 1 Page 2/2
	Date 6/12/2014	Checked Staff				

Attachment 2

Settlement Calculations



U.S. Army Corps of Engineers, Fort Worth District
Appendix I – Slope Stability and Settlement Analysis – Fort Bliss
Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



Client: UASCE Fort Worth District
 Prepared by: ARCADIS U.S., INC. TX ENGINEERING LICENSE No. F-533

Fort Bliss Municipal Solid Waste Landfill
 El Paso, Texas
 Final Cover Design
 June 2014
 Revision 0

Subject: Landfill Waste Settlement Calculation

Waste	Primary Compression Index c_c	0.15	Lower Bound
	Secondary Compression Index c_{α}	0.02	
	Density	65	pcf
	Primary Compression Completion	0.25	year

Cover Thickness	3	ft
Cover Density	120	pcf

Layer	Depth, top (ft bgs)	Depth, Bottom (ft bgs)	Layer Thickness (ft)	Initial Overburden Pressure at Midlevel of Layer σ_0 (psf)	Increment of Overburden Pressure at Midlevel of Layer $\Delta\sigma$ (psf)	$(\sigma_0 + \Delta\sigma)/\sigma_0$	Primary Compression (ft)	Cumulative Primary Compression (ft)	Secondary Compression (ft)	Time after cover completion (year)			Time after cover completion (year)			Time after cover completion (year)		
										1	15	30	1	15	30	1	15	30
1	0	2	2	65	360	6.54	0.24	0.24	0.02	0.07	0.08	0.02	0.07	0.08	0.27	0.32	0.33	
2	2	4	2	195	360	2.85	0.14	0.38	0.02	0.07	0.08	0.05	0.14	0.17	0.43	0.52	0.55	
3	4	6	2	325	360	2.11	0.10	0.48	0.02	0.07	0.08	0.07	0.21	0.25	0.55	0.69	0.73	
4	6	8	2	455	360	1.79	0.08	0.55	0.02	0.07	0.08	0.10	0.28	0.33	0.65	0.84	0.89	
5	8	10	2	585	360	1.62	0.06	0.62	0.02	0.07	0.08	0.12	0.36	0.42	0.74	0.97	1.03	
6	10	12	2	715	360	1.50	0.05	0.67	0.02	0.07	0.08	0.14	0.43	0.50	0.81	1.10	1.17	
7	12	14	2	845	360	1.43	0.05	0.72	0.02	0.07	0.08	0.17	0.50	0.58	0.88	1.21	1.30	
8	14	16	2	975	360	1.37	0.04	0.76	0.02	0.07	0.08	0.19	0.57	0.67	0.95	1.33	1.42	
9	16	18	2	1105	360	1.33	0.04	0.79	0.02	0.07	0.08	0.22	0.64	0.75	1.01	1.43	1.54	
10	18	20	2	1235	360	1.29	0.03	0.83	0.02	0.07	0.08	0.24	0.71	0.83	1.07	1.54	1.66	
11	20	22	2	1365	360	1.26	0.03	0.86	0.02	0.07	0.08	0.26	0.78	0.91	1.12	1.64	1.77	
12	22	24	2	1495	360	1.24	0.03	0.89	0.02	0.07	0.08	0.29	0.85	1.00	1.17	1.74	1.88	
13	24	26	2	1625	360	1.22	0.03	0.91	0.02	0.07	0.08	0.31	0.92	1.08	1.22	1.84	1.99	
14	26	28	2	1755	360	1.21	0.02	0.94	0.02	0.07	0.08	0.34	1.00	1.16	1.27	1.93	2.10	
15	28	30	2	1885	360	1.19	0.02	0.96	0.02	0.07	0.08	0.36	1.07	1.25	1.32	2.03	2.21	
16	30	32	2	2015	360	1.18	0.02	0.98	0.02	0.07	0.08	0.39	1.14	1.33	1.37	2.12	2.31	
17	32	34	2	2145	360	1.17	0.02	1.00	0.02	0.07	0.08	0.41	1.21	1.41	1.41	2.21	2.41	
18	34	36	2	2275	360	1.16	0.02	1.02	0.02	0.07	0.08	0.43	1.28	1.50	1.45	2.30	2.52	
19	36	38	2	2405	360	1.15	0.02	1.04	0.02	0.07	0.08	0.46	1.35	1.58	1.50	2.39	2.62	
20	38	40	2	2535	360	1.14	0.02	1.05	0.02	0.07	0.08	0.48	1.42	1.66	1.54	2.48	2.72	
21	40	42	2	2665	360	1.14	0.02	1.07	0.02	0.07	0.08	0.51	1.49	1.75	1.58	2.57	2.82	
22	42	44	2	2795	360	1.13	0.02	1.09	0.02	0.07	0.08	0.53	1.56	1.83	1.62	2.65	2.92	
23	44	46	2	2925	360	1.12	0.02	1.10	0.02	0.07	0.08	0.55	1.64	1.91	1.66	2.74	3.02	
24	46	48	2	3055	360	1.12	0.01	1.12	0.02	0.07	0.08	0.58	1.71	2.00	1.69	2.82	3.11	
25	48	50	2	3185	360	1.11	0.01	1.13	0.02	0.07	0.08	0.60	1.78	2.08	1.73	2.91	3.21	
26	50	52	2	3315	360	1.11	0.01	1.14	0.02	0.07	0.08	0.63	1.85	2.16	1.77	2.99	3.31	
27	52	54	2	3445	360	1.10	0.01	1.16	0.02	0.07	0.08	0.65	1.92	2.25	1.81	3.08	3.40	
28	54	56	2	3575	360	1.10	0.01	1.17	0.02	0.07	0.08	0.67	1.99	2.33	1.84	3.16	3.50	
29	56	58	2	3705	360	1.10	0.01	1.18	0.02	0.07	0.08	0.70	2.06	2.41	1.88	3.24	3.59	
30	58	60	2	3835	360	1.09	0.01	1.19	0.02	0.07	0.08	0.72	2.13	2.50	1.92	3.33	3.69	

ft bgs = feet below ground surface
 pcf = pound per cubic foot
 psf = pound per square foot

Client: UASCE Fort Worth District
 Prepared by: ARCADIS U.S., INC. TX ENGINEERING LICENSE No. F-533

Fort Bliss Municipal Solid Waste Landfill
 El Paso, Texas
 Final Cover Design
 June 2014
 Revision 0

Subject: Landfill Waste Settlement Calculation

Waste	Primary Compression Index c_c	0.25	Upper Bound
	Secondary Compression Index c_{α}	0.07	
	Density	65	pcf
	Primary Compression Completion	0.25	year

Cover Thickness	3	ft
Cover Density	120	pcf

Layer	Depth, top (ft bgs)	Depth, Bottom (ft bgs)	Layer Thickness (ft)	Initial Overburden Pressure at Midlevel of Layer σ_0 (psf)	Increment of Overburden Pressure at Midlevel of Layer $\Delta\sigma$ (psf)	$(\sigma_0 + \Delta\sigma)/\sigma_0$	Primary Compression (ft)	Cumulative Primary Compression (ft)	Secondary Compression (ft)	Secondary Compression (ft)	Secondary Compression (ft)	Time after cover completion (year)			Time after cover completion (year)			Time after cover completion (year)		
												1	15	30	1	15	30	1	15	30
1	0	2	2	65	360	6.54	0.41	0.41	0.08	0.25	0.29	0.08	0.25	0.29	0.49	0.66	0.70			
2	2	4	2	195	360	2.85	0.23	0.63	0.08	0.25	0.29	0.17	0.50	0.58	0.80	1.13	1.22			
3	4	6	2	325	360	2.11	0.16	0.80	0.08	0.25	0.29	0.25	0.75	0.87	1.05	1.54	1.67			
4	6	8	2	455	360	1.79	0.13	0.92	0.08	0.25	0.29	0.34	1.00	1.16	1.26	1.92	2.09			
5	8	10	2	585	360	1.62	0.10	1.03	0.08	0.25	0.29	0.42	1.24	1.46	1.45	2.27	2.48			
6	10	12	2	715	360	1.50	0.09	1.12	0.08	0.25	0.29	0.51	1.49	1.75	1.62	2.61	2.86			
7	12	14	2	845	360	1.43	0.08	1.19	0.08	0.25	0.29	0.59	1.74	2.04	1.78	2.94	3.23			
8	14	16	2	975	360	1.37	0.07	1.26	0.08	0.25	0.29	0.67	1.99	2.33	1.94	3.25	3.59			
9	16	18	2	1105	360	1.33	0.06	1.32	0.08	0.25	0.29	0.76	2.24	2.62	2.08	3.56	3.94			
10	18	20	2	1235	360	1.29	0.06	1.38	0.08	0.25	0.29	0.84	2.49	2.91	2.22	3.87	4.29			
11	20	22	2	1365	360	1.26	0.05	1.43	0.08	0.25	0.29	0.93	2.74	3.20	2.36	4.17	4.63			
12	22	24	2	1495	360	1.24	0.05	1.48	0.08	0.25	0.29	1.01	2.99	3.49	2.49	4.46	4.97			
13	24	26	2	1625	360	1.22	0.04	1.52	0.08	0.25	0.29	1.10	3.24	3.78	2.62	4.76	5.30			
14	26	28	2	1755	360	1.21	0.04	1.56	0.08	0.25	0.29	1.18	3.49	4.08	2.74	5.04	5.63			
15	28	30	2	1885	360	1.19	0.04	1.60	0.08	0.25	0.29	1.26	3.73	4.37	2.86	5.33	5.96			
16	30	32	2	2015	360	1.18	0.04	1.63	0.08	0.25	0.29	1.35	3.98	4.66	2.98	5.62	6.29			
17	32	34	2	2145	360	1.17	0.03	1.67	0.08	0.25	0.29	1.43	4.23	4.95	3.10	5.90	6.62			
18	34	36	2	2275	360	1.16	0.03	1.70	0.08	0.25	0.29	1.52	4.48	5.24	3.22	6.18	6.94			
19	36	38	2	2405	360	1.15	0.03	1.73	0.08	0.25	0.29	1.60	4.73	5.53	3.33	6.46	7.26			
20	38	40	2	2535	360	1.14	0.03	1.76	0.08	0.25	0.29	1.69	4.98	5.82	3.44	6.74	7.58			
21	40	42	2	2665	360	1.14	0.03	1.79	0.08	0.25	0.29	1.77	5.23	6.11	3.56	7.01	7.90			
22	42	44	2	2795	360	1.13	0.03	1.81	0.08	0.25	0.29	1.85	5.48	6.40	3.67	7.29	8.22			
23	44	46	2	2925	360	1.12	0.03	1.84	0.08	0.25	0.29	1.94	5.73	6.69	3.78	7.56	8.53			
24	46	48	2	3055	360	1.12	0.02	1.86	0.08	0.25	0.29	2.02	5.97	6.99	3.88	7.84	8.85			
25	48	50	2	3185	360	1.11	0.02	1.88	0.08	0.25	0.29	2.11	6.22	7.28	3.99	8.11	9.16			
26	50	52	2	3315	360	1.11	0.02	1.91	0.08	0.25	0.29	2.19	6.47	7.57	4.10	8.38	9.48			
27	52	54	2	3445	360	1.10	0.02	1.93	0.08	0.25	0.29	2.28	6.72	7.86	4.20	8.65	9.79			
28	54	56	2	3575	360	1.10	0.02	1.95	0.08	0.25	0.29	2.36	6.97	8.15	4.31	8.92	10.10			
29	56	58	2	3705	360	1.10	0.02	1.97	0.08	0.25	0.29	2.44	7.22	8.44	4.41	9.19	10.41			
30	58	60	2	3835	360	1.09	0.02	1.99	0.08	0.25	0.29	2.53	7.47	8.73	4.52	9.46	10.72			

ft bgs = feet below ground surface
 pcf = pound per cubic foot
 psf = pound per square foot

Client: UASCE Fort Worth District
 Prepared by: ARCADIS U.S., INC. TX ENGINEERING LICENSE No. F-533

Fort Bliss Municipal Solid Waste Landfill
 El Paso, Texas
 Final Cover Design
 June 2014
 Revision 0

Subject: Settlement Calculation due to PV load

Waste	Primary Compression Index c_c	0.20	
	Density	65	pcf

Cover	Primary Compression Index c_c	0.01	
	Density	120	pcf

PV Ballast	Width	6	ft
	Load	210	psf

Layer	Depth, top (ft bgs)	Depth, Bottom (ft bgs)	Layer Thickness (ft)	Material	Density (pcf)	Initial Overburden Pressure at Midlevel of Layer σ_0 (psf)	Depth/Width	Interpolation location	Stress Ratio	Increment of Overburden Pressure at Midlevel of Layer $\Delta\sigma$ (psf)	$(\sigma_0 + \Delta\sigma)/\sigma_0$	Primary Compression (inch)	Cumulative Primary Compression (inch)
1	0	2	2	Cover	120	120.00	0.17	1	0.92	193.2	2.61	0.10	0.10
2	2	4	2	Cover	120	360.00	0.50	1	0.76	159.6	1.44	0.04	0.14
3	4	6	2	Waste	65	545.00	0.83	1	0.60	126.0	1.23	0.43	0.57
4	6	8	2	Waste	65	675.00	1.17	2	0.49	101.9	1.15	0.29	0.86
5	8	10	2	Waste	65	805.00	1.50	2	0.42	87.2	1.11	0.21	1.08
6	10	12	2	Waste	65	935.00	1.83	2	0.35	72.5	1.08	0.16	1.23
7	12	14	2	Waste	65	1065.00	2.17	3	0.29	61.3	1.06	0.12	1.35
8	14	16	2	Waste	65	1195.00	2.50	3	0.26	53.6	1.04	0.09	1.44
9	16	18	2	Waste	65	1325.00	2.83	3	0.22	45.9	1.03	0.07	1.51
10	18	20	2	Waste	65	1455.00	3.17	4	0.19	40.6	1.03	0.06	1.57
11	20	22	2	Waste	65	1585.00	3.50	4	0.18	37.8	1.02	0.05	1.62
12	22	24	2	Waste	65	1715.00	3.83	4	0.17	35.0	1.02	0.04	1.66
13	24	26	2	Waste	65	1845.00	4.17	5	0.16	32.6	1.02	0.04	1.70
14	26	28	2	Waste	65	1975.00	4.50	5	0.15	30.5	1.02	0.03	1.73
15	28	30	2	Waste	65	2105.00	4.83	5	0.14	28.4	1.01	0.03	1.76
16	30	32	2	Waste	65	2235.00	5.17	6	0.13	26.6	1.01	0.02	1.78
17	32	34	2	Waste	65	2365.00	5.50	6	0.12	25.2	1.01	0.02	1.81
18	34	36	2	Waste	65	2495.00	5.83	6	0.11	23.8	1.01	0.02	1.82
19	36	38	2	Waste	65	2625.00	6.17	7	0.11	22.4	1.01	0.02	1.84
20	38	40	2	Waste	65	2755.00	6.50	7	0.10	21.0	1.01	0.02	1.86
21	40	42	2	Waste	65	2885.00	6.83	7	0.09	19.6	1.01	0.01	1.87
22	42	44	2	Waste	65	3015.00	7.17	8	0.09	18.6	1.01	0.01	1.89
23	44	46	2	Waste	65	3145.00	7.50	8	0.09	17.9	1.01	0.01	1.90
24	46	48	2	Waste	65	3275.00	7.83	8	0.08	17.2	1.01	0.01	1.91
25	48	50	2	Waste	65	3405.00	8.17	9	0.08	16.5	1.00	0.01	1.92
26	50	52	2	Waste	65	3535.00	8.50	9	0.08	15.8	1.00	0.01	1.93
27	52	54	2	Waste	65	3665.00	8.83	9	0.07	15.1	1.00	0.01	1.94
28	54	56	2	Waste	65	3795.00	9.17	10	0.07	14.4	1.00	0.01	1.94
29	56	58	2	Waste	65	3925.00	9.50	10	0.07	13.7	1.00	0.01	1.95
30	58	60	2	Waste	65	4055.00	9.83	10	0.06	13.0	1.00	0.01	1.96

ft bgs = feet below ground surface
 pcf = pound per cubic foot
 psf = pound per square foot

Boussinesq Infinite Long Footing

Depth/Width	0	1	2	3	4	5	6	7	8	9	10
Stress Ratio	1	0.52	0.31	0.2	0.16	0.13	0.11	0.09	0.08	0.07	0.06

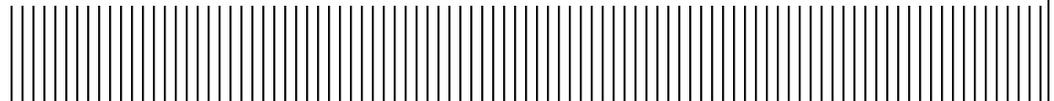


U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102

Appendix L – Final Facility Surface Water Drainage Report

Fort Bliss Municipal Solid Waste Landfill Permit 1422

Revised July 2014



Prepared By: ARCADIS U.S., Inc.

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TX Engineering License # F-533

Engineering Certification

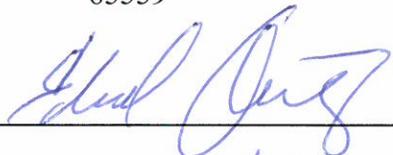
I attest that this Plan has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Rule §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Plan.

Certifying Engineer: Eduardo Quiroz, P.E.

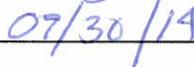
State: Texas

Registration Number: 85559

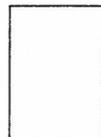
Signature:



Certification Date:



Engineering Seal:



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1. Introduction

The Fort Bliss Municipal Solid Waste Landfill (MSWLF) includes active Subtitle D Type I and Type IV (C&D) landfill cells that are currently in use to serve the United States Army Fort Bliss area. Permitted types of solid wastes disposed of at the Fort Bliss MSWLF are non-hazardous solid waste from military operations, bulky items, grass and tree trimmings, refuse from litter cans, construction debris, classified waste (dry), dead animals, Regulated Asbestos Containing Material (RACM), and empty oil cans (1-quart and 5-gallon sizes). The MSWLF does not receive hazardous waste nor does it recover incoming waste.

The landfill area is comprised of five distinct areas:

- § 1970's-era inactive cells that cover approximately 80-acres that are considered closed.
- § An approximately 3-acre Type I cell with final cover in place (non-Subtitle D) that complies with the 1995 closure plan and TCEQ requirements.
- § An approximately 10.5-acre Type I active cell meeting Subtitle D requirements (Subtitle D Cell).
- § An approximately 5-acre Type IV construction and demolition (C&D) debris active cell.
- § Approximately 3.2 acres designated for landfill roads, access areas, guard shack/scale house, etc.

This Facility Surface Water Drainage Report has been completed to meet the requirements of Title 30 of the Texas Administrative Code (TAC) Chapter 330.63(c) (30 TAC §330.63(c)) as part of the final closure and permit modification application for an alternative cover design and grading plan. This report illustrates that the proposed modification does not adversely alter the existing (permitted) drainage patterns and that these drainage patterns can be retained for the modification.

This report also serves as the surface water drainage report required by 30 TAC § Subchapter G. The facility design complies with the requirements of 30 TAC § 330.303 relating to management of run-on and runoff. The surface water drainage analysis for the

Fort Bliss MSWLF is presented in Section 2. An Erosion and Sediment Control Plan is included in Section 3. Section 4 presents the maintenance and inspection requirements.

1.1. General Geology and Soils

The Fort Bliss MSWLF is underlain by Hueco Bolson deposits of tertiary age and typically are composed of unconsolidated to slightly consolidated interbedded sands, clay, silt, gravel, and caliche. Individual beds are not well defined and range in thickness from a fraction of an inch to about 100 feet. The general geology and soils details for the MSWLF site are provided in Attachment 6 of this report.

1.2. General Climate and Weather

The MSWLF is located in west Texas where desert conditions exist; therefore, surface water flow near the MSWLF is limited. Maximum daytime summer temperatures range between 90 and 105 degrees Fahrenheit (°F) and winter temperatures range from 55 to 60°F. The surrounding area receives less than 10 inches of rain per year and relative humidity is very low. Depending upon the intensity and duration of each precipitation event, the water delivered by the occurrence may infiltrate into the soil or become surface runoff. The infiltrated water may percolate downward to the water table or return to the atmosphere via evapotranspiration.

1.3. Surface Water Bodies

No surface water bodies exist at or near the MSWLF. Given a large rain event, surface water runoff may flow downstream to the storm water retention basin located approximately 2 miles south of the landfill, north of Fred Wilson Boulevard. Structural control measures to reduce sediment are described in the 2005 Storm Water Pollution Prevention Plan (Attachment 5). Further discussion on the surface water drainage and erosion and sedimentation controls are given in Sections 2 and 3, respectively.

2. Facility Surface Water Drainage Analysis

The final grading/drainage plan for the approximately 110 acre landfill was modified to incorporate an optimized ET cover to further economize the closure effort and costs. This optimized ET cover will reduce the cover thickness and soil characteristics of the cover system to allow for the utilization of soil borrow from sources located within the Fort. The grading was further altered to minimize the excavation and relocation of waste as well as to provide uniform slopes that maximized a southern orientation (to the extent practical) for the future PV development. However, the drainage concept remains consistent with the previously approved site plans and consists of mostly overland and shallow concentrated flows leading off the landfill side slopes. Diversion swales provide flow paths for internal watersheds to the perimeter swales. Surface water runoff collected by these diversion swales discharge either directly or via downchutes into the perimeter swales. In general, surrounding flow patterns drain towards the northwest, southwest and southeast corners of the landfill. Three sets of culverts convey runoff from the perimeter swales to these historic discharge locations as shown on Drawing D-1 in Attachment 1. The surrounding drainage patterns will not be adversely altered as a result of this alternative cover design and grading plan.

A hydrologic and hydraulic analysis was conducted on the final grading plan, shown on Sheets C-2 and C-3 in Appendix B (Design Drawings) of the permit modification. The analysis incorporates the proposed alternative cover design and grading modifications to estimate the peak discharge and run-off volumes associated with the 25-year, 24-hour design storm event as required in 30 TAC §330.305(c). The runoff volumes and peak discharges show that the drainage is not adversely affected and that the designated storm water control features (i.e. diversion swales, downchutes, perimeter swales, and culverts) are adequate.

Drawing D-1 in Attachment 1 of this report provides the drainage areas, cross-sectional areas, and grades used in the analysis.

The TCEQ Guidelines for Preparing a Surface Water Drainage Report for a Municipal Solid Waste Facility (RG-417) and the Rational Method described in Chapter 5, Section 6 of the Texas Department of Transportation's Hydraulic Design Manual (TxDOT 2004) was used to calculate the peak discharge flows. Use of USDA Natural Resources Conservation Service (NRCC) Technical Release 55 (TR-55) method has been approved by the Texas Commission on Environmental Quality (TCEQ) Executive Director for the calculation of the runoff volumes. The values for runoff volume, peak discharge, and flow velocity calculated in this analysis are used to design the erosion and sediment

controls and to confirm that the existing drainage patterns for the landfill will not be adversely affected because of these modifications.

2.1. Runoff Volume

The volume of runoff from the landfill cover is dependent on the anticipated amount of precipitation and potential abstractions (principally infiltration) which depend on the soil type, vegetative cover, and the hydraulic conditions of the soil and proposed cover material.

The runoff volume from the landfill is calculated in accordance with 30 TAC §330.63(c)(1)(C) and §330.305(a) using the Curve Number (CN) Method, also known as the Soil Conservation Service (SCS Runoff Curve Number Method) method TR-55:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

Where: Q = runoff (inches over the watershed area)

P = precipitation for the 25-year/24-hour storm event (inches)

S = $1000/CN - 10$ = potential maximum retention after runoff begins (inches)

CN = SCS curve number (Table 2-2, Chapter 2, TR-55)

The following assumptions were used to obtain the values above:

P = 3.5 inches (NOAA National Weather Service, Technical Paper 40, 1961)

CN = 82 (weighted average: 106.3 acres of CN 81 from Table 2.2d, fair herbaceous cover Hydrologic Soil Type C and 3.2 acres of CN 85 from Table 2.2a, Gravel access roads Hydrologic Soil Type B)

Therefore, the total runoff volume for the landfill during a 25-year, 24-hour storm event is:

$$S = 1000/82 - 10 = 2.2$$

$$Q = (3.5 - 0.2*2.2)^2 / (3.5 + 0.8*2.2) = 1.78 \text{ inches}$$

$$\text{Runoff Volume} = Q*A = 1.78 \text{ inches (109.5 acres)/12} = 16.2 \text{ acre-feet (ac-ft).}$$

A copy of Worksheet 2 from TR-55 is provided as Attachment 1 of this report.

**Table 2-1
Summary of Runoff Volumes**

Precipitation (P)	Runoff (Q)	Total Runoff Volume (V)
3.5 inches (25-year, 24-hour)	1.78 inches	16.2 ac-ft

The landfill was divided into 19 separate drainage (watershed) areas based on the final grading plan as shown on Sheets C-2 and C-3 of Appendix B (Design Drawings) of the permit modification application. The following table summarizes the runoff volume for each watershed.

**Table 2-2
Runoff Volumes by Watershed**

Watershed No.	Area (acres)	Runoff Volume (ac-ft)
1	4.4	0.6
2	12.5	1.9
3	2.0	0.3
4	0.9	0.1
5	1.1	0.2
6	2.3	0.3
7	2.1	0.3
8	0.8	0.1
9	1.9	0.3
10	1.3	0.2
11	0.5	0.1
12	14.3	2.1
13	6.8	1.0
14	4.4	0.7
15	4.4	0.7
16	7.9	1.2
17	17.8	2.6
18	19.9	3.0
19	4.2	0.5
Total:	109.5	16.2

2.2. Peak Discharges

The peak discharge at any storm water control outlet or overland flow from a watershed area is dependent on the time of concentration of that watershed area or drainage swale outfall. The following paragraphs described the rational method and assumptions used to calculate the peak discharge flows for each of the 19 watershed areas shown on Drawing D-1 in Attachment 1 of this report.

2.2.1. Time of Concentration

The time of concentration (T_c) is the time required for a drop of water to travel from the most hydrological remote point in the watershed to the point of collection.

The time of concentration was calculated according to the procedures specified in TR-55 for each watershed area.

The steps for determining the time of concentration are summarized below:

1. The landfill was divided into 19 separate watershed areas based on the final grading plan as shown on Drawing D-1 in Attachment 1.
2. The area of each watershed was determined as summarized in Table 2-2.
3. The sheet flow, shallow concentrated flow, and channel flow lengths and slopes were determined for each watershed area using the grades shown on Drawing D-1 in Attachment 1 of this report.
4. The travel time (T_t) for the separate types of flow in each watershed area were calculated (Worksheet 3, Chapter 3, TR-55) using the following equations and then added together to compute the total T_c for the watershed area:

$$T_c = \text{Sheet Flow } T_t + \text{Shallow Concentrated Flow } T_t + \text{Channel Flow } T_t$$

- a. Sheet flow travel time was calculated with a maximum flow length of 300-feet using Overton and Meadow's equation: $T_t = 0.007 (nL)^{0.8} / (P^2)^{0.5} (S)^{0.4}$ (the value for "bare soil", 0.011, was used for the roughness coefficient n).
- b. Shallow concentrated flow travel time was calculated using the equation $T_t = L/3600 * V$ where the average flow velocity (V) was obtained from Figure 3.1 in Chapter 3 of TR-55 for unpaved surface at the specified watercourse slope.
- c. Channel flow travel time was also calculated using $T_t = L/3600 * V$ where the average flow velocity was calculated by the Manning's equation:

$V = 1.49 * (r^{2/3}) (s^{1/2}) / n$. (0.022 was used for Manning's roughness coefficient for the grass swale, n). The following iteration was followed to determine the final T_t :

1. Depth of flow, "y", is assumed.
2. Cross-section area, wetted perimeter, and hydraulic radius are calculated.

3. It is determined and the peak discharge is computed with TR-55.
4. The peak discharge is used in the Manning's equation to determine the depth of flow, "y".
5. The computed depth of flow is compared with the assumed value. The assumed value is adjusted and the calculation reiterated until the calculated and assumed values are close in value.

2.2.2. Rational Method

The procedure for calculating the Rational Method described in Chapter 5, Section 6 of the Texas Department of Transportation's Hydraulic Design Manual (TxDOT 2004) was used to calculate the maximum rate of runoff. The Rational Method estimates the peak rate of runoff at any location in a watershed as a function of the drainage area, runoff coefficient, and mean rainfall intensity of duration equal to the time of concentration. The rational formula is expressed as:

$$Q = CC_fIA$$

Where: Q = Maximum rate of runoff (cfs)

C = Runoff coefficient (0.38 based on poor vegetative cover and relatively flat land)

C_f = Runoff Coefficient Adjustments (1.1 for the 25-year storm)

I = Average rainfall intensity (in/hr) for the 25-year/24 hr and the time of concentration for each area as described in Section 2.2.1 above.

A = Drainage area (acres)

Because all of the watersheds are small and the fact that they had times of concentration less than 10.25 minutes (minimum time of concentration of 10 minutes recommended by 2004 TxDOT Hydraulic Manual), the rainfall intensity for the 25-year storm for all watersheds was 4.4 inches/hour. The runoff coefficient was calculated as a factor of the relief, soil infiltration characteristics, vegetative cover, and surface type in accordance with the Hydraulic Design Manual (TxDOT 2004). A runoff coefficient factor of 1.1 was used to adjust the runoff coefficient since these calculations are for the 25-year storm event. A sample calculation and the results of the peak discharge calculations for the 19 watersheds are provided in Attachment 1 and Table 2-3, respectively.

**Table 2-3
Peak Discharges**

Watershed No.	Area (acres)	Time of Concentration (hours)	Peak Discharge (cfs)
1	4.4	0.14	8.1
2	12.5	0.11	23.0
3	2.0	0.03	3.6
4	0.9	0.03	1.6
5	1.1	0.01	1.9
6	2.3	0.09	4.2
7	2.1	0.11	3.9
8	0.8	0.08	1.5
9	1.9	0.16	3.5
10	1.3	0.04	2.4
11	0.5	0.03	1.0
12	14.3	0.17	26.2
13	6.8	0.04	12.5
14	4.4	0.07	8.0
15	4.4	0.07	8.2
16	7.9	0.10	14.5
17	17.8	0.07	32.7
18	19.9	0.14	36.6
19	4.2	0.06	7.8

2.3. Peak Runoff Velocity Calculations

The general surface hydrology and stormwater runoff for the final cover grades are shown on Drawing D-1 in Attachment 1 of this report. Storm water from watersheds 1, 2, 3, 10, 12, 13, 16, 17, and 18 drain straight to the perimeter drainage swales, whereas watersheds 4 through 9, 11, 14, 15, and 19 drain to erosion control lined diversion swales and then out to the existing perimeter drainage swales. Downchutes are used to convey runoff down steep embankments. Culverts collect runoff from the perimeter drainage swales and discharge to the natural surrounding flow patterns that generally flow towards the southeast, southwest, and northwest corners of the landfill.

The flow velocities and the flow depths for the diversion swales, perimeter swales, and downchutes are summarized below in Tables 2-4 through 2-6. The typical diversion swale is V-shaped, 1 to 2 feet deep with approximately 10 (H): 1 (V) side slopes on one side and 2 (H): 1 (V) side slopes on opposite side. The typical perimeter swale is trapezoidal, 1 to 2 feet deep with 4 (H): 1 (V) side slopes and a bottom width that ranges from 13 feet to 30 feet. The typical downchute is trapezoidal in shape, 1 to 2 feet deep with 1 (H): 1 (V) side slopes. Details shown on Sheet C-7 in Appendix B (Design Drawings) of the permit modification were used for the hydraulic analysis of the landfill drainage structures. A sample calculation of the methodology used for determining the velocities and flow depths is provided in Attachment 1. As demonstrated in Tables 2-4 through 2-6, flow depths of each conveyance structure are less than or equal to 1 foot, therefore all drainage structures provide sufficient capacity to convey peak flow from the 25-year, 24-hour storm event. Erosion control measures for velocities greater than the permissible velocity of the soil are discussed in Section 3.0 of this report.

**Table 2-4
Velocities and Depths of Flow in Diversion Swales**

Diversion Swale	Watershed Associated with Swale	Peak Discharge (cfs)	Flow Depth (ft)	Velocity (ft/s)
DS-1A	4	1.6	0.3	3.7
DS-1B	5	1.9	0.3	3.1
DS-1C	6	4.2	0.4	3.5
DS-1D	7	3.9	0.4	3.3
DS-1E	8	1.5	0.3	2.9
DS-2A	19	7.8	0.6	4.4
DS-3A	11	1.0	0.2	3.3
DS-4C/4D	14, 15, & 17	48.9	0.9	5.8
DS-SDA	14	8.0	0.7	2.6
DS-SDB	15	8.2	0.7	2.8

The potential need and sizing of diversion swales DS-3B, DS-4A, and DS-4B will be evaluated further during final design. Diversion swale DS-1F will convey a minor amount of flow and is intended to funnel any remaining runoff that is not directly captured by downchute DC-3. Therefore, analysis of these drainage structures is not included in Table 2-4.

**Table 2-5
Velocities and Depths of Flow in Perimeter Swales**

Perimeter Swale	Watershed Associated with Swale	Peak Discharge (cfs)	Flow Depth (ft)	Velocity (ft/s)
PS-1A	3 thru 5, 10 & 19	17.3	0.4	2.3
PS-1B	10	2.4	0.2	1.0
PS-2A/2B/2C/2D	1, 6 thru 9	21.3	0.2	1.3
PS-3A	2	23.0	1.0	1.7
PS-4A	16 & 18	51.1	0.5	1.7
PS-4B	16	14.5	0.2	2.1
PS-5A	11 thru 15 & 17	88.6	0.6	2.9
PS-5B	11 thru 13	39.7	0.5	1.8
PS-5C/5D/5E/5F	11 & 12	27.2	0.4	2.4

**Table 2-6
Velocities and Depths of Flow in Downchutes**

Downchute	Watershed Associated with Downchute	Peak Discharge (cfs)	Flow Depth (ft)	Velocity (ft/s)
DC-1	4 & 5	3.5	0.1	4.0
DC-2	6 & 7	8.1	0.1	5.5
DC-3	8 & 9	5.0	0.1	4.5
DC-4	14 & 15	16.2	0.2	7.2

2.4. Culver Capacity Calculations

Storm water from the perimeter drainage swales drain to four sets of culverts. Three sets of culverts discharge to the natural surrounding flow patterns at the southeast, southwest, and northwest corners of the landfill. The fourth culvert conveys flow south across the access point on the west side of the landfill.

The headwater/depth ratio and outlet velocity are summarized below in Table 2-7. Culverts 1 through 3 will consist of 24-inch CMP barrels and Culvert 4 will have 36-inch barrels. Culverts were sized using nomographs from the Federal Highway Administration HEC-5 manual. These nomographs are provided in Attachment 1. Culverts were sized to provide sufficient capacity to convey peak flow from the 25-year, 24-hour storm event without overtopping. A gabion mattress will be used for erosion control on the outlet side of each culvert. As discussed in Section 3.2.2 below, the permissible velocity for gabions mattresses is 18 ft/sec.

**Table 2-7
Velocities and HW/D Ratios of Flow in Culverts**

Culvert	Watershed Associated with Culvert	Culvert Size	Peak Discharge (cfs)	HW/D Ratio	Outlet Velocity (ft/s)
C-1	3 thru 5, 10 & 19	One Barrel, 24" CMP	17.3	1.5	5.5
C-2A	1, 6 thru 9	Two Barrel, 24" CMPs	21.3	1.5	3.4
C-2	1, 2, 6 thru 9	Three Barrel, 24" CMPs	48.4	1.5	5.1
C-3	11 thru 18	Three Barrel, 36" CMPs	139.7	1.3	6.6

2.5. Summary of Drainage Analysis

Table 2-8 summarizes the results from the pre-developed (permitted facility conditions per the approved 1995 Closure Plan) and post-developed conditions (final closure with optimized ET cover design and grading plan) to demonstrate that the proposed modification does not adversely affect the drainage patterns. The comparison illustrates that the range of peak flow and normal depth of flow decrease compared to pre-developed conditions. This is due to the smaller watersheds created by the modified grading plan. However, the maximum velocities increase over the pre-development condition. This is due to the use of internal downchutes off two of the landfill cells. These downshutes will be protected from scour with the use of gabion mattresses as described in Section 3.2.2 below and will discharge to shallow swales before the stormwater is discharged off-site. The drainage patterns were not altered significantly so as to change the previously permitted drainage conditions of the site.

**Table 2-8
Comparison of Peak Discharges, Flow Depths, and Flow Velocities in Swales**

Condition and Analysis	Range of Peak Discharge (cfs)	Range of Normal Depth of Flow, y (ft)	Range of Flow Velocities (ft/s)
Pre-Development (2005 Permitted)	10.9 – 73.6	0.7 – 1.1	1.9 – 3.9
Post-Development (Optimized ET Cover and Grading)	1.0 – 36.6	0.1 – 0.7	1.1 – 7.2

3. Erosion and Sediment Control Plan

This plan describes the design and operation considerations for erosion and sediment control measures specified and best management practices (BMPs) of the landfill facility in order to minimize erosion and provide effective erosional stability to top dome surfaces and external embankment side slopes during all phases of landfill operations in accordance with 30 TAC §330.305(d).

The plan lays out the erosion and sediment control measures for the three conditions of the Fort Bliss MSWLF: the active Subtitle D disposal areas, intermediate cover areas, and final cover areas. The installation of the proposed erosion and sediment control measures will be on-going and include both temporary and permanent controls throughout the remaining duration of the landfill operation until closure is completed when all permanent controls are finally installed.

Landfill cover phases are defined as daily cover, intermediate cover, and final cover. The topography of the landfill changes over time as the landfill is operating and reaching closure grades. In order to comply with 30 TAC §330.305(d), top dome surfaces and external embankment side slopes are defined as areas of above graded slopes that drain to the perimeter swales, areas that have received intermediate or final cover, and areas that have received their permitted elevation and will remain inactive for longer than 180 days. Slopes that drain to cells where waste is being placed are not considered external embankment side slopes.

Based on the above definitions, all areas of the Fort Bliss MSWLF will require erosion and sediment controls per 30 TAC §330.305(d) with the exception of active internal slopes within Subtitle D cell where waste and daily cover are being placed.

3.1. General Erosion and Soil Loss Assessment

Areas of the site most prone to erosion and soil loss are areas of soil disturbance for the landfill operations, areas with steep slopes for intermediate and final covers, and intermediate or permanent drainage swales that control storm water discharges leaving the site. Therefore, the erosion and sediment control plan focuses on these sensitive areas and incorporates structural and non-structural controls to guard against soil loss from the site.

During a rain event, stormwater falls on the top dome and embankment side slopes of the landfill where erosion is more susceptible. In areas of steeper slopes and embankment side slopes, structural BMPs such as temporary soil berms and diversion swales are proposed to control the runoff and minimize erosion. The following sections, accompanied by the Permit Modification Drawings in Appendix B (Design Drawings) describe the design for structural erosion control measures proposed to avoid erosion and off-site discharge of sediments during the phases of landfill operation through final closure. Maintenance and inspections are addressed in Section 3.4 of this report.

3.2. Interim Construction Stages

This sub-section describes temporary and intermediate erosion control measures that will be used during the landfill interim construction stages to minimize erosion of top dome surfaces and external embankment side slopes as required by 30 TAC §330.305(e)(2). The erosion control measures were selected and designed based on velocity and soil erosion analyses. The temporary erosion control measures shall remain in place until the final cover installation is completed and all permanent erosion control measures have been installed.

3.2.1. Description of Phase Development

Interim construction phases include filling of waste, daily cover grading, and placement of intermediate soil cover in the Subtitle D. The phased development for landfill cell construction and solid waste placement will be followed as specified in the typical fill operation cross section detail on Sheet C-6 in Appendix B (Design Drawings) of the permit modification. This sequencing will ensure adequate slope stability and limited erosion and soil loss during cell construction and installation of the intermediate and final cover systems.

During filling operations through installation of the final cover, the top dome of the daily and intermediate cover for Subtitle D shall be sloped at 2% to 5% and the external embankment side slopes will be 4(H):1(V). Stormwater shall be controlled with temporary soil berms, and diversion swales to avoid erosion of the embankment side slopes and maintain flow velocities at or below the permissible non-erodible velocity.

The temporary soil berms will be used on-cap to divert runoff to the diversion swales, located around the perimeter of Subtitle D cell, as shown on Drawing D-1 in Attachment 1 of this report. The typical temporary soil berm design will be 2-foot high as measured from the invert of the channel to the top of berm, with the invert sloped at 0.5% minimum and 10% maximum in the direction of flow towards the diversion swales. The slopes of the soil berms will be stabilized with mulch or equal (see Section 3.2.3 below).

Two diversion swales will run around the perimeter of the Subtitle D cell cap to convey runoff from temporary soil berms as shown on Drawing D-1. The recommended minimum dimensions of the discharge swales are V-shaped, 1 to 2 feet deep with 10 (H): 1 (V) side slopes on one side and 2 (H): 1 (V) side slopes on opposite side. Stabilization of the swales shall be established using a Rolled Erosion Control Product (RECP) or recycled concrete rip-rap (free of metal or rebar) to be selected in final design. A specification of the RECPs is included in Attachment 4.

The drainage swales will convey runoff to the on-cap downchute. Runoff from this downchute will eventually be conveyed off-site via perimeter swales and culverts. Hydraulic analysis of the diversion swales, downchutes, perimeter swales, and culverts are included in Attachment 1.

3.2.2. Erosion and Sediment Controls Design

The erosion and sedimentation controls described above were designed based on the following criteria outlined in 30 TAC §330.305(d), to ensure the stability of top dome surface and external embankment side slopes:

The estimated peak runoff velocity should be less than the permissible non-erodible velocities under similar conditions. Typical permissible non-erodible flow velocities assumed for the design are:

- Silty-Sandy Loam is 3 ft/sec
- Recycled Concrete Rip-Rap (D50 > 9”) is 9 ft/sec
- Rolled Erosion Control Product (unvegetated) is 12 ft/sec
- 12” Thick Gabion Mattress is 18 ft/sec

The potential soil erosion loss should not exceed the permissible soil loss for comparable soil slope lengths and soil-cover conditions. The soil erosion loss of 50 tons/acre/year is selected as the permissible soil erosion loss for interim erosion and sediment controls as recommended in the *Guidance for Address Erosional Stability During All Phases of Landfill Operation*, 30 TAC §330.63(c), §330.305(c), (d) and (e), 02/14/07.

Peak Runoff Velocities Calculations

To calculate the flow velocity being conveyed along the temporary soil berm and out the swales and downchute as described above and shown on Drawing D-1 in Attachment 1 of this report, the interim peak discharge from watershed 14 was used. The flow velocity along the temporary soil berm is 2.5 ft/sec on the top dome and the flow velocity through

the permanent swale along the top dome is 2.6 ft/sec. Thereafter, the velocity through the downchute is 7.2 ft/sec and the velocity through the swale off the landfill is 5.8 ft/sec as calculated in Section 3 and presented in Tables 2-4 through 2-6 and Attachment 1.

Drainage and conveyance structures were designed and sized to withstand erosive forces of water and not to exceed the permissible non-erodible velocities presented in Section 3.2.2 and summarized in Table 3-1.

**Table 3-1
Comparison of Calculated Flow Velocities and Permissible Non-Erodible Velocities**

Type	Velocity	Permissible Non-Erodible Velocity
Temp. Soil Berm – Subtitle D Top Dome	2.5 ft/sec	3 ft/sec (silty-loam)
Swale – Subtitle D Top Dome	2.6 ft/sec	9 to12 ft/sec (RECP or Recycled Rip-Rap)
Downchute – Off Subtitle D Top Dome	7.2 ft/sec	18 ft/sec (Gabion Mattress)
Swale – Off Landfill	5.8 ft/sec	9 to12 ft/sec (RECP or Recycled Rip-Rap)

To further reduce flow velocities and allow sediments and other pollutants to settle, rock check dams will be installed along the drainage swales as shown on Sheets C-4 and C-5 in Appendix B (Design Drawings).

The hydraulic calculation supporting this design of the temporary soil berm is included in Attachment 2. The hydraulic calculation supporting the design of the permanent diversion drainage swales are included in Attachment 1.

Soil Loss Calculations

Soil erosion loss was estimated utilizing the Revised Universal Soil Loss Equation Version 2 (RUSLE2). RUSLE2 uses factors that represent the effects of climate (erosivity, precipitation, and temperature), soil erodibility, topography, cover management, and support practices to compute soil loss and erosion.

RUSLE2 is a mathematical model that uses a system of equations implemented in a computer program to estimate erosion rates. The other major component of RUSLE2 is a database containing an extensive array of site/county specific values (precipitation, R, EL, etc.) that are used by the RUSLE2 user to describe a site-specific condition so RUSLE2 can compute erosion values that directly reflect conditions at a particular site. The RUSLE2 computer program and its extensive database information were developed by the USDA-Agricultural Research Service (ARS), USDA-Natural Resources Conservation Service (NRCS) and the University of Tennessee. The soil loss estimation

slope is 1,500 feet long from the crest of the subtitle D cell to the perimeter swale. The RUSLE2 computer program allows for a maximum of 1,000 feet. Therefore, the soil estimation slope was divided into two segments. A 1,000 foot segment with an average slope of 1.8% was calculated using the following flow segments: 270 feet at 0.5%; 280 feet at 1.7%; 20 feet at 25%; and 430 feet at 1.6%. The 500 foot segment has an average slope of 1.8%.

Results show soil losses of 2.9 tons/acre/year. With the rock check dams installed as a best management practice (BMP) for pollution prevention, the soil losses would be reduced to 0.08 tons/acre/year. The soil loss analyses demonstrate that proposed erosion and sedimentation controls can achieve effective erosional stability. Soil loss calculations are included in Attachment 2.

3.2.3. Soil Surface Stabilization – Interim Measures

The selected BMPs to be implemented during landfill operations, for soil stabilization and stormwater control, are ones that are proven and commonly used as described below.

Temporary stabilization of intermediate cover on top dome and external slopes will be completed within 180 days after installation and maintained until the final cover is placed and permanent stabilization controls implemented. The specific cover practices that will be implemented prior to installation of final closure:

§ Mulch - Mulching is the application of a layer of organic, biodegradable material which is spread over areas where vegetation is not yet established. Types of mulch include compost, straw, wood chips, or manufactured products. Mulch application can be in dry or hydraulic forms. When applied dry, the thickness of the mulch will vary depending on the type of mulch applied. Primary-grind mulch (e.g. wood shreds that form a mass of intermixed fragments), which will be used primarily for erosion control, will be applied using spreading equipment, such as a bulldozer, at a minimum thickness of 2-inches. Compost material, which will consist of more finely ground mulch, will be applied using mechanical spreaders or sprayers. A tackifier or binder can be used to increase the strength and durability of the mulch. Hydraulic mulch applications consist of the use of hydromulch, bonded fiber matrix, Flexible Growth Medium (FGM), as well as other commercially available products. Hydraulic mulch typically includes a tackifier or binder. Seeds can be applied to the soil first or mixed into the hydraulic mulch.

The application method and application rate of hydraulic mulch will be based on manufacturers' recommendations to ensure a uniform and complete coverage. Any mulch (dry or hydraulic) that is used shall be evaluated by site personnel to ensure it remains in place on the slopes during rain events or windy conditions.

For erosion control in drainage swales as shown on Drawing D-1 in Attachment 1 of this report, rolled-erosion control Turf Reinforcement Mat (TRM) products can be used and are specified herein. The standard specification for rolled erosion control products published by the Erosion Control Technology Council is provided in Attachment 4.

For pollution prevention, rip-rap rock check dams (rock check dam) are specified. These types of silt control structures are alternatives of traditional silt fences and straw bales. A typical rock check dam consists of rip-rap rock placed in a swale with gravel filter on the upstream face that decreases velocity so that sediment can settle out of the storm water before passing over the dam. Rock check dams are detailed on Sheet C-9 in Appendix B (Design Drawings).

For on-site stockpiles, some combination of silt fences, rock berms and/or soil berms will be required around the stockpiles to prevent the discharge of sediment-laden runoff from the stockpile area(s) unless vegetation is used to stabilize the stockpiles.

3.3. Final Cover Stage

Permanent erosion and sediment control measures will be installed during the final cover phase. These permanent erosion and sedimentation control measures include an erosion control layer (e.g mulch and rip-rap). Details of the measures are shown on Sheet C-7 and C-9 in Appendix B (Design Drawings).

3.3.1. Erosion and Sedimentation Controls Design

Permanent erosion and sediment control measures were designed based on the peak flow velocities presented in Tables 2-4 through 2-6 and soil loss analysis discussed below for the final cover design.

Peak Runoff Velocities Calculations

The flow velocity through the drainage conveyance structures were calculated in Section 2.3 and presented in Table 2-4 through 2-7. The diversion swales, downchutes, and culverts will have erosion control protection as specified on the drawings. All the velocities presented in Tables 2-4 through 2-7 compared to the permissible erodible velocities presented in Table 3-1 illustrate that the drainage and conveyance structures were designed and sized to withstand erosive forces of water and not to exceed the permissible non-erodible velocities.

Soil Loss Calculations

RUSLE2 was exercised to compute the soil loss analysis for the final cover surfaces. The 1,000 foot segment now has an average slope of 2.6%, which was calculated using the

following flow segments: 270 feet at 3.5%; 280 feet at 1.7%; 20 feet at 25%; and 430 feet at 1.6%. The 500 foot segment has an average slope of 1.8%. The input data for management operations have been changed: vegetative cover and rip-rap surface treatment on embankments added, etc. The results show soil losses of 3.1 tons/acre/year and reduction to 0.08, because of erosion control measures. The soil loss analysis demonstrates that the landfill surfaces with proposed erosion and sedimentation controls can achieve recommended soil loss rate. (According to *Guidance for Addressing Erosional Stability During all Phases of Landfill Operation*, 30 TAC §330.63(c), §330.305(c), (d) and (e), 02/14/07, the soil erosion loss of 50 tons/acre/year is a permissible soil erosion loss rate and 2 to 3 tons/acre/year is a recommended rate for final cover phase).

Erosion calculations report is included in Attachment 3. Based on velocity and soil erosion analyses, selections of BMPs are identified and general installation guidance is provided in Appendix B (Design Drawings) of the permit modification.

3.3.2. Soil Surface Stabilization – Permanent Measures

The selected BMPs that will be implemented for final cover and post closure landfill operations, to meet the soil stabilization and stormwater control requirements, are ones that are proven and commonly used as described below.

Vegetation - Vegetative cover reduces erosion potential by shielding the soil surface from the direct erosive impact of raindrops, improving the soil's water storage porosity and capacity, so more water can infiltrate, slowing the runoff and allowing the sediment to drop out, and physically holding the soil in place with plant roots. Vegetative cover will consist of a balanced mixture of native herbaceous and vascular plants. Appendix E of the Final Cover Design report prepared by Weaver Boos Consultants, LLC provides a recommended seed mix for vegetation establishment that utilizes indigenous species of the area such as red threeawn and mesa dropseed. This type of vegetation is more suitable for the area and was selected in accordance with rules and regulations published in the Federal Seed Act and Texas Seed Law. The standard seeding specification published by the Texas Department of Transportation (TxDOT) is provided in Attachment 4.

Localized erosion control protection such as rip-rap surface treatment, RECP, and gabion mattresses will be installed as determined by Fort Bliss at the time of closure.

4. Maintenance and Inspections

In addition to the design and operational considerations as previously described in the Erosion and Sedimentation Control Plan, inspection and maintenance of the stormwater management system and erosion control measures are necessary to maintain the required effectiveness of the system components. The inspection, maintenance, and repair guidelines discussed in the following sections will be implemented into the employee training program as outlined in Site Operating Plan and Stormwater Pollution Prevention Plan 2005.

4.1. Stormwater Management System

The facility will be monitored to ensure the integrity and adequate operation of the stormwater collection and conveyance structures. On a weekly basis and following major storm events, all temporary and permanent drainage facilities will be inspected. In the event of a washout or failure, the drainage system will be restored and repaired pursuant to 30 TAC §330.305(e) (1). Plans and actions will be developed to address and remediate the problem, to ensure protection to ground and surface waters.

Erosion of intermediate and final cover will be repaired pursuant to 30 TAC §330.165(g). Sediment and debris will be removed from swales as needed to maintain the effectiveness of the stormwater management system. Minor maintenance requirements, such as the removal of excessive sediment and vegetation, will be undertaken as required.

In accordance with 30 TAC §330.305(g), Stormwater Pollution Prevention Plan 2005, describes inspections, maintenance, and record keeping frequencies and techniques for the phased development of the landfill. The plan discusses how the owner or operator will handle, store, treat, and dispose of surface or groundwater that has become contaminated by contact with the working face of the landfill or with leachate pursuant to §330.207 of this title (relating to Contaminated Water Management); and how storage areas for this contaminated water will be designed with regard to size, locations, and methods.

A Storm Water Pollution Prevention Plan was prepared for the site in 2005 (Attachment 5). The plan satisfies the control of erosion and sedimentation using interim controls for the phased development of the landfill as required by 30 TAC §330.63(c) (1) and §330.305(c), (d), and (e) until the landfill is closed per the regulations.

4.2. Landfill Cover Materials

Landfill cover soils are inspected on a regular basis. Daily cover soils are inspected and applied as part of the Site Operating Plan requirements. In addition, pursuant to the facility's SWPPP, during the active life of the site, daily, intermediate and final cover will be inspected weekly and after a significant rainfall event for areas of erosion, exposed waste, or other damage. During the post-closure maintenance period of the site, the final cover will be inspected quarterly. The inspections will include any temporary or permanent erosion measures that are in place at the time of the inspection.

Reports of these inspections will be documented in the Cover Application Log and will be maintained as part of the site operating record, in accordance with the Site Operating Plan. Damage to the cover system noted during these inspections will be repaired, as set forth below, and documented in the Cover Application Log. Any runoff from damaged or eroded areas that has met waste will be handled as contaminated water in accordance with SWPPP until the repairs are completed.

In accordance with 30 TAC §330.165(g), erosion gullies or washed-out areas deep enough to jeopardize the intermediate or final cover must be repaired within five days of detection. An eroded area is considered deep enough to jeopardize the intermediate or final cover if it exceeds four inches in depth as measured from the vertical plane from the erosion feature and the 90-degree intersection of this plane with the horizontal slope face or surface. Damage to any temporary or permanent erosion measures that are noted during the inspections, will be repaired or replaced within 14 days of detection. The repair schedule as outlined for the cover or the erosion measures may be extended due to inclement weather conditions or the severity of the condition requiring an extended repair schedule.

Attachment 1

Drainage Basins Map, Peak Discharge Flow and Drainage Swale Design



U.S. Army Corps of Engineers, Fort Worth District
Appendix L – Final Facility Surface Water Drainage Report – Fort Bliss
Municipal Solid Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



Worksheet 2: Runoff curve number and runoff

Project	By	Date
Location	Checked	Date

Check one: Present Developed

1. Runoff curve number

Soil name and hydrologic group <small>(appendix A)</small>	Cover description <small>(cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)</small>	CN ^{1/}			Area <input checked="" type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN x area
		Table 2-2	Figure 2-3	Figure 2-4		
C	HERBACEOUS (FAIR)	81			106.25	8606.25
B	GRAVEL (ACCESS ROADWAYS)	85			3.18	270.30

^{1/} Use only one CN source per line

Totals ➡ 109.43 8,876.55

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{8876.55}{109.43} = 81.12$;

Use CN ➡ 82

2. Runoff

	Storm #1	Storm #2	Storm #3
Frequency yr	25		
Rainfall, P (24-hour) in	3.5		
Runoff, Q in			

(Use P and CN with table 2-1, figure 2-1, or equations 2-3 and 2-4)

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \quad \text{where } I_a = 0.2S$$

$$S = \frac{1000}{CN} - 10$$

$$= \frac{1000}{82} - 10 = 2.2$$

$$Q = \frac{(3.5 - (0.2)(2.2))^2}{(3.5 - 0.2(2.2)) + 2.2} = \frac{(3.5 - 0.44)^2}{(3.5 - 0.44) + 2.2} = \frac{(3.06)^2}{5.26} = 1.72$$

Worksheet 3: Time of Concentration (T_c) or travel time (T_t)

Project MUNICIPAL SOLID WASTE LANDFILL FORT BLISS - TEXAS	By DC	Date 06/06/2014
Location WATERSHED #12	Checked	Date

Check one: Present Developed

Check one: T_c T_t through subarea

Notes: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)

	Segment ID		
1. Surface description (table 3-1)	12A		
2. Manning's roughness coefficient, n (table 3-1)	BARE		
3. Flow length, L (total L \leq 300 ft) ft	0.011		
4. Two-year 24-hour rainfall, P_2 in	30		
5. Land slope, s ft/ft	1.5		
6. $T_t = \frac{0.007 (nL)^{0.8}}{P_2^{0.5} s^{0.4}}$ Compute T_t hr	0.20		
	0.004	+	0.004

Shallow concentrated flow

	Segment ID		
7. Surface description (paved or unpaved)	12B		
8. Flow length, Lft	UNPAVED		
9. Watercourse slope, s ft/ft	950		
10. Average velocity, V (figure 3-1) ft/s	0.0137		
11. $T_t = \frac{L}{3600 V}$ Compute T_t hr	1.82		
	0.145	+	0.145

Channel flow

	Segment ID		
12. Cross sectional flow area, a ft ²	12C		
13. Wetted perimeter, p_w ft	33.00		
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r ft	37.25		
15. Channel slope, s ft/ft	0.89		
16. Manning's roughness coefficient, n	0.0077		
17. $V = \frac{1.49 r^{2/3} s^{1/2}}{n}$ Compute V ft/s	0.022		
18. Flow length, L ft	5.50		
19. $T_t = \frac{L}{3600 V}$ Compute T_t hr	400		
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) Hr	0.020	+	0.020
			0.169

**Peak Discharge Using The Rational Method
25-Year Storm Event**

Equation: $Q = CC_tIA$

Watershed No.	Area (A; acres)	Time of Concentration (hrs)	Time of Concentration (min)	Intensity (I; in/hr)	Coefficient (C)	Coefficient Adjustment Factor (Cf)	Peak Flow (cfs)
1	4.41	0.14	10.0	4.4	0.38	1.1	8.1
2	12.50	0.11	10.0	4.4	0.38	1.1	23.0
3	1.96	0.03	10.0	4.4	0.38	1.1	3.6
4	0.86	0.03	10.0	4.4	0.38	1.1	1.6
5	1.05	0.01	10.0	4.4	0.38	1.1	1.9
6	2.30	0.09	10.0	4.4	0.38	1.1	4.2
7	2.12	0.11	10.0	4.4	0.38	1.1	3.9
8	0.80	0.08	10.0	4.4	0.38	1.1	1.5
9	1.93	0.16	10.0	4.4	0.38	1.1	3.5
10	1.31	0.04	10.0	4.4	0.38	1.1	2.4
11	0.53	0.03	10.0	4.4	0.38	1.1	1.0
12	14.27	0.17	10.1	4.4	0.38	1.1	26.2
13	6.80	0.04	10.0	4.4	0.38	1.1	12.5
14	4.35	0.07	10.0	4.4	0.38	1.1	8.0
15	4.44	0.07	10.0	4.4	0.38	1.1	8.2
16	7.90	0.10	10.0	4.4	0.38	1.1	14.5
17	17.76	0.07	10.0	4.4	0.38	1.1	32.7
18	19.88	0.14	10.0	4.4	0.38	1.1	36.6
19	4.24	0.06	10.0	4.4	0.38	1.1	7.8

Rainfall Intensity-Duration-Frequency Coefficients for Texas Counties

1. Select your county. 2. Enter the time of concentration Watershed No. 1 - 18

County	Coefficient	2-year	5-year	10-year	25-year	50-year	100-year
El Paso	e (in)	0.797	0.802	0.795	0.843	0.900	0.825
Eastland	b	24	34	42	60	90	65
Ector	d (mins)	9.5	12.0	12.0	12.0	12.0	9.5
Edwards							
El Paso	Intensity (in/hr)*	2.2	2.9	3.6	4.4	5.6	5.6
Ellis							
Erath	Coefficient						
Falls	e (mm)	0.797	0.802	0.795	0.843	0.900	0.825
Fannin	b	610	864	1067	1524	2286	1651
Fayette	d (mins)	9.5	12.0	12.0	12.0	12.0	9.5
	Intensity (mm/hr)*	57.1	72.4	91.4	112.5	141.5	142.4

* for time of Concentration = **10 mins**

Runoff Coefficient

Hydraulic Design Manual (TxDOT)

	Value
Relief (C_r)	0.08
Soil Infiltration (C_i)	0.07
Vegetal Cover (C_v)	0.12
Surface (C_s)	0.11
Coefficient ($C = C_r + C_i + C_v + C_s$)	0.38
Coefficient Adjustment Factor (C_f)	1.1

**Diversion Swale Hydraulic Analysis
25-Year Storm Event**

Diversion Swale	Contributing Watersheds	Slope (ft/ft)	Manning Roughness, n	Side Slope 1 (z ₁ :1)	Side Slope 2 (z ₂ :1)	Depth (ft)	Area (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Avg Velocity (ft/s)	Flow (cfs)
DS-1A	4	0.036	0.020	10.0	2.0	0.27	0.44	3.32	0.13	3.66	1.60
DS-1B	5	0.021	0.020	10.0	2.0	0.32	0.61	3.91	0.16	3.12	1.90
DS-1C	6	0.017	0.020	10.0	2.0	0.45	1.19	5.48	0.22	3.52	4.20
DS-1D	7	0.015	0.020	10.0	2.0	0.44	1.18	5.46	0.22	3.29	3.90
DS-1E	8	0.020	0.020	10.0	2.0	0.29	0.52	3.61	0.14	2.89	1.50
DS-2A	19	0.020	0.020	10.0	2.0	0.55	1.79	6.71	0.27	4.36	7.80
DS-3A	11	0.037	0.020	10.0	2.0	0.23	0.30	2.77	0.11	3.29	1.00
DS-4C/4D	14, 15, & 17	0.017	0.020	10.0	10.0	0.92	8.47	18.50	0.46	5.77	48.90
DS-SDA	14	0.005	0.020	10.0	2.0	0.71	3.06	8.78	0.35	2.61	8.00
DS-SDB	15	0.006	0.020	10.0	2.0	0.70	2.91	8.56	0.34	2.81	8.20

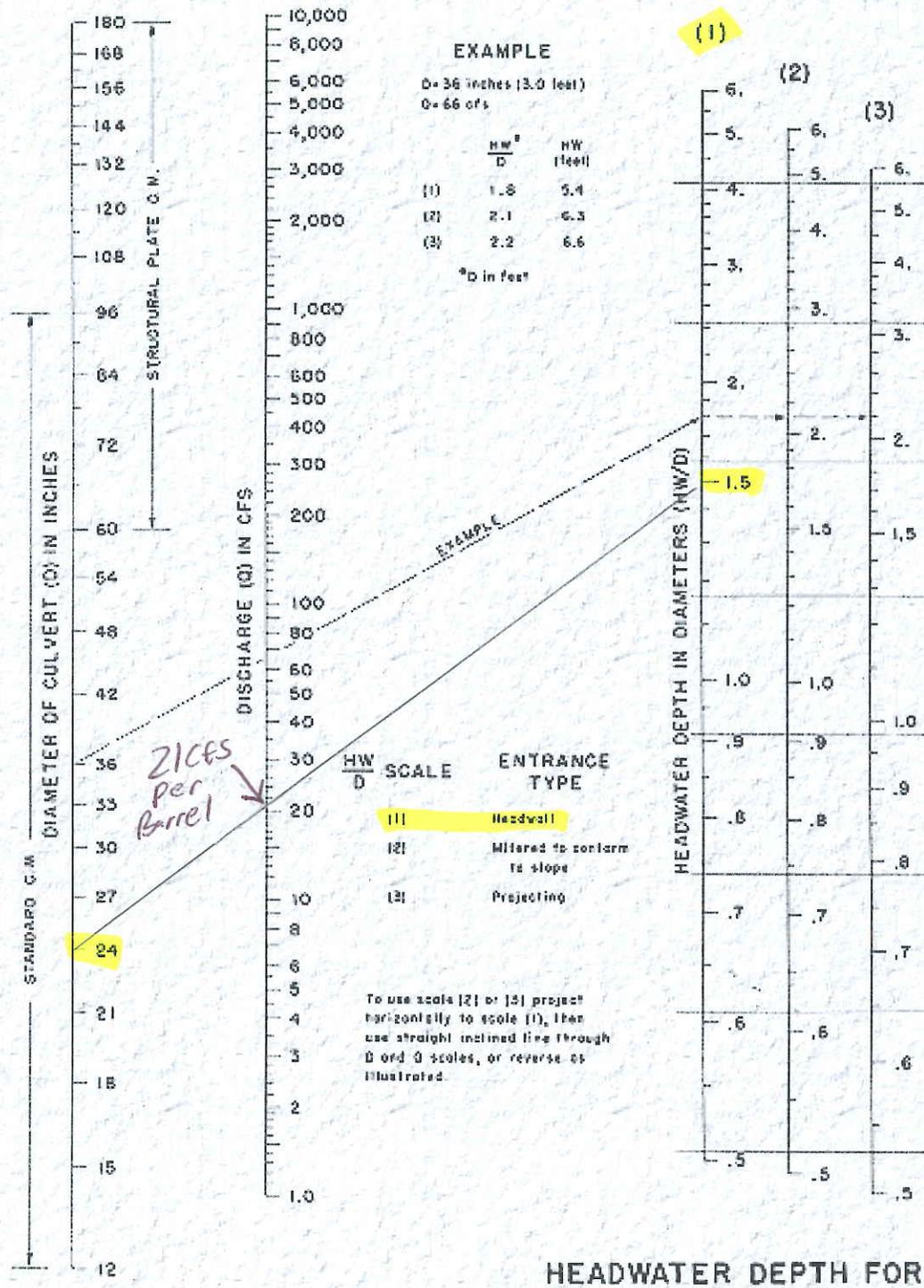
**Perimeter Swale Hydraulic Analysis
25-Year Storm Event**

Perimeter Swale	Contributing Watersheds	Slope (ft/ft)	Manning Roughness, n	Side Slope 1 (z ₁ :1)	Side Slope 2 (z ₂ :1)	Bottom Width (ft)	Depth (ft)	Area (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Avg Velocity (ft/s)	Flow (cfs)
PS-1A	3 thru 5, 10 & 19	0.0070	0.026	4	4	20.00	0.35	7.56	22.91	0.33	2.29	17.3
PS-1B	10	0.0031	0.026	4	4	13.00	0.18	2.45	14.48	0.17	0.98	2.4
PS-2B	1, 6 thru 9	0.0041	0.026	4	4	70.00	0.22	15.88	71.85	0.22	1.34	21.3
PS-3A	2	0.0014	0.026	4	4	10.00	0.95	13.15	17.85	0.74	1.75	23.0
PS-4A	16 & 18	0.0024	0.026	4	4	60.00	0.49	30.10	64.01	0.47	1.70	51.1
PS-4B	16	0.0107	0.026	4	4	30.00	0.22	6.83	31.82	0.21	2.12	14.5
PS-5A	11 thru 15 & 17	0.0056	0.026	4	4	50.00	0.58	30.52	54.81	0.56	2.90	88.6
PS-5B	11 thru 13	0.0023	0.026	4	4	40.00	0.54	22.64	44.43	0.51	1.75	39.7
PS-5C	11 & 12	0.0077	0.026	4	4	30.00	0.35	11.14	32.92	0.34	2.44	27.2

**Downchute Hydraulic Analysis
25-Year Storm Event**

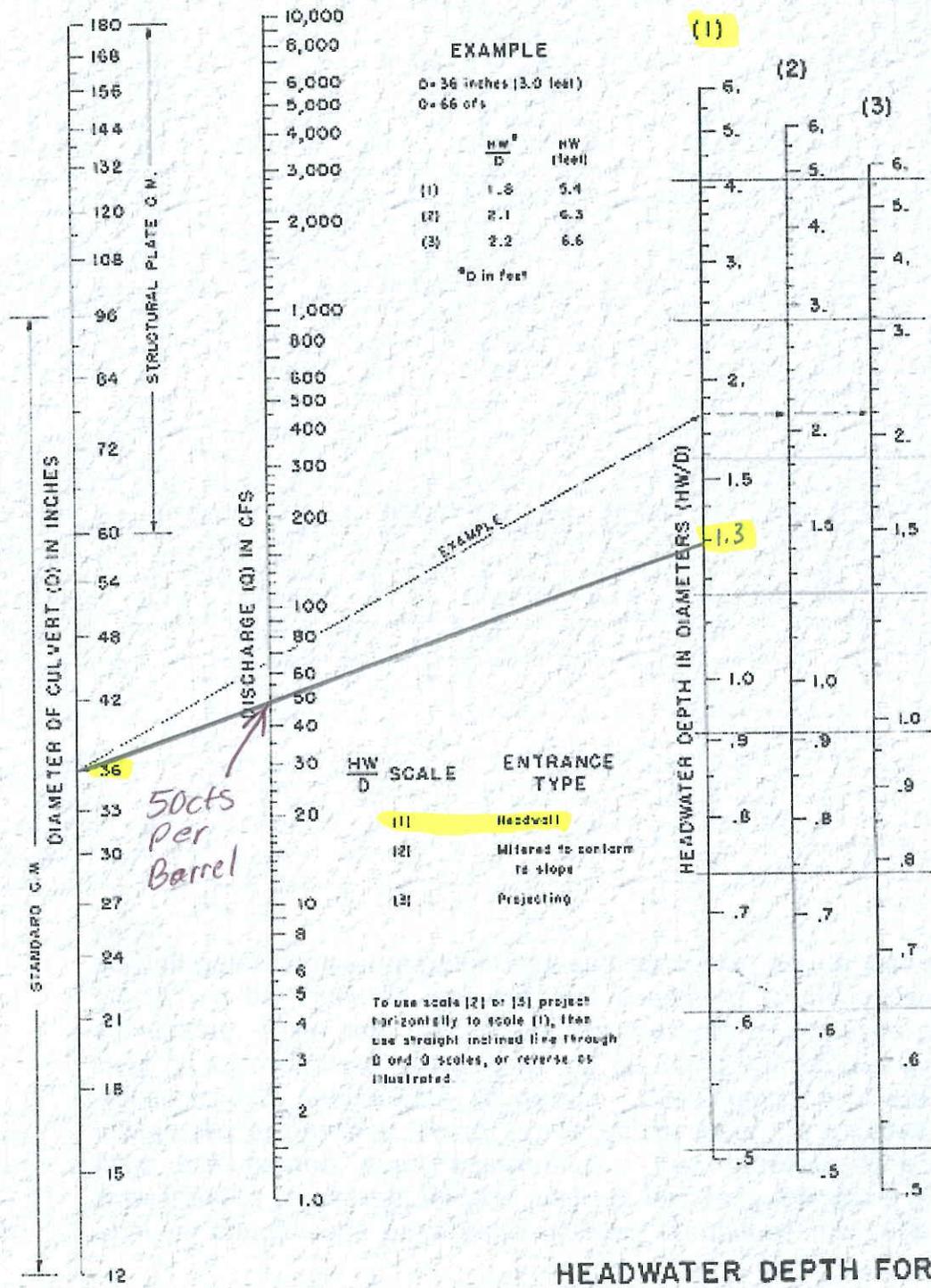
Downchute	Contributing Watersheds	Slope (ft/ft)	Manning Roughness, n	Side Slope 1 (z ₁ :1)	Side Slope 2 (z ₂ :1)	Bottom Width (ft)	Depth (ft)	Area (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Avg Velocity (ft/s)	Flow (cfs)
DC-1	4 & 5	0.25	0.033	1	1	12.00	0.07	0.89	12.21	0.07	3.94	3.50
DC-2	6 & 7	0.25	0.033	1	1	12.00	0.12	1.48	12.34	0.12	5.48	8.10
DC-3	8 & 9	0.25	0.033	1	1	12.00	0.09	1.10	12.26	0.09	4.53	5.00
DC-4	14 & 15	0.25	0.033	1	1	12.00	0.18	2.25	12.52	0.18	7.19	16.20

CHART 5

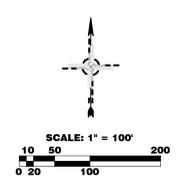
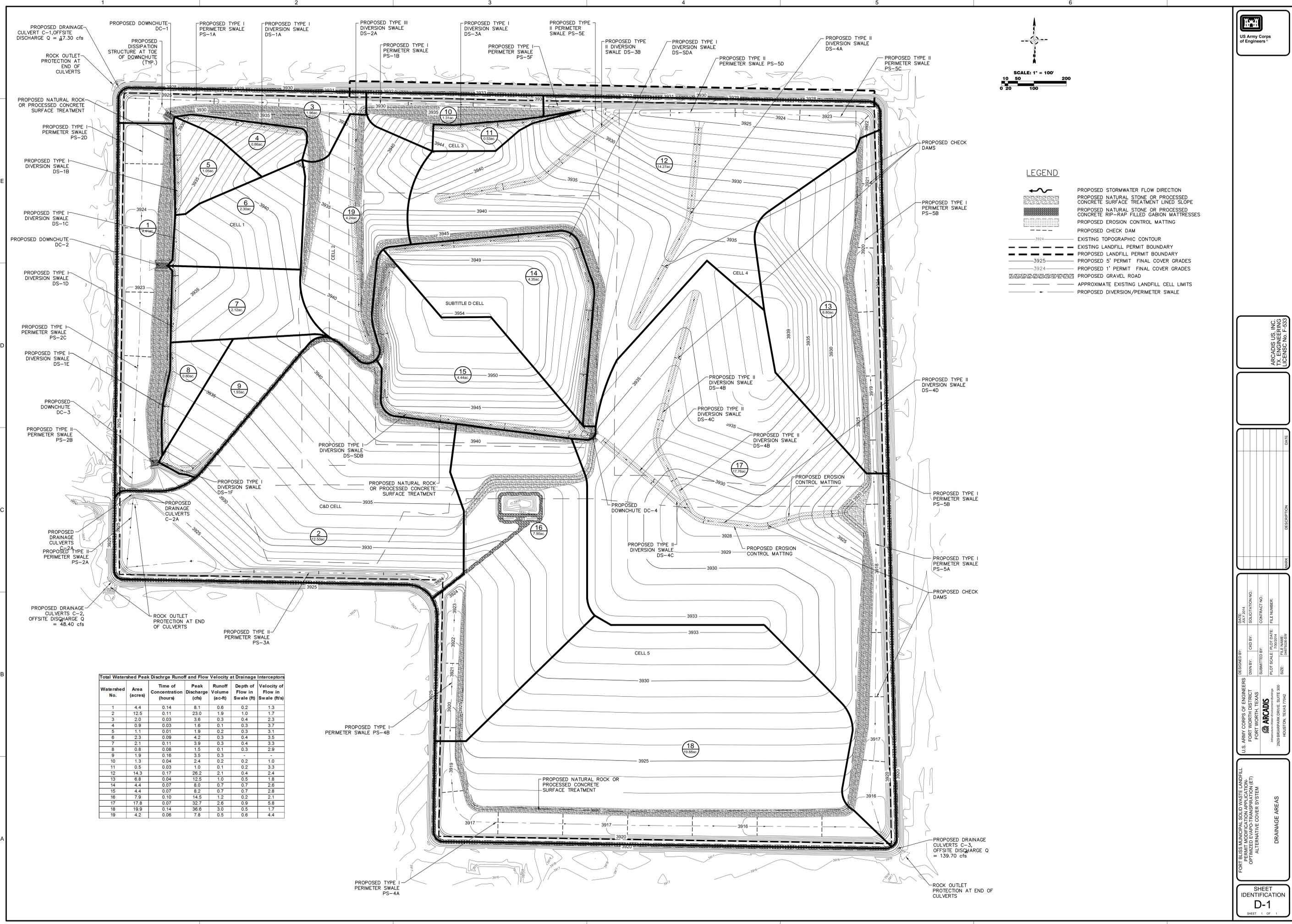


**HEADWATER DEPTH FOR
 C. M. PIPE CULVERTS
 WITH INLET CONTROL**

CHART 5



HEADWATER DEPTH FOR G. M. PIPE CULVERTS WITH INLET CONTROL



LEGEND

- PROPOSED STORMWATER FLOW DIRECTION
- PROPOSED NATURAL STONE OR PROCESSED CONCRETE SURFACE TREATMENT LINED SLOPE
- PROPOSED NATURAL STONE OR PROCESSED CONCRETE RIP-RAP FILLED GABION MATTRESSES
- PROPOSED EROSION CONTROL MATTING
- PROPOSED CHECK DAM
- EXISTING TOPOGRAPHIC CONTOUR
- EXISTING LANDFILL PERMIT BOUNDARY
- PROPOSED LANDFILL PERMIT BOUNDARY
- PROPOSED 5' PERMIT FINAL COVER GRADES
- PROPOSED 1' PERMIT FINAL COVER GRADES
- PROPOSED GRAVEL ROAD
- APPROXIMATE EXISTING LANDFILL CELL LIMITS
- PROPOSED DIVERSION/PERIMETER SWALE

Total Watershed Peak Discharge, Runoff and Flow Velocity at Drainage Interceptors

Watershed No.	Area (acres)	Time of Concentration (hours)	Peak Discharge (cfs)	Runoff Volume (ac-ft)	Depth of Flow in Swale (ft)	Velocity of Flow in Swale (ft/s)
1	4.4	0.14	8.1	0.6	0.2	1.3
2	12.5	0.11	23.0	1.9	1.0	1.7
3	2.0	0.03	3.6	0.3	0.4	2.3
4	0.9	0.03	1.6	0.1	0.3	3.7
5	1.1	0.01	1.9	0.2	0.3	3.1
6	2.3	0.09	4.2	0.3	0.4	3.5
7	2.1	0.11	3.9	0.3	0.4	3.3
8	0.8	0.08	1.5	0.1	0.3	2.9
9	1.9	0.16	3.5	0.3	0.4	3.1
10	1.3	0.04	2.4	0.2	0.2	1.0
11	0.5	0.03	1.0	0.1	0.2	3.3
12	14.3	0.17	26.2	2.1	0.4	2.4
13	6.8	0.04	12.5	1.0	0.5	1.8
14	4.4	0.07	8.0	0.7	0.7	2.6
15	4.4	0.07	8.2	0.7	0.7	2.8
16	7.9	0.10	14.5	1.2	0.2	2.1
17	17.8	0.07	32.7	2.6	0.9	5.8
18	19.9	0.14	36.8	3.0	0.5	1.7
19	4.2	0.06	7.8	0.5	0.6	4.4

US Army Corps of Engineers

RESIGNED BY: []
 DWN BY: []
 SUBMITTED BY: []
 FILE NAME: []
 DATE: []

FOR BLISS MUNICIPAL SOLID WASTE LANDFILL
 FORT WORTH DISTRICT
 FORT WORTH, TEXAS
 ALTERNATIVE EVAPOTRANSPIRATION (ET)
 ALTERNATIVE COVER SYSTEM
 DRAINAGE AREAS

RESOURCES:
 SOLICITATION NO.: []
 CONTRACT NO.: []
 PLOT SCALE: []
 FILE NUMBER: []
 SIZE: []

ARCADIS
 2929 BARBARAK DRIVE, SUITE 300
 HOUSTON, TEXAS 77052

PROPOSED DRAINAGE CULVERTS C-3, OFFSITE DISCHARGE Q = 139.70 cfs

PROPOSED TYPE I PERIMETER SWALE PS-4A

PROPOSED TYPE I PERIMETER SWALE PS-4B

PROPOSED TYPE I PERIMETER SWALE PS-4C

PROPOSED TYPE I PERIMETER SWALE PS-4D

PROPOSED TYPE I PERIMETER SWALE PS-4E

PROPOSED TYPE I PERIMETER SWALE PS-4F

PROPOSED TYPE I PERIMETER SWALE PS-4G

PROPOSED TYPE I PERIMETER SWALE PS-4H

PROPOSED TYPE I PERIMETER SWALE PS-4I

PROPOSED TYPE I PERIMETER SWALE PS-4J

PROPOSED TYPE I PERIMETER SWALE PS-4K

PROPOSED TYPE I PERIMETER SWALE PS-4L

PROPOSED TYPE I PERIMETER SWALE PS-4M

PROPOSED TYPE I PERIMETER SWALE PS-4N

PROPOSED TYPE I PERIMETER SWALE PS-4O

PROPOSED TYPE I PERIMETER SWALE PS-4P

PROPOSED TYPE I PERIMETER SWALE PS-4Q

PROPOSED TYPE I PERIMETER SWALE PS-4R

PROPOSED TYPE I PERIMETER SWALE PS-4S

PROPOSED TYPE I PERIMETER SWALE PS-4T

PROPOSED TYPE I PERIMETER SWALE PS-4U

PROPOSED TYPE I PERIMETER SWALE PS-4V

PROPOSED TYPE I PERIMETER SWALE PS-4W

PROPOSED TYPE I PERIMETER SWALE PS-4X

PROPOSED TYPE I PERIMETER SWALE PS-4Y

PROPOSED TYPE I PERIMETER SWALE PS-4Z

PROPOSED TYPE II PERIMETER SWALE PS-5A

PROPOSED TYPE II PERIMETER SWALE PS-5B

PROPOSED TYPE II PERIMETER SWALE PS-5C

PROPOSED TYPE II PERIMETER SWALE PS-5D

PROPOSED TYPE II PERIMETER SWALE PS-5E

PROPOSED TYPE II PERIMETER SWALE PS-5F

PROPOSED TYPE II PERIMETER SWALE PS-5G

PROPOSED TYPE II PERIMETER SWALE PS-5H

PROPOSED TYPE II PERIMETER SWALE PS-5I

PROPOSED TYPE II PERIMETER SWALE PS-5J

PROPOSED TYPE II PERIMETER SWALE PS-5K

PROPOSED TYPE II PERIMETER SWALE PS-5L

PROPOSED TYPE II PERIMETER SWALE PS-5M

PROPOSED TYPE II PERIMETER SWALE PS-5N

PROPOSED TYPE II PERIMETER SWALE PS-5O

PROPOSED TYPE II PERIMETER SWALE PS-5P

PROPOSED TYPE II PERIMETER SWALE PS-5Q

PROPOSED TYPE II PERIMETER SWALE PS-5R

PROPOSED TYPE II PERIMETER SWALE PS-5S

PROPOSED TYPE II PERIMETER SWALE PS-5T

PROPOSED TYPE II PERIMETER SWALE PS-5U

PROPOSED TYPE II PERIMETER SWALE PS-5V

PROPOSED TYPE II PERIMETER SWALE PS-5W

PROPOSED TYPE II PERIMETER SWALE PS-5X

PROPOSED TYPE II PERIMETER SWALE PS-5Y

PROPOSED TYPE II PERIMETER SWALE PS-5Z

Attachment 2

Intermediate Erosion and Soil Control Design Calculations (*Peak Runoff Velocity, Swale Design, and Soil Loss*)



U.S. Army Corps of Engineers, Fort Worth District
Appendix L – Final Facility Surface Water Drainage Report – Fort Bliss
Municipal Solid Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



Temporary Soil Berm Hydraulic Analysis
25-Year Storm Event

Watershed Swale	Slope (ft/ft)	Manning Roughness, n	Side Slope 1 (z ₁ :1)	Side Slope 2 (z ₂ :1)	Depth (ft)	Area (ft ²)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Avg Velocity (ft/s)	Flow (cfs)
Temp. Soil Berm - Top Dome	0.020	0.026	50	2	0.35	3.17	18.24	0.17	2.52	8.00

Manning's n-Values

[Previous](#) [Top](#)

Description	Manning's "n"
Pipes	
Reinforced concrete	0.013
Vitrified clay pipe	0.013
Smooth welded pipe	0.011
Corrugated metal pipe	0.023
Polyvinyl chloride (PVC)	0.010
Natural Channels	
Gravel beds, Straight	0.025
Gravel beds, large boulders	0.040
Earth, straight, some grass	0.026
Earth, winding, no vegetation	0.030
Earth, winding	0.050
Miscellaneous	
Smooth surfaces (concrete, asphalt, bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils	0.06-0.17
Short grass	0.15
Dense grass	0.24
Bermuda grass	0.41
Light underbrush woods	0.40
Dense underbrush woods	0.80

Source: Soil Conservation Service TR-55



RUSLE2 Expanded Profile Erosion Calculation Record

Info: Ft. Bliss Permit Modification 2014
 Interim Conditions
 1st Segment of 1,500' Soil Loss Estimation Slope

File: profiles\Ft Bliss MSWLF Final Cover

Inputs:

Location: Texas\EI Paso County
 Soil: loamy sand
 Slope length (horiz): 1000 ft
 Avg. slope steepness: 1.8 %

Management	Vegetation	Yield units	Yield (# of units)
Strip/Barrier Managements\Straw bale barrier	Permanent cover not harvested\straw bale barrier	pounds	50.0

Contouring: a. rows up-and-down hill
 Strips/barriers: 1 Straw bale barrier at end of slope
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 3.0 t/ac/yr
 Soil loss erod. portion: 1.6 t/ac/yr
 Detachment on slope: 1.6 t/ac/yr
 Soil loss for cons. plan: 1.6 t/ac/yr
 Sediment delivery: 0.048 t/ac/yr
 Crit. slope length: -- ft
 Surf. cover after planting: 0 %
 Soil conditioning index (SCI): -0.035
 Avg. annual slope STIP: 27
 Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

Period Start Date	Operation	PLU	Avg. surf. cover, %	Avg. SC subfactor	Avg. CC subfactor	Avg. roughness, in.	Avg. SR subfactor	Avg. C factor	EI, %
2/15/0	Bulldozer, clearing/cutting	0.45	0	1.0	1.0	0.32	0.95	0.43	0.30
3/1/0		0.45	0	1.0	1.0	0.31	0.95	0.43	0.33
3/15/0	Bulldozer, filling/leveling	1.0	0	1.0	1.0	0.24	1.00	1.00	0.024
3/16/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.43
4/1/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.49
4/16/0		1.00	0	1.0	1.0	0.24	1.00	0.99	0.61
5/1/0		0.99	0	1.0	1.0	0.24	1.00	0.99	0.89
5/16/0		0.99	0	1.0	1.0	0.24	1.00	0.99	1.4
6/1/0		0.99	0	1.0	1.0	0.24	1.00	0.98	3.8
6/16/0		0.98	0	1.0	1.0	0.24	1.00	0.98	6.4
7/1/0		0.98	0	1.0	1.0	0.24	1.00	0.98	13
7/16/0		0.98	0	1.0	1.0	0.24	1.00	0.97	15
8/1/0		0.97	0	1.0	1.0	0.24	1.00	0.97	13
8/15/0	Disk, tandem light finishing	1.0	0	1.0	1.0	0.29	0.97	0.97	0.97
8/16/0		1.00	0	1.0	1.0	0.28	0.97	0.97	15
9/1/0	default	1.00	0	1.0	1.0	0.28	0.97	0.97	10
9/16/0		1.00	0	1.0	1.0	0.28	0.97	0.97	7.3
10/1/0		0.99	0	1.0	1.0	0.27	0.98	0.97	3.7
10/16/0		0.99	0	1.0	1.0	0.27	0.98	0.97	2.6
11/1/0		0.99	0	1.0	1.0	0.27	0.98	0.96	1.1
11/16/0		0.98	0	1.0	1.0	0.27	0.98	0.96	0.97
12/1/0		0.98	0	1.0	1.0	0.27	0.98	0.96	0.91
12/16/0		0.98	0	1.0	1.0	0.27	0.98	0.95	0.81
1/1/1	straw bale barrier	0.97	0	1.0	1.0	0.27	0.98	0.95	0.13
1/16/1		0.97	0	1.0	1.0	0.27	0.98	0.95	0.19
2/1/1		0.96	0	1.0	1.0	0.27	0.98	0.94	0.26

Period Start Date, m/d/y	Operation Name	Man soil loss rate, t/ac/yr	Man sed del. rate	EI, %
2/15/0	Bulldozer, clearing/cutting	0.041	0.041	0.30
3/1/0		0.042	0.042	0.33
3/15/0	Bulldozer, filling/leveling	0.14	0.14	0.024
3/16/0		0.15	0.15	0.43
4/1/0		0.18	0.18	0.49
4/16/0		0.22	0.22	0.61
5/1/0		0.32	0.32	0.89
5/16/0		0.48	0.48	1.4
6/1/0		1.4	1.4	3.8
6/16/0		2.2	2.2	6.4
7/1/0		5.0	5.0	13
7/16/0		5.5	5.5	15
8/1/0		6.2	6.2	13
8/15/0	Disk, tandem light finishing	6.6	6.6	0.97
8/16/0		6.3	6.3	15
9/1/0	default	4.3	4.3	10
9/16/0		3.0	3.0	7.3
10/1/0		1.2	1.2	3.7
10/16/0		0.77	0.77	2.6
11/1/0		0.33	0.33	1.1
11/16/0		0.31	0.31	0.97
12/1/0		0.32	0.32	0.91
12/16/0		0.27	0.27	0.81
1/1/1	straw bale barrier	0.043	0.043	0.13
1/16/1		0.056	0.056	0.19
2/1/1		0.087	0.087	0.26



RUSLE2 Expanded Profile Erosion Calculation Record

Info: Ft. Bliss Permit Modification 2014
 Interim Conditions
 2nd Segment of 1,500' Soil Loss Estimation Slope

File: profiles\Ft Bliss MSWLF Final Cover

Inputs:

Location: Texas\El Paso County
 Soil: loamy sand
 Slope length (horiz): 500 ft
 Avg. slope steepness: 1.8 %

<i>Management</i>		<i>Vegetation</i>	
Strip/Barrier	Managements\Straw bale barrier	Permanent cover	not harvested\straw bale barrier
		Yield units	pounds
			50.0

Contouring: a. rows up-and-down hill
 Strips/barriers: 1 Straw bale barrier at end of slope
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 3.0 t/ac/yr
 Soil loss erod. portion: 1.3 t/ac/yr
 Detachment on slope: 1.3 t/ac/yr
 Soil loss for cons. plan: 1.3 t/ac/yr
 Sediment delivery: 0.028 t/ac/yr
 Crit. slope length: -- ft
 Surf. cover after planting: 0 %
 Soil conditioning index (SCI): -0.0097
 Avg. annual slope STIR: 27
 Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

The SCI is the Soil Conditioning Index rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The STIR value is the Soil Tillage Intensity Rating. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil

Date	Operation	Vegetation	Surf. res. cov. after op, %
2/15/0	Bulldozer, clearing/cutting		0
3/15/0	Bulldozer, filling/leveling		0
8/15/0	Disk, tandem light finishing		0
9/1/0	default		0
1/1/1	Begin growth	Permanent cover not harvested\straw bale barrier	0

Period Start Date	Operation	PLU	Avg. surf. cover, %	Avg. SC subfactor	Avg. CC subfactor	Avg. roughness, in.	Avg. SR subfactor	Avg. C factor	EI, %
2/15/0	Bulldozer, clearing/cutting	0.45	0	1.0	1.0	0.32	0.95	0.43	0.30
3/1/0		0.45	0	1.0	1.0	0.31	0.95	0.43	0.33
3/15/0	Bulldozer, filling/leveling	1.0	0	1.0	1.0	0.24	1.00	1.00	0.024
3/16/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.43
4/1/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.49
4/16/0		1.00	0	1.0	1.0	0.24	1.00	0.99	0.61
5/1/0		0.99	0	1.0	1.0	0.24	1.00	0.99	0.89
5/16/0		0.99	0	1.0	1.0	0.24	1.00	0.99	1.4
6/1/0		0.99	0	1.0	1.0	0.24	1.00	0.98	3.8
6/16/0		0.98	0	1.0	1.0	0.24	1.00	0.98	6.4
7/1/0		0.98	0	1.0	1.0	0.24	1.00	0.98	13
7/16/0		0.98	0	1.0	1.0	0.24	1.00	0.97	15
8/1/0		0.97	0	1.0	1.0	0.24	1.00	0.97	13
8/15/0	Disk, tandem light finishing	1.0	0	1.0	1.0	0.29	0.97	0.97	0.97
8/16/0		1.00	0	1.0	1.0	0.28	0.97	0.97	15
9/1/0	default	1.00	0	1.0	1.0	0.28	0.97	0.97	10
9/16/0		1.00	0	1.0	1.0	0.28	0.97	0.97	7.3
10/1/0		0.99	0	1.0	1.0	0.27	0.98	0.97	3.7
10/16/0		0.99	0	1.0	1.0	0.27	0.98	0.97	2.6
11/1/0		0.99	0	1.0	1.0	0.27	0.98	0.96	1.1
11/16/0		0.98	0	1.0	1.0	0.27	0.98	0.96	0.97
12/1/0		0.98	0	1.0	1.0	0.27	0.98	0.96	0.91
12/16/0		0.98	0	1.0	1.0	0.27	0.98	0.95	0.81
1/1/1	straw bale barrier	0.97	0	1.0	1.0	0.27	0.98	0.95	0.13
1/16/1		0.97	0	1.0	1.0	0.27	0.98	0.95	0.19
2/1/1		0.96	0	1.0	1.0	0.27	0.98	0.94	0.26

Period Start Date, m/d/y	Operation Name	Man soil loss rate, t/ac/yr	Man sed del. rate	EI, %
2/15/0	Bulldozer, clearing/cutting	0.037	0.037	0.30
3/1/0		0.038	0.038	0.33
3/15/0	Bulldozer, filling/leveling	0.11	0.11	0.024
3/16/0		0.12	0.12	0.43
4/1/0		0.14	0.14	0.49
4/16/0		0.18	0.18	0.61
5/1/0		0.26	0.26	0.89
5/16/0		0.38	0.38	1.4
6/1/0		1.1	1.1	3.8
6/16/0		1.8	1.8	6.4
7/1/0		4.0	4.0	13
7/16/0		4.4	4.4	15
8/1/0		4.9	4.9	13
8/15/0	Disk, tandem light finishing	5.2	5.2	0.97
8/16/0		5.0	5.0	15
9/1/0	default	3.4	3.4	10
9/16/0		2.4	2.4	7.3
10/1/0		0.99	0.99	3.7
10/16/0		0.61	0.61	2.6
11/1/0		0.26	0.26	1.1
11/16/0		0.25	0.25	0.97
12/1/0		0.26	0.26	0.91
12/16/0		0.21	0.21	0.81
1/1/1	straw bale barrier	0.035	0.035	0.13
1/16/1		0.045	0.045	0.19
2/1/1		0.069	0.069	0.26

Attachment 3

Final Erosion and Soil Control Design Calculations (Soil Loss)



U.S. Army Corps of Engineers, Fort Worth District
Appendix L – Final Facility Surface Water Drainage Report – Fort Bliss
Municipal Solid Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014





RUSLE2 Expanded Profile Erosion Calculation Record

Info: Ft. Bliss Permit Modification 2014
 Final Conditions
 1st Segment of 1,500' Soil Loss Estimation Slope

File: profiles\Ft Bliss MSWLF Final Cover

Inputs:

Location: Texas\EI Paso County
 Soil: loamy sand
 Slope length (horiz): 1000 ft
 Avg. slope steepness: 2.6 %

<i>Management</i>		<i>Vegetation</i>	<i>Yield units</i>	<i>Yield (# of units)</i>
CMZ 23\d.Construction Site Templates\Construction site	Strip/Barrier Managements\Straw bale barrier	Gramma, yr 1	lbs	300
		Permanent cover not harvested\straw bale barrier	pounds	50.0

Contouring: a. rows up-and-down hill
 Strips/barriers: 1 Straw bale barrier at end of slope
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 3.0 t/ac/yr
 Soil loss erod. portion: 2.1 t/ac/yr
 Detachment on slope: 2.1 t/ac/yr
 Soil loss for cons. plan: 2.1 t/ac/yr
 Sediment delivery: 0.061 t/ac/yr

Crit. slope length: -- ft
 Surf. cover after planting: 0 %

Soil conditioning index (SCI): -0.013
 Avg. annual slope STIR: 29
 Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

Period Start Date	Operation	PLU	Avg. surf. cover, %	Avg. SC subfactor	Avg. CC subfactor	Avg. roughness, in.	Avg. SR subfactor	Avg. C factor	EI, %
2/15/0	Bulldozer, clearing/cutting	0.45	0	1.0	1.0	0.32	0.95	0.43	0.30
3/1/0		0.45	0	1.0	1.0	0.31	0.95	0.43	0.33
3/15/0	Bulldozer, filling/leveling	1.0	0	1.0	1.0	0.24	1.00	1.00	0.024
3/16/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.43
4/1/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.49
4/16/0		1.00	0	1.0	1.0	0.24	1.00	0.99	0.61
5/1/0		0.99	0	1.0	1.0	0.24	1.00	0.99	0.89
5/16/0		0.99	0	1.0	1.0	0.24	1.00	0.99	1.4
6/1/0		0.99	0	1.0	1.0	0.24	1.00	0.98	3.8
6/16/0		0.98	0	1.0	1.0	0.24	1.00	0.98	6.4
7/1/0		0.98	0	1.0	1.0	0.24	1.00	0.98	13
7/16/0		0.98	0	1.0	1.0	0.24	1.00	0.97	15
8/1/0		0.97	0	1.0	1.0	0.24	1.00	0.97	13
8/15/0	Disk, tandem light finishing	1.0	0	1.0	1.0	0.29	0.97	0.97	0.97
8/16/0		1.00	0	1.0	1.0	0.28	0.97	0.97	15
9/1/0	default	1.00	0	1.0	1.0	0.28	0.97	0.97	0.76
9/2/0	Add mulch	1.00	69	0.16	1.0	0.28	0.97	0.16	0.74
9/3/0	Mulch crimper	0.99	67	0.17	1.0	0.28	0.97	0.16	8.6
9/16/0		0.99	66	0.17	1.0	0.28	0.97	0.17	7.3
10/1/0		0.99	65	0.18	1.0	0.27	0.98	0.17	3.7
10/16/0		0.99	64	0.18	1.0	0.27	0.98	0.17	2.6
11/1/0		0.98	64	0.18	1.0	0.27	0.98	0.18	1.1
11/16/0		0.98	63	0.19	1.0	0.27	0.98	0.18	0.97
12/1/0		0.98	63	0.19	1.0	0.27	0.98	0.18	0.91
12/16/0		0.97	62	0.19	1.0	0.27	0.98	0.18	0.81
1/1/1	straw bale barrier	0.97	62	0.19	1.0	0.27	0.98	0.18	0.13
1/16/1		0.96	62	0.19	1.0	0.27	0.98	0.18	0.19
2/1/1		0.96	61	0.20	1.0	0.27	0.98	0.18	0.26

<i>Period Start Date, m/d/y</i>	<i>Operation Name</i>	<i>Man soil loss rate, t/ac/yr</i>	<i>Man sed del. rate</i>	<i>EI, %</i>
2/15/0	Bulldozer, clearing/cutting	0.064	0.064	0.30
3/1/0		0.065	0.065	0.33
3/15/0	Bulldozer, filling/leveling	0.23	0.23	0.024
3/16/0		0.25	0.25	0.43
4/1/0		0.30	0.30	0.49
4/16/0		0.37	0.37	0.61
5/1/0		0.54	0.54	0.89
5/16/0		0.80	0.80	1.4
6/1/0		2.3	2.3	3.8
6/16/0		3.7	3.7	6.4
7/1/0		8.3	8.3	13
7/16/0		9.1	9.1	15
8/1/0		10	10	13
8/15/0	Disk, tandem light finishing	11	11	0.97
8/16/0		10	10	15
9/1/0	default	8.2	8.2	0.76
9/2/0	Add mulch	0.86	0.86	0.74
9/3/0	Mulch crimper	0.80	0.80	8.6
9/16/0		0.60	0.60	7.3
10/1/0		0.26	0.26	3.7
10/16/0		0.16	0.16	2.6
11/1/0		0.070	0.070	1.1
11/16/0		0.067	0.067	0.97
12/1/0		0.071	0.071	0.91
12/16/0		0.060	0.060	0.81
1/1/1	straw bale barrier	0.0098	0.0098	0.13
1/16/1		0.013	0.013	0.19
2/1/1		0.020	0.020	0.26



RUSLE2 Expanded Profile Erosion Calculation Record

Info: Ft. Bliss Permit Modification 2014
 Final Conditions
 2nd Segment of 1,500' Soil Loss Estimation Slope

File: profiles\Ft Bliss MSWLF Final Cover

Inputs:

Location: Texas\EI Paso County
 Soil: loamy sand
 Slope length (horiz): 500 ft
 Avg. slope steepness: 1.8 %

<i>Management</i>		<i>Vegetation</i>	<i>Yield units</i>	<i>Yield (# of units)</i>
CMZ 23\ld.Construction Site Templates\Construction site	Strip/Barrier Managements\Straw bale barrier	Grama, yr 1	lbs	300
		Permanent cover not harvested\straw bale barrier	pounds	50.0

Contouring: a. rows up-and-down hill
 Strips/barriers: 1 Straw bale barrier at end of slope
 Diversion/terrace, sediment basin: (none)
 Subsurface drainage: (none)
 Adjust res. burial level: Normal res. burial

Outputs:

T value: 3.0 t/ac/yr
 Soil loss erod. portion: 1.0 t/ac/yr
 Detachment on slope: 1.00 t/ac/yr
 Soil loss for cons. plan: 1.00 t/ac/yr
 Sediment delivery: 0.020 t/ac/yr

Crit. slope length: -- ft
 Surf. cover after planting: 0 %

Soil conditioning index (SCI): 0.071
 Avg. annual slope STIR: 29
 Wind & irrigation-induced erosion for SCI: 0 t/ac/yr

Period Start Date	Operation	PLU	Avg. surf. cover, %	Avg. SC subfactor	Avg. CC subfactor	Avg. roughness, in.	Avg. SR subfactor	Avg. C factor	EI, %
2/15/0	Bulldozer, clearing/cutting	0.45	0	1.0	1.0	0.32	0.95	0.43	0.30
3/1/0		0.45	0	1.0	1.0	0.31	0.95	0.43	0.33
3/15/0	Bulldozer, filling/leveling	1.0	0	1.0	1.0	0.24	1.00	1.00	0.024
3/16/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.43
4/1/0		1.00	0	1.0	1.0	0.24	1.00	1.00	0.49
4/16/0		1.00	0	1.0	1.0	0.24	1.00	0.99	0.61
5/1/0		0.99	0	1.0	1.0	0.24	1.00	0.99	0.89
5/16/0		0.99	0	1.0	1.0	0.24	1.00	0.99	1.4
6/1/0		0.99	0	1.0	1.0	0.24	1.00	0.98	3.8
6/16/0		0.98	0	1.0	1.0	0.24	1.00	0.98	6.4
7/1/0		0.98	0	1.0	1.0	0.24	1.00	0.98	13
7/16/0		0.98	0	1.0	1.0	0.24	1.00	0.97	15
8/1/0		0.97	0	1.0	1.0	0.24	1.00	0.97	13
8/15/0	Disk, tandem light finishing	1.0	0	1.0	1.0	0.29	0.97	0.97	0.97
8/16/0		1.00	0	1.0	1.0	0.28	0.97	0.97	15
9/1/0	default	1.00	0	1.0	1.0	0.28	0.97	0.97	0.76
9/2/0	Add mulch	1.00	69	0.16	1.0	0.28	0.97	0.15	0.74
9/3/0	Mulch crimper	0.99	67	0.17	1.0	0.28	0.97	0.16	8.6
9/16/0		0.99	66	0.17	1.0	0.28	0.97	0.17	7.3
10/1/0		0.99	65	0.18	1.0	0.27	0.98	0.17	3.7
10/16/0		0.99	64	0.18	1.0	0.27	0.98	0.17	2.6
11/1/0		0.98	64	0.18	1.0	0.27	0.98	0.18	1.1
11/16/0		0.98	63	0.19	1.0	0.27	0.98	0.18	0.97
12/1/0		0.98	63	0.19	1.0	0.27	0.98	0.18	0.91
12/16/0		0.97	62	0.19	1.0	0.27	0.98	0.18	0.81
1/1/1	straw bale barrier	0.97	62	0.19	1.0	0.27	0.98	0.18	0.13
1/16/1		0.96	62	0.19	1.0	0.27	0.98	0.18	0.19
2/1/1		0.96	61	0.20	1.0	0.27	0.98	0.18	0.26

Period Start Date, m/d/yy	Operation Name	Man soil loss rate, t/ac/yr	Man sed del. rate	El. %
2/15/0	Bulldozer, clearing/cutting	0.037	0.037	0.30
3/1/0		0.038	0.038	0.33
3/15/0	Bulldozer, filling/leveling	0.11	0.11	0.024
3/16/0		0.12	0.12	0.43
4/1/0		0.14	0.14	0.49
4/16/0		0.18	0.18	0.61
5/1/0		0.26	0.26	0.89
5/16/0		0.38	0.38	1.4
6/1/0		1.1	1.1	3.8
6/16/0		1.8	1.8	6.4
7/1/0		4.0	4.0	13
7/16/0		4.4	4.4	15
8/1/0		4.9	4.9	13
8/15/0	Disk, tandem light finishing	5.2	5.2	0.97
8/16/0		5.0	5.0	15
9/1/0	default	3.9	3.9	0.76
9/2/0	Add mulch	0.47	0.47	0.74
9/3/0	Mulch crimper	0.44	0.44	8.6
9/16/0		0.32	0.32	7.3
10/1/0		0.14	0.14	3.7
10/16/0		0.088	0.088	2.6
11/1/0		0.038	0.038	1.1
11/16/0		0.037	0.037	0.97
12/1/0		0.038	0.038	0.91
12/16/0		0.032	0.032	0.81
1/1/1	straw bale barrier	0.0053	0.0053	0.13
1/16/1		0.0070	0.0070	0.19
2/1/1		0.011	0.011	0.26

Attachment 4

Erosion and Soil Control Measures Specifications Information



U.S. Army Corps of Engineers, Fort Worth District
Appendix L – Final Facility Surface Water Drainage Report – Fort Bliss
Municipal Solid Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014





Installation Guide for Rolled Erosion Control Products (RECPs) Including Mulch Control Nettings (MCNs), Open Weave Textiles (OWTs), Erosion Control Blankets (ECBs), and Turf Reinforcement Mats (TRMs)

This document is intended to provide general guidelines for the installation of RECPs and does not supersede manufacturer's guidelines. The following sections summarize the general, accepted procedures for installation of RECPs and provide basic guidance for slope and channel installations. Detailed design/installation information should be obtained from the manufacturer.

General Procedure. Prepare a stable and firm soil surface free of rocks and other obstructions. Apply soil amendments as necessary to prepare seedbed. Place fertilizer, water, and seed in accordance with manufacturer, local/state regulations, or engineer/specifiers requirements. Typically, RECPs are unrolled parallel to the primary direction of flow. Ensure the product maintains intimate contact with the soil surface over the entirety of the installation. Do not stretch or allow material to bridge over surface inconsistencies. Staple/stake RECPs to soil such that each staple/stake is flush with underlying soil. Install anchor trenches, seams and terminal ends as specified.

Install RECPs after application of seed, fertilizer, mulches (if necessary) and other necessary soil amendments, unless soil in-filling of the TRM is required. For TRMs if soil in-filling, install TRM, apply seed, and other soil amendments lightly brush or rake 0.3 to 0.7 in. (8 to 18 mm) of topsoil into TRM matrix to fill the product thickness. If in-filling with a hydraulically-applied matrix or medium is required; install TRM, then install hydraulically-applied matrix or medium at the manufacturer's suggested application rate.

Apply MCNs (Materials Type 1.A., 2.A., 3.A.) immediately after dry mulch application.

Anchor Trenches, Seams and Terminal Ends

(A) Upslope Anchor – utilize one of the methods detailed below for initial anchoring of RECPs

(1) Staples. Install the RECPs 3 ft. (900 mm) beyond the shoulder of the slope onto flat final grade. Secure roll end with a single row of stakes/staples on 1 ft. (300-mm) centers.

(2) Anchor trench. Excavate a 6 in. by 6 in. (150 mm by 150 mm) anchor trench. Extend the upslope terminal end of the RECPs 3 ft. (900 mm) past the anchor trench. Use stakes or staples to fasten the product into the bottom of the anchor trench on 1 ft. (300 mm) centers. Backfill the trench and compact the soil into the anchor trench. Apply seed and any necessary soil amendments to the compacted soil and cover with remaining 1 ft. (300 mm) terminal end of the RECPs. Fold product over compacted soil in anchor trench to overlap downslope material. Secure terminal end of RECPs with a single row of stakes or staples on 1 ft. (300 mm) centers.

(3) Staple check. Construct a stake/staple check slot along the top edge of the RECPs by installing two rows of staggered stakes/staples 4 in. (100 mm) apart on 4 in. (100 mm) centers.

(4) Single net product anchor trench. Excavate a 6 in. by 6 in. (150 mm by 150 mm) anchor trench. Position roll such that the leading end of the roll is downslope and upside down. Apply seed and necessary soil amendments. Extend product 1 ft. downslope of anchor trench and place material in anchor trench (upside down). Secure terminal end and material in anchor trench with staples at 1 ft. intervals. Fill anchor trench with soil and compact. Apply seed and necessary soil amendments to fill placed in anchor trench. Move remaining roll over and downslope of anchor trench and proceed unrolling RECP downslope (since roll was initially reversed, folding material over anchor trench will result in the net side up, and rolling correctly downslope over the anchor trench).

(B) Seams – utilize one of the methods detailed below for seaming of RECPs

(1) Adjacent seams. Overlap edges of adjacent RECPs by 2 to 4 in. (50 to 100 mm) or by abutting products as defined by manufacturer. Use a sufficient number of stakes or staples to prevent seam or abutted rolls from separating.



(2) **Consecutive rolls.** Shingle and overlap consecutive rolls 2 to 6 in. (50 to 150 mm) in the direction of flow. Secure staples through seam at 1 ft. (300 mm) intervals.

(3) **Check seam.** Construct a stake/staple check seam along the top edge of RECPs for slope application and at specified intervals in a channel by installing two staggered rows of stakes/staples 4 in. (100 mm) apart on 4 in. (100 mm) centers.

(4) **Slope interruption check slot.** Excavate a trench measuring 6 in. wide by 6 in. deep (150 x 150 mm). Secure product to the bottom of the trench. Fold product over upslope material and fill and compact the trench on the downslope side of check slot and seed fill. Continue rolling material downslope over trench.

(C) Terminal Ends – utilize one of the methods detailed below for all terminal ends of RECPs

(1) **Staples.** Install the RECPs 3 ft. (900 mm) beyond the end of the channel and secure end with a single row of stakes/staples on 1 ft. (300-mm) centers. Stakes/staples for securing RECPs to the soil are typically 6 in. (150 mm) long.

(2) **Anchor trench.** Excavate a 6 in. by 6 in. (150 mm by 150 mm) anchor trench. Extend the terminal end of the RECPs 3 ft. (900 mm) past the anchor trench. Use stakes or staples to fasten the product into the bottom of the anchor trench on 1 ft. (300 mm) centers. Backfill the trench and compact the soil into the anchor trench. Apply seed and any necessary soil amendments to the compacted soil and cover with remaining 1 ft. (300 mm) terminal end of the RECPs. Secure terminal end of RECPs with a single row of stakes or staples on 1 ft. (300 mm) centers.

(3) **Check slot.** Construct a stake/staple check slot along the terminal end of the RECPs by installing two rows of staggered stakes/staples 4 in. (100 mm) apart on 4 in. (100 mm) centers.

Slope Installations. At the top of slope, anchor the RECPs according to one of the method detailed in Section (A) above. Securely fasten all RECPs to the soil by installing stakes/staples at a minimum rate of 1.3/yd² (1.5/m²) within the body of the blanket. For the most effective RECP installation use stake/staple patterns and densities as recommended by the manufacturer. For adjacent and consecutive rolls of RECPs follow seaming instructions detailed in Section (B) above. The terminal end of the RECPs installation must be anchored using one of the methods detailed in Section (C) above.

Channel Installations. Construct an anchor trench at the beginning of the channel across its entire width according to Section (A) (2) above. Follow the manufacturer's installation guidelines in constructing additional anchor trenches or stake/staple check slots at intervals along the channel reach and at the terminal end of the channel, according to paragraph (A) above respectively. Unroll RECPs down the center of the channel in the primary water flow direction. Securely fasten all RECPs to the soil by installing stakes/staples at a minimum rate of 1.7/yd² (1.5/m²). Significantly higher anchor rates and longer stakes/staples may be necessary in sandy, loose, or wet soils and in severe applications. For adjacent and consecutive rolls of RECPs follow seaming instructions detailed in Section (B) above. All terminal ends of the RECPs must be anchored using one of the methods detailed in Section (C) above.

With any RECP installation, ensure sufficient staples to resist uplift from hydraulics, wind, mowers, and foot traffic. For the most effective installation of RECPs, the ECTC recommends using stake/staple patterns and densities as recommended by the manufacturer.

Repair any damaged areas immediately by restoring soil to finished grade, re-applying soil amendments and seed, and replacing the RECPs.

Shoreline Installations. When required, lower the waterline as necessary and construct an anchor trench at the top of slope as described in Section (A) (2). Unroll the product down the slope and follow the manufacturer's installation guidelines in constructing additional anchor trenches or stake/staple check slots at intervals along the shoreline. Construct an anchor trench just below the mean water line at the terminal end of the shoreline, according to paragraph (C) (2) above. Securely fasten all RECPs along the shoreline to the soil by installing



stakes/staples at a minimum rate of 1.7/yd² (1.5/m²) through the body of the rolled erosion control product. Significantly higher anchor rates and longer stakes/staples may be necessary in sandy, loose, or wet soils, below the waterline and in severe applications. For adjacent and consecutive rolls of RECPs follow seaming instructions detailed in Section (B) above.

Attachment 5

2005 Stormwater Pollution Prevention Plan (For Reference Only. Prepared by U.S. Army Center for Health Promotion and Preventive Medicine.)



U.S. Army Corps of Engineers, Fort Worth District
Appendix L – Final Facility Surface Water Drainage Report – Fort Bliss
Municipal Solid Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



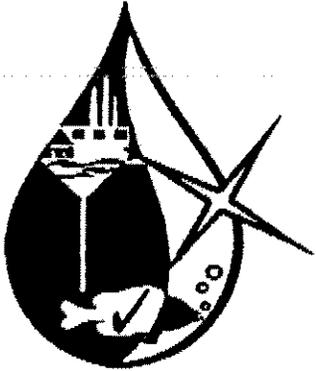
OPTIONAL FORM 89 (7-90) Kelly's phone # 360-222-1111

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NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Storm Water Pollution Prevention Plan - 2005



Fort Bliss, Texas

November 2005
Project Number: 32-EE-2754-05

Prepared for:
Fort Bliss, Directorate of Environment
Fort Bliss, TX

Prepared by:
U.S. Army Center for Health Promotion and Preventive Medicine
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Distribution limited to U.S. Government agencies only; protection of privileged information evaluating another command, November 2005. Requests for this document must be referred to. U.S. Army Air Defense Artillery Center and Ft. Bliss, ATTN: IMSW-BLS-Z, Building 622, S. Taylor Rd, Fort Bliss, Texas 79916-6816

21 119

Fort Bliss TX SWP3

APPENDIX J. SANITARY LANDFILL SITE SWMU 1

Location: SWMU 1
Open Landfill
Phone: (915) 490-5860

Site Coordinator: Manny Telemates

1.0 INDUSTRIAL ACTIVITY DESCRIPTION

Sanitary Landfill Solid Waste Management Unit (SWMU) 1 at Fort Bliss meets the definition of an industrial activity due to the industrial wastes which it received or potentially received. This trench-and-fill landfill has been in operation since 1974 and encompasses approximately 105 acres. A chain-link fence surrounds the entire site and a guard is located at the entrance. Permitted waste materials at the landfill include household and commercial refuse, asbestos, and triple-rinsed empty POL containers. Other activities at this site include: light vehicle maintenance, such as oil changes or additions, and fuel dispensing for equipment. There is a WAP for POLs and antifreeze.

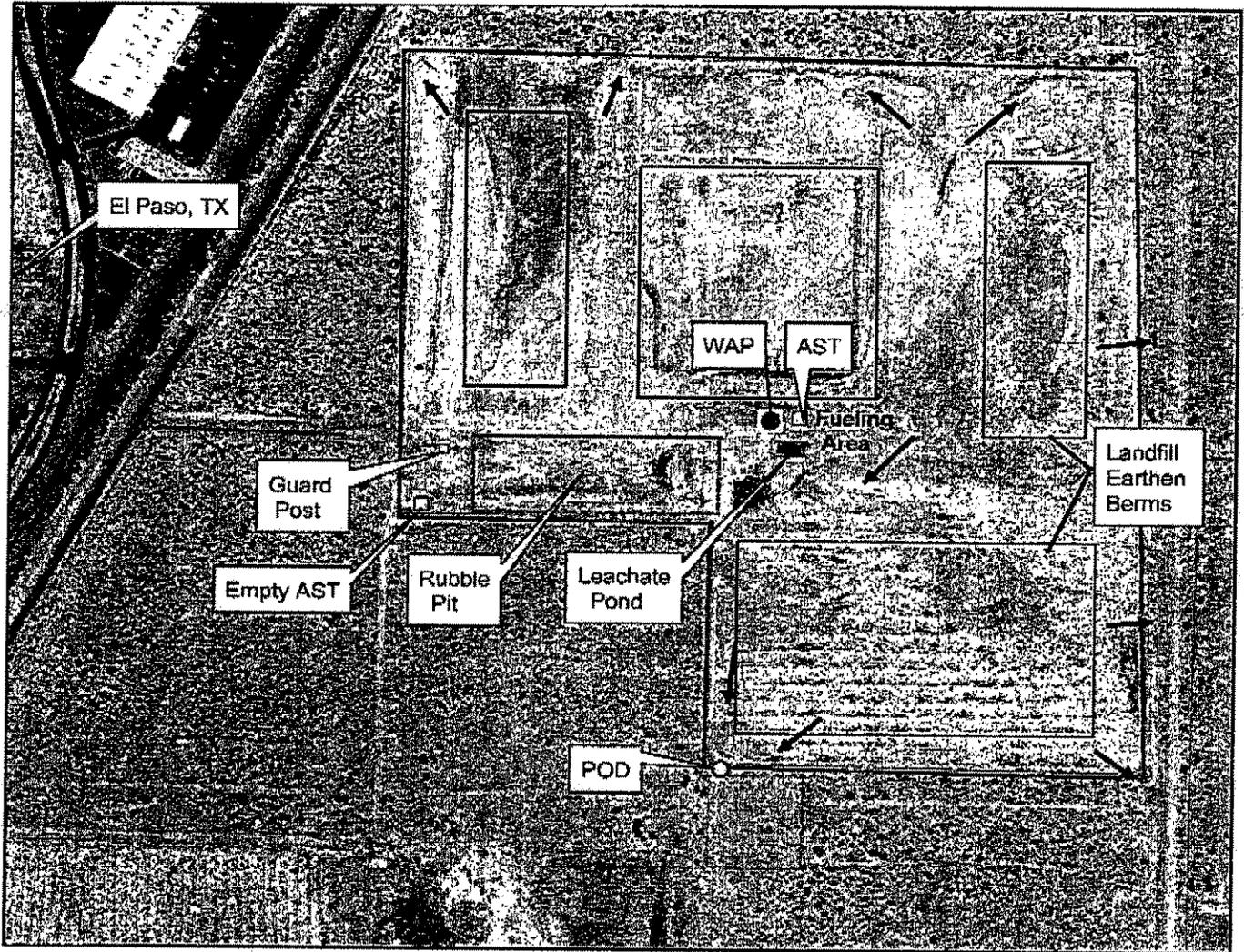
Sanitary Landfill SWMU 1 has not been capped and is surrounded by earthen berms. Storm water exits the site at a low area in the southwest corner of the site and typically ponds in the surrounding low-lying areas offsite. Given a large rain event, runoff from the landfill eventually enters a storm water collection system ending in a large evaporation retention pond south of the site, north of Fred Wilson Boulevard.

2.0 SITE MAP

Figure J-1 is a site map of the Sanitary Landfill SWMU 1. The location of storm water outfall is noted on the site map. Structural control measures to reduce pollutants, including earthen contour berms, were constructed surrounding the landfill pits. The site map notes the presence of these structural control measures. There are no surface water bodies at or near the site.

Fort Bliss TX SWP3

Figure J-1. SWMU 1 Sanitary Landfill



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Legend

- Point of Discharge
- Waste Accumulation Point
- Storm Water Flow
- ▭ Rubble Pit
- ▭ Earthen Berm
- ▨ Aboveground Storage Tank
- Fence
- ▭ Buildings
- ▭ Concrete Berm



Fort Bliss TX SWP3**3.0 STORM WATER POLLUTION PREVENTION TEAM**

The SWPPT Leader for Fort Bliss is the Storm Water Manager [Mr. Kelly Blough (915)-568-0794] who is responsible for SWP3 implementation, maintenance, and revision for this site, with the support of the site coordinator [Manny Telemantes (915) 490-5860]. The Storm Water Manager and the site coordinator have the responsibility to:

- Ensure good housekeeping practices.
- Conduct annual comprehensive site evaluations.
- Conduct quarterly visual observations of storm water runoff.
- Coordinate annual employee training programs.
- Conduct onsite preventive maintenance inspections.
- Update material inventories.
- Attend SWPPT meetings as necessary.

4.0 DESCRIPTION OF POTENTIAL POLLUTANT SOURCES**4.1 INVENTORY OF EXPOSED MATERIALS**

Table J-1 describes the potential pollutant sources at the Sanitary Landfill SWMU 1. The site activities, materials, and physical features that could pollute to storm water are identified in the table. For each potential source, a contamination potential assessment is included. Additionally, visual observations and pollutants of concern are addressed for all potential sources. Table J-1 will be revised and reviewed annually.

Table J-1. Summary of Potential Pollutant Sources

Potential Pollutant Source	Pollutants of Concern	Visual Observations of Site	Contamination Potential
Uncapped Landfill	COD, Metals, TSS	The uncapped landfill areas are within the earthen berms and should not contaminate storm water.	Low
Leachate Pond	BOD, COD, Metals, TSS	Leachate is removed and placed in a lined retention pond until it evaporates. If the pond were to overflow, it would return back to the landfill.	Low
WAP	COD, Oil and Grease, TPH	POLs and antifreeze are on containment pallets on a concrete pad typically covered with a tarp. However, the tarp was not present during the last site visit.	Low
Fuel Dispensing Area	COD, Oil and Grease, TPH	Fuel dispensing area contains a diesel 750-gallon aboveground storage tank with secondary containment and a 55-gallon drum of antifreeze. Area was kept clean with no evidence of spills/leaks.	Low

Fort Bliss TX SWP3**Table J-1. Summary of Potential Pollutant Sources (continued)**

Potential Pollutant Source	Pollutants of Concern	Visual Observations of Site	Contamination Potential
Maintenance Area	COD, Oil and Grease, TPH	An outdoor area north of the office building is used for light vehicle maintenance, such as adding oil to vehicles, as well as for temporary storage of equipment. Area was kept clean with no evidence of spills/leaks.	Low
Empty Aboveground Storage Tank	BOD, COD, Oil and Grease, TPH	This empty 10,000-gallon AST has no secondary containment and is old and rusty. It has been here for an unknown amount of time. It will be removed and used for bioremediation at another location in the future.	Low

4.2 SIGNIFICANT SPILLS AND LEAKS

No significant spills or leaks of toxic or hazardous substances have occurred at the site in the previous 5 years. Table J-2 will be updated annually to record all significant spills and leaks of toxic or hazardous pollutants that do occur.

Table J-2. Significant Spills and Leaks*

Date (month/day/year)	Description			Response Procedures	
	Location	Type of Material	Quantity	Amount Recovered	Material Still Exposed?
No spills or leaks occurred at the site in the 5 years prior to AUG 2005.	NA	NA	NA	NA	NA

* Significant spills include, but are not limited to, releases of oil or hazardous substances in excess of reportable quantities.

5.0 MEASURES AND CONTROLS**5.1 EXISTING BMPs**

BMPs are defined as physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water. The existing BMPs incorporated at the Sanitary Landfill SWMU 1 are identified in Table J-3. All existing procedural BMPs presented in Table J-3 will continue to be implemented by site personnel.

Fort Bliss TX SWP3**Table J-3. Existing BMPs**

Existing BMPs	Description
Good Housekeeping	
General good housekeeping	All landfill areas are maintained in a clean and orderly manner.
Containment of wastes	Waste materials are containerized and stored in the waste material storage area to reduce the risks of accidental spills and prevent contact with storm water runoff.
Security at critical points	Security measures are in place at the landfill to help prevent an accidental or intentional release of materials. The landfill is surrounded by a fence and locked during off-duty hours, and a patrol is stationed at the entrance during duty hours.
Preventive Maintenance	
Maintaining the secondary containment of the AST	Routine inspection and maintenance of the AST secondary containment (includes digging out contaminated soil that builds up along the base).
Maintaining earthen berms	Routine inspection and maintenance of the stabilization and structural erosion control measures, such as the earthen berms surrounding the landfill open pits.
Spill Prevention and Response Procedures	
Secondary containment for AST	The AST has proper secondary containment.
Emergency spill control station and supplies	A designated emergency spill control kit should be readily accessible in the fueling area.
Spill prevention and response signs	Signs posted explaining proper handling, disposal, and spill response procedures.
Inspections	
Weekly inspections	Landfill inspections are performed weekly. The condition of the following areas are noted during the inspections: storm water runoff/runoff control, the presence of landfill leachate/seepage, leachate collection and treatment system, the presence of any discharges to surface waters.
Employee Training	
Storm water pollution prevention training provided to all activity personnel	Annual storm water pollution prevention training is provided for personnel at all levels of responsibility. Section 8.0 of this plan addresses the storm water training program at Fort Bliss.
Storm Water Diversion	
Diversion of storm water from PPMs	Contoured earthen berms surround the landfill to minimize storm water runoff and runoff. The landfill is sufficiently stabilized and graded to divert storm water.
Sediment and Erosion Prevention	
Grading and stabilization of site surfaces to reduce erosion	The landfill is sufficiently graded or stabilized (swales/berms) to prevent erosion problems.
Sedimentation and storm water retention pond	In a large rain event, storm water from the landfill and the area south of it for several miles collects downstream in the sedimentation and storm water retention pond.
OTHER/ADVANCE POLLUTION PREVENTION	
Leachate Pond	Leachate is removed and placed in a lined retention pond until it evaporates. If the pond were to overflow, it would return back to the landfill.
Stabilization and grading of landfill surfaces to minimize storm water runoff and runoff, and erosion	As previously discussed, landfill surfaces are stabilized and graded or have berms to minimize storm water runoff and runoff and erosion.

Fort Bliss TX SWP3**5.2 PROPOSED BMPs**

Table J-4 provides a summary of the baseline and advanced BMPs that are recommended for the Sanitary Landfill SWMU 1. A narrative description of the BMP, as well as a scheduled date of implementation, is also provided.

Table J-4. Proposed BMPs

Proposed BMP	Discussion	Scheduled Date of Implementation
Good Housekeeping		
None	NA	NA
Preventive Maintenance		
Tarp or cover for the waste accumulation area	A pallet with antifreeze and other products are exposed to storm water and should be covered minimally with a tarp or a shed.	1 September 2006
Spill Prevention and Response Procedures		
Remove empty AST	Remove the empty 10,000-gallon AST.	1 September 2006
Tag valve on WAP	Add embossed metal tag to valve that state valve should be maintained in the closed position. Also state contact info for inspection by hazardous waste pick up crew or PPT for determination of when to drain contained rainwater.	1 September 2006
Inspections		
None	NA	NA
Employee Training		
None	NA	NA
Storm Water Diversion		
Maintain earthen berms	Some of the earthen berms are deteriorating and need to be refurbished. Berms around the north fence line should be rebuilt.	1 September 2006
Sediment and Erosion Prevention		
Maintain earthen berms	See Storm Water Diversion BMP.	1 September 2006
Other/Advance Pollution Prevention		
Change sample collection location	Sample collection is currently several miles downstream of the site at the sedimentation retention pond area. By the time the landfill discharge reaches this location several other storm water inlets have contributed to the sample. The sample location should be moved to the landfill's northwest corner (see Figure J-1 POD) where the storm water actually discharges from the site.	1 September 2006

Fort Bliss TX SWP3

6.0 SAMPLING INFORMATION

The Sanitary Landfill SWMU 1 is subject to the storm water monitoring and reporting requirements outlined for Sector L – Landfills and Land Application Sites in the MSGP. Pollutants to be analyzed for include TSS and total recoverable iron. Quarterly sampling was conducted the second (1 Jan – 31 Dec 2004) and third period (1 Jan – 31 Dec 2005) of the permit. The Fort Bliss Directorate of Environment has decided to conduct benchmark sampling every year since it does not meet waiver requirements due to the sampling location. Specific monitoring requirements (including analytical detection limits, reporting requirements, and sampling requirements) are outlined in Sector L of the MSGP. Copies of all analytical monitoring must be maintained onsite within this SWP3 (Appendix L). The new monitoring location is shown on the site map, Figure J-1.

In addition to analytical monitoring, quarterly visual observations of storm water quality must be conducted at the site. The examination must be of a grab sample collected at the new monitoring location identified on the site map within 30 minutes (or as soon thereafter as practical, but not to exceed 60 minutes) of when the runoff begins discharging. Samples must be collected within the seasonal periods: January through March; April through June; July through September; and October through December. The examination of storm water grab samples shall include any observations of color, odor, turbidity, floating solids, foam, oil sheen, or other obvious indicators of storm water pollution. Reports of the visual observation will include: the examination date and time, examination personnel, visual quality of the storm water discharge, and probable sources of any observed storm water contamination. A Summary of Quarterly Visual Observation form is included in Appendix M; it should be photocopied and completed as necessary. Copies of the Summary of Quarterly Visual Observation reports must be kept in the SWP3 (Appendix M) and submitted to the SWPPT Leader.

To date, all storm water sampling is conducted as required under Sector L of the MSGP at the remote sampling location several miles downstream. In the future, sampling must be conducted at the POD. Analytical results from storm water analytical monitoring are included in Appendix L of this SWP3.

Fort Bliss TX SWP3

requirements, sampling requirements) are outlined in Sectors K and N of the MSGP. Copies of all analytical monitoring must be maintained onsite within this SWP3 (Appendix M). The monitoring location is noted on the site map, Figure I-1.

In addition to analytical monitoring, quarterly visual observations of storm water quality must also be conducted annually by the SWPPP Team. The examination must be of a grab sample collected at the new monitoring location identified on the site map within 30 minutes (or as soon thereafter as practical, but not to exceed 60 minutes) of when the runoff begins discharging. Samples must be collected within the seasonal periods: January through March; April through June; July through September; and October through December. The examination of storm water grab samples shall include any observations of color, odor, turbidity, floating solids, foam, oil sheen, or other obvious indicators of storm water pollution. Reports of the visual observation will include the examination date and time, examination personnel, visual quality of the storm water discharge, and probable sources of any observed storm water contamination. A Summary of Quarterly Visual Observation form is included in Appendix M; it should be photocopied and completed as necessary. Copies of the Summary of Quarterly Visual Observation reports must be kept in the SWP3 (Appendix M) and submitted to the SWPPT Leader.

Attachment 6

Geohydrologic Site Characterization of the Municipal Solid Waste Landfill Facility, U.S. Army Defense Artillery Center and Fort Bliss, El Paso County, Texas

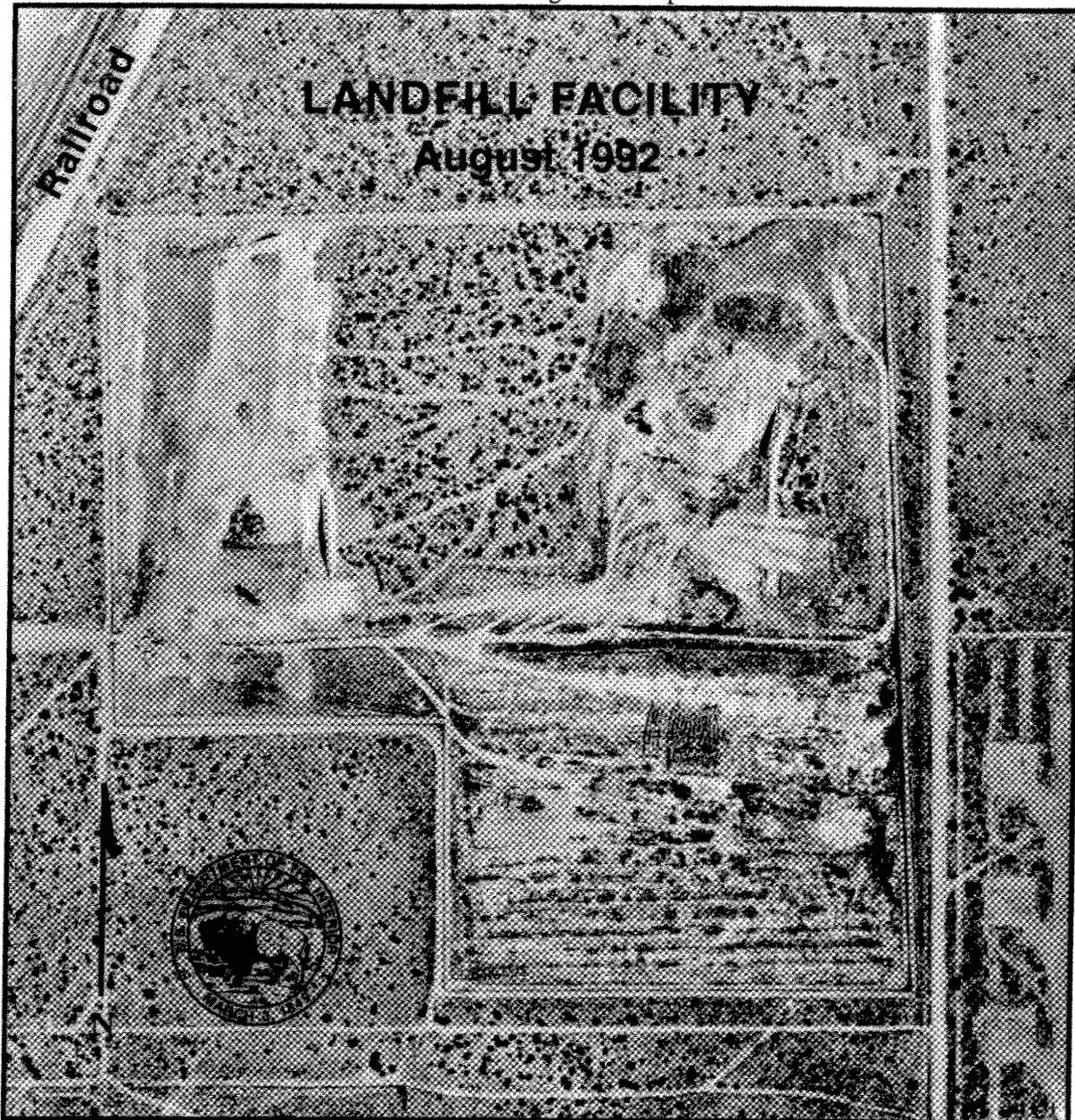


U.S. Army Corps of Engineers, Fort Worth District
Appendix L – Final Facility Surface Water Drainage Report – Fort Bliss
Municipal Solid Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



GEOHYDROLOGIC SITE CHARACTERIZATION OF THE MUNICIPAL SOLID WASTE LANDFILL FACILITY, U.S. ARMY AIR DEFENSE ARTILLERY CENTER AND FORT BLISS, EL PASO COUNTY, TEXAS

U.S. GEOLOGICAL SURVEY
Water-Resources Investigations Report 95-4217



Prepared in cooperation with the
U.S. DEPARTMENT OF THE ARMY,
U.S. ARMY AIR DEFENSE ARTILLERY CENTER AND FORT BLISS

GEOHYDROLOGIC SITE CHARACTERIZATION OF THE
MUNICIPAL SOLID WASTE LANDFILL FACILITY,
U.S. ARMY AIR DEFENSE ARTILLERY CENTER AND
FORT BLISS, EL PASO COUNTY, TEXAS

By Cynthia G. Abeyta

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Albuquerque, New Mexico
1996

U.S. DEPARTMENT OF THE INTERIOR

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CONVERSION FACTORS AND VERTICAL DATUM

<u>Multiply</u>	<u>By</u>	<u>To obtain</u>
inch	25.40	millimeter
foot	0.3048	meter
mile	1.609	kilometer
acre	4,047	square meter
quart	0.9464	liter
gallon	3.785	liter
gallon per minute	0.06309	liter per second
foot squared per day	0.09290	meter squared per day
ton	907.1848	kilogram

Temperature in degrees Celsius ($^{\circ}\text{C}$) or degrees Fahrenheit ($^{\circ}\text{F}$) can be converted as follows:

$$^{\circ}\text{F} = 1.8 (^{\circ}\text{C}) + 32$$

$$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$$

Sea level: In this report "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of the United States and Canada, formerly called Sea Level Datum of 1929.

The use of trade names in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

**GEOHYDROLOGIC SITE CHARACTERIZATION OF THE MUNICIPAL
SOLID WASTE LANDFILL FACILITY, U.S. ARMY AIR DEFENSE ARTILLERY
CENTER AND FORT BLISS, EL PASO COUNTY, TEXAS**

By Cynthia G. Abeyta

ABSTRACT

Geohydrologic conditions of the Municipal Solid Waste Landfill Facility (MSWLF) on the U.S. Army Air Defense Artillery Center and Fort Bliss, El Paso County, Texas, were evaluated by the U.S. Geological Survey in cooperation with the U.S. Army. The 106.03-acre MSWLF has been in operation since January 1974. The landfill contains household refuse, Post solid wastes, bulky items, grass and tree trimmings from family housing, refuse from litter cans, construction debris, classified waste (dry), dead animals, asbestos, and empty oil cans.

The MSWLF, located about 1,200 feet east of the nearest occupied structure, is estimated to receive an average of approximately 56 tons of municipal solid waste per day and, at a fill rate of 1-4 acres per year, is expected to reach its capacity by the year 2004. The MSWLF is located in the Hueco Bolson, 4 miles east of the Franklin Mountains. Elevations at the MSWLF range from 3,907 to 3,937 feet above sea level. The climate at the MSWLF and vicinity is arid continental, characterized by an abundance of sunny days, high summer temperatures, relatively cool winters typical of arid areas, scanty rainfall, and very low humidity throughout the year. Average annual temperature near the MSWLF and vicinity is 63.3 degrees Fahrenheit and annual precipitation is 7.8 inches. Potential evaporation in the El Paso area was estimated to be 65 inches per year. Soils at and adjacent to the MSWLF are nearly level to gently sloping, have a fine sandy loam subsoil, and are moderately deep over caliche.

The MSWLF is underlain by Hueco Bolson deposits of Tertiary age and typically are composed of unconsolidated to slightly consolidated interbedded sands, clay, silt, gravel, and caliche. Individual beds are not well defined and range in thickness from a fraction of an inch to about 100 feet. The primary source of ground water in the MSWLF area is in the deposits of the Hueco Bolson. A relatively thick vadose zone of approximately 300 feet overlies the aquifer of the Hueco Bolson deposits in the vicinity of the MSWLF. A deep water table prevails for all of the study area. Whether any perched water zones exist below the MSWLF is unknown. Under current conditions, extensive ground-water development by the City of El Paso encompasses the MSWLF. Hydraulic characteristics of the Hueco Bolson vary significantly as a result of the nonuniform nature of the individual beds. Wells in the vicinity of the MSWLF range in depth from about 600 feet to greater than 1,200 feet. Recharge resulting from direct infiltration of precipitation is minor due to the high evaporation and low precipitation rates. The hydraulic gradient in the vicinity of the MSWLF is generally to the south but may vary due to pumpage of a well located on the northeast corner of the perimeter boundary. Ground-water monitoring data for the MSWLF vicinity show a water-level decline of 55.65 feet from November 1958 to December 1987. Depth to water at the northeast corner of the MSWLF as of July 26, 1994, was 325.8 feet below land surface.

The city-operated Shearman Well Field, located north of the MSWLF, is a primary source of ground water for the City of El Paso. The test-pumping rate of well JL-49-05-914 (the well nearest to the MSWLF having test-pumping data) was 1,972 gallons per minute on July 20, 1992; the static water level prior to pumping was 317.54 feet below land surface. El Paso Water Utilities reports that the pumping level after 8 hours of pumping was 367.80 feet below land surface, resulting in a drawdown of 50.26 feet, transmissivity of 22,200 feet squared per day (166,000 gallons per day per foot), and specific capacity of 39.2 gallons per minute per foot of drawdown.

After the well was shut off, the well recovered to a static water level of 317.46 feet below land surface on July 21, 1992.

Ground water in the El Paso area is chemically suitable for most uses. El Paso Water Utilities reports that concentrations of dissolved solids in the vicinity of the MSWLF generally range from 297 to 625 milligrams per liter (wells JL-49-05-904 and JL-49-05-915, respectively).

INTRODUCTION

The U.S. Army Air Defense Artillery Center and Fort Bliss (USAADACENFB) is evaluating geohydrologic conditions of the Municipal Solid Waste Landfill Facility (MSWLF) to implement requirements of Federal and State of Texas regulatory programs. In 1994, the U.S. Geological Survey, in cooperation with the U.S. Army, initiated a study of the USAADACENFB MSWLF to identify geohydrologic conditions at the facility. Results of this study will be used by the U.S. Army to aid in fulfilling regulatory requirements at the facility as specified in Title 40 of the Federal Code of Regulations, Part 258 (40 CFR 258) and Part 30 of the Texas Administrative Code, Section 330 (30 TAC 330) (Texas Natural Resources Conservation Commission, 1993). The MSWLF is located in Texas, within El Paso County (fig. 1) on Federal land administered by the USAADACENFB.

Purpose and Scope

The primary objectives of this report are to: (1) present information on the boundaries, area, and contents of the MSWLF; (2) present information on the environmental setting of the MSWLF and vicinity, including a description of the physiography, climate, and soils; (3) describe geologic and hydrologic characteristics of the unsaturated zone and shallow aquifer; and (4) describe the ground-water quality in the vicinity of the MSWLF.

Information presented in this report will result in a better understanding of the hydrogeology at the MSWLF. The hydrogeology of the MSWLF is characterized on the basis of existing data. Water-level data were compiled for wells located in the vicinity of the MSWLF. Water-quality data were compiled for wells within a 1-mile radius of the MSWLF.

Description of the U.S. Army Air Defense Artillery Center and Fort Bliss and Municipal Solid Waste Landfill Facility

The USAADACENFB military reservation is located within the extraterritorial jurisdiction of the City of El Paso and extends into unincorporated portions of El Paso County, Texas, and the counties of Doña Ana and Otero in New Mexico (fig. 1). The primary missions of the USAADACENFB are air defense artillery training, senior noncommissioned officers training, administrative and logistical support of tenant activities, and provision of training facilities for reserve components.

The USAADACENFB military reservation serves a total Post population of more than 90,000 people (Population Performance Factors, March 1994, USAADACENFB, written commun., April 26, 1994). The total Post population includes military and civilian personnel (17,934 and 7,903 people, respectively), on- and off-Post family members (8,420 and 15,738 people, respectively), and retirees and retiree family members (14,502 and 26,465 people, respectively).

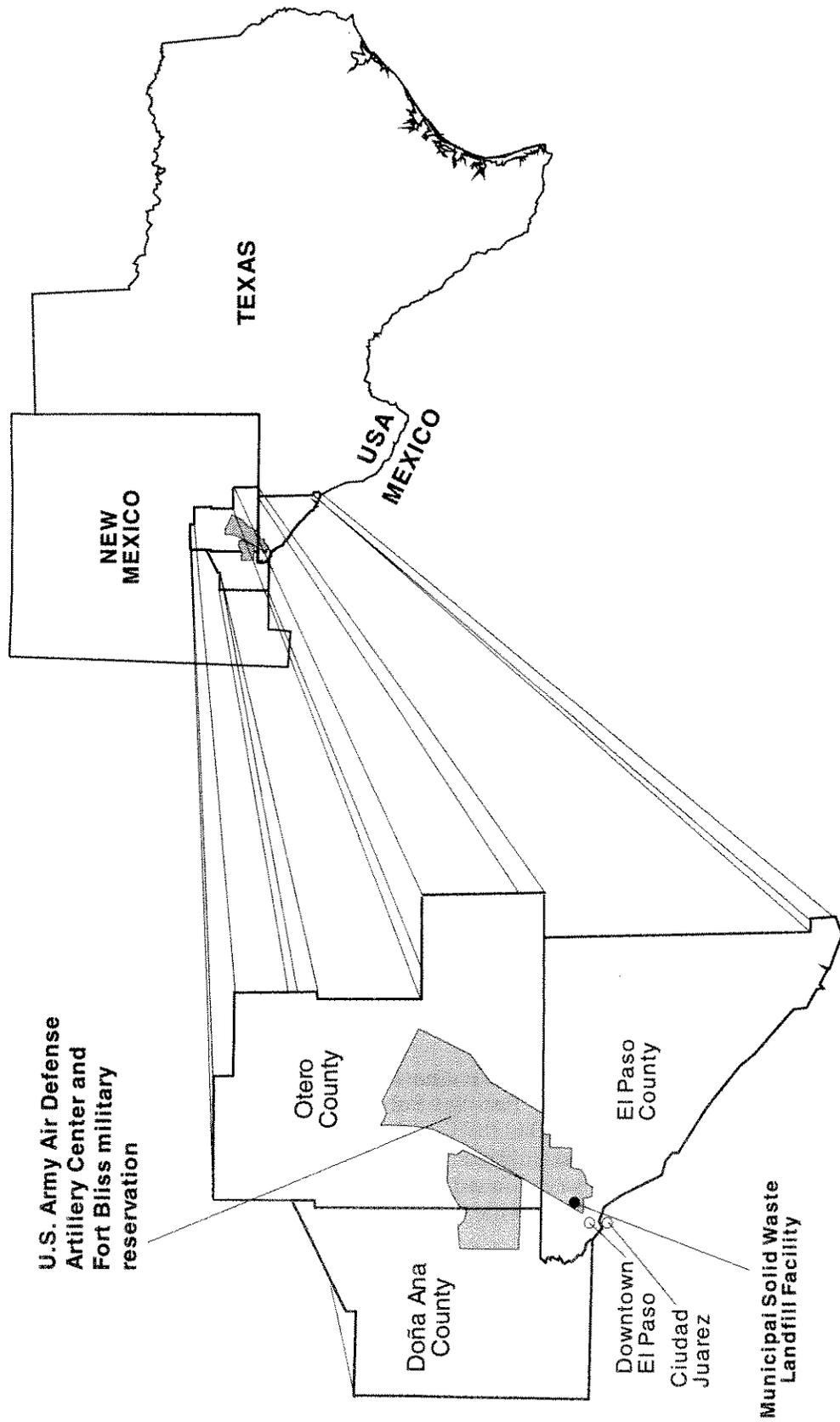


Figure 1.--Location of U.S. Army Air Defense Artillery Center and Fort Bliss military reservation, Texas and New Mexico.

On November 1, 1982, the USAADACENFB received Texas Department of Health Permit No. 1422 for operation of an existing Type I and Type IV municipal solid waste disposal facility. As defined by the TAC, a Type I facility is a standard landfill for the disposal of municipal solid waste; a Type IV facility is authorized for the disposal of brush, construction-demolition waste, and rubbish that are free of putrescible and household wastes (30 TAC §330.41.b and 30 TAC §330.41.e). The permit was issued pursuant to the provisions of the Texas Solid Waste Disposal Act and the Texas Department of Health Municipal Solid Waste Management Regulations for the 106.03-acre existing site.

The MSWLF is located northwest of Biggs Army Airfield, and 300 feet east of the Southern Pacific Railroad tracks, in El Paso County, Texas (fig. 2). The MSWLF is about 1,200 feet east of the nearest occupied structure. Occupied structures include residential and commercial areas located on the west side of the MSWLF (fig. 2). An all-weather road is accessible to the MSWLF year round. A 10-foot-high chain link fence with barbed wire outriggers surrounds the entire perimeter of the facility. A 6-foot 4-inch by 12-foot 4-inch by 10-foot-high enclosed guard shack is located on the facility near the entrance. No utilities are within the perimeter of the MSWLF. Existing boundary conditions of the MSWLF are shown in figure 3.

Types of solid wastes disposed of at the MSWLF include household refuse, Post solid wastes, bulky items, grass and tree trimmings from family housing, refuse from litter cans, construction debris, classified waste (dry), dead animals, asbestos, and empty oil cans (1-quart and 5-gallon sizes). The USAADACENFB Directorate of Public Works and Logistics manages contract operation of the MSWLF. Operation of the MSWLF is by a private contractor who also provides refuse collection and disposal services. The method of landfilling at the MSWLF is progressive trench where excavation and filling occur simultaneously in trenches 40 feet wide by 30 feet deep. Refuse is dumped at the end of the trench, then spread and covered by use of a crawler tractor. Daily cover of a minimum of 6 inches of compacted earth and a final cover of 2 to 3 feet are provided.

Two ground-water production wells are located about 350 feet north of the MSWLF. Well W3 has been in operation for several years; well W3A is a newly completed well located adjacent to W3 (figs. 2 and 3). These wells are used as public supply wells and are owned by the U.S. Army. To comply with Resource Conservation and Recovery Act (RCRA) and Texas Natural Resource Conservation Commission (TNRCC) regulations, a methane-gas monitoring network was installed at the MSWLF. Ten methane-gas monitoring probes were installed within the perimeter of the MSWLF. The methane-monitoring program is discussed in the Soils and Soil Gas section of this report.

The MSWLF was established in January 1974 and is estimated to receive an average of approximately 56 tons of municipal solid waste per day. The landfill fill rate is 1-4 acres per year; the MSWLF is expected to reach its capacity by the year 2004 at this fill rate (approximately 15 acres of the permitted area will not be filled).

A permit modification regarding soil and plastic liners has been approved by the TNRCC to construct a landfill cell within the MSWLF (labeled Subtitle D in fig. 3), complying with current federal requirements (RCRA, Subtitle D is discussed in the Federal Regulatory Program and Resource Conservation and Recovery Act Subtitle D and State of Texas Programs sections of this report). When construction of the cell is completed and approved in approximately October 1994, future wastes will be disposed of in the Subtitle D area (fig. 3).

Federal Regulatory Program

In June 1980 the Department of Defense (DOD) issued Defense Environmental Quality Program Policy Memorandum 80-6, which mandated that hazardous waste material sites on DOD installations be identified. DOD policy is to identify and evaluate suspected problems associated with past hazardous contamination and to control hazards to the public health and welfare. The USAADACENFB implemented the DOD mandate in February 1983 by initiating an Installation Restoration Program (IRP) to identify the location and contents of past hazardous material disposal or spill sites and to control hazards to public health and the environment. The IRP is the basis for response actions on DOD installations under the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, the Superfund Amendment and Reauthorization Act (SARA) of 1986, the RCRA of 1976, the Hazardous and Solid Waste Amendments of 1984, and Executive Order 12316. The SARA confirms that CERCLA is applicable to Federal facilities and defines the process by which Federal agencies are required to initiate remedial actions at their facilities.

Previous IRP investigations at the USAADACENFB, in compliance with the above mandates, began with a USAADACENFB Headquarters installation assessment (Environmental Science and Engineering, Inc., 1983). The initial assessment was followed by an evaluation of solid waste management units (U.S. Army Environmental Hygiene Agency, 1987) and an RCRA Facility Assessment (RFA) (A.T. Kearney, Inc., 1989; U.S. Army Environmental Hygiene Agency, 1989; and Environmental Science and Engineering, Inc., 1991). Initial assessments included a literature search of published and unpublished reports, discussions with key installation personnel, examination of topographic maps and aerial photographs, identification of potentially hazardous sites, and initial assessments of those sites.

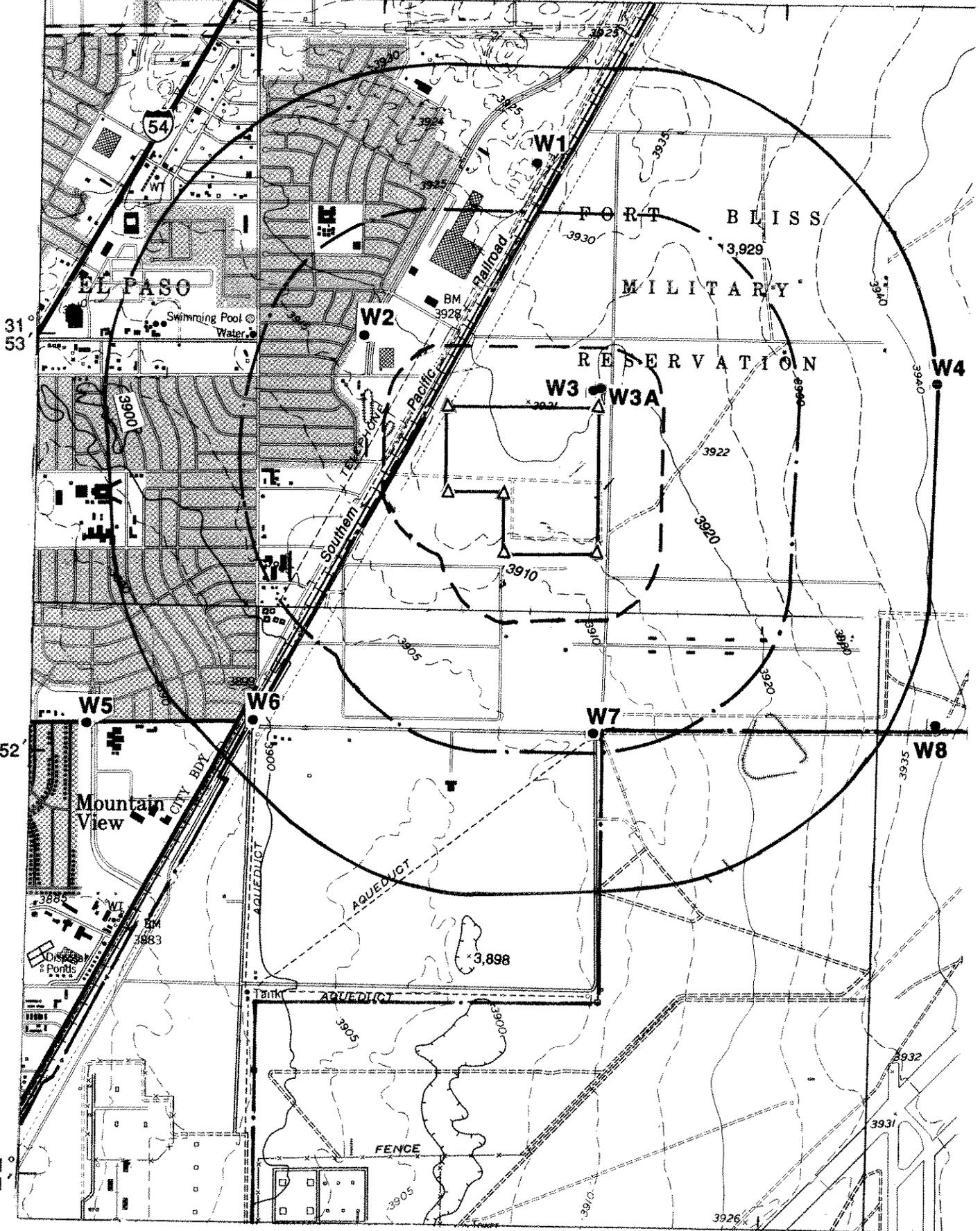
On January 17, 1991, a permit for industrial solid waste management for Class I hazardous waste storage, processing, and Post-closure care at the USAADACENFB military reservation was issued by the Texas Water Commission (TWC, now called the TNRCC) under provisions of the Texas Health and Safety Code Announcement, Chapter 361 (Vernon). The permit is referred to as Texas permit number HW-50296/Environmental Protection Agency permit number TX4213720101. Provisions in the permit stem from State and Federal authority and are subject to TNRCC rules and orders and Texas laws.

A requirement of the permit was that an RCRA Facility Investigation (RFI) be conducted at specified units identified in the permit. The MSWLF, identified as RFI Unit No. 1 in the permit and the previous RFA, was identified as one of the units to be included in the RFI. On the basis of findings in the RFA studies, a field phase of the RFI was conducted during May through June 1990. Work performed at the MSWLF included collection and analysis of soil cuttings at various locations within the MSWLF. Soil samples were analyzed for total petroleum hydrocarbons, total metals, volatile organic carbons, semivolatile organic carbons (by base-neutral-acid extraction), and polychlorinated biphenyls. Volume I of the RFI report of the USAADACENFB sites was completed in December 1991 (Environmental Science and Engineering, Inc., 1991). Findings of the RFI pertaining to the MSWLF indicated that "all of the constituents analyzed for were below action levels" (Environmental Science and Engineering, Inc., 1991, p. 5-1). The RFI reports were submitted to the TWC in February 1992. On the basis of the results of the RFI reports, the TWC, in a March 4, 1992, correspondence, prescribed "no additional efforts at this time" for RFI Unit No. 1 (MSWLF).

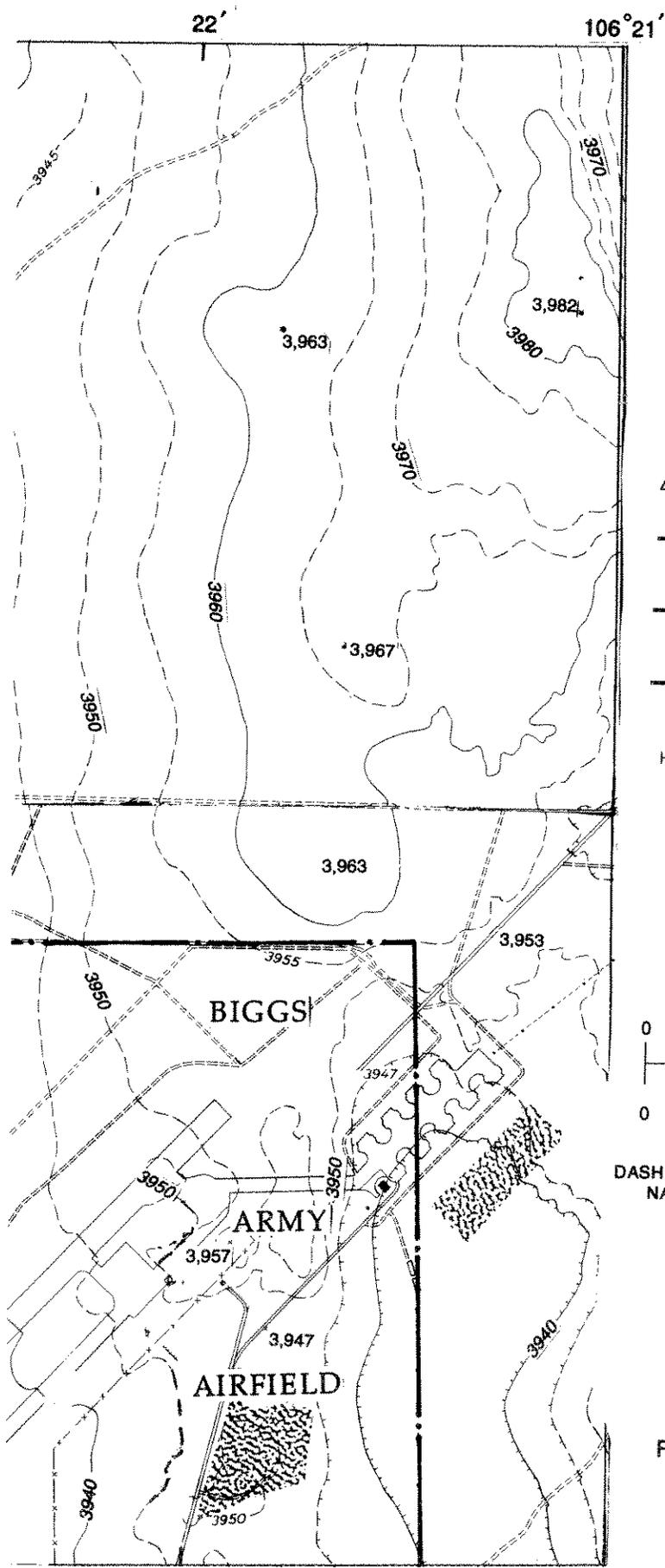
106° 25'

24'

23'



Base from U.S. Geological Survey, 1:24,000 quadrangles: El Paso, Texas; Fort Bliss SE, Texas; Fort Bliss NE, Texas; North Franklin Mountains, Texas



- EXPLANATION**
- △-----△ APPROXIMATE BOUNDARY OF LANDFILL
 - 950-FOOT PERIMETER BOUNDARY AROUND LANDFILL
 - . - . - . 3,000-FOOT PERIMETER BOUNDARY AROUND LANDFILL
 - 1-MILE PERIMETER BOUNDARY AROUND LANDFILL
 - RAILROAD
 - W8
● EXISTING WELL AND IDENTIFICATION NUMBER

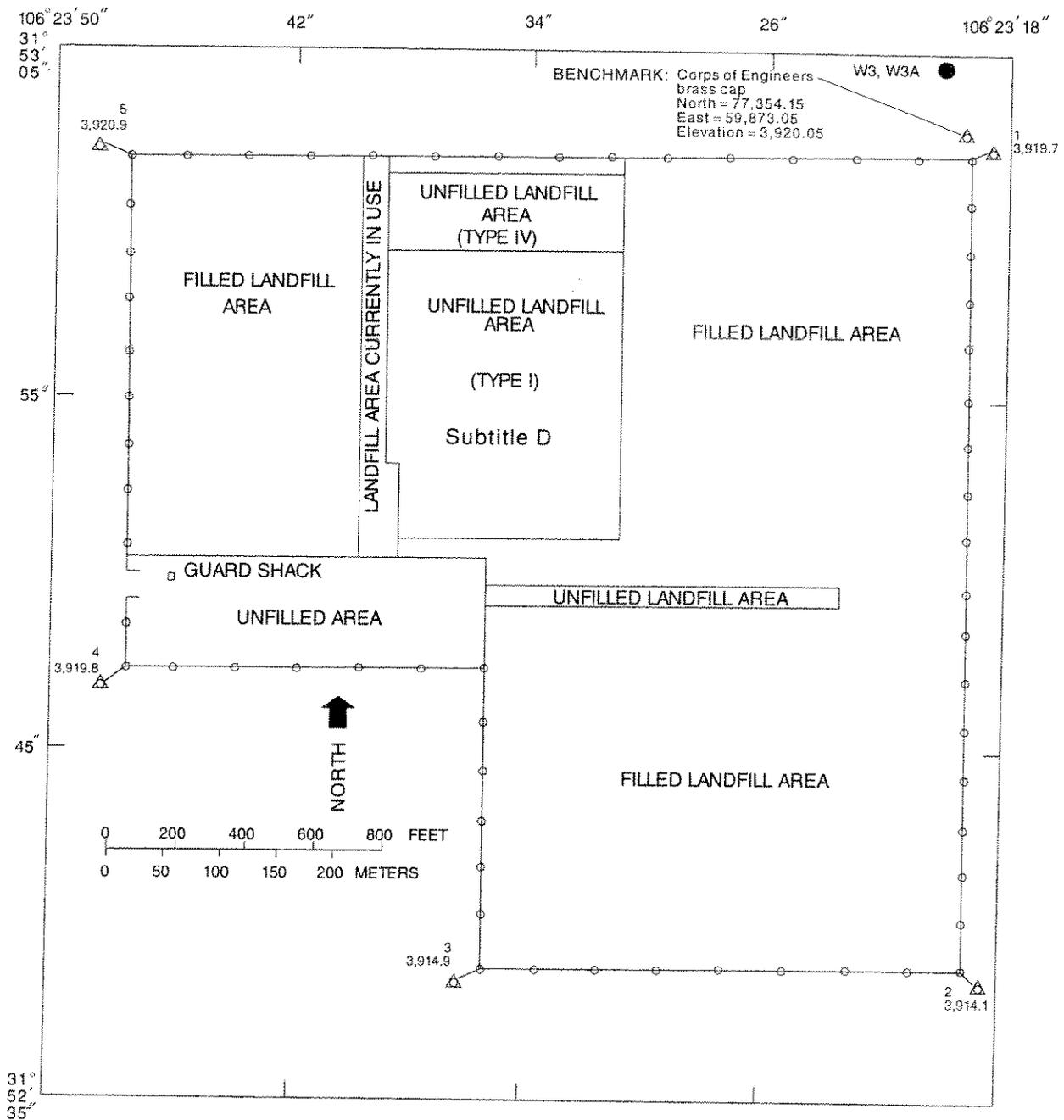
SCALE 1:24,000

0 0.5 1 MILE

0 0.5 1 KILOMETER

CONTOUR INTERVAL 20 FEET
 DASHED LINES REPRESENT 5- TO 10-FOOT CONTOURS
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

Figure 2.--Location of U.S. Army Air Defense Artillery Center and Fort Bliss Municipal Solid Waste Landfill Facility, Texas.



EXPLANATION

- FENCE/LANDFILL BOUNDARY
- 3,919.8 △ CONTROL POINT -- Identification number and elevation, in feet above sea level
- W3, W3A ● GROUND-WATER PRODUCTION WELL AND IDENTIFICATION NUMBER
- TYPE I STANDARD LANDFILL FACILITY FOR DISPOSAL OF MUNICIPAL SOLID WASTE
- TYPE IV FACILITY AUTHORIZED FOR DISPOSAL OF BRUSH, CONSTRUCTION-DEMOLITION WASTE, AND RUBBISH THAT ARE FREE OF PUTRESCIBLE AND HOUSEHOLD WASTES

Figure 3.--Existing Municipal Solid Waste Landfill Facility boundary conditions.

Resource Conservation and Recovery Act Subtitle D and State of Texas Programs

On October 9, 1991, the RCRA of 1976 was officially expanded to include revisions to the Criteria for Classification of Solid Waste Disposal Facilities and Practices set forth in 40 CFR Part 257, and to add RCRA Subtitle D (40 CFR Part 258). These revisions that implement minimum Federal criteria for municipal solid waste landfill facilities are referred to as Subtitle D of the RCRA. On October 9, 1993, Chapter 330 Municipal Solid Waste of the 30 TAC became effective in the State of Texas. The 30 TAC includes the Subtitle D requirements and covers all aspects of municipal solid waste management under the authority of the TNRCC. Although Texas State permit HW-50296 remains in force, the USAADACENFB is initiating studies to comply with the requirements in 30 TAC Chapter 330 (30 TAC 330).

This study of the MSWLF was conducted to compile existing geohydrologic information to characterize the site, which is under the regulatory jurisdiction of the TNRCC. The study was conducted in accordance with recommendations presented in the TNRCC's Municipal Solid Waste Regulations, 30 TAC 330, which implement requirements of Subtitle D of the RCRA.

Well-Numbering System

The well-numbering system in Texas was developed by the Texas Water Development Board for use throughout the State (fig. 4). The well number is divided into five segments; in this report the first four segments are divided by hyphens. The first segment is a two-letter prefix that identifies the county. The second segment indicates a 1-degree quadrangle that is given a number consisting of two digits ranging from 01 to 89. Each 1-degree quadrangle is divided into 7.5-minute quadrangles that are given a two-digit number from 01 to 64; this two-digit number is the third segment of the well number. Each 7.5-minute quadrangle is divided into 2.5-minute quadrangles that are given a single-digit number from 1 to 9; this one digit number is the fourth segment of the well number. Finally, each well within a 2.5-minute quadrangle is given a two-digit number in the order in which it was inventoried, starting with 01; this two-digit number is the fifth segment of the well number.

ENVIRONMENTAL SETTING

The Fort Bliss Post Headquarters and MSWLF are located in Texas, within the extraterritorial jurisdiction of the City of El Paso (fig. 5). The population of the El Paso metropolitan area is greater than 600,000. Ciudad Juarez, Mexico, lies directly south of El Paso across the Rio Grande and has a population greater than 1,000,000.

Physiography

Fort Bliss military reservation lies in the Hueco Bolson intermontane valley (fig. 5). The Hueco Bolson intermontane valley was produced by numerous diverse faults and folds and is divided into two distinct parts. The northern extension of the Hueco Bolson is referred to as the Tularosa Basin; the southern extension is referred to as the Hueco Bolson proper (Knowles and Kennedy, 1958, p. 8), hereafter referred to as the Hueco Bolson. The Tularosa Basin and Hueco Bolson are divided indefinitely a few miles north of the New Mexico-Texas border. The Tularosa Basin has no external drainage; the Hueco Bolson is partly drained by the Rio Grande. Elevations of the Fort Bliss military reservation range from 3,800 feet to more than 8,000 feet above sea level.

The MSWLF is 4 miles east of the rugged Franklin Mountains. The Franklin Mountains have peaks from 4,600 feet to greater than 7,000 feet above sea level. Geographic coordinates of the MSWLF are 31°52'54.51" north latitude, 106°25'33.09" west longitude. Elevations at the MSWLF range from 3,907 to 3,937 feet above sea level.

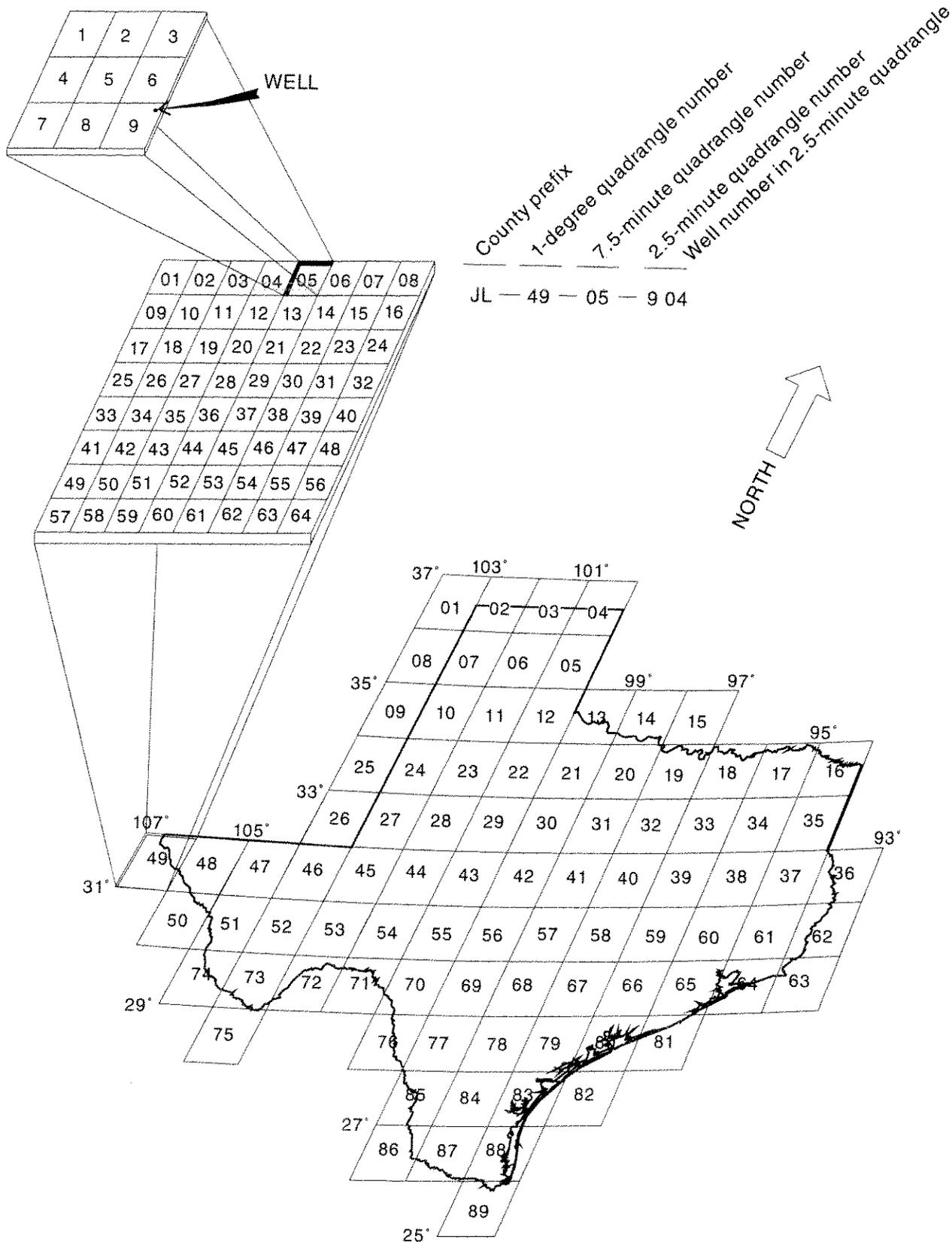


Figure 4.--Texas well-numbering system.

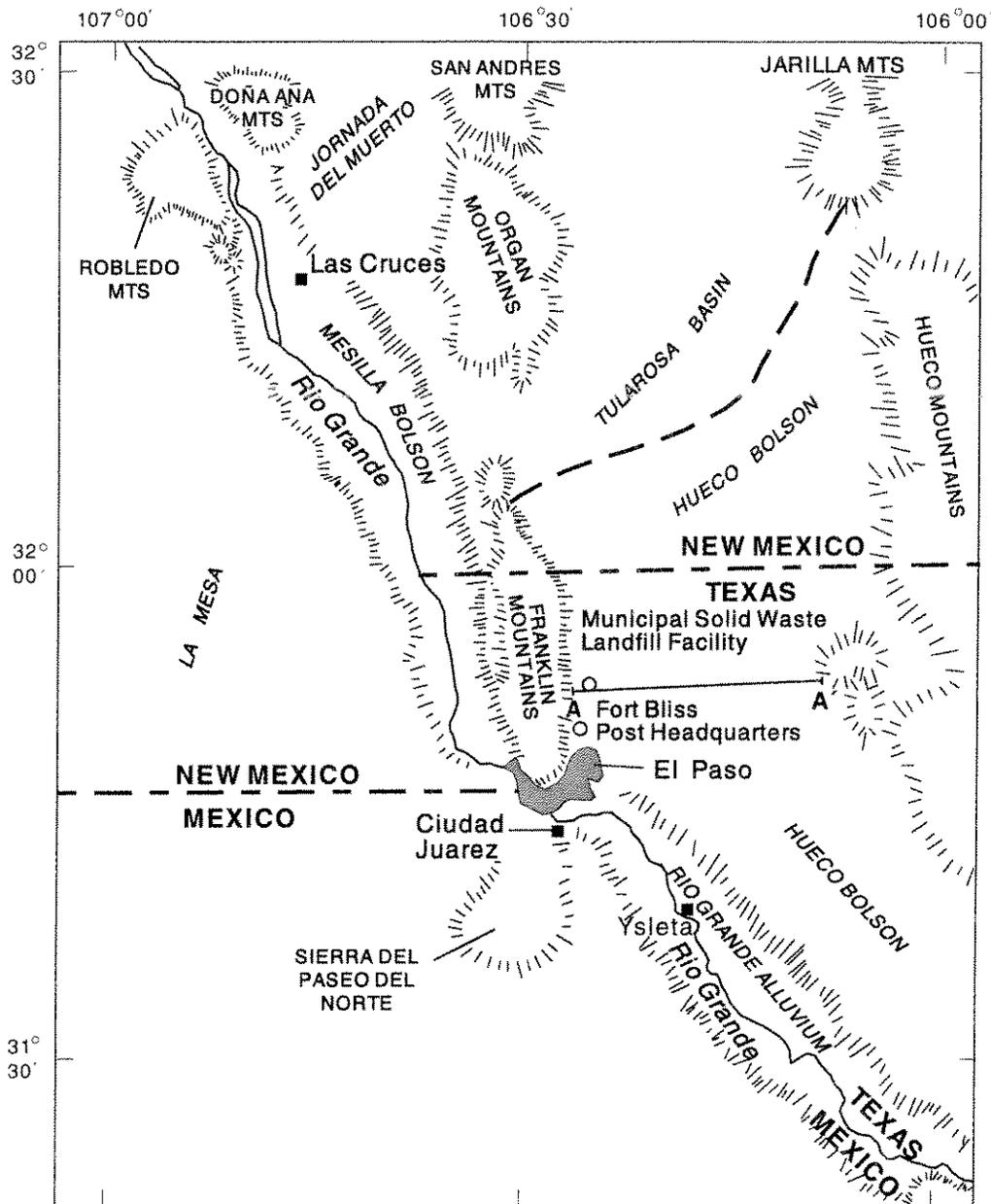


Figure 5.--Physiographic structures of the Tularosa Basin and Hueco Bolson (modified from Sayre and Livingston, 1945). See figures 9 and 11 for explanation of A - A'.

Climate

The climate of the MSWLF and vicinity, classified as arid continental, is characterized by an abundance of sunny days, high summer temperatures, relatively cool winters typical of arid areas, scanty rainfall, and very low humidity throughout the year. Temperature and precipitation data are recorded at El Paso International Airport by the National Weather Service and reported in monthly and annual reports by the National Oceanic and Atmospheric Administration. El Paso International Airport is approximately 4.5 miles southeast of the MSWLF.

Average annual precipitation in the El Paso area is 7.8 inches (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1992). Average monthly precipitation ranges from less than 1 inch during October through June to more than 1.2 inches in July, August, and September. Winter months are typically dry, and monthly snowfalls seldom exceed 3 inches (approximately 0.25 inch of water). Snow rarely lasts longer than 24 hours in the nonmountainous areas. Typically rainy months receive almost half of the annual precipitation in the form of brief but locally heavy thunderstorms. Prolonged periods of continuous precipitation are rare.

Average annual temperature at El Paso International Airport is 63.3 °F, ranging from a mean monthly low of 44.2 °F in January to a mean monthly high of 82.5 °F in July (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, 1992). Summer daytime temperatures are frequently above 90 °F and occasionally rise above 100 °F. Summer night minimum temperatures are usually 60 to 65 °F. Winter days are cool and mild with temperatures rising to 55 to 60 °F. Night temperatures drop to below freezing during several nights in December and January.

The prevailing wind direction in the winter months is from the north and in the summer months is from the south. Dust and wind storms are frequent in March and April and wind speeds occasionally exceed 35 miles per hour.

Evaporation records from a class A evaporation pan at Ysleta, Texas, for 1985-92 are given in table 1. Ysleta, Texas, is located in El Paso County southeast of El Paso and 16 miles southeast of the MSWLF. Average annual pan evaporation for 1985-92 was about 93 inches. Sixty-one percent of evaporation occurred during April through August. Potential evaporation is calculated using the pan evaporation figure and the conservative factor of 0.70, resulting in an estimate of 65 inches per year. Relative humidity in the Fort Bliss/El Paso area is generally low. No studies have been identified that discuss pollution characteristics of ambient air quality at the MSWLF.

Soils and Soil Gas

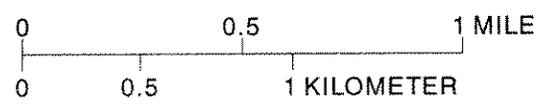
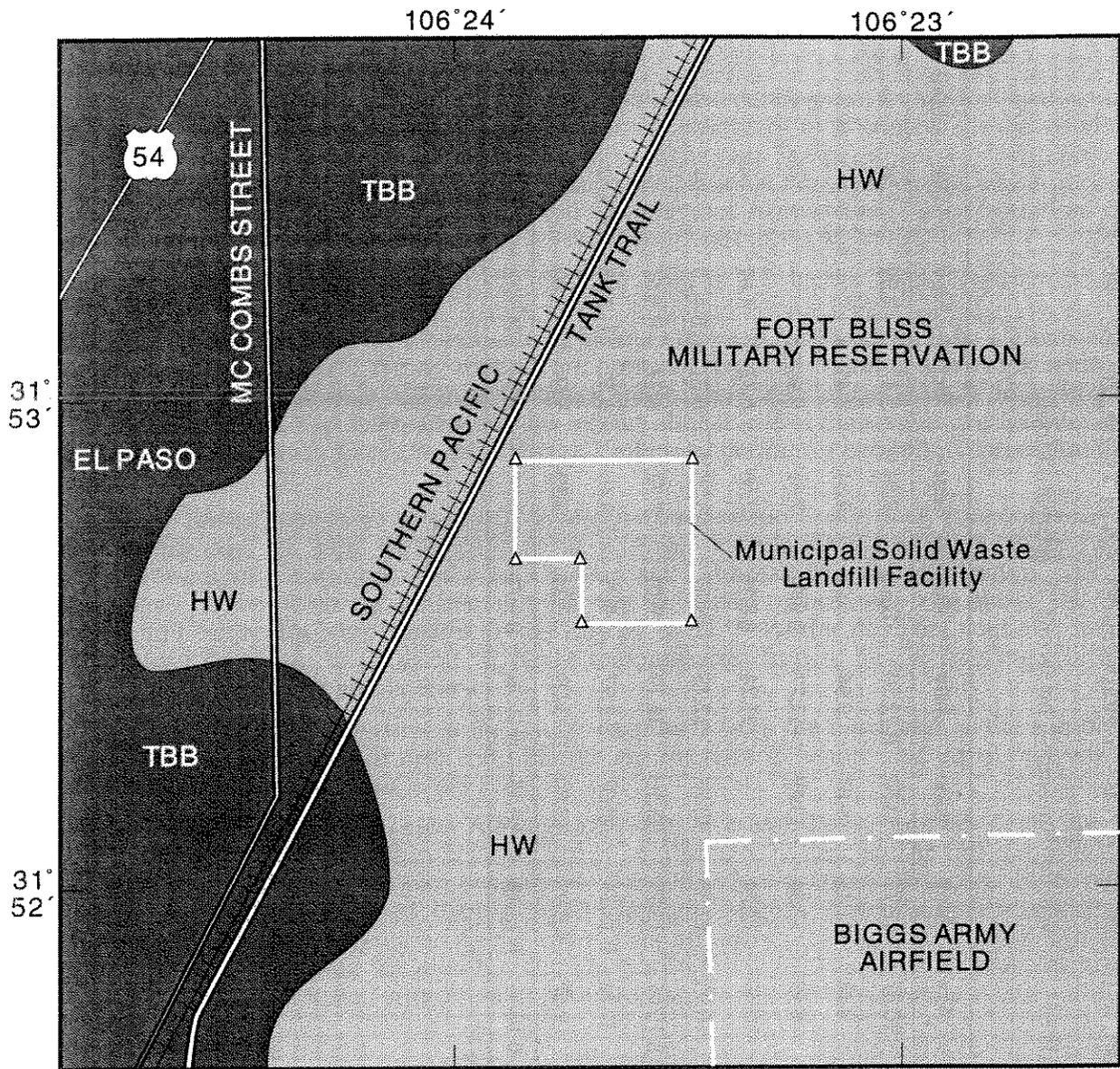
Soils of El Paso County, described by Jaco (1971), constitute generally the first 5 feet of unconsolidated material below land surface. The following is a description of soils at and adjacent to the MSWLF as described by Jaco. The soil descriptions are not applicable to the deeper part of the vadose zone (Hueco Bolson) through which potential contaminants would migrate toward the water table. Because soils do provide much of the material readily available for engineering purposes, however, estimated engineering properties (Jaco, 1971) are shown in table 2 for each soil series.

Soils on the MSWLF and vicinity are mapped in figure 6. Although soils are described by association, soils are highly variable in the field and mapping units generally include areas that have more than one soil series. Soils on the MSWLF are nearly level to gently sloping, have a fine sandy loam subsoil, and are moderately deep over caliche. Loam denotes a mixture of clay (7 to 27 percent), silt (28 to 50 percent), and sand (less than 52 percent). West and north of the MSWLF soils are also nearly level and gently sloping. These soils have a clay loam subsoil and are moderately deep over soft caliche. The following is a brief description of each mapping unit, including the percentages of each series (Jaco, 1971).

Table 1.--Evaporation, in inches, from class A evaporation pan at Ysleta, Texas, 1985-92

[Records of U.S. Weather Bureau. --, no record; B, estimated total]

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1985	--	--	B 7.55	10.37	12.72	13.52	B 12.50	11.03	7.69	5.47	3.09	B 2.58	--
1986	3.51	4.72	7.27	9.48	11.15	9.61	9.94	9.77	8.34	5.45	--	--	--
1987	--	--	B 6.65	8.95	12.34	13.49	13.77	B 9.94	7.31	5.98	--	--	--
1988	--	B 4.56	8.77	10.40	13.24	--	11.24	B 8.16	7.56	6.37	4.64	--	--
1989	--	4.54	7.60	10.96	12.53	13.76	12.43	9.87	8.28	6.02	B 4.25	--	--
1990	--	--	B 6.62	B 10.01	12.75	15.10	11.19	9.01	7.22	6.21	B 3.61	--	--
1991	5.07	B 3.94	B 7.07	11.38	B 13.76	13.07	9.97	9.71	B 6.45	6.57	3.53	B 3.32	B 93.84
1992	B 2.33	B 3.38	6.41	9.67	B 8.92	13.50	B 13.00	10.22	9.32	5.69	B 3.80	--	--
Average	B 3.64	B 4.23	B 7.24	B 10.15	B 12.18	13.15	B 11.76	B 9.71	B 7.77	5.97	B 3.82	B 2.95	B 92.57



EXPLANATION

- HW
 HUECO-WINK ASSOCIATION
- TBB
 TURNEY-BERINO ASSOCIATION

Figure 6.--Soils of the Municipal Solid Waste Landfill Facility and vicinity (modified from Jaco, 1971).

Table 2.--Engineering classification and estimated engineering properties of soil at the Municipal Solid Waste Landfill Facility and vicinity

[Engineering properties from Jaco (1971). TBB, Turney-Berino; HW, Hueco-Wink. The unified system of soil classification is used by Soil Conservation Service engineers. SM, SP, and SC are coarse-grained soils; CL is fine-grained soils. USDA, U.S. Department of Agriculture; AASHO, American Association of State Highway Officials; mm, millimeter; no., number; --, no data]

Soils and map symbols (fig. 6)	Depth below land surface (inches)	USDA texture	Classification		Percentage passing sieve					Permeability (inches per hour)	Available water capacity (inches per inch of soil)	Shrink-swell potential
			Unified	AASHO	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)				
Berino, TBB	0-8	Fine sandy loam	SM or SM-SC	A-2 or A-4	100	100	90-100	25-45	0.63-2.00	0.10	Low.	
	8-13	Loam	CL	A-6	100	100	85-95	60-75	0.63-2.00	0.15	Moderate.	
	13-37	Clay loam	CL	A-6	100	95-100	65-80	55-70	0.20-0.63	0.16	Moderate.	
	37-82	Loam	SC or CL	A-6	90-100	85-95	60-70	45-65	0.63-2.00	0.15	Low to moderate.	
	82-100	Fine sandy loam	SM or SM-SC	A-2 or A-4	100	100	90-100	25-45	0.63-2.00	0.10	Low.	
Hueco, HW	0-4	Loamy fine sand	SP or SP-SM	A-3	100	100	70-85	0-10	2.00-6.30	0.08	Low.	
	4-26	Fine sandy loam	SM or SM-SC	A-2-4	100	100	80-95	15-30	2.00-6.30	0.10	Low.	
Turney, TBB	0-3	Fine sandy loam	SM or SM-SC	A-2 or A-4	100	100	90-100	25-45	0.63-2.00	0.10	Low.	
	3-10	Loam	CL	A-6	100	95-100	85-95	50-65	0.63-2.00	0.15	Moderate.	
	10-34	Clay loam	CL	A-6	100	95-100	75-90	55-70	0.20-0.63	0.16	Moderate.	
	34-60	Caliche (about clay loam texture)	CL	A-6	95-100	95-100	75-90	55-70	0.20-0.63	0.15	Moderate.	
	60-80	Fine sandy loam	SM or SM-SC	A-2 or A-4	100	100	90-100	25-45	0.63-2.00	0.10	Low.	
Wink, HW	0-24	Fine sandy loam	SM-SC	A-2-4	100	95-100	95-100	20-35	0.63-2.00	0.10	Low.	
	24-73	Cemented caliche										
	73-100	Gravelly loam	SM or SM-SC	A-2 or A-4	90-95	70-85	65-80	25-45	2.00-6.30	0.08	Low.	

HW--Hueco-Wink Association, hummocky. The Hueco-Wink Association includes Hueco and Wink soils. In El Paso County, the Hueco-Wink Association constitutes 41 percent of the soils. Hueco soils constitute 42 percent of the association; Wink soils constitute 38 percent, and minor soils constitute 20 percent.

Hueco soils--typically have a brown, loamy, fine sand surface layer, about 4 inches thick, that is mildly alkaline and noncalcareous. The subsoil is brown and yellowish-brown, calcareous, fine sandy loam about 22 inches thick. A layer of indurated caliche is about 32 inches thick at a depth of 26 inches.

Wink soils--typically have a pale-brown surface layer about 6 inches thick and a light yellowish-brown subsoil about 18 inches thick. Both layers are calcareous, fine sandy loam. Cemented caliche begins at a depth of about 24 inches.

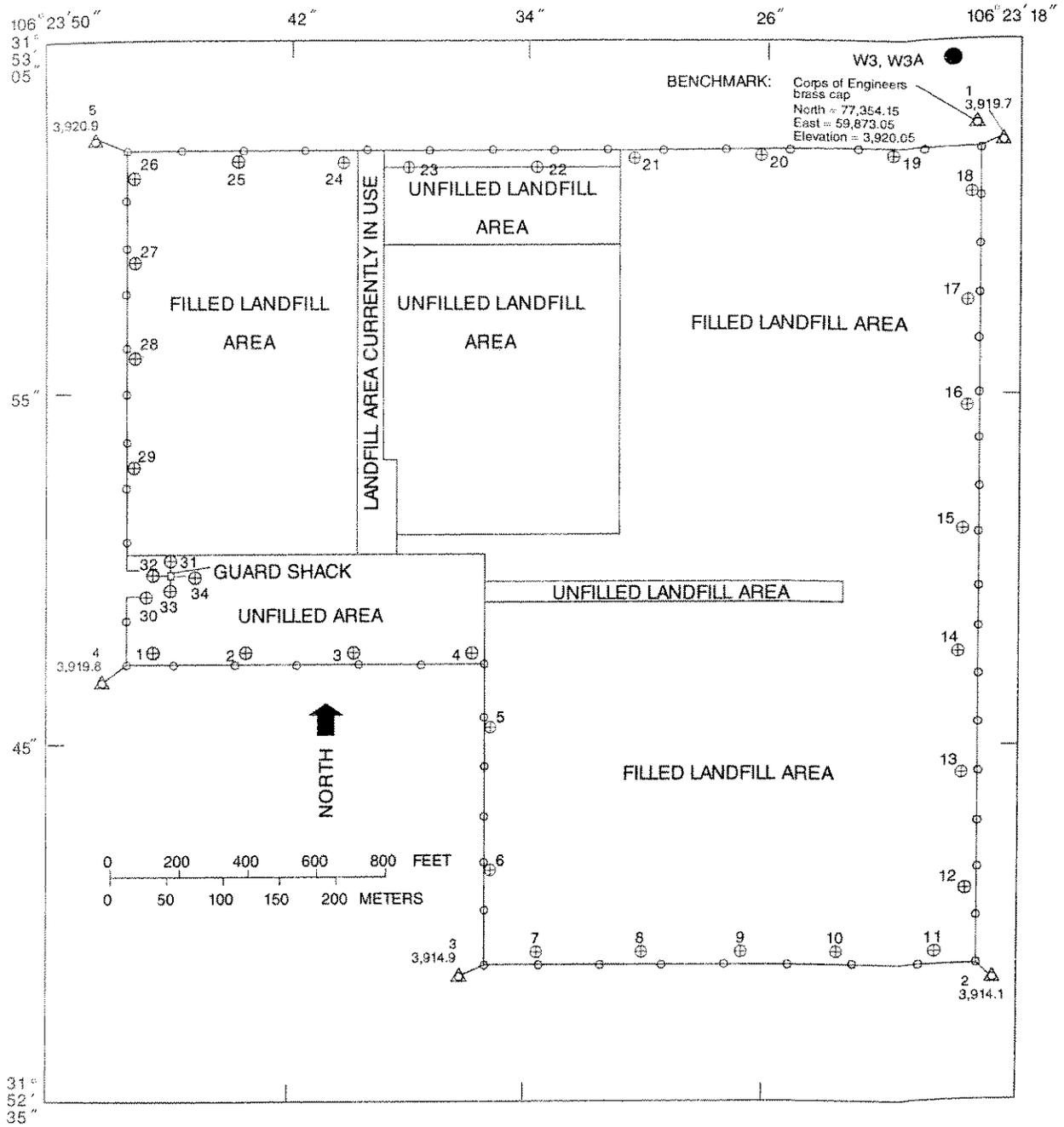
TBB--Turney-Berino Association, undulating. The Turney-Berino Association includes Turney and Berino soils. In El Paso County, the Turney-Berino Association constitutes 5 percent of the soils. Turney soils constitute 68 percent of the association, Berino soils constitute 18 percent, and minor soils constitute 14 percent.

Turney soils--typically have a moderately alkaline, calcareous surface layer about 10 inches thick. They are light-reddish-brown, fine sandy loam to a depth of about 3 inches and are light-brown loam below. The subsoil is light-brown, calcareous clay loam. Depth to soft caliche is about 34 inches.

Berino soils--are similar to Turney soils but their surface layer is noncalcareous and mildly alkaline, and their clay loam subsoil contains clay films on the soil particles.

To determine the location and concentration of vapor-phase gases generated by the MSWLF that may have migrated upward to the surface, laterally toward the MSWLF perimeter, or to the MSWLF guard shack, a soil-gas survey was conducted June 15-16, 1994, by the USAADACENFB. At 30 points around the perimeter of the MSWLF and 4 points adjacent to the four walls of the guard shack (fig. 7), a 1/4-inch-diameter rod was driven to 4 feet below land surface and then extracted. A probe was inserted into the resultant hole. Dirt was used to seal the annular space of the hole at the land surface. A portable gas meter (Gastech GT201) calibrated to methane was used to measure the concentration of methane and hydrocarbons at each probe site. Methane and hydrocarbon concentrations in the ambient air in the guard shack also were measured using the portable gas meter. Results of data collected during the soil-gas survey are presented in table 3. In all cases methane was less than 1 percent by volume. Hydrocarbon concentrations ranged from 80 to 1,160 parts per million.

A methane-gas monitoring network was installed at the MSWLF in November 1994. The monitoring network was designed to collect representative samples of explosive gases (specifically methane) generated by the facility and to monitor whether these gases exceed maximum allowable levels as defined in RCRA Subtitle D (40 CFR 258.23 (d)) and 30 TAC §330.56(n)(2). The methane-monitoring probes are screened from 5 to 30 feet below land surface. Locations of methane-monitoring probes and ambient-air methane-monitoring sites are shown in figure 8. These sites are monitored quarterly.



EXPLANATION

- FENCE/LANDFILL BOUNDARY
- △ CONTROL POINT -- Identification number and elevation, in feet above sea level
- W3, W3A GROUND-WATER PRODUCTION WELL AND IDENTIFICATION NUMBER
- ⊕ 7 METHANE-MONITORING LOCATION AND IDENTIFICATION NUMBER

Figure 7.--Methane-monitoring locations of soil-gas survey conducted June 15-16, 1994, by the U.S. Army Air Defense Artillery Center and Fort Bliss.

Table 3.—Results of soil-gas survey conducted June 15-16, 1994, by U.S. Army Air Defense Artillery Center and Fort Bliss¹

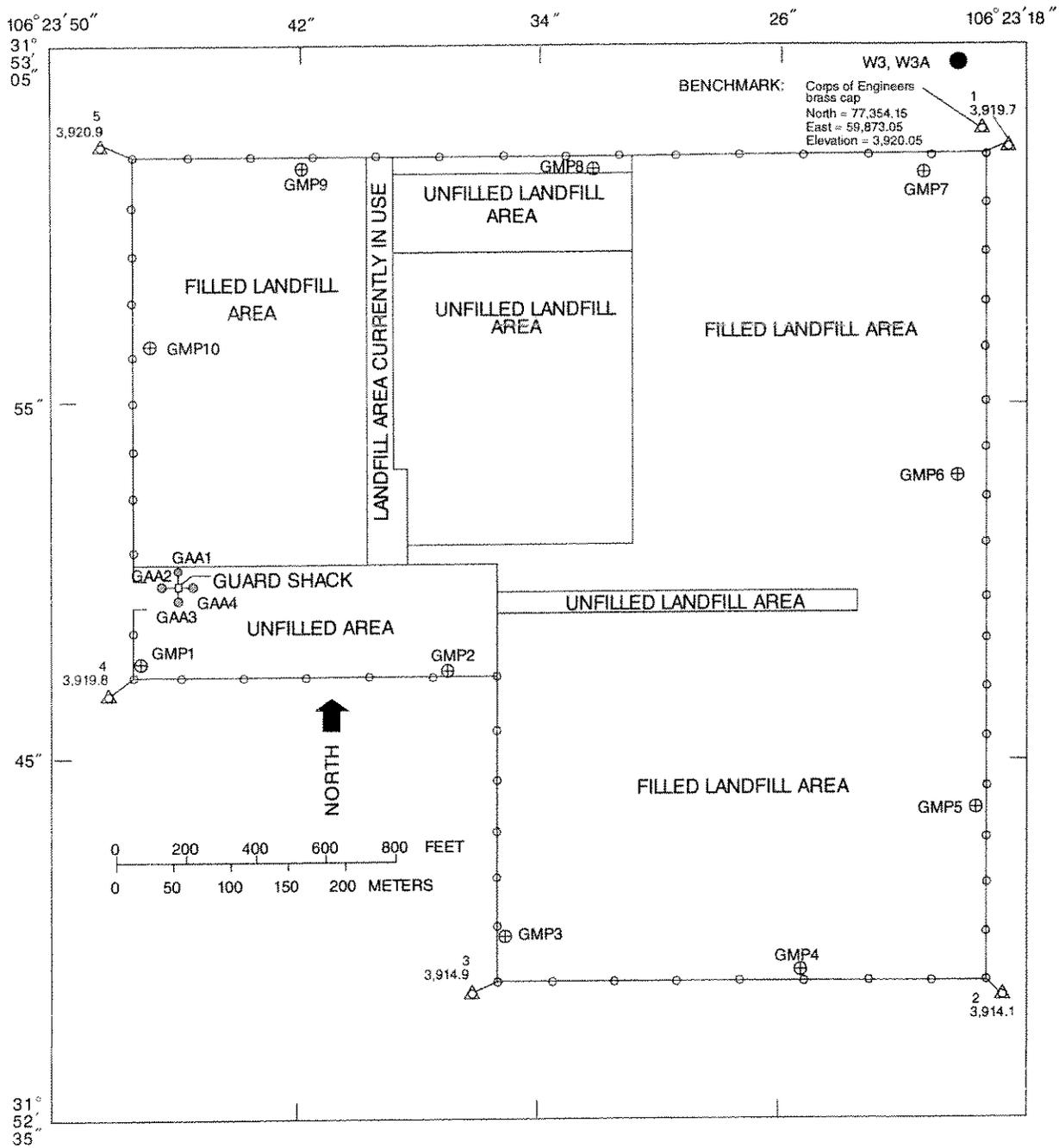
[<, less than]

Map number (fig. 7)	Date	Time	Percent by volume methane ²	Hydrocarbon concentration (parts per million)
1	6-15-94	0818	<1	320
2	6-15-94	0837	<1	380
3	6-15-94	0850	<1	360
4	6-15-94	0906	<1	360
5	6-15-94	0917	<1	340
6	6-15-94	0936	<1	240
7	6-15-94	0950	<1	280
8	6-15-94	1002	<1	260
9	6-15-94	1012	<1	300
10	6-15-94	1027	<1	280
11	6-15-94	1040	<1	260
12	6-15-94	1113	<1	260
13	6-15-94	1134	<1	240
14	6-15-94	1148	<1	80
15	6-15-94	1405	<1	260
16	6-15-94	1417	<1	200
17	6-15-94	1429	<1	200
18	6-15-94	1440	<1	280
19	6-15-94	1452	<1	320
20	6-15-94	1501	<1	380
21	6-15-94	1511	<1	380
22	6-15-94	1523	<1	400
23	6-15-94	1535	<1	380
24	6-15-94	1543	<1	480
25	6-15-94	1557	<1	460
26	6-16-94	0820	<1	260
27	6-16-94	0835	<1	1,160
28	6-16-94	0855	<1	480
29	6-16-94	0908	<1	600
30	6-16-94	0925	<1	440
³ 31	6-16-94	0939	<1	500
³ 32	6-16-94	0946	<1	580
³ 33	6-16-94	0956	<1	580
³ 34	6-16-94	1005	<1	600

¹Samples collected from a depth of 4 feet. Measurements made with a Gastech GT201 gas monitor calibrated to methane.

²1 percent by volume equals 10,000 parts per million methane.

³Measured within 5 feet of each of the four walls of the guard shack. All measurements of methane in the ambient air in the guard shack were zero.



EXPLANATION

- FENCE/LANDFILL BOUNDARY
- △ CONTROL POINT -- Identification number and elevation, in feet above sea level
- GROUND-WATER PRODUCTION WELL AND IDENTIFICATION NUMBER
- ⊕ METHANE-MONITORING WELL AND IDENTIFICATION NUMBER
- ⊙ AMBIENT-AIR METHANE-MONITORING SITE AND IDENTIFICATION NUMBER

Figure 8.--Location of methane-monitoring sites at the Municipal Solid Waste Landfill Facility.

GEOHYDROLOGY

Data describing the geohydrologic characteristics of the deposits in the MSWLF area were compiled from existing sources and during installation of the MSWLF methane-monitoring system. A summary of the information available on the geohydrology of the MSWLF and vicinity is presented in the following sections.

Geology

The MSWLF is underlain by Hueco Bolson deposits of locally derived materials. The Hueco Bolson is a clastic-filled graben extending from a few miles north of the New Mexico-Texas border to several miles south into Mexico (fig. 5). Hueco Bolson deposits are of Tertiary age and primarily include fluvial and lacustrine deposits, but alluvial-fan material and aeolian sediments also are present (Cliett, 1969). Hueco Bolson deposits are reported to have a maximum thickness of about 9,000 feet within a deep structural trough (fig. 9) paralleling the east base of the Franklin Mountains (Mattick, 1967, p. 85-91).

Hueco Bolson deposits typically are composed of fine- to medium-grained sand with interbedded lenses of clay, silt, gravel, and caliche. These deposits range from unconsolidated to slightly consolidated. Sand fragments are composed primarily of chert, granite, and porphyry. Individual beds are not well defined and range in thickness from a fraction of an inch to about 100 feet.

Consolidated igneous and sedimentary rocks ranging in age from Precambrian to Tertiary are exposed in the Franklin and Hueco Mountains (fig. 5). Igneous rocks are predominately granitic and are composed of coarse grains of quartz and feldspar. These granitic rocks are easily weathered and are a primary source material of the bolson deposits.

Hydrology

A summary of information available on the hydrology of the MSWLF and vicinity is presented in the following sections. Tabulated data were compiled from El Paso Water Utilities and U.S. Geological Survey data bases.

Ground Water

The three primary sources of ground water in the El Paso area are Hueco Bolson deposits, Mesilla Bolson deposits, and Rio Grande alluvium (Alvarez and Buckner, 1980, p. 4). The primary source of ground water in the MSWLF area is the unconsolidated and semiconsolidated sedimentary deposits of the Hueco Bolson. Wells completed in the Hueco Bolson supply water for the City of El Paso, Ciudad Juarez, Fort Bliss military reservation, private industries, and agricultural areas. Wells discharging large amounts of water usually are drilled at least 200 feet into water-yielding material. City of El Paso and Fort Bliss municipal water-supply wells completed in the Hueco Bolson range in depth from about 600 feet to greater than 1,200 feet.

A relatively thick unsaturated zone of approximately 300 feet overlies the aquifer of the Hueco Bolson deposits in the vicinity of the MSWLF. A deep water table prevails for all of the study area. Whether any perched water zones exist below the MSWLF is unknown. Under current conditions, extensive ground-water development by the City of El Paso encompasses the MSWLF (fig. 10).

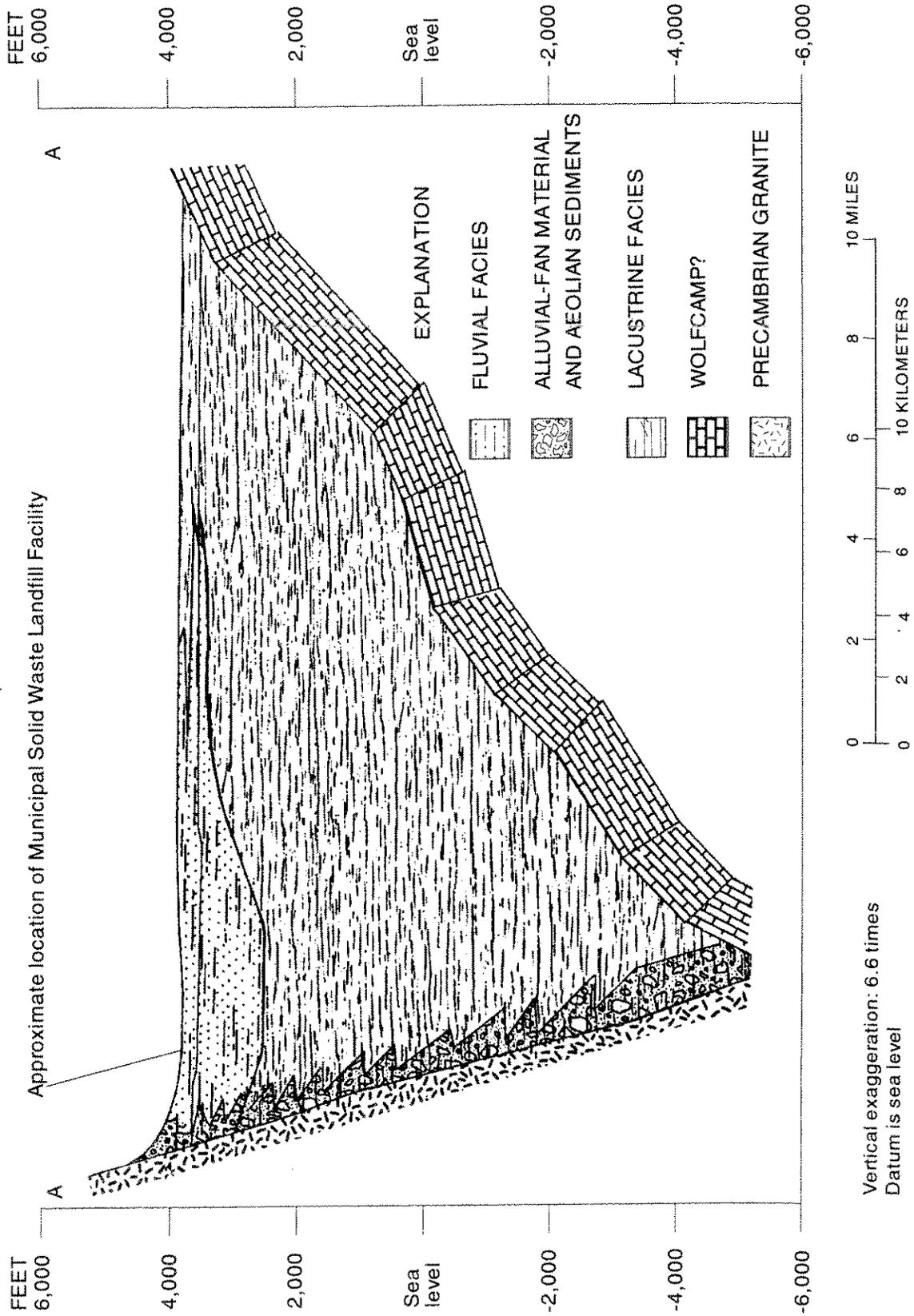
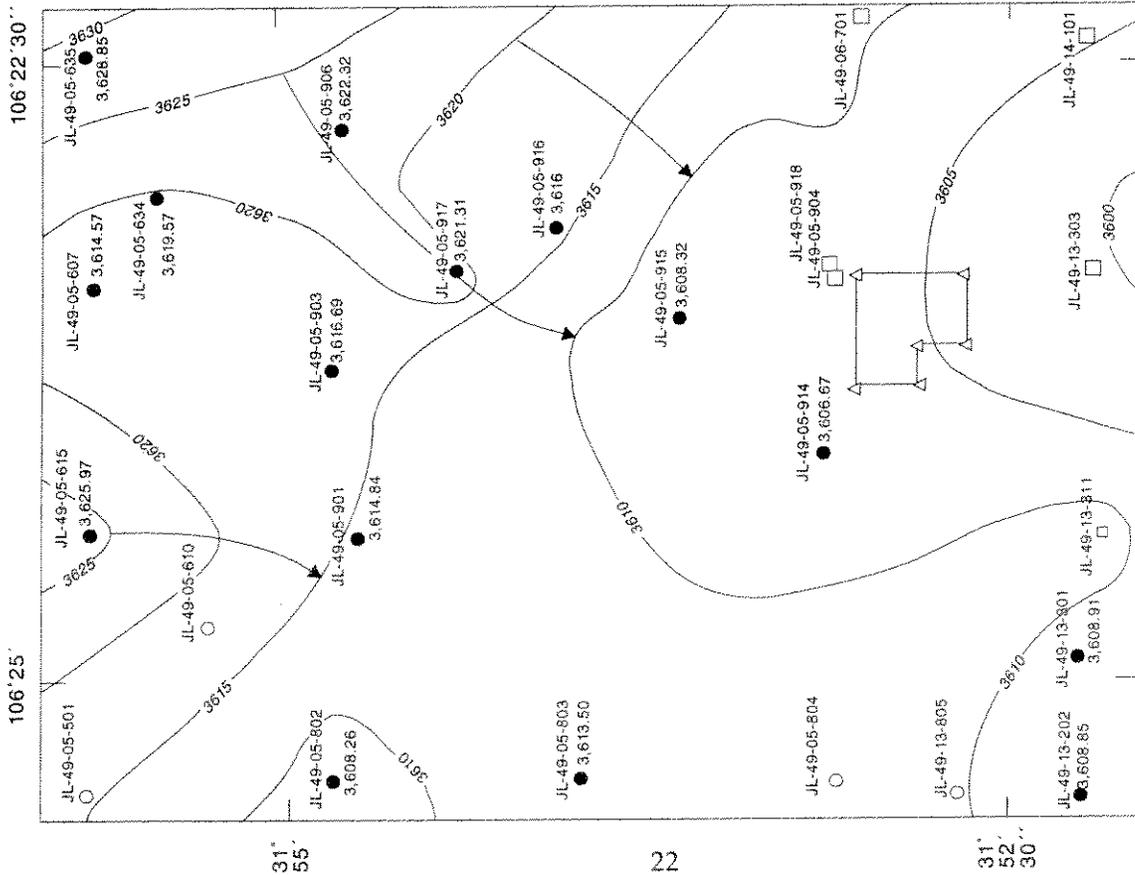


Figure 9.--Geologic section of the Hueco Bolson (trace shown in fig. 5; modified from Cliett, 1969, fig. 2, and published with permission).



EXPLANATION

WATER-LEVEL CONTOUR--Shows altitude at which water level would have stood in tightly cased wells, December 1993 to February 1994. Contour interval: 5 feet. Datum is sea level

APPROXIMATE DIRECTION OF GROUND-WATER FLOW

APPROXIMATE BOUNDARY OF U.S. ARMY AIR DEFENSE ARTILLERY CENTER AND FORT BLISS MUNICIPAL SOLID WASTE LANDFILL FACILITY

CITY OF EL PASO WELL--Upper number is well number; lower number is elevation of water level, in feet above sea level

CITY OF EL PASO WELL--Well number, water-level data not available for period December 1993 to February 1994

U.S. ARMY WELL--Well number, water-level data not available for period December 1993 to February 1994

Figure 10. --Approximate water-level altitude and directions of ground-water flow from December 1993 to February 1994 (water-level contours from Roger Sperka, El Paso Water Utilities, written commun., 1994).

Hydraulic characteristics of the Hueco Bolson vary significantly because of the nonuniform nature of the individual beds (Alvarez and Buckner, 1980). On a regional scale the Hueco Bolson can be considered a single aquifer, but on a local scale the rate and volume of water flowing through individual beds probably vary considerably. Transmissivities of Hueco Bolson deposits under water-table conditions in the El Paso area are estimated to be 1,340 to 37,500 feet squared per day (10,000 to 280,000 gallons per day per foot) (Alvarez and Buckner, 1980, p. 6).

The Hueco Bolson aquifer underlying the MSWLF is recharged primarily by inflow from the mountainous areas to the north, west, and east. Recharge resulting from direct infiltration of precipitation may be minor due to the high evaporation and low precipitation rates discussed earlier in this report. The regional direction of ground-water flow in the Hueco Bolson deposits is generally south and southwest, toward the Rio Grande. Hydraulic gradients have been altered locally due to extensive pumping of ground water in the El Paso area. Ground-water flow direction at a given location may change from time to time due to pumpage of City of El Paso and U.S. Army production wells. The direction of flow in various strata of the aquifer at a given location generally is somewhat difficult to determine due to the three-dimensional nature of the aquifer. An inventory of wells located within a 1-mile radius of the MSWLF is given in table 4.

Water levels have been declining in the El Paso area. Water pumped from wells in the vicinity of the MSWLF is mostly for municipal use. Ground-water monitoring data in the vicinity of the MSWLF show a water-level decline of 55.65 feet from November 1958 to December 1987 (well JL-49-05-904, table 4). Depth to water in the MSWLF area is currently 325.8 feet below land surface (newly completed U.S. Army well JL-49-05-918 located adjacent to U.S. Army well JL-49-05-904, July 26, 1994). The hydraulic gradient in the MSWLF area is variable due to pumpage of well JL-49-05-918, located near the northeast corner of the perimeter boundary (well W3A in fig. 2). A water-level map (fig. 10) of ground water underlying the MSWLF and vicinity indicates that flow is generally to the south.

The city-operated Shearman Well Field is a primary source of ground water for the City of El Paso. The Shearman Well Field is located north of the MSWLF and includes wells JL-49-05-914, JL-49-05-915, JL-49-05-916, JL-49-05-917, JL-49-05-906, JL-49-05-634, and JL-49-05-635 (fig. 10). Well JL-49-05-906 has been in operation for several years; ground-water monitoring data at this well indicate a water-level decline of 48.34 feet from March 1966 to December 1993 (El Paso Water Utilities, El Paso, Texas, written commun., 1995). Shearman Well Field wells JL-49-05-914, JL-49-05-915, JL-49-05-916, JL-49-05-917, JL-49-05-634, and JL-49-05-635 were installed from 1990 to 1992 and are planned to begin operation from mid-October 1994 through December 1995.

Test-pumping rates at wells in the Shearman Well Field range from 1,800 to 2,400 gallons per minute; drawdowns in the wells ranged from 39.83 feet (well JL-49-05-917 after 24 hours of pumping at 1,930 gallons per minute, August 18-19, 1992) to 73.40 feet (well JL-49-05-916 after 20 hours of pumping at 1,994 gallons per minute, June 30, 1992). Transmissivities of the seven Shearman Well Field wells range from 16,200 to 25,600 feet squared per day (121,000 to 191,000 gallons per day per foot) (El Paso Water Utilities, written commun., 1995). The test-pumping rate of well JL-49-05-914, the well nearest to the MSWLF having test pumping data (fig. 10), was 1,972 gallons per minute on July 20, 1992; the static water level prior to pumping was 317.54 feet below land surface; the pumping level after 8 hours of pumping was 367.80 feet below land surface, resulting in a drawdown rate of 50.26 feet, transmissivity of 22,200 feet squared per day (166,000 gallons per day per foot), and specific capacity of 39.2 gallons per minute per foot of drawdown. After the well was shut off, the well recovered to a static water level of 317.46 feet below land surface on July 21, 1992.

Table 4.--Records of wells in the vicinity of the Municipal Solid Waste Landfill Facility
 [Data from El Paso Water Utilities and U.S. Geological Survey files. N, north; W, west; --, no data]

Well identification number (fig. 2)	Well number (fig. 10)	Latitude-longitude	Use	Owner	Well depth (feet)	Elevation of well (feet above sea level)	Date water level measured	Depth to water (feet below land surface)	Elevation of water level (feet above sea level)
W1	JL-49-05-915	31°53'37"N- 106°23'31"W	Public supply	City of El Paso	1,202.0	3,925.0	08-Aug-92	322.05	3,602.95
							22-Jan-93	317.69	3,607.31
							22-Dec-93	316.68	3,608.32
W2	JL-49-05-914	31°53'09"N- 106°24'03"W	Public supply	City of El Paso	935.0	3,917.0	20-July-92	317.54	3,599.46
							21-July-92	317.46	3,599.54
							22-Jan-93	311.12	3,605.88
							22-Dec-93	310.33	3,606.67
W3	JL-49-05-904	31°53'03"N- 106°23'22"W	Public supply	U.S. Army	826.0	3,920.0	18-Nov-58	249.00	3,671.00
							18-Jan-80	291.50	3,628.50
							28-Dec-81	293.34	3,626.66
							23-Jan-83	295.65	3,624.35
							23-Dec-83	294.72	3,625.28
							09-Feb-85	297.71	3,622.29
							31-Dec-85	299.63	3,620.37
							30-Dec-86	303.22	3,616.78
							23-Dec-87	304.65	3,615.35
							26-July-94	325.8	3,594.2
							W3A	JL-49-05-918	31°53'05"N- 106°23'20"W
W4	JL-49-06-701	31°53'05"N- 106°22'20"W	Public supply	U.S. Army	819.0	3,944.0	02-Dec-59	274.00	3,670.00
							18-Jan-79	305.75	3,638.25
							26-Dec-79	308.40	3,635.60
							29-Dec-80	309.15	3,634.85
							24-Dec-81	312.16	3,631.84
							21-Jan-83	315.46	3,628.54
							23-Dec-83	314.72	3,629.28
							29-Jan-85	315.27	3,628.73
							31-Dec-85	320.19	3,623.81
							02-Jan-86	318.64	3,625.36
							29-Dec-86	321.16	3,622.84
							23-Dec-87	323.24	3,620.76
12-Dec-88	326.19	3,617.81							
08-Dec-89	327.69	3,616.31							
12-Dec-90	326.87	3,616.31							
14-Jan-92	327.74	3,616.26							
22-Dec-92	330.07	3,613.93							

Table 4.--Records of wells in the vicinity of the Municipal Solid Waste Landfill Facility--Continued

Well identification number (fig. 2)	Well number (fig. 10)	Latitude-longitude	Use	Owner	Well depth (feet)	Elevation of well (feet above sea level)	Date water level measured	Depth to water (feet below land surface)	Elevation of water level (feet above sea level)
W5	JL-49-13-301	31°52'12"N-106°24'51"W	Observation	City of El Paso	612.0	3,882.0	15-Feb-64	228.48	3,653.52
							31-Dec-64	228.89	3,653.11
							31-Dec-66	233.55	3,648.45
							31-Dec-67	234.08	3,647.92
							31-Dec-68	235.55	3,646.45
							31-Dec-69	235.02	3,646.98
							31-Dec-70	237.83	3,644.17
							31-Dec-71	241.11	3,640.89
							31-Dec-72	238.80	3,643.20
							31-Dec-73	247.28	3,634.72
							31-Dec-74	246.75	3,635.25
							19-Dec-75	248.42	3,633.58
							20-Dec-76	251.55	3,630.45
							19-Dec-77	250.53	3,631.47
							20-Dec-78	253.11	3,628.89
							20-Dec-79	255.03	3,626.97
							19-Dec-80	258.58	3,623.42
							21-Dec-81	257.56	3,624.44
							21-Dec-82	259.69	3,622.31
							13-Dec-83	260.73	3,621.27
20-Dec-84	262.45	3,619.55							
17-Dec-85	265.06	3,616.94							
24-Dec-86	266.32	3,615.68							
21-Dec-87	266.89	3,615.11							
19-Dec-88	268.55	3,613.45							
14-Dec-89	269.96	3,612.04							
18-Dec-90	270.90	3,611.10							
15-Dec-91	271.89	3,610.11							
17-Dec-92	271.85	3,610.15							
21-Dec-93	273.09	3,608.91							
W6	JL-49-13-311	31°52'11"N-106°24'19"W	Observation	U.S. Army	812.0	3,900.0	18-Jan-79	267.04	3,632.96
							15-Jan-80	269.98	3,630.02
							24-Dec-80	270.62	3,629.38
							24-Dec-81	272.12	3,627.88
							21-Jan-83	274.09	3,625.91
							23-Dec-83	274.93	3,625.07
							28-Jan-85	277.96	3,622.04
							31-Dec-85	277.99	3,622.01

Table 4.--Records of wells in the vicinity of the Municipal Solid Waste Landfill Facility--Concluded

Well identification number (fig. 2)	Well number (fig. 10)	Latitude-longitude	Use	Owner	Well depth (feet)	Elevation of well (feet above sea level)	Date water level measured	Depth to water (feet below land surface)	Elevation of water level (feet above sea level)
W6 (Continued)									
	JL-49-13-303	31°52'11"N- 106°23'22"W	Public supply	U.S. Army	813.0	3,908.0	29-Dec-86 29-Dec-87 12-Dec-88 10-Dec-89 12-Dec-90 14-Jan-92 22-Dec-92	281.75 284.01 285.32 286.30 287.12 287.17 290.07	3,618.25 3,615.99 3,614.68 3,613.70 3,612.88 3,612.83 3,609.93
	JL-49-14-101	31°52'14"N- 106°22'21"W	Public supply	U.S. Army	819.0	3,940.0	21-Aug-59 18-Jan-80 24-Jan-81 23-Dec-83 02-Jan-86 19-Dec-86	274.00 321.31 308.60 314.52 318.95 322.82	3,666.00 3,618.69 3,631.40 3,625.48 3,621.05 3,617.18

Ground water in the El Paso area is chemically suitable for most uses. Concentrations of dissolved solids in water from the Hueco Bolson fluvial deposits (fig. 11) range from 300 parts per million to more than 1,500 parts per million; concentrations of dissolved solids in water from underlying lake deposits are as much as 50,000 parts per million (Cliett, 1969, p. 210). El Paso Water Utilities reports that dissolved-solids concentration in the MSWLF vicinity generally ranges from 297 to 625 milligrams per liter (wells JL-49-05-904 and JL-49-05-915, respectively) but concentrations have been measured as high as 1,312 milligrams per liter (well JL-49-05-914, April 7, 1992) (table 5).

Surface Water

The Rio Grande is the only perennial stream in the El Paso area. Streamflow in the Rio Grande at El Paso is regulated by upstream reservoirs and diversions. Flow in the Rio Grande at El Paso averaged 543 cubic feet per second from 1938 to 1988 (International Boundary and Water Commission, 1988, p. 9). Runoff from the western and southern slopes of the Franklin Mountains drains into the Rio Grande. Runoff from the eastern slopes of the Franklin Mountains drains into the Hueco Bolson where it infiltrates and/or evaporates (Alvarez and Buckner, 1980, p. 6).

No perennial or ephemeral streams are on or in the vicinity of the MSWLF. Moderately defined arroyos extend from the Franklin Mountains and drain into the Hueco Bolson 2 or more miles west of the MSWLF. The arroyos flow only in response to intense precipitation during thunderstorms. Surface outflow at the MSWLF is assumed to be negligible due to the absence of surface-water flow in the vicinity of the facility.

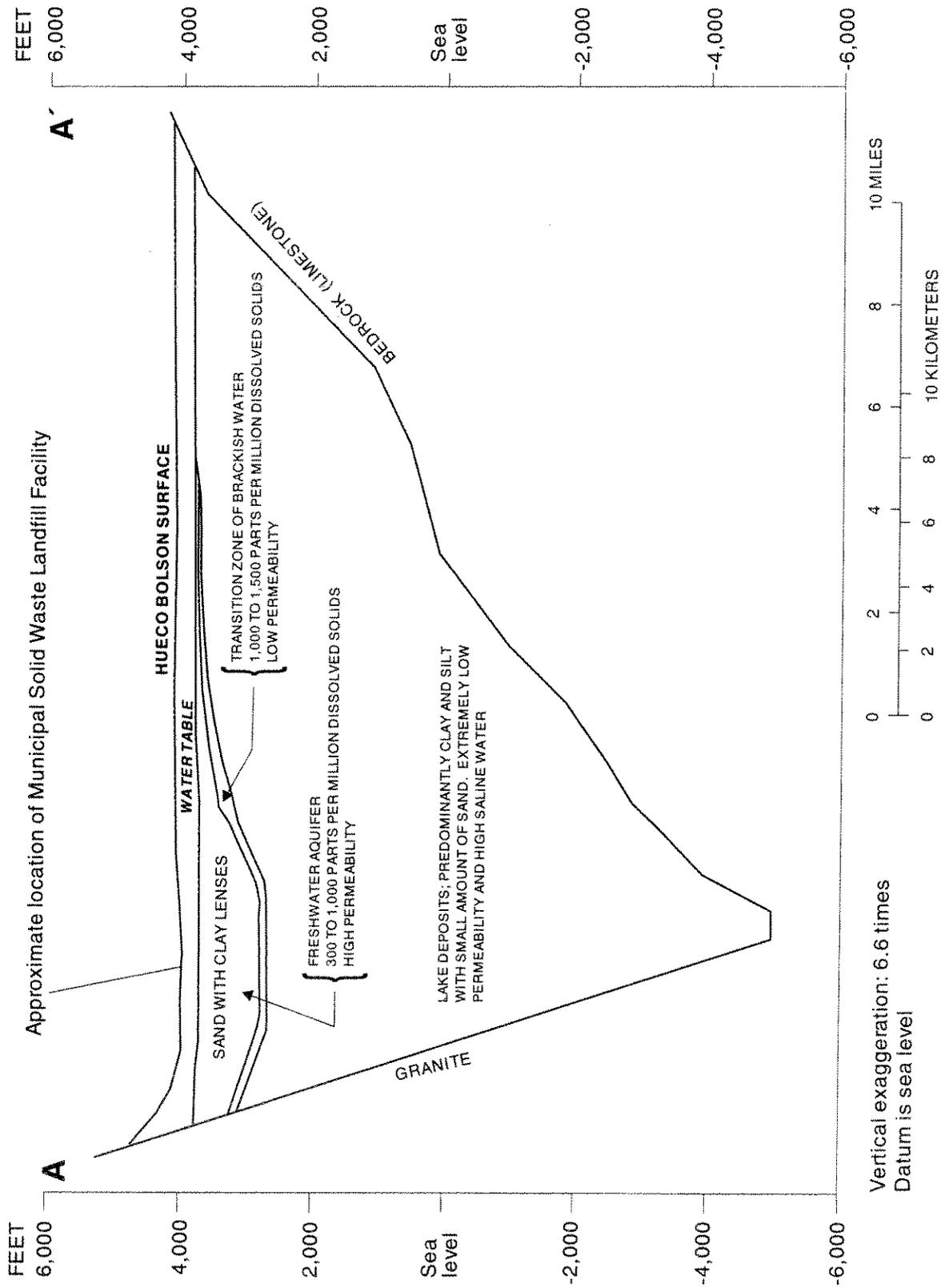


Figure 11.- Ground-water occurrence in the Hueco Bolson (trace shown in fig. 5; modified from Cliett, 1969, fig. 3, and published with permission).

Table 5.--Water-quality records of wells in the vicinity of the Municipal Solid Waste Landfill Facility
 [µS/cm, microsiemens per centimeter at 25 degrees Celsius; mg/L, milligrams per liter; DS, dissolved solids; EPWU, El Paso Water
 Utilities; USGS, U.S. Geological Survey; --, no data; <, less than; µg/L, micrograms per liter]

Well- identi- fication number (fig. 2)	Well number (fig. 10)	Analyst	Depth (feet below land surface)	Date	Specific conduct- ance (µS/cm)	pH	Hard- ness (mg/L)	Re- ported DS (mg/L)	Calcu- lated DS (mg/L)	Calc- ium (mg/L)	Mag- nesium (mg/L)	Sol- dium (mg/L)	Potas- sium (mg/L)	Bicar- bonate (mg/L)	Car- bonate (mg/L)	Sul- fate (mg/L)	Chlo- ride (mg/L)	Fluo- ride (mg/L)	Silica (mg/L)	Nitrate (mg/L)	Phos- phate (mg/L)
Field properties and inorganic constituents																					
W1	JL-49-05-915	EPWU ¹	1,005-1,015	04-May-92	674	8.69	58	365	481	16	4.4	123	8.7	168	7.2	56	88	1.3	18	6.2	<0.09
			1,175-1,185	04-May-92	1,180	8.46	86	625	678	26	5.3	203	8.4	105	7.2	41	280	0.8	20	<0.1	1.3
			443-1,202	09-Aug-92	582	8.20	79	338	414	24	4.8	93	8.9	150	0	52	72	1.0	36	7.9	<0.09
W2	JL-49-05-914	EPWU ¹	960-970	08-Apr-92	772	8.43	80	425	495	22	5.8	126	9.6	139	7.2	55	125	1.0	30	4.6	<0.09
			1,008-1,018	08-Apr-92	787	8.49	66	436	498	20	3.8	134	10	124	9.6	62	130	1.0	32	3.6	<0.09
			1,094-1,104	07-Apr-92	834	8.50	80	492	567	30	1.5	151	8.5	146	7.2	73	143	1.0	35	5.2	0.1
			1,194-1,204	07-Apr-92	2,420	8.05	319	1,312	1,354	111	10	366	13	83	4.8	101	660	0.8	32	4.3	<0.09
			371-935	23-July-92	664	8.08	95	384	477	26	7.3	100	9.9	184	0	72	68	1.1	35	8.8	<0.09
W3	JL-49-05-904	USGS	260-815	24-Feb-59	595	7.6	88	358	413	23	7.5	92	--	165	0	61	61	0.9	32	3.0	--
			260-815	14-June-61	554	7.5	81	338	379	21	6.9	84	--	154	0	52	54	0.9	34	5.8	--
			260-815	22-June-81	470	8.2	69	314	353	18	5.8	73	8.9	146	0	47	43	0.8	35	10	--
			260-815	08-Aug-85	530	7.7	73	316	357	19	6.2	75	9.2	142	0	45	52	0.9	31	8.0	--
			260-815	16-Aug-87	545	8.30	70	310	362	18	6.1	73	9.6	149	--	48	49	0.90	29	8.0	--
			260-815	18-Aug-87	520	8.09	86	363	364	23	6.9	72	9.5	149	0	44	50	0.83	38	8.4	<0.09
			260-815	13-Sept-89	506	8.20	72	304	357	19	6.0	73	9.0	152	0	45	45	0.90	31	7.5	--
W4	JL-49-06-701	USGS	260-815	14-May-91	515	7.9	72	307	359	19	6.0	72	10	144	0	44	55	0.90	29	8.4	--
			260-815	16-Jan-92	476	7.9	71	297	350	19	5.7	70	9.4	148	0	44	45	0.9	30	6.4	--
			293-810	16-May-61	505	6.9	70	306	342	18	6.1	78	--	136	0	40	56	1.1	31	6.3	--
		USGS	293-810	11-Apr-66	627	7.3	97	362	403	24	9.0	91	--	142	0	39	92	0.9	31	5.3	--

Table 5.--Water-quality records of wells in the vicinity of the Municipal Solid Waste Landfill Facility--Continued

Well identification number (fig. 2)	Well number (fig. 10)	Analyst	Depth (feet below land surface)	Date	Specific conductance (μ S/cm)	pH	Hardness (mg/L)	Reported DS (mg/L)	Calculation DS (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sulfate (mg/L)	Potassium (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Nitrate (mg/L)	Phosphate (mg/L)			
W4	JL-49-06-701	USGS	293-810	22-June-81	615	8.0	93	371	407	25	7.4	87	7.0	134	0	37	100	0.8	32	8.4	--			
			293-810	06-June-83	625	8.1	93	363	401	25	7.4	87	6.4	134	0	33	99	0.9	30	8.0	--			
			293-810	06-June-83	600	8.05	92	397	397	28	5.0	90	6.6	127	0	30	100	0.84	30	8.1	<0.03			
			293-810	01-Sept-84	670	7.8	99	387	421	27	7.7	93	7.2	126	0	31	120	0.9	30	8.0	--			
			293-810	22-May-85	632	8.1	93	363	393	25	7.4	87	6.3	118	0	30	110	0.8	30	8.0	--			
			293-810	18-Aug-87	695	8.2	93	370	415	25	7.5	89	8.3	126	0	30	120	0.90	29	8.0	--			
			293-810	18-Aug-87	640	8.23	98	405	404	28	6.8	89	6.6	124	0	28	112	0.80	24	9.1	<0.09			
			293-810	23-May-88	641	8.10	94	365	408	25	7.6	83	7.5	127	0	39	110	0.80	30	8.0	0.06			
			293-810	07-June-90	751	8.00	100	396	433	28	8.5	100	6.6	122	0	30	130	0.60	30	7.5	--			
			293-810	16-June-93	658	7.9	96	381	415	26	7.5	89	7.3	124	0	33	120	0.8	29	7.5	--			
			W6	JL-49-13-311	USGS	324-807	05-June-81	745	8.1	96	463	529	25	8.1	120	10	195	0	84	76	1.2	33	9.7	--
						324-807	06-June-83	720	8.0	100	447	511	26	8.5	110	9.0	195	0	84	68	1.3	35	9.3	--
						324-807	06-June-83	715	7.96	100	516	516	28	7.0	115	9.2	190	0	82	73	1.2	33	11	<0.03
						324-807	01-Sept-84	745	7.8	100	456	518	27	8.6	110	10	190	0	87	75	1.3	34	9.3	--
324-807	06-May-86	770				8.0	97	450	519	25	8.5	110	9.8	192	0	86	77	1.3	34	9.3	--			
324-807	23-May-88	736				8.10	100	412	515	27	8.9	110	10	192	0	79	78	1.5	3.5	8.9	0.06			
324-807	29-May-91	741				7.9	100	439	512	27	8.4	110	9.4	192	0	78	77	1.2	34	9.3	--			
W7	JL-49-13-303	USGS				260-690	20-Apr-53	599	7.7	90	356	416	22	8.5	92	--	169	0	63	55	0.9	36	5.9	--
						260-690	24-July-56	511	7.9	68	328	364	18	5.6	83	--	161	0	48	42	1.0	38	5.5	--
						260-690	05-June-57	569	7.5	76	358	402	20	6.6	92	--	166	0	58	51	0.9	38	7.1	--
			260-690	16-May-61	533	7.4	74	340	375	19	6.4	84	--	160	0	54	44	1.0	37	7.0	--			
			260-690	05-June-81	490	8.1	68	336	385	16	5.7	83	9.8	159	0	52	47	0.9	32	9.7	--			
			260-690	06-June-83	505	8.1	69	318	365	18	5.8	75	8.8	159	0	49	39	1.0	33	9.7	--			
			260-690	06-June-83	490	8.08	70	356	356	19	5.5	74	8.4	159	0	38	40	0.95	35	11	<0.03			
			260-690	22-May-85	508	8.1	68	303	347	18	5.7	75	7.8	150	0	40	40	1.0	32	9.3	--			

Field properties and inorganic constituents--Continued

Table 5.--Water-quality records of wells in the vicinity of the Municipal Solid Waste Landfill Facility--Continued

Well identification number (fig. 2)	Well number (fig. 10)	Analyst	Depth (feet below land surface)	Date	Specific conductance ($\mu\text{S}/\text{cm}$)	pH	Hardness (mg/L)	Reported DS (mg/L)	Calculated DS (mg/L)	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Bicarbonate (mg/L)	Carbonate (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Silica (mg/L)	Nitrate (mg/L)	Phosphate (mg/L)
W7	JL-49-13-303	USGS	260-690	18-Aug-87	525	8.30	66	300	361	17	5.7	75	9.4	161	--	46	37	1.0	30	8.9	--
		EPWU	260-690	18-Aug-87	495	8.14	72	366	366	19	6.0	74	9.5	162	0	46	40	0.96	93	8.8	<0.09
		USGS	260-690	19-Sept-88	534	8.20	73	317	378	19	6.1	76	9.9	165	0	52	40	0.90	32	8.9	--
		USGS	260-690	04-June-90	503	8.10	68	308	365	18	5.7	75	8.4	160	0	48	40	0.80	32	8.9	--
		USGS	260-690	09-June-92	499	7.8	68	305	364	18	5.5	73	9.6	163	0	48	37	1.0	32	9.3	--
W8	JL-49-14-101	USGS	289-810	24-Aug-59	473	7.5	67	297	341	18	5.4	77	--	146	0	43	45	0.8	30	5.8	--
		USGS	289-810	16-May-61	487	7.2	65	298	339	17	5.6	78	--	141	0	44	46	1.0	31	6.5	--
		USGS	289-810	19-May-67	530	7.4	70	324	372	19	5.4	86	--	160	0	48	49	1.4	28	3.5	--
		USGS	289-810	05-June-81	520	8.2	77	336	380	20	6.5	78	7.9	146	0	43	69	0.8	30	8.4	--
		USGS	289-810	06-June-83	560	8.1	84	345	388	22	7.0	82	7.9	146	0	40	74	0.8	31	8.0	--
		EPWU	289-810	06-June-83	553	8.05	86	368	368	22	7.5	78	7.8	138	0	30	75	0.60	30	9.3	<0.03
		USGS	289-810	22-May-85	562	8.1	83	329	363	22	6.7	78	7.2	129	0	38	75	0.8	30	6.6	--
		USGS	289-810	18-Aug-87	680	8.20	89	370	415	23	7.6	90	8.7	140	0	38	99	0.90	29	8.0	--
		EPWU	289-810	18-Aug-87	630	8.20	92	423	424	27	6.0	91	8.5	142	0	36	104	0.80	25	8.4	<0.09
		USGS	289-810	13-Sept-89	580	8.10	84	332	379	22	7.1	79	7.9	138	0	38	79	0.80	30	7.1	--
		USGS	289-810	14-May-91	575	7.9	86	338	387	23	6.9	80	9.2	137	0	37	85	0.80	28	8.0	--
USGS	289-810	16-June-93	574	8.0	86	341	379	23	6.9	79	9.0	134	0	40	79	0.8	30	7.5	--		

Field properties and inorganic constituents--Concluded

Table 5.--Water-quality records of wells in the vicinity of the Municipal Solid Waste Landfill Facility--Continued

Well identification number (fig. 2)	Well number (fig. 10)	Analyst	Depth (feet below land surface)	Date	Arsenic (µg/L)	Barium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Zinc (µg/L)
Metals																			
W1	JL-49-05-915	EPWU ¹	1,005-1,015	04-May-92	<10	109	128	<0.5	<10	<10	4,110	16	73	158	<1	--	<10	<1	423
		EPWU ¹	1,175-1,185	04-May-92	<10	198	84	<5	20	<10	2,330	12	89	115	<1	--	<10	<1	266
		EPWU ¹	443-1,202	09-Aug-92	<10	69	117	<0.5	<10	<10	68	<5	51	3	<1	--	<10	<1	37
W2	JL-49-05-914	EPWU ¹	960-970	08-Apr-92	<10	325	112	<0.5	<10	<10	816	<5	64	34	<1	--	<10	<1	201
		EPWU ¹	1,008-1,018	08-Apr-92	<10	61	99	<0.5	<10	<10	425	44	68	30	<1	--	<10	<1	168
		EPWU ¹	1,094-1,104	07-Apr-92	<10	104	280	<0.5	<10	<10	174	<5	438	70	<1	--	<10	<1	138
		EPWU ¹	1,194-1,204	07-Apr-92	<10	133	542	<0.5	<10	<10	813	8	173	40	<1	--	<10	<1	334
		EPWU ¹	371-935	23-July-92	<10	55	145	<0.5	<10	<10	835	<5	62	140	<1	--	<10	<1	47
W3	JL-49-05-904	USGS	260-815	14-May-91	--	--	120	--	--	--	--	--	--	--	--	--	--	--	--
		EPWU	260-815	16-June-92	<10	67	114	<0.5	<10	<10	<10	<5	48	<2	<1	--	<10	<1	19
		USGS	260-815	16-June-92	--	--	120	--	--	1	--	<1	--	--	--	--	--	--	--
W4	JL-49-06-701	EPWU	293-810	06-June-83	--	--	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	<10	<10
		USGS	293-810	22-May-85	--	--	--	--	10	--	--	<1	--	--	--	--	--	--	--
		USGS	293-810	23-May-88	--	--	90	--	--	--	--	--	--	--	--	--	--	--	--
		USGS	293-810	16-June-93	--	--	100	--	--	<1	--	1	--	--	--	--	--	--	--
		EPWU	293-810	16-June-93	5.7	107	87	<0.5	6.8	<5	<20	<5	36	<10	<1	--	<5	<0.5	<10
W6	JL-49-13-311	EPWU	324-807	06-June-83	--	--	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	<10	<10
		USGS	324-807	23-May-88	--	--	150	--	--	--	--	--	--	--	--	--	--	--	--
		USGS	324-807	29-May-91	--	--	150	--	--	--	--	--	--	--	--	--	--	--	--
W7	JL-49-13-303	EPWU	260-690	06-June-83	--	--	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	<10	<10
		USGS	260-690	22-May-85	--	--	--	--	10	--	--	2	--	--	--	--	--	--	--

Table 3.—Water-quality records of wells in the vicinity of the Municipal Solid Waste Landfill Facility—Concluded

Well identification number (fig. 2)	Well number (fig. 10)	Analyst	Depth (feet below land surface)	Date	Arsenic (µg/L)	Barium (µg/L)	Boron (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Copper (µg/L)	Iron (µg/L)	Lead (µg/L)	Lithium (µg/L)	Manganese (µg/L)	Mercury (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Zinc (µg/L)	
Metals—Concluded																				
W7	JL-49-13-303	USGS	260-690	19-Sept-88	--	--	130	--	--	--	--	--	--	--	--	--	--	--	--	
		USGS	260-690	04-June-90	--	--	130	--	--	--	--	--	--	--	--	--	--	--	--	--
		EPWU	260-690	09-June-92	<10	52	129	<0.5	<10	<10	<10	12	<5	56	<2	<1	--	<10	<1	7
		USGS	260-690	09-June-92	--	--	210	--	--	--	2	--	<1	--	--	--	--	--	--	--
W8	JL-49-14-101	EPWU	289-810	06-June-83	--	--	--	<10	<10	<10	<10	<10	--	<10	--	<10	--	<10	<10	
		USGS	289-810	22-May-85	--	--	--	--	<10	--	--	--	2	--	--	--	--	--	--	--
		USGS	289-810	14-May-91	--	--	100	--	--	--	--	--	--	--	--	--	--	--	--	--
		USGS	289-810	16-June-93	--	--	110	--	--	--	<1	--	<1	--	--	--	--	--	--	--
		EPWU	289-810	16-June-93	<5	86	98	<0.5	6.7	<5	<20	<5	45	<10	<1	--	<5	<0.5	<10	

¹Sample was air lifted during interval sampling; sampling method was probably not an appropriate method for detailed chemical analyses because of screen corrosion or incrustation effects on the water sample (high metal concentrations). These analyses should be considered not representative of natural water conditions (Roger Sperka, El Paso Water Utilities, oral commun., 1995).

SUMMARY

Geohydrologic conditions of the MSWLF on the USAADACENFB were evaluated by the U.S. Geological Survey in cooperation with the U.S. Army. The report includes: (1) information on the boundaries, areas, and contents of the MSWLF; (2) information on the environmental setting of the MSWLF and vicinity including a description of the physiography, climate, and soils; (3) description of geologic and hydrologic characteristics of the unsaturated zone and the shallow part of the aquifer; and (4) description of the ground-water quality in the vicinity of the MSWLF.

The 106.03-acre MSWLF has been in operation since January 1974 and is located about 1,200 feet east of the nearest occupied structure. The MSWLF is estimated to receive an average of approximately 56 tons of municipal solid waste per day. The landfill fill rate is about 1-4 acres per year and at this fill rate is expected to reach its capacity by the year 2004.

Types of solid wastes disposed of at the MSWLF include household refuse, Post solid wastes, bulky items, grass and tree trimmings from family housing, refuse from litter cans, construction debris, classified waste (dry), dead animals, asbestos, and empty oil cans. Operation, refuse collection, and disposal services are provided by a private contractor. The method of landfilling is progressive trench where excavation and filling occur simultaneously in trenches 40 feet wide by 30 feet deep. Refuse is dumped at the end of the trench, then spread and covered by use of a crawler tractor. Daily cover of a minimum of 6 inches of compacted earth and a final cover of 2 to 3 feet are provided.

The MSWLF is located in the Hueco Bolson proper 4 miles east of the Franklin Mountains. The Franklin Mountains have peaks ranging from 4,600 to greater than 7,000 feet above sea level. Elevations at the MSWLF range from 3,907 to 3,937 feet above sea level. The climate of the MSWLF, classified as arid continental, is characterized by an abundance of sunny days, high summer temperatures, relatively cool winters typical of arid areas, scanty rainfall, and very low humidity throughout the year. Average annual temperature is 63.3 °F in the El Paso area; mean annual precipitation is 7.8 inches. Typically rainy months receive almost half of the annual precipitation in the form of brief but locally heavy thunderstorms. Prolonged periods of continuous precipitation are rare. The prevailing wind direction in the winter months is from the north and in the summer months is from the south. Potential evaporation in the El Paso area is estimated to be 65 inches per year. Soils at and adjacent to the MSWLF are nearly level to gently sloping, have a fine sandy loam subsoil, and are moderately deep over caliche.

The MSWLF is underlain by Hueco Bolson deposits of Tertiary age and typically are composed of fine- to medium-grained sand with interbedded lenses of clay, silt, gravel, and caliche. The deposits range from unconsolidated to slightly consolidated. Individual beds are not well defined and range in thickness from a fraction of an inch to about 100 feet. Hueco Bolson deposits are reported to have a maximum thickness of 9,000 feet within a deep structural trough paralleling the east base of the Franklin Mountains.

The primary source of ground water in the MSWLF area is the unconsolidated and semiconsolidated sedimentary deposits of the Hueco Bolson. A relatively thick vadose zone of approximately 300 feet overlies the aquifer of the Hueco Bolson deposits in the vicinity of the MSWLF. A deep water table prevails for all of the study area. Whether any perched water zones exist below the MSWLF is unknown. Under current conditions, extensive ground-water development by the City of El Paso encompasses the MSWLF. An inventory of nine wells located within a 1-mile radius of the MSWLF was compiled. These wells are owned and operated by the City of El Paso or the U.S. Army. Wells discharging large amounts of water usually are drilled at least 200 feet into water-yielding material. The municipal water system of the City of El Paso and Fort Bliss is supplied by wells ranging in depth from about 600 feet to greater than 1,200 feet.

Hydraulic characteristics of the Hueco Bolson vary significantly as a result of the nonuniform nature of the individual beds. On a regional scale the Hueco Bolson can be considered a single aquifer, but on a local scale the rate and volume of water flowing through individual beds probably vary considerably. Recharge resulting from direct infiltration of precipitation may be minor due to the high evaporation and low precipitation rates. Hydraulic gradients have been altered locally due to extensive pumping of ground water in the El Paso area. The hydraulic gradient in the MSWLF vicinity is generally to the south but may vary due to pumpage of a well on the northeast corner of the perimeter boundary. Ground-water flow direction at a given location may change from time to time due to pumpage of City of El Paso and U.S. Army production wells. Ground-water monitoring data in the MSWLF vicinity showed a water-level decline of 55.65 feet from November 1958 to December 1987. Depth to water at the northeast corner of the MSWLF as of July 26, 1994, was 325.8 feet below land surface.

The city-operated Shearman Well Field, located north of the MSWLF, is a primary source of ground water for the City of El Paso. Currently, one well in the Shearman Well Field is in operation; the rest of the well field is planned to be in full operation by December 1995. Records from El Paso Water Utilities report that the test-pumping rate of well JL-49-05-914 (the well nearest to the MSWLF having test-pumping data) was 1,972 gallons per minute on July 20, 1992; the static water level prior to pumping was 317.54 feet below land surface. The pumping level after 8 hours of pumping was 367.80 feet below land surface, resulting in a drawdown rate of 50.26 feet, transmissivity of 22,200 feet squared per day (166,000 gallons per day per foot), and specific capacity of 39.2 gallons per minute per foot of drawdown. After the well was shut off, the well recovered to a static water level of 317.46 feet below land surface on July 21, 1992.

Ground water in the El Paso area is chemically suitable for most uses. Records from El Paso Water Utilities report concentrations of dissolved solids in the MSWLF vicinity ranging from 297 to 625 milligrams per liter (wells JL-49-05-904 and JL-49-05-915, respectively), but concentrations have been measured as high as 1,312 milligrams per liter (well JL-49-05-914, April 7, 1992). No perennial or ephemeral streams are on or in the vicinity of the MSWLF.

REFERENCES

- A.T. Kearney, Inc., 1989, RCRA Facility assessment, preliminary report/visual site inspection report, March 1989, Fort Bliss, Texas: A.T. Kearney, Inc., Chicago.
- Alvarez, H.J., and Buckner, A.W., 1980, Ground-water development in the El Paso region, Texas, with emphasis on the resources of the lower El Paso Valley: Texas Department of Water Resources Report 246, 346 p.
- Cliett, Tom, 1969, Groundwater occurrence of the El Paso area and its related geology, *in* Guidebook of the Border Region: New Mexico Geological Society, 20th Field Conference, October 23-25, 1969: New Mexico Geological Society, p. 209-213.
- Environmental Science and Engineering, Inc., 1983, Installation assessment of the Headquarters, October 1983, U.S. Army Air Defense Center and Fort Bliss, Texas: Environmental Science and Engineering, Inc. Report No. 335, Gainesville, Fla.
- _____, 1991, Volume I, RCRA facility investigation report, Texas solid waste management units, December 1991, Fort Bliss, El Paso, Texas: Environmental Science and Engineering, Inc., Plymouth Meeting, Penn.
- International Boundary and Water Commission, 1988, Flow of the Rio Grande and related data, 1988: U.S. of America, Department of State, International Boundary and Water Commission, United States and Mexico, Water Bulletin No. 58, 144 p.
- Jaco, H.B., 1971, Soil survey of El Paso County, Texas: U.S. Department of Agriculture, Soil Conservation Service, November 1971, 59 p., 62 sheets, and explanation p.
- Knowles, D.B., and Kennedy, R.A., 1958, Ground-water resources of the Hueco Bolson northeast of El Paso, Texas: U.S. Geological Survey Water-Supply Paper 1426, 186 p.
- Mattick, R.E., 1967, A seismic and gravity profile across the Hueco Bolson, Texas: U.S. Geological Survey Professional Paper 575-D.
- Sayre, A.N., and Livingston, Penn, 1945, Ground-water resources of the El Paso area, Texas: U.S. Geological Survey Water-Supply Paper 919, 190 p.
- Texas Natural Resources Conservation Commission, 1993, 30 TAC 330, Municipal solid waste: Texas Register, Austin, Tex., 194 p. plus updates through December 1993.
- U.S. Army Environmental Hygiene Agency, 1987, Interim final report, evaluation of solid waste management units, August 1987, Fort Bliss, Texas: U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.
- _____, 1989, Final report, evaluation of solid waste management units, 3-7AUG1987 and 26-29SEP1989, Fort Bliss, Texas: U.S. Army Environmental Hygiene Agency, Aberdeen Proving Ground, Md.
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Environmental Data Service, 1992, Annual summary, Texas: National Oceanic and Atmospheric Administration, v. 97, no. 13, 80 p.

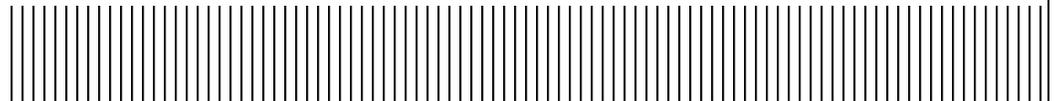


**U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102**

Appendix O – Final Closure Plan

Fort Bliss Municipal Solid Waste Landfill Permit 1422

Revised July 2014



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Engineering Certification

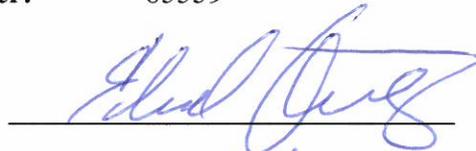
I attest that this Plan has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Rule §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Plan.

Certifying Engineer: Eduardo Quiroz, P.E.

State: Texas

Registration Number: 85559

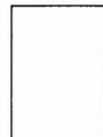
Signature:



Certification Date:

07/30/14

Engineering Seal:



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1. Introduction

The final closure plan has been prepared to provide a general guidance for the Fort Bliss Municipal Solid Waste Landfill (MSWLF) in meeting the Texas Commission on Environmental Quality (TCEQ) rules listed in Title 30 of the Texas Administrative Code Chapter 330 Rule 457 (Title 30 TAC §330.457) in reference to the closure requirements for MSWLF units.



2. Final Cover Requirements

2.1. Final Cover Design

Title 30 TAC §330.457(a)

The Fort Bliss MSWLF was permitted on November 1, 1982 for a total area of 106 acres. Currently, approximately 80% of the MSWLF has been operationally closed or is inactive. Three acres of the MSWLF have been closed as a Type I landfill unit. Ten and a half acres of the remaining portion of the landfill are designed to meet both USEPA Subtitle D and the Texas Municipal Solid Waste regulations. The remaining landfill area is classified as a Type IV construction and demolition debris cell.

The currently permitted final cover requirements for the MSWLF are summarized as follows:

Table 2-1
Fort Bliss MSWLF Final Cover Requirements (Title 30 TAC §330.457(e)(2))

Area*	Cover Requirements	Current Status
80 Acres	36" thick optimized ET soil layer	Operationally Closed/Inactive
10.5 Acres (Type I)	36" thick optimized ET soil layer	Active
3 Acres (Type I)	Non-Subtitle D Cover	Closed 1999
5 Acres (Type IV)	36" thick optimized ET soil layer	Active
7 Acres **	N/A	N/A

* Acreage is approximate and for estimation purposes only.

** Designed landfill access area (outside waste fill limits).

As summarized in Table 2-1, the 3-acre Non-Subtitle D Type I cell was closed in 1999 with a final cover that complied with the closure plan for that cell and for which TCEQ closure approval was obtained on February 24, 1999. However, the remainder of the facility will be closed with an optimized Evapo-Transpiration (ET) final cover designed to be equivalent with the currently permitted final cover systems. The optimized ET cover will be the only final cover design for those parts of the landfill that have not

received a permitted final cover (i.e. all landfill cells except the non-subtitle D cell that was capped/closed in 1999). The optimized ET final cover will also be installed over top of the approved final cover of the Non-Subtitle D Type I cell for site grading and drainage purposes.

The optimized ET final cover system will consist of a 3-foot thick soil layer comprised of the following:

- § 36-inch thick layer constructed in 12-inch lifts of Silty Sand or Clayey Sand (SM or SC or any combination thereof) material compacted to a maximum of 90% of the Standard Proctor maximum dry density. The soils in this layer will be capable of storing moisture in the final cover system so that moisture can be removed by evapotranspiration and transpiration from vegetation growing on the cover.

The optimized ET cover system will be constructed from course-grained permeable soils in lifts (from top to bottom) as follows:

- § Top 12-inch thick lift consisting of Silty Sand or Clayey Sand (United Soil Classification System (USCS) classification SM or SC or any combination thereof) material serves as a medium for plant growth, and provides protection against erosion and desiccation;
- § Second 12-inch thick lift consisting of Silty Sand or Clayey Sand (SM or SC or any combination thereof) material;
- § 12-inch thick bottom lift consisting of Silty Sand or Clayey Sand (SM or SC or any combination thereof) material.

2.2. Final Cover Area

As summarized in Table 2-1, the 3-acre Non-Subtitle D Type I cell was closed in 1999. However, the remainder of the facility will be closed with an optimized evapotranspiration (ET) landfill final cover. The total area to be capped and closed with the optimized ET landfill cover (95.5 acres) includes the 80-acre 1970's era inactive cells, the 10.5-acre Type I cell, and the 5-acre Type IV C&D cell. The optimized ET cover system is proposed for areas of existing waste with the exception of the Cell 2 area which was previously capped with a geomembrane cover. In areas that transition between the waste cells, general fill will be installed to transition the grading between cover areas.

3. Maximum Inventory of Waste

Title 30 TAC §330.457(e)(3)

Based on the approved 1995 final landfill contours, the total permitted waste capacity of the Fort Bliss MSWLF is 5.9 million cubic yards. The March 2009 MOD for the 10-foot height increase in the Subtitle-D cell added an additional 180,000 cubic yards of landfill capacity. The optimized ET landfill cover final grading plan does not significantly alter the final grades presented in the March 2009 MOD; however, the optimized ET landfill cover final grading plan generally conforms to the grades developed during filling operations (based on the 2010 topographic survey) to provide more easily constructible ridges, swales, and slopes and a more uniform surface for installation and maintenance of the optimized ET final cover. In addition, the final grading is design to minimize waste relocation and optimized the south slope orientation to the extent practical to support the potential for future post-closure use (i.e., Photo-Voltaic (PV) development on the final cover).

The landfill cover, as further shown in the permit drawings, maintains a minimum slope of 2 percent (at the top deck of the landfill) and a maximum slope of 5 percent (at the side slopes of the landfill) in accordance with the regulations. In addition, as further noted in the Slope Stability and Settlement Analysis, the grading has been adjusted to account for settlement that is anticipated to occur over the 30 year post-closure life. In general, the settlement is anticipated to be uniform across the landfill, this will ensure the overall grades of the final cover (i.e., post closure care) will maintain the minimum 2 percent slope. The exception to this is the Active C&D area, where the potential for settlement is expected to be higher, to account for this in this area, the slope at closure was increase to 5 percent. The 5% slope in this area is required to account for the anticipated future settlement based on our revised settlement analysis.

The latest Annual Solid Waste Report for FY2013 reported that the current remaining airspace volume in the active cells totaled 59,986 CY as of August 31, 2013. It should be noted that the landfill will be closed prior to reaching its permitted waste capacity of 5,893,932 CY. As reported in the 21 February 1996 Report on Volume Calculations and Case Studies, exploratory trenches advanced through the 1970's era filled and operationally closed landfill cells discovered an in-place waste depth of 25-feet corresponding to an in-place waste volume of 2,984,467 CY. The permitted waste capacity over this same area, based on the design waste depth of 30-ft, is 3,676,542 CY. Therefore, the disparity between the permitted capacity and the anticipated final volume of in-place waste is primarily related to the shallower waste depth in the historic cells.

4. Final Cover Design

4.1. Optimized ET Cover System

As previously discussed in Section 2.1, the Fort Bliss MSWLF will be closed with an optimized ET final cover designed to be equivalent with the currently permitted final cover systems. The optimized ET cover will allow for storm water storage during wet weather periods this promotes deep root growth while limiting infiltration to the underlying waste. The optimized ET cover will be the only final cover design for those parts of the landfill that have not received a permitted final cover. The optimized ET cover system was designed to meet the requirements listed in Title 30 TAC §330.457 and will consist of a 3-foot thick soil layer constructed in three 12-inch thick lifts (from top to bottom) as follows:

- § 12-inch thick top lift suitable for sustaining vegetative growth and consisting of Silty Sand or Clayey Sand (SM or SC or any combination thereof) material compacted to a maximum of 90% of the Standard Proctor maximum dry density. The top lift serves as a medium for plant growth, and provides protection against erosion and desiccation;
- § 12-inch thick second lift consisting of Silty Sand or Clayey Sand (SM or SC or any combination thereof) material compacted to a maximum of 90% of the Standard Proctor maximum dry density;
- § 12-inch thick bottom lift consisting of existing cover material and/or additional stockpiled Silty Sand or Clayey Sand (SM or SC or any combination thereof) material compacted to a maximum of 90% of the Standard Proctor maximum dry density to provide additional water retention storage volume.

It should be noted that the TCEQ Municipal Solid Waste (MSW) Permitting Program uses a 25-inch average annual precipitation line as defined by Title 30 TAC §330.5(b)(1)(D) to delineate areas of the State defined as arid. El Paso lies to the west of the 25-inch average annual precipitation line and therefore has been deemed arid for the purposes of considering an alternative landfill design and modeling and constructing without model calibration.

4.2. Landfill Cells

Title 30 TAC §330.457(e)(1)

The Fort Bliss MSWLF is comprised of five distinct areas:

1. 1970's era inactive cells that consist of 30-foot deep trenches with two feet of clean soil cover. These cells cover an 80 acre area and are unlined and without leachate collection. The permit does not allow further placement of MSW on these cells. According to the March 1995 Final Closure Plan and Cost Estimate these 80 acres are closed; however, formal TCEQ approval documentation has not been located in the DOE or TCEQ files.
2. A three-acre Type 1 cell with final cover in place (non-Subtitle D) that complies with the closure plan and TCEQ closure requirements. TCEQ approval was received on February 24, 1999.
3. A 10.5-acre Type I active cell meeting Subtitle D requirements. This cell is lined and has a leachate collection system. This cell is nearing permitted capacity and is anticipated to be full by January 2012.
4. A 5-acre active Type IV construction debris cell. This cell is unlined and without leachate collection. This cell is also anticipated to reach capacity by July 2012.
5. Seven acres designated for landfill roads, access areas, gatehouse, etc.

4.3. 1970's Inactive Cells

The 1970's era inactive areas are covered with 24-inch thick clean soil, as indicated in the March 1995 Final Closure Plan and Cost Estimate sealed by Mr. John Karlsruher of Cardenas-Salcedo and Associates, Inc. These landfill areas are also indicated as closed in the May 1999 Final Cover Quality Control Plan for the 3-acre Type 1 cell. However, this area is described as in interim closure by Fort Bliss DPW-ENV and no TCEQ approval or Texas P.E. certification of closure has been found in TCEQ or Fort Bliss DPW-ENV records. Accordingly, the optimized ET final cover system as described in Section 4.1 will be installed over these areas. The existing intermediate cover material will require clearing/grubbing and/or tilling, and re-grading, and compaction as defined in Section 5 to meet the requirements of the intermediate cover component of the optimized ET cover system.

The final grades of these 1970's era cells will be adjusted to create uniform pyramidal shapes at each of the waste cell areas. All cells will be graded to a slope between 2 percent and 5 percent; as well as, crowned at the top to promote positive drainage off the landfill and preclude ponding of surface water when total fill height and expected subsidence are taken into consideration.

4.4. Non-Subtitle D Area (Type I)

The closure of the Non-Subtitle D Type I cell was approved by TCEQ on February 24, 1999. However, general fill materials will be installed over top of the approved final cover for this area to allow for a smoother transition of grading between adjacent cells and to provide necessary drainage.

4.5. Subtitle D Area (Type I)

The final cover for the Type I Subtitle D area will be the ET final cover system as described in Section 4.1. Final closure grades will be generally consistent with the March 2009 MOD grades and will form a landfill plateau with minimum 2% top slopes and maximum 25% side slopes.

4.6. Non-Subtitle D Area (Type IV)

The final cover for the Type IV Non-Subtitle D area will be the optimized ET final cover system as described in Section 4.1. The final grading of the Non-Subtitle D cell will create a uniform pyramidal shape with a minimum of a 5 percent slope to account for estimated future settlement in this disposal area

5. Construction Quality Assurance

5.1. Introduction

Title 30 TAC §330.457(e)(1)

Construction of the optimized ET final cover system will be performed by using equipment that is suitable for completing the construction and achieving the desired grading, compaction and vegetative cover requirements.

5.2. Construction Quality Control Plan (CQCP)

This section addresses the construction of the soil components of the optimized ET final cover system and outlines the Construction Quality Control Plan (CQCP) to be implemented with regard to material selection and evaluation, laboratory test requirements, and field test requirements.

The primary soil parameters and construction specifications that will impact the performance of the optimized ET final cover system are soil gradation, saturated hydraulic properties, and degree of compaction. The modeling and design of the optimized ET cover system was based on these material and construction specification requirements. Therefore, the QA testing procedures presented herein will be required prior to and during the final closure construction to ensure that the optimized ET final cover is constructed in accordance with the design intent and to maximize optimized ET performance.

5.2.1. Source Material Evaluation

Material evaluations shall be performed on existing cover soils as well as stockpiled or delivered material prior to and during construction to ascertain its acceptability for the intended purpose. All material shall be sampled and tested by the Contractor in accordance with the requirements specified in the following subsections and summarized in Table 5-1 below. Copies of the laboratory inspection testing results will be submitted to the Engineer of Record and will also be included in the Final Cover System Evaluation Report (FCSER).

Standards referenced in this Section are:

- § ASTM D422, Test Method for Particle Size Analysis of Soils
- § ASTM D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³)

- § ASTM D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- § ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
- § ASTM D2216, Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- § ASTM D5084 – Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Parameter
- § ASTM D6938, Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
- § EM 1110-2-1906 Appendix VII, U.S. Army Corps of Engineers Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials

5.2.2. Use of Existing Intermediate Cover Soils

Both the bottom and second lifts of the optimized ET cover may utilize existing in-place cover material provided such in-place soils meet the material characteristics and compaction requirements as specified in Table 5-1. In general, the procedure for utilizing existing intermediate cover soils is as follows:

- Existing Intermediate Cover thickness is less than 12 inches - supplement with additional soils meeting material specifications to achieve required thickness and compact as required
- Existing Intermediate Cover thickness is equal to or greater than 12 inches and meets compaction - document that materials meet characteristic and compaction requirements and leave in place as bottom lift
- Existing Intermediate Cover thickness equals 12 inches and does not meet compaction - re-work and re-compact as required
- Existing Intermediate Cover thickness is more than 12 inches and does not meet compaction requirements – remove excess material and temporarily stockpile for reuse. Remaining in-place material will be re-worked and re-compacted as required.

Material specifications, construction requirements, and field testing requirements for each lift are further discussed in Sections 5.2.3 and 5.2.4.

**Table 5-1
Fort Bliss MSWLF Optimized ET Cover Source Material Evaluation**

Soil Parameter	Testing Method	Bottom 12-inch-thick Layer		Second 12-inch-thick Layer		Top 12-inch-thick Layer	
		Testing Frequency	Passing Criteria	Testing Frequency	Passing Criteria	Testing Frequency	Passing Criteria
Soil classification (borrow source testing)	ASTM D 2487	Each 10,000 cy	SM or SC ²	Each 10,000 cy	SM or SC ²	Each 10,000 cy	SM or SC ²
Moisture density relationship (borrow source testing)	ASTM D698	1 per soil type ¹	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below. ¹	1 per soil type	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.	1 per soil type	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.
Percentage (% volume) of rock particles between 1 inch and 2 inches in diameter (borrow Source testing)	ASTM D442	1 per soil type ¹	10% or less	1 per soil type	10% or less	1 per soil type	10% or less
Saturated hydraulic conductivity ⁴ (cm/s), K _s (borrow source testing will also be completed as noted in footnote 4)	ASTM D 5084 or EM1110-2-1806, Appendix VII	1 per each 10,000 cy borrow soil placed (samples to be obtained from installed material)	$K_s \leq 2.4 \times 10^{-4}$ cm/s	1 per each 10,000 cy borrow soil placed (samples to be obtained from installed material)	$K_s \leq 2.4 \times 10^{-4}$ cm/s	1 per each 10,000 cy borrow soil placed (samples to be obtained from installed material)	$K_s \leq 2.4 \times 10^{-4}$ cm/s
Field density and moisture	ASTM D 6938	4 tests per acre	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.	4 tests per acre	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.	4 tests per acre	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.
Thickness Verification	Instrument Survey Methods	1 per 10,000 sf	≥ 12-inches	1 per 10,000 sf	≥12-inches	1 per 10,000 sf	≥ 12-inches

¹ If the existing cover soil is utilized as the initial 12-inch-thick layer and if re-compaction of the initial 12-inch-thick layer is required by the POR, then a moisture density relationship test and field density measurements will be required. If this condition occurs then saturated hydraulic conductivity test will also be performed on the re-compacted soil, otherwise, testing will be performed on undisturbed samples from the installed cover.

² Soils will be classified in accordance with the Unified Soil Classification System (USCS) to verify consistency of soil used in the initial 12-inch-thick layer or soils that will be obtained from the soil borrow area.

⁴ Unless otherwise indicated, the laboratory testing will be performed on undisturbed samples recovered from the installed layers. The frequency of sampling area for the installed cover will be determined for the installed thickness. For example, for a 1-foot-thick layer, 10,000 cy corresponds to 6.2 acres; for a 2-foot-thick vegetation support layer, frequency will be 3.1 acres. A saturated hydraulic conductivity test will also be performed on the borrow soil (1 per soil type). The borrow soil material will be re-compacted to meet the compaction specification listed in Section 2.2.



5.2.3. Optimized ET Cover – Bottom Lift

5.2.3.1. Material Specification

The optimized ET cover bottom lift will consist of twelve-inches of soil materials (SM or SC or any combination thereof) placed over the waste and compacted to maximum of 90% of the Standard Proctor maximum dry density at a moisture content less than optimum.

5.2.3.2. Existing Intermediate Cover Material Construction Requirements

Across the 1970's era inactive cells, the optimized ET cover bottom lift will likely consist of the existing intermediate cover soil placed in accordance with the Site Operating Plan. In general, over 24-inches of compacted intermediate cover material has been placed over these inactive cells. Over time, isolated patches of native vegetation have taken root across these cells. Therefore, the Contractor will be required to clear and grub all existing intermediate cover material of all vegetation, roots, and other deleterious materials using bulldozers, graders, tillers, or other suitable equipment to provide a smooth uniformly graded bare surface.

All existing intermediate cover material will require re-working, and compaction as necessary to create an intermediate cover material subgrade consistent with the final cover requirements. Prior to final grading and compaction, the existing intermediate cover material will be probed at 100-foot intervals to verify that a minimum of 12-inches of cover soil is in place and verify the existing in-place density. Where existing suitable intermediate cover material does not meet or cannot be re-worked to meet the final cover material or compaction requirements or does not measure the minimum of 12-inches in depth, additional stockpiled SM/SC cover material shall be backfilled, graded, and compacted to create a uniform bare surface of suitable intermediate cover material. Intermediate cover material may exceed the minimum 12-inches in thickness, where necessary.

5.2.3.3. Active Cell Areas

Where existing intermediate cover material has not been installed (i.e. the active Type I and IV cells), SM/SC soil material will be placed as a single lift to achieve a minimum compacted thickness of 12-inches. All intermediate cover material (existing re-worked material and stockpiled backfill) will require static and/or vibratory compaction to meet the project compaction requirements of a maximum of 90% of the Standard Proctor maximum dry at a moisture content less than optimum density through the full 12-inch soil layer. Should in-place density exceed project requirements, intermediate cover material will be tilled to a minimum depth of 12-inches, and re-compacted with appropriate energy to meet the project requirements. Surveying and grade stakes will be used to verify the final grades of the bottom lift.

5.2.3.4. Field QA Testing

To ensure performance of the constructed optimized ET cover is similar to that modeled during design, the material for the bottom lift will be sampled and tested at the minimum frequencies presented below prior to and during construction:

- § Soil Classification testing (ASTM D2487) - Minimum frequency of 1 test per 10,000 CY of material for existing intermediate cover material and/or stockpiled material.
- § Standard Proctor moisture/density testing (ASTM D698) – Minimum frequency of 1 test per soil type per lift of existing intermediate cover material or 1 test per soil type of stockpiled material.
- § Sieve and hydrometer analysis testing (ASTM D422) - Minimum frequency 1 test per soil type per lift of existing intermediate cover material or 1 test per soil type stockpiled material. Soils shall be classified as SM, SC, or any combination thereof to be considered acceptable for use in the final optimized ET cover system.
- § Saturated hydraulic parameter testing (ASTM D5084 or EM 1110-2-1906 Appendix VII) - Minimum frequency of 1 test per 6 acres of existing intermediate cover material or 1 test per 10,000 CY stockpiled material. Saturated hydraulic conductivity shall be less than or equal to 10E-4 cm/sec to be considered acceptable for use in the optimized ET cover system.
- § Field density and moisture content testing (ASTM D6938) – Minimum frequency of 1 test per 10,000 SF for existing intermediate cover material and/or stockpile material installed.

5.2.4. Optimized ET Cover – Second Lift

5.2.4.1. Material Specification

The optimized ET cover second lift will be installed over the first lift as approved by the Engineer of Record and will consist of a minimum of 12-inches of stockpiled SM/SC material compacted to a maximum of 90% of the Standard Proctor maximum dry density at a moisture content less than optimum. This material may be excess intermediate cover soil material that has been removed and temporarily stockpiled for reuse. The soil will be inspected as placed to be free of vegetation, roots, debris, and rocks greater than 2-inches in diameter.

5.2.4.2. Construction Requirements

The optimized ET cover second lift will be placed as a single lift to achieve a minimum compacted thickness of 12-inches and compacted to a maximum of 90% of the Standard Proctor maximum dry density. Over-compacted material will be tilled and re-compacted. Surveying will be performed to verify the thickness of the lift.

5.2.4.3. Field QA Testing

To ensure performance of the constructed optimized ET cover is similar to that modeled during design the material for the second lift will be sampled and tested at the minimum frequencies presented below during construction:

- § Soil Classification testing (ASTM D2487) - Minimum frequency of 1 test per 10,000 CY of stockpiled material.
- § Standard Proctor moisture/density testing (ASTM D698) – Minimum frequency of 1 test per soil type of stockpiled material installed.
- § Sieve and hydrometer analysis testing (ASTM D422) - Minimum frequency of 1 test per soil type stockpiled material. Soils shall be classified as SM, SC, or any combination thereof to be considered acceptable for use in the optimized ET cover system.
- § Saturated hydraulic parameter testing (ASTM D5084 or EM 1110-2-1906 Appendix VII) - Minimum frequency of 1 test per 10,000 CY stockpiled material. Saturated hydraulic conductivity shall be less than or equal to 10E-4 cm/sec to be considered acceptable for use in the optimized ET cover system.
- § Field density and moisture content testing (ASTM D6938) – Minimum frequency of 1 test per 10,000 SF stockpiled material installed.
- § Thickness Verification (instrument survey methods) – Minimum frequency of 1 survey shot per 10,000 SF performed on a 100-foot grid.

5.2.5. Optimized ET Cover - Surface Layer (Top Lift)

5.2.5.1. Material Specification

The optimized ET cover surface layer (top lift –surface layer) will be installed over the second compacted lift as approved by the Engineer of Record and will consist of a minimum of 12-inches of stockpiled SM/SC material compacted to a maximum of 90% of the Standard Proctor maximum dry density at a moisture content less than optimum. The soil will be inspected as placed to be free of vegetation, roots, debris, and rocks greater than 2-inches in diameter. Where possible, stockpiled SM/SC material visually observed to contain a higher organic content will be reserved for use in the vegetative surface layer.

5.2.5.2. Construction Requirements

The vegetative surface layer (top lift) will be placed as a single lift to achieve a minimum compacted thickness of 12-inches and compacted to a maximum of 90% of the Standard Proctor maximum dry density at a moisture content less than the optimum moisture content. Over-compacted material will be tilled and re-compacted. Placement of vegetative surface layer material will not occur during rainfall events to prevent saturation and overcompaction. Surveying will be performed to verify the thickness and final grades of the vegetative surface layer.

The top 4-inches of the vegetative surface layer will be tilled perpendicular to the slope of the surface in preparation for seeding in accordance with Section 5.3.

5.2.5.3. Field QA Testing

To ensure performance of the constructed optimized ET cap is similar to that modeled during design, the vegetative surface layer material will be sampled and tested at the minimum frequencies presented below during construction:

- § Soil Classification testing (ASTM D2487) - Minimum frequency of 1 test per 10,000 CY of stockpiled material.
- § Standard Proctor moisture/density testing (ASTM D698) – Minimum frequency of 1 test per soil type of stockpiled material installed.
- § Sieve and hydrometer analysis testing (ASTM D422) - Minimum frequency of 1 test per soil type stockpiled material. Soils shall be classified as SM, SC, or any combination thereof to be considered acceptable for use in the optimized ET cover system.
- § Saturated hydraulic parameter testing (ASTM D5084 or EM 1110-2-1906 Appendix VII) - Minimum frequency of 1 test per 10,000 CY stockpiled material. Saturated hydraulic conductivity shall be less than or equal to $10E-4$ cm/sec to be considered acceptable for use in the optimized ET cover system.
- § Field density and moisture content testing (ASTM D6938) – Minimum frequency of 1 test per 10,000 SF stockpiled material installed.

5.2.6. General Fill Material

5.2.6.1. Material Specification

The general fill material used for the preparation of subgrade below the cover system and in areas between the waste cell for the transition of the grades on the overall site will consist of existing and/or stockpiled material, free from trash or deleterious debris, compacted to a maximum of 90% of the Standard Proctor maximum dry density at a moisture content less than optimum. The soil will be inspected as placed to be free of

vegetation, roots, debris, and rocks greater than 2-inches in diameter within 12 inches of the final grade and 6-inches in diameter below the final 12-inch layer. Where possible, existing and/or stockpiled material visually observed to contain a higher organic content will be reserved for use in the upper 12-inch surface layer. Where general fill material is used, in all cases the upper most 12-inch layer (top/surface layer) will consist of SM/SC soils.

5.2.6.2. Construction Requirements

The general fill will be placed lifts to achieve a minimum compacted thickness of 12-inches and compacted to a maximum of 90% of the Standard Proctor maximum dry density at a moisture content less than the optimum moisture content. Placement of general fill material will not occur during rainfall events to prevent saturation and overcompaction. Surveying will be performed to verify the thickness and final grades of the general fill.

5.2.6.3. Field QA Testing

To ensure performance of the general fill is similar to that modeled during design, the general fill material will be sampled and tested at the minimum frequencies presented below during construction:

- § Soil Classification testing (ASTM D2487) - Minimum frequency of 1 test per 20,000 CY of stockpiled material.
- § Standard Proctor moisture/density testing (ASTM D698) – Minimum frequency of 1 test per soil type of stockpiled material installed.
- § Sieve and hydrometer analysis testing (ASTM D422) - Minimum frequency of 1 test per soil type stockpiled material. Soils shall be managed to the allowable maximum stone size based on the use as upper 12-inch layer or lower lift general fill.
- § Field density and moisture content testing (ASTM D6938) – Minimum frequency of 1 test per 10,000 SF per lift of material installed.

5.3. Vegetation Planting Plan

The purpose of this plan is to detail the procedures to be used for soil preparation and initial planting for vegetation on the surface cover. However, the expectation is that native vegetative cover will eventually establish itself over the landfill. As such this plan sets forth use a specified native seed mix for permanent cover which includes the two target grass species from the genera *Aristida* and *Sporobolus* for permanent establishment, but also allows for use of non-native and cultivated seed mixes per TxDOT specifications which are designed for temporary cover to achieve soil

stabilization in the event final grading is completed outside of the germination period for target species (May 15 – November).

5.3.1. Soil Preparation and Seeding

All seeds must conform to the requirements of the USDA rules and regulations set forth in the Federal Seed Act and Texas seed law. Utilization of local soils stockpiled on-site will constitute the 12-inch thick Vegetative Surface Layer. These soils consist of silty sands (SM) and clayey sands (SC) and will be compacted to a maximum of 90% of the Standard Proctor maximum dry density prior to seedbed preparation as discussed in Section 5.2.5.

Seedbed preparation will start as soon as possible after completion of the Vegetative Surface Layer to the lines and grades specified in the construction plans. The vegetated area will be cultivated to a typical depth of 4-inches before placement of seed or seed mix. If temporary seeding is utilized, the area covered with temporary grass will be cultivated to a typical depth of 4 inches before application of permanent seeds.

Table 5-2 includes the schedule and species for seeding as well as the seed application rate of pure live seed (PLS) per acre. The schedule is subject to potentially change depending on the availability of grass species specified as well as due to unexpected climatic conditions during and immediately after final cover construction are encountered.

**Table 5-2
Fort Bliss MSWLF Optimized ET Cover Seeding Schedule**

Dates	Seed Type to Use	Seed Species to Use (Common Name)	Seed Species to Use (Latin Name)	Rates (lb Pure Live Seed/ac)
February 1 – May 15	Perennial (Native Species Seed Mix)	Green Sprangletop	<i>Leptochloa dubia</i>	0.3
		Red threawn	<i>Aristida purpurea Nutt.</i>	0.4
		Mesa dropseed	<i>Sporobolus flexuosus</i>	0.9
		Blue Grama	<i>Bouteloua gracilis</i>	1.0
		Indian Ricegrass	<i>Oryzopsis hymenoides</i>	1.6
		Purple Prairieclover	<i>Dalea purpurea</i>	0.5
May 16 – August 31	Temporary Warm (Summer) Season (A Native Species and A Cultivated Species)	Buffalo Grass	<i>Buchloe dactyloides</i>	50
September 1 – November 30	Temporary Cool (Winter) Season (Introduced Species)	Plains Bristlegrass	<i>Setaria vulpiseta</i>	4.0

Plant seeding may utilize methods, as suggested by the Texas Department of Transportation *Specifications Book*.

1. Broadcast Seeding. Distribute seed/mixture uniformly over the areas shown on the plans using hand or mechanical distribution or hydro-seeding on top of the soil. When seed and water are to be distributed as a slurry during hydroseeding, apply the mixture to the area to be seeded within 30 minutes of placement of components in the equipment. Roll the planted area with a light roller or other suitable equipment. Roll sloped areas along the contour of the slope.

5.3.2. Fertilizer Recommendations

The installed vegetation layer will be tested for fertilizer needs prior to seeding. Except for broadcast seeding, initial fertilization will occur prior to seeding. Fertilizer needs for the installed vegetation layer will be determined by collecting one soil sample per every 10 acres of installed vegetation layer, (for the purpose of this plan only one vegetation layer is proposed). Soil nutrient needs will be tested by a qualified agronomic testing laboratory (e.g. Texas A&M University Soil, Water and Forage Testing Laboratory). The laboratory testing report will determine macro and micro nutrient needs and may also contain suggestions for soil inoculants, organic matter, etc. for the installed vegetation layer. The nitrogen, phosphoric acid and potash ratio is 2:1:1, and will be applied at a rate of 100 pounds of nitrogen, 50 pounds of phosphoric acid and 50 pounds of potash per acre, unless laboratory testing results mandate higher rates. At a minimum, micronutrients will be applied at a minimum rate of 1 pound per acre of boron, calcium and magnesium.

Seed and fertilizer (as required by soils analysis) may be distributed simultaneously during Broadcast Seeding operations, provided each component is applied at the specified rate. When temporary and permanent seeding are both specified for the same area, apply half of the amount of fertilizer during temporary seeding operation and the other half during the permanent seeding operation. Fertilization will occur at intervals of no more than six week after initial seeding and until vegetation is established. To prevent damage to established vegetation, turf type line equipment will be used to apply fertilizer.

Unless otherwise specified on the plans, use a fertilizer containing nitrogen, phosphoric acid and potash nutrients. Similar to urea-based and plastic resin-coated fertilizers, at least 50 percent of the nitrogen component must be of a slow release formulation unless otherwise dictated by the soils laboratory. The vegetation establishment contractor will ensure that fertilizer is in an acceptable condition for distribution in containers labeled with the analysis. Fertilizer is subject to testing by the Texas A&M Feed and Fertilizer Control Service in accordance with the Texas Fertilizer Law.

5.4. Vegetation Establishment Verification Plan

5.4.1. Introduction

The Vegetation Establishment Verification Plan will ensure that the vegetation is established consistent with the parameters used in the optimized ET Final Cover Demonstration and includes the following subsections:

- § Vegetation Establishment Period
- § Maintenance Activities to be Completed During the Vegetation Establishment Period
- § Vegetation Performance Specification

5.4.2. Vegetation Establishment Period

The maintenance period will start immediately after seeding is conducted and will continue until TCEQ approves the vegetation establishment verification. It is assumed the vegetation establishment will occur within the first year. Vegetation will be considered established when a satisfactory population of mature plants is verified to cover no less than 10% of the ET final ground cover area. It is assumed that re-use of local stockpiled soils containing native plant seed stock will significantly aide in facilitating vegetative growth. It is assumed that the vegetation establishment period will occur within the 30-year post closure period and its approval is not contingent on the start of the post-closure period.

The vegetation establishment period begins after the Final Cover System Evaluation Report (see Section 5.5.1) is approved by TCEQ and ends when the Vegetation Establishment Report (see Section 5.5.2) is approved by TCEQ. The facility will establish the vegetation consistent with the parameters specified in the Vegetation Planting Plan.

5.4.3. Maintenance Activities to be Completed during the Vegetation Establishment Period

The following maintenance activities ensure that the planted vegetation will meet the vegetation performance specification:

- § Following application of perennial seed mix, the certifying engineer will visit the site on a periodic basis within the first month to inspect the cover surface and to check for any damage to the installed cover soils.
- § After the inspections, the certifying engineer will visit the site periodically for the first year to inspect the installed final cover soils and the vegetation being developed. Areas with excessive erosion will be re-graded by replenishing the topsoil and re-seeded.
- § Areas of significant differential settlement will be re-graded and re-seeded.
- § Areas that experience erosion will be promptly repaired.
- § All activities including but not limited to site visits by the POR will be documented in the Site Operating Record.

5.4.4. Vegetation Performance Specification

The vegetation layer will be evaluated at the end of the vegetation establishment period by a Texas Licensed Professional Engineer to determine if the vegetation is established in accordance with the Evapotranspiration Cover Design Report. The performance specification for the vegetation layer is summarized herein:

- § Vegetative Coverage – The vegetative coverage specification is based upon a demonstration during the vegetation establishment period of a satisfactory population of mature plants covering no less than 10% of the optimized ET final ground cover area.

5.5. Documentation

5.5.1. Final Cover System Evaluation Report (FCSER)

Following the installation of the optimized ET cover system, a Final Cover System Evaluation Report will be submitted certifying that the ET soils were constructed in accordance with the construction methods and test procedures in the Final Cover Quality Control Program. The FCSER will be signed and sealed by a Professional Engineer in the State of Texas and include, at a minimum:

- § Completed report forms required by TCEQ
- § Summary of construction activities
- § Summary of the initial installation of vegetation
- § Summary of all laboratory and field test results
- § Drawings showing sample and test locations
- § Field and laboratory test results
- § As-built drawings
- § A description of significant construction problems and the resolution of these problems
- § A statement of compliance with the Final Cover Quality Control Program

The Final Cover Evaluation Report will be signed and sealed by the Professional Engineer, signed by the site operator, and submitted to the MSW Permits Section of Waste Permits Division of the TCEQ for acceptance. Upon acceptance of the Final Cover Evaluation Report, the vegetation establishment period will begin as noted in the Vegetation Establishment Verification Plan. After the acceptance of the Final Cover Evaluation Report and during the vegetation establishment period, the applicant will request closure of the site in accordance with this Report.

5.5.2. Vegetation Establishment Verification Report

At the end of the vegetation establishment period, a Vegetation Establishment Verification Report will be completed as described in the Vegetation Establishment Verification Plan. A quarterly report will be submitted to TCEQ during the vegetation establishment period. The quarterly report will include the status of vegetation establishment activities (fertilizer application, reseeding, etc.) and any other activities that are related to installed final cover or vegetation

The Vegetation Establishment Verification Report will be prepared and submitted to TCEQ for approval at the end of the vegetation establishment period. The report will be prepared by a Texas Licensed Professional Engineer and include the following:

- § Documentation that the percent vegetative cover is in accordance with the ground cover and bare area determination procedures included in this plan. This documentation will include the engineers' assessment of the vegetation cover and photographs that document compliance with the performance specification.
- § The certifying engineer will also provide a statement indicating that the vegetation layer of the optimized ET final cover system has been maintained consistent with the parameters used in the UNSAT-H analysis.

6. Schedule for Closure Activities

The landfill closure schedule and other closure related activities shall follow the requirements of Title 30 TAC §330.457(f) and (g).

6.1. Closure Schedule

Title 30 TAC §330.457(e)(4)

An overall timetable for the closure of the Fort Bliss MSWLF is presented following this section. This schedule is based on the current BRAC realignment process at Fort Bliss and the regulatory closure requirements described in subsequent sections.

6.2. Final Contour Map

Title 30 TAC §330.457(e)(5)

A final contour map depicting the proposed final contours, top slopes, and side slopes, and proposed surface drainage features is provided as Sheets C-2 and C-3 in Appendix B of the permit modification application. The MSWLF is not within a 100-year flood plain.

6.3. Location of Plan

Title 30 TAC §330.457(f)(1)

Fort Bliss DPW-ENV shall maintain a copy of the closure plan in the operating record.

6.4. Written Notification

Title 30 TAC §330.457(f)(2)

No later than 45 days prior to the initiation of closure activities for any area or final closure of the facility, Fort Bliss shall provide written notification to the Executive Director of the intent to close the unit or facility and place this notice of intent in the operating record.

No later than 90 days prior to the initiation of a final facility closure, Fort Bliss shall, through a public notice in the newspaper(s) of largest circulation in the vicinity of the facility, provide public notice for final facility closure. This notice shall provide the following information:

- § Facility Name
- § Facility Address
- § Physical Location of the Facility

- § The Permit Number
- § Last Date of Intended Receipt of Waste.

6.5. Start of Final Closure Activities

Title 30 TAC §330.457(f)(3)

Fort Bliss shall begin final closure activities for each unit or facility no later than 30 days after the date on which the unit or facility receives the known final receipt of wastes or, if the unit or facility has remaining capacity and there is a reasonable likelihood that the unit or facility will receive additional wastes, no later than one year after the most recent receipt of wastes. A request for an extension beyond the one-year deadline for the initiation of closure may be submitted to the executive director for review and approval and shall include all applicable documentation necessary to demonstrate that the unit has the capacity to receive additional waste and that Fort Bliss has taken and will continue to take all steps necessary to prevent threats to human health and the environment from the MSWLF.

6.6. Completion of Final Closure Activities

Title 30 TAC §330.457(f)(4)

Fort Bliss shall complete final closure activities for the unit or facility in accordance with the approved final closure plan within 180 days following the initiation or final closure activities. A request for an extension for the completion of final closure activities may be submitted to the Executive Director for review and approval and shall include all applicable documentation necessary to demonstrate that closure will, of necessity, take longer than 180 days and all steps have been taken and will continue to be taken to prevent threats to human health and the environment from the unclosed MSWLF unit.

6.7. Certification

Title 30 TAC §330.457(f)(5)

Following final closure of the MSWLF unit or facility, the owner or operator shall submit to the Executive Director for review and approval a Final Cover System Evaluation Report (FCSER), a Vegetation Establishment Report, signed by an independent licensed professional engineer, verifying that final closure has been completed in accordance with the approved final closure plan. The submittal to the Executive Director shall include all applicable documentation necessary for certification of closure. Once approved, this certification shall be placed in the operating record.

6.8. Inspection Report

Title 30 TAC §330.457(f)(6)

Following receipt of the required final closure documents, as applicable, and an inspection report from the commission's district office verifying proper closure of the MSWLF unit or facility according to the approved final closure plan, the executive director may acknowledge the termination of operation and closure of the unit or facility and deem it properly closed.

6.9. Affidavit to the Public

Title 30 TAC §330.457(g)

Upon notification to the executive director, Fort Bliss shall post a minimum of one sign at the main entrance and all other frequently used points of access for the facility notifying all persons who may utilize the facility of the date on closing for specific unit(s) or the entire facility and the prohibition against further receipt of waste materials after the stated date.

Within 10 days after completion of final closure of the MSWLF unit or facility, Fort Bliss shall submit to the executive director a certified copy of an "Affidavit to the Public" in accordance with the requirements of Title 30 TAC §330.19 and place a copy of the affidavit in the operating record. In addition, a certified notation of the deed to the facility property, or on some other instrument that is normally examined during title search, needs to be recorded. This is intended so that in perpetuity any potential purchaser of the property is notified that the land has been used as a landfill facility and use of the land is restricted.

Post-closure care maintenance specified in Title 30 TAC §330.463(b) (relating to Post-Closure Care Requirements) shall begin immediately upon the date of final closure as approved by the executive director.

6.10. Post-Closure Care

Following the professional engineer certification of the completion of closure as accepted by the Executive Director of the TCEQ Waste Permits Division, Fort Bliss DPW-ENV shall commence the 30-year post-closure care period. A Vegetation Establishment Report shall be submitted semi-annually during the cover vegetation start-up period indicating the type and quantity of vegetation established, the percent vegetative cover, and the vegetative root structure. If the type or quantity of vegetation or root structure does not meet specifications, then corrective action shall be taken to improve the vegetation

consistent with the optimized ET final cover design. Post-closure care requirements are discussed in the *Post Closure Plan*.

7. Closure Cost Estimate

Title 30 TAC §330.63(j)

As an agency of the Federal Government, Fort Bliss is not required to complete financial assurance mechanism requirements. Therefore, a closure cost estimate is not required per Title 30 TAC §37.8001.



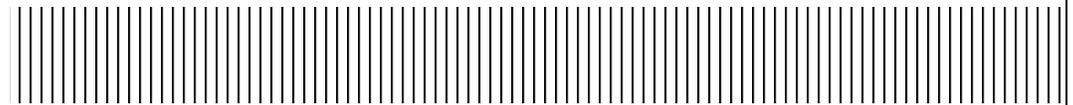


U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102

Appendix P – Post-Closure Care Plan

Fort Bliss Municipal Solid Waste Landfill Permit #1422

Revised July 2014



Report Prepared By:

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04675026



ARCADIS U.S., Inc.
TX Engineering License # F-533

Engineering Certification

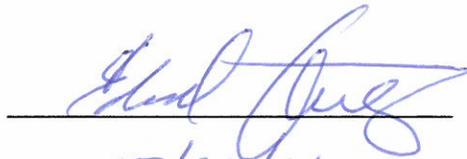
I attest that this Plan has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Chapter §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Plan.

Certifying Engineer: Eduardo Quiroz, P.E.

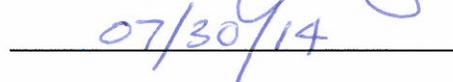
State: Texas

Registration Number: 85559

Signature:



Certification Date:



Engineering Seal:



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1. Introduction

This Post–Closure Care Plan has been prepared to provide general guidance for Fort Bliss in meeting the Texas Commission on Environmental Quality (TCEQ) rules listed in Title 30 of the Texas Administrative Code Chapter 330 Rule 463 (Title 30 TAC §330.463) in reference to the post-closure care maintenance requirements for Municipal Solid Waste Landfill (MSWLF) units. A copy of this Post-Closure Care Plan will be maintained in the operating record.



2. Maintenance and Monitoring

2.1. Post-Closure Care

Title 30 TAC §330.463(b)(1)

After professional engineer certification of the completion of closure requirements for the MSWLF is accepted by the executive director, Fort Bliss shall begin conducting post-closure care maintenance for 30 years unless the executive director specifies otherwise. Post closure care shall consist, at a minimum, of the following:

2.1.1. General Maintenance

Title 30 TAC §330.463(b)(1)(A)

Fort Bliss (the owner) or operator shall retain the right of entry to the closed unit or facility and shall maintain all rights-of-way and conduct maintenance and/or remediation activities as needed, in order to maintain the integrity and effectiveness of all final cover and drainage control system(s); to correct any effects of settlement, subsidence, ponded water, erosion, or other events or failures detrimental to the integrity of the closed unit or facility; and to prevent surface run-on and run-off from eroding or otherwise damaging the final cover system.

2.1.2. Leachate Collection System Monitoring

Title 30 TAC §330.463(b)(1)(B)

Fort Bliss shall maintain and operate the leachate collection system (LCS) in accordance with the requirements listed in Title 30 TAC §330.331 and §330.333 (relating to Design Criteria and Leachate Collection System, respectively).

Leachate shall be measured at least once a year by a scaled dip stick into the on-site vertical leachate monitoring pipe. The watermark on the stick measures the depth of leachate that collected on the liner. If the leachate is more than 12 inches (30 centimeters) deep in the landfill, it will be pumped out through the leachate transfer pipe and spread on the Subtitle D cell for evaporation.

The leachate measurement shall be kept in the site operating record. These measurements shall also be reported to the TCEQ. The executive director may allow Fort Bliss to stop managing leachate if Fort Bliss demonstrates to the approval of the executive director that leachate no longer poses a threat to human health and the environment.



2.1.3. Groundwater Monitoring

Title 30 TAC §330.463(b)(1)(C)

Ground-water monitoring requirements under Title 30 TAC §330.403 (relating to Ground-Water Monitoring Systems), §330.405 (relating to Groundwater Sampling and Analysis Requirements), §330.407 (relating to Detection Monitoring Program for Type I Landfills), and §330.409 (relating to Assessment Monitoring Program) were suspended by the executive director on May 22, 1996, since Fort Bliss demonstrated that there is no potential for migration of hazardous constituents from the MSWLF unit to the uppermost aquifer as defined in Title 30 TAC §330.3 (relating to Definitions) during the active life and the closure and post-closure care period of the unit. A copy of the May 22, 1996 letter is provided in Appendix F of the permit modification application.

2.1.4. Gas Monitoring

Title 30 TAC §330.463(b)(1)(D)

Fort Bliss shall maintain and operate the gas monitoring system in accordance with the requirements listed in 30 TAC §330 Subchapter I and the current approved Landfill Gas Management Plan. Existing gas monitoring wells will be extended to coordinate with the final cover system construction and, in limited locations, the existing gas monitoring wells will be abandoned and relocated to coordinate with final cover drainage features as further shown on the Permit Drawings (see Permit Application Appendix B).

2.1.5. Electrical Resistivity Surveys

Title 30 TAC §330.463(b)(1)(E)

Fort Bliss is not subject to electrical resistivity surveys.

2.1.6. Vegetation Establishment Monitoring

A Vegetation Establishment Report shall be submitted semi-annually during the cover vegetation start-up period indicating the type and quantity of vegetation established, the percent vegetative cover, and the vegetative root structure. If the type or quantity of vegetation or root structure does not meet specifications, then corrective action shall be taken to improve the vegetation consistent with the optimized ET final cover design in accordance with the Fort Bliss MSWLF Closure Plan.



2.1.7. Schedule

Title 30 TAC §330.463(b)(3)(A)

Post-closure activities required for the MSWLF are described below:

**Table 2-1
Post-Closure Monitoring and Inspection Activities**

Items	Inspection period	Action	Remark
Erosion	Quarterly and after any major storm	Correct	-----
Methane	Quarterly	Report to TCEQ	Monitoring
Leachate	Annually	Report to TCEQ	Measuring
Vegetation Establishment – As defined in the Closure Plan	During establishment period: - Periodically during the initial month - Periodically during the first year	Report to TCEQ	Monitoring/Measuring

2.1.8. Post Closure Care Period

Title 30 TAC §330.463(b)(2)

Following the professional engineer certification of the completion of closure as accepted by the executive director of the TCEQ Waste Permits Division, Fort Bliss DPW-ENV shall commence the 30-year post-closure care period. The length of the Post-Closure Care maintenance period of the MSWLF may be decreased by the executive director if Fort Bliss submits to the executive director for review and approval a documented certification, signed by an independent registered professional engineer and including all applicable documentation necessary to support the certification that demonstrates that the reduced period is sufficient to protect human health and the environment. The post-closure maintenance period may be increased by the executive director if it is determined that the lengthened period is necessary to protect human health and the environment. If there is evidence of a release from the MSWLF, the executive director may require an investigation into the nature and extent to the release and an assessment of measures necessary to correct an impact to groundwater.



3. Post - Closure Cost Estimate

Title 30 TAC §330.463(b)(3)(D)

As an agency of the Federal Government, Fort Bliss is not required to complete financial assurance mechanism requirements. Therefore, a post-closure cost estimate is not required per Title 30 TAC §37.8001.



4. Completion of Post - Closure Care

Title 30 TAC §330.465

Following completion of the post-closure care maintenance period for the MSWLF, Fort Bliss will submit to the executive director for review and approval a documented certification, signed by an independent registered professional engineer verifying that post-closure care maintenance has been completed in accordance with the approved post-closure care plan. The submittal to the executive director shall include all applicable and supporting documentation necessary for the certification of completion of post-closure care maintenance.

Upon completion of the post-closure care period for the MSWLF Fort Bliss shall also submit to the executive director a request for voluntary revocation of the facility permit.

Title 30 TAC §330.463(b)(3)(C)

Fort Bliss/Army is considering future development of the site for photovoltaic installation (PV Development). The PV Development would consist of a series of photovoltaic solar panel arrays constructed across the landfill on top of the optimized ET cover system.

If the Army decides to move forward with the PV Development and install the solar panel arrays on top of the closure landfill, the land use and development plans shall comply with the requirements set forth in Title 30 TAC Chapter 330, Subchapter T: Use of Land Over Closed Municipal Solid Waste Landfills. The procedures and protocols that will be followed to protect and maintain the integrity of the optimized ET cover system has been included as Appendix R – Post-Closure Use Report that was development to adhere to all the requirements of Subchapter T.



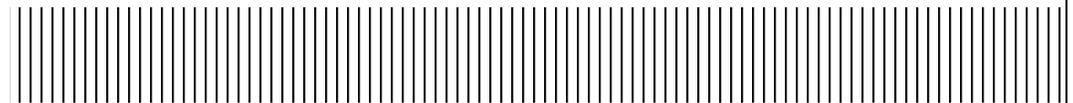


U.S. Army Corps of Engineers, Fort Worth District

819 Taylor Street, Fort Worth, TX 76102

**Appendix Q –
Evapotranspiration Cover
Design Report
Fort Bliss Municipal Solid Waste Landfill
Permit 1422**

July 2014



**U.S. ARMY FORT BLISS
MUNICIPAL SOLID WASTE LANDFILL
EL PASO COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1422**

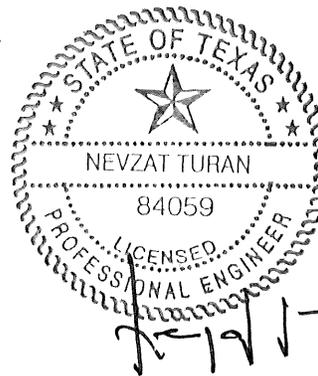
**OPTIMIZED EVAPO-TRANSPIRATION COVER
PERMIT MODIFICATION APPLICATION**

WB FINAL COVER DESIGN

Prepared for

U.S. Army Corps of Engineers, Fort Worth District

July 2014



Prepared by

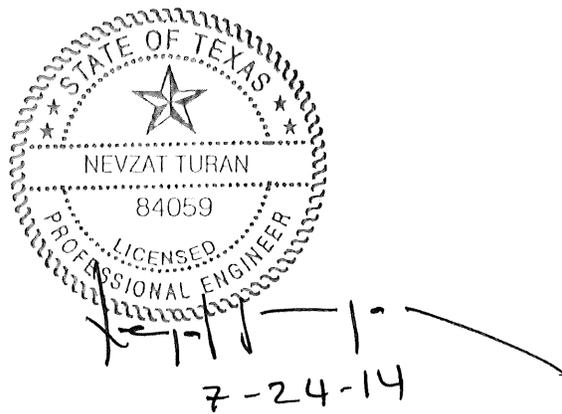
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817-735-9770

WBC Project No. 2449-310-11-00-01

This document is intended for permitting purposes only.

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1 INTRODUCTION

The purpose of this appendix is to present a water balance (WB) final cover design as an alternative to the Subtitle D composite final cover for the U.S. Army Fort Bliss Municipal Solid Waste Landfill (Fort Bliss Landfill). The WB cover consists of monolithic soil layer that stores moisture for infiltrating rainfall until it is removed by evapotranspiration. The WB final cover system soils will consist of the following:

- 36-inch-thick Monolithic Soil Layer. The soils in this layer will be capable of storing moisture in the final cover system so that the moisture can be removed by evaporation and transpiration from vegetation growing on the cover.

The above WB final cover system is designed to minimize infiltration of stormwater into the underlying wastes. This WB cover consists of a cover that employs a thick layer of soil with adequate soil-water storage capacity to retain any infiltrated water until it can be removed through evapotranspiration. The WB cover concept relies on making moisture stored in the soil layer available for vegetative growth or retain it until it moves upward due to evaporation. In other words, the thickness of the WB Cover must be sufficient enough to hold infiltration of precipitation until the water can be consumed by evapotranspiration.

Consistent with Title 30 Texas Administrative Code (TAC) §330.457(d)(1) and (2), the WB final cover is designed to be equivalent with the prescriptive composite final cover system. The equivalency demonstration has been developed in accordance with the Texas Commission on Environmental Quality (TCEQ) guidance document titled, "Guidance for Requesting a Water Balance Alternative Final Cover for a Municipal Solid Waste Landfill," dated January 2012.

The following sections of this appendix discuss the requirements of the equivalency demonstration, a description of the numeric model, Unsaturated Soil Water and Heat Flow Model (UNSAT-H) used to make the equivalency demonstration, a summary of the model input parameters, a summary of the equivalency demonstration, and specifications for the WB final cover system. In addition, the following information is presented in appendices listed below.

- Appendix A – Soils Data. This appendix includes testing results for existing soil borrow sources within the permit boundary.
- Appendix B – Climatological Data. This appendix includes precipitation and evapotranspiration data that was used as input into the UNSAT-H model.

- Appendix C – UNSAT-H Model Input. This appendix includes the UNSAT-H model input files for the WB final cover, which includes the input files in “.inp” and “.lis” UNSAT-H file formats and an input summary table.
- Appendix D – UNSAT-H Model Output. This appendix includes the UNSAT-H model output files for the WB final cover. The UNSAT-H output file includes annual summaries from 1981 to 2010.
- Appendix E – WB Final Cover System Quality Control Plan. This appendix includes procedures for constructing the WB cover consistent with the design conditions included in this appendix.

2 EQUIVALENCY DEMONSTRATION REQUIREMENTS

Consistent with Title 30 TAC §330.457(d)(1) and (2), the WB final cover is designed such that it achieves an equivalent reduction in infiltration and provides protection from wind and water erosion equivalent to the standard Subtitle D final cover design. The equivalency demonstration is based on the TCEQ guidance document titled, “TCEQ Guidance for Requesting a Water Balance Alternative Final Cover for a Municipal Solid Waste Landfill,” dated January 2012. This demonstration was completed using the UNSAT-H computer model.

Through the use of the UNSAT-H computer model, it is demonstrated that the percolation through the WB final cover is less than 4 mm/yr for any given year for the 30 year modeling period. As stated in the TCEQ guidance document, alternative cover designs that limit infiltration to 4 mm/yr or less will be considered to have achieved an equivalent reduction in infiltration as standard Subtitle D final cover designs that employ a geomembrane. The UNSAT-H model input and output files for the final cover design are included in Appendix C and Appendix D, respectively.

Additionally, Title 30 TAC §330.457(d)(2) requires an alternative final cover that provides equivalent protection from wind and water erosion. The WB cover meets these requirements as the final cover drainage structures are identical to the final cover erosion control structures used for the final cover system options.

3 UNSAT-H FINAL COVER MODEL

UNSAT-H Version 3.01 was selected to model the WB final cover. UNSAT-H is a one-dimensional physically based model and is the most commonly used model for alternative final covers. UNSAT-H incorporates evapotranspiration (ET) in the analysis, which is the combination of direct evaporation from the soil and transpiration through vegetation. The UNSAT-H parameter groups that include climate, vegetation, and soils are discussed in the following subsections. Parameters used in UNSAT-H for WB cover are discussed below, and the input files are provided and listed in Appendix C.

3.1 General

The WB final cover is a 3-foot-thick monolithic soil layer. The design is based on site specific data and available published data for typical soils and vegetation encountered at the facility. The UNSAT-H modeling approach for the WB final cover has been developed consistent with the TCEQ guidance document titled, "Guidance for Requesting a Water Balance Alternative Final Cover for a Municipal Solid Waste Landfill" dated January 2012. This guidance document states that WB final cover designs that limit infiltration to 4 mm/yr or less will be considered to have achieved an equivalent reduction in infiltration as standard Subtitle D final cover systems. The following sections discuss climate, vegetation, and soil input parameters.

3.2 Climate

The facility is located in the western portion of El Paso County. The climate for El Paso County is typical of an arid region, with lower rainfall rates and higher evaporation rates. Actual daily rainfall data was obtained from the National Oceanic and Atmospheric Administration (NOAA) El Paso International Airport Weather Station. Actual precipitation data between 1981 and 2010 is used for the model simulation. The model simulation was performed for the 30-year period consisting of 1981 through 2010 due to higher annual average precipitation for this period (9.6 inches), compared to the most recent 30-year period consisting of 1984 through 2013 which has lower annual average precipitation (9.2 inches). Daily climatological data was used to estimate potential evapotranspiration. The daily climatological data was also obtained from the NOAA El Paso International Airport Weather Station. The El Paso International Airport is located approximately 4.4 miles southeast of the facility.

A detailed weather data summary as well as the actual climatological data input files are included in Appendix B. The annual average rainfall used for the modeling is 9.6 inches (24.5 cm/yr for the modeling period of 30 years as shown on page D-4 in Appendix D)

3.3 Soil Input Parameters

The major soil input parameters (which include saturated hydraulic conductivity and soil moisture retention curves) were obtained from site specific soil information from laboratory testing performed on soils from on-site borrow sources and are summarized in Table 3-1. The soil parameters are characteristic of the on-site silty sand (SM) and clayey sand (SC) soils. Supporting information for the soil input parameters and laboratory test information is included in Appendix A.

**Table 3-1
Soil Property Summary**

Soil Property	WB Final Cover (3 Feet)
Residual Water Content, θ_r (% Volume)	4
Saturated Water Content, θ_s (% Volume)	39
α Coefficient of Van Genuchten Function (1/cm)	0.010
n Coefficient of Van Genuchten Function	1.27
Saturated Hydraulic Conductivity (cm/s)	2.3×10^{-4}

In addition to the major soil input parameters, including saturated hydraulic conductivity and soil moisture retention curves, suction head is another key soil parameter. An initial matric suction of 15,000 cm has been used. This suction head represents a low water content, as suggested by Craig H. Benson, Ph.D., P.E., in the document titled “Water Balance Covers for Waste Containment.” The values of initial suction head for each year were adjusted by the program (program uses the soil suction head estimated for the ending day of the year as the initial suction head for the next year automatically) for subsequent years based on result from previous years when the program is run for multiple years.

3.4 Vegetation

The key parameters for vegetation establishment are the percent ground cover and root penetration. The vegetation parameters used in the UNSAT-H model demonstration for this WB Cover are consistent with the vegetation parameters used in the UNSAT-H model demonstration for the approved WB cover or ET cover design.

A percent ground cover of 10 percent was used for both designs. Vegetation establishment will be in accordance with the requirements listed in Appendix E (Section 3 – Vegetation Establishment). Vegetation specifications have been developed to achieve vegetation establishment and are included in Appendix E.

4 EQUIVALENCY DEMONSTRATION SUMMARY

A summary of the equivalency demonstration utilizing the results from UNSAT-H program modeling is provided in Appendix D – UNSAT-H Output. As shown on page D-4 in Appendix D, the WB final cover system provides less than 4 mm per year of percolation at the bottom of final cover soil profile, as required by the TCEQ guidance document.

5 WB FINAL COVER MATERIAL REQUIREMENTS

The material requirements and specifications for the 36-inch thick monolithic WB final cover system are incorporated into the detailed material specifications and quality control procedures included in Appendix E – WB Final Cover System Quality Control Plan. A description of the material requirements and the required CQA tests that will be completed to confirm that the design requirement is met are included in Appendix E.

In general, the monolithic soil layer will meet the soil characteristics included in Appendix A – Soils Data. Construction quality assurance and quality control procedures for each of these layers, including surveying requirements, are also addressed in Appendix E.

APPENDIX A

SOILS DATA



Includes pages A-1 through A-15

SOILS DATA

Introduction

As part of the WB AFC final cover equivalency demonstration, testing of onsite soils was performed to determine suitability of onsite borrow soils for construction of WB final cover. Soil testing results were used to develop the soil input parameters for the UNSAT-H model simulation.

Sampling

ZIA Engineering and Environmental Consultants performed sampling of on-site soils for the laboratory testing performed in March 2013. Also, Malcolm Pirnie (an ARCADIS company) performed sampling of on-site soils for the laboratory testing performed in December 2007 and March 2009. Composite soil samples were collected from on-site borrow sources, representative of soils that have been excavated and will be excavated at the site.

Testing

For the samples collected by ZIA Engineering and Environmental Consultants, laboratory testing on the composite soil samples was performed by TRI/Environmental Inc. in Austin in March 2013. Soil testing included a standard Proctor (ASTM D 698); saturated hydraulic conductivity (ASTM D 5084); and soil moisture characteristic curve (ASTM D 6836). The composite samples were also used for the standard Proctor compaction test to determine the saturated hydraulic conductivity of the site soils. The soil samples were compacted to 85 percent of the maximum dry density before the permeability and soil moisture characteristic curve tests were performed.

For the samples collected by Malcolm Pirnie, laboratory testing on the composite soil samples was performed by AMEC Earth Environmental, Inc. in El Paso in December 2008 and by TRI/Environmental Inc. in Austin in March 2009. Soil testing included sieve analyses (ASTM D 422 and ASTM C 117 and C 136) and soil classification testing (ASTM D 2487 and D 4318).

Results

The results of the December 2008 and March 2009 laboratory testing presented on pages A-5 through A-15 indicate that the on-site borrow sources primarily consist of silty sand (SM) and clayey sand (SC) soils. The objective of the March 2013 laboratory testing was to develop a soil moisture retention curve and hydraulic conductivity characteristics for

the site borrow area soils. The results of the March 2013 laboratory testing are summarized below.

Table 1
WB Cover Testing Results for Borrow Source Soils (March 2013 testing)

Item	Result from Composite Sample #1	Result from Composite Sample #2
Saturated Moisture Content (θ_s)	41	39
Residual Moisture Content (θ_r)	5	4
α (1/cm)	0.014	0.010
n	1.33	1.27
Saturated Hydraulic Conductivity, cm/s	1.2×10^{-4}	2.3×10^{-4}

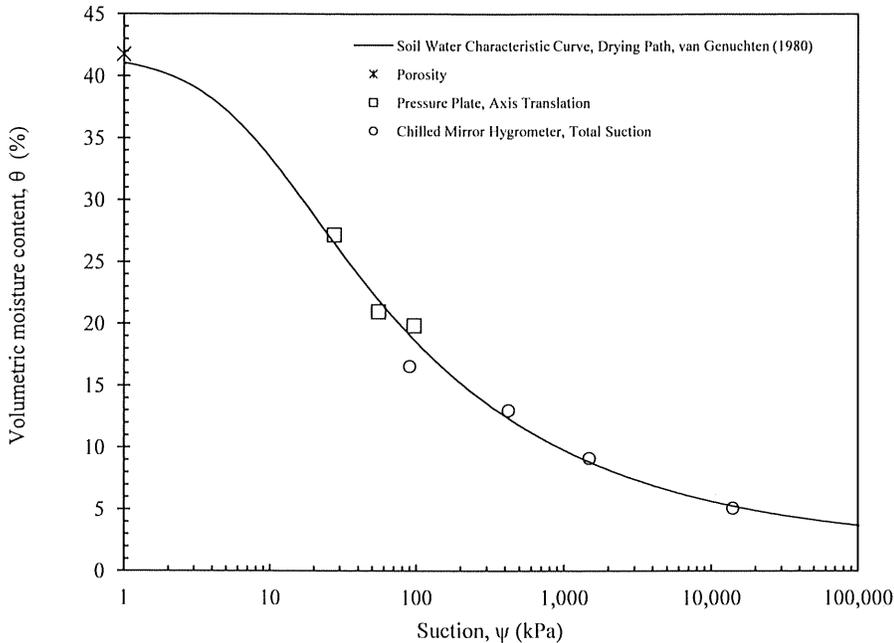
The saturated hydraulic conductivity and soil moisture characteristic curve test results provided by TRI/Environmental, Inc. for the two composite samples are presented on pages A-3 and A-4. The composite soil sample was tested to identify general characteristics of the soils available at the site for WB cover construction. The soil was compacted to 85 percent of the maximum dry density for testing for saturated hydraulic conductivity and soil moisture characteristic curve parameters. Although the compaction specification in Appendix E allows up to 90 percent of maximum dry density, the laboratory testing was performed for 85 percent of the maximum dry density to allow a conservative estimate for the saturated hydraulic conductivity of the recompacted soils available from onsite borrow sources.



Soil Water Characteristic Curve and Predicted Hydraulic Conductivity Function

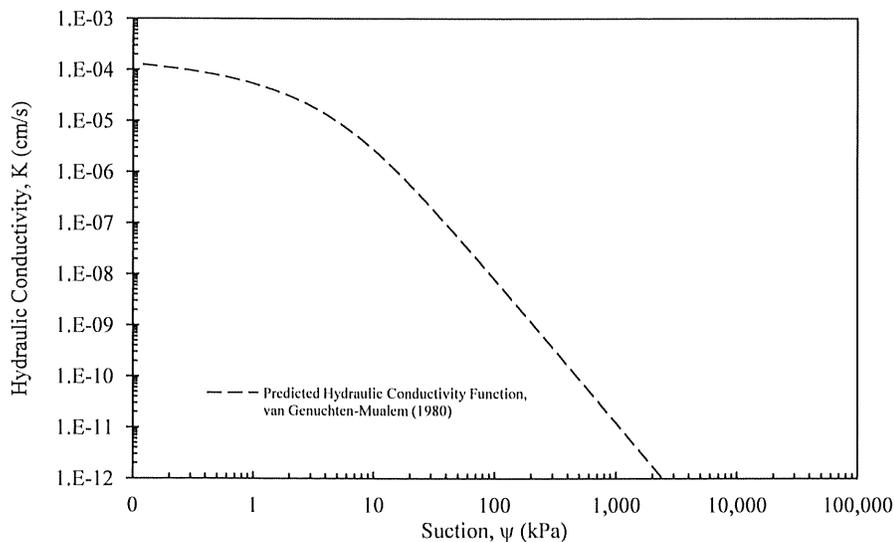
Client: ZIA Engineering & Environmental Consultants
Project: FFBC 13001 - Fort Bliss Landfill
Sample: WED-CS-8-3

TRI Log#: E2373-30-05
Test Method: ASTM D 6836, Methods B & D
Test Date: 03/14/13



Initial Sample Conditions	
Avg. Sample Height (cm)	3.84
Avg. Sample Diameter (cm)	7.13
Initial Water Content (%)	13.8
Dry Density (g/cm^3)	1.54
G_s (Assumed)	2.65
Degree of Saturation, $S_{r, \text{initial}}$ (%)	51.0
Void Ratio, e	0.72
Porosity, n	0.42
Volumetric Water Content, θ (%)	0.21
Saturated Hydraulic Conductivity (cm/s)	1.2E-04

van Genuchten Model Parameters	
θ_r	0.020
α ($\text{cm H}_2\text{O}^{-1}$)	0.014
n	1.33



Note 1: The sample was remolded to a target dry density of 85 percent of the maximum standard Proctor density at optimum water content. Specimens were prepared via kneading compaction utilizing a Harvard compaction tamper.

Note 2: The value of saturated hydraulic conductivity utilized in the prediction of the hydraulic conductivity function was determined by ASTM D 5084, Method F.

Jeffrey A. Kuhn, Ph.D., P.E., 4/1/13

Analysis & Quality Review/Date

Tested by: Olga Vasquez

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.

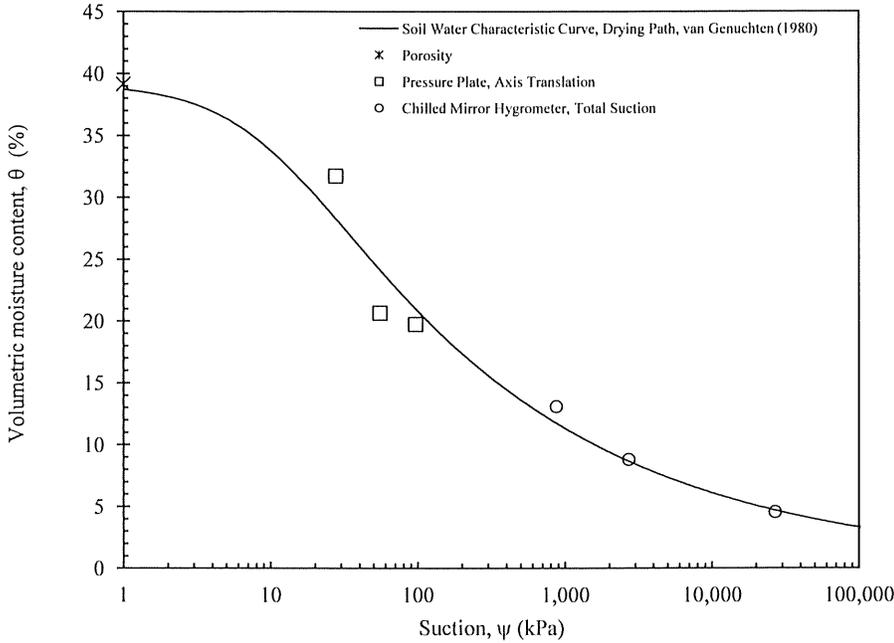
TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.



Soil Water Characteristic Curve and Predicted Hydraulic Conductivity Function

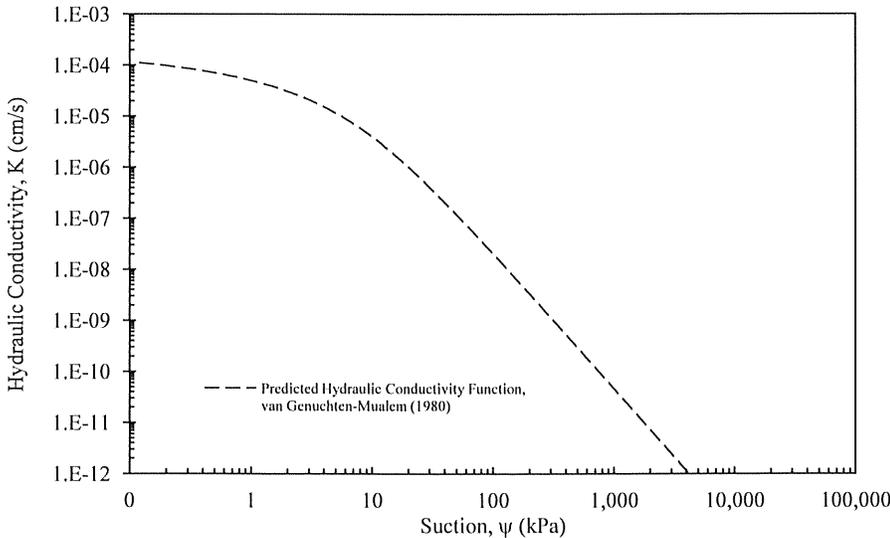
Client: ZIA Engineering & Environmental Consultants
Project: FFBC 13001 - Fort Bliss Landfill
Sample: BCT Stockpile

TRI Log#: E2373-30-05
Test Method: ASTM D 6836, Methods B & D
Test Date: 03/14/13



Initial Sample Conditions	
Avg. Sample Height (cm)	3.79
Avg. Sample Diameter (cm)	7.13
Initial Water Content (%)	12.3
Dry Density (g/cm^3)	1.61
G_s (Assumed)	2.65
Degree of Saturation, $S_{r, \text{initial}}$ (%)	50.6
Void Ratio, e	0.64
Porosity, n	0.39
Volumetric Water Content, θ (%)	0.20
Saturated Hydraulic Conductivity (cm/s)	2.3E-04

van Genuchten Model Parameters	
θ_r (cm^3/cm^3)	0.001
α ($\text{cm H}_2\text{O}^{-1}$)	0.010
n	1.27



Note 1: The sample was remolded to a target dry density of 85 percent of the maximum standard Proctor density at optimum water content. Specimens were prepared via kneading compaction utilizing a Harvard compaction tamper.

Note 2: The value of saturated hydraulic conductivity utilized in the prediction of the hydraulic conductivity function was determined by ASTM D 5084, Method F.

Jeffrey A. Kuhn, Ph.D., P.E., 4/1/13

Analysis & Quality Review/Date

Tested by: Olga Vasquez

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material.

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Client: Malcom Pirnie
12400 Coit Road
Dallas, TX 75251-

Report Date: December 23, 2008

Project #: 8719-000087
Work Order #: 1
Lab #: TT-1

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Sampled By: Client
Date Sampled: 12/11/2008
Visual Description of Material: Poorly Graded Sand w/ Silt
Sample Source: TT-1

Project Manager: David Varela SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1In.	100%
3/4In.	95%
1/2In.	92%
3/8In.	91%
#4	87%
#10	82%
#40	58%
#100	22%
#200	12%

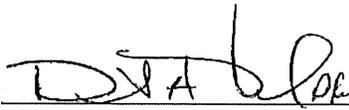
Plasticity Index (ASTM D4318-05)

Preparation Method: Dry
Liquid Limit Method: A

Liquid Limit: NV
Plastic Limit: NV
Plasticity Index: NP

PI Sample Was Air Dried.

Soil Classification (ASTM D2487-06) SP-SM

Reviewed By: 
MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Colt Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087
Work Order #: 1
Lab #: TT-2
Sampled By: Client
Date Sampled: 12/11/2008
Visual Description of Silty Sand
Material:
Sample Source: TT-2

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1/2in.	100%
3/8in.	99%
#4	97%
#10	94%
#40	76%
#100	38%
#200	15%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: NV

Liquid Limit Method: A

Plastic Limit: NV

Soil Classification (ASTM D2487-06) SM

Plasticity Index: NP

PI Sample Was Air Dried.

Reviewed By: DTA

MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Coit Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087

Work Order #: 1

Lab #: TT-21A

Sampled By: Client

Date Sampled: 12/11/2008

Visual Description of Material: Clayey Sand

Sample Source: TT-21A

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1in.	100%
3/4in.	99%
1/2in.	99%
3/8in.	99%
#4	97%
#10	95%
#40	81%
#100	48%
#200	26%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 32

Liquid Limit Method: A

Plastic Limit: 16

Soil Classification (ASTM D2487-06) SC

Plasticity Index: 16

PI Sample Was Air Dried.

Reviewed By: T. Varela
MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
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www.amec.com



Client: Malcom Pirnie
12400 Coit Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087

Work Order #: 1

Lab #: TT-28

Sampled By: Client

Date Sampled: 12/11/2008

Visual Description of Silty Sand
Material:

Sample Source: TT-28

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
3/4in.	100%
1/2in.	99%
3/8in.	98%
#4	96%
#10	93%
#40	76%
#100	41%
#200	18%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 22

Liquid Limit Method: A

Plastic Limit: 20

Soil Classification (ASTM D2487-06) SM

Plasticity Index: 2

PI Sample Was Air Dried.

Reviewed By: 

MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Colt Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087
Work Order #: 1

Lab #: TT-3
Sampled By: Client
Date Sampled: 12/11/2008

Visual Description of Silty Sand w/ Gravel
Material:
Sample Source: TT-3

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1 1/4in.	100%
1in.	95%
3/4in.	93%
1/2in.	89%
3/8in.	88%
#4	85%
#10	80%
#40	62%
#100	33%
#200	16%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 20

Liquid Limit Method: A

Plastic Limit: 15

PI Sample Was Air Dried.

Soil Classification (ASTM D2487-06) SC-SM

Plasticity Index: 5

Reviewed By: [Signature]
MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Coit Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087
Work Order #: 1
Lab #: TT-16
Sampled By: Client
Date Sampled: 12/11/2008
Visual Description of Clayey Sand
Material:
Sample Source: TT-16

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1/2in.	100%
3/8in.	99%
#4	97%
#10	94%
#40	80%
#100	43%
#200	24%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 25

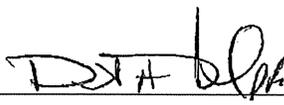
Liquid Limit Method: A

Plastic Limit: 14

Soil Classification (ASTM D2487-06) SC

Plasticity Index: 11

PI Sample Was Air Dried.

Reviewed By: 

MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
 12400 Coit Road
 Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
 Ft. Bliss, TX

Project #: 8719-000087

Work Order #: 1

Lab #: TT-6

Sampled By: Client

Date Sampled: 12/11/2008

Visual Description of Material: Silty Clayey Sand

Sample Source: TT-6

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

<u>Sieve Size</u>	<u>Passing</u>
1 1/4in.	100%
1in.	97%
3/4in.	96%
1/2in.	94%
3/8in.	90%
#4	85%
#10	81%
#40	63%
#100	34%
#200	15%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 23

Liquid Limit Method: A

Plastic Limit: 17

PI Sample Was Air Dried.

Soil Classification (ASTM D2487-06) SC-SM

Plasticity Index: 6

Reviewed By: DATA below
 MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
 Email:

AMEC Earth Environmental, Inc.
 125 Montoya Rd
 El Paso, TX 79932
 Tel 9155852472
 Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Coit Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087
Work Order #: 1
Lab #: TT-8
Sampled By: Client
Date Sampled: 12/11/2008
Visual Description of Material: Clayey Sand
Sample Source: TT-8

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

<u>Sieve Size</u>	<u>Passing</u>
1/2in.	100%
3/8in.	98%
#4	96%
#10	93%
#40	75%
#100	38%
#200	20%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 27

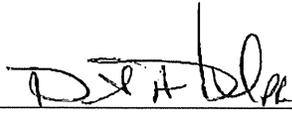
Liquid Limit Method: A

Plastic Limit: 18

Soil Classification (ASTM D2487-06) SC

Plasticity Index: 9

PI Sample Was Air Dried.

Reviewed By: 
MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Coit Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087
Work Order #: 1
Lab #: TT-31
Sampled By: Client
Date Sampled: 12/11/2008
Visual Description of Material: Silty Clayey Sand
Sample Source: TT-31

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

<u>Sieve Size</u>	<u>Passing</u>
3/4in.	100%
1/2in.	98%
3/8in.	97%
#4	93%
#10	89%
#40	66%
#100	30%
#200	17%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 23

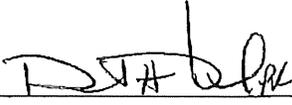
Liquid Limit Method: A

Plastic Limit: 16

Soil Classification (ASTM D2487-06) SC-SM

Plasticity Index: 7

PI Sample Was Air Dried.

Reviewed By: 

MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

www.amec.com



Client: Malcom Pirnie
12400 Colt Road
Dallas, TX 75251-

Report Date: December 23, 2008

Attn: Garrett Ferguson
Project Name: Geotech Laboratory Testing
Ft. Bliss, TX

Project #: 8719-000087
Work Order #: 1
Lab #: TT-21B
Sampled By: Client
Date Sampled: 12/11/2008
Visual Description of Material: Clayey Sand
Sample Source: TT-21B

Project Manager: David Varela

SOILS / AGGREGATES

Sieve Analysis (ASTM C117-04/C136-06)

200 Wash Procedure: A

Sieve Size	Passing
1in.	100%
3/4in.	98%
1/2in.	96%
3/8in.	95%
#4	94%
#10	92%
#40	74%
#100	40%
#200	21%

Plasticity Index (ASTM D4318-05)

Preparation Method: Dry

Liquid Limit: 28

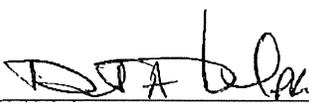
Liquid Limit Method: A

Plastic Limit: 17

Soil Classification (ASTM D2487-06) SC

Plasticity Index: 11

PI Sample Was Air Dried.

Reviewed By: 

MG

Senior Materials Engineer

Distribution: Client: File: Supplier: Other: Addressee (2)
Email:

AMEC Earth Environmental, Inc.
125 Montoya Rd
El Paso, TX 79932
Tel 9155852472
Fax 9155852626

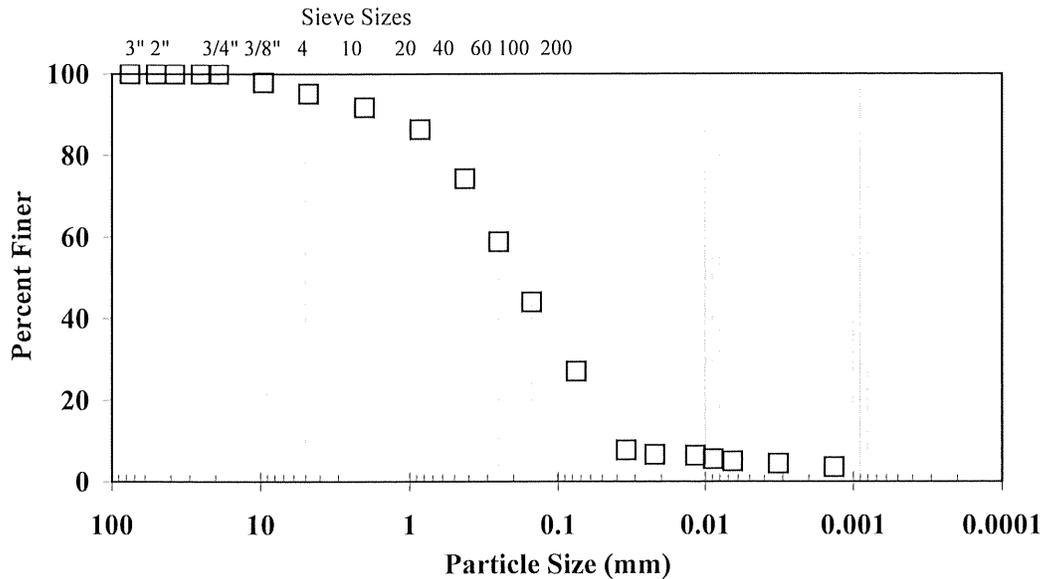
www.amec.com



Particle Size Analysis for Soils

Client: Malcom Pirnie Inc.
Project: Ft. Bliss
Sample: Composite

TRI Log#: E2325-09-04
Test Method: ASTM D 422
Test Date: 03/14/09



Sieve Analysis	
Sieve Size	Percentage Passing (%)
3-in.	100.0
2-in.	100.0
1.5-in.	100.0
1 in.	100.0
3/4 in.	100.0
3/8 in.	97.9
No. 4 (4.75 mm)	95.1
No. 10 (2.00 mm)	91.7
No. 20 (850 mm)	86.4
No. 40 (425 mm)	74.3
No. 60 (250 mm)	58.8
No. 100 (150 mm)	44.0
No. 200 (75 mm)	27.0
Hydrometer Analysis	
Particale Size	Percentage Passing (%)
0.074 mm	25.0
0.005 mm	4.5
0.001 mm	2.0

Notes: Soil classifies as a silty sand (SM) in accordance with ASTM D 2487.

The as received moisture content was 22.57 % as determined by ASTM D 2116.

Plastic Index (ASTM D 4318) Results	
Liquid Limit	25
Plastic Limit	NP
Plastic Index	NP
Notes: Specimen was air dried, 3 point Liquid Limit procedure was used.	

John M. Allen, P.E., 03/16/2009

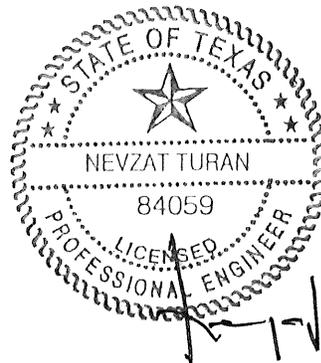
Quality Review/Date

Tested by: Tamika Walker

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without prior approval of TRI.

APPENDIX B

CLIMATOLOGICAL DATA SUMMARY



7-24-14

Includes pages B-1 through B-212

1 SUMMARY

This appendix (Appendix B) includes the climatological data used in the Equivalency Design Demonstration. The climatological data included in this appendix was obtained from the National Oceanic and Atmospheric Administration (NOAA) El Paso International Airport Weather Station due to its close proximity to the facility (approximately 4.4 miles southeast of the facility). Data was used in the modeling and was obtained from the National Climatic Data Center (NCDC) (<http://www.ncdc.noaa.gov/oa/ncdc.html>).

The UNSAT-H demonstration was performed for a 30-year period from 1981 to 2010. The daily weather data (which includes the rainfall data and climate data used to estimate potential evapotranspiration) for the 30-year period are listed on pages B-3 through B-212. The data shown is in the format which the UNSAT-H program uses. For example, on page B-3, the first number for each line represents the day of the year. The day of the year is then followed by (separated by commas in the data file) the following data in sequential order that apply for each day: maximum air temperature (degrees F), minimum air temperature (degrees F), dew point temperature (degrees F), solar radiation (langleys), average wind speed (miles per hour), average cloud cover, and precipitation (inches). The rest of the days are entered in the same manner.

The files shown on pages B-3 through B-212 are the actual input files used in the UNSAT-H model with the header and page number added.

**EL PASO INTERNATIONAL
AIRPORT CLIMATE DATA**

(1981 THROUGH 2010)

Climate Data (1981)

1, 68, 34, 26, 326.7, 7.9, 0.1, 0.00,
2, 65, 33, 25, 338.9, 6.3, 0.2, 0.00,
3, 69, 32, 25, 359.7, 7.1, 0.1, 0.00,
4, 65, 31, 25, 196.4, 6.5, 0.7, 0.00,
5, 68, 43, 26, 279.8, 7.1, 0.9, 0.00,
6, 64, 40, 27, 271.0, 7.7, 0.8, 0.02,
7, 47, 41, 24, 343.4, 6.0, 0.9, 0.15,
8, 54, 41, 23, 306.8, 6.8, 0.7, 0.07,
9, 58, 33, 22, 365.6, 6.7, 0.4, 0.00,
10, 54, 35, 22, 256.6, 6.6, 0.8, 0.00,
11, 52, 40, 23, 263.8, 7.1, 1, 0.01,
12, 47, 38, 22, 281.7, 8.6, 1, 0.20,
13, 53, 40, 21, 128.6, 6.6, 1, 0.11,
14, 56, 37, 21, 356.4, 5.4, 0.6, 0.00,
15, 60, 28, 20, 341.5, 6.1, 0.4, 0.00,
16, 53, 34, 21, 252.8, 7.2, 1, 0.08,
17, 39, 27, 23, 174.3, 7.4, 1, 0.35,
18, 35, 26, 21, 213.1, 6.8, 1, 0.11,
19, 38, 30, 21, 265.8, 6.1, 0.7, 0.00,
20, 36, 28, 22, 390.8, 6.5, 1, 0.00,
21, 54, 29, 23, 368.3, 6.9, 0.3, 0.00,
22, 56, 24, 23, 274.6, 6.9, 0, 0.00,
23, 63, 25, 23, 332.9, 6.9, 0.3, 0.00,
24, 68, 36, 24, 246.7, 6.1, 0.6, 0.00,
25, 62, 39, 23, 269.0, 6.6, 0.9, 0.00,
26, 61, 39, 24, 391.6, 6.9, 0.5, 0.00,
27, 63, 34, 24, 409.5, 6.8, 0.2, 0.00,
28, 65, 33, 23, 412.4, 7.5, 0.5, 0.00,
29, 63, 33, 23, 415.3, 7.4, 0.3, 0.00,
30, 66, 28, 24, 266.4, 7.1, 0.6, 0.00,
31, 52, 38, 23, 209.3, 8.1, 0.3, 0.00,
32, 52, 27, 25, 318.8, 7.2, 0, 0.00,
33, 53, 22, 25, 363.9, 7.4, 0.5, 0.00,
34, 57, 27, 24, 342.4, 6.8, 0.8, 0.00,
35, 63, 24, 23, 273.8, 7.1, 0.2, 0.00,
36, 60, 28, 25, 336.6, 8.7, 0.2, 0.00,
37, 61, 22, 21, 427.9, 6.7, 0.6, 0.00,
38, 66, 35, 21, 444.5, 6.7, 0.2, 0.00,
39, 67, 49, 25, 369.0, 6.7, 0.5, 0.00,
40, 57, 46, 24, 262.9, 7.8, 0.9, 0.19,
41, 63, 36, 24, 251.1, 7.1, 0.4, 0.00,
42, 56, 24, 22, 458.7, 8.1, 0.4, 0.00,
43, 65, 30, 22, 462.3, 6.8, 0.5, 0.00,
44, 64, 34, 25, 383.3, 8.7, 0.2, 0.00,
45, 67, 26, 26, 469.7, 8.4, 0.2, 0.00,
46, 68, 29, 25, 448.2, 8.2, 0.6, 0.00,
47, 75, 30, 25, 298.6, 7.1, 0.1, 0.00,
48, 76, 36, 25, 359.6, 8.0, 0.3, 0.00,
49, 76, 42, 27, 246.2, 8.2, 0.1, 0.00,
50, 78, 34, 27, 321.7, 9.2, 0, 0.00,
51, 80, 39, 27, 270.4, 7.7, 0.7, 0.00,
52, 66, 34, 25, 496.6, 8.3, 0.3, 0.00,
53, 66, 23, 23, 280.6, 8.0, 0, 0.00,
54, 71, 23, 23, 192.6, 7.7, 0, 0.00,
55, 77, 29, 23, 101.7, 8.6, 0, 0.00,

56,75,40,23,281.6,8.6,0.4,0.00,
57,77,56,24,357.3,7.9,0.9,0.00,
58,64,55,25,444.0,7.5,1,0.12,
59,67,50,24,341.4,8.7,0.8,0.05,
60,73,44,24,410.7,8.0,0.2,0.00,
61,70,45,23,438.7,7.9,0.9,0.00,
62,67,47,23,536.5,8.0,0.8,0.12,
63,64,45,22,340.6,9.2,0.4,0.02,
64,66,37,22,544.7,8.8,0.6,0.00,
65,61,36,23,272.8,8.0,0.6,0.14,
66,64,41,22,360.5,8.0,0.3,0.00,
67,66,37,21,556.9,8.7,0.3,0.00,
68,63,38,22,531.3,6.6,0.2,0.00,
69,59,39,23,520.2,7.7,0.9,0.00,
70,68,47,23,448.7,9.1,0.7,0.01,
71,68,47,24,364.7,9.8,0.7,0.08,
72,70,43,22,202.4,7.9,0.1,0.00,
73,73,41,24,581.0,9.1,0.2,0.00,
74,67,40,23,511.3,8.2,0.7,0.00,
75,75,43,25,429.0,8.1,0.8,0.00,
76,80,46,26,134.9,8.8,0.3,0.00,
77,75,44,25,356.2,9.3,0,0.00,
78,79,38,24,600.8,8.0,0.7,0.00,
79,77,48,24,383.6,6.8,0.8,0.00,
80,69,50,24,250.9,7.5,0.4,0.00,
81,73,40,24,594.4,8.1,0,0.00,
82,78,40,24,616.2,9.1,0.2,0.00,
83,82,47,24,620.0,8.7,0.2,0.00,
84,77,52,25,490.4,8.3,0.3,0.00,
85,85,49,26,535.0,9.4,0.3,0.00,
86,82,48,27,330.3,10.7,0.1,0.00,
87,56,42,25,528.8,9.8,0.4,0.02,
88,65,45,25,638.5,10.5,0.2,0.00,
89,73,47,24,567.9,8.8,0,0.00,
90,71,46,24,501.2,8.2,0,0.00,
91,80,35,25,403.7,9.1,0,0.00,
92,82,41,25,443.4,9.3,0.6,0.00,
93,62,50,23,518.7,9.3,0.1,0.00,
94,67,45,25,616.0,8.0,0,0.00,
95,72,40,25,549.7,9.2,0.3,0.00,
96,82,45,25,353.7,10.0,0.5,0.00,
97,79,51,25,451.8,8.9,0.5,0.00,
98,80,59,26,291.3,9.2,0,0.00,
99,84,42,25,459.9,9.8,0.1,0.00,
100,86,54,24,561.0,11.8,0.2,0.00,
101,88,56,23,678.5,9.4,0.5,0.00,
102,86,53,23,539.9,8.4,0.7,0.00,
103,89,64,25,656.1,9.0,0.7,0.00,
104,66,47,25,436.6,7.5,1,0.17,
105,66,48,23,453.7,9.1,1,0.00,
106,78,53,23,578.7,8.2,0.9,0.00,
107,67,58,25,677.2,9.8,1,0.07,
108,79,56,26,439.9,9.4,0.5,0.00,
109,80,55,25,583.4,8.6,0,0.00,
110,82,45,23,705.2,9.9,0.1,0.00,
111,76,55,24,703.1,9.3,0.7,0.00,
112,69,45,26,609.7,7.8,0.8,0.00,

113,63,51,27,545.1,9.4,0.8,0.41,
114,72,43,26,718.6,9.7,0.1,0.00,
115,82,50,27,543.5,11.1,0,0.00,
116,87,55,29,723.5,9.3,0.3,0.00,
117,87,55,28,725.8,8.0,0.5,0.00,
118,88,57,27,726.0,10.1,0.3,0.00,
119,91,60,29,730.4,9.6,0.3,0.00,
120,86,63,28,502.9,8.7,0.7,0.00,
121,84,58,29,375.0,8.7,0.6,0.71,
122,74,58,29,509.6,9.3,0.7,0.00,
123,84,56,28,544.6,8.8,0.1,0.00,
124,84,60,29,657.9,9.7,0,0.00,
125,82,55,29,513.0,9.8,0.2,0.00,
126,84,57,28,743.4,7.8,0.1,0.00,
127,85,59,27,746.7,9.9,0.1,0.00,
128,83,60,29,655.1,10.0,0,0.00,
129,75,54,29,750.2,8.9,0,0.00,
130,78,47,30,751.9,8.0,0.3,0.00,
131,89,50,31,598.6,6.3,0.1,0.00,
132,87,70,31,755.2,8.2,0,0.00,
133,88,63,32,756.8,9.8,0.1,0.00,
134,87,55,34,485.9,8.1,0.2,0.01,
135,87,57,35,717.8,9.9,0.2,0.00,
136,84,62,36,693.8,8.4,0.1,0.00,
137,78,63,36,644.8,9.0,0.1,0.00,
138,89,54,39,589.8,9.0,0,0.00,
139,85,57,38,765.2,8.6,0.2,0.00,
140,95,59,36,627.4,8.6,0.7,0.00,
141,89,62,36,721.3,8.4,0.4,0.00,
142,86,61,35,768.8,9.9,0.5,0.00,
143,87,66,36,769.9,8.1,0.8,0.00,
144,90,59,35,709.6,8.2,0.4,0.00,
145,94,68,34,771.9,9.2,0.2,0.00,
146,94,72,34,579.5,9.4,0.5,0.00,
147,98,74,36,690.3,8.6,0.6,0.00,
148,96,69,37,595.1,6.8,0.6,0.00,
149,91,63,35,680.9,7.5,0.4,0.00,
150,93,61,35,776.3,7.6,0.4,0.00,
151,96,55,37,460.9,7.3,0.2,0.00,
152,94,60,36,777.8,6.9,0.4,0.00,
153,96,62,36,760.3,9.1,0.1,0.00,
154,98,63,37,704.9,9.7,0.6,0.00,
155,94,63,37,623.3,8.0,0.6,0.43,
156,95,62,37,562.5,8.0,0.8,0.00,
157,102,63,38,631.7,8.5,0.2,0.00,
158,108,65,40,454.8,9.9,0,0.00,
159,105,67,40,729.1,8.8,0,0.00,
160,104,71,39,636.4,6.8,0,0.00,
161,104,77,41,508.3,8.2,0,0.00,
162,105,66,41,518.5,8.2,0.1,0.00,
163,103,67,42,689.5,7.8,0.1,0.00,
164,101,79,41,783.0,8.8,0.3,0.00,
165,99,73,42,733.6,7.1,0,0.00,
166,91,68,42,783.2,7.0,0.1,0.00,
167,85,58,42,670.1,8.0,0.1,0.00,
168,88,54,43,725.4,7.6,0,0.00,
169,100,54,43,637.9,6.4,0,0.00,

170,103,65,43,653.3,7.3,0,0.00,
171,107,65,45,574.5,8.0,0,0.00,
172,108,69,45,783.2,7.7,0,0.00,
173,110,73,45,783.0,6.3,0.3,0.00,
174,100,73,45,738.6,7.2,0.9,0.00,
175,100,72,45,782.6,7.1,0.7,0.00,
176,96,70,47,782.3,7.2,0.7,0.00,
177,93,69,49,752.6,7.7,0.6,0.00,
178,92,70,49,781.7,7.3,0.5,0.00,
179,91,67,49,781.3,6.9,0.8,0.00,
180,88,70,50,459.7,6.3,0.9,0.18,
181,90,70,50,780.4,7.2,0.9,0.03,
182,88,69,50,779.9,6.7,0.7,0.00,
183,98,69,50,779.4,7.3,0.5,0.00,
184,100,70,50,653.5,7.5,0.3,0.00,
185,103,72,50,717.2,8.5,0.2,0.00,
186,98,73,50,314.9,7.2,0.1,0.00,
187,98,70,49,776.8,7.4,0.3,0.00,
188,101,70,50,597.2,7.3,0.7,0.00,
189,97,71,51,377.8,6.5,0.7,0.00,
190,83,69,53,684.1,7.6,0.9,0.01,
191,92,65,54,760.5,8.0,0.4,0.00,
192,94,71,52,772.7,6.9,0.4,0.00,
193,93,71,52,771.8,7.1,0.4,0.08,
194,98,64,52,770.8,7.1,0.3,0.00,
195,98,68,53,769.8,6.9,0.5,0.00,
196,98,71,54,663.4,6.7,0.5,0.00,
197,96,70,54,767.6,7.1,0.6,0.68,
198,92,70,55,765.0,7.8,0.7,0.00,
199,97,70,54,493.9,6.6,0.2,0.00,
200,101,72,55,636.3,7.4,0.5,0.00,
201,102,71,56,705.9,6.7,0.2,0.00,
202,102,71,56,553.5,7.2,0.1,0.00,
203,103,68,55,758.7,6.7,0,0.00,
204,103,70,54,662.9,7.0,0.2,0.00,
205,105,72,53,688.2,7.0,0.4,0.00,
206,102,72,53,755.7,6.9,0.5,0.00,
207,101,73,54,607.0,7.1,0.3,0.00,
208,98,73,55,276.5,7.5,0.5,0.27,
209,93,71,56,404.9,7.2,0.8,0.12,
210,90,71,55,749.3,6.9,0.8,0.54,
211,89,71,56,495.7,6.6,0.8,0.38,
212,92,71,56,745.9,7.0,0.6,0.00,
213,94,75,56,744.1,6.9,0.5,0.00,
214,98,76,57,720.5,6.9,0.7,0.00,
215,97,72,56,621.6,6.7,0.9,0.09,
216,95,71,56,551.6,6.5,0.7,0.00,
217,99,73,55,617.6,7.5,0.3,0.00,
218,98,76,55,513.5,5.9,0.6,0.32,
219,80,67,55,593.8,7.2,1,1.23,
220,80,66,55,607.3,6.0,0.7,0.04,
221,89,63,56,509.3,6.1,0.1,0.00,
222,90,69,56,481.4,6.5,0.7,1.54,
223,81,67,56,481.1,6.0,0.9,0.42,
224,87,66,56,518.5,6.3,0.5,0.02,
225,83,69,55,500.4,7.0,0.8,0.00,
226,90,67,55,506.2,6.9,0.7,0.09,

227, 90, 71, 55, 639.9, 6.4, 0.9, 0.07,
228, 93, 66, 55, 526.3, 6.7, 0.7, 0.54,
229, 87, 67, 56, 709.2, 6.4, 0.3, 0.26,
230, 87, 67, 56, 706.6, 5.8, 0.4, 0.64,
231, 88, 68, 57, 584.0, 6.8, 0.2, 0.00,
232, 89, 65, 56, 533.0, 6.4, 0, 0.00,
233, 89, 63, 55, 692.9, 6.6, 0, 0.00,
234, 92, 66, 55, 610.9, 6.8, 0.2, 0.00,
235, 97, 67, 55, 693.1, 6.8, 0.2, 0.00,
236, 93, 66, 55, 619.7, 6.4, 0.1, 0.00,
237, 93, 63, 54, 464.6, 6.1, 0, 0.00,
238, 94, 63, 56, 684.5, 6.4, 0.1, 0.00,
239, 92, 63, 56, 681.5, 6.5, 0.2, 0.00,
240, 92, 68, 55, 526.0, 6.6, 0.3, 0.00,
241, 94, 65, 54, 675.5, 7.0, 0, 0.00,
242, 98, 64, 54, 672.4, 7.2, 0, 0.00,
243, 99, 71, 54, 564.2, 6.7, 0.4, 0.00,
244, 86, 70, 53, 436.5, 6.3, 0.6, 0.00,
245, 95, 62, 52, 580.5, 6.2, 0.1, 0.00,
246, 97, 64, 52, 525.9, 6.3, 0.5, 0.00,
247, 93, 70, 53, 607.6, 6.4, 0.6, 0.00,
248, 80, 68, 52, 612.4, 6.1, 0.7, 0.00,
249, 87, 63, 52, 642.5, 6.6, 0.8, 0.00,
250, 80, 67, 52, 617.0, 6.7, 1, 0.07,
251, 68, 61, 52, 244.9, 7.1, 1, 0.32,
252, 71, 63, 52, 516.4, 6.2, 1, 0.05,
253, 87, 63, 52, 586.9, 7.2, 0.6, 0.00,
254, 87, 70, 53, 535.2, 6.8, 0.8, 0.00,
255, 91, 68, 53, 558.6, 6.7, 0.2, 0.00,
256, 94, 67, 53, 528.1, 7.0, 0.3, 0.00,
257, 92, 63, 53, 214.4, 7.2, 0.1, 0.00,
258, 89, 70, 51, 618.0, 7.1, 0.7, 0.00,
259, 88, 64, 51, 551.1, 5.9, 0.1, 0.00,
260, 83, 61, 50, 299.3, 6.2, 0.4, 0.00,
261, 83, 53, 49, 546.7, 6.0, 0, 0.00,
262, 86, 53, 48, 562.2, 5.6, 0.5, 0.00,
263, 93, 54, 48, 475.6, 7.5, 0, 0.00,
264, 95, 58, 49, 595.5, 6.7, 0.5, 0.00,
265, 86, 67, 49, 591.7, 6.8, 0.9, 0.08,
266, 86, 66, 49, 438.1, 6.7, 0.8, 0.00,
267, 91, 66, 47, 344.6, 7.3, 0.4, 0.00,
268, 93, 61, 46, 580.2, 6.5, 0.1, 0.00,
269, 94, 59, 44, 576.3, 5.7, 0, 0.00,
270, 96, 56, 42, 572.4, 5.9, 0.1, 0.00,
271, 95, 65, 42, 544.9, 5.9, 0.2, 0.00,
272, 94, 60, 42, 564.6, 6.6, 0.1, 0.00,
273, 95, 63, 42, 475.3, 5.5, 0.5, 0.00,
274, 82, 67, 43, 258.3, 5.8, 0.9, 0.00,
275, 87, 65, 42, 389.0, 6.9, 0.8, 0.01,
276, 87, 60, 43, 313.4, 7.2, 0.2, 0.00,
277, 87, 55, 42, 452.0, 7.4, 0.3, 0.00,
278, 83, 62, 43, 428.5, 7.3, 1, 0.03,
279, 73, 61, 42, 537.0, 6.9, 0.8, 0.01,
280, 78, 57, 43, 455.5, 7.2, 0.8, 0.00,
281, 85, 62, 42, 529.1, 6.1, 0.6, 0.00,
282, 84, 57, 42, 494.2, 6.6, 0, 0.00,
283, 84, 52, 43, 282.0, 5.8, 0.9, 0.03,

284,82,60,40,222.5,6.6,0.6,0.32,
285,81,55,38,367.1,6.7,0.3,0.00,
286,81,55,37,448.9,7.0,0.2,0.00,
287,80,57,38,388.6,6.3,0.2,0.00,
288,85,50,40,417.5,7.2,0,0.00,
289,80,53,39,312.0,7.3,0,0.00,
290,76,45,38,340.2,7.1,0.2,0.00,
291,66,42,38,316.1,6.4,0.7,0.00,
292,75,53,38,335.5,6.1,0.7,0.00,
293,80,46,38,482.6,6.2,0.6,0.00,
294,79,51,39,478.9,7.1,0.8,0.12,
295,65,45,37,475.2,5.6,0.6,0.01,
296,61,41,36,405.5,6.2,0.3,0.00,
297,71,34,36,285.6,5.7,0.3,0.00,
298,75,46,36,425.2,6.7,0.3,0.00,
299,76,34,35,165.4,6.7,0,0.00,
300,80,35,36,259.7,6.8,0.6,0.00,
301,82,41,37,357.3,6.7,0.5,0.00,
302,82,49,35,214.5,7.0,0.3,0.00,
303,76,45,34,380.1,6.1,0,0.00,
304,67,41,32,284.4,7.4,0,0.00,
305,67,32,32,389.5,6.8,0,0.00,
306,72,30,33,377.1,6.4,0,0.00,
307,76,30,34,346.2,6.7,0,0.00,
308,80,32,33,241.9,7.2,0,0.00,
309,81,36,31,419.3,6.5,0.3,0.00,
310,80,47,30,423.6,6.4,0.6,0.00,
311,76,41,32,420.5,6.8,0.2,0.00,
312,71,41,32,417.5,5.8,0.3,0.00,
313,66,36,31,298.6,7.2,0.1,0.00,
314,68,27,32,411.6,7.4,0,0.00,
315,71,30,32,363.5,6.4,0.1,0.00,
316,75,32,33,406.0,6.7,0.1,0.00,
317,80,35,32,403.2,7.1,0,0.00,
318,80,33,31,400.5,7.7,0.5,0.00,
319,82,39,28,381.4,7.3,0.1,0.00,
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322,81,45,28,390.4,6.8,0.4,0.00,
323,64,37,26,100.7,6.7,0.4,0.00,
324,66,26,26,358.0,6.6,0,0.00,
325,73,30,26,269.1,6.2,0.2,0.00,
326,75,31,25,381.3,7.1,0.5,0.00,
327,75,38,24,379.2,7.6,0.2,0.00,
328,77,32,25,302.6,5.9,0,0.00,
329,77,40,27,156.0,7.6,0.3,0.00,
330,64,38,25,217.4,9.6,0.4,0.00,
331,58,46,23,137.2,8.2,1,0.06,
332,51,46,22,344.8,7.3,1,0.17,
333,66,44,22,73.6,8.1,0.8,0.07,
334,56,40,23,200.7,6.7,0.2,0.00,
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336,60,26,25,290.9,6.9,0.1,0.00,
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344, 70, 30, 24, 354.7, 6.4, 0.3, 0.00,
345, 69, 34, 26, 354.0, 7.2, 0.8, 0.00,
346, 64, 45, 25, 353.3, 6.6, 1, 0.03,
347, 65, 49, 26, 326.9, 6.5, 0.4, 0.05,
348, 59, 32, 23, 263.9, 6.1, 0.3, 0.00,
349, 63, 26, 21, 252.8, 7.9, 0.4, 0.00,
350, 71, 38, 20, 351.5, 6.7, 0.7, 0.00,
351, 60, 30, 23, 280.4, 6.5, 0.2, 0.00,
352, 60, 20, 25, 277.9, 6.2, 0, 0.00,
353, 65, 22, 24, 350.9, 6.8, 0.7, 0.00,
354, 74, 53, 23, 350.9, 7.1, 0.2, 0.00,
355, 77, 57, 22, 351.0, 6.6, 0, 0.00,
356, 60, 35, 22, 320.2, 6.8, 0.1, 0.00,
357, 56, 22, 22, 243.5, 6.6, 0.1, 0.00,
358, 54, 17, 23, 351.7, 6.4, 0.1, 0.00,
359, 62, 18, 24, 352.1, 6.0, 0.5, 0.00,
360, 64, 40, 23, 352.6, 6.3, 0.7, 0.00,
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362, 65, 30, 25, 353.8, 5.9, 0.1, 0.00,
363, 66, 29, 25, 354.5, 5.8, 0.5, 0.00,
364, 68, 30, 25, 355.3, 6.2, 0.3, 0.00,
365, 62, 39, 25, 316.1, 6.5, 0.3, 0.00,

Climate Data (1982)

1, 68, 39, 26, 326.7, 7.9, 0.8, 0.00,
2, 60, 39, 25, 338.9, 6.3, 0.4, 0.00,
3, 43, 25, 25, 359.7, 7.1, 0.5, 0.02,
4, 47, 10, 25, 196.4, 6.5, 0.4, 0.00,
5, 61, 21, 26, 279.8, 7.1, 0.8, 0.00,
6, 65, 42, 27, 271.0, 7.7, 0.3, 0.00,
7, 52, 26, 24, 343.4, 6.0, 0.6, 0.00,
8, 49, 17, 23, 306.8, 6.8, 0.5, 0.00,
9, 55, 18, 22, 365.6, 6.7, 0.5, 0.00,
10, 52, 23, 22, 256.6, 6.6, 0.7, 0.00,
11, 33, 20, 23, 263.8, 7.1, 0.9, 0.05,
12, 56, 30, 22, 281.7, 8.6, 0.9, 0.12,
13, 43, 24, 21, 128.6, 6.6, 0.4, 0.14,
14, 50, 19, 21, 356.4, 5.4, 0.3, 0.00,
15, 58, 20, 20, 341.5, 6.1, 0, 0.00,
16, 58, 23, 21, 252.8, 7.2, 0.4, 0.00,
17, 62, 22, 23, 174.3, 7.4, 0.1, 0.00,
18, 67, 31, 21, 213.1, 6.8, 0.2, 0.00,
19, 59, 44, 21, 265.8, 6.1, 1, 0.00,
20, 62, 42, 22, 390.8, 6.5, 1, 0.01,
21, 66, 34, 23, 368.3, 6.9, 0.4, 0.00,
22, 51, 32, 23, 274.6, 6.9, 0.1, 0.00,
23, 51, 21, 23, 332.9, 6.9, 0.1, 0.00,
24, 63, 27, 24, 246.7, 6.1, 0, 0.00,
25, 67, 29, 23, 269.0, 6.6, 0, 0.00,
26, 66, 28, 24, 391.6, 6.9, 0, 0.00,
27, 69, 38, 24, 409.5, 6.8, 0, 0.00,
28, 68, 28, 23, 412.4, 7.5, 0.5, 0.00,
29, 57, 35, 23, 415.3, 7.4, 0.5, 0.00,
30, 53, 27, 24, 266.4, 7.1, 0.3, 0.00,
31, 56, 21, 23, 209.3, 8.1, 0.6, 0.00,
32, 54, 29, 25, 318.8, 7.2, 0.3, 0.00,
33, 47, 15, 25, 363.9, 7.4, 0, 0.00,
34, 55, 16, 24, 342.4, 6.8, 0, 0.00,
35, 61, 21, 23, 273.8, 7.1, 0.6, 0.00,
36, 56, 32, 25, 336.6, 8.7, 0.8, 0.00,
37, 47, 22, 21, 427.9, 6.7, 0.9, 0.00,
38, 54, 21, 21, 444.5, 6.7, 0.7, 0.00,
39, 57, 40, 25, 369.0, 6.7, 0.8, 0.01,
40, 57, 32, 24, 262.9, 7.8, 0.4, 0.00,
41, 63, 39, 24, 251.1, 7.1, 0.7, 0.00,
42, 70, 40, 22, 458.7, 8.1, 0.4, 0.00,
43, 63, 32, 22, 462.3, 6.8, 0.7, 0.00,
44, 64, 38, 25, 383.3, 8.7, 0.6, 0.00,
45, 69, 30, 26, 469.7, 8.4, 0.6, 0.00,
46, 70, 49, 25, 448.2, 8.2, 0.1, 0.00,
47, 75, 37, 25, 298.6, 7.1, 0.1, 0.00,
48, 70, 43, 25, 359.6, 8.0, 0.4, 0.00,
49, 71, 37, 27, 246.2, 8.2, 0.4, 0.02,
50, 68, 44, 27, 321.7, 9.2, 0.6, 0.00,
51, 73, 38, 27, 270.4, 7.7, 0.1, 0.00,
52, 76, 35, 25, 496.6, 8.3, 0, 0.00,
53, 76, 37, 23, 280.6, 8.0, 0.5, 0.00,
54, 81, 43, 23, 192.6, 7.7, 0.6, 0.00,

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59,69,37,24,341.4,8.7,0.3,0.00,
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63,70,45,22,340.6,9.2,0,0.00,
64,65,35,22,544.7,8.8,0.3,0.00,
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69,83,55,23,520.2,7.7,0.8,0.00,
70,81,60,23,448.7,9.1,0.9,0.00,
71,76,56,24,364.7,9.8,0.9,0.00,
72,76,51,22,202.4,7.9,0.5,0.00,
73,65,41,24,581.0,9.1,0.7,0.00,
74,67,45,23,511.3,8.2,0.5,0.00,
75,74,38,25,429.0,8.1,0.2,0.00,
76,77,37,26,134.9,8.8,0.7,0.00,
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80,72,35,24,250.9,7.5,0,0.00,
81,74,34,24,594.4,8.1,0.2,0.00,
82,76,38,24,616.2,9.1,0.5,0.00,
83,77,43,24,620.0,8.7,0.3,0.00,
84,70,36,25,490.4,8.3,0.7,0.00,
85,65,45,26,535.0,9.4,0.9,0.00,
86,73,48,27,330.3,10.7,0.3,0.00,
87,78,44,25,528.8,9.8,0.4,0.00,
88,72,43,25,638.5,10.5,0.3,0.00,
89,77,40,24,567.9,8.8,0.6,0.00,
90,80,39,24,501.2,8.2,0.6,0.00,
91,79,60,25,403.7,9.1,0.8,0.00,
92,72,51,25,443.4,9.3,0,0.00,
93,79,33,23,518.7,9.3,0.7,0.00,
94,80,51,25,616.0,8.0,0.2,0.00,
95,80,54,25,549.7,9.2,0.3,0.00,
96,85,54,25,353.7,10.0,0.8,0.00,
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99,78,55,25,459.9,9.8,0.8,0.00,
100,77,53,24,561.0,11.8,0.3,0.00,
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102,90,68,23,539.9,8.4,0.7,0.00,
103,86,58,25,656.1,9.0,0.8,0.00,
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114, 76, 40, 26, 718.6, 9.7, 0.1, 0.04,
115, 81, 55, 27, 543.5, 11.1, 0.1, 0.00,
116, 84, 51, 29, 723.5, 9.3, 0.7, 0.00,
117, 83, 52, 28, 725.8, 8.0, 0.7, 0.00,
118, 87, 52, 27, 726.0, 10.1, 0.4, 0.00,
119, 81, 57, 29, 730.4, 9.6, 0.9, 0.00,
120, 79, 55, 28, 502.9, 8.7, 0.7, 0.00,
121, 73, 49, 29, 375.0, 8.7, 0.8, 0.00,
122, 81, 54, 29, 509.6, 9.3, 0.8, 0.00,
123, 85, 51, 28, 544.6, 8.8, 0.3, 0.00,
124, 72, 54, 29, 657.9, 9.7, 0.9, 0.13,
125, 71, 50, 29, 513.0, 9.8, 0.3, 0.01,
126, 76, 46, 28, 743.4, 7.8, 0.2, 0.00,
127, 80, 44, 27, 746.7, 9.9, 0, 0.00,
128, 88, 46, 29, 655.1, 10.0, 0, 0.00,
129, 85, 51, 29, 750.2, 8.9, 0.1, 0.00,
130, 84, 63, 30, 751.9, 8.0, 0.4, 0.00,
131, 84, 50, 31, 598.6, 6.3, 0.2, 0.00,
132, 73, 58, 31, 755.2, 8.2, 0, 0.00,
133, 77, 53, 32, 756.8, 9.8, 0.1, 0.00,
134, 83, 49, 34, 485.9, 8.1, 0, 0.00,
135, 89, 47, 35, 717.8, 9.9, 0, 0.00,
136, 86, 57, 36, 693.8, 8.4, 0, 0.00,
137, 89, 50, 36, 644.8, 9.0, 0, 0.00,
138, 95, 53, 39, 589.8, 9.0, 0.3, 0.00,
139, 92, 51, 38, 765.2, 8.6, 0, 0.00,
140, 91, 54, 36, 627.4, 8.6, 0, 0.00,
141, 94, 53, 36, 721.3, 8.4, 0, 0.00,
142, 80, 58, 35, 768.8, 9.9, 0.5, 0.00,
143, 89, 53, 36, 769.9, 8.1, 0.1, 0.00,
144, 93, 53, 35, 709.6, 8.2, 0.2, 0.00,
145, 92, 61, 34, 771.9, 9.2, 0.3, 0.00,
146, 96, 55, 34, 579.5, 9.4, 0.1, 0.00,
147, 84, 60, 36, 690.3, 8.6, 0.4, 0.05,
148, 90, 59, 37, 595.1, 6.8, 0, 0.00,
149, 93, 56, 35, 680.9, 7.5, 0, 0.00,
150, 93, 69, 35, 776.3, 7.6, 0, 0.00,
151, 94, 58, 37, 460.9, 7.3, 0, 0.00,
152, 101, 59, 36, 777.8, 6.9, 0.1, 0.00,
153, 94, 66, 36, 760.3, 9.1, 0, 0.00,
154, 91, 67, 37, 704.9, 9.7, 0.3, 0.00,
155, 97, 60, 37, 623.3, 8.0, 0.8, 0.00,
156, 102, 54, 37, 562.5, 8.0, 0.7, 0.00,
157, 98, 67, 38, 631.7, 8.5, 0.9, 0.00,
158, 100, 62, 40, 454.8, 9.9, 0.3, 0.00,
159, 99, 70, 40, 729.1, 8.8, 0.6, 0.00,
160, 97, 61, 39, 636.4, 6.8, 0, 0.00,
161, 99, 63, 41, 508.3, 8.2, 0.2, 0.00,
162, 99, 62, 41, 518.5, 8.2, 0, 0.00,
163, 96, 63, 42, 689.5, 7.8, 0, 0.00,
164, 101, 65, 41, 783.0, 8.8, 0, 0.00,
165, 98, 61, 42, 733.6, 7.1, 0.4, 0.00,
166, 94, 65, 42, 783.2, 7.0, 0.4, 0.00,
167, 95, 64, 42, 670.1, 8.0, 0.1, 0.00,
168, 96, 65, 43, 725.4, 7.6, 0.5, 0.00,

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171,88,62,45,574.5,8.0,0.4,0.01,
172,94,58,45,783.2,7.7,0.4,0.00,
173,99,60,45,783.0,6.3,0.3,0.00,
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186,89,71,50,314.9,7.2,0.8,0.00,
187,95,70,49,776.8,7.4,0.5,0.00,
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192,101,70,52,772.7,6.9,0.5,0.00,
193,94,63,52,771.8,7.1,0.4,0.71,
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226, 98, 72, 55, 506.2, 6.9, 0.3, 0.00,
227, 100, 76, 55, 639.9, 6.4, 0.3, 0.00,
228, 102, 73, 55, 526.3, 6.7, 0.5, 0.00,
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233, 97, 70, 55, 692.9, 6.6, 0.4, 0.00,
234, 96, 67, 55, 610.9, 6.8, 0.2, 0.00,
235, 97, 67, 55, 693.1, 6.8, 0.2, 0.00,
236, 96, 75, 55, 619.7, 6.4, 0.7, 0.00,
237, 94, 69, 54, 464.6, 6.1, 0.9, 0.06,
238, 95, 66, 56, 684.5, 6.4, 0.5, 0.00,
239, 98, 69, 56, 681.5, 6.5, 0.5, 0.00,
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242, 96, 66, 54, 672.4, 7.2, 0.3, 0.00,
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245, 97, 67, 52, 580.5, 6.2, 0.5, 0.11,
246, 97, 66, 52, 525.9, 6.3, 0.3, 0.00,
247, 95, 66, 53, 607.6, 6.4, 0.1, 0.00,
248, 97, 65, 52, 612.4, 6.1, 0.1, 0.00,
249, 99, 63, 52, 642.5, 6.6, 0.1, 0.00,
250, 94, 66, 52, 617.0, 6.7, 0.6, 0.00,
251, 91, 67, 52, 244.9, 7.1, 0.8, 0.00,
252, 92, 71, 52, 516.4, 6.2, 0.9, 0.00,
253, 82, 63, 52, 586.9, 7.2, 0.9, 0.53,
254, 83, 62, 53, 535.2, 6.8, 0.5, 0.00,
255, 81, 60, 53, 558.6, 6.7, 0.5, 0.01,
256, 87, 61, 53, 528.1, 7.0, 0.1, 0.00,
257, 88, 61, 53, 214.4, 7.2, 0, 0.00,
258, 92, 61, 51, 618.0, 7.1, 0.2, 0.03,
259, 93, 65, 51, 551.1, 5.9, 0.4, 0.00,
260, 93, 68, 50, 299.3, 6.2, 0.5, 0.00,
261, 87, 61, 49, 546.7, 6.0, 0.9, 0.24,
262, 85, 61, 48, 562.2, 5.6, 0.3, 0.01,
263, 89, 66, 48, 475.6, 7.5, 0.6, 2.20,
264, 80, 62, 49, 595.5, 6.7, 0.5, 0.01,
265, 86, 59, 49, 591.7, 6.8, 0.1, 0.00,
266, 96, 61, 49, 438.1, 6.7, 0, 0.00,
267, 97, 61, 47, 344.6, 7.3, 0.6, 0.00,
268, 92, 63, 46, 580.2, 6.5, 0.4, 0.00,
269, 97, 61, 44, 576.3, 5.7, 0.1, 0.00,
270, 91, 68, 42, 572.4, 5.9, 0.1, 0.00,
271, 87, 64, 42, 544.9, 5.9, 0.4, 0.00,
272, 85, 64, 42, 564.6, 6.6, 0.9, 0.00,
273, 76, 61, 42, 475.3, 5.5, 0.9, 2.14,
274, 81, 60, 43, 258.3, 5.8, 0.4, 0.00,
275, 82, 55, 42, 389.0, 6.9, 0, 0.00,
276, 87, 53, 43, 313.4, 7.2, 0, 0.00,
277, 90, 61, 42, 452.0, 7.4, 0.4, 0.00,
278, 91, 61, 43, 428.5, 7.3, 0.1, 0.00,
279, 89, 56, 42, 537.0, 6.9, 0.1, 0.00,
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286,69,41,37,448.9,7.0,0,0.00,
287,75,43,38,388.6,6.3,0.1,0.00,
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303,79,42,34,380.1,6.1,0.3,0.00,
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315,62,43,32,363.5,6.4,0.3,0.00,
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317,68,33,32,403.2,7.1,0.5,0.00,
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320,61,42,28,395.3,6.1,1,0.00,
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322,67,52,28,390.4,6.8,0.6,0.00,
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325,71,41,26,269.1,6.2,0.6,0.00,
326,72,41,25,381.3,7.1,0.8,0.00,
327,71,44,24,379.2,7.6,1,0.00,
328,44,33,25,302.6,5.9,1,0.02,
329,41,31,27,156.0,7.6,1,0.03,
330,46,39,25,217.4,9.6,1,0.16,
331,50,39,23,137.2,8.2,0.7,0.00,
332,61,44,22,344.8,7.3,0.1,0.00,
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336,46,36,25,290.9,6.9,0.6,0.00,
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340, 61, 29, 25, 253.1, 6.7, 0, 0.00,
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342, 45, 39, 26, 356.4, 8.5, 0.9, 0.21,
343, 43, 39, 24, 355.5, 7.0, 1, 0.54,
344, 56, 40, 24, 354.7, 6.4, 1, 0.03,
345, 50, 36, 26, 354.0, 7.2, 0.8, 0.00,
346, 47, 34, 25, 353.3, 6.6, 0.5, 0.00,
347, 53, 37, 26, 326.9, 6.5, 0.6, 0.00,
348, 59, 37, 23, 263.9, 6.1, 0.3, 0.00,
349, 55, 31, 21, 252.8, 7.9, 0.5, 0.00,
350, 61, 31, 20, 351.5, 6.7, 0.1, 0.00,
351, 65, 29, 23, 280.4, 6.5, 0, 0.00,
352, 66, 36, 25, 277.9, 6.2, 0.6, 0.00,
353, 63, 36, 24, 350.9, 6.8, 0.1, 0.00,
354, 65, 32, 23, 350.9, 7.1, 0, 0.00,
355, 66, 31, 22, 351.0, 6.6, 0.2, 0.00,
356, 62, 50, 22, 320.2, 6.8, 0.5, 0.00,
357, 65, 44, 22, 243.5, 6.6, 0.7, 0.39,
358, 45, 36, 23, 351.7, 6.4, 0.4, 0.00,
359, 38, 33, 24, 352.1, 6.0, 1, 0.24,
360, 38, 31, 23, 352.6, 6.3, 0.9, 0.03,
361, 45, 30, 23, 353.1, 6.3, 0.2, 0.00,
362, 49, 29, 25, 353.8, 5.9, 0.5, 0.00,
363, 37, 21, 25, 354.5, 5.8, 0.8, 0.00,
364, 40, 24, 25, 355.3, 6.2, 0.9, 0.17,
365, 34, 27, 25, 316.1, 6.5, 1.0, 0.31,

Climate Data (1983)

1, 35, 13, 26, 326.7, 7.9, 0.6, 0.00,
2, 30, 12, 25, 338.9, 6.3, 0.6, 0.00,
3, 44, 13, 25, 359.7, 7.1, 0.1, 0.00,
4, 40, 15, 25, 196.4, 6.5, 0.1, 0.00,
5, 31, 24, 26, 279.8, 7.1, 1, 0.00,
6, 40, 23, 27, 271.0, 7.7, 0.6, 0.00,
7, 57, 22, 24, 343.4, 6.0, 0.3, 0.00,
8, 59, 35, 23, 306.8, 6.8, 0.1, 0.00,
9, 61, 33, 22, 365.6, 6.7, 0, 0.00,
10, 57, 31, 22, 256.6, 6.6, 0, 0.00,
11, 61, 25, 23, 263.8, 7.1, 0.3, 0.00,
12, 62, 28, 22, 281.7, 8.6, 0, 0.00,
13, 63, 30, 21, 128.6, 6.6, 0.2, 0.00,
14, 61, 33, 21, 356.4, 5.4, 0.6, 0.00,
15, 51, 36, 20, 341.5, 6.1, 0.9, 0.00,
16, 58, 28, 21, 252.8, 7.2, 0.2, 0.00,
17, 54, 40, 23, 174.3, 7.4, 1, 0.22,
18, 61, 43, 21, 213.1, 6.8, 0.6, 0.01,
19, 60, 36, 21, 265.8, 6.1, 0.6, 0.00,
20, 48, 37, 22, 390.8, 6.5, 0.7, 0.03,
21, 48, 30, 23, 368.3, 6.9, 0.7, 0.00,
22, 53, 25, 23, 274.6, 6.9, 0.1, 0.00,
23, 57, 26, 23, 332.9, 6.9, 0.6, 0.00,
24, 57, 30, 24, 246.7, 6.1, 0.5, 0.00,
25, 61, 29, 23, 269.0, 6.6, 0.4, 0.00,
26, 58, 30, 24, 391.6, 6.9, 0.1, 0.00,
27, 65, 27, 24, 409.5, 6.8, 0.6, 0.00,
28, 58, 43, 23, 412.4, 7.5, 0.4, 0.01,
29, 62, 32, 23, 415.3, 7.4, 0.5, 0.00,
30, 60, 44, 24, 266.4, 7.1, 1, 0.08,
31, 54, 40, 23, 209.3, 8.1, 0.8, 0.00,
32, 51, 35, 25, 318.8, 7.2, 0.7, 0.00,
33, 55, 37, 25, 363.9, 7.4, 0.4, 0.00,
34, 50, 36, 24, 342.4, 6.8, 1, 0.03,
35, 53, 40, 23, 273.8, 7.1, 0.9, 0.54,
36, 56, 34, 25, 336.6, 8.7, 0.6, 0.00,
37, 55, 41, 21, 427.9, 6.7, 0.7, 0.02,
38, 60, 40, 21, 444.5, 6.7, 0.2, 0.00,
39, 65, 38, 25, 369.0, 6.7, 0.5, 0.01,
40, 60, 42, 24, 262.9, 7.8, 0.3, 0.00,
41, 61, 33, 24, 251.1, 7.1, 0.6, 0.00,
42, 63, 33, 22, 458.7, 8.1, 0, 0.00,
43, 62, 30, 22, 462.3, 6.8, 0, 0.00,
44, 68, 28, 25, 383.3, 8.7, 0.1, 0.00,
45, 58, 39, 26, 469.7, 8.4, 0.4, 0.00,
46, 61, 32, 25, 448.2, 8.2, 0, 0.00,
47, 66, 32, 25, 298.6, 7.1, 0.4, 0.00,
48, 70, 33, 25, 359.6, 8.0, 0.1, 0.00,
49, 72, 30, 27, 246.2, 8.2, 0.3, 0.00,
50, 62, 49, 27, 321.7, 9.2, 0.1, 0.00,
51, 64, 33, 27, 270.4, 7.7, 0, 0.00,
52, 63, 28, 25, 496.6, 8.3, 0.3, 0.00,
53, 66, 34, 23, 280.6, 8.0, 0.3, 0.00,
54, 70, 34, 23, 192.6, 7.7, 0.5, 0.00,

55, 68, 37, 23, 101.7, 8.6, 0.8, 0.00,
56, 66, 45, 23, 281.6, 8.6, 0.8, 0.00,
57, 64, 45, 24, 357.3, 7.9, 0.5, 0.00,
58, 67, 46, 25, 444.0, 7.5, 0.2, 0.00,
59, 70, 37, 24, 341.4, 8.7, 0, 0.00,
60, 74, 38, 24, 410.7, 8.0, 0.6, 0.00,
61, 74, 40, 23, 438.7, 7.9, 1, 0.00,
62, 64, 45, 23, 536.5, 8.0, 0.9, 0.08,
63, 57, 43, 22, 340.6, 9.2, 0.8, 0.06,
64, 60, 44, 22, 544.7, 8.8, 0.6, 0.00,
65, 65, 46, 23, 272.8, 8.0, 0.1, 0.00,
66, 68, 43, 22, 360.5, 8.0, 0.4, 0.00,
67, 71, 45, 21, 556.9, 8.7, 0.1, 0.00,
68, 65, 36, 22, 531.3, 6.6, 0, 0.00,
69, 73, 33, 23, 520.2, 7.7, 0, 0.00,
70, 79, 40, 23, 448.7, 9.1, 0.7, 0.00,
71, 76, 50, 24, 364.7, 9.8, 0.8, 0.00,
72, 77, 39, 22, 202.4, 7.9, 0.3, 0.00,
73, 73, 52, 24, 581.0, 9.1, 0.5, 0.04,
74, 63, 47, 23, 511.3, 8.2, 0.7, 0.24,
75, 61, 35, 25, 429.0, 8.1, 0.1, 0.00,
76, 67, 37, 26, 134.9, 8.8, 0.5, 0.00,
77, 68, 51, 25, 356.2, 9.3, 0.4, 0.00,
78, 55, 45, 24, 600.8, 8.0, 0.6, 0.00,
79, 59, 41, 24, 383.6, 6.8, 0.5, 0.00,
80, 67, 34, 24, 250.9, 7.5, 0.6, 0.00,
81, 60, 39, 24, 594.4, 8.1, 0.7, 0.00,
82, 64, 44, 24, 616.2, 9.1, 0.4, 0.00,
83, 70, 44, 24, 620.0, 8.7, 0.2, 0.00,
84, 60, 38, 25, 490.4, 8.3, 0.5, 0.03,
85, 59, 39, 26, 535.0, 9.4, 0.2, 0.00,
86, 64, 37, 27, 330.3, 10.7, 0, 0.00,
87, 72, 32, 25, 528.8, 9.8, 0.4, 0.00,
88, 71, 51, 25, 638.5, 10.5, 0.4, 0.00,
89, 77, 38, 24, 567.9, 8.8, 0, 0.00,
90, 84, 44, 24, 501.2, 8.2, 0, 0.00,
91, 69, 43, 25, 403.7, 9.1, 0, 0.00,
92, 70, 32, 25, 443.4, 9.3, 0, 0.00,
93, 78, 53, 23, 518.7, 9.3, 0.2, 0.00,
94, 62, 32, 25, 616.0, 8.0, 0.8, 0.12,
95, 38, 29, 25, 549.7, 9.2, 1, 0.41,
96, 37, 28, 25, 353.7, 10.0, 1, 0.60,
97, 38, 25, 25, 451.8, 8.9, 0.9, 0.29,
98, 50, 23, 26, 291.3, 9.2, 0.6, 0.00,
99, 66, 35, 25, 459.9, 9.8, 0, 0.00,
100, 73, 44, 24, 561.0, 11.8, 0, 0.00,
101, 75, 42, 23, 678.5, 9.4, 0.1, 0.00,
102, 67, 42, 23, 539.9, 8.4, 0.2, 0.00,
103, 57, 38, 25, 656.1, 9.0, 0.2, 0.00,
104, 62, 33, 25, 436.6, 7.5, 0, 0.00,
105, 69, 36, 23, 453.7, 9.1, 0, 0.00,
106, 74, 36, 23, 578.7, 8.2, 0, 0.00,
107, 81, 39, 25, 677.2, 9.8, 0, 0.00,
108, 81, 41, 26, 439.9, 9.4, 0, 0.00,
109, 78, 51, 25, 583.4, 8.6, 0, 0.00,
110, 78, 46, 23, 705.2, 9.9, 0, 0.00,
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116,80,61,29,723.5,9.3,0,0.00,
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127,83,55,27,746.7,9.9,0.2,0.00,
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136,86,42,36,693.8,8.4,0,0.00,
137,77,54,36,644.8,9.0,0.1,0.00,
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144,96,59,35,709.6,8.2,0.4,0.02,
145,92,54,34,771.9,9.2,0.4,0.03,
146,90,55,34,579.5,9.4,0.4,0.00,
147,91,56,36,690.3,8.6,0.1,0.00,
148,92,58,37,595.1,6.8,0.2,0.00,
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150,96,62,35,776.3,7.6,0.4,0.00,
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156,91,57,37,562.5,8.0,0,0.00,
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158,90,51,40,454.8,9.9,0,0.00,
159,95,56,40,729.1,8.8,0,0.00,
160,94,60,39,636.4,6.8,0,0.00,
161,94,58,41,508.3,8.2,0,0.00,
162,98,60,41,518.5,8.2,0.3,0.00,
163,95,73,42,689.5,7.8,0,0.00,
164,92,65,41,783.0,8.8,0,0.00,
165,89,61,42,733.6,7.1,0,0.00,
166,95,60,42,783.2,7.0,0.4,0.12,
167,94,56,42,670.1,8.0,0.3,0.00,
168,99,65,43,725.4,7.6,0.2,0.00,

169,101,65,43,637.9,6.4,0,0.00,
170,100,68,43,653.3,7.3,0,0.00,
171,103,56,45,574.5,8.0,0,0.00,
172,102,60,45,783.2,7.7,0.3,0.00,
173,99,69,45,783.0,6.3,0.6,0.00,
174,94,62,45,738.6,7.2,0.5,0.00,
175,85,62,45,782.6,7.1,0.7,0.11,
176,92,56,47,782.3,7.2,0.1,0.00,
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178,92,66,49,781.7,7.3,0,0.00,
179,96,54,49,781.3,6.9,0,0.00,
180,100,55,50,459.7,6.3,0.1,0.00,
181,102,60,50,780.4,7.2,0.1,0.00,
182,100,71,50,779.9,6.7,0.3,0.00,
183,99,67,50,779.4,7.3,0.6,0.00,
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186,98,72,50,314.9,7.2,0.6,0.00,
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188,96,70,50,597.2,7.3,0.3,0.00,
189,98,69,51,377.8,6.5,0.1,0.00,
190,98,68,53,684.1,7.6,0.2,0.00,
191,98,69,54,760.5,8.0,0.4,0.00,
192,93,63,52,772.7,6.9,0.7,0.00,
193,95,68,52,771.8,7.1,0.8,0.00,
194,95,64,52,770.8,7.1,0.6,0.00,
195,97,65,53,769.8,6.9,0.3,0.00,
196,101,72,54,663.4,6.7,0.1,0.00,
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198,100,69,55,765.0,7.8,0.3,0.23,
199,96,67,54,493.9,6.6,0.2,0.00,
200,97,70,55,636.3,7.4,0.2,0.00,
201,97,70,56,705.9,6.7,0.2,0.02,
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208,95,70,55,276.5,7.5,0.7,0.16,
209,95,74,56,404.9,7.2,0.6,0.00,
210,98,74,55,749.3,6.9,0.7,0.00,
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212,99,67,56,745.9,7.0,0.4,0.00,
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226, 97, 72, 55, 506.2, 6.9, 0.4, 0.00,
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229, 94, 66, 56, 709.2, 6.4, 0.3, 0.00,
230, 91, 67, 56, 706.6, 5.8, 0.2, 0.00,
231, 96, 59, 57, 584.0, 6.8, 0.1, 0.00,
232, 97, 64, 56, 533.0, 6.4, 0.1, 0.00,
233, 98, 72, 55, 692.9, 6.6, 0.6, 0.01,
234, 95, 67, 55, 610.9, 6.8, 0.7, 0.15,
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237, 95, 66, 54, 464.6, 6.1, 0.3, 0.01,
238, 94, 65, 56, 684.5, 6.4, 0.3, 0.03,
239, 95, 66, 56, 681.5, 6.5, 0.2, 0.00,
240, 97, 68, 55, 526.0, 6.6, 0.1, 0.00,
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242, 95, 68, 54, 672.4, 7.2, 0.1, 0.00,
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253, 96, 65, 52, 586.9, 7.2, 0.4, 0.00,
254, 90, 64, 53, 535.2, 6.8, 0.3, 0.00,
255, 95, 65, 53, 558.6, 6.7, 0.4, 0.25,
256, 86, 67, 53, 528.1, 7.0, 0.6, 0.13,
257, 87, 66, 53, 214.4, 7.2, 0.6, 0.02,
258, 93, 65, 51, 618.0, 7.1, 0.3, 0.11,
259, 95, 66, 51, 551.1, 5.9, 0.6, 0.00,
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261, 94, 66, 49, 546.7, 6.0, 0, 0.00,
262, 95, 65, 48, 562.2, 5.6, 0, 0.00,
263, 87, 60, 48, 475.6, 7.5, 0.4, 0.00,
264, 79, 53, 49, 595.5, 6.7, 0.1, 0.00,
265, 91, 57, 49, 591.7, 6.8, 0.3, 0.00,
266, 92, 61, 49, 438.1, 6.7, 0.7, 0.00,
267, 86, 66, 47, 344.6, 7.3, 0.8, 0.00,
268, 91, 60, 46, 580.2, 6.5, 0, 0.00,
269, 93, 61, 44, 576.3, 5.7, 0.2, 0.00,
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271, 87, 63, 42, 544.9, 5.9, 0.7, 0.02,
272, 77, 61, 42, 564.6, 6.6, 0.8, 0.00,
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275, 88, 62, 42, 389.0, 6.9, 0.7, 0.05,
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323,59,44,26,100.7,6.7,0.1,0.00,
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325,75,46,26,269.1,6.2,0.3,0.00,
326,50,37,25,381.3,7.1,0.7,0.10,
327,50,33,24,379.2,7.6,0.2,0.00,
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329,70,29,27,156.0,7.6,0.4,0.00,
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331,50,34,23,137.2,8.2,0.1,0.00,
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334,61,30,23,200.7,6.7,0.7,0.00,
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336,63,45,25,290.9,6.9,0.9,0.02,
337,62,45,25,203.2,6.9,0.2,0.00,
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343, 70, 40, 24, 355.5, 7.0, 0.4, 0.00,
344, 66, 49, 24, 354.7, 6.4, 0, 0.00,
345, 66, 32, 26, 354.0, 7.2, 0.1, 0.00,
346, 71, 33, 25, 353.3, 6.6, 0.1, 0.00,
347, 59, 31, 26, 326.9, 6.5, 0.5, 0.00,
348, 58, 30, 23, 263.9, 6.1, 0.5, 0.00,
349, 67, 35, 21, 252.8, 7.9, 0, 0.00,
350, 60, 31, 20, 351.5, 6.7, 0.2, 0.00,
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353, 54, 16, 24, 350.9, 6.8, 0.6, 0.00,
354, 69, 39, 23, 350.9, 7.1, 0.7, 0.00,
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356, 66, 44, 22, 320.2, 6.8, 0.8, 0.00,
357, 70, 48, 22, 243.5, 6.6, 0.9, 0.00,
358, 65, 16, 23, 351.7, 6.4, 0.9, 0.00,
359, 31, 13, 24, 352.1, 6.0, 0.9, 0.00,
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363, 38, 10, 25, 354.5, 5.8, 0.1, 0.00,
364, 44, 15, 25, 355.3, 6.2, 0.1, 0.00,
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Climate Data (1984)

1, 62, 31, 28, 326.7, 6.6, 0.2, 0.00,
2, 48, 38, 33, 338.9, 8.2, 0.9, 0.18,
3, 52, 35, 36, 359.7, 4.3, 0.7, 0.00,
4, 60, 33, 35, 196.4, 4.9, 0.1, 0.00,
5, 60, 37, 36, 279.8, 5.5, 0.6, 0.00,
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7, 70, 36, 35, 343.4, 5.6, 0.2, 0.04,
8, 56, 47, 45, 306.8, 4.1, 0.8, 0.09,
9, 63, 38, 34, 365.6, 7.0, 0.3, 0.00,
10, 50, 29, 23, 256.6, 5.9, 0.2, 0.00,
11, 58, 22, 23, 263.8, 7.2, 0.1, 0.00,
12, 57, 33, 22, 281.7, 5.0, 0.3, 0.00,
13, 55, 34, 26, 128.6, 7.2, 0.9, 0.00,
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17, 57, 35, 29, 174.3, 7.4, 0.6, 0.00,
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19, 57, 27, 15, 265.8, 5.4, 0.6, 0.00,
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21, 50, 14, 18, 368.3, 2.5, 0, 0.00,
22, 58, 18, 20, 274.6, 6.3, 0.1, 0.00,
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24, 61, 31, 15, 246.7, 7.7, 0, 0.00,
25, 58, 26, 16, 269.0, 3.0, 0, 0.00,
26, 64, 22, 18, 391.6, 5.1, 0, 0.00,
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31, 61, 26, 20, 209.3, 4.8, 0.3, 0.00,
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33, 67, 35, 28, 363.9, 5.0, 0.6, 0.00,
34, 69, 28, 17, 342.4, 3.3, 0.1, 0.00,
35, 61, 30, 15, 273.8, 7.2, 0, 0.00,
36, 63, 27, 17, 336.6, 7.1, 0, 0.00,
37, 62, 24, 18, 427.9, 2.8, 0, 0.00,
38, 65, 25, 23, 444.5, 4.5, 0, 0.00,
39, 64, 35, 17, 369.0, 6.2, 0, 0.00,
40, 68, 22, 12, 262.9, 7.4, 0.2, 0.00,
41, 73, 32, 18, 251.1, 9.8, 0.3, 0.00,
42, 62, 44, 13, 458.7, 11.6, 0, 0.00,
43, 61, 22, 5, 462.3, 5.7, 0.1, 0.00,
44, 69, 34, 12, 383.3, 5.7, 0, 0.00,
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52, 60, 15, 12, 496.6, 4.4, 0, 0.00,
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54, 68, 39, 10, 192.6, 5.8, 0.3, 0.00,

55, 68, 26, 9, 101.7, 6.4, 0, 0.00,
56, 73, 40, 9, 281.6, 13.6, 0.3, 0.00,
57, 57, 34, 17, 357.3, 12.9, 0.2, 0.00,
58, 55, 23, 17, 444.0, 4.2, 0, 0.00,
59, 60, 24, 14, 341.4, 5.9, 0.6, 0.00,
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62, 75, 35, 17, 536.5, 4.9, 0.5, 0.00,
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64, 72, 45, 17, 544.7, 1.9, 0.3, 0.00,
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66, 51, 22, 26, 360.5, 5.2, 0, 0.00,
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69, 74, 38, 23, 520.2, 5.2, 0, 0.00,
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71, 73, 42, 25, 364.7, 8.2, 0.4, 0.00,
72, 75, 47, 22, 202.4, 8.0, 0.4, 0.00,
73, 78, 42, 24, 581.0, 5.2, 0.5, 0.00,
74, 80, 44, 26, 511.3, 6.5, 0.6, 0.00,
75, 80, 52, 26, 429.0, 6.0, 0.6, 0.00,
76, 81, 51, 23, 134.9, 7.6, 0.4, 0.00,
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83, 65, 38, 15, 620.0, 6.3, 0.2, 0.00,
84, 73, 28, 13, 490.4, 4.9, 0.1, 0.00,
85, 72, 43, 16, 535.0, 11.5, 0.6, 0.00,
86, 75, 55, 26, 330.3, 15.7, 0.5, 0.00,
87, 67, 47, 28, 528.8, 17.8, 0.3, 0.03,
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89, 73, 30, 20, 567.9, 5.8, 0.5, 0.00,
90, 77, 48, 25, 501.2, 13.6, 0.1, 0.00,
91, 73, 39, 17, 403.7, 5.8, 0, 0.00,
92, 80, 42, 18, 443.4, 12.7, 0.2, 0.00,
93, 65, 45, 16, 518.7, 17.1, 0.1, 0.00,
94, 70, 42, 19, 616.0, 8.4, 0, 0.00,
95, 74, 38, 17, 549.7, 4.2, 0.4, 0.00,
96, 81, 40, 18, 353.7, 4.6, 0, 0.00,
97, 85, 50, 17, 451.8, 14.5, 0.5, 0.00,
98, 67, 51, 35, 291.3, 15.1, 0.6, 0.01,
99, 77, 38, 31, 459.9, 7.7, 0, 0.00,
100, 80, 53, 28, 561.0, 16.4, 0.1, 0.00,
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103, 81, 51, 16, 656.1, 6.7, 0, 0.00,
104, 88, 49, 17, 436.6, 5.8, 0, 0.00,
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106, 76, 45, 13, 578.7, 5.5, 0, 0.00,
107, 77, 47, 19, 677.2, 6.1, 0, 0.00,
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137,78,57,55,644.8,5.4,0.9,0.08,
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139,90,56,45,765.2,6.9,0.1,0.00,
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146,100,57,35,579.5,8.8,0,0.00,
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149,87,67,46,680.9,12.3,0.3,0.00,
150,89,61,48,776.3,7.6,0.3,0.00,
151,91,60,45,460.9,5.8,0.2,0.00,
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156,87,66,40,562.5,8.8,0.3,0.00,
157,86,69,39,631.7,13.9,0.6,0.00,
158,89,67,41,454.8,12.2,0.7,0.00,
159,94,69,37,729.1,15.3,0.6,0.00,
160,94,72,39,636.4,11.1,0.1,0.00,
161,94,74,32,508.3,6.9,0,0.00,
162,98,63,35,518.5,5.4,0.1,0.00,
163,96,68,40,689.5,8.4,0.3,0.00,
164,97,71,42,783.0,6.5,0.4,0.00,
165,96,64,54,733.6,8.7,0.3,0.29,
166,91,61,59,783.2,5.2,0.4,0.05,
167,91,62,61,670.1,9.2,0.7,0.69,
168,90,64,62,725.4,5.9,0.6,0.45,

169,88,65,62,637.9,4.8,0.9,0.25,
170,80,64,63,653.3,6.9,0.9,0.01,
171,81,64,63,574.5,6.7,0.7,0.61,
172,92,65,63,783.2,4.3,0.4,0.26,
173,94,67,60,783.0,3.0,0.3,0.00,
174,95,69,59,738.6,3.3,0.9,0.00,
175,98,73,56,782.6,6.1,0.8,0.00,
176,94,74,56,782.3,9.6,0.6,0.00,
177,95,68,57,752.6,4.2,0.2,0.00,
178,97,74,57,781.7,8.8,0.2,0.00,
179,96,68,58,781.3,5.5,0.6,0.56,
180,90,68,62,459.7,6.8,0.7,0.01,
181,95,68,55,780.4,6.4,0.4,0.00,
182,96,66,54,779.9,6.0,0.2,0.00,
183,95,64,52,779.4,4.6,0.6,0.00,
184,94,72,57,653.5,6.7,0.7,0.00,
185,98,68,54,717.2,6.0,0.5,0.00,
186,99,72,54,314.9,8.0,0.3,0.00,
187,96,64,54,776.8,6.8,0.3,0.00,
188,95,67,55,597.2,7.7,0.1,0.00,
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190,97,68,51,684.1,6.5,0.1,0.00,
191,98,67,49,760.5,5.8,0.1,0.00,
192,100,73,52,772.7,8.0,0.4,0.00,
193,95,70,57,771.8,8.1,0.5,0.00,
194,91,70,57,770.8,8.8,0.6,0.00,
195,95,66,54,769.8,7.4,0.1,0.00,
196,96,66,53,663.4,6.3,0.1,0.00,
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215,98,72,59,621.6,5.7,0.8,0.00,
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223,80,70,66,481.1,4.7,1,0.00,
224,81,70,66,518.5,7.1,1,0.50,
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227, 88, 72, 64, 639.9, 3.9, 0.5, 0.00,
228, 87, 70, 64, 526.3, 4.1, 0.5, 0.03,
229, 88, 70, 60, 709.2, 5.3, 0.4, 0.09,
230, 86, 63, 57, 706.6, 5.8, 0.5, 0.00,
231, 91, 67, 59, 584.0, 5.8, 0.4, 0.00,
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233, 92, 67, 63, 692.9, 4.5, 0.4, 0.00,
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236, 92, 68, 57, 619.7, 8.9, 0.6, 0.00,
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238, 91, 70, 63, 684.5, 6.6, 0.7, 0.19,
239, 90, 72, 65, 681.5, 5.9, 0.4, 0.00,
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242, 99, 68, 61, 672.4, 5.5, 0.3, 0.00,
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244, 91, 63, 56, 436.5, 6.5, 0.4, 0.00,
245, 93, 63, 56, 580.5, 4.0, 0.2, 0.00,
246, 94, 67, 57, 525.9, 7.0, 0.5, 0.00,
247, 84, 64, 60, 607.6, 6.9, 0.4, 0.08,
248, 83, 57, 44, 612.4, 6.9, 0, 0.00,
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251, 92, 56, 46, 244.9, 5.9, 0, 0.00,
252, 95, 65, 46, 516.4, 5.8, 0, 0.00,
253, 97, 60, 46, 586.9, 5.0, 0, 0.00,
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258, 95, 60, 44, 618.0, 7.1, 0, 0.00,
259, 84, 64, 55, 551.1, 9.7, 0.2, 0.00,
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261, 89, 57, 53, 546.7, 4.9, 0.1, 0.00,
262, 89, 59, 48, 562.2, 5.3, 0.1, 0.00,
263, 90, 55, 43, 475.6, 5.0, 0, 0.00,
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265, 90, 52, 42, 591.7, 5.7, 0.2, 0.00,
266, 88, 60, 47, 438.1, 4.9, 0.6, 0.03,
267, 93, 56, 46, 344.6, 5.0, 0.3, 0.00,
268, 91, 56, 47, 580.2, 5.1, 0.1, 0.00,
269, 88, 56, 52, 576.3, 9.7, 0.9, 0.36,
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272, 74, 52, 52, 564.6, 1.1, 0.5, 0.00,
273, 66, 53, 46, 475.3, 6.2, 0.7, 0.00,
274, 73, 51, 51, 258.3, 6.6, 0.8, 0.00,
275, 81, 55, 53, 389.0, 4.6, 0.7, 0.00,
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277, 77, 58, 56, 452.0, 7.3, 0.9, 0.10,
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288, 82, 54, 42, 417.5, 1.2, 0.2, 0.00,
289, 81, 60, 47, 312.0, 17.6, 0.6, 0.00,
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314, 70, 52, 30, 411.6, 7.8, 0, 0.00,
315, 67, 36, 17, 363.5, 6.9, 0, 0.00,
316, 71, 28, 24, 406.0, 4.3, 0.5, 0.00,
317, 75, 34, 26, 403.2, 4.2, 0.2, 0.00,
318, 77, 41, 31, 400.5, 6.9, 0.2, 0.00,
319, 73, 45, 29, 381.4, 1.4, 0, 0.00,
320, 74, 38, 25, 395.3, 5.8, 0.4, 0.00,
321, 58, 39, 36, 268.8, 7.0, 0.8, 0.00,
322, 59, 39, 43, 390.4, 7.2, 0.8, 0.05,
323, 57, 33, 36, 100.7, 3.9, 0.2, 0.00,
324, 58, 33, 35, 358.0, 4.0, 0.7, 0.00,
325, 50, 32, 35, 269.1, 5.8, 0.2, 0.00,
326, 50, 26, 30, 381.3, 7.6, 0.7, 0.00,
327, 51, 33, 32, 379.2, 7.6, 0.9, 0.00,
328, 52, 34, 38, 302.6, 6.6, 0.8, 0.09,
329, 51, 44, 38, 156.0, 1.9, 0.8, 0.25,
330, 59, 43, 36, 217.4, 11.8, 0.7, 0.03,
331, 45, 32, 19, 137.2, 16.7, 0.3, 0.09,
332, 47, 22, 18, 344.8, 4.4, 0.3, 0.00,
333, 57, 22, 21, 73.6, 5.9, 0, 0.00,
334, 60, 37, 27, 200.7, 11.0, 0.1, 0.00,
335, 58, 29, 26, 298.6, 6.2, 0.2, 0.00,
336, 62, 30, 27, 290.9, 8.2, 0.5, 0.00,
337, 60, 32, 26, 203.2, 5.9, 0.3, 0.00,
338, 62, 32, 29, 360.8, 5.9, 0.7, 0.00,
339, 42, 35, 31, 359.6, 5.4, 0.9, 0.20,

340, 50, 31, 31, 253.1, 4.4, 0.5, 0.00,
341, 51, 28, 24, 235.2, 5.8, 0.2, 0.00,
342, 56, 30, 29, 356.4, 4.8, 0.7, 0.00,
343, 67, 37, 38, 355.5, 5.0, 0.5, 0.00,
344, 66, 36, 35, 354.7, 5.8, 0, 0.00,
345, 66, 31, 31, 354.0, 5.1, 0.1, 0.00,
346, 56, 40, 43, 353.3, 9.4, 1, 0.08,
347, 59, 45, 42, 326.9, 7.0, 0.8, 0.00,
348, 50, 37, 38, 263.9, 6.7, 0.9, 0.31,
349, 39, 32, 32, 252.8, 8.5, 1, 0.41,
350, 43, 32, 30, 351.5, 9.2, 0.6, 0.00,
351, 50, 25, 29, 280.4, 4.5, 0.3, 0.00,
352, 59, 27, 31, 277.9, 6.9, 0.6, 0.00,
353, 53, 39, 41, 350.9, 5.9, 0.9, 0.00,
354, 61, 37, 45, 350.9, 5.1, 0.9, 0.01,
355, 63, 47, 44, 351.0, 8.6, 0.9, 0.01,
356, 56, 32, 22, 320.2, 7.2, 0.7, 0.00,
357, 54, 30, 26, 243.5, 6.4, 0.3, 0.00,
358, 54, 26, 26, 351.7, 4.9, 0.6, 0.00,
359, 58, 34, 29, 352.1, 6.5, 0.7, 0.00,
360, 54, 36, 30, 352.6, 6.9, 0.7, 0.00,
361, 59, 39, 35, 353.1, 5.8, 1, 0.00,
362, 66, 41, 44, 353.8, 7.3, 1, 0.00,
363, 59, 48, 50, 354.5, 5.1, 1, 0.15,
364, 60, 37, 37, 355.3, 6.4, 0.4, 0.00,
365, 58, 36, 35, 316.1, 5.7, 0.8, 0.00,
366, 60, 40, 34, 300.0, 7.5, 0.2, 0.00,

Climate Data (1985)

1, 55, 27, 27, 326.7, 7.6, 0.7, 0.01,
2, 35, 21, 18, 338.9, 4.7, 0.3, 0.00,
3, 43, 16, 19, 359.7, 3.5, 0, 0.00,
4, 53, 19, 22, 196.4, 4.6, 0, 0.00,
5, 57, 22, 25, 279.8, 3.8, 0, 0.00,
6, 58, 22, 26, 271.0, 3.6, 0.6, 0.00,
7, 57, 31, 26, 343.4, 4.6, 0.9, 0.00,
8, 64, 41, 29, 306.8, 11.1, 0.6, 0.00,
9, 54, 33, 27, 365.6, 1.4, 0.1, 0.01,
10, 57, 27, 28, 256.6, 4.9, 0.6, 0.00,
11, 56, 31, 26, 263.8, 11.4, 0.7, 0.00,
12, 31, 21, 21, 281.7, 9.5, 1, 0.22,
13, 34, 16, 21, 128.6, 3.8, 0.9, 0.18,
14, 40, 13, 23, 356.4, 5.2, 0.6, 0.00,
15, 45, 32, 29, 341.5, 5.7, 0.8, 0.00,
16, 43, 27, 30, 252.8, 5.6, 0.7, 0.11,
17, 48, 22, 26, 174.3, 5.7, 0, 0.00,
18, 63, 24, 28, 213.1, 5.4, 0, 0.00,
19, 67, 26, 27, 265.8, 8.8, 0, 0.00,
20, 44, 22, 18, 390.8, 9.4, 0.2, 0.00,
21, 46, 17, 17, 368.3, 4.2, 0, 0.00,
22, 54, 23, 24, 274.6, 5.3, 0.5, 0.00,
23, 57, 29, 30, 332.9, 4.7, 0.9, 0.00,
24, 64, 37, 31, 246.7, 4.6, 0.9, 0.07,
25, 61, 43, 40, 269.0, 4.0, 0.8, 0.01,
26, 57, 43, 44, 391.6, 7.2, 1, 0.26,
27, 57, 44, 36, 409.5, 8.0, 0.6, 0.01,
28, 55, 38, 31, 412.4, 5.8, 0.6, 0.00,
29, 62, 33, 33, 415.3, 8.0, 0.4, 0.00,
30, 60, 40, 30, 266.4, 14.5, 0.4, 0.00,
31, 42, 19, 24, 209.3, 7.9, 1, 0.07,
32, 24, 13, 13, 318.8, 6.9, 0.6, 0.05,
33, 40, 8, 17, 363.9, 3.7, 0.2, 0.00,
34, 50, 28, 27, 342.4, 8.1, 0.7, 0.00,
35, 49, 31, 30, 273.8, 9.4, 0.7, 0.00,
36, 48, 30, 29, 336.6, 7.1, 0.6, 0.01,
37, 53, 34, 22, 427.9, 9.3, 0.3, 0.00,
38, 56, 23, 20, 444.5, 5.2, 0, 0.00,
39, 63, 22, 23, 369.0, 6.4, 0, 0.00,
40, 65, 38, 27, 262.9, 8.7, 0.2, 0.00,
41, 62, 31, 26, 251.1, 9.1, 0.2, 0.00,
42, 53, 22, 13, 458.7, 6.2, 0, 0.00,
43, 63, 21, 14, 462.3, 5.4, 0, 0.00,
44, 68, 30, 21, 383.3, 7.6, 0, 0.00,
45, 63, 26, 23, 469.7, 4.7, 0, 0.00,
46, 66, 25, 21, 448.2, 4.6, 0, 0.00,
47, 73, 27, 22, 298.6, 4.1, 0, 0.00,
48, 77, 35, 25, 359.6, 7.6, 0.3, 0.00,
49, 74, 36, 27, 246.2, 5.6, 0.7, 0.00,
50, 69, 39, 40, 321.7, 4.9, 1, 0.00,
51, 71, 47, 40, 270.4, 7.3, 0.9, 0.00,
52, 73, 37, 25, 496.6, 7.4, 0.5, 0.00,
53, 60, 41, 32, 280.6, 8.9, 0.6, 0.00,
54, 57, 37, 36, 192.6, 1.3, 0.9, 0.13,

55, 53, 32, 31, 101.7, 5.3, 0.3, 0.00,
56, 64, 29, 26, 281.6, 4.9, 0, 0.00,
57, 67, 31, 28, 357.3, 6.0, 0.8, 0.00,
58, 67, 34, 37, 444.0, 4.6, 0.3, 0.00,
59, 67, 51, 41, 341.4, 5.4, 0.5, 0.00,
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62, 65, 39, 20, 536.5, 19.5, 0.3, 0.00,
63, 56, 29, 12, 340.6, 8.3, 0, 0.00,
64, 70, 23, 16, 544.7, 5.1, 0.1, 0.00,
65, 76, 40, 25, 272.8, 5.6, 0.9, 0.00,
66, 77, 40, 21, 360.5, 6.4, 0.9, 0.00,
67, 83, 36, 29, 556.9, 5.2, 0.7, 0.00,
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69, 83, 43, 42, 520.2, 6.3, 0.6, 0.00,
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71, 78, 47, 39, 364.7, 11.4, 0.6, 0.00,
72, 59, 46, 33, 202.4, 1.1, 1, 0.00,
73, 55, 43, 35, 581.0, 9.5, 1, 0.03,
74, 50, 39, 39, 511.3, 8.3, 1, 0.42,
75, 60, 34, 38, 429.0, 5.8, 0.8, 0.00,
76, 58, 39, 37, 134.9, 5.2, 0.9, 0.00,
77, 68, 38, 40, 356.2, 5.4, 0.7, 0.00,
78, 62, 41, 34, 600.8, 13.5, 0.4, 0.13,
79, 65, 44, 32, 383.6, 13.7, 0.4, 0.00,
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82, 70, 36, 15, 616.2, 6.0, 0, 0.00,
83, 77, 32, 22, 620.0, 3.5, 0.4, 0.00,
84, 80, 40, 28, 490.4, 6.4, 0.6, 0.00,
85, 77, 59, 26, 535.0, 1.6, 0.6, 0.00,
86, 79, 52, 23, 330.3, 12.4, 0.3, 0.00,
87, 78, 55, 22, 528.8, 15.2, 0.9, 0.00,
88, 62, 40, 29, 638.5, 15.4, 0.8, 0.01,
89, 54, 37, 19, 567.9, 13.4, 0.5, 0.00,
90, 66, 33, 17, 501.2, 6.1, 0, 0.00,
91, 70, 32, 20, 403.7, 6.9, 0, 0.00,
92, 79, 32, 19, 443.4, 6.2, 0, 0.00,
93, 83, 39, 20, 518.7, 7.3, 0.4, 0.00,
94, 80, 51, 22, 616.0, 13.5, 0.3, 0.00,
95, 80, 57, 28, 549.7, 11.9, 0.3, 0.00,
96, 83, 53, 29, 353.7, 5.9, 0, 0.00,
97, 75, 47, 36, 451.8, 8.5, 0.1, 0.00,
98, 71, 48, 43, 291.3, 8.6, 0.7, 0.00,
99, 74, 40, 44, 459.9, 5.5, 0.3, 0.00,
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103, 82, 49, 41, 656.1, 4.7, 0.3, 0.00,
104, 83, 53, 40, 436.6, 3.5, 0.2, 0.00,
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106, 89, 48, 30, 578.7, 5.5, 0.6, 0.00,
107, 86, 63, 42, 677.2, 6.4, 0.7, 0.00,
108, 87, 55, 38, 439.9, 9.2, 0.2, 0.00,
109, 77, 50, 22, 583.4, 7.5, 0, 0.00,
110, 83, 49, 29, 705.2, 8.9, 0, 0.00,
111, 76, 58, 35, 703.1, 1.4, 0.6, 0.00,

112, 71, 51, 35, 609.7, 1.4, 0.4, 0.00,
113, 78, 46, 26, 545.1, 6.8, 0, 0.00,
114, 86, 42, 26, 718.6, 5.1, 0.5, 0.00,
115, 81, 66, 34, 543.5, 9.9, 0.5, 0.00,
116, 76, 49, 37, 723.5, 7.8, 0.7, 0.00,
117, 76, 46, 44, 725.8, 6.1, 1, 0.07,
118, 65, 48, 37, 726.0, 8.3, 0.6, 0.00,
119, 76, 45, 41, 730.4, 8.7, 0, 0.00,
120, 88, 48, 40, 502.9, 4.3, 0, 0.00,
121, 83, 58, 45, 375.0, 5.1, 0.3, 0.00,
122, 83, 60, 48, 509.6, 4.7, 0.8, 0.00,
123, 83, 51, 47, 544.6, 4.1, 0.3, 0.00,
124, 89, 53, 44, 657.9, 3.7, 0.3, 0.00,
125, 85, 61, 32, 513.0, 3.6, 0.8, 0.00,
126, 86, 50, 32, 743.4, 2.7, 0.6, 0.00,
127, 88, 56, 35, 746.7, 4.2, 1, 0.00,
128, 92, 57, 36, 655.1, 4.7, 0.3, 0.00,
129, 94, 55, 38, 750.2, 6.8, 0.7, 0.00,
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131, 83, 54, 25, 598.6, 1.6, 0, 0.00,
132, 82, 47, 23, 755.2, 1.4, 0, 0.00,
133, 79, 55, 27, 756.8, 11.3, 0, 0.00,
134, 78, 42, 17, 485.9, 4.9, 0, 0.00,
135, 89, 41, 27, 717.8, 5.5, 0.6, 0.00,
136, 92, 59, 44, 693.8, 6.0, 0.9, 0.00,
137, 85, 57, 50, 644.8, 5.7, 0.6, 0.01,
138, 86, 55, 48, 589.8, 4.6, 0.3, 0.00,
139, 86, 49, 40, 765.2, 4.7, 0.4, 0.00,
140, 84, 68, 31, 627.4, 8.1, 0.3, 0.00,
141, 86, 61, 32, 721.3, 7.3, 0, 0.00,
142, 84, 56, 39, 768.8, 7.2, 0.3, 0.00,
143, 87, 53, 44, 769.9, 5.1, 0.6, 0.00,
144, 93, 60, 45, 709.6, 4.5, 0.2, 0.00,
145, 95, 59, 41, 771.9, 4.4, 0.1, 0.00,
146, 94, 56, 28, 579.5, 5.0, 0, 0.00,
147, 94, 61, 25, 690.3, 6.5, 0.2, 0.00,
148, 94, 67, 26, 595.1, 4.2, 0.6, 0.00,
149, 96, 65, 25, 680.9, 7.6, 0.4, 0.00,
150, 90, 62, 35, 776.3, 5.1, 0.8, 0.00,
151, 89, 65, 47, 460.9, 5.3, 0.9, 0.00,
152, 94, 60, 40, 777.8, 5.7, 0.2, 0.00,
153, 94, 55, 27, 760.3, 5.4, 0.6, 0.00,
154, 90, 68, 21, 704.9, 6.1, 0.5, 0.00,
155, 82, 57, 32, 623.3, 7.1, 0.3, 0.00,
156, 79, 50, 40, 562.5, 4.3, 0.2, 0.00,
157, 95, 49, 39, 631.7, 3.2, 0, 0.00,
158, 102, 62, 41, 454.8, 3.0, 0, 0.00,
159, 103, 63, 40, 729.1, 3.1, 0.1, 0.00,
160, 106, 64, 44, 636.4, 6.4, 0.4, 0.00,
161, 101, 62, 47, 508.3, 4.7, 0.2, 0.00,
162, 94, 65, 51, 518.5, 5.9, 0, 0.00,
163, 86, 67, 57, 689.5, 9.8, 0.8, 0.00,
164, 96, 59, 49, 783.0, 4.3, 0.7, 0.00,
165, 104, 68, 41, 733.6, 4.3, 0.5, 0.00,
166, 103, 64, 43, 783.2, 4.1, 0.5, 0.00,
167, 105, 65, 45, 670.1, 4.8, 0.4, 0.00,
168, 104, 66, 45, 725.4, 7.2, 0.4, 0.00,

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170, 83, 60, 56, 653.3, 5.2, 0.4, 0.00,
171, 93, 63, 52, 574.5, 4.2, 0.2, 0.00,
172, 97, 70, 48, 783.2, 3.6, 0.2, 0.00,
173, 99, 70, 54, 783.0, 6.0, 0.4, 0.00,
174, 96, 64, 55, 738.6, 4.2, 0.3, 0.00,
175, 93, 71, 58, 782.6, 4.5, 0.7, 0.00,
176, 94, 70, 60, 782.3, 5.3, 0.7, 0.02,
177, 96, 62, 35, 752.6, 3.9, 0, 0.00,
178, 89, 66, 40, 781.7, 5.9, 0, 0.00,
179, 92, 61, 45, 781.3, 1.6, 0.3, 0.00,
180, 96, 63, 40, 459.7, 2.6, 0.2, 0.00,
181, 101, 63, 37, 780.4, 5.1, 0.4, 0.00,
182, 103, 66, 34, 779.9, 4.3, 0.2, 0.00,
183, 96, 71, 45, 779.4, 7.8, 0.5, 0.00,
184, 92, 64, 49, 653.5, 4.0, 0.4, 0.00,
185, 100, 61, 41, 717.2, 4.6, 0.2, 0.00,
186, 102, 63, 40, 314.9, 3.9, 0.1, 0.00,
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193, 95, 60, 51, 771.8, 2.3, 0.2, 0.00,
194, 98, 65, 45, 770.8, 2.0, 0.2, 0.00,
195, 99, 64, 47, 769.8, 3.5, 0, 0.00,
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197, 92, 61, 54, 767.6, 4.2, 0.2, 0.00,
198, 94, 63, 50, 765.0, 2.1, 0.1, 0.00,
199, 95, 70, 56, 493.9, 3.1, 0.5, 0.04,
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201, 88, 60, 60, 705.9, 2.4, 0.6, 0.03,
202, 86, 59, 60, 553.5, 2.0, 0.5, 0.00,
203, 89, 66, 63, 758.7, 3.3, 0.6, 0.00,
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205, 95, 63, 58, 688.2, 4.8, 0.5, 0.00,
206, 93, 66, 58, 755.7, 6.6, 0.5, 0.09,
207, 85, 63, 63, 607.0, 4.4, 0.8, 0.20,
208, 88, 67, 65, 276.5, 2.9, 0.8, 0.12,
209, 93, 68, 62, 404.9, 1.6, 0.6, 0.03,
210, 95, 69, 59, 749.3, 2.3, 0.5, 0.00,
211, 95, 72, 57, 495.7, 2.7, 0.6, 0.01,
212, 95, 68, 57, 745.9, 3.2, 0.4, 0.00,
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214, 92, 65, 62, 720.5, 3.9, 0.5, 0.34,
215, 93, 67, 59, 621.6, 2.9, 0.5, 0.01,
216, 96, 69, 57, 551.6, 2.5, 0.3, 0.00,
217, 97, 69, 58, 617.6, 2.7, 0.2, 0.00,
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219, 101, 66, 57, 593.8, 4.9, 0.5, 0.01,
220, 91, 69, 57, 607.3, 2.8, 0.7, 0.00,
221, 98, 75, 58, 509.3, 4.7, 0.6, 0.00,
222, 89, 71, 61, 481.4, 4.5, 0.7, 0.00,
223, 88, 66, 61, 481.1, 4.0, 0.7, 0.00,
224, 93, 70, 60, 518.5, 3.5, 0.7, 0.00,
225, 95, 68, 56, 500.4, 3.4, 0.5, 0.00,

226, 97, 67, 51, 506.2, 3.1, 0.2, 0.00,
227, 94, 68, 56, 639.9, 2.9, 0.6, 0.00,
228, 96, 65, 56, 526.3, 3.5, 0.5, 0.00,
229, 90, 66, 62, 709.2, 2.4, 0.7, 0.00,
230, 92, 65, 63, 706.6, 2.5, 0.6, 0.00,
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233, 93, 67, 63, 692.9, 1.2, 0.3, 0.01,
234, 98, 68, 60, 610.9, 1.2, 0.2, 0.00,
235, 102, 66, 57, 693.1, 2.2, 0.4, 0.00,
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237, 94, 68, 55, 464.6, 1.5, 0.4, 0.00,
238, 96, 65, 51, 684.5, 1.1, 0.2, 0.00,
239, 96, 63, 49, 681.5, 1.8, 0.4, 0.00,
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242, 93, 61, 44, 672.4, 2.3, 0, 0.00,
243, 93, 62, 50, 564.2, 0.7, 0.2, 0.00,
244, 96, 65, 52, 436.5, 1.5, 0.4, 0.01,
245, 91, 73, 57, 580.5, 1.2, 0.9, 0.00,
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249, 87, 62, 48, 642.5, 1.8, 0.1, 0.00,
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251, 89, 57, 48, 244.9, 3.2, 0.7, 0.00,
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253, 91, 64, 57, 586.9, 5.2, 0.6, 0.03,
254, 87, 64, 60, 535.2, 3.8, 0.7, 0.02,
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256, 88, 66, 61, 528.1, 3.8, 0.9, 0.06,
257, 82, 64, 62, 214.4, 5.6, 0.8, 0.03,
258, 82, 67, 62, 618.0, 4.6, 0.7, 0.00,
259, 90, 62, 60, 551.1, 3.5, 0.6, 0.02,
260, 89, 63, 60, 299.3, 3.4, 0.6, 0.12,
261, 86, 64, 61, 546.7, 3.2, 0.7, 0.15,
262, 84, 61, 61, 562.2, 4.9, 0.5, 0.39,
263, 84, 59, 57, 475.6, 2.9, 0.4, 0.14,
264, 82, 56, 50, 595.5, 2.7, 0.1, 0.00,
265, 84, 54, 42, 591.7, 5.2, 0, 0.00,
266, 80, 53, 46, 438.1, 3.6, 0, 0.00,
267, 87, 53, 45, 344.6, 4.2, 0.1, 0.00,
268, 82, 58, 42, 580.2, 3.7, 0.3, 0.00,
269, 80, 57, 45, 576.3, 2.1, 0.3, 0.00,
270, 88, 53, 43, 572.4, 2.7, 0.2, 0.00,
271, 79, 55, 52, 544.9, 5.7, 0.9, 0.21,
272, 74, 51, 49, 564.6, 3.1, 0.2, 0.00,
273, 66, 48, 45, 475.3, 4.3, 0.8, 0.00,
274, 53, 47, 47, 258.3, 3.5, 0.9, 0.34,
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278, 74, 47, 35, 428.5, 2.1, 0.2, 0.00,
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308,73,35,37,241.9,3.4,0,0.00,
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315,76,45,35,363.5,4.7,0.3,0.00,
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317,64,37,36,403.2,3.4,0.7,0.00,
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326,69,29,23,381.3,5.2,0.1,0.00,
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328,70,37,43,302.6,4.4,0.4,0.07,
329,67,42,47,156.0,3.9,0.9,0.00,
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332,62,38,32,344.8,5.8,0.7,0.00,
333,65,42,31,73.6,7.2,0.6,0.00,
334,59,49,35,200.7,11.4,0.6,0.01,
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336,64,27,28,290.9,3.5,0.4,0.00,
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345, 44, 24, 21, 354.0, 4.8, 0.3, 0.00,
346, 43, 20, 24, 353.3, 6.1, 0.5, 0.05,
347, 46, 21, 19, 326.9, 4.2, 0, 0.00,
348, 49, 11, 12, 263.9, 2.5, 0.1, 0.00,
349, 55, 16, 15, 252.8, 3.8, 0.1, 0.00,
350, 54, 20, 16, 351.5, 3.8, 0.4, 0.00,
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352, 57, 20, 16, 277.9, 2.9, 0, 0.00,
353, 59, 17, 17, 350.9, 3.0, 0, 0.00,
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356, 65, 22, 19, 320.2, 3.3, 0, 0.00,
357, 63, 23, 18, 243.5, 4.3, 0.1, 0.00,
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365, 64, 51, 35, 316.1, 5.0, 0.7, 0.00,

Climate Data (1986)

1, 63, 34, 36, 326.7, 4.1, 0.2, 0.01,
2, 64, 29, 25, 338.9, 3.8, 0.3, 0.00,
3, 62, 29, 25, 359.7, 3.3, 0.8, 0.00,
4, 57, 28, 17, 196.4, 6.3, 0.3, 0.00,
5, 55, 30, 12, 279.8, 4.1, 0.7, 0.00,
6, 62, 25, 21, 271.0, 6.3, 0.2, 0.00,
7, 46, 29, 21, 343.4, 1.0, 0.9, 0.00,
8, 47, 18, 18, 306.8, 3.1, 0, 0.00,
9, 49, 15, 19, 365.6, 2.6, 0, 0.00,
10, 58, 17, 19, 256.6, 2.1, 0, 0.00,
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12, 63, 18, 18, 281.7, 3.2, 0, 0.00,
13, 61, 23, 19, 128.6, 3.1, 0.4, 0.00,
14, 57, 28, 20, 356.4, 4.0, 1, 0.00,
15, 64, 27, 26, 341.5, 4.2, 0.4, 0.00,
16, 63, 34, 27, 252.8, 4.7, 0.2, 0.00,
17, 66, 25, 23, 174.3, 4.5, 0, 0.00,
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21, 70, 47, 23, 368.3, 7.1, 0.4, 0.00,
22, 61, 34, 22, 274.6, 4.5, 0.7, 0.00,
23, 68, 26, 21, 332.9, 5.5, 0.3, 0.00,
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25, 63, 32, 14, 269.0, 8.1, 0, 0.00,
26, 59, 25, 17, 391.6, 3.8, 0, 0.00,
27, 63, 24, 19, 409.5, 4.1, 0, 0.00,
28, 71, 21, 16, 412.4, 4.5, 0, 0.00,
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32, 60, 38, 39, 318.8, 4.7, 0.9, 0.00,
33, 59, 44, 45, 363.9, 4.3, 0.8, 0.01,
34, 66, 30, 33, 342.4, 4.9, 0, 0.00,
35, 53, 39, 34, 273.8, 7.2, 0.6, 0.16,
36, 55, 37, 26, 336.6, 7.3, 0.2, 0.00,
37, 61, 38, 23, 427.9, 9.7, 0.3, 0.00,
38, 52, 35, 19, 444.5, 7.2, 0.5, 0.00,
39, 47, 30, 22, 369.0, 3.8, 0.8, 0.00,
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41, 48, 32, 27, 251.1, 8.9, 0.3, 0.10,
42, 53, 29, 26, 458.7, 5.6, 0, 0.00,
43, 63, 31, 27, 462.3, 5.1, 0.3, 0.00,
44, 69, 40, 28, 383.3, 8.6, 0.4, 0.00,
45, 71, 45, 33, 469.7, 6.5, 0.6, 0.00,
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47, 70, 50, 35, 298.6, 7.8, 0.6, 0.00,
48, 70, 49, 36, 359.6, 11.4, 0, 0.00,
49, 78, 57, 34, 246.2, 13.6, 0.4, 0.00,
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51, 76, 47, 32, 270.4, 7.0, 0.5, 0.00,
52, 68, 46, 16, 496.6, 8.5, 0.5, 0.00,
53, 66, 32, 13, 280.6, 4.3, 0, 0.00,
54, 74, 25, 12, 192.6, 3.6, 0.2, 0.00,

55, 77, 36, 22, 101.7, 2.8, 0, 0.00,
56, 81, 36, 25, 281.6, 4.6, 0, 0.00,
57, 83, 43, 24, 357.3, 3.9, 0, 0.00,
58, 68, 45, 25, 444.0, 6.5, 0.1, 0.00,
59, 64, 37, 22, 341.4, 4.7, 0, 0.00,
60, 75, 29, 22, 410.7, 4.0, 0, 0.00,
61, 71, 49, 30, 438.7, 5.1, 0.8, 0.00,
62, 72, 37, 37, 536.5, 5.3, 0.5, 0.00,
63, 70, 36, 26, 340.6, 5.0, 0.1, 0.00,
64, 75, 33, 22, 544.7, 4.5, 0, 0.00,
65, 77, 40, 22, 272.8, 3.5, 0.1, 0.00,
66, 76, 50, 24, 360.5, 7.1, 0.4, 0.00,
67, 79, 47, 26, 556.9, 8.8, 0.5, 0.00,
68, 74, 56, 26, 531.3, 12.9, 0.4, 0.00,
69, 72, 44, 23, 520.2, 8.5, 0.7, 0.00,
70, 56, 45, 35, 448.7, 14.7, 0.6, 0.08,
71, 60, 43, 29, 364.7, 11.6, 0.6, 0.00,
72, 59, 40, 27, 202.4, 1.6, 0.7, 0.00,
73, 54, 41, 36, 581.0, 7.4, 0.6, 0.31,
74, 60, 40, 26, 511.3, 9.4, 0, 0.00,
75, 72, 33, 23, 429.0, 6.5, 0.2, 0.00,
76, 59, 40, 27, 134.9, 12.1, 0.5, 0.00,
77, 56, 37, 30, 356.2, 7.6, 0.6, 0.00,
78, 56, 36, 29, 600.8, 4.5, 0.4, 0.00,
79, 63, 29, 23, 383.6, 2.7, 0, 0.00,
80, 69, 32, 20, 250.9, 3.7, 0, 0.00,
81, 73, 36, 16, 594.4, 3.4, 0, 0.00,
82, 77, 33, 15, 616.2, 3.1, 0, 0.00,
83, 80, 38, 18, 620.0, 4.9, 0.3, 0.00,
84, 80, 40, 21, 490.4, 4.5, 0.2, 0.00,
85, 81, 39, 26, 535.0, 6.1, 0, 0.00,
86, 80, 48, 34, 330.3, 6.6, 0.1, 0.00,
87, 80, 42, 33, 528.8, 3.6, 0.3, 0.00,
88, 79, 51, 39, 638.5, 4.4, 0.6, 0.00,
89, 80, 44, 34, 567.9, 4.0, 0.5, 0.00,
90, 83, 46, 31, 501.2, 5.5, 0.7, 0.00,
91, 75, 52, 36, 403.7, 6.9, 0.6, 0.00,
92, 76, 52, 32, 443.4, 13.9, 0.1, 0.00,
93, 69, 49, 15, 518.7, 12.0, 0.1, 0.00,
94, 73, 41, 18, 616.0, 4.4, 0, 0.00,
95, 81, 38, 21, 549.7, 3.3, 0.6, 0.00,
96, 85, 49, 26, 353.7, 4.9, 0.8, 0.00,
97, 92, 57, 30, 451.8, 6.5, 0.8, 0.00,
98, 88, 61, 34, 291.3, 6.2, 1, 0.00,
99, 83, 56, 41, 459.9, 5.0, 0.7, 0.00,
100, 83, 49, 31, 561.0, 5.4, 0.5, 0.00,
101, 81, 62, 21, 678.5, 9.4, 0.8, 0.00,
102, 83, 57, 27, 539.9, 8.0, 0.5, 0.00,
103, 85, 66, 25, 656.1, 12.7, 0.5, 0.00,
104, 80, 43, 10, 436.6, 5.9, 0.7, 0.00,
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106, 87, 55, 30, 578.7, 7.1, 0.5, 0.00,
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118,84,49,28,726.0,5.4,0.9,0.00,
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138,78,41,29,589.8,3.6,0.1,0.00,
139,86,48,22,765.2,2.9,0,0.00,
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152,84,53,50,777.8,5.2,0.5,0.00,
153,84,61,53,760.3,5.9,0.6,0.00,
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166,99,64,41,783.2,3.8,0,0.00,
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173, 95, 63, 59, 783.0, 4.8, 0.9, 0.44,
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175, 75, 63, 64, 782.6, 5.9, 1, 0.81,
176, 82, 65, 63, 782.3, 3.5, 0.9, 0.03,
177, 86, 67, 63, 752.6, 4.2, 0.8, 0.00,
178, 92, 67, 62, 781.7, 3.8, 0.4, 0.00,
179, 95, 69, 62, 781.3, 3.3, 0.6, 0.02,
180, 94, 73, 59, 459.7, 6.0, 0.9, 0.00,
181, 96, 73, 59, 780.4, 6.9, 0.6, 0.00,
182, 94, 69, 60, 779.9, 5.5, 0.7, 0.00,
183, 84, 67, 63, 779.4, 6.0, 0.9, 0.01,
184, 92, 71, 61, 653.5, 5.3, 0.6, 0.00,
185, 90, 69, 62, 717.2, 8.1, 0.6, 0.00,
186, 93, 71, 54, 314.9, 8.7, 0.3, 0.00,
187, 96, 69, 55, 776.8, 6.9, 0.6, 0.00,
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189, 91, 67, 62, 377.8, 3.7, 0.6, 0.25,
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191, 88, 66, 60, 760.5, 5.5, 0.9, 0.00,
192, 95, 67, 57, 772.7, 5.6, 0.4, 0.00,
193, 100, 74, 54, 771.8, 5.8, 0.1, 0.00,
194, 96, 71, 57, 770.8, 7.3, 0.3, 0.00,
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196, 88, 68, 61, 663.4, 7.9, 0.5, 0.00,
197, 89, 64, 60, 767.6, 6.1, 0.5, 0.00,
198, 88, 65, 62, 765.0, 4.7, 0.7, 0.37,
199, 89, 68, 61, 493.9, 4.9, 0.6, 0.12,
200, 92, 63, 60, 636.3, 3.5, 0.5, 0.00,
201, 93, 63, 56, 705.9, 5.2, 0.4, 0.03,
202, 91, 68, 58, 553.5, 5.6, 0.7, 0.36,
203, 89, 62, 61, 758.7, 5.8, 0.8, 0.53,
204, 87, 62, 62, 662.9, 3.0, 0.6, 0.03,
205, 92, 67, 65, 688.2, 2.6, 0.7, 0.83,
206, 95, 63, 60, 755.7, 2.2, 0, 0.00,
207, 99, 65, 57, 607.0, 3.3, 0.1, 0.00,
208, 101, 69, 54, 276.5, 4.0, 0.4, 0.00,
209, 102, 70, 51, 404.9, 3.6, 0.2, 0.00,
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215, 95, 70, 56, 621.6, 5.1, 0.5, 0.02,
216, 97, 71, 54, 551.6, 4.7, 0.4, 0.00,
217, 96, 69, 54, 617.6, 5.0, 0.3, 0.00,
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219, 99, 74, 56, 593.8, 4.8, 0.8, 0.00,
220, 94, 69, 58, 607.3, 4.4, 0.7, 0.00,
221, 93, 71, 61, 509.3, 4.7, 0.8, 0.04,
222, 86, 67, 63, 481.4, 5.0, 0.8, 0.12,
223, 92, 67, 60, 481.1, 5.4, 0.6, 0.00,
224, 94, 68, 60, 518.5, 3.4, 0.6, 0.00,
225, 97, 67, 63, 500.4, 6.3, 0.7, 0.14,

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239,85,66,63,681.5,6.4,0.9,0.02,
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310, 67, 37, 39, 423.6, 5.2, 0, 0.00,
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317, 34, 29, 28, 403.2, 5.5, 1, 0.02,
318, 50, 33, 34, 400.5, 2.4, 0.8, 0.00,
319, 53, 37, 39, 381.4, 3.9, 1, 0.00,
320, 67, 41, 43, 395.3, 3.0, 0.9, 0.00,
321, 75, 46, 46, 268.8, 6.0, 0.6, 0.00,
322, 67, 53, 52, 390.4, 2.6, 0.8, 0.04,
323, 69, 49, 47, 100.7, 7.0, 0.3, 0.02,
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326, 69, 49, 38, 381.3, 8.1, 0.2, 0.00,
327, 54, 31, 29, 379.2, 6.4, 0.2, 0.00,
328, 52, 24, 20, 302.6, 2.9, 0, 0.00,
329, 59, 25, 22, 156.0, 4.9, 0, 0.00,
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331, 59, 24, 24, 137.2, 1.6, 0, 0.00,
332, 61, 25, 25, 344.8, 2.8, 0.1, 0.00,
333, 65, 24, 24, 73.6, 2.7, 0.1, 0.00,
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335, 60, 28, 18, 298.6, 3.4, 0, 0.00,
336, 63, 20, 16, 290.9, 1.3, 0.1, 0.00,
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357,53,33,37,243.5,2.2,0.5,0.00,
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Climate Data (1987)

1, 57, 26, 25, 326.7, 3.9, 0.3, 0.00,
2, 64, 31, 23, 338.9, 8.9, 0.4, 0.00,
3, 57, 28, 19, 359.7, 3.5, 0.3, 0.00,
4, 63, 22, 22, 196.4, 3.1, 0, 0.00,
5, 71, 33, 30, 279.8, 7.2, 0.2, 0.00,
6, 59, 30, 32, 271.0, 2.8, 0.4, 0.00,
7, 62, 27, 29, 343.4, 3.9, 0.1, 0.00,
8, 56, 34, 24, 306.8, 8.5, 0.2, 0.00,
9, 52, 24, 18, 365.6, 3.7, 0.3, 0.00,
10, 54, 22, 15, 256.6, 5.6, 0.1, 0.00,
11, 59, 20, 12, 263.8, 4.0, 0, 0.00,
12, 62, 19, 16, 281.7, 4.2, 0, 0.00,
13, 61, 22, 17, 128.6, 5.8, 0, 0.00,
14, 67, 30, 15, 356.4, 6.1, 0.7, 0.00,
15, 49, 31, 23, 341.5, 4.3, 0.7, 0.00,
16, 54, 25, 27, 252.8, 5.4, 0.4, 0.00,
17, 36, 17, 25, 174.3, 3.0, 0.8, 0.27,
18, 36, 9, 18, 213.1, 5.0, 0.3, 0.02,
19, 44, 15, 21, 265.8, 3.4, 0.1, 0.00,
20, 39, 25, 24, 390.8, 7.6, 0.6, 0.00,
21, 46, 17, 19, 368.3, 4.8, 0, 0.00,
22, 48, 15, 17, 274.6, 3.9, 0, 0.00,
23, 50, 18, 20, 332.9, 4.8, 0.6, 0.00,
24, 60, 28, 20, 246.7, 1.2, 0.1, 0.00,
25, 62, 21, 24, 269.0, 4.0, 0.2, 0.00,
26, 67, 29, 27, 391.6, 5.5, 0.1, 0.00,
27, 67, 24, 27, 409.5, 4.6, 0.3, 0.00,
28, 68, 31, 24, 412.4, 6.5, 0.8, 0.00,
29, 72, 39, 23, 415.3, 7.0, 0.1, 0.00,
30, 72, 33, 30, 266.4, 6.2, 0.4, 0.00,
31, 59, 40, 31, 209.3, 11.0, 0.6, 0.00,
32, 63, 32, 31, 318.8, 4.7, 0, 0.00,
33, 70, 27, 28, 363.9, 3.9, 0, 0.00,
34, 73, 26, 26, 342.4, 4.8, 0.5, 0.00,
35, 69, 41, 29, 273.8, 6.0, 0.7, 0.00,
36, 58, 34, 32, 336.6, 7.2, 0.5, 0.00,
37, 61, 22, 21, 427.9, 5.2, 0, 0.00,
38, 64, 23, 17, 444.5, 4.8, 0.1, 0.00,
39, 66, 23, 15, 369.0, 4.5, 0.7, 0.00,
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41, 72, 32, 28, 251.1, 4.2, 0.3, 0.00,
42, 73, 31, 30, 458.7, 4.9, 0, 0.00,
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44, 72, 40, 34, 383.3, 7.5, 0.2, 0.00,
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52, 37, 25, 30, 496.6, 7.0, 0.9, 0.23,
53, 48, 18, 27, 280.6, 3.8, 0.7, 0.00,

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62, 71, 34, 25, 536.5, 7.2, 0, 0.00,
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69, 58, 39, 39, 520.2, 5.4, 0.8, 0.34,
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74, 78, 39, 17, 511.3, 11.2, 0.4, 0.00,
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76, 62, 38, 31, 134.9, 16.1, 0.7, 0.06,
77, 69, 45, 30, 356.2, 9.4, 0.5, 0.00,
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82, 62, 39, 20, 616.2, 15.4, 0.1, 0.00,
83, 62, 41, 22, 620.0, 8.3, 0.3, 0.00,
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324,67,22,8,358.0,6.4,0,0.00,
325,72,30,21,269.1,8.0,0,0.00,
326,69,38,21,381.3,5.8,0,0.00,
327,72,31,21,379.2,3.8,0.7,0.00,
328,69,42,23,302.6,6.5,0.3,0.00,
329,68,27,22,156.0,6.0,0,0.00,
330,60,29,18,217.4,6.8,0,0.00,
331,52,22,21,137.2,3.6,0,0.00,
332,58,20,18,344.8,4.9,0.1,0.00,
333,60,26,18,73.6,6.9,0,0.00,
334,58,30,17,200.7,6.0,0.1,0.00,
335,58,27,16,298.6,5.8,0.3,0.00,
336,65,24,17,290.9,5.7,0.4,0.00,
337,70,29,21,203.2,4.6,0.1,0.00,
338,71,30,23,360.8,4.7,0.8,0.00,

339,73,44,28,359.6,1.6,0.5,0.00,
340,65,32,30,253.1,4.9,0,0.00,
341,70,28,25,235.2,5.7,0,0.00,
342,64,35,20,356.4,6.6,0,0.00,
343,67,25,14,355.5,5.7,0,0.00,
344,69,29,18,354.7,6.2,0,0.00,
345,76,33,24,354.0,8.0,0,0.00,
346,66,37,28,353.3,7.5,0.6,0.00,
347,46,27,29,326.9,6.4,1,1.46,
348,34,8,22,263.9,4.0,0.7,0.82,
349,27,6,11,252.8,5.4,0.5,0.00,
350,30,7,14,351.5,9.7,0.5,0.00,
351,40,17,24,280.4,8.1,0.5,0.00,
352,43,31,32,277.9,6.3,0.9,0.27,
353,54,34,36,350.9,9.9,0.6,0.00,
354,55,34,37,350.9,4.2,0.6,0.00,
355,56,29,33,351.0,4.9,0,0.00,
356,61,29,32,320.2,5.2,0,0.00,
357,70,36,28,243.5,12.9,0,0.00,
358,60,33,32,351.7,5.0,0.5,0.00,
359,38,22,26,352.1,8.9,1,0.20,
360,30,15,19,352.6,4.0,0.6,0.12,
361,36,14,20,353.1,7.1,0,0.00,
362,45,14,21,353.8,5.8,0,0.00,
363,52,20,23,354.5,6.2,0.5,0.00,
364,64,31,29,355.3,7.6,0.4,0.00,
365,50,25,21,316.1,9.7,0.6,0.00,

Climate Data (1988)

1,46,31,24,326.7,8.2,1,0.00,
2,48,25,21,338.9,4.7,0.4,0.00,
3,55,22,25,359.7,3.9,0.5,0.00,
4,62,34,28,196.4,4.9,0.7,0.00,
5,58,30,32,279.8,4.8,1,0.00,
6,60,42,38,271.0,1.6,0.5,0.02,
7,55,32,26,343.4,5.2,0.7,0.00,
8,60,26,22,306.8,8.4,0.4,0.00,
9,55,27,22,365.6,6.4,0.1,0.00,
10,59,25,23,256.6,4.5,0.5,0.00,
11,59,28,24,263.8,4.9,0.8,0.00,
12,64,33,23,281.7,7.6,0,0.00,
13,60,26,19,128.6,6.6,0.2,0.00,
14,61,26,18,356.4,6.1,0,0.00,
15,63,19,17,341.5,5.5,0.2,0.00,
16,64,39,26,252.8,1.4,0.7,0.00,
17,60,32,29,174.3,7.1,0.9,0.00,
18,55,37,30,213.1,14.1,0.8,0.23,
19,43,30,26,265.8,11.0,0.6,0.00,
20,42,29,19,390.8,5.4,0.4,0.00,
21,45,19,21,368.3,7.6,0.4,0.00,
22,46,26,18,274.6,11.0,0.5,0.00,
23,55,16,18,332.9,6.1,0,0.00,
24,52,24,16,246.7,7.4,0,0.00,
25,52,19,10,269.0,5.7,0,0.00,
26,59,20,13,391.6,6.5,0,0.00,
27,62,25,17,409.5,6.7,0.7,0.00,
28,65,33,20,412.4,5.7,0.7,0.00,
29,69,27,24,415.3,6.1,0.6,0.00,
30,64,39,30,266.4,6.7,0.6,0.00,
31,67,37,33,209.3,6.5,0.7,0.00,
32,66,36,33,318.8,6.9,0.8,0.00,
33,71,44,37,363.9,7.4,0.7,0.00,
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35,54,34,32,273.8,1.4,1,0.02,
36,37,30,29,336.6,8.2,0.9,0.53,
37,40,31,29,427.9,6.6,1,0.00,
38,52,31,32,444.5,3.5,0.5,0.00,
39,61,25,32,369.0,3.7,0,0.00,
40,64,34,30,262.9,6.5,0,0.00,
41,67,30,27,251.1,7.0,0,0.00,
42,54,25,23,458.7,5.1,0,0.00,
43,64,22,23,462.3,3.4,0,0.00,
44,72,23,21,383.3,5.7,0.1,0.00,
45,61,35,11,469.7,1.3,0,0.00,
46,63,25,13,448.2,6.0,0,0.00,
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48,63,38,23,359.6,8.1,0.4,0.00,
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50,45,28,33,321.7,9.4,0.7,0.15,
51,58,22,27,270.4,4.3,0,0.00,
52,66,26,24,496.6,3.8,0,0.00,
53,70,28,21,280.6,7.2,0.6,0.00,
54,68,40,22,192.6,5.8,0.6,0.00,

55,74,38,25,101.7,3.5,0.7,0.00,
56,71,36,28,281.6,5.8,0.9,0.00,
57,75,42,33,357.3,6.7,0.8,0.00,
58,73,42,39,444.0,5.2,0.1,0.00,
59,78,36,35,341.4,5.8,0,0.00,
60,78,40,29,410.7,6.0,0.4,0.00,
61,74,44,26,438.7,7.3,0.7,0.00,
62,64,47,27,536.5,1.7,0.7,0.00,
63,52,37,33,340.6,5.5,0.7,0.10,
64,64,33,33,544.7,7.5,0.1,0.00,
65,69,34,31,272.8,6.0,0,0.00,
66,75,34,28,360.5,4.8,0.3,0.00,
67,73,47,28,556.9,13.1,0.3,0.00,
68,59,31,5,531.3,1.4,0.4,0.00,
69,69,22,7,520.2,7.1,0,0.00,
70,76,42,11,448.7,17.1,0.1,0.00,
71,59,44,5,364.7,15.8,0.2,0.00,
72,60,36,4,202.4,8.1,0.2,0.00,
73,59,30,3,581.0,9.0,0,0.00,
74,61,24,9,511.3,4.7,0.2,0.00,
75,71,28,13,429.0,9.7,0.2,0.00,
76,72,48,12,134.9,13.2,0.1,0.00,
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78,55,28,14,600.8,5.8,0,0.00,
79,66,22,8,383.6,4.8,0,0.00,
80,75,23,1,250.9,4.9,0,0.00,
81,80,28,-1,594.4,5.1,0,0.00,
82,79,36,7,616.2,8.0,0,0.00,
83,80,39,16,620.0,7.3,0,0.00,
84,87,41,15,490.4,1.6,0,0.00,
85,82,45,11,535.0,7.6,0,0.00,
86,81,39,19,330.3,9.3,0.3,0.00,
87,86,47,27,528.8,9.3,0.9,0.00,
88,82,61,17,638.5,15.1,0.3,0.00,
89,66,38,2,567.9,9.5,0,0.00,
90,79,30,10,501.2,1.1,0,0.00,
91,62,42,14,403.7,12.7,0.4,0.00,
92,61,28,22,443.4,8.4,0,0.00,
93,75,44,16,518.7,8.7,0,0.00,
94,79,35,12,616.0,6.1,0,0.00,
95,82,36,11,549.7,7.7,0.2,0.00,
96,82,51,12,353.7,6.5,0.6,0.00,
97,80,48,23,451.8,8.2,0.6,0.00,
98,81,48,31,291.3,5.9,0.5,0.00,
99,86,55,36,459.9,9.4,0.1,0.00,
100,75,50,32,561.0,1.5,0,0.00,
101,67,40,23,678.5,6.9,0.3,0.00,
102,76,35,19,539.9,4.3,0.1,0.00,
103,86,39,14,656.1,4.9,0.4,0.00,
104,84,46,17,436.6,6.0,0.9,0.00,
105,74,55,39,453.7,1.2,0.6,0.00,
106,82,44,36,578.7,6.7,0.5,0.00,
107,69,54,40,677.2,1.1,0.7,0.01,
108,65,44,35,439.9,12.3,0.8,0.08,
109,72,45,36,583.4,8.7,0.2,0.00,
110,78,49,33,705.2,8.0,0.2,0.00,
111,82,46,28,703.1,8.6,0.4,0.00,

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113,72,41,28,545.1,11.5,0.1,0.00,
114,74,38,27,718.6,5.3,0,0.00,
115,71,44,22,543.5,14.8,0,0.00,
116,78,37,22,723.5,7.1,0,0.00,
117,85,40,17,725.8,5.6,0,0.00,
118,85,47,26,726.0,5.3,0.8,0.00,
119,81,50,39,730.4,9.0,0.9,0.14,
120,78,49,44,502.9,1.7,0.2,0.00,
121,85,47,38,375.0,6.8,0,0.00,
122,86,52,26,509.6,19.6,0.3,0.00,
123,71,45,15,544.6,11.3,0,0.00,
124,81,35,17,657.9,5.4,0,0.00,
125,87,45,34,513.0,9.4,0.3,0.00,
126,90,54,38,743.4,7.3,0.4,0.00,
127,85,64,27,746.7,14.0,0.4,0.00,
128,82,45,19,655.1,13.2,0.3,0.00,
129,80,52,20,750.2,1.2,0,0.00,
130,86,41,20,751.9,5.6,0,0.00,
131,93,42,22,598.6,5.8,0,0.00,
132,81,57,41,755.2,1.0,0,0.00,
133,85,49,43,756.8,5.9,0,0.00,
134,92,50,35,485.9,4.2,0,0.00,
135,97,53,32,717.8,3.8,0,0.00,
136,98,57,32,693.8,4.8,0,0.00,
137,97,57,42,644.8,8.8,0.4,0.00,
138,94,64,49,589.8,8.0,0.8,0.14,
139,83,56,41,765.2,7.7,0.8,0.00,
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141,82,53,33,721.3,9.0,0.3,0.00,
142,82,48,33,768.8,6.2,0,0.00,
143,85,50,32,769.9,6.5,0.1,0.00,
144,91,53,30,709.6,7.1,0.1,0.00,
145,91,59,38,771.9,6.5,0.4,0.00,
146,93,58,46,579.5,6.1,0.4,0.00,
147,92,56,49,690.3,5.8,0.1,0.00,
148,95,57,46,595.1,7.7,0.3,0.01,
149,92,61,33,680.9,7.5,0,0.00,
150,91,61,27,776.3,1.7,0.3,0.00,
151,84,57,33,460.9,1.8,0.2,0.00,
152,79,56,25,777.8,7.6,0,0.00,
153,87,46,22,760.3,5.0,0.4,0.00,
154,96,51,28,704.9,6.9,0.4,0.00,
155,90,61,43,623.3,8.7,0.5,0.00,
156,90,58,42,562.5,7.7,0,0.00,
157,94,63,42,631.7,8.1,0.5,0.01,
158,95,63,41,454.8,7.1,0.3,0.00,
159,95,62,30,729.1,8.2,0,0.00,
160,94,65,23,636.4,8.0,0,0.00,
161,101,59,27,508.3,5.7,0,0.00,
162,95,67,54,518.5,14.1,0.5,0.01,
163,96,65,51,689.5,9.9,0.6,0.01,
164,94,59,51,783.0,8.3,0.3,0.00,
165,94,62,41,733.6,6.4,0.4,0.00,
166,95,68,52,783.2,9.9,0.4,0.00,
167,90,59,53,670.1,7.8,0.2,0.00,
168,93,62,48,725.4,7.0,0,0.00,

169,97,65,51,637.9,6.6,0.1,0.00,
170,96,68,48,653.3,1.0,0.4,0.00,
171,96,68,44,574.5,8.9,0.2,0.00,
172,96,69,43,783.2,9.5,0.2,0.00,
173,97,62,45,783.0,6.6,0,0.00,
174,99,67,45,738.6,5.1,0.2,0.00,
175,99,67,44,782.6,5.3,0.6,0.00,
176,95,72,51,782.3,6.8,0.8,0.00,
177,94,65,55,752.6,6.6,0.5,0.00,
178,88,64,60,781.7,6.0,0.8,0.00,
179,90,65,59,781.3,7.6,0.7,0.00,
180,93,61,57,459.7,5.8,0.3,0.00,
181,97,72,52,780.4,8.3,0.4,0.00,
182,98,71,52,779.9,7.3,0.2,0.00,
183,93,66,61,779.4,8.7,0.8,1.27,
184,90,66,63,653.5,6.0,0.4,0.01,
185,94,68,60,717.2,4.8,0.3,0.00,
186,95,73,61,314.9,6.4,0.4,0.00,
187,96,69,66,776.8,7.6,0.5,0.56,
188,91,68,66,597.2,8.1,0.9,0.01,
189,93,68,65,377.8,5.8,0.7,0.14,
190,90,67,64,684.1,6.6,0.6,0.04,
191,91,67,63,760.5,6.3,0.7,0.82,
192,81,63,65,772.7,6.2,0.8,0.01,
193,91,66,61,771.8,6.5,0.3,0.01,
194,98,69,56,770.8,5.4,0,0.00,
195,99,66,55,769.8,6.5,0.1,0.00,
196,96,75,58,663.4,8.7,0.8,0.00,
197,94,70,59,767.6,5.9,0.6,0.04,
198,96,70,62,765.0,5.8,0.5,0.07,
199,98,71,60,493.9,7.7,0.6,0.00,
200,93,69,58,636.3,5.8,0.3,0.00,
201,95,67,60,705.9,8.5,0.4,0.00,
202,84,70,61,553.5,1.0,0.7,0.00,
203,87,65,55,758.7,7.5,0.5,0.00,
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205,97,61,49,688.2,6.1,0.2,0.00,
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208,97,63,56,276.5,5.5,0.3,0.00,
209,95,66,54,404.9,5.3,0.6,0.00,
210,94,66,60,749.3,6.2,0.7,0.33,
211,92,70,64,495.7,5.3,0.7,0.04,
212,90,63,59,745.9,5.8,0.4,0.00,
213,92,66,60,744.1,5.7,0.3,0.00,
214,91,67,61,720.5,7.7,0.5,0.08,
215,88,68,65,621.6,6.7,0.9,0.76,
216,93,68,64,551.6,7.3,0.7,0.00,
217,89,69,66,617.6,6.3,0.9,0.00,
218,77,66,66,513.5,5.5,0.9,0.20,
219,87,64,64,593.8,4.8,0.6,0.26,
220,85,67,67,607.3,4.8,0.8,0.00,
221,85,66,66,509.3,5.8,1,0.26,
222,83,67,65,481.4,6.0,0.9,0.06,
223,90,67,66,481.1,6.5,0.9,0.06,
224,92,68,65,518.5,5.1,0.6,0.32,
225,93,67,66,500.4,4.5,0.2,0.00,

226,95,68,66,506.2,3.9,0.3,0.00,
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229,87,66,66,709.2,7.0,0.7,0.06,
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235,94,68,65,693.1,6.4,0.3,0.18,
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237,95,66,58,464.6,5.3,0.2,0.00,
238,96,69,62,684.5,4.9,0.5,0.00,
239,91,69,66,681.5,6.7,0.7,0.06,
240,94,66,64,526.0,6.9,0.9,0.06,
241,73,65,61,675.5,8.3,1,0.00,
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243,80,62,64,564.2,5.6,0.6,0.02,
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245,89,65,62,580.5,5.1,0.4,0.02,
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247,78,64,60,607.6,7.8,0.9,0.44,
248,79,57,50,612.4,8.2,0.5,0.00,
249,78,54,49,642.5,6.4,0.6,0.00,
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252,96,54,50,516.4,3.8,0,0.00,
253,94,57,48,586.9,5.5,0,0.00,
254,92,63,39,535.2,6.4,0,0.00,
255,91,56,49,558.6,7.1,0.5,0.02,
256,89,64,61,528.1,5.7,0.7,0.31,
257,88,62,60,214.4,5.7,0.4,0.00,
258,89,59,55,618.0,6.3,0.1,0.00,
259,91,56,49,551.1,5.7,0,0.00,
260,92,57,46,299.3,6.7,0,0.00,
261,89,60,58,546.7,7.0,0.1,0.00,
262,92,59,50,562.2,6.8,0,0.00,
263,90,54,38,475.6,6.3,0,0.00,
264,87,63,55,595.5,5.8,0.8,0.04,
265,86,60,64,591.7,5.0,0.5,0.61,
266,86,62,63,438.1,7.0,0.3,0.08,
267,82,56,45,344.6,5.9,0,0.00,
268,86,50,48,580.2,5.2,0,0.00,
269,90,52,49,576.3,4.4,0,0.00,
270,91,55,50,572.4,4.3,0,0.00,
271,93,57,46,544.9,6.6,0,0.00,
272,90,54,39,564.6,7.5,0.1,0.00,
273,77,53,39,475.3,5.4,0.4,0.00,
274,80,46,40,258.3,5.6,0.1,0.00,
275,88,48,40,389.0,4.9,0,0.00,
276,83,56,44,313.4,5.7,0,0.00,
277,83,49,44,452.0,6.1,0,0.00,
278,84,49,42,428.5,6.2,0,0.00,
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283, 79, 56, 45, 282.0, 9.4, 0.5, 0.00,
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285, 73, 51, 48, 367.1, 8.0, 0.8, 0.00,
286, 77, 51, 48, 448.9, 6.4, 0.1, 0.00,
287, 82, 50, 48, 388.6, 4.3, 0, 0.00,
288, 84, 54, 50, 417.5, 5.8, 0.3, 0.14,
289, 78, 57, 57, 312.0, 6.3, 0.6, 0.00,
290, 86, 52, 53, 340.2, 5.5, 0.2, 0.00,
291, 88, 56, 50, 316.1, 4.7, 0.1, 0.00,
292, 89, 54, 47, 335.5, 4.1, 0.3, 0.00,
293, 88, 54, 47, 482.6, 4.6, 0.5, 0.00,
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295, 80, 58, 53, 475.2, 8.6, 0.5, 0.02,
296, 79, 51, 52, 405.5, 6.3, 0.5, 0.00,
297, 82, 51, 42, 285.6, 6.3, 0, 0.00,
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301, 85, 51, 40, 357.3, 7.0, 0, 0.00,
302, 78, 52, 42, 214.5, 5.4, 0.5, 0.00,
303, 80, 44, 43, 380.1, 3.5, 0.4, 0.00,
304, 77, 47, 44, 284.4, 4.4, 0.7, 0.00,
305, 82, 52, 37, 389.5, 8.6, 0, 0.00,
306, 79, 39, 39, 377.1, 4.8, 0.1, 0.00,
307, 79, 52, 32, 346.2, 1.0, 0.4, 0.00,
308, 81, 55, 34, 241.9, 11.7, 0, 0.00,
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310, 77, 45, 25, 423.6, 8.4, 0.2, 0.00,
311, 83, 37, 28, 420.5, 7.4, 0.2, 0.00,
312, 81, 55, 38, 417.5, 8.1, 0.1, 0.00,
313, 82, 45, 41, 298.6, 5.3, 0.3, 0.00,
314, 76, 53, 37, 411.6, 13.3, 0, 0.00,
315, 78, 40, 30, 363.5, 5.9, 0.4, 0.00,
316, 75, 46, 31, 406.0, 1.1, 0.2, 0.00,
317, 72, 49, 32, 403.2, 6.9, 0, 0.00,
318, 77, 38, 30, 400.5, 6.0, 0, 0.00,
319, 79, 44, 30, 381.4, 9.2, 0.1, 0.00,
320, 66, 43, 21, 395.3, 15.0, 0.1, 0.00,
321, 60, 30, 18, 268.8, 5.6, 0, 0.00,
322, 68, 25, 14, 390.4, 6.8, 0.4, 0.00,
323, 70, 39, 17, 100.7, 14.3, 0.2, 0.00,
324, 55, 29, 21, 358.0, 11.2, 0.2, 0.00,
325, 57, 22, 16, 269.1, 5.0, 0.5, 0.00,
326, 63, 26, 16, 381.3, 6.6, 0, 0.00,
327, 63, 22, 12, 379.2, 4.4, 0, 0.00,
328, 67, 22, 13, 302.6, 5.7, 0, 0.00,
329, 72, 41, 18, 156.0, 1.7, 0.6, 0.00,
330, 63, 45, 31, 217.4, 17.9, 0.9, 0.05,
331, 51, 40, 34, 137.2, 17.2, 0.8, 0.19,
332, 54, 29, 20, 344.8, 6.3, 0, 0.00,
333, 56, 23, 18, 73.6, 5.7, 0, 0.00,
334, 59, 28, 18, 200.7, 7.8, 0, 0.00,
335, 59, 27, 13, 298.6, 8.2, 0, 0.00,
336, 62, 27, 18, 290.9, 7.3, 0.4, 0.00,
337, 64, 31, 20, 203.2, 7.7, 0.5, 0.00,
338, 68, 33, 20, 360.8, 7.8, 0, 0.00,
339, 62, 37, 26, 359.6, 9.1, 0, 0.00,

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Climate Data (1989)

1, 62, 23, 13, 326.7, 7.3, 0.7, 0.00,
2, 57, 39, 21, 338.9, 5.2, 1, 0.00,
3, 60, 38, 28, 359.7, 5.9, 1, 0.00,
4, 70, 41, 33, 196.4, 11.3, 0.7, 0.01,
5, 60, 43, 32, 279.8, 13.2, 0, 0.00,
6, 61, 29, 27, 271.0, 11.9, 0.4, 0.00,
7, 50, 27, 17, 343.4, 1.2, 0.3, 0.00,
8, 45, 24, 3, 306.8, 9.3, 0.4, 0.00,
9, 48, 11, 1, 365.6, 4.9, 0, 0.00,
10, 57, 13, 5, 256.6, 5.2, 0, 0.00,
11, 68, 23, 13, 263.8, 9.2, 0, 0.00,
12, 45, 34, 15, 281.7, 14.1, 0.3, 0.00,
13, 38, 18, 10, 128.6, 7.0, 0.7, 0.00,
14, 51, 11, 12, 356.4, 7.1, 0, 0.00,
15, 59, 17, 9, 341.5, 5.4, 0.2, 0.00,
16, 60, 28, 8, 252.8, 8.9, 0.1, 0.00,
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18, 68, 32, 11, 213.1, 8.0, 0.3, 0.00,
19, 66, 32, 13, 265.8, 7.1, 0.1, 0.00,
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21, 57, 21, 22, 368.3, 6.2, 0.6, 0.00,
22, 62, 37, 29, 274.6, 5.2, 0.8, 0.00,
23, 67, 31, 28, 332.9, 7.6, 0.4, 0.00,
24, 67, 37, 27, 246.7, 7.8, 0.3, 0.00,
25, 63, 29, 23, 269.0, 6.0, 0, 0.00,
26, 58, 36, 31, 391.6, 1.7, 0.1, 0.00,
27, 55, 39, 34, 409.5, 9.2, 0.5, 0.10,
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29, 58, 28, 29, 415.3, 7.8, 0, 0.00,
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33, 63, 45, 40, 363.9, 9.8, 0.4, 0.00,
34, 68, 38, 33, 342.4, 8.3, 0.2, 0.00,
35, 71, 31, 24, 273.8, 11.2, 0.4, 0.00,
36, 73, 50, 29, 336.6, 15.0, 0.4, 0.00,
37, 60, 23, 9, 427.9, 1.8, 1, 0.00,
38, 44, 21, 8, 444.5, 9.0, 0.6, 0.00,
39, 53, 24, 14, 369.0, 9.5, 0.9, 0.00,
40, 56, 28, 13, 262.9, 6.3, 0.4, 0.00,
41, 65, 31, 21, 251.1, 4.9, 0.5, 0.00,
42, 74, 31, 28, 458.7, 5.0, 0.1, 0.00,
43, 72, 42, 27, 462.3, 1.1, 0.2, 0.00,
44, 62, 39, 14, 383.3, 9.5, 0.4, 0.00,
45, 57, 41, 32, 469.7, 8.6, 0.9, 0.00,
46, 61, 41, 32, 448.2, 5.4, 0.7, 0.00,
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48, 54, 43, 43, 359.6, 4.7, 1, 0.00,
49, 51, 38, 41, 246.2, 5.9, 0.8, 0.00,
50, 71, 33, 36, 321.7, 11.0, 0.5, 0.00,
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52, 60, 35, 21, 496.6, 7.2, 0, 0.00,
53, 67, 29, 21, 280.6, 4.9, 0.1, 0.00,
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55, 78, 35, 24, 101.7, 3.9, 0.4, 0.00,
56, 82, 37, 26, 281.6, 3.7, 0.5, 0.00,
57, 82, 39, 26, 357.3, 8.5, 0.1, 0.00,
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59, 68, 56, 27, 341.4, 9.5, 0.7, 0.00,
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77, 85, 46, 23, 356.2, 5.9, 0.6, 0.00,
78, 84, 44, 23, 600.8, 8.3, 0.2, 0.00,
79, 80, 33, 27, 383.6, 12.1, 0.6, 0.23,
80, 55, 33, 30, 250.9, 6.2, 0.3, 0.02,
81, 73, 33, 24, 594.4, 5.3, 0.3, 0.00,
82, 76, 41, 22, 616.2, 8.8, 0.6, 0.00,
83, 76, 57, 27, 620.0, 9.8, 0.5, 0.00,
84, 77, 54, 22, 490.4, 9.8, 0.1, 0.00,
85, 72, 56, 26, 535.0, 1.9, 0.7, 0.00,
86, 57, 45, 41, 330.3, 7.5, 0.8, 0.37,
87, 73, 39, 35, 528.8, 8.1, 0.1, 0.00,
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89, 78, 53, 27, 567.9, 8.8, 0, 0.00,
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91, 85, 47, 30, 403.7, 11.5, 0.2, 0.00,
92, 83, 62, 26, 443.4, 13.6, 0.2, 0.00,
93, 83, 62, 30, 518.7, 13.3, 0.3, 0.00,
94, 82, 47, 29, 616.0, 5.9, 0, 0.00,
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96, 89, 43, 26, 353.7, 6.8, 0.1, 0.00,
97, 91, 42, 26, 451.8, 7.3, 0, 0.00,
98, 93, 53, 30, 291.3, 6.7, 0.1, 0.00,
99, 91, 56, 29, 459.9, 12.7, 0, 0.00,
100, 56, 37, 27, 561.0, 13.1, 0, 0.00,
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102, 83, 51, 22, 539.9, 9.6, 0.5, 0.00,
103, 74, 47, 39, 656.1, 6.7, 0.3, 0.00,
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106, 87, 50, 24, 578.7, 9.2, 0.1, 0.00,
107, 90, 52, 22, 677.2, 6.4, 0, 0.00,
108, 94, 50, 26, 439.9, 5.4, 0.3, 0.00,
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149,93,65,48,680.9,1.7,0.3,0.00,
150,95,68,41,776.3,9.5,0.1,0.00,
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155,90,53,21,623.3,6.0,0.1,0.00,
156,92,59,37,562.5,7.0,0.5,0.00,
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158,96,66,24,454.8,7.7,0.2,0.00,
159,96,59,29,729.1,9.0,0.1,0.00,
160,92,69,26,636.4,7.1,0,0.00,
161,94,60,42,508.3,8.2,0,0.00,
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163,96,70,29,689.5,1.4,0,0.00,
164,94,60,42,783.0,6.8,0.3,0.00,
165,89,61,50,733.6,9.3,0.4,0.00,
166,93,66,49,783.2,7.0,0.6,0.00,
167,102,64,42,670.1,6.1,0.2,0.00,
168,105,65,38,725.4,5.9,0.4,0.00,

169,106,67,39,637.9,5.9,0.1,0.00,
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171,106,66,42,574.5,7.0,0.4,0.00,
172,105,76,44,783.2,1.0,0.6,0.00,
173,100,66,43,783.0,8.0,0.5,0.00,
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184,105,72,48,653.5,9.4,0.1,0.00,
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186,98,69,47,314.9,8.8,0,0.00,
187,96,69,41,776.8,7.7,0,0.00,
188,99,64,40,597.2,7.2,0.4,0.00,
189,97,67,40,377.8,5.8,0.6,0.00,
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229, 98, 67, 57, 709.2, 6.7, 0.4, 0.18,
230, 94, 68, 62, 706.6, 6.2, 0.7, 0.03,
231, 98, 65, 63, 584.0, 6.8, 0.6, 1.19,
232, 81, 65, 67, 533.0, 4.8, 0.9, 0.28,
233, 90, 68, 63, 692.9, 6.9, 0.7, 0.00,
234, 93, 66, 60, 610.9, 4.6, 0.2, 0.00,
235, 95, 67, 58, 693.1, 5.9, 0.5, 0.00,
236, 93, 64, 56, 619.7, 4.8, 0.3, 0.01,
237, 95, 66, 56, 464.6, 5.6, 0.4, 0.00,
238, 88, 66, 62, 684.5, 8.3, 0.9, 0.26,
239, 75, 65, 65, 681.5, 4.6, 1, 0.21,
240, 83, 67, 65, 526.0, 4.9, 0.8, 0.03,
241, 85, 68, 64, 675.5, 5.5, 1, 0.04,
242, 88, 67, 64, 672.4, 6.9, 0.8, 0.14,
243, 87, 66, 64, 564.2, 4.6, 0.7, 0.08,
244, 92, 68, 64, 436.5, 4.6, 0.6, 0.00,
245, 90, 65, 63, 580.5, 4.9, 0.4, 0.07,
246, 93, 65, 61, 525.9, 5.1, 0.1, 0.00,
247, 93, 67, 58, 607.6, 5.9, 0.4, 0.00,
248, 91, 67, 63, 612.4, 5.0, 0.7, 0.08,
249, 90, 67, 63, 642.5, 6.8, 0.7, 0.08,
250, 92, 65, 61, 617.0, 6.4, 0.1, 0.00,
251, 94, 66, 54, 244.9, 6.9, 0.2, 0.00,
252, 92, 61, 42, 516.4, 6.4, 0, 0.00,
253, 92, 62, 51, 586.9, 5.1, 0.3, 0.00,
254, 93, 63, 55, 535.2, 6.3, 0.1, 0.00,
255, 93, 63, 61, 558.6, 6.0, 0.5, 0.01,
256, 80, 58, 57, 528.1, 9.6, 0.4, 0.15,
257, 80, 54, 54, 214.4, 6.1, 0.2, 0.00,
258, 85, 54, 48, 618.0, 5.4, 0.2, 0.00,
259, 87, 52, 42, 551.1, 4.9, 0, 0.00,
260, 90, 59, 51, 299.3, 5.2, 0.3, 0.00,
261, 93, 61, 56, 546.7, 4.6, 0.2, 0.00,
262, 89, 68, 59, 562.2, 6.6, 0.7, 0.09,
263, 92, 63, 59, 475.6, 5.0, 0.1, 0.00,
264, 95, 64, 55, 595.5, 5.3, 0.2, 0.00,
265, 76, 58, 54, 591.7, 1.7, 0.5, 0.00,
266, 78, 53, 43, 438.1, 7.8, 0.2, 0.00,
267, 83, 48, 42, 344.6, 4.5, 0, 0.00,
268, 89, 50, 39, 580.2, 5.4, 0, 0.00,
269, 82, 53, 38, 576.3, 7.5, 0.1, 0.00,
270, 82, 46, 32, 572.4, 6.6, 0, 0.00,
271, 84, 43, 31, 544.9, 4.2, 0, 0.00,
272, 87, 45, 32, 564.6, 5.1, 0, 0.00,
273, 88, 50, 32, 475.3, 4.1, 0, 0.00,
274, 92, 50, 32, 258.3, 6.5, 0, 0.00,
275, 90, 52, 34, 389.0, 5.7, 0, 0.00,
276, 90, 52, 36, 313.4, 5.1, 0.2, 0.00,
277, 87, 52, 40, 452.0, 6.7, 0.7, 0.00,
278, 84, 57, 54, 428.5, 9.7, 0.5, 0.00,
279, 81, 51, 47, 537.0, 6.2, 0, 0.00,
280, 84, 50, 45, 455.5, 5.6, 0.2, 0.00,
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316,77,34,21,406.0,5.9,0.3,0.00,
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323,68,37,20,100.7,7.5,0.9,0.00,
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325,71,42,40,269.1,9.2,0.3,0.00,
326,65,40,33,381.3,8.7,0,0.00,
327,64,32,30,379.2,4.3,0.4,0.00,
328,72,41,31,302.6,1.5,0.6,0.00,
329,70,45,36,156.0,8.4,0.3,0.00,
330,70,40,37,217.4,9.2,0.2,0.00,
331,65,43,24,137.2,11.0,0.7,0.00,
332,49,39,14,344.8,12.3,0.9,0.00,
333,47,34,12,73.6,12.6,0.6,0.00,
334,54,26,23,200.7,7.8,0.1,0.00,
335,56,29,23,298.6,6.5,0.1,0.00,
336,54,29,27,290.9,7.7,0.2,0.00,
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342, 54, 24, 22, 356.4, 5.0, 0, 0.00,
343, 62, 19, 15, 355.5, 6.9, 0, 0.00,
344, 73, 41, 13, 354.7, 9.7, 0.3, 0.00,
345, 48, 19, 14, 354.0, 8.6, 0.1, 0.00,
346, 45, 8, 8, 353.3, 5.5, 0, 0.00,
347, 53, 11, 3, 326.9, 4.0, 0.1, 0.00,
348, 60, 19, 4, 263.9, 8.4, 0.2, 0.00,
349, 67, 41, 8, 252.8, 11.3, 0.6, 0.00,
350, 51, 28, 8, 351.5, 7.6, 1, 0.00,
351, 55, 40, 31, 280.4, 7.8, 0.8, 0.00,
352, 60, 34, 32, 277.9, 1.6, 0.1, 0.00,
353, 60, 38, 30, 350.9, 7.3, 0.1, 0.00,
354, 61, 29, 24, 350.9, 5.9, 0, 0.00,
355, 61, 21, 21, 351.0, 7.0, 0.2, 0.00,
356, 31, 14, 7, 320.2, 6.4, 0.3, 0.00,
357, 45, 9, 7, 243.5, 2.2, 0, 0.00,
358, 59, 18, 12, 351.7, 5.6, 0.3, 0.00,
359, 61, 24, 18, 352.1, 5.9, 0.5, 0.00,
360, 56, 23, 19, 352.6, 5.0, 0.7, 0.00,
361, 63, 34, 19, 353.1, 4.0, 0.9, 0.00,
362, 59, 43, 36, 353.8, 8.1, 0.7, 0.00,
363, 54, 39, 42, 354.5, 6.8, 0.9, 0.16,
364, 50, 36, 38, 355.3, 3.9, 0.7, 0.00,
365, 50, 28, 29, 316.1, 5.8, 0.2, 0.00,

Climate Data (1990)

1, 51, 20, 26, 326.7, 4.0, 0, 0.00,
2, 58, 22, 29, 338.9, 5.0, 0, 0.00,
3, 50, 32, 27, 359.7, 13.9, 0.6, 0.06,
4, 51, 24, 25, 196.4, 4.8, 0.5, 0.00,
5, 51, 26, 18, 279.8, 9.7, 0.2, 0.00,
6, 49, 24, 17, 271.0, 7.3, 0.2, 0.00,
7, 55, 20, 16, 343.4, 5.5, 0, 0.00,
8, 62, 22, 19, 306.8, 7.4, 0.2, 0.00,
9, 67, 28, 24, 365.6, 6.0, 0, 0.00,
10, 68, 28, 25, 256.6, 4.5, 0, 0.00,
11, 69, 24, 25, 263.8, 4.0, 0, 0.00,
12, 53, 34, 17, 281.7, 7.3, 0.4, 0.00,
13, 62, 27, 19, 128.6, 4.9, 0.1, 0.00,
14, 68, 31, 25, 356.4, 5.9, 0, 0.00,
15, 68, 34, 21, 341.5, 6.5, 0.4, 0.00,
16, 61, 29, 23, 252.8, 6.4, 0.3, 0.00,
17, 63, 23, 23, 174.3, 5.6, 0.4, 0.00,
18, 62, 35, 30, 213.1, 8.6, 0.8, 0.18,
19, 46, 33, 30, 265.8, 6.8, 0.7, 0.00,
20, 50, 23, 26, 390.8, 5.0, 0.3, 0.00,
21, 53, 29, 26, 368.3, 8.6, 0.3, 0.00,
22, 57, 33, 26, 274.6, 6.3, 0.7, 0.00,
23, 57, 43, 38, 332.9, 7.2, 0.8, 0.05,
24, 61, 38, 23, 246.7, 11.2, 0.1, 0.00,
25, 57, 23, 7, 269.0, 3.9, 0, 0.00,
26, 64, 25, 6, 391.6, 4.7, 0.2, 0.00,
27, 73, 35, 10, 409.5, 7.9, 0.5, 0.00,
28, 55, 30, 7, 412.4, 8.6, 0, 0.00,
29, 63, 24, 0, 415.3, 6.8, 0.2, 0.00,
30, 69, 31, 3, 266.4, 6.3, 0.2, 0.00,
31, 65, 45, 27, 209.3, 9.2, 1, 0.00,
32, 58, 36, 32, 318.8, 1.3, 0.6, 0.00,
33, 48, 35, 25, 363.9, 11.0, 0.6, 0.00,
34, 53, 23, 21, 342.4, 3.6, 0, 0.00,
35, 62, 21, 16, 273.8, 6.2, 0, 0.00,
36, 56, 39, 16, 336.6, 12.0, 0, 0.00,
37, 63, 25, 18, 427.9, 5.7, 0, 0.00,
38, 69, 25, 17, 444.5, 5.1, 0, 0.00,
39, 70, 48, 35, 369.0, 7.5, 0.9, 0.01,
40, 59, 43, 31, 262.9, 11.1, 0.4, 0.07,
41, 63, 32, 22, 251.1, 7.0, 0, 0.00,
42, 72, 32, 20, 458.7, 3.9, 0.1, 0.00,
43, 76, 37, 19, 462.3, 8.2, 0.6, 0.00,
44, 74, 58, 25, 383.3, 16.0, 0.9, 0.00,
45, 67, 42, 33, 469.7, 13.3, 0.9, 0.00,
46, 45, 27, 13, 448.2, 16.4, 0.4, 0.00,
47, 52, 23, 7, 298.6, 6.4, 0, 0.00,
48, 63, 24, 9, 359.6, 3.5, 0, 0.00,
49, 66, 30, 14, 246.2, 7.0, 0, 0.00,
50, 72, 35, 16, 321.7, 11.0, 0.2, 0.00,
51, 51, 32, 16, 270.4, 9.0, 0.2, 0.00,
52, 63, 28, 16, 496.6, 7.6, 0.3, 0.00,
53, 63, 34, 15, 280.6, 4.6, 0, 0.00,
54, 68, 29, 11, 192.6, 4.0, 0, 0.00,

55, 74, 35, 10, 101.7, 6.1, 0, 0.00,
56, 78, 33, 6, 281.6, 4.6, 0.7, 0.00,
57, 78, 43, 24, 357.3, 6.2, 0.8, 0.00,
58, 75, 46, 43, 444.0, 6.8, 0.6, 0.06,
59, 53, 40, 34, 341.4, 1.1, 0.9, 0.00,
60, 57, 38, 31, 410.7, 5.9, 0.6, 0.00,
61, 67, 35, 32, 438.7, 4.7, 0.7, 0.00,
62, 67, 38, 32, 536.5, 4.1, 0.8, 0.00,
63, 76, 44, 36, 340.6, 5.5, 0.7, 0.00,
64, 77, 51, 32, 544.7, 13.3, 0.7, 0.00,
65, 62, 44, 19, 272.8, 15.0, 0.1, 0.00,
66, 67, 35, 19, 360.5, 7.6, 0, 0.00,
67, 80, 31, 18, 556.9, 4.4, 0.4, 0.00,
68, 81, 48, 23, 531.3, 8.1, 0.9, 0.00,
69, 69, 48, 33, 520.2, 6.7, 0.9, 0.41,
70, 64, 44, 29, 448.7, 12.1, 0.3, 0.00,
71, 75, 42, 24, 364.7, 8.7, 0.2, 0.00,
72, 64, 42, 21, 202.4, 12.3, 0.5, 0.00,
73, 55, 34, 10, 581.0, 14.2, 0.2, 0.00,
74, 60, 36, 15, 511.3, 9.2, 0.4, 0.00,
75, 62, 30, 16, 429.0, 5.4, 0, 0.00,
76, 70, 32, 15, 134.9, 4.4, 0.3, 0.00,
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78, 68, 44, 29, 600.8, 8.4, 0, 0.00,
79, 76, 36, 29, 383.6, 4.5, 0.2, 0.00,
80, 84, 43, 25, 250.9, 7.2, 0.5, 0.00,
81, 84, 46, 23, 594.4, 4.9, 0.4, 0.00,
82, 86, 43, 29, 616.2, 5.3, 0.4, 0.00,
83, 74, 45, 44, 620.0, 8.4, 0.5, 0.00,
84, 76, 40, 38, 490.4, 3.8, 0.6, 0.00,
85, 62, 44, 36, 535.0, 6.4, 0.9, 0.00,
86, 75, 48, 35, 330.3, 8.4, 0.6, 0.00,
87, 76, 49, 26, 528.8, 1.4, 0.8, 0.00,
88, 67, 51, 28, 638.5, 12.5, 0.6, 0.00,
89, 67, 41, 26, 567.9, 6.6, 0.5, 0.00,
90, 73, 41, 24, 501.2, 5.2, 0.6, 0.00,
91, 77, 51, 30, 403.7, 7.8, 0.6, 0.00,
92, 67, 50, 37, 443.4, 1.4, 0.7, 0.00,
93, 76, 48, 39, 518.7, 7.4, 0.3, 0.00,
94, 80, 43, 31, 616.0, 8.3, 0, 0.00,
95, 76, 55, 32, 549.7, 11.7, 0.1, 0.00,
96, 68, 46, 37, 353.7, 1.1, 0.4, 0.00,
97, 75, 42, 34, 451.8, 5.7, 0.9, 0.00,
98, 80, 55, 32, 291.3, 9.3, 0.2, 0.00,
99, 79, 56, 28, 459.9, 12.4, 0.1, 0.00,
100, 80, 47, 28, 561.0, 7.7, 0, 0.00,
101, 81, 47, 30, 678.5, 8.6, 0.5, 0.00,
102, 86, 54, 28, 539.9, 9.1, 0.2, 0.00,
103, 90, 46, 18, 656.1, 1.8, 0, 0.00,
104, 89, 52, 30, 436.6, 6.6, 0.1, 0.00,
105, 91, 53, 20, 453.7, 7.7, 0.2, 0.00,
106, 88, 53, 20, 578.7, 11.1, 0.6, 0.00,
107, 72, 52, 33, 677.2, 1.9, 1, 0.00,
108, 76, 49, 46, 439.9, 1.1, 0.5, 0.03,
109, 80, 44, 34, 583.4, 8.5, 0.2, 0.00,
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129,89,65,24,750.2,1.4,0.5,0.00,
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136,87,61,24,693.8,1.0,0.1,0.00,
137,84,51,41,644.8,8.6,0.7,0.00,
138,92,62,38,589.8,11.3,0.8,0.00,
139,89,61,22,765.2,15.2,0.6,0.00,
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142,96,62,41,768.8,7.7,0.7,0.00,
143,98,62,40,769.9,9.2,0.3,0.00,
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146,93,69,29,579.5,11.9,0.3,0.00,
147,93,58,25,690.3,5.9,0,0.00,
148,96,60,40,595.1,1.1,0.1,0.00,
149,84,67,27,680.9,13.7,0,0.00,
150,88,54,31,776.3,7.1,0.2,0.00,
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152,95,68,29,777.8,11.7,0,0.00,
153,95,61,29,760.3,6.1,0,0.00,
154,101,55,32,704.9,5.5,0,0.00,
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156,104,77,41,562.5,11.0,0.4,0.00,
157,102,76,40,631.7,9.5,0.8,0.00,
158,100,80,41,454.8,9.3,1,0.00,
159,102,74,44,729.1,8.1,0.5,0.00,
160,97,79,49,636.4,1.1,0.8,0.00,
161,97,75,53,508.3,6.6,0.7,0.00,
162,98,76,56,518.5,7.6,0.8,0.00,
163,98,79,47,689.5,11.0,0.5,0.00,
164,98,74,45,783.0,12.2,0.1,0.00,
165,99,71,45,733.6,9.0,0.2,0.00,
166,95,78,45,783.2,9.5,0.7,0.00,
167,97,72,40,670.1,1.4,0.1,0.00,
168,103,61,43,725.4,6.2,0.2,0.00,

169,104,73,53,637.9,8.1,0.2,0.00,
170,106,78,48,653.3,9.5,0.1,0.00,
171,103,75,44,574.5,8.8,0.1,0.00,
172,106,73,48,783.2,6.4,0.1,0.00,
173,99,70,53,783.0,1.7,0,0.00,
174,105,72,51,738.6,6.2,0.1,0.00,
175,106,76,47,782.6,6.9,0.1,0.00,
176,110,68,42,782.3,7.1,0.5,0.00,
177,110,71,44,752.6,8.3,0.2,0.00,
178,105,76,45,781.7,7.9,0.1,0.00,
179,106,74,47,781.3,7.4,0.1,0.00,
180,103,74,49,459.7,9.6,0.1,0.00,
181,98,72,48,780.4,11.0,0,0.00,
182,96,69,51,779.9,1.1,0.3,0.00,
183,89,67,55,779.4,6.4,0.8,0.00,
184,94,68,60,653.5,8.1,0.5,0.01,
185,96,73,61,717.2,6.7,0.7,0.01,
186,94,73,60,314.9,7.4,0.8,0.00,
187,97,71,52,776.8,7.1,0.3,0.00,
188,98,71,55,597.2,9.3,0.3,0.00,
189,95,70,59,377.8,6.9,0.6,0.00,
190,97,74,61,684.1,7.2,0.7,0.00,
191,97,71,63,760.5,6.6,0.4,0.00,
192,99,70,55,772.7,9.6,0.6,0.00,
193,85,69,62,771.8,1.6,0.7,0.02,
194,93,62,55,770.8,9.1,0.6,0.00,
195,94,67,59,769.8,8.8,0.9,0.15,
196,84,67,63,663.4,6.9,0.9,0.01,
197,92,63,59,767.6,6.5,0.6,0.00,
198,97,67,60,765.0,6.8,0.3,0.02,
199,96,67,58,493.9,7.3,0.3,0.00,
200,97,68,59,636.3,8.2,0.3,0.00,
201,99,71,63,705.9,5.8,0.4,0.23,
202,96,71,63,553.5,9.0,0.8,0.00,
203,86,68,60,758.7,11.1,0.6,0.00,
204,88,65,58,662.9,7.2,0.2,0.00,
205,92,65,59,688.2,8.3,0.6,0.00,
206,95,69,61,755.7,9.6,0.6,0.00,
207,95,65,63,607.0,8.2,0.4,1.28,
208,93,66,61,276.5,8.7,0.4,0.53,
209,89,66,62,404.9,8.7,0.6,0.04,
210,84,63,63,749.3,7.8,0.5,1.07,
211,79,64,64,495.7,7.4,0.7,0.55,
212,79,65,64,745.9,7.4,0.8,0.04,
213,84,64,63,744.1,5.7,0.6,0.00,
214,91,67,59,720.5,9.2,0.4,0.00,
215,92,69,59,621.6,8.1,0.3,0.00,
216,91,66,58,551.6,9.5,0.3,0.00,
217,87,66,57,617.6,11.3,0.8,0.00,
218,71,61,61,513.5,9.0,1,0.35,
219,67,58,61,593.8,5.5,1,0.84,
220,84,62,63,607.3,5.8,0.6,0.00,
221,92,62,61,509.3,6.2,0,0.00,
222,93,62,58,481.4,5.5,0.1,0.00,
223,90,68,57,481.1,6.1,0.8,0.00,
224,87,65,61,518.5,6.1,0.9,0.03,
225,81,64,64,500.4,7.1,0.9,0.15,

226,86,61,61,506.2,6.5,0.5,0.03,
227,86,66,62,639.9,6.2,0.6,0.01,
228,87,66,62,526.3,9.2,0.6,0.00,
229,91,65,54,709.2,9.1,0.5,0.00,
230,92,67,55,706.6,8.1,0.2,0.00,
231,95,65,56,584.0,6.1,0.4,0.00,
232,90,65,61,533.0,11.4,0.8,0.25,
233,78,64,66,692.9,7.4,1,0.29,
234,85,63,62,610.9,6.9,0.8,0.03,
235,88,60,59,693.1,5.0,0.1,0.00,
236,92,66,59,619.7,6.1,0.1,0.00,
237,95,62,56,464.6,5.2,0,0.00,
238,97,69,62,684.5,6.2,0.3,0.00,
239,98,67,59,681.5,5.7,0.2,0.00,
240,97,69,54,526.0,7.4,0.1,0.00,
241,96,66,48,675.5,8.0,0,0.00,
242,96,63,53,672.4,6.0,0.1,0.00,
243,96,67,56,564.2,6.4,0.1,0.00,
244,93,69,63,436.5,5.8,0.6,0.06,
245,93,63,57,580.5,5.9,0.6,0.03,
246,86,64,55,525.9,1.1,0.4,0.00,
247,82,63,62,607.6,9.4,0.7,0.00,
248,83,67,66,612.4,6.3,1,0.02,
249,89,65,64,642.5,6.0,0.4,0.00,
250,95,65,63,617.0,6.5,0.4,0.00,
251,92,68,62,244.9,7.2,0.4,0.00,
252,94,62,57,516.4,5.1,0,0.00,
253,94,65,55,586.9,8.8,0.4,0.00,
254,93,64,54,535.2,6.5,0.2,0.00,
255,93,63,51,558.6,6.7,0.2,0.00,
256,91,58,50,528.1,6.0,0.2,0.00,
257,81,61,57,214.4,7.3,0.7,0.01,
258,82,61,59,618.0,6.7,0.5,0.00,
259,87,57,59,551.1,5.0,0.3,0.20,
260,90,60,55,299.3,7.2,0,0.00,
261,91,61,60,546.7,8.7,0.4,0.04,
262,88,64,64,562.2,5.5,0.5,0.05,
263,86,63,62,475.6,6.7,0.5,0.53,
264,88,66,64,595.5,5.9,0.8,0.00,
265,76,62,64,591.7,8.1,1,0.93,
266,62,54,58,438.1,8.7,1,0.55,
267,73,54,57,344.6,4.6,0.8,0.00,
268,85,54,58,580.2,4.6,0,0.00,
269,90,57,55,576.3,4.5,0.1,0.00,
270,88,57,52,572.4,5.9,0,0.00,
271,87,61,55,544.9,4.6,0.7,0.00,
272,84,61,57,564.6,5.4,0.8,0.00,
273,71,60,61,475.3,1.0,1,1.04,
274,69,58,61,258.3,4.6,0.9,0.44,
275,71,57,58,389.0,7.8,0.7,0.14,
276,80,55,52,313.4,6.6,0,0.00,
277,84,52,52,452.0,6.5,0,0.00,
278,84,56,58,428.5,5.9,0.7,0.00,
279,84,59,58,537.0,8.3,0.1,0.00,
280,87,61,54,455.5,8.3,0.1,0.00,
281,84,57,47,529.1,11.3,0.1,0.00,
282,68,47,33,494.2,8.4,0,0.00,

283,72,40,34,282.0,4.6,0,0.00,
284,81,43,34,222.5,8.0,0,0.00,
285,76,47,34,367.1,6.7,0.1,0.00,
286,83,43,32,448.9,9.6,0,0.00,
287,84,50,25,388.6,8.2,0,0.00,
288,83,47,35,417.5,7.8,0.4,0.00,
289,83,47,41,312.0,7.4,0.3,0.00,
290,82,55,42,340.2,7.3,0,0.00,
291,78,48,38,316.1,7.0,0.1,0.00,
292,84,49,43,335.5,8.7,0,0.00,
293,78,56,36,482.6,13.3,0.1,0.00,
294,64,40,29,478.9,7.7,0.2,0.00,
295,71,31,31,475.2,4.3,0,0.00,
296,80,40,32,405.5,5.7,0.2,0.00,
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298,81,41,35,425.2,5.1,0,0.00,
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300,85,41,33,259.7,9.4,0.1,0.00,
301,76,47,41,357.3,7.5,0,0.00,
302,77,41,43,214.5,4.0,0,0.00,
303,81,40,38,380.1,3.7,0,0.00,
304,82,42,37,284.4,7.1,0.2,0.00,
305,75,51,43,389.5,8.3,0.9,0.00,
306,76,53,51,377.1,9.8,0.8,0.30,
307,59,40,41,346.2,7.1,0.5,0.08,
308,56,32,34,241.9,5.6,0,0.00,
309,64,31,34,419.3,7.4,0,0.00,
310,70,41,37,423.6,7.5,0.8,0.00,
311,49,33,32,420.5,13.0,0.9,0.58,
312,53,33,34,417.5,6.2,0.5,0.10,
313,60,33,34,298.6,4.8,0,0.00,
314,68,32,36,411.6,4.1,0,0.00,
315,71,36,38,363.5,5.8,0,0.00,
316,72,38,39,406.0,6.5,0.2,0.00,
317,73,38,37,403.2,5.5,0.4,0.00,
318,72,37,38,400.5,5.1,0,0.00,
319,76,37,39,381.4,4.5,0,0.00,
320,74,40,36,395.3,9.9,0.3,0.00,
321,70,39,42,268.8,5.2,0.3,0.00,
322,75,38,42,390.4,5.1,0,0.00,
323,79,39,38,100.7,6.0,0.3,0.00,
324,60,50,51,358.0,8.5,1,0.19,
325,65,50,47,269.1,5.9,0.8,0.03,
326,66,43,35,381.3,7.1,0.5,0.00,
327,66,40,28,379.2,7.0,0.5,0.00,
328,73,40,39,302.6,6.0,0.5,0.00,
329,75,52,48,156.0,8.5,0.7,0.00,
330,69,47,44,217.4,15.3,0.4,0.06,
331,56,43,20,137.2,13.4,0.2,0.00,
332,56,27,16,344.8,9.2,0,0.00,
333,59,28,18,73.6,8.2,0,0.00,
334,64,31,29,200.7,5.8,0.1,0.00,
335,66,35,36,298.6,4.0,0.5,0.00,
336,68,34,20,290.9,1.2,0.2,0.00,
337,55,31,6,203.2,8.3,0,0.00,
338,55,21,7,360.8,6.8,0,0.00,
339,60,22,14,359.6,7.2,0.3,0.00,

340,58,29,15,253.1,7.5,0,0.00,
341,54,22,16,235.2,4.3,0,0.00,
342,59,19,14,356.4,4.2,0,0.00,
343,62,25,15,355.5,5.6,0,0.00,
344,63,23,17,354.7,6.3,0,0.00,
345,69,30,26,354.0,6.6,0,0.00,
346,70,42,37,353.3,6.8,0.2,0.00,
347,62,45,44,326.9,5.9,0.9,0.00,
348,67,48,42,263.9,8.1,0.8,0.00,
349,56,45,44,252.8,7.2,1,0.01,
350,54,47,49,351.5,7.5,1,0.24,
351,48,37,25,280.4,15.3,0.1,0.00,
352,51,28,25,277.9,1.8,0,0.00,
353,62,24,23,350.9,8.5,0.1,0.00,
354,65,37,23,350.9,12.4,0,0.00,
355,59,40,29,351.0,15.0,0.5,0.00,
356,55,31,27,320.2,13.8,0.5,0.00,
357,40,22,3,243.5,9.9,0,0.00,
358,43,20,-1,351.7,8.8,0.4,0.00,
359,50,17,7,352.1,5.3,0.3,0.00,
360,45,30,12,352.6,5.9,0.9,0.00,
361,55,27,20,353.1,5.8,0.6,0.00,
362,56,38,42,353.8,6.9,0.8,0.09,
363,63,46,41,354.5,13.0,0.3,0.00,
364,61,41,36,355.3,8.4,0.2,0.00,
365,62,31,29,316.1,6.8,0,0.00,

Climate Data (1991)

1, 60, 30, 27, 326.7, 6.3, 0.4, 0.00,
2, 62, 26, 24, 338.9, 4.6, 0.4, 0.00,
3, 60, 30, 28, 359.7, 5.1, 0.8, 0.00,
4, 51, 39, 37, 196.4, 4.6, 0.9, 0.00,
5, 60, 36, 42, 279.8, 6.3, 0.8, 0.00,
6, 61, 40, 43, 271.0, 6.1, 0.6, 0.01,
7, 62, 37, 38, 343.4, 5.1, 0.3, 0.00,
8, 63, 29, 34, 306.8, 4.8, 0.5, 0.00,
9, 57, 38, 36, 365.6, 9.2, 0.7, 0.00,
10, 58, 38, 34, 256.6, 8.6, 0.4, 0.02,
11, 56, 30, 26, 263.8, 5.5, 0.2, 0.00,
12, 56, 26, 22, 281.7, 5.5, 0.5, 0.00,
13, 62, 22, 22, 128.6, 6.4, 0, 0.00,
14, 60, 38, 24, 356.4, 11.4, 0.3, 0.00,
15, 57, 25, 19, 341.5, 6.9, 0, 0.00,
16, 55, 28, 25, 252.8, 9.5, 0.6, 0.00,
17, 45, 37, 35, 174.3, 11.1, 1, 0.15,
18, 52, 35, 34, 213.1, 7.6, 0.5, 0.42,
19, 55, 35, 31, 265.8, 1.6, 0.1, 0.00,
20, 52, 32, 30, 390.8, 9.2, 0.9, 0.02,
21, 34, 29, 27, 368.3, 6.9, 1, 0.04,
22, 49, 30, 31, 274.6, 4.9, 0.8, 0.00,
23, 48, 33, 36, 332.9, 6.3, 0.6, 0.08,
24, 53, 29, 29, 246.7, 6.5, 0, 0.00,
25, 60, 34, 29, 269.0, 6.3, 0.4, 0.00,
26, 62, 30, 28, 391.6, 5.9, 0.4, 0.00,
27, 64, 43, 17, 409.5, 8.8, 0.3, 0.00,
28, 62, 33, 24, 412.4, 1.7, 0.3, 0.00,
29, 60, 39, 29, 415.3, 11.3, 0.5, 0.00,
30, 52, 25, 26, 266.4, 5.0, 0.2, 0.08,
31, 59, 22, 23, 209.3, 3.3, 0, 0.00,
32, 63, 29, 23, 318.8, 7.3, 0.5, 0.00,
33, 68, 36, 26, 363.9, 6.4, 0.7, 0.00,
34, 68, 35, 34, 342.4, 6.4, 0.4, 0.00,
35, 66, 40, 21, 273.8, 7.5, 0, 0.00,
36, 64, 31, 26, 336.6, 5.7, 0, 0.00,
37, 66, 27, 22, 427.9, 6.5, 0, 0.00,
38, 65, 34, 25, 444.5, 11.4, 0, 0.00,
39, 72, 35, 24, 369.0, 8.7, 0.2, 0.00,
40, 64, 35, 29, 262.9, 8.3, 0.8, 0.00,
41, 61, 41, 31, 251.1, 7.9, 1, 0.00,
42, 52, 46, 44, 458.7, 4.5, 1, 0.13,
43, 67, 45, 49, 462.3, 8.3, 0.8, 0.14,
44, 70, 50, 40, 383.3, 13.4, 0.4, 0.00,
45, 71, 42, 30, 469.7, 5.0, 0.2, 0.00,
46, 64, 36, 29, 448.2, 7.1, 0.6, 0.00,
47, 73, 46, 38, 298.6, 1.0, 0.6, 0.00,
48, 66, 46, 37, 359.6, 12.1, 0.4, 0.03,
49, 51, 40, 37, 246.2, 11.1, 0.9, 0.10,
50, 51, 31, 30, 321.7, 8.6, 0.5, 0.06,
51, 57, 29, 26, 270.4, 5.1, 0, 0.00,
52, 67, 28, 27, 496.6, 5.5, 0, 0.00,
53, 71, 31, 26, 280.6, 5.8, 0.4, 0.00,

54,71,42,24,192.6,6.1,1,0.00,
55,72,53,22,101.7,9.6,0.9,0.00,
56,59,37,24,281.6,6.9,0.9,0.00,
57,61,31,26,357.3,8.0,0.8,0.00,
58,67,34,32,444.0,5.6,0.4,0.00,
59,57,46,43,341.4,9.9,0.8,0.20,
60,64,44,39,410.7,17.9,0.6,0.03,
61,58,46,35,438.7,2.4,0.3,0.07,
62,69,41,27,536.5,7.6,0,0.00,
63,76,36,25,340.6,8.0,0,0.00,
64,80,49,31,544.7,13.8,0,0.00,
65,75,55,33,272.8,18.4,0.5,0.00,
66,64,39,20,360.5,13.8,0.1,0.00,
67,63,29,11,556.9,5.7,0,0.00,
68,67,30,16,531.3,1.6,0.4,0.00,
69,79,40,31,520.2,7.9,0.8,0.00,
70,73,54,26,448.7,17.6,0.8,0.00,
71,68,49,18,364.7,14.3,0,0.00,
72,65,37,12,202.4,6.2,0.8,0.00,
73,69,38,17,581.0,13.6,0.2,0.00,
74,65,37,18,511.3,7.6,0.2,0.00,
75,53,37,19,429.0,16.0,0.3,0.00,
76,64,26,16,134.9,5.8,0.3,0.00,
77,76,36,17,356.2,5.5,0.8,0.00,
78,72,52,35,600.8,15.6,0.8,0.00,
79,68,39,30,383.6,8.3,0.6,0.00,
80,65,40,28,250.9,15.8,0.4,0.00,
81,58,38,24,594.4,14.8,0.1,0.00,
82,69,31,21,616.2,5.5,0.3,0.00,
83,81,35,19,620.0,6.7,0.4,0.00,
84,80,47,25,490.4,1.0,0.5,0.00,
85,79,47,30,535.0,16.4,0.6,0.00,
86,69,41,26,330.3,1.7,0.2,0.00,
87,54,39,25,528.8,17.3,0.3,0.00,
88,64,29,26,638.5,12.2,0,0.00,
89,62,39,19,567.9,1.5,0.1,0.00,
90,69,26,19,501.2,5.8,0,0.00,
91,84,35,22,403.7,1.9,0.2,0.00,
92,76,53,19,443.4,13.7,0,0.00,
93,78,41,18,518.7,6.7,0.5,0.00,
94,73,47,34,616.0,1.3,0.4,0.00,
95,79,40,38,549.7,8.1,0.2,0.00,
96,84,44,35,353.7,9.1,0.1,0.00,
97,86,62,23,451.8,14.4,0.2,0.00,
98,81,58,19,291.3,11.9,0.4,0.00,
99,78,45,14,459.9,8.9,0,0.00,
100,83,45,23,561.0,11.7,0,0.00,
101,84,62,13,678.5,16.9,0,0.00,
102,71,46,12,539.9,1.9,0,0.00,
103,66,37,8,656.1,11.8,0,0.00,
104,73,44,14,436.6,9.6,0,0.00,
105,84,37,12,453.7,6.8,0,0.00,
106,83,42,15,578.7,1.9,0.6,0.00,
107,80,63,29,677.2,14.0,0.3,0.00,
108,78,58,28,439.9,12.3,0.6,0.00,
109,82,52,22,583.4,5.8,0.4,0.00,
110,86,48,29,705.2,7.3,0.4,0.00,

111,84,56,16,703.1,13.2,0.1,0.00,
112,80,56,16,609.7,9.0,0.4,0.00,
113,81,57,19,545.1,9.2,0.6,0.00,
114,79,52,24,718.6,11.0,0.1,0.00,
115,84,43,22,543.5,12.7,0,0.00,
116,80,58,28,723.5,13.7,0.3,0.00,
117,78,55,26,725.8,14.1,0.2,0.00,
118,68,42,10,726.0,12.3,0,0.00,
119,75,33,10,730.4,8.9,0,0.00,
120,84,45,17,502.9,7.3,0.4,0.00,
121,86,47,24,375.0,6.6,0.1,0.00,
122,84,49,25,509.6,13.2,0,0.00,
123,81,47,18,544.6,11.9,0,0.00,
124,78,51,14,657.9,1.6,0,0.00,
125,80,45,19,513.0,8.4,0.3,0.00,
126,87,43,31,743.4,7.4,0.7,0.00,
127,89,59,33,746.7,13.5,0,0.00,
128,92,52,30,655.1,7.7,0.3,0.00,
129,93,55,31,750.2,8.7,0.6,0.00,
130,92,59,30,751.9,11.4,0.1,0.00,
131,91,50,30,598.6,1.3,0,0.00,
132,89,54,25,755.2,7.3,0.4,0.00,
133,92,62,30,756.8,9.8,0.3,0.00,
134,91,63,28,485.9,14.6,0,0.00,
135,83,60,26,717.8,13.3,0,0.00,
136,87,50,27,693.8,9.9,0,0.00,
137,91,56,28,644.8,8.8,0,0.00,
138,94,53,31,589.8,7.0,0.1,0.00,
139,95,65,42,765.2,11.8,0.5,0.00,
140,87,65,51,627.4,13.0,0.9,0.08,
141,84,60,60,721.3,9.6,0.6,0.15,
142,86,55,45,768.8,6.8,0,0.00,
143,90,55,31,769.9,9.1,0,0.00,
144,90,55,31,709.6,6.7,0,0.00,
145,95,52,29,771.9,7.5,0,0.00,
146,95,58,27,579.5,9.7,0,0.00,
147,95,62,31,690.3,6.7,0,0.00,
148,94,64,32,595.1,9.2,0,0.00,
149,93,56,25,680.9,8.7,0,0.00,
150,92,68,19,776.3,14.6,0.2,0.00,
151,88,62,30,460.9,11.4,0.6,0.00,
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153,82,51,36,760.3,8.3,0,0.00,
154,87,51,33,704.9,7.5,0,0.00,
155,94,55,30,623.3,6.6,0.2,0.00,
156,89,57,35,562.5,9.8,0.3,0.00,
157,94,56,34,631.7,8.4,0.1,0.00,
158,95,57,40,454.8,6.3,0,0.00,
159,96,61,43,729.1,8.8,0.4,0.00,
160,89,64,49,636.4,7.6,0.9,0.00,
161,81,62,53,508.3,9.1,0.9,0.00,
162,85,60,48,518.5,6.8,0.7,0.00,
163,90,68,45,689.5,11.5,0.5,0.00,
164,91,65,44,783.0,11.0,0.6,0.00,
165,90,60,41,733.6,8.4,0.4,0.00,
166,93,55,34,783.2,6.3,0,0.00,
167,98,62,39,670.1,6.5,0,0.00,

168,102,61,32,725.4,6.1,0,0.00,
169,104,61,29,637.9,7.0,0,0.00,
170,103,71,34,653.3,6.5,0.3,0.00,
171,98,75,31,574.5,8.7,0.5,0.00,
172,98,60,24,783.2,7.5,0,0.00,
173,99,53,28,783.0,6.9,0,0.00,
174,101,60,29,738.6,7.1,0,0.00,
175,105,65,43,782.6,9.1,0.1,0.00,
176,104,73,45,782.3,12.2,0.1,0.00,
177,103,71,47,752.6,7.8,0,0.00,
178,103,73,39,781.7,8.5,0.3,0.01,
179,100,74,54,781.3,7.5,0.4,0.00,
180,101,73,57,459.7,6.9,0.5,0.00,
181,99,69,58,780.4,8.5,0.3,0.00,
182,94,66,62,779.9,6.9,0.6,1.03,
183,85,65,64,779.4,7.1,0.7,0.01,
184,88,62,60,653.5,7.6,0.4,0.00,
185,88,63,59,717.2,7.7,0.6,0.03,
186,94,64,53,314.9,7.1,0.3,0.00,
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189,100,71,56,377.8,8.3,0.4,0.02,
190,93,69,61,684.1,8.1,0.8,0.00,
191,90,70,58,760.5,8.2,0.9,0.00,
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193,93,69,58,771.8,8.3,0.8,0.08,
194,86,67,61,770.8,8.0,0.9,0.02,
195,79,67,66,769.8,5.8,0.9,0.53,
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197,89,65,65,767.6,7.5,0.5,0.04,
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199,95,67,55,493.9,6.5,0.2,0.00,
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201,93,69,60,705.9,7.1,0.7,0.00,
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203,87,67,64,758.7,6.0,0.9,0.00,
204,91,66,62,662.9,5.7,0.6,0.09,
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208,92,64,61,276.5,5.3,0.4,0.00,
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227, 89, 66, 64, 639.9, 4.7, 0.6, 0.00,
228, 94, 67, 64, 526.3, 6.0, 0.6, 0.00,
229, 94, 67, 63, 709.2, 7.5, 0.8, 0.29,
230, 91, 69, 65, 706.6, 6.4, 0.8, 0.00,
231, 92, 67, 61, 584.0, 7.5, 0.4, 0.00,
232, 94, 66, 62, 533.0, 5.1, 0.4, 0.00,
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239, 93, 64, 57, 681.5, 6.9, 0.1, 0.00,
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242, 95, 68, 57, 672.4, 9.3, 0.6, 0.00,
243, 91, 63, 56, 564.2, 9.5, 0.3, 0.00,
244, 90, 60, 54, 436.5, 6.4, 0.1, 0.00,
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246, 100, 63, 54, 525.9, 7.9, 0.4, 0.03,
247, 84, 66, 60, 607.6, 9.4, 0.7, 0.06,
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249, 87, 66, 63, 642.5, 6.4, 0.9, 0.00,
250, 93, 64, 61, 617.0, 6.2, 0.3, 0.04,
251, 96, 65, 61, 244.9, 7.9, 0.4, 0.00,
252, 75, 65, 64, 516.4, 5.8, 1, 0.28,
253, 80, 65, 65, 586.9, 5.9, 1, 0.12,
254, 87, 63, 62, 535.2, 7.1, 0.7, 0.25,
255, 89, 62, 61, 558.6, 7.3, 0.8, 0.58,
256, 79, 61, 61, 528.1, 7.4, 0.9, 0.00,
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258, 86, 58, 49, 618.0, 6.1, 0.7, 0.00,
259, 86, 58, 55, 551.1, 9.4, 0.6, 0.00,
260, 78, 65, 62, 299.3, 5.3, 1, 0.22,
261, 73, 54, 58, 546.7, 8.3, 1, 0.21,
262, 60, 47, 45, 562.2, 1.7, 0.9, 0.00,
263, 63, 47, 45, 475.6, 6.6, 0.9, 0.00,
264, 72, 50, 53, 595.5, 4.6, 0.6, 0.00,
265, 84, 52, 55, 591.7, 6.7, 0.1, 0.00,
266, 82, 57, 55, 438.1, 6.8, 0.3, 0.00,
267, 82, 56, 49, 344.6, 8.0, 0.1, 0.00,
268, 87, 52, 49, 580.2, 4.7, 0, 0.00,
269, 86, 55, 46, 576.3, 7.0, 0.2, 0.00,
270, 85, 52, 41, 572.4, 7.5, 0.2, 0.00,
271, 83, 49, 43, 544.9, 7.3, 0.7, 0.00,
272, 82, 48, 48, 564.6, 6.4, 0.1, 0.00,
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274, 84, 58, 50, 258.3, 6.6, 0.3, 0.00,
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277, 91, 64, 35, 452.0, 8.7, 0, 0.00,
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287, 83, 54, 33, 388.6, 8.0, 0.1, 0.00,
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291, 92, 49, 29, 316.1, 6.2, 0, 0.00,
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295, 79, 58, 44, 475.2, 1.4, 0.3, 0.00,
296, 77, 51, 45, 405.5, 1.4, 0.1, 0.00,
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308, 62, 27, 26, 241.9, 4.5, 0, 0.00,
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312, 62, 36, 35, 417.5, 4.8, 0, 0.00,
313, 72, 35, 38, 298.6, 5.6, 0.4, 0.00,
314, 74, 50, 40, 411.6, 9.8, 1, 0.00,
315, 62, 48, 46, 363.5, 8.5, 1, 0.26,
316, 52, 48, 45, 406.0, 6.3, 1, 0.02,
317, 59, 49, 50, 403.2, 5.7, 1, 0.00,
318, 68, 53, 48, 400.5, 9.9, 0.6, 0.00,
319, 70, 45, 46, 381.4, 8.6, 0.6, 0.09,
320, 54, 41, 31, 395.3, 13.0, 0.4, 0.13,
321, 62, 40, 28, 268.8, 11.7, 0, 0.00,
322, 71, 44, 29, 390.4, 11.8, 0.1, 0.00,
323, 58, 39, 28, 100.7, 11.6, 0.1, 0.00,
324, 56, 30, 27, 358.0, 6.5, 0, 0.00,
325, 64, 29, 24, 269.1, 8.1, 0.2, 0.00,
326, 71, 40, 25, 381.3, 11.4, 0, 0.00,
327, 52, 32, 6, 379.2, 9.1, 0, 0.00,
328, 57, 22, 12, 302.6, 5.7, 0, 0.00,
329, 64, 27, 15, 156.0, 4.7, 0.1, 0.00,
330, 69, 28, 21, 217.4, 5.0, 0.1, 0.00,
331, 71, 31, 25, 137.2, 5.3, 0.2, 0.00,
332, 71, 44, 25, 344.8, 8.7, 0.7, 0.00,
333, 59, 36, 15, 73.6, 11.9, 0.1, 0.00,
334, 57, 27, 19, 200.7, 8.4, 0, 0.00,
335, 39, 30, 28, 298.6, 6.5, 0.9, 0.04,
336, 48, 30, 24, 290.9, 9.6, 0.2, 0.00,
337, 52, 24, 21, 203.2, 6.9, 0, 0.00,
338, 56, 22, 20, 360.8, 6.3, 0.5, 0.00,

339, 55, 32, 23, 359.6, 5.8, 0.6, 0.00,
340, 63, 29, 27, 253.1, 6.6, 0, 0.00,
341, 68, 35, 31, 235.2, 8.1, 0, 0.00,
342, 68, 35, 31, 356.4, 5.3, 0.5, 0.00,
343, 70, 34, 33, 355.5, 7.1, 0.4, 0.00,
344, 70, 46, 42, 354.7, 6.4, 0.6, 0.04,
345, 61, 49, 47, 354.0, 11.6, 0.7, 0.65,
346, 58, 46, 40, 353.3, 8.1, 0.4, 0.00,
347, 60, 38, 35, 326.9, 6.9, 0, 0.00,
348, 55, 33, 25, 263.9, 8.7, 0, 0.00,
349, 51, 30, 28, 252.8, 8.3, 0.5, 0.00,
350, 58, 33, 29, 351.5, 8.5, 0.7, 0.00,
351, 60, 36, 35, 280.4, 6.8, 0.8, 0.00,
352, 52, 44, 43, 277.9, 6.4, 1, 0.44,
353, 57, 45, 48, 350.9, 6.7, 0.9, 0.27,
354, 54, 44, 43, 350.9, 12.6, 1, 0.23,
355, 45, 38, 39, 351.0, 9.9, 1, 1.18,
356, 55, 34, 36, 320.2, 1.9, 0.5, 0.00,
357, 58, 31, 34, 243.5, 6.2, 0.4, 0.00,
358, 54, 34, 32, 351.7, 8.5, 0.6, 0.00,
359, 44, 38, 36, 352.1, 5.2, 1, 0.23,
360, 50, 38, 38, 352.6, 5.6, 1, 0.21,
361, 53, 36, 34, 353.1, 4.7, 0.5, 0.00,
362, 57, 33, 34, 353.8, 4.0, 0.4, 0.00,
363, 62, 38, 38, 354.5, 6.4, 0.5, 0.00,
364, 67, 34, 37, 355.3, 6.0, 0, 0.00,
365, 60, 37, 28, 316.1, 8.3, 0, 0.00,

Climate Data (1992)

1, 57, 31, 25, 326.7, 9.4, 0, 0.00,
2, 53, 29, 24, 338.9, 6.4, 0.5, 0.00,
3, 52, 34, 25, 359.7, 6.9, 1, 0.00,
4, 55, 41, 40, 196.4, 5.5, 0.9, 0.02,
5, 63, 41, 44, 279.8, 4.7, 0.8, 0.02,
6, 68, 43, 43, 271.0, 1.2, 0.8, 0.04,
7, 55, 40, 26, 343.4, 1.5, 0.1, 0.00,
8, 52, 37, 28, 306.8, 6.8, 0.7, 0.00,
9, 60, 34, 24, 365.6, 1.8, 0.1, 0.00,
10, 54, 35, 23, 256.6, 9.5, 0.7, 0.28,
11, 42, 35, 35, 263.8, 6.0, 1, 0.32,
12, 49, 39, 32, 281.7, 14.5, 0.7, 0.15,
13, 50, 30, 27, 128.6, 5.6, 0.1, 0.00,
14, 52, 25, 26, 356.4, 4.4, 0.1, 0.00,
15, 42, 24, 20, 341.5, 1.9, 0, 0.00,
16, 46, 18, 18, 252.8, 5.6, 0.7, 0.00,
17, 46, 26, 26, 174.3, 6.5, 1, 0.00,
18, 44, 31, 28, 213.1, 7.0, 0.9, 0.08,
19, 47, 24, 25, 265.8, 5.9, 0.7, 0.00,
20, 52, 31, 32, 390.8, 6.5, 0.9, 0.09,
21, 54, 40, 36, 368.3, 11.0, 0.7, 0.04,
22, 60, 36, 27, 274.6, 11.7, 0, 0.00,
23, 59, 29, 20, 332.9, 5.5, 0, 0.00,
24, 60, 25, 23, 246.7, 6.2, 0.3, 0.00,
25, 61, 33, 28, 269.0, 7.2, 0.9, 0.00,
26, 54, 43, 40, 391.6, 5.2, 0.9, 0.10,
27, 61, 34, 36, 409.5, 5.9, 0.6, 0.00,
28, 64, 33, 35, 412.4, 5.0, 0.2, 0.00,
29, 64, 32, 34, 415.3, 4.2, 0.2, 0.00,
30, 67, 34, 31, 266.4, 5.1, 0, 0.00,
31, 65, 32, 29, 209.3, 6.9, 0.2, 0.00,
32, 55, 36, 36, 318.8, 7.2, 0.9, 0.01,
33, 54, 44, 44, 363.9, 6.2, 1, 0.04,
34, 52, 42, 41, 342.4, 1.0, 0.9, 0.08,
35, 57, 37, 32, 273.8, 8.1, 0.6, 0.00,
36, 59, 31, 32, 336.6, 6.8, 0.1, 0.00,
37, 62, 31, 31, 427.9, 5.2, 0.7, 0.00,
38, 61, 40, 26, 444.5, 6.4, 0.9, 0.00,
39, 60, 43, 40, 369.0, 6.4, 0.7, 0.03,
40, 63, 36, 37, 262.9, 8.0, 0.2, 0.00,
41, 65, 35, 37, 251.1, 6.8, 0.7, 0.00,
42, 64, 42, 40, 458.7, 6.2, 0.9, 0.00,
43, 66, 39, 37, 462.3, 5.9, 0.6, 0.00,
44, 65, 40, 39, 383.3, 9.9, 1, 0.00,
45, 63, 49, 33, 469.7, 12.9, 0.3, 0.00,
46, 63, 34, 31, 448.2, 6.9, 0.6, 0.00,
47, 62, 39, 27, 298.6, 14.9, 0.1, 0.00,
48, 59, 39, 21, 359.6, 11.7, 0.5, 0.00,
49, 58, 28, 21, 246.2, 7.2, 0.5, 0.00,
50, 69, 26, 19, 321.7, 6.5, 0, 0.00,
51, 73, 31, 24, 270.4, 6.4, 0.3, 0.00,
52, 75, 37, 27, 496.6, 8.4, 0.4, 0.00,
53, 71, 40, 23, 280.6, 7.2, 0.4, 0.00,

54, 71, 44, 30, 192.6, 1.1, 0.5, 0.00,
55, 58, 41, 32, 101.7, 1.8, 0.7, 0.00,
56, 59, 26, 25, 281.6, 6.1, 0.3, 0.00,
57, 62, 42, 22, 357.3, 7.1, 0.5, 0.00,
58, 69, 29, 24, 444.0, 7.8, 0.1, 0.00,
59, 73, 33, 25, 341.4, 6.0, 0, 0.00,
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61, 72, 40, 25, 438.7, 7.1, 0.6, 0.00,
62, 76, 43, 35, 536.5, 7.8, 0.5, 0.08,
63, 61, 48, 44, 340.6, 9.7, 0.7, 0.06,
64, 62, 46, 36, 544.7, 11.2, 0.6, 0.00,
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66, 75, 44, 29, 360.5, 6.9, 0, 0.00,
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69, 61, 39, 28, 520.2, 9.2, 0.3, 0.01,
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71, 68, 34, 28, 364.7, 7.5, 0.4, 0.00,
72, 67, 31, 27, 202.4, 6.6, 0, 0.00,
73, 74, 33, 22, 581.0, 5.5, 0, 0.00,
74, 78, 36, 20, 511.3, 6.0, 0, 0.00,
75, 82, 37, 21, 429.0, 6.9, 0.1, 0.00,
76, 77, 43, 24, 134.9, 8.8, 0, 0.00,
77, 69, 50, 39, 356.2, 8.7, 0.7, 0.17,
78, 67, 49, 29, 600.8, 14.9, 0.1, 0.03,
79, 71, 42, 25, 383.6, 7.1, 0.1, 0.00,
80, 80, 38, 23, 250.9, 6.3, 0.7, 0.00,
81, 76, 60, 25, 594.4, 14.6, 0.4, 0.00,
82, 71, 53, 37, 616.2, 9.3, 0.3, 0.00,
83, 76, 47, 33, 620.0, 1.6, 0.1, 0.00,
84, 74, 53, 22, 490.4, 1.5, 0, 0.00,
85, 79, 40, 22, 535.0, 7.2, 0, 0.00,
86, 83, 41, 25, 330.3, 7.3, 0.5, 0.00,
87, 72, 54, 40, 528.8, 9.3, 0.8, 0.13,
88, 70, 50, 42, 638.5, 9.8, 0.3, 0.00,
89, 75, 48, 40, 567.9, 8.0, 0.3, 0.00,
90, 79, 48, 41, 501.2, 1.7, 0.5, 0.02,
91, 78, 47, 35, 403.7, 9.1, 0.1, 0.00,
92, 64, 44, 37, 443.4, 12.7, 0.5, 0.00,
93, 68, 47, 37, 518.7, 7.8, 0.6, 0.00,
94, 73, 38, 30, 616.0, 5.2, 0, 0.00,
95, 78, 38, 27, 549.7, 7.1, 0.3, 0.00,
96, 79, 44, 35, 353.7, 9.9, 0.4, 0.00,
97, 82, 57, 33, 451.8, 9.9, 0, 0.00,
98, 86, 47, 30, 291.3, 7.1, 0.3, 0.00,
99, 86, 48, 28, 459.9, 6.9, 0.2, 0.00,
100, 84, 60, 24, 561.0, 1.7, 0.3, 0.00,
101, 86, 58, 28, 678.5, 8.7, 0, 0.00,
102, 89, 56, 26, 539.9, 8.0, 0.2, 0.00,
103, 88, 51, 37, 656.1, 8.1, 0, 0.00,
104, 88, 54, 53, 436.6, 8.8, 0.5, 0.13,
105, 85, 57, 45, 453.7, 8.2, 0.4, 0.15,
106, 84, 50, 34, 578.7, 9.0, 0.3, 0.00,
107, 81, 58, 33, 677.2, 9.0, 0.8, 0.00,
108, 81, 50, 37, 439.9, 8.0, 0.2, 0.00,
109, 84, 49, 37, 583.4, 18.0, 0.3, 0.00,
110, 71, 46, 34, 705.2, 1.2, 0.5, 0.02,

111,75,47,25,703.1,8.3,0,0.00,
112,80,45,22,609.7,6.6,0,0.00,
113,86,56,26,545.1,9.2,0.1,0.00,
114,88,53,31,718.6,6.6,0.3,0.00,
115,93,51,38,543.5,8.7,0.7,0.00,
116,81,57,47,723.5,11.4,0.3,0.00,
117,85,56,47,725.8,6.5,0.6,0.00,
118,93,60,45,726.0,6.6,0,0.00,
119,96,65,40,730.4,9.6,0,0.00,
120,95,62,40,502.9,7.2,0,0.00,
121,97,63,43,375.0,6.9,0.3,0.00,
122,96,65,44,509.6,9.2,0.2,0.00,
123,89,62,52,544.6,8.7,0.9,0.09,
124,71,58,57,657.9,8.8,1,0.02,
125,81,61,53,513.0,8.1,0.8,0.00,
126,85,59,51,743.4,9.2,0.8,0.15,
127,79,57,53,746.7,1.7,0.8,0.75,
128,81,54,53,655.1,7.7,0.4,0.01,
129,82,56,51,750.2,8.5,0.4,0.02,
130,82,57,45,751.9,1.4,0.6,0.00,
131,78,58,43,598.6,1.2,0.4,0.00,
132,86,61,45,755.2,11.2,0.1,0.00,
133,90,61,44,756.8,6.6,0.3,0.00,
134,87,62,49,485.9,9.0,0.9,0.05,
135,87,56,49,717.8,7.6,0.5,0.00,
136,90,60,46,693.8,8.1,0.5,0.00,
137,93,57,48,644.8,7.5,0.1,0.00,
138,91,56,48,589.8,7.7,0.3,1.26,
139,84,58,56,765.2,7.7,0.9,1.14,
140,84,60,51,627.4,8.8,0.9,0.01,
141,81,61,55,721.3,6.9,0.9,0.04,
142,85,56,51,768.8,9.0,0.5,0.08,
143,86,56,52,769.9,8.5,0.6,0.11,
144,70,56,53,709.6,1.4,0.8,0.28,
145,72,55,54,771.9,1.2,0.6,0.03,
146,79,53,48,579.5,6.9,0.5,0.00,
147,77,54,52,690.3,7.2,0.5,0.12,
148,83,55,50,595.1,11.1,0.5,0.02,
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150,84,56,52,776.3,7.8,0.7,0.02,
151,84,58,53,460.9,7.8,0.6,0.02,
152,85,55,50,777.8,7.2,0.2,0.00,
153,86,64,50,760.3,8.1,0.6,0.12,
154,88,55,45,704.9,5.7,0,0.00,
155,96,58,46,623.3,8.9,0.1,0.00,
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157,96,72,40,631.7,1.3,0,0.00,
158,89,73,39,454.8,1.4,0.5,0.00,
159,91,64,50,729.1,9.7,0.6,0.00,
160,88,57,48,636.4,8.1,0.1,0.00,
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163,99,61,37,689.5,6.9,0,0.00,
164,97,70,38,783.0,6.8,0,0.00,
165,96,69,29,733.6,8.1,0,0.00,
166,96,70,26,783.2,1.4,0,0.00,
167,98,75,25,670.1,13.4,0.7,0.00,

168,100,72,27,725.4,12.5,0,0.00,
169,99,60,30,637.9,6.1,0,0.00,
170,107,64,40,653.3,7.7,0.3,0.00,
171,106,70,41,574.5,7.1,0.3,0.00,
172,103,72,47,783.2,8.6,0.5,0.00,
173,97,65,59,783.0,9.7,0.4,0.14,
174,95,65,57,738.6,5.4,0.7,0.00,
175,99,70,52,782.6,7.9,0.5,0.01,
176,99,65,47,782.3,8.0,0.1,0.00,
177,103,70,43,752.6,6.8,0.4,0.00,
178,100,69,53,781.7,7.3,0.1,0.00,
179,100,68,44,781.3,7.8,0,0.00,
180,102,66,34,459.7,8.0,0,0.00,
181,103,65,38,780.4,7.4,0,0.00,
182,103,66,39,779.9,1.0,0,0.00,
183,101,81,39,779.4,13.2,0.1,0.00,
184,98,71,38,653.5,8.6,0,0.00,
185,104,63,47,717.2,1.3,0.3,0.02,
186,102,76,52,314.9,9.8,0.2,0.00,
187,105,74,50,776.8,6.1,0,0.00,
188,108,76,46,597.2,7.9,0.1,0.00,
189,107,77,48,377.8,6.9,0,0.00,
190,104,71,50,684.1,7.2,0.1,0.00,
191,102,77,53,760.5,9.5,0.3,0.00,
192,100,76,54,772.7,8.1,0.6,0.10,
193,96,71,56,771.8,9.2,0.5,0.00,
194,94,67,51,770.8,11.5,0.3,0.00,
195,96,73,41,769.8,11.0,0,0.00,
196,99,71,41,663.4,1.3,0,0.00,
197,101,72,39,767.6,7.6,0.5,0.00,
198,101,75,43,765.0,8.1,0.3,0.00,
199,98,70,58,493.9,11.6,0.4,0.05,
200,99,65,55,636.3,6.4,0.3,0.00,
201,94,72,54,705.9,6.2,0.3,0.00,
202,96,68,58,553.5,6.9,0.3,0.08,
203,96,68,58,758.7,6.5,0.2,0.00,
204,100,69,57,662.9,6.3,0.2,0.00,
205,99,74,60,688.2,8.3,0.4,0.00,
206,96,69,62,755.7,8.7,0.6,0.17,
207,92,65,61,607.0,8.0,0.6,0.14,
208,97,73,60,276.5,7.1,0.5,0.00,
209,93,71,62,404.9,7.8,0.8,0.00,
210,94,70,63,749.3,7.4,0.8,0.00,
211,98,71,58,495.7,7.0,0.6,0.00,
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214,83,65,64,720.5,8.9,0.9,0.07,
215,91,64,62,621.6,6.3,0.7,0.01,
216,98,66,58,551.6,6.2,0.1,0.00,
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218,100,68,55,513.5,7.5,0.3,0.00,
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220,96,68,57,607.3,7.1,0.1,0.01,
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225,87,65,64,500.4,9.5,0.8,1.64,
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227,98,69,59,639.9,5.8,0.2,0.00,
228,94,69,58,526.3,7.1,0.4,0.00,
229,95,69,56,709.2,6.0,0.1,0.00,
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232,96,68,59,533.0,7.4,0.5,0.03,
233,95,67,55,692.9,6.9,0.3,0.08,
234,96,71,54,610.9,8.8,0.2,0.00,
235,94,67,54,693.1,7.3,0.4,0.00,
236,91,69,61,619.7,8.1,0.8,0.21,
237,86,70,59,464.6,1.5,0.6,0.00,
238,91,63,54,684.5,6.3,0.1,0.00,
239,93,64,57,681.5,6.6,0.1,0.00,
240,92,67,56,526.0,8.0,0.2,0.00,
241,96,67,56,675.5,5.9,0.3,0.00,
242,93,73,55,672.4,1.4,0.9,0.00,
243,91,70,52,564.2,7.9,0.4,0.00,
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245,95,65,49,580.5,8.0,0,0.00,
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247,97,64,43,607.6,5.8,0.6,0.00,
248,99,67,44,612.4,8.6,0.6,0.00,
249,98,66,44,642.5,8.1,0.1,0.00,
250,97,69,42,617.0,6.5,0,0.00,
251,100,62,45,244.9,7.0,0.4,0.00,
252,100,74,49,516.4,8.2,0.5,0.00,
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255,90,61,53,558.6,8.0,0.1,0.00,
256,91,61,53,528.1,6.9,0,0.00,
257,96,70,53,214.4,7.8,0.2,0.00,
258,89,69,61,618.0,9.0,0.8,0.00,
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261,95,66,58,546.7,5.4,0.1,0.00,
262,96,69,55,562.2,8.1,0.4,0.00,
263,93,67,57,475.6,6.5,0.7,0.00,
264,88,71,54,595.5,13.4,0.4,0.00,
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266,87,62,41,438.1,9.2,0,0.00,
267,84,56,45,344.6,8.2,0,0.00,
268,86,57,45,580.2,5.3,0,0.00,
269,91,59,41,576.3,9.2,0,0.00,
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271,89,57,42,544.9,6.6,0,0.00,
272,86,53,37,564.6,1.8,0,0.00,
273,84,52,37,475.3,8.9,0,0.00,
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277,86,50,28,452.0,5.4,0,0.00,
278,89,51,26,428.5,5.0,0,0.00,
279,91,53,28,537.0,5.8,0.3,0.00,
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283,84,39,23,282.0,6.9,0,0.00,
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293,87,57,45,482.6,6.9,0.6,0.00,
294,79,60,46,478.9,7.8,0.9,0.00,
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302,65,52,49,214.5,9.3,0.7,0.09,
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307,74,36,26,346.2,1.0,0.2,0.00,
308,64,37,30,241.9,11.3,0.7,0.08,
309,49,31,25,419.3,7.7,0.3,0.00,
310,54,35,28,423.6,5.1,0.8,0.00,
311,61,31,23,420.5,6.0,0.1,0.00,
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313,71,35,30,298.6,8.2,0,0.00,
314,71,50,35,411.6,8.7,0.2,0.00,
315,74,51,38,363.5,9.6,0.2,0.00,
316,64,44,29,406.0,12.0,0,0.00,
317,64,33,21,403.2,6.9,0,0.00,
318,68,29,16,400.5,6.5,0,0.00,
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320,73,34,24,395.3,6.2,0,0.00,
321,73,34,30,268.8,6.0,0.3,0.00,
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323,67,50,35,100.7,8.8,0.6,0.00,
324,65,45,33,358.0,7.5,0.6,0.00,
325,63,38,34,269.1,15.0,0.8,0.16,
326,52,35,24,381.3,1.8,0.3,0.00,
327,56,30,28,379.2,7.1,0.6,0.00,
328,58,38,26,302.6,13.9,0.7,0.04,
329,50,31,17,156.0,12.0,0,0.00,
330,49,21,15,217.4,6.0,0,0.00,
331,50,20,14,137.2,7.3,0,0.00,
332,53,18,14,344.8,5.5,0,0.00,
333,54,17,15,73.6,6.5,0,0.00,
334,57,21,14,200.7,6.2,0.5,0.00,
335,57,26,16,298.6,8.2,0.7,0.00,
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337,62,28,18,203.2,6.4,0.4,0.00,
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339, 55, 31, 41, 359.6, 8.4, 0.9, 0.68,
340, 35, 25, 26, 253.1, 5.7, 1, 0.39,
341, 34, 29, 31, 235.2, 6.1, 1, 0.00,
342, 33, 28, 29, 356.4, 7.1, 1, 0.00,
343, 46, 26, 30, 355.5, 12.3, 0.7, 0.04,
344, 54, 38, 34, 354.7, 9.0, 0, 0.00,
345, 61, 31, 34, 354.0, 8.0, 0.4, 0.00,
346, 64, 35, 35, 353.3, 6.1, 0.5, 0.00,
347, 63, 37, 31, 326.9, 11.3, 0.4, 0.00,
348, 45, 32, 31, 263.9, 8.8, 0.9, 0.01,
349, 42, 29, 25, 252.8, 5.2, 0.6, 0.05,
350, 47, 32, 25, 351.5, 9.9, 0.4, 0.00,
351, 48, 33, 24, 280.4, 9.0, 0.4, 0.00,
352, 52, 23, 22, 277.9, 6.3, 0.2, 0.00,
353, 64, 32, 29, 350.9, 1.6, 0.2, 0.00,
354, 58, 39, 29, 350.9, 7.8, 0.6, 0.00,
355, 50, 36, 25, 351.0, 7.2, 0.9, 0.00,
356, 59, 34, 30, 320.2, 5.6, 0.8, 0.00,
357, 64, 35, 36, 243.5, 6.6, 0.4, 0.00,
358, 61, 35, 18, 351.7, 1.4, 0.6, 0.00,
359, 55, 39, 23, 352.1, 8.3, 0.9, 0.00,
360, 56, 34, 26, 352.6, 9.6, 0.9, 0.00,
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362, 60, 31, 32, 353.8, 5.7, 0.8, 0.00,
363, 69, 48, 45, 354.5, 9.2, 1, 0.00,
364, 71, 55, 49, 355.3, 8.1, 0.8, 0.00,
365, 63, 49, 46, 316.1, 7.1, 1, 0.01,
366, 54, 44, 47, 300.0, 7.6, 1, 0.12,

Climate Data (1993)

1, 47, 41, 42, 326.7, 5.7, 1, 0.26,
2, 55, 44, 46, 338.9, 6.0, 0.9, 0.00,
3, 61, 43, 34, 359.7, 12.2, 0.7, 0.00,
4, 53, 31, 23, 196.4, 6.4, 0.3, 0.00,
5, 58, 38, 33, 279.8, 6.2, 1, 0.00,
6, 56, 47, 48, 271.0, 5.7, 0.9, 0.19,
7, 63, 49, 44, 343.4, 14.3, 0.7, 0.00,
8, 64, 49, 45, 306.8, 14.0, 0.7, 0.06,
9, 58, 45, 37, 365.6, 8.4, 0.7, 0.00,
10, 52, 35, 32, 256.6, 5.9, 0.8, 0.01,
11, 63, 39, 39, 263.8, 13.4, 0.5, 0.04,
12, 60, 37, 31, 281.7, 9.1, 0.5, 0.00,
13, 62, 36, 37, 128.6, 7.1, 0.8, 0.13,
14, 52, 38, 43, 356.4, 5.2, 0.8, 0.05,
15, 56, 46, 38, 341.5, 1.2, 0.6, 0.00,
16, 61, 37, 39, 252.8, 6.0, 0.6, 0.00,
17, 62, 49, 47, 174.3, 8.3, 1, 0.11,
18, 53, 47, 46, 213.1, 1.0, 1, 0.35,
19, 56, 44, 37, 265.8, 1.9, 0.5, 0.14,
20, 56, 40, 32, 390.8, 1.3, 0, 0.00,
21, 65, 32, 34, 368.3, 4.7, 0.1, 0.00,
22, 67, 33, 35, 274.6, 5.8, 0.1, 0.00,
23, 69, 34, 25, 332.9, 11.0, 0, 0.00,
24, 55, 30, 23, 246.7, 5.9, 0.2, 0.00,
25, 58, 30, 20, 269.0, 7.9, 0, 0.00,
26, 61, 28, 22, 391.6, 4.9, 0.5, 0.00,
27, 57, 39, 25, 409.5, 5.0, 1, 0.00,
28, 60, 45, 38, 412.4, 6.9, 0.8, 0.00,
29, 50, 34, 32, 415.3, 1.3, 0.4, 0.00,
30, 48, 33, 34, 266.4, 9.6, 0.9, 0.00,
31, 61, 36, 38, 209.3, 6.5, 0.2, 0.00,
32, 66, 37, 32, 318.8, 7.1, 0.1, 0.00,
33, 62, 31, 18, 363.9, 6.5, 0.3, 0.00,
34, 64, 30, 23, 342.4, 8.0, 0.2, 0.00,
35, 53, 37, 29, 273.8, 8.5, 0.6, 0.00,
36, 57, 30, 25, 336.6, 5.2, 0.1, 0.00,
37, 59, 26, 20, 427.9, 5.8, 0.6, 0.00,
38, 66, 28, 22, 444.5, 5.9, 0.4, 0.00,
39, 70, 35, 30, 369.0, 6.1, 0.9, 0.00,
40, 59, 47, 40, 262.9, 1.4, 0.7, 0.01,
41, 57, 43, 32, 251.1, 13.5, 0.4, 0.00,
42, 59, 41, 29, 458.7, 13.8, 0, 0.00,
43, 63, 33, 27, 462.3, 8.6, 0.4, 0.00,
44, 66, 39, 25, 383.3, 5.3, 0.8, 0.00,
45, 65, 46, 29, 469.7, 1.6, 0.9, 0.13,
46, 58, 44, 31, 448.2, 13.5, 0.5, 0.04,
47, 62, 43, 29, 298.6, 6.9, 0.7, 0.00,
48, 69, 40, 26, 359.6, 6.9, 0.5, 0.00,
49, 72, 39, 30, 246.2, 6.7, 0.7, 0.00,
50, 75, 50, 40, 321.7, 1.7, 0.8, 0.00,
51, 68, 52, 40, 270.4, 16.7, 0.6, 0.02,
52, 65, 44, 28, 496.6, 11.9, 0.1, 0.00,
53, 62, 44, 21, 280.6, 1.4, 0.4, 0.00,

54, 65, 36, 24, 192.6, 6.7, 0.9, 0.00,
55, 57, 48, 34, 101.7, 12.8, 0.9, 0.01,
56, 61, 44, 28, 281.6, 9.6, 0.1, 0.00,
57, 69, 34, 26, 357.3, 5.4, 0.5, 0.00,
58, 62, 44, 35, 444.0, 7.4, 1, 0.00,
59, 60, 42, 38, 341.4, 9.6, 0.8, 0.11,
60, 54, 39, 29, 410.7, 15.2, 0.3, 0.00,
61, 63, 35, 28, 438.7, 11.0, 0, 0.00,
62, 65, 33, 22, 536.5, 7.6, 0, 0.00,
63, 61, 40, 28, 340.6, 9.3, 0.1, 0.00,
64, 64, 31, 21, 544.7, 6.4, 0, 0.00,
65, 70, 32, 18, 272.8, 6.0, 0.2, 0.00,
66, 74, 37, 19, 360.5, 5.6, 0, 0.00,
67, 77, 39, 19, 556.9, 6.7, 0, 0.00,
68, 79, 44, 19, 531.3, 9.4, 0.1, 0.00,
69, 77, 42, 21, 520.2, 6.9, 0.4, 0.00,
70, 74, 42, 30, 448.7, 9.7, 0.2, 0.00,
71, 62, 32, 27, 364.7, 12.4, 0, 0.00,
72, 56, 26, 21, 202.4, 6.4, 0.2, 0.00,
73, 67, 34, 26, 581.0, 7.0, 0.8, 0.00,
74, 74, 51, 33, 511.3, 15.3, 0.2, 0.00,
75, 78, 55, 33, 429.0, 1.1, 0.2, 0.00,
76, 81, 44, 29, 134.9, 8.6, 0.4, 0.00,
77, 79, 60, 34, 356.2, 12.8, 0.7, 0.00,
78, 76, 53, 33, 600.8, 8.5, 0.1, 0.00,
79, 79, 48, 30, 383.6, 8.1, 0.5, 0.00,
80, 80, 50, 30, 250.9, 8.2, 0.8, 0.00,
81, 76, 51, 36, 594.4, 7.3, 0, 0.00,
82, 80, 46, 38, 616.2, 6.2, 0.1, 0.00,
83, 80, 55, 33, 620.0, 7.7, 0.2, 0.00,
84, 82, 49, 31, 490.4, 6.4, 0, 0.00,
85, 82, 48, 30, 535.0, 1.2, 0.3, 0.00,
86, 70, 46, 28, 330.3, 13.7, 0.2, 0.00,
87, 72, 46, 29, 528.8, 8.9, 0, 0.00,
88, 65, 49, 29, 638.5, 14.6, 0.4, 0.01,
89, 71, 47, 31, 567.9, 14.8, 0, 0.00,
90, 74, 46, 31, 501.2, 8.8, 0, 0.00,
91, 76, 47, 29, 403.7, 8.1, 0.2, 0.00,
92, 80, 48, 28, 443.4, 1.0, 0.5, 0.00,
93, 74, 50, 22, 518.7, 1.7, 0, 0.00,
94, 78, 40, 24, 616.0, 7.0, 0, 0.00,
95, 84, 45, 24, 549.7, 12.1, 0.4, 0.00,
96, 76, 55, 24, 353.7, 18.5, 0.5, 0.00,
97, 69, 48, 22, 451.8, 11.6, 0.3, 0.00,
98, 68, 42, 19, 291.3, 7.7, 0, 0.00,
99, 78, 38, 17, 459.9, 8.5, 0, 0.00,
100, 85, 53, 21, 561.0, 11.9, 0, 0.00,
101, 86, 56, 27, 678.5, 9.6, 0, 0.00,
102, 83, 61, 24, 539.9, 13.6, 0.7, 0.00,
103, 77, 55, 30, 656.1, 11.2, 0.7, 0.00,
104, 69, 51, 25, 436.6, 14.0, 0.7, 0.00,
105, 75, 45, 17, 453.7, 8.0, 0.1, 0.00,
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108, 89, 54, 29, 439.9, 12.1, 0, 0.00,
109, 84, 60, 24, 583.4, 1.5, 0, 0.00,
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135,93,64,41,717.8,8.8,0.5,0.00,
136,91,66,42,693.8,9.1,0.3,0.00,
137,90,68,37,644.8,9.6,0.1,0.00,
138,89,63,44,589.8,8.1,0.1,0.00,
139,91,61,48,765.2,9.2,0.3,0.00,
140,94,58,45,627.4,7.3,0.2,0.00,
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150,97,62,39,776.3,7.5,0,0.00,
151,100,62,43,460.9,9.7,0.2,0.00,
152,98,72,41,777.8,13.9,0,0.00,
153,98,71,33,760.3,15.1,0,0.00,
154,94,68,33,704.9,15.2,0,0.00,
155,93,70,31,623.3,8.8,0,0.00,
156,97,61,35,562.5,1.5,0.1,0.00,
157,97,73,35,631.7,14.4,0.7,0.00,
158,88,63,34,454.8,11.5,0,0.00,
159,87,65,28,729.1,1.8,0,0.00,
160,90,64,30,636.4,8.3,0,0.00,
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164,105,68,49,783.0,6.7,0,0.00,
165,101,71,50,733.6,1.3,0,0.00,
166,94,65,56,783.2,1.8,0.1,0.00,
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172,98,68,56,783.2,9.9,0.3,0.70,
173,99,67,54,783.0,8.1,0.1,0.00,
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194,93,74,62,770.8,1.0,0.7,0.00,
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201,95,68,62,705.9,6.8,0.7,0.07,
202,95,69,57,553.5,7.4,0.5,0.00,
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226, 93, 69, 61, 506.2, 8.9, 0.7, 0.02,
227, 95, 69, 63, 639.9, 5.5, 0.4, 0.07,
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229, 95, 71, 62, 709.2, 7.3, 0.4, 0.00,
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232, 97, 70, 60, 533.0, 6.5, 0.2, 0.00,
233, 97, 69, 54, 692.9, 6.3, 0, 0.00,
234, 97, 72, 54, 610.9, 8.1, 0.3, 0.00,
235, 99, 72, 53, 693.1, 6.7, 0, 0.00,
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238, 93, 70, 62, 684.5, 6.9, 0.6, 0.00,
239, 93, 70, 59, 681.5, 8.8, 0.5, 0.00,
240, 91, 72, 58, 526.0, 7.6, 0.6, 0.00,
241, 87, 68, 63, 675.5, 8.0, 0.8, 0.17,
242, 91, 67, 63, 672.4, 7.6, 0.6, 0.37,
243, 76, 61, 58, 564.2, 9.7, 0.9, 0.51,
244, 85, 62, 59, 436.5, 4.8, 0.6, 0.00,
245, 94, 65, 59, 580.5, 5.7, 0.3, 0.00,
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357,49,28,28,243.5,9.2,0.1,0.00,
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359,53,20,21,352.1,4.6,0,0.00,
360,55,22,22,352.6,6.7,0.5,0.00,
361,63,37,34,353.1,6.5,0.9,0.00,
362,62,45,37,353.8,4.9,1,0.00,
363,52,37,34,354.5,1.5,1,0.22,
364,55,36,33,355.3,6.8,0.4,0.00,
365,56,31,34,316.1,7.1,0.4,0.00,

Climate Data (1994)

1, 58, 31, 34, 326.7, 7.7, 0.4, 0.00,
2, 66, 40, 26, 338.9, 9.3, 0.3, 0.00,
3, 62, 31, 20, 359.7, 7.3, 0.1, 0.00,
4, 63, 35, 24, 196.4, 6.7, 0, 0.00,
5, 71, 35, 23, 279.8, 11.5, 0.6, 0.00,
6, 69, 38, 18, 271.0, 16.2, 0.5, 0.00,
7, 53, 24, 6, 343.4, 6.6, 0, 0.00,
8, 56, 20, 7, 306.8, 4.8, 0.3, 0.00,
9, 59, 24, 11, 365.6, 6.0, 0.3, 0.00,
10, 61, 23, 13, 256.6, 7.2, 0, 0.00,
11, 58, 28, 17, 263.8, 6.2, 0.4, 0.00,
12, 59, 25, 14, 281.7, 8.3, 0, 0.00,
13, 62, 23, 12, 128.6, 5.8, 0, 0.00,
14, 64, 23, 13, 356.4, 5.3, 0.4, 0.00,
15, 62, 32, 17, 341.5, 5.7, 0.9, 0.00,
16, 68, 37, 17, 252.8, 1.7, 0.1, 0.00,
17, 62, 28, 14, 174.3, 6.0, 0, 0.00,
18, 67, 26, 12, 213.1, 5.4, 0, 0.00,
19, 68, 25, 17, 265.8, 4.9, 0, 0.00,
20, 71, 29, 15, 390.8, 7.3, 0.3, 0.00,
21, 61, 31, 30, 368.3, 6.9, 0.4, 0.00,
22, 60, 29, 34, 274.6, 5.1, 0.2, 0.00,
23, 63, 29, 35, 332.9, 4.7, 0.9, 0.00,
24, 71, 40, 37, 246.7, 6.9, 0.6, 0.00,
25, 71, 42, 30, 269.0, 11.7, 0.1, 0.00,
26, 56, 41, 20, 391.6, 12.1, 0.6, 0.00,
27, 56, 34, 13, 409.5, 8.4, 0.1, 0.00,
28, 46, 32, 20, 412.4, 1.1, 1, 0.02,
29, 44, 32, 29, 415.3, 5.5, 0.7, 0.01,
30, 55, 30, 24, 266.4, 9.7, 0.3, 0.00,
31, 42, 22, 17, 209.3, 8.2, 0.7, 0.00,
32, 46, 16, 11, 318.8, 8.7, 0.2, 0.00,
33, 52, 15, 10, 363.9, 5.9, 0.8, 0.00,
34, 63, 24, 13, 342.4, 7.0, 0.8, 0.00,
35, 61, 42, 27, 273.8, 11.0, 0.7, 0.00,
36, 64, 32, 26, 336.6, 6.6, 0.3, 0.00,
37, 66, 27, 21, 427.9, 6.5, 0.1, 0.00,
38, 74, 35, 20, 444.5, 9.7, 0.8, 0.00,
39, 61, 45, 37, 369.0, 9.7, 0.9, 0.23,
40, 58, 39, 32, 262.9, 9.1, 0.3, 0.00,
41, 60, 38, 29, 251.1, 7.5, 0.3, 0.00,
42, 73, 42, 24, 458.7, 13.6, 0.4, 0.00,
43, 59, 36, 17, 462.3, 1.5, 0.1, 0.00,
44, 56, 27, 12, 383.3, 7.8, 0.2, 0.00,
45, 64, 37, 18, 469.7, 5.8, 0.7, 0.00,
46, 72, 38, 23, 448.2, 6.6, 0, 0.00,
47, 76, 34, 21, 298.6, 5.4, 0.3, 0.00,
48, 76, 40, 27, 359.6, 6.9, 0.7, 0.00,
49, 76, 52, 26, 246.2, 14.5, 0.5, 0.00,
50, 62, 45, 20, 321.7, 13.5, 0.3, 0.00,
51, 61, 38, 21, 270.4, 6.5, 0.7, 0.00,
52, 64, 40, 23, 496.6, 9.9, 0.8, 0.00,
53, 58, 45, 18, 280.6, 16.2, 0.1, 0.00,

54, 58, 33, 10, 192.6, 6.4, 0.1, 0.00,
55, 66, 24, 10, 101.7, 7.0, 0.1, 0.00,
56, 75, 32, 13, 281.6, 7.3, 0.5, 0.00,
57, 70, 38, 21, 357.3, 5.4, 0.4, 0.00,
58, 74, 46, 29, 444.0, 7.8, 0.4, 0.00,
59, 67, 51, 27, 341.4, 12.7, 0.2, 0.00,
60, 68, 38, 31, 410.7, 6.7, 0, 0.00,
61, 68, 37, 25, 438.7, 6.5, 0.6, 0.00,
62, 73, 40, 22, 536.5, 5.8, 0.8, 0.00,
63, 78, 48, 35, 340.6, 6.9, 0.7, 0.00,
64, 77, 50, 32, 544.7, 1.8, 0, 0.00,
65, 79, 40, 24, 272.8, 7.7, 0, 0.00,
66, 81, 43, 25, 360.5, 1.1, 0.1, 0.00,
67, 64, 38, 34, 556.9, 11.6, 0.3, 0.02,
68, 59, 35, 29, 531.3, 7.6, 0.3, 0.00,
69, 68, 30, 21, 520.2, 7.3, 0, 0.00,
70, 76, 37, 19, 448.7, 9.7, 0.2, 0.00,
71, 68, 47, 25, 364.7, 11.7, 0.4, 0.00,
72, 59, 42, 35, 202.4, 11.3, 0.9, 0.04,
73, 59, 46, 46, 581.0, 7.6, 1, 0.31,
74, 75, 50, 47, 511.3, 6.2, 0.6, 0.00,
75, 77, 48, 46, 429.0, 6.2, 0.3, 0.00,
76, 83, 53, 39, 134.9, 9.2, 0.3, 0.00,
77, 82, 54, 36, 356.2, 8.7, 0.4, 0.00,
78, 78, 62, 40, 600.8, 1.2, 0.8, 0.00,
79, 68, 56, 42, 383.6, 14.2, 0.8, 0.00,
80, 74, 47, 35, 250.9, 5.1, 0, 0.00,
81, 80, 47, 31, 594.4, 1.9, 0.4, 0.00,
82, 76, 59, 26, 616.2, 13.8, 0.8, 0.00,
83, 78, 58, 34, 620.0, 9.0, 0.2, 0.00,
84, 80, 50, 30, 490.4, 11.7, 0.7, 0.00,
85, 67, 49, 28, 535.0, 17.8, 0.3, 0.00,
86, 60, 36, 26, 330.3, 11.6, 0.6, 0.00,
87, 60, 29, 15, 528.8, 6.6, 0.1, 0.00,
88, 72, 33, 16, 638.5, 6.6, 0.6, 0.00,
89, 66, 41, 23, 567.9, 11.1, 0.4, 0.00,
90, 78, 37, 28, 501.2, 5.4, 0, 0.00,
91, 83, 50, 29, 403.7, 8.5, 0.2, 0.00,
92, 82, 56, 24, 443.4, 1.0, 0.2, 0.00,
93, 79, 45, 29, 518.7, 6.9, 0.5, 0.00,
94, 79, 56, 26, 616.0, 14.7, 0.7, 0.00,
95, 73, 48, 17, 549.7, 16.4, 0.1, 0.00,
96, 74, 40, 20, 353.7, 8.0, 0.2, 0.00,
97, 82, 46, 19, 451.8, 11.5, 0.4, 0.00,
98, 83, 53, 24, 291.3, 13.2, 0.4, 0.00,
99, 81, 61, 24, 459.9, 16.8, 0.3, 0.00,
100, 81, 51, 26, 561.0, 13.6, 0, 0.00,
101, 72, 47, 24, 678.5, 8.0, 0.2, 0.00,
102, 78, 42, 23, 539.9, 5.6, 0.6, 0.00,
103, 83, 45, 24, 656.1, 8.6, 0.6, 0.00,
104, 86, 62, 26, 436.6, 12.6, 0.3, 0.00,
105, 82, 56, 28, 453.7, 9.1, 0.1, 0.00,
106, 81, 51, 29, 578.7, 1.6, 0, 0.00,
107, 85, 45, 23, 677.2, 6.9, 0.1, 0.00,
108, 90, 50, 24, 439.9, 5.5, 0.8, 0.00,
109, 95, 52, 29, 583.4, 5.9, 0.7, 0.00,
110, 88, 59, 40, 705.2, 8.8, 0.4, 0.00,

111, 91, 59, 43, 703.1, 6.5, 0.5, 0.00,
112, 87, 63, 48, 609.7, 8.9, 0.6, 0.02,
113, 81, 60, 51, 545.1, 8.4, 0.8, 0.63,
114, 83, 57, 39, 718.6, 12.0, 0.1, 0.00,
115, 77, 51, 26, 543.5, 16.0, 0.1, 0.00,
116, 81, 58, 27, 723.5, 14.3, 0.1, 0.00,
117, 78, 52, 29, 725.8, 13.2, 0.2, 0.00,
118, 79, 43, 26, 726.0, 9.1, 0, 0.00,
119, 75, 48, 24, 730.4, 1.9, 0, 0.00,
120, 79, 44, 30, 502.9, 7.5, 0, 0.00,
121, 85, 51, 32, 375.0, 1.8, 0.3, 0.00,
122, 83, 57, 26, 509.6, 9.3, 0.2, 0.00,
123, 87, 61, 28, 544.6, 9.0, 0.1, 0.00,
124, 93, 55, 35, 657.9, 5.8, 0, 0.00,
125, 96, 63, 47, 513.0, 8.4, 0.4, 0.00,
126, 92, 64, 40, 743.4, 1.4, 0.8, 0.00,
127, 88, 68, 34, 746.7, 11.0, 1, 0.00,
128, 80, 60, 45, 655.1, 12.5, 0.9, 0.00,
129, 85, 53, 36, 750.2, 8.2, 0, 0.00,
130, 86, 49, 38, 751.9, 7.7, 0, 0.00,
131, 86, 58, 44, 598.6, 7.0, 0.2, 0.00,
132, 84, 61, 44, 755.2, 9.1, 0.6, 0.00,
133, 86, 59, 39, 756.8, 11.4, 0.3, 0.00,
134, 91, 63, 44, 485.9, 7.6, 0.4, 0.00,
135, 94, 63, 43, 717.8, 1.5, 0.2, 0.00,
136, 94, 66, 36, 693.8, 1.5, 0.4, 0.00,
137, 94, 61, 34, 644.8, 7.0, 0.5, 0.00,
138, 93, 64, 47, 589.8, 7.6, 0.5, 0.00,
139, 92, 63, 48, 765.2, 8.1, 0, 0.00,
140, 93, 62, 47, 627.4, 7.0, 0, 0.00,
141, 91, 65, 50, 721.3, 8.3, 0.6, 0.00,
142, 80, 61, 52, 768.8, 9.1, 0.7, 0.16,
143, 92, 57, 51, 769.9, 7.0, 0.8, 0.12,
144, 91, 62, 58, 709.6, 7.5, 0.6, 0.25,
145, 88, 63, 42, 771.9, 11.3, 0.1, 0.00,
146, 81, 59, 43, 579.5, 8.9, 0.2, 0.00,
147, 89, 61, 45, 690.3, 5.9, 0.1, 0.00,
148, 97, 63, 41, 595.1, 5.0, 0.4, 0.00,
149, 99, 65, 38, 680.9, 6.1, 0.6, 0.00,
150, 103, 68, 38, 776.3, 5.5, 0.7, 0.00,
151, 101, 73, 50, 460.9, 9.7, 0.8, 0.27,
152, 101, 68, 52, 777.8, 1.9, 0.5, 0.37,
153, 98, 67, 54, 760.3, 8.4, 0.3, 0.00,
154, 96, 65, 54, 704.9, 9.0, 0.2, 0.30,
155, 97, 67, 53, 623.3, 6.3, 0.2, 0.00,
156, 100, 67, 42, 562.5, 7.7, 0.3, 0.00,
157, 102, 72, 40, 631.7, 8.6, 0.2, 0.00,
158, 100, 79, 46, 454.8, 11.2, 0.3, 0.00,
159, 100, 76, 34, 729.1, 9.7, 0, 0.00,
160, 102, 73, 38, 636.4, 7.8, 0, 0.00,
161, 107, 68, 47, 508.3, 8.2, 0.3, 0.00,
162, 102, 77, 45, 518.5, 12.6, 0.8, 0.00,
163, 103, 73, 45, 689.5, 1.2, 0.4, 0.00,
164, 102, 76, 47, 783.0, 8.3, 0.2, 0.00,
165, 104, 78, 43, 733.6, 9.3, 0.1, 0.00,
166, 100, 82, 41, 783.2, 1.5, 0, 0.00,
167, 104, 79, 41, 670.1, 8.3, 0.1, 0.00,

168,106,79,50,725.4,12.1,0.5,0.00,
169,101,74,52,637.9,1.2,0.5,0.00,
170,97,74,49,653.3,1.3,0.5,0.00,
171,99,73,51,574.5,9.6,0.3,0.00,
172,94,76,54,783.2,7.9,0.7,0.00,
173,98,72,52,783.0,7.9,0.5,0.00,
174,104,72,49,738.6,9.3,0,0.00,
175,107,71,45,782.6,6.7,0,0.00,
176,111,79,42,782.3,7.6,0,0.00,
177,112,80,42,752.6,7.7,0,0.00,
178,113,81,43,781.7,9.9,0.3,0.00,
179,113,81,40,781.3,9.2,0.9,0.00,
180,111,82,44,459.7,7.7,0.5,0.00,
181,114,77,43,780.4,7.2,0.7,0.00,
182,111,85,44,779.9,7.5,0.4,0.00,
183,108,83,47,779.4,9.7,0.7,0.00,
184,108,85,47,653.5,1.5,0.8,0.00,
185,103,84,46,717.2,12.7,0.8,0.00,
186,102,78,47,314.9,12.7,0.1,0.00,
187,100,78,34,776.8,11.8,0,0.00,
188,104,78,32,597.2,8.1,0,0.00,
189,102,72,50,377.8,11.5,0.3,0.02,
190,101,71,50,684.1,8.2,0.3,0.00,
191,102,71,50,760.5,7.3,0.1,0.00,
192,103,75,48,772.7,9.2,0.3,0.00,
193,107,79,46,771.8,8.6,0.2,0.00,
194,107,76,44,770.8,8.4,0.4,0.00,
195,102,70,50,769.8,9.5,0.3,0.00,
196,102,75,51,663.4,1.2,0.4,0.00,
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198,92,69,61,765.0,7.7,1,0.08,
199,96,69,59,493.9,7.1,0.7,0.00,
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202,101,75,55,553.5,11.0,0.6,0.02,
203,99,72,56,758.7,7.1,0.5,0.00,
204,102,71,50,662.9,6.7,0.3,0.00,
205,103,73,47,688.2,7.0,0.3,0.00,
206,105,73,46,755.7,7.5,0.7,0.00,
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208,97,74,57,276.5,7.1,1,0.00,
209,91,66,60,404.9,9.4,0.8,0.06,
210,97,66,56,749.3,9.0,0.5,0.00,
211,98,70,58,495.7,8.1,0.4,0.00,
212,102,73,56,745.9,7.2,0.5,0.00,
213,100,76,57,744.1,7.8,0.7,0.00,
214,99,74,60,720.5,7.7,0.8,0.01,
215,99,72,54,621.6,8.6,0.5,0.01,
216,97,73,50,551.6,1.3,0.2,0.00,
217,95,72,52,617.6,9.7,0.2,0.00,
218,100,73,52,513.5,6.6,0.3,0.00,
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220,101,78,49,607.3,1.4,0.7,0.00,
221,102,73,52,509.3,8.4,0.5,0.00,
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223,94,70,54,481.1,1.2,0.3,0.00,
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225, 102, 71, 48, 500.4, 6.8, 0.1, 0.00,
226, 96, 72, 50, 506.2, 11.3, 0.4, 0.00,
227, 89, 72, 58, 639.9, 8.3, 1, 0.00,
228, 99, 74, 55, 526.3, 6.2, 0.4, 0.00,
229, 104, 71, 49, 709.2, 6.2, 0.2, 0.00,
230, 106, 71, 49, 706.6, 7.5, 0.4, 0.00,
231, 103, 78, 49, 584.0, 9.3, 0.5, 0.00,
232, 100, 70, 50, 533.0, 9.3, 0.2, 0.00,
233, 100, 69, 56, 692.9, 6.8, 0.3, 0.00,
234, 101, 74, 53, 610.9, 5.5, 0.6, 0.00,
235, 103, 75, 52, 693.1, 4.9, 0.3, 0.00,
236, 98, 75, 54, 619.7, 8.1, 0.1, 0.00,
237, 99, 71, 52, 464.6, 6.4, 0.1, 0.00,
238, 102, 71, 49, 684.5, 7.3, 0, 0.00,
239, 99, 73, 51, 681.5, 7.8, 0, 0.00,
240, 102, 74, 49, 526.0, 6.2, 0.2, 0.00,
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242, 98, 71, 56, 672.4, 8.3, 0.7, 0.00,
243, 93, 71, 58, 564.2, 8.0, 0.6, 0.00,
244, 91, 71, 58, 436.5, 9.8, 0.4, 0.00,
245, 92, 70, 58, 580.5, 1.7, 0.3, 0.00,
246, 91, 71, 59, 525.9, 9.0, 0.8, 0.00,
247, 90, 71, 63, 607.6, 7.5, 0.8, 0.03,
248, 95, 67, 58, 612.4, 8.2, 0.7, 0.00,
249, 88, 72, 58, 642.5, 8.8, 0.7, 0.00,
250, 93, 67, 57, 617.0, 6.8, 0.4, 0.00,
251, 96, 64, 54, 244.9, 7.1, 0, 0.00,
252, 97, 69, 52, 516.4, 6.1, 0.1, 0.00,
253, 99, 71, 49, 586.9, 7.0, 0.3, 0.00,
254, 96, 68, 52, 535.2, 8.8, 0.6, 0.00,
255, 96, 70, 52, 558.6, 9.3, 0.2, 0.00,
256, 94, 67, 55, 528.1, 8.7, 0.3, 0.00,
257, 92, 70, 57, 214.4, 6.5, 0.6, 0.00,
258, 92, 63, 42, 618.0, 8.3, 0, 0.00,
259, 86, 60, 48, 551.1, 1.9, 0.1, 0.00,
260, 87, 60, 39, 299.3, 9.2, 0.2, 0.00,
261, 88, 55, 36, 546.7, 7.0, 0.2, 0.00,
262, 92, 61, 34, 562.2, 5.0, 0.9, 0.00,
263, 95, 64, 36, 475.6, 5.1, 0.7, 0.00,
264, 82, 72, 45, 595.5, 7.6, 1, 0.00,
265, 75, 58, 45, 591.7, 1.0, 0.4, 0.00,
266, 91, 58, 42, 438.1, 7.0, 0, 0.00,
267, 92, 59, 38, 344.6, 8.0, 0.4, 0.00,
268, 91, 59, 40, 580.2, 7.3, 0.7, 0.00,
269, 93, 63, 43, 576.3, 7.5, 0.5, 0.00,
270, 96, 58, 35, 572.4, 6.2, 0, 0.00,
271, 97, 55, 28, 544.9, 6.2, 0, 0.00,
272, 97, 61, 31, 564.6, 5.8, 0.1, 0.00,
273, 97, 63, 35, 475.3, 5.9, 0.6, 0.00,
274, 89, 71, 42, 258.3, 9.2, 0.9, 0.00,
275, 87, 58, 44, 389.0, 9.9, 0.4, 0.00,
276, 87, 68, 45, 313.4, 7.3, 0.4, 0.00,
277, 91, 62, 44, 452.0, 5.4, 0.7, 0.00,
278, 96, 65, 44, 428.5, 13.6, 0.4, 0.00,
279, 81, 64, 43, 537.0, 12.3, 0.5, 0.00,
280, 76, 57, 54, 455.5, 1.3, 0.5, 0.19,
281, 73, 52, 40, 529.1, 9.9, 0, 0.00,

282, 73, 47, 34, 494.2, 8.4, 0, 0.00,
283, 75, 43, 29, 282.0, 5.4, 0, 0.00,
284, 80, 41, 28, 222.5, 4.6, 0, 0.00,
285, 84, 45, 30, 367.1, 5.7, 0, 0.00,
286, 84, 51, 31, 448.9, 13.3, 0.5, 0.00,
287, 66, 54, 46, 388.6, 14.3, 0.9, 0.13,
288, 78, 52, 38, 417.5, 12.3, 0.3, 0.00,
289, 79, 62, 46, 312.0, 9.1, 0.7, 0.00,
290, 67, 55, 45, 340.2, 9.2, 0.6, 0.03,
291, 75, 48, 48, 316.1, 6.4, 0.1, 0.00,
292, 80, 49, 44, 335.5, 5.6, 0.2, 0.00,
293, 83, 54, 39, 482.6, 7.9, 0, 0.00,
294, 82, 47, 36, 478.9, 6.1, 0, 0.00,
295, 83, 45, 32, 475.2, 5.7, 0.4, 0.00,
296, 85, 49, 32, 405.5, 5.8, 0.2, 0.00,
297, 85, 57, 31, 285.6, 5.8, 0.4, 0.00,
298, 71, 52, 45, 425.2, 9.2, 0.6, 0.00,
299, 71, 50, 46, 165.4, 6.1, 0.5, 0.00,
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301, 85, 46, 35, 357.3, 6.5, 0, 0.00,
302, 86, 47, 36, 214.5, 6.6, 0.2, 0.00,
303, 79, 55, 37, 380.1, 8.9, 0.8, 0.00,
304, 77, 50, 20, 284.4, 8.0, 0, 0.00,
305, 79, 42, 25, 389.5, 8.7, 0.5, 0.00,
306, 75, 60, 43, 377.1, 14.9, 0.8, 0.06,
307, 69, 58, 47, 346.2, 11.2, 0.8, 0.00,
308, 62, 44, 36, 241.9, 12.3, 0.5, 0.09,
309, 69, 32, 29, 419.3, 6.5, 0, 0.00,
310, 79, 38, 29, 423.6, 6.4, 0, 0.00,
311, 82, 45, 31, 420.5, 8.5, 0.6, 0.00,
312, 72, 56, 45, 417.5, 9.8, 0.5, 0.04,
313, 72, 45, 33, 298.6, 8.4, 0, 0.00,
314, 76, 39, 35, 411.6, 6.4, 0.3, 0.00,
315, 66, 45, 45, 363.5, 1.2, 0.8, 0.08,
316, 63, 53, 54, 406.0, 7.0, 0.9, 0.27,
317, 64, 47, 42, 403.2, 7.5, 0, 0.00,
318, 63, 40, 33, 400.5, 9.2, 0.1, 0.00,
319, 59, 41, 33, 381.4, 9.7, 0.5, 0.00,
320, 73, 44, 37, 395.3, 8.1, 0.8, 0.00,
321, 62, 43, 28, 268.8, 12.9, 0.2, 0.00,
322, 71, 41, 30, 390.4, 7.4, 0.1, 0.00,
323, 73, 39, 27, 100.7, 12.6, 0.4, 0.00,
324, 56, 33, 14, 358.0, 13.5, 0.1, 0.00,
325, 66, 29, 19, 269.1, 6.3, 0.1, 0.00,
326, 69, 38, 26, 381.3, 9.2, 0.9, 0.00,
327, 53, 45, 36, 379.2, 8.7, 0.9, 0.00,
328, 64, 40, 41, 302.6, 5.8, 0.3, 0.00,
329, 70, 43, 42, 156.0, 6.2, 0.8, 0.00,
330, 75, 47, 35, 217.4, 16.5, 0.4, 0.00,
331, 58, 37, 17, 137.2, 13.6, 0, 0.00,
332, 59, 25, 10, 344.8, 8.1, 0, 0.00,
333, 54, 34, 5, 73.6, 11.6, 0, 0.00,
334, 61, 24, 6, 200.7, 7.0, 0, 0.00,
335, 68, 30, 17, 298.6, 5.8, 0.1, 0.00,
336, 69, 35, 26, 290.9, 7.0, 0, 0.00,
337, 68, 32, 27, 203.2, 6.8, 0.3, 0.00,
338, 71, 39, 31, 360.8, 6.4, 0.6, 0.00,

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343,54,38,33,355.5,8.0,0.2,0.00,
344,53,33,13,354.7,9.6,0.5,0.00,
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346,56,39,28,353.3,7.0,1,0.01,
347,55,42,42,326.9,6.3,0.5,0.02,
348,62,34,38,263.9,4.9,0.3,0.00,
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350,61,34,22,351.5,6.9,0,0.00,
351,64,27,21,280.4,7.2,0,0.00,
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355,67,32,21,351.0,7.5,0.3,0.00,
356,65,42,20,320.2,9.1,1,0.00,
357,55,43,37,243.5,9.8,1,0.37,
358,51,43,40,351.7,6.0,0.9,0.01,
359,58,43,43,352.1,5.4,0.7,0.00,
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Climate Data (1995)

1, 53, 30, 28, 326.7, 7.5, 0.7, 0.00,
2, 45, 30, 28, 338.9, 6.6, 0.7, 0.00,
3, 54, 30, 30, 359.7, 5.4, 0.7, 0.00,
4, 46, 33, 31, 196.4, 7.3, 0.9, 0.00,
5, 61, 37, 33, 279.8, 13.0, 0.9, 0.16,
6, 55, 43, 28, 271.0, 17.6, 0.1, 0.00,
7, 58, 38, 29, 343.4, 8.2, 0.3, 0.00,
8, 66, 34, 32, 306.8, 7.2, 0.6, 0.00,
9, 67, 34, 32, 365.6, 5.6, 0.5, 0.00,
10, 65, 34, 31, 256.6, 7.0, 0.8, 0.00,
11, 67, 40, 24, 263.8, 8.0, 0.7, 0.00,
12, 61, 49, 35, 281.7, 11.7, 0.6, 0.01,
13, 62, 38, 33, 128.6, 7.2, 0.2, 0.00,
14, 65, 35, 33, 356.4, 6.3, 0.1, 0.00,
15, 69, 41, 31, 341.5, 7.5, 0.8, 0.00,
16, 63, 42, 25, 252.8, 15.4, 0.5, 0.00,
17, 55, 34, 24, 174.3, 7.9, 0.6, 0.00,
18, 50, 33, 16, 213.1, 9.6, 0.1, 0.00,
19, 52, 26, 17, 265.8, 4.8, 0.7, 0.00,
20, 63, 38, 18, 390.8, 5.8, 0.7, 0.00,
21, 63, 32, 21, 368.3, 6.5, 0.4, 0.00,
22, 59, 41, 21, 274.6, 8.6, 0.3, 0.00,
23, 60, 29, 24, 332.9, 6.7, 0.4, 0.00,
24, 61, 35, 25, 246.7, 7.1, 0.7, 0.00,
25, 65, 36, 31, 269.0, 6.4, 0.9, 0.00,
26, 59, 43, 34, 391.6, 14.7, 0.2, 0.09,
27, 56, 42, 28, 409.5, 18.2, 0.1, 0.00,
28, 56, 35, 20, 412.4, 7.7, 0.2, 0.00,
29, 56, 30, 24, 415.3, 7.8, 0.2, 0.00,
30, 53, 27, 21, 266.4, 6.2, 0, 0.00,
31, 60, 26, 17, 209.3, 7.0, 0.3, 0.00,
32, 72, 35, 22, 318.8, 5.1, 0.1, 0.00,
33, 74, 35, 28, 363.9, 5.1, 0, 0.00,
34, 65, 41, 22, 342.4, 9.1, 0, 0.00,
35, 68, 33, 18, 273.8, 4.9, 0, 0.00,
36, 72, 34, 20, 336.6, 6.1, 0, 0.00,
37, 74, 34, 18, 427.9, 6.6, 0, 0.00,
38, 76, 36, 20, 444.5, 8.4, 0.1, 0.00,
39, 67, 36, 28, 369.0, 6.4, 0.1, 0.00,
40, 73, 39, 32, 262.9, 1.5, 0.4, 0.00,
41, 63, 47, 34, 251.1, 1.4, 0.9, 0.30,
42, 61, 45, 32, 458.7, 11.7, 0.2, 0.00,
43, 67, 46, 33, 462.3, 1.9, 0.6, 0.00,
44, 70, 52, 43, 383.3, 11.9, 0.7, 0.00,
45, 71, 53, 45, 469.7, 14.7, 0.9, 0.03,
46, 62, 49, 47, 448.2, 8.7, 1, 0.45,
47, 65, 47, 43, 298.6, 6.8, 0.6, 0.03,
48, 61, 37, 35, 359.6, 5.8, 0.5, 0.00,
49, 71, 42, 36, 246.2, 5.7, 0.4, 0.00,
50, 67, 44, 29, 321.7, 7.6, 0, 0.00,
51, 75, 37, 28, 270.4, 5.4, 0.4, 0.00,
52, 67, 47, 35, 496.6, 6.4, 0.8, 0.00,
53, 72, 46, 42, 280.6, 6.2, 0.4, 0.02,

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58,72,54,35,444.0,9.8,0.5,0.00,
59,72,46,37,341.4,7.4,0.4,0.05,
60,60,42,40,410.7,7.4,0.9,0.00,
61,65,35,32,438.7,7.0,0.5,0.00,
62,74,43,28,536.5,9.6,0.6,0.00,
63,73,57,29,340.6,11.9,0.3,0.00,
64,74,50,37,544.7,12.4,0.6,0.00,
65,65,50,42,272.8,11.0,0.8,0.08,
66,59,36,25,360.5,9.4,0.4,0.00,
67,59,35,15,556.9,6.6,0.6,0.00,
68,70,41,19,531.3,5.8,0.4,0.00,
69,77,46,27,520.2,6.7,0,0.00,
70,81,54,36,448.7,13.0,0.3,0.00,
71,60,48,40,364.7,13.5,0.6,0.34,
72,70,43,29,202.4,8.0,0.1,0.00,
73,77,42,27,581.0,7.7,0.3,0.00,
74,72,47,33,511.3,8.5,0.3,0.00,
75,74,46,39,429.0,4.9,0.3,0.00,
76,78,48,37,134.9,7.0,0.5,0.00,
77,77,55,39,356.2,8.7,0.2,0.00,
78,82,58,35,600.8,11.9,0.3,0.00,
79,81,56,36,383.6,1.2,0.2,0.00,
80,85,62,34,250.9,14.8,0.3,0.00,
81,75,57,28,594.4,13.9,0.8,0.00,
82,80,45,30,616.2,8.4,0.6,0.00,
83,80,58,32,620.0,12.4,0.2,0.00,
84,69,47,25,490.4,12.2,0,0.00,
85,64,35,10,535.0,7.3,0,0.00,
86,76,36,17,330.3,8.4,0.7,0.00,
87,75,47,30,528.8,9.5,0.1,0.00,
88,72,41,30,638.5,7.9,0.3,0.00,
89,74,46,33,567.9,8.3,0.3,0.00,
90,70,45,35,501.2,6.7,0.3,0.00,
91,74,44,35,403.7,6.7,0.1,0.00,
92,79,48,23,443.4,9.9,0.3,0.00,
93,73,49,26,518.7,9.5,0.1,0.00,
94,71,46,37,616.0,8.8,0.5,0.02,
95,79,48,32,549.7,7.8,0,0.00,
96,83,54,20,353.7,9.7,0.2,0.00,
97,84,59,15,451.8,8.7,0.1,0.00,
98,86,59,16,291.3,12.1,0.1,0.00,
99,85,55,21,459.9,18.8,0.2,0.00,
100,63,47,13,561.0,13.0,0.4,0.00,
101,73,42,14,678.5,8.2,0.1,0.00,
102,83,40,12,539.9,7.0,0,0.00,
103,92,44,18,656.1,7.7,0.4,0.00,
104,86,64,17,436.6,13.3,0.4,0.00,
105,81,61,15,453.7,8.9,1,0.00,
106,80,57,21,578.7,11.5,0.9,0.00,
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113,72,41,26,545.1,6.8,0,0.00,
114,79,43,22,718.6,5.7,0,0.00,
115,85,46,21,543.5,9.7,0,0.00,
116,86,60,12,723.5,1.0,0.1,0.00,
117,84,51,31,725.8,7.3,0.5,0.00,
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119,89,67,22,730.4,12.0,0,0.00,
120,91,69,31,502.9,15.5,0.7,0.00,
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123,85,63,22,544.6,1.1,0,0.00,
124,90,53,29,657.9,8.4,0.3,0.00,
125,87,69,24,513.0,14.0,0.6,0.01,
126,86,52,18,743.4,1.4,0.3,0.00,
127,70,53,23,746.7,16.8,0.4,0.00,
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130,86,55,28,751.9,7.7,0.3,0.00,
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132,90,69,30,755.2,16.7,0.6,0.00,
133,89,67,33,756.8,15.7,0,0.00,
134,92,62,34,485.9,7.0,0.6,0.00,
135,98,63,29,717.8,9.3,0.7,0.00,
136,92,65,26,693.8,15.2,0.6,0.00,
137,74,56,30,644.8,18.1,0,0.00,
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139,90,57,27,765.2,5.8,0.7,0.00,
140,93,56,24,627.4,9.4,0.4,0.00,
141,95,70,25,721.3,8.9,0.8,0.00,
142,97,73,24,768.8,13.2,0.1,0.00,
143,90,73,30,769.9,13.7,0.3,0.00,
144,88,62,22,709.6,9.4,0,0.00,
145,93,58,30,771.9,11.8,0,0.00,
146,88,62,30,579.5,13.5,0.3,0.00,
147,86,64,28,690.3,12.0,0.3,0.00,
148,91,58,29,595.1,7.9,0.5,0.00,
149,91,62,37,680.9,1.3,0.3,0.00,
150,88,59,40,776.3,8.5,0.2,0.00,
151,91,63,26,460.9,1.5,0.3,0.00,
152,94,64,30,777.8,5.5,0.2,0.00,
153,99,68,32,760.3,16.3,0.3,0.00,
154,89,68,24,704.9,12.9,0.4,0.00,
155,91,55,30,623.3,8.7,0.3,0.00,
156,95,64,34,562.5,11.5,0.4,0.00,
157,94,77,32,631.7,18.9,0.4,0.00,
158,93,67,35,454.8,14.0,0.3,0.00,
159,93,71,33,729.1,16.8,0.3,0.00,
160,89,61,32,636.4,6.3,0.3,0.00,
161,95,58,35,508.3,7.0,0.2,0.00,
162,86,61,48,518.5,1.7,0.2,0.00,
163,96,62,43,689.5,6.1,0.2,0.00,
164,99,70,38,783.0,6.9,0.2,0.00,
165,101,69,31,733.6,8.2,0.2,0.00,
166,99,69,33,783.2,11.6,0.3,0.00,
167,96,66,38,670.1,1.7,0.2,0.00,

168,94,63,56,725.4,11.5,0.2,0.00,
169,92,63,55,637.9,8.5,0.3,0.00,
170,95,69,54,653.3,8.7,0.3,0.00,
171,94,65,52,574.5,7.2,0.3,0.00,
172,98,68,48,783.2,7.6,0.3,0.00,
173,98,70,43,783.0,6.1,0.4,0.00,
174,100,70,36,738.6,7.7,0.3,0.00,
175,96,64,45,782.6,7.2,0.3,0.00,
176,94,62,52,782.3,13.0,0.3,0.00,
177,94,65,51,752.6,7.6,0.2,0.00,
178,94,62,47,781.7,5.0,0.3,0.00,
179,97,63,44,781.3,7.5,0.4,0.00,
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181,89,68,57,780.4,8.5,0.4,0.00,
182,87,65,58,779.9,8.3,0.4,0.00,
183,94,67,54,779.4,7.4,0.4,0.00,
184,94,77,36,653.5,17.6,0.4,0.00,
185,95,72,28,717.2,14.0,0.4,0.00,
186,96,70,36,314.9,7.0,0.4,0.00,
187,97,68,46,776.8,8.7,0.4,0.00,
188,95,69,50,597.2,8.9,0.4,0.00,
189,94,73,54,377.8,5.6,0.4,0.00,
190,95,68,48,684.1,7.8,0.4,0.00,
191,98,68,41,760.5,11.8,0.5,0.00,
192,97,67,38,772.7,8.6,0.5,0.00,
193,96,73,43,771.8,7.4,0.4,0.00,
194,97,70,47,770.8,8.4,0.4,0.00,
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213,90,67,56,744.1,7.0,0.6,0.00,
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226, 89, 70, 62, 506.2, 8.8, 0.5, 0.12,
227, 88, 69, 63, 639.9, 7.0, 0.5, 0.00,
228, 90, 65, 66, 526.3, 8.4, 0.5, 0.07,
229, 90, 70, 67, 709.2, 6.7, 0.4, 0.22,
230, 90, 67, 63, 706.6, 4.5, 0.5, 0.00,
231, 93, 70, 58, 584.0, 14.1, 0.5, 0.03,
232, 87, 70, 59, 533.0, 8.1, 0.4, 0.07,
233, 93, 69, 57, 692.9, 8.1, 0.4, 0.01,
234, 96, 71, 59, 610.9, 8.2, 0.5, 0.00,
235, 93, 71, 60, 693.1, 7.0, 0.4, 0.16,
236, 94, 68, 55, 619.7, 4.7, 0.5, 0.00,
237, 98, 68, 51, 464.6, 4.9, 0.4, 0.00,
238, 98, 70, 54, 684.5, 7.5, 0.4, 0.08,
239, 95, 70, 56, 681.5, 6.8, 0.4, 0.00,
240, 93, 71, 53, 526.0, 5.2, 0.4, 0.00,
241, 96, 69, 53, 675.5, 4.9, 0.4, 0.00,
242, 97, 68, 55, 672.4, 5.9, 0.4, 0.00,
243, 96, 72, 54, 564.2, 7.5, 0.4, 0.00,
244, 93, 69, 52, 436.5, 1.6, 0.4, 0.00,
245, 92, 65, 48, 580.5, 9.0, 0.5, 0.00,
246, 93, 67, 48, 525.9, 6.9, 0.5, 0.00,
247, 96, 67, 47, 607.6, 5.4, 0.4, 0.00,
248, 98, 63, 45, 612.4, 5.4, 0.5, 0.00,
249, 101, 69, 44, 642.5, 5.1, 0.4, 0.00,
250, 99, 67, 46, 617.0, 8.8, 0.4, 0.00,
251, 94, 68, 56, 244.9, 9.1, 0.4, 0.02,
252, 89, 67, 58, 516.4, 1.2, 0.4, 0.00,
253, 82, 64, 61, 586.9, 5.3, 0.4, 0.60,
254, 85, 62, 59, 535.2, 4.8, 0.4, 0.38,
255, 91, 65, 55, 558.6, 4.2, 0.4, 0.00,
256, 88, 66, 52, 528.1, 9.7, 0.4, 0.00,
257, 77, 61, 58, 214.4, 8.4, 0.5, 0.19,
258, 64, 60, 60, 618.0, 12.0, 0.4, 0.79,
259, 79, 61, 61, 551.1, 5.6, 0.3, 0.00,
260, 85, 61, 60, 299.3, 4.8, 0.3, 0.00,
261, 89, 63, 58, 546.7, 9.1, 0.3, 1.03,
262, 83, 62, 60, 562.2, 4.6, 0.3, 0.00,
263, 87, 62, 58, 475.6, 5.5, 0.3, 0.00,
264, 82, 50, 51, 595.5, 12.2, 0.4, 0.00,
265, 58, 47, 42, 591.7, 8.1, 0.4, 0.00,
266, 81, 49, 50, 438.1, 5.2, 0.4, 0.00,
267, 88, 64, 50, 344.6, 7.5, 0.3, 0.00,
268, 85, 59, 50, 580.2, 4.6, 0.3, 0.00,
269, 88, 61, 51, 576.3, 6.1, 0.3, 0.00,
270, 90, 61, 50, 572.4, 5.0, 0.3, 0.00,
271, 82, 61, 57, 544.9, 6.6, 0.3, 0.17,
272, 85, 58, 52, 564.6, 11.1, 0.3, 0.00,
273, 80, 58, 41, 475.3, 6.9, 0.3, 0.00,
274, 86, 54, 46, 258.3, 6.4, 0.3, 0.00,
275, 83, 58, 41, 389.0, 8.9, 0.3, 0.00,
276, 83, 52, 41, 313.4, 4.6, 0.3, 0.00,
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278, 74, 54, 16, 428.5, 9.3, 0.4, 0.00,
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327,72,40,24,379.2,5.6,0.5,0.00,
328,70,35,23,302.6,3.6,0.3,0.00,
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Climate Data (1996)

1, 47, 38, 30, 326.7, 9.2, 0.5, 0.00,
2, 38, 27, 24, 338.9, 7.8, 0.4, 0.11,
3, 55, 27, 23, 359.7, 11.6, 0.5, 0.00,
4, 64, 43, 20, 196.4, 8.0, 0.4, 0.00,
5, 62, 35, 23, 279.8, 11.1, 0.5, 0.00,
6, 56, 31, 26, 271.0, 8.0, 0.5, 0.00,
7, 52, 24, 24, 343.4, 3.8, 0.4, 0.00,
8, 59, 24, 25, 306.8, 4.5, 0.4, 0.00,
9, 62, 25, 25, 365.6, 2.9, 0.4, 0.00,
10, 66, 27, 24, 256.6, 7.8, 0.4, 0.00,
11, 60, 31, 23, 263.8, 5.3, 0.4, 0.00,
12, 64, 26, 21, 281.7, 5.5, 0.4, 0.00,
13, 67, 30, 21, 128.6, 8.3, 0.4, 0.00,
14, 70, 31, 18, 356.4, 5.9, 0.3, 0.00,
15, 69, 32, 18, 341.5, 6.0, 0.4, 0.00,
16, 73, 43, 21, 252.8, 11.2, 0.4, 0.00,
17, 69, 50, 27, 174.3, 33.4, 0.5, 0.00,
18, 52, 28, 0, 213.1, 11.4, 0.4, 0.00,
19, 65, 26, 8, 265.8, 12.1, 0.4, 0.00,
20, 57, 32, 17, 390.8, 1.0, 0.5, 0.00,
21, 61, 21, 10, 368.3, 5.0, 0.4, 0.00,
22, 68, 33, 14, 274.6, 12.6, 0.4, 0.00,
23, 51, 34, 13, 332.9, 14.4, 0.4, 0.00,
24, 54, 20, 3, 246.7, 7.7, 0.3, 0.00,
25, 62, 22, 4, 269.0, 1.3, 0.3, 0.00,
26, 62, 36, 16, 391.6, 11.7, 0.3, 0.00,
27, 61, 32, 10, 409.5, 6.9, 0.4, 0.00,
28, 68, 35, 12, 412.4, 8.9, 0.4, 0.00,
29, 69, 30, 10, 415.3, 9.4, 0.4, 0.00,
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31, 68, 50, 24, 209.3, 15.3, 0.5, 0.00,
32, 61, 47, 36, 318.8, 1.5, 0.4, 0.08,
33, 52, 36, 32, 363.9, 8.4, 0.5, 0.09,
34, 59, 39, 31, 342.4, 7.4, 0.4, 0.02,
35, 60, 31, 29, 273.8, 3.7, 0.4, 0.00,
36, 67, 32, 30, 336.6, 3.0, 0.4, 0.00,
37, 71, 34, 30, 427.9, 4.5, 0.5, 0.00,
38, 73, 39, 30, 444.5, 5.5, 0.4, 0.00,
39, 74, 38, 27, 369.0, 6.3, 0.5, 0.00,
40, 76, 36, 26, 262.9, 5.5, 0.4, 0.00,
41, 77, 45, 25, 251.1, 7.9, 0.4, 0.00,
42, 57, 40, 11, 458.7, 12.3, 0.3, 0.00,
43, 60, 36, 8, 462.3, 8.8, 0.3, 0.00,
44, 66, 36, 20, 383.3, 3.7, 0.4, 0.00,
45, 71, 36, 32, 469.7, 8.6, 0.4, 0.00,
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47, 66, 40, 26, 298.6, 6.1, 0.4, 0.00,
48, 76, 38, 24, 359.6, 6.5, 0.3, 0.00,
49, 80, 55, 22, 246.2, 19.5, 0.4, 0.00,
50, 76, 56, 21, 321.7, 11.2, 0.4, 0.00,
51, 77, 56, 35, 270.4, 9.8, 0.4, 0.00,
52, 74, 46, 30, 496.6, 5.3, 0.4, 0.00,
53, 79, 47, 23, 280.6, 17.4, 0.4, 0.00,

54, 66, 50, 22, 192.6, 11.5, 0.4, 0.00,
55, 68, 45, 19, 101.7, 6.8, 0.4, 0.00,
56, 66, 54, 32, 281.6, 15.3, 0.4, 0.00,
57, 65, 43, 30, 357.3, 17.2, 0.5, 0.00,
58, 60, 37, 21, 444.0, 9.9, 0.4, 0.00,
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62, 64, 32, 6, 536.5, 6.2, 0.4, 0.00,
63, 69, 26, 5, 340.6, 4.0, 0.3, 0.00,
64, 72, 47, 11, 544.7, 14.6, 0.3, 0.00,
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67, 53, 24, 13, 556.9, 5.4, 0.4, 0.00,
68, 52, 32, 5, 531.3, 9.2, 0.4, 0.00,
69, 62, 21, 4, 520.2, 3.5, 0.5, 0.00,
70, 73, 31, 8, 448.7, 3.6, 0.4, 0.00,
71, 79, 38, 12, 364.7, 8.5, 0.3, 0.00,
72, 78, 52, 11, 202.4, 13.2, 0.3, 0.00,
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74, 65, 44, 24, 511.3, 11.3, 0.4, 0.00,
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78, 65, 40, 20, 600.8, 6.0, 0.4, 0.00,
79, 64, 39, 15, 383.6, 7.1, 0.4, 0.00,
80, 71, 31, 12, 250.9, 5.6, 0.4, 0.00,
81, 80, 50, 13, 594.4, 4.8, 0.3, 0.00,
82, 79, 57, 19, 616.2, 13.3, 0.3, 0.00,
83, 78, 59, 25, 620.0, 24.3, 0.3, 0.00,
84, 68, 50, 10, 490.4, 22.8, 0.3, 0.00,
85, 68, 42, 9, 535.0, 8.2, 0.4, 0.00,
86, 57, 32, 11, 330.3, 11.6, 0.4, 0.00,
87, 69, 37, 17, 528.8, 5.6, 0.3, 0.00,
88, 74, 42, 19, 638.5, 11.2, 0.3, 0.00,
89, 73, 54, 22, 567.9, 25.1, 0.3, 0.00,
90, 72, 51, 9, 501.2, 9.0, 0.2, 0.00,
91, 75, 49, 23, 403.7, 8.2, 0.3, 0.00,
92, 79, 44, 22, 443.4, 8.9, 0.2, 0.00,
93, 84, 55, 29, 518.7, 8.9, 0.3, 0.00,
94, 76, 54, 25, 616.0, 15.0, 0.3, 0.00,
95, 69, 48, 27, 549.7, 1.1, 0.3, 0.02,
96, 48, 37, 31, 353.7, 11.6, 0.4, 0.47,
97, 56, 36, 31, 451.8, 5.5, 0.3, 0.00,
98, 68, 35, 28, 291.3, 5.3, 0.3, 0.00,
99, 79, 44, 27, 459.9, 6.3, 0.3, 0.00,
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104, 78, 59, 17, 436.6, 25.3, 0.3, 0.00,
105, 69, 46, 4, 453.7, 9.7, 0.3, 0.00,
106, 72, 44, 16, 578.7, 8.2, 0.4, 0.00,
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154,99,63,31,704.9,5.5,0.4,0.00,
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156,100,67,36,562.5,4.9,0.4,0.00,
157,103,72,28,631.7,9.7,0.4,0.00,
158,105,82,27,454.8,11.3,0.3,0.00,
159,91,69,46,729.1,12.2,0.3,0.00,
160,98,67,48,636.4,7.0,0.3,0.00,
161,101,69,42,508.3,9.4,0.2,0.00,
162,102,68,38,518.5,5.0,0.2,0.00,
163,101,78,39,689.5,8.0,0.2,0.00,
164,98,70,44,783.0,1.9,0.2,0.00,
165,86,70,55,733.6,6.9,0.2,0.05,
166,91,66,58,783.2,6.8,0.3,0.08,
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170,103,73,46,653.3,3.8,0.3,0.00,
171,105,67,38,574.5,8.2,0.3,0.00,
172,106,74,35,783.2,6.9,0.3,0.00,
173,107,74,40,783.0,9.8,0.4,0.00,
174,102,76,46,738.6,1.4,0.3,0.00,
175,98,74,45,782.6,9.0,0.3,0.00,
176,99,73,43,782.3,13.8,0.3,0.00,
177,98,72,48,752.6,8.6,0.2,0.00,
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183,94,69,54,779.4,6.0,0.4,0.00,
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186,94,73,57,314.9,6.1,0.4,0.00,
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203,93,69,60,758.7,7.3,0.5,0.01,
204,97,72,58,662.9,7.9,0.5,0.00,
205,97,74,57,688.2,7.0,0.5,0.00,
206,96,72,55,755.7,8.5,0.5,0.01,
207,92,70,55,607.0,9.7,0.5,0.00,
208,94,70,53,276.5,4.8,0.6,0.00,
209,95,73,53,404.9,8.9,0.6,0.00,
210,95,75,56,749.3,7.5,0.5,0.00,
211,98,72,53,495.7,5.3,0.4,0.00,
212,100,72,57,745.9,7.9,0.5,0.00,
213,93,71,62,744.1,5.0,0.6,0.09,
214,94,72,59,720.5,6.2,0.6,0.05,
215,90,74,57,621.6,8.0,0.5,0.00,
216,90,71,61,551.6,8.3,0.5,0.00,
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218,95,76,50,513.5,9.2,0.4,0.00,
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222,83,70,61,481.4,7.6,0.5,0.12,
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225, 96, 64, 48, 500.4, 6.2, 0.5, 0.00,
226, 97, 66, 45, 506.2, 5.4, 0.5, 0.00,
227, 99, 70, 45, 639.9, 6.3, 0.5, 0.00,
228, 98, 70, 45, 526.3, 5.0, 0.5, 0.00,
229, 98, 73, 46, 709.2, 6.7, 0.4, 0.00,
230, 94, 66, 55, 706.6, 8.2, 0.5, 0.86,
231, 88, 66, 58, 584.0, 6.7, 0.5, 0.00,
232, 92, 73, 56, 533.0, 9.1, 0.4, 0.01,
233, 89, 68, 61, 692.9, 6.9, 0.4, 0.02,
234, 91, 68, 58, 610.9, 6.5, 0.5, 0.00,
235, 91, 72, 51, 693.1, 8.4, 0.4, 0.00,
236, 85, 69, 56, 619.7, 1.7, 0.5, 0.09,
237, 85, 62, 59, 464.6, 8.3, 0.4, 0.00,
238, 79, 69, 63, 684.5, 7.0, 0.4, 0.00,
239, 84, 69, 63, 681.5, 5.1, 0.4, 0.07,
240, 85, 68, 62, 526.0, 7.3, 0.4, 0.02,
241, 77, 68, 65, 675.5, 5.6, 0.4, 0.61,
242, 87, 64, 54, 672.4, 8.2, 0.4, 0.00,
243, 87, 67, 60, 564.2, 7.1, 0.4, 0.00,
244, 90, 68, 59, 436.5, 7.8, 0.4, 0.00,
245, 94, 66, 56, 580.5, 8.4, 0.5, 0.47,
246, 87, 64, 56, 525.9, 9.8, 0.5, 0.00,
247, 87, 67, 56, 607.6, 8.9, 0.4, 0.00,
248, 88, 63, 58, 612.4, 5.2, 0.5, 0.00,
249, 88, 63, 58, 642.5, 5.9, 0.4, 0.00,
250, 91, 67, 56, 617.0, 5.7, 0.4, 0.00,
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254, 86, 66, 56, 535.2, 6.8, 0.4, 0.02,
255, 83, 67, 61, 558.6, 9.2, 0.4, 0.05,
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258, 76, 62, 57, 618.0, 8.3, 0.4, 0.03,
259, 81, 62, 46, 551.1, 13.1, 0.3, 0.01,
260, 84, 64, 49, 299.3, 7.6, 0.3, 0.00,
261, 86, 57, 47, 546.7, 7.2, 0.3, 0.00,
262, 86, 67, 44, 562.2, 1.8, 0.3, 0.00,
263, 83, 61, 46, 475.6, 8.5, 0.3, 0.00,
264, 86, 63, 42, 595.5, 9.2, 0.4, 0.00,
265, 90, 53, 37, 591.7, 3.9, 0.4, 0.00,
266, 93, 56, 42, 438.1, 5.6, 0.4, 0.00,
267, 91, 57, 40, 344.6, 4.9, 0.3, 0.00,
268, 87, 57, 51, 580.2, 8.7, 0.3, 0.01,
269, 87, 59, 54, 576.3, 11.4, 0.3, 0.00,
270, 85, 64, 47, 572.4, 1.5, 0.3, 0.00,
271, 80, 58, 36, 544.9, 12.4, 0.3, 0.00,
272, 80, 49, 34, 564.6, 6.1, 0.3, 0.00,
273, 85, 49, 30, 475.3, 5.5, 0.3, 0.00,
274, 86, 52, 37, 258.3, 5.3, 0.3, 0.00,
275, 90, 62, 42, 389.0, 3.3, 0.3, 0.00,
276, 91, 56, 39, 313.4, 9.8, 0.3, 0.00,
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279, 81, 58, 52, 537.0, 7.2, 0.3, 0.00,
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316,75,36,30,406.0,3.9,0.3,0.00,
317,76,38,33,403.2,5.1,0.4,0.00,
318,75,38,33,400.5,4.5,0.3,0.00,
319,76,46,32,381.4,7.0,0.4,0.00,
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322,67,32,24,390.4,5.3,0.4,0.00,
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324,78,38,16,358.0,8.9,0.3,0.00,
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328,65,47,18,302.6,8.3,0.3,0.00,
329,58,37,16,156.0,10.8,0.4,0.00,
330,61,30,20,217.4,12.9,0.3,0.00,
331,65,27,23,137.2,9.3,0.3,0.00,
332,50,32,25,344.8,10.0,0.3,0.00,
333,41,36,26,73.6,5.4,0.3,0.02,
334,57,36,21,200.7,11.7,0.3,0.14,
335,50,37,20,298.6,21.8,0.3,0.00,
336,53,26,22,290.9,7.1,0.3,0.00,
337,58,30,21,203.2,7.2,0.3,0.00,
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339, 64, 25, 14, 359.6, 7.5, 0.4, 0.00,
340, 65, 27, 15, 253.1, 1.9, 0.2, 0.00,
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342, 68, 44, 32, 356.4, 9.5, 0.4, 0.00,
343, 68, 35, 30, 355.5, 6.5, 0.4, 0.00,
344, 74, 35, 30, 354.7, 6.6, 0.4, 0.00,
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346, 69, 48, 28, 353.3, 13.4, 0.4, 0.00,
347, 68, 39, 30, 326.9, 4.4, 0.4, 0.00,
348, 69, 35, 30, 263.9, 5.3, 0.4, 0.00,
349, 69, 35, 27, 252.8, 4.0, 0.3, 0.00,
350, 45, 28, 11, 351.5, 11.0, 0.4, 0.00,
351, 53, 17, 10, 280.4, 7.2, 0.4, 0.00,
352, 51, 19, 10, 277.9, 8.5, 0.5, 0.00,
353, 34, 6, -4, 350.9, 6.2, 0.4, 0.00,
354, 46, 11, -8, 350.9, 8.9, 0.4, 0.00,
355, 52, 11, -1, 351.0, 11.8, 0.4, 0.00,
356, 62, 28, 9, 320.2, 9.3, 0.4, 0.00,
357, 70, 37, 12, 243.5, 2.7, 0.4, 0.00,
358, 60, 38, 19, 351.7, 8.3, 0.4, 0.00,
359, 55, 32, 10, 352.1, 9.8, 0.5, 0.00,
360, 51, 30, 12, 352.6, 6.5, 0.6, 0.00,
361, 64, 31, 15, 353.1, 5.3, 0.5, 0.00,
362, 66, 37, 20, 353.8, 7.9, 0.5, 0.00,
363, 64, 47, 23, 354.5, 11.6, 0.5, 0.00,
364, 64, 34, 24, 355.3, 3.9, 0.4, 0.00,
365, 65, 28, 21, 316.1, 3.5, 0.4, 0.00,
366, 65, 34, 23, 300.0, 4.6, 0.4, 0.00,

Climate Data (1997)

1, 68, 48, 30, 326.7, 7.7, 0.5, 0.00,
2, 71, 40, 31, 338.9, 1.4, 0.4, 0.00,
3, 74, 53, 30, 359.7, 16.4, 0.5, 0.01,
4, 63, 49, 30, 196.4, 13.6, 0.4, 0.23,
5, 57, 44, 31, 279.8, 6.2, 0.5, 0.00,
6, 45, 23, 25, 271.0, 12.8, 0.5, 0.09,
7, 28, 18, 18, 343.4, 7.5, 0.4, 0.03,
8, 33, 10, 19, 306.8, 4.0, 0.4, 0.00,
9, 43, 17, 20, 365.6, 9.6, 0.4, 0.00,
10, 51, 31, 26, 256.6, 9.5, 0.4, 0.00,
11, 58, 37, 28, 263.8, 8.8, 0.4, 0.00,
12, 46, 21, 18, 281.7, 9.5, 0.4, 0.00,
13, 28, 19, 10, 128.6, 9.7, 0.4, 0.00,
14, 56, 23, 21, 356.4, 1.8, 0.3, 0.00,
15, 52, 31, 15, 341.5, 8.1, 0.4, 0.00,
16, 47, 26, 18, 252.8, 9.4, 0.4, 0.00,
17, 54, 26, 21, 174.3, 7.6, 0.5, 0.00,
18, 56, 32, 20, 213.1, 6.6, 0.4, 0.00,
19, 50, 31, 26, 265.8, 4.1, 0.4, 0.00,
20, 62, 40, 30, 390.8, 5.6, 0.5, 0.00,
21, 62, 43, 28, 368.3, 1.2, 0.4, 0.02,
22, 60, 33, 28, 274.6, 6.9, 0.4, 0.00,
23, 64, 44, 26, 332.9, 11.5, 0.4, 0.00,
24, 61, 44, 27, 246.7, 1.2, 0.3, 0.00,
25, 68, 31, 24, 269.0, 6.4, 0.3, 0.00,
26, 67, 39, 26, 391.6, 13.2, 0.3, 0.00,
27, 64, 38, 28, 409.5, 1.7, 0.4, 0.00,
28, 52, 31, 17, 412.4, 7.6, 0.4, 0.00,
29, 58, 31, 15, 415.3, 11.7, 0.4, 0.00,
30, 60, 35, 24, 266.4, 6.2, 0.5, 0.00,
31, 67, 28, 23, 209.3, 6.1, 0.5, 0.00,
32, 71, 36, 19, 318.8, 8.1, 0.4, 0.00,
33, 70, 32, 21, 363.9, 7.1, 0.5, 0.00,
34, 64, 38, 22, 342.4, 7.3, 0.4, 0.00,
35, 62, 34, 18, 273.8, 1.2, 0.4, 0.00,
36, 63, 42, 24, 336.6, 7.7, 0.4, 0.00,
37, 65, 41, 17, 427.9, 17.2, 0.5, 0.00,
38, 53, 28, 11, 444.5, 7.3, 0.4, 0.00,
39, 57, 32, 22, 369.0, 7.6, 0.5, 0.00,
40, 60, 25, 18, 262.9, 5.5, 0.4, 0.00,
41, 66, 25, 9, 251.1, 5.4, 0.4, 0.00,
42, 71, 27, 18, 458.7, 9.3, 0.3, 0.00,
43, 60, 36, 27, 462.3, 8.3, 0.3, 0.00,
44, 51, 33, 29, 383.3, 9.3, 0.4, 0.06,
45, 54, 26, 28, 469.7, 3.2, 0.4, 0.00,
46, 63, 25, 22, 448.2, 3.7, 0.4, 0.00,
47, 69, 32, 19, 298.6, 7.1, 0.4, 0.00,
48, 73, 45, 20, 359.6, 4.4, 0.3, 0.00,
49, 71, 45, 29, 246.2, 6.9, 0.4, 0.19,
50, 59, 40, 36, 321.7, 6.4, 0.4, 0.00,
51, 67, 38, 32, 270.4, 15.3, 0.4, 0.00,
52, 58, 38, 22, 496.6, 12.2, 0.4, 0.00,
53, 56, 32, 28, 280.6, 9.4, 0.4, 0.00,

54, 63, 36, 33, 192.6, 6.5, 0.4, 0.00,
55, 61, 35, 31, 101.7, 11.1, 0.4, 0.00,
56, 39, 33, 28, 281.6, 1.6, 0.4, 0.00,
57, 56, 34, 27, 357.3, 15.6, 0.5, 0.00,
58, 62, 38, 23, 444.0, 12.1, 0.4, 0.00,
59, 64, 42, 32, 341.4, 12.3, 0.4, 0.04,
60, 53, 35, 31, 410.7, 8.5, 0.4, 0.10,
61, 62, 27, 24, 438.7, 8.0, 0.5, 0.00,
62, 72, 38, 24, 536.5, 1.6, 0.4, 0.00,
63, 74, 40, 19, 340.6, 11.4, 0.3, 0.00,
64, 63, 40, 10, 544.7, 1.4, 0.3, 0.00,
65, 70, 31, 23, 272.8, 6.6, 0.3, 0.00,
66, 77, 39, 30, 360.5, 2.6, 0.3, 0.00,
67, 80, 43, 26, 556.9, 7.3, 0.4, 0.00,
68, 76, 46, 20, 531.3, 1.4, 0.4, 0.00,
69, 74, 44, 29, 520.2, 4.9, 0.5, 0.00,
70, 76, 42, 32, 448.7, 5.3, 0.4, 0.00,
71, 78, 47, 38, 364.7, 6.8, 0.3, 0.00,
72, 81, 43, 25, 202.4, 12.1, 0.3, 0.00,
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74, 78, 38, 26, 511.3, 4.2, 0.4, 0.00,
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76, 80, 59, 26, 134.9, 12.3, 0.3, 0.00,
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78, 73, 41, 24, 600.8, 4.5, 0.4, 0.00,
79, 81, 38, 24, 383.6, 3.7, 0.4, 0.00,
80, 86, 38, 25, 250.9, 4.9, 0.4, 0.00,
81, 78, 49, 31, 594.4, 7.1, 0.3, 0.00,
82, 83, 50, 30, 616.2, 11.8, 0.3, 0.00,
83, 75, 59, 26, 620.0, 12.7, 0.3, 0.00,
84, 63, 43, 35, 490.4, 12.1, 0.3, 0.15,
85, 66, 41, 41, 535.0, 9.3, 0.4, 0.39,
86, 71, 43, 38, 330.3, 14.6, 0.4, 0.00,
87, 76, 50, 30, 528.8, 11.1, 0.3, 0.00,
88, 76, 51, 30, 638.5, 1.4, 0.3, 0.00,
89, 60, 49, 22, 567.9, 12.5, 0.3, 0.00,
90, 69, 50, 35, 501.2, 8.0, 0.2, 0.00,
91, 76, 52, 34, 403.7, 12.6, 0.3, 0.00,
92, 79, 47, 26, 443.4, 8.8, 0.2, 0.00,
93, 78, 50, 33, 518.7, 11.9, 0.3, 0.00,
94, 57, 43, 30, 616.0, 2.9, 0.3, 0.02,
95, 66, 45, 32, 549.7, 16.6, 0.3, 0.00,
96, 70, 50, 32, 353.7, 7.2, 0.4, 0.00,
97, 78, 42, 31, 451.8, 7.0, 0.3, 0.00,
98, 75, 45, 31, 291.3, 6.6, 0.3, 0.00,
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104, 74, 40, 28, 436.6, 6.0, 0.3, 0.00,
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106, 81, 44, 36, 578.7, 7.7, 0.4, 0.00,
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124,90,57,41,657.9,5.2,0.3,0.00,
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133,89,54,46,756.8,6.9,0.2,0.00,
134,92,67,41,485.9,9.4,0.3,0.00,
135,90,60,45,717.8,9.1,0.3,0.00,
136,89,64,50,693.8,7.0,0.3,0.00,
137,93,61,49,644.8,5.4,0.4,0.00,
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140,81,56,55,627.4,8.7,0.3,0.16,
141,83,60,55,721.3,6.6,0.3,0.00,
142,82,55,54,768.8,5.6,0.4,0.14,
143,87,55,49,769.9,4.8,0.3,0.00,
144,90,67,45,709.6,16.0,0.4,0.00,
145,87,67,42,771.9,18.6,0.3,0.00,
146,88,71,40,579.5,13.5,0.3,0.00,
147,88,57,33,690.3,8.2,0.3,0.00,
148,93,63,47,595.1,4.7,0.3,0.00,
149,97,64,50,680.9,8.3,0.3,0.00,
150,100,64,44,776.3,7.1,0.3,0.00,
151,93,68,62,460.9,8.2,0.3,0.00,
152,101,65,51,777.8,6.2,0.2,0.00,
153,100,77,44,760.3,11.2,0.3,0.00,
154,102,71,39,704.9,6.4,0.4,0.00,
155,100,71,56,623.3,7.4,0.3,0.00,
156,95,66,51,562.5,9.2,0.4,0.00,
157,92,63,54,631.7,11.6,0.4,0.15,
158,83,62,60,454.8,12.4,0.3,0.01,
159,88,61,50,729.1,7.3,0.3,0.00,
160,91,58,43,636.4,5.1,0.3,0.00,
161,95,63,53,508.3,5.3,0.2,0.00,
162,98,67,50,518.5,9.2,0.2,0.00,
163,93,72,44,689.5,13.6,0.2,0.01,
164,95,72,46,783.0,14.7,0.2,0.00,
165,81,61,56,733.6,1.0,0.2,0.67,
166,76,58,55,783.2,7.8,0.3,0.27,
167,85,63,42,670.1,8.8,0.2,0.00,

168,93,58,48,725.4,4.3,0.2,0.00,
169,97,67,47,637.9,4.6,0.3,0.00,
170,100,69,47,653.3,8.3,0.3,0.00,
171,99,69,44,574.5,9.6,0.3,0.00,
172,98,77,39,783.2,11.5,0.3,0.00,
173,100,71,40,783.0,1.2,0.4,0.00,
174,98,65,44,738.6,9.6,0.3,0.00,
175,98,71,37,782.6,1.4,0.3,0.00,
176,100,64,49,782.3,6.9,0.3,0.00,
177,93,68,56,752.6,11.0,0.2,0.00,
178,94,69,53,781.7,4.9,0.3,0.00,
179,99,67,51,781.3,6.4,0.4,0.00,
180,102,69,47,459.7,6.3,0.4,0.00,
181,104,73,49,780.4,5.9,0.4,0.00,
182,105,68,47,779.9,4.7,0.4,0.00,
183,105,76,49,779.4,8.2,0.4,0.00,
184,104,72,54,653.5,6.7,0.4,0.00,
185,92,74,55,717.2,14.5,0.4,0.00,
186,96,65,40,314.9,6.9,0.4,0.00,
187,97,72,38,776.8,1.4,0.4,0.00,
188,96,68,40,597.2,9.2,0.4,0.21,
189,93,66,46,377.8,6.7,0.4,0.03,
190,95,67,53,684.1,7.7,0.4,0.00,
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192,93,67,47,772.7,1.3,0.5,0.00,
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194,99,72,54,770.8,7.8,0.4,0.00,
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196,99,67,53,663.4,8.5,0.5,0.00,
197,96,73,52,767.6,6.7,0.5,0.00,
198,100,72,50,765.0,7.1,0.5,0.00,
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201,97,71,56,705.9,8.1,0.5,0.03,
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203,93,70,61,758.7,5.5,0.5,0.00,
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205,95,68,62,688.2,8.8,0.5,0.17,
206,93,66,63,755.7,6.7,0.5,0.00,
207,95,73,61,607.0,8.6,0.5,0.00,
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211,87,68,65,495.7,7.1,0.4,0.08,
212,90,69,65,745.9,6.3,0.5,0.05,
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225, 90, 66, 60, 500.4, 3.3, 0.5, 0.01,
226, 89, 67, 60, 506.2, 7.3, 0.5, 0.26,
227, 94, 68, 55, 639.9, 1.9, 0.5, 0.00,
228, 95, 74, 55, 526.3, 8.8, 0.5, 0.00,
229, 95, 73, 59, 709.2, 1.0, 0.4, 0.00,
230, 88, 69, 63, 706.6, 7.3, 0.5, 0.00,
231, 93, 75, 62, 584.0, 7.3, 0.5, 0.00,
232, 97, 69, 62, 533.0, 4.4, 0.4, 0.00,
233, 95, 69, 60, 692.9, 6.8, 0.4, 0.00,
234, 97, 75, 58, 610.9, 8.4, 0.5, 0.00,
235, 91, 70, 62, 693.1, 9.2, 0.4, 0.02,
236, 93, 71, 59, 619.7, 7.4, 0.5, 0.10,
237, 93, 69, 50, 464.6, 6.0, 0.4, 0.00,
238, 93, 66, 49, 684.5, 4.9, 0.4, 0.00,
239, 96, 63, 47, 681.5, 4.8, 0.4, 0.00,
240, 99, 67, 46, 526.0, 7.1, 0.4, 0.00,
241, 99, 69, 52, 675.5, 8.9, 0.4, 0.00,
242, 98, 69, 54, 672.4, 6.4, 0.4, 0.00,
243, 95, 70, 53, 564.2, 9.7, 0.4, 0.00,
244, 93, 69, 52, 436.5, 9.1, 0.4, 0.00,
245, 94, 69, 51, 580.5, 1.0, 0.5, 0.00,
246, 91, 69, 56, 525.9, 9.8, 0.5, 0.07,
247, 90, 68, 49, 607.6, 7.4, 0.4, 0.00,
248, 91, 69, 58, 612.4, 5.8, 0.5, 0.00,
249, 92, 69, 58, 642.5, 4.6, 0.4, 0.01,
250, 95, 70, 55, 617.0, 4.2, 0.4, 0.00,
251, 97, 67, 49, 244.9, 7.0, 0.4, 0.00,
252, 96, 67, 54, 516.4, 7.8, 0.4, 0.00,
253, 91, 68, 60, 586.9, 6.7, 0.4, 0.09,
254, 91, 67, 60, 535.2, 5.6, 0.4, 0.23,
255, 90, 67, 61, 558.6, 4.9, 0.4, 0.00,
256, 92, 65, 58, 528.1, 3.5, 0.4, 0.00,
257, 94, 69, 62, 214.4, 8.0, 0.5, 0.42,
258, 92, 68, 62, 618.0, 5.8, 0.4, 0.00,
259, 94, 69, 60, 551.1, 6.2, 0.3, 0.00,
260, 97, 73, 57, 299.3, 5.9, 0.3, 0.00,
261, 93, 71, 57, 546.7, 7.5, 0.3, 0.00,
262, 97, 71, 57, 562.2, 5.6, 0.3, 0.00,
263, 91, 71, 56, 475.6, 15.4, 0.3, 0.00,
264, 84, 60, 58, 595.5, 12.9, 0.4, 0.70,
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266, 81, 62, 59, 438.1, 6.6, 0.4, 0.00,
267, 76, 63, 54, 344.6, 7.7, 0.3, 0.00,
268, 84, 62, 50, 580.2, 5.5, 0.3, 0.00,
269, 88, 63, 55, 576.3, 2.5, 0.3, 0.00,
270, 90, 66, 54, 572.4, 3.7, 0.3, 0.00,
271, 90, 61, 49, 544.9, 7.4, 0.3, 0.00,
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273, 91, 61, 55, 475.3, 4.3, 0.3, 0.00,
274, 93, 67, 53, 258.3, 9.9, 0.3, 0.00,
275, 88, 67, 53, 389.0, 7.5, 0.3, 0.00,
276, 91, 62, 53, 313.4, 8.3, 0.3, 0.00,
277, 89, 63, 48, 452.0, 6.4, 0.3, 0.00,
278, 90, 57, 44, 428.5, 4.5, 0.4, 0.00,
279, 89, 63, 51, 537.0, 4.7, 0.3, 0.00,
280, 84, 61, 53, 455.5, 7.4, 0.3, 0.01,
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314,56,40,30,411.6,8.8,0.3,0.00,
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316,51,45,47,406.0,4.6,0.3,0.40,
317,57,47,40,403.2,17.2,0.4,0.05,
318,62,43,41,400.5,12.4,0.3,0.00,
319,50,32,32,381.4,5.0,0.4,0.00,
320,53,29,33,395.3,2.4,0.4,0.00,
321,55,32,38,268.8,3.7,0.4,0.00,
322,60,32,34,390.4,3.9,0.4,0.00,
323,65,31,31,100.7,7.6,0.3,0.00,
324,70,44,30,358.0,8.4,0.3,0.00,
325,62,44,30,269.1,9.3,0.4,0.00,
326,63,39,25,381.3,8.9,0.4,0.00,
327,65,36,25,379.2,5.5,0.5,0.00,
328,70,34,29,302.6,3.5,0.3,0.00,
329,72,35,32,156.0,5.5,0.4,0.00,
330,72,40,31,217.4,5.8,0.3,0.00,
331,70,49,36,137.2,14.9,0.3,0.00,
332,58,43,30,344.8,12.7,0.3,0.00,
333,60,32,29,73.6,4.4,0.3,0.00,
334,61,29,27,200.7,6.2,0.3,0.00,
335,63,44,33,298.6,6.2,0.3,0.25,
336,51,40,38,290.9,13.8,0.3,0.03,
337,54,37,34,203.2,1.3,0.3,0.00,
338,52,32,26,360.8,5.0,0.3,0.00,

339,56,27,28,359.6,4.1,0.4,0.00,
340,57,34,30,253.1,7.8,0.2,0.00,
341,55,47,44,235.2,15.2,0.3,0.22,
342,62,46,40,356.4,23.9,0.4,0.00,
343,50,39,25,355.5,19.5,0.4,0.00,
344,46,28,23,354.7,7.0,0.4,0.00,
345,37,26,16,354.0,9.7,0.4,0.00,
346,42,19,11,353.3,4.1,0.4,0.00,
347,50,17,14,326.9,2.1,0.4,0.00,
348,55,20,17,263.9,3.5,0.4,0.00,
349,57,23,19,252.8,3.7,0.3,0.00,
350,60,24,19,351.5,6.8,0.4,0.00,
351,58,22,19,280.4,3.9,0.4,0.00,
352,61,24,20,277.9,1.7,0.5,0.00,
353,64,27,22,350.9,6.8,0.4,0.00,
354,50,33,32,350.9,1.0,0.4,0.22,
355,53,36,36,351.0,1.4,0.4,0.01,
356,54,33,35,320.2,8.9,0.4,0.42,
357,45,33,33,243.5,8.0,0.4,0.11,
358,47,35,31,351.7,12.7,0.4,0.00,
359,38,29,31,352.1,6.3,0.5,0.15,
360,37,26,23,352.6,1.1,0.6,0.00,
361,41,19,22,353.1,7.1,0.5,0.00,
362,44,25,18,353.8,7.9,0.5,0.00,
363,50,21,22,354.5,3.6,0.5,0.00,
364,55,24,28,355.3,4.2,0.4,0.00,
365,55,29,31,316.1,5.6,0.4,0.00,

Climate Data (1998)

1, 57, 29, 32, 326.7, 4.2, 0.5, 0.00,
2, 64, 28, 34, 338.9, 2.8, 0.4, 0.00,
3, 66, 34, 37, 359.7, 6.3, 0.5, 0.00,
4, 61, 36, 40, 196.4, 3.6, 0.4, 0.03,
5, 55, 38, 38, 279.8, 7.1, 0.5, 0.01,
6, 51, 33, 26, 271.0, 6.1, 0.5, 0.00,
7, 50, 24, 24, 343.4, 5.0, 0.4, 0.00,
8, 52, 28, 22, 306.8, 6.1, 0.4, 0.00,
9, 60, 37, 23, 365.6, 9.9, 0.4, 0.00,
10, 61, 37, 29, 256.6, 8.7, 0.4, 0.00,
11, 59, 45, 33, 263.8, 13.3, 0.4, 0.00,
12, 61, 32, 31, 281.7, 8.1, 0.4, 0.00,
13, 60, 30, 31, 128.6, 1.1, 0.4, 0.00,
14, 58, 36, 28, 356.4, 8.5, 0.3, 0.00,
15, 56, 24, 21, 341.5, 5.8, 0.4, 0.00,
16, 63, 38, 30, 252.8, 7.2, 0.4, 0.00,
17, 68, 36, 34, 174.3, 1.6, 0.5, 0.00,
18, 68, 35, 32, 213.1, 5.4, 0.4, 0.00,
19, 70, 34, 28, 265.8, 9.2, 0.4, 0.00,
20, 63, 47, 29, 390.8, 7.8, 0.5, 0.00,
21, 57, 38, 35, 368.3, 4.8, 0.4, 0.01,
22, 56, 31, 31, 274.6, 6.1, 0.4, 0.00,
23, 62, 31, 26, 332.9, 6.9, 0.4, 0.00,
24, 63, 28, 23, 246.7, 3.5, 0.3, 0.00,
25, 65, 29, 22, 269.0, 5.4, 0.3, 0.00,
26, 63, 32, 19, 391.6, 6.4, 0.3, 0.00,
27, 68, 24, 18, 409.5, 3.0, 0.4, 0.00,
28, 70, 30, 19, 412.4, 6.6, 0.4, 0.00,
29, 67, 29, 19, 415.3, 5.3, 0.4, 0.00,
30, 64, 33, 26, 266.4, 11.0, 0.5, 0.00,
31, 60, 34, 26, 209.3, 6.6, 0.5, 0.00,
32, 58, 29, 22, 318.8, 6.9, 0.4, 0.00,
33, 64, 27, 25, 363.9, 7.2, 0.5, 0.00,
34, 70, 31, 24, 342.4, 9.7, 0.4, 0.00,
35, 57, 43, 31, 273.8, 12.6, 0.4, 0.04,
36, 55, 35, 30, 336.6, 13.3, 0.4, 0.00,
37, 59, 23, 27, 427.9, 4.8, 0.5, 0.00,
38, 65, 32, 30, 444.5, 12.3, 0.4, 0.00,
39, 65, 49, 34, 369.0, 14.1, 0.5, 0.00,
40, 53, 40, 40, 262.9, 14.9, 0.4, 0.10,
41, 55, 38, 30, 251.1, 1.6, 0.4, 0.00,
42, 57, 29, 29, 458.7, 7.0, 0.3, 0.00,
43, 57, 38, 26, 462.3, 7.8, 0.3, 0.00,
44, 60, 32, 28, 383.3, 4.6, 0.4, 0.00,
45, 62, 44, 34, 469.7, 9.2, 0.4, 0.00,
46, 53, 42, 35, 448.2, 1.9, 0.4, 0.00,
47, 51, 38, 26, 298.6, 16.2, 0.4, 0.00,
48, 56, 37, 24, 359.6, 11.1, 0.3, 0.00,
49, 51, 38, 31, 246.2, 17.3, 0.4, 0.01,
50, 56, 26, 27, 321.7, 6.3, 0.4, 0.00,
51, 60, 34, 25, 270.4, 5.2, 0.4, 0.00,
52, 59, 39, 33, 496.6, 11.8, 0.4, 0.00,
53, 66, 45, 31, 280.6, 17.7, 0.4, 0.00,

54, 69, 43, 31, 192.6, 8.7, 0.4, 0.00,
55, 80, 40, 27, 101.7, 16.5, 0.4, 0.00,
56, 55, 42, 27, 281.6, 24.0, 0.4, 0.00,
57, 54, 39, 19, 357.3, 2.2, 0.5, 0.00,
58, 53, 36, 18, 444.0, 16.5, 0.4, 0.00,
59, 51, 22, 6, 341.4, 6.5, 0.4, 0.00,
60, 55, 23, 6, 410.7, 7.7, 0.4, 0.00,
61, 61, 30, 11, 438.7, 6.7, 0.5, 0.00,
62, 72, 32, 17, 536.5, 8.2, 0.4, 0.00,
63, 75, 53, 21, 340.6, 18.8, 0.3, 0.00,
64, 71, 50, 21, 544.7, 11.2, 0.3, 0.00,
65, 70, 50, 34, 272.8, 15.5, 0.3, 0.01,
66, 57, 37, 27, 360.5, 26.0, 0.3, 0.01,
67, 54, 25, 22, 556.9, 5.4, 0.4, 0.00,
68, 62, 28, 20, 531.3, 4.0, 0.4, 0.00,
69, 60, 29, 20, 520.2, 7.4, 0.5, 0.00,
70, 64, 31, 22, 448.7, 11.3, 0.4, 0.00,
71, 62, 31, 30, 364.7, 5.2, 0.3, 0.00,
72, 70, 37, 34, 202.4, 5.8, 0.3, 0.00,
73, 75, 45, 39, 581.0, 7.2, 0.4, 0.02,
74, 60, 42, 37, 511.3, 1.6, 0.4, 0.09,
75, 63, 37, 38, 429.0, 9.6, 0.3, 0.00,
76, 64, 48, 41, 134.9, 13.9, 0.3, 0.00,
77, 70, 48, 37, 356.2, 15.5, 0.4, 0.00,
78, 63, 36, 21, 600.8, 5.8, 0.4, 0.00,
79, 69, 33, 28, 383.6, 5.6, 0.4, 0.00,
80, 71, 42, 31, 250.9, 4.7, 0.4, 0.00,
81, 79, 45, 30, 594.4, 6.5, 0.3, 0.00,
82, 82, 58, 31, 616.2, 1.4, 0.3, 0.00,
83, 86, 47, 32, 620.0, 1.5, 0.3, 0.00,
84, 83, 49, 31, 490.4, 9.7, 0.3, 0.00,
85, 81, 46, 39, 535.0, 19.5, 0.4, 0.00,
86, 66, 45, 36, 330.3, 15.6, 0.4, 0.00,
87, 79, 39, 31, 528.8, 12.7, 0.3, 0.00,
88, 76, 47, 33, 638.5, 17.2, 0.3, 0.00,
89, 50, 38, 29, 567.9, 2.1, 0.3, 0.05,
90, 62, 36, 25, 501.2, 13.4, 0.2, 0.00,
91, 75, 30, 20, 403.7, 8.8, 0.3, 0.00,
92, 60, 42, 25, 443.4, 19.8, 0.2, 0.00,
93, 69, 33, 23, 518.7, 4.7, 0.3, 0.00,
94, 79, 37, 24, 616.0, 8.2, 0.3, 0.00,
95, 76, 43, 26, 549.7, 6.2, 0.3, 0.00,
96, 66, 48, 29, 353.7, 18.6, 0.4, 0.00,
97, 68, 43, 27, 451.8, 15.1, 0.3, 0.00,
98, 66, 43, 21, 291.3, 12.3, 0.3, 0.00,
99, 73, 40, 21, 459.9, 5.7, 0.3, 0.00,
100, 83, 36, 25, 561.0, 5.5, 0.2, 0.00,
101, 88, 48, 30, 678.5, 12.7, 0.3, 0.00,
102, 78, 56, 30, 539.9, 24.6, 0.3, 0.00,
103, 75, 52, 32, 656.1, 11.6, 0.3, 0.00,
104, 80, 45, 26, 436.6, 17.9, 0.3, 0.00,
105, 71, 43, 24, 453.7, 17.0, 0.3, 0.00,
106, 64, 41, 24, 578.7, 11.0, 0.4, 0.00,
107, 63, 38, 23, 677.2, 6.8, 0.3, 0.00,
108, 70, 35, 26, 439.9, 7.5, 0.3, 0.00,
109, 74, 44, 26, 583.4, 5.8, 0.3, 0.00,
110, 80, 42, 29, 705.2, 9.0, 0.2, 0.00,

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120,80,47,41,502.9,3.8,0.4,0.00,
121,85,55,32,375.0,13.3,0.3,0.00,
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125,88,63,28,513.0,16.1,0.4,0.00,
126,86,62,31,743.4,11.5,0.4,0.00,
127,85,56,29,746.7,8.6,0.3,0.00,
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129,82,58,32,750.2,11.3,0.2,0.00,
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132,87,59,28,755.2,9.0,0.3,0.00,
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135,79,50,25,717.8,6.9,0.3,0.00,
136,94,46,22,693.8,8.6,0.3,0.00,
137,93,65,34,644.8,5.3,0.4,0.00,
138,98,63,48,589.8,6.9,0.3,0.00,
139,95,63,48,765.2,6.6,0.4,0.00,
140,96,61,42,627.4,6.3,0.3,0.00,
141,90,66,40,721.3,11.6,0.3,0.00,
142,89,69,37,768.8,13.9,0.4,0.00,
143,90,67,24,769.9,1.2,0.3,0.00,
144,90,60,24,709.6,11.4,0.4,0.00,
145,90,66,30,771.9,12.3,0.3,0.00,
146,91,59,32,579.5,9.2,0.3,0.00,
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148,97,54,33,595.1,5.9,0.3,0.00,
149,97,61,34,680.9,6.3,0.3,0.00,
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151,97,64,35,460.9,8.5,0.3,0.00,
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154,99,75,40,704.9,15.4,0.4,0.00,
155,89,64,38,623.3,16.2,0.3,0.00,
156,88,58,35,562.5,8.2,0.4,0.00,
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160,89,62,40,636.4,8.1,0.3,0.00,
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164,95,74,51,783.0,18.8,0.2,0.00,
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166,93,63,41,783.2,9.7,0.3,0.00,
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169,96,71,44,637.9,7.6,0.3,0.00,
170,101,62,46,653.3,7.5,0.3,0.00,
171,102,64,46,574.5,8.9,0.3,0.00,
172,100,76,46,783.2,12.5,0.3,0.00,
173,100,69,42,783.0,9.7,0.4,0.00,
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178,105,77,48,781.7,9.6,0.3,0.00,
179,107,72,46,781.3,5.8,0.4,0.00,
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182,97,72,62,779.9,11.8,0.4,0.00,
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184,95,70,65,653.5,8.7,0.4,0.45,
185,97,69,66,717.2,7.1,0.4,0.00,
186,96,73,65,314.9,1.6,0.4,0.00,
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190,92,68,63,684.1,5.9,0.4,0.00,
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192,104,74,59,772.7,4.2,0.5,0.00,
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203,90,69,61,758.7,8.3,0.5,0.00,
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211,97,74,61,495.7,1.5,0.4,0.02,
212,94,70,62,745.9,6.9,0.5,0.07,
213,89,67,63,744.1,4.3,0.6,0.12,
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215,95,73,62,621.6,6.2,0.5,0.00,
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225, 86, 66, 63, 500.4, 7.4, 0.5, 0.01,
226, 91, 65, 57, 506.2, 5.0, 0.5, 0.00,
227, 93, 66, 55, 639.9, 5.9, 0.5, 0.00,
228, 93, 67, 56, 526.3, 5.7, 0.5, 0.00,
229, 94, 68, 56, 709.2, 6.1, 0.4, 0.00,
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232, 87, 68, 65, 533.0, 1.3, 0.4, 0.00,
233, 89, 69, 61, 692.9, 1.1, 0.4, 0.00,
234, 92, 68, 57, 610.9, 5.0, 0.5, 0.00,
235, 93, 67, 59, 693.1, 4.7, 0.4, 0.00,
236, 96, 70, 59, 619.7, 5.4, 0.5, 0.00,
237, 98, 73, 61, 464.6, 6.5, 0.4, 0.00,
238, 94, 74, 65, 684.5, 7.3, 0.4, 0.00,
239, 97, 74, 66, 681.5, 5.5, 0.4, 0.00,
240, 92, 73, 64, 526.0, 1.7, 0.4, 0.00,
241, 91, 69, 60, 675.5, 9.0, 0.4, 0.00,
242, 92, 63, 54, 672.4, 6.8, 0.4, 0.00,
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245, 89, 68, 53, 580.5, 11.6, 0.5, 0.00,
246, 80, 67, 62, 525.9, 7.0, 0.5, 0.13,
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250, 91, 64, 50, 617.0, 6.9, 0.4, 0.00,
251, 93, 64, 50, 244.9, 8.1, 0.4, 0.00,
252, 91, 68, 53, 516.4, 8.8, 0.4, 0.00,
253, 91, 67, 58, 586.9, 8.4, 0.4, 0.00,
254, 90, 66, 49, 535.2, 7.7, 0.4, 0.00,
255, 90, 63, 54, 558.6, 4.6, 0.4, 0.00,
256, 97, 64, 51, 528.1, 6.7, 0.4, 0.00,
257, 98, 70, 49, 214.4, 8.3, 0.5, 0.00,
258, 91, 67, 57, 618.0, 1.5, 0.4, 0.00,
259, 88, 67, 55, 551.1, 7.3, 0.3, 0.00,
260, 88, 65, 55, 299.3, 6.0, 0.3, 0.00,
261, 90, 66, 55, 546.7, 3.9, 0.3, 0.00,
262, 95, 63, 52, 562.2, 6.1, 0.3, 0.00,
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264, 89, 72, 57, 595.5, 8.1, 0.4, 0.00,
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266, 94, 67, 62, 438.1, 8.6, 0.4, 0.09,
267, 95, 70, 57, 344.6, 6.6, 0.3, 0.00,
268, 94, 71, 58, 580.2, 7.0, 0.3, 0.00,
269, 92, 67, 48, 576.3, 6.7, 0.3, 0.00,
270, 95, 60, 47, 572.4, 4.2, 0.3, 0.00,
271, 94, 66, 58, 544.9, 5.1, 0.3, 0.00,
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273, 93, 63, 60, 475.3, 5.7, 0.3, 0.39,
274, 85, 65, 59, 258.3, 8.0, 0.3, 0.11,
275, 84, 64, 39, 389.0, 11.2, 0.3, 0.00,
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277, 87, 69, 53, 452.0, 15.7, 0.3, 0.00,
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279, 73, 46, 27, 537.0, 5.8, 0.3, 0.00,
280, 79, 46, 34, 455.5, 5.0, 0.3, 0.00,
281, 83, 47, 35, 529.1, 2.9, 0.2, 0.00,

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289,83,64,34,312.0,18.1,0.3,0.00,
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302,75,48,52,214.5,2.0,0.3,0.00,
303,80,52,52,380.1,6.7,0.2,0.00,
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318,69,37,38,400.5,3.2,0.3,0.00,
319,71,39,36,381.4,4.6,0.4,0.00,
320,73,37,37,395.3,2.2,0.4,0.00,
321,76,38,37,268.8,5.7,0.4,0.00,
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323,72,48,38,100.7,8.2,0.3,0.00,
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326,70,30,33,381.3,4.6,0.4,0.00,
327,73,34,34,379.2,4.9,0.5,0.00,
328,74,40,35,302.6,6.6,0.3,0.00,
329,72,40,33,156.0,3.9,0.4,0.00,
330,73,35,32,217.4,6.3,0.3,0.00,
331,73,39,37,137.2,4.2,0.3,0.00,
332,76,42,43,344.8,5.7,0.3,0.00,
333,63,44,43,73.6,14.1,0.3,0.33,
334,61,35,40,200.7,6.3,0.3,0.00,
335,67,39,42,298.6,7.3,0.3,0.00,
336,56,44,47,290.9,8.1,0.3,0.25,
337,57,42,41,203.2,14.8,0.3,0.00,
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339, 66, 42, 37, 359.6, 12.3, 0.4, 0.00,
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342, 48, 29, 19, 356.4, 8.1, 0.4, 0.00,
343, 55, 28, 26, 355.5, 6.2, 0.4, 0.00,
344, 45, 37, 30, 354.7, 16.0, 0.4, 0.00,
345, 47, 34, 27, 354.0, 4.4, 0.4, 0.00,
346, 52, 23, 27, 353.3, 2.3, 0.4, 0.00,
347, 57, 24, 26, 326.9, 4.1, 0.4, 0.00,
348, 60, 27, 27, 263.9, 6.0, 0.4, 0.00,
349, 63, 37, 30, 252.8, 9.9, 0.3, 0.00,
350, 64, 34, 32, 351.5, 7.8, 0.4, 0.00,
351, 60, 40, 36, 280.4, 9.5, 0.4, 0.00,
352, 60, 42, 43, 277.9, 16.0, 0.5, 0.08,
353, 59, 41, 39, 350.9, 7.8, 0.4, 0.00,
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355, 67, 44, 25, 351.0, 12.3, 0.4, 0.00,
356, 44, 25, 19, 320.2, 6.4, 0.4, 0.00,
357, 47, 23, 23, 243.5, 4.2, 0.4, 0.00,
358, 49, 28, 21, 351.7, 3.9, 0.4, 0.00,
359, 55, 21, 23, 352.1, 3.2, 0.5, 0.00,
360, 59, 24, 26, 352.6, 6.3, 0.6, 0.00,
361, 64, 33, 30, 353.1, 4.4, 0.5, 0.00,
362, 66, 32, 30, 353.8, 5.2, 0.5, 0.00,
363, 69, 34, 30, 354.5, 4.3, 0.5, 0.00,
364, 64, 36, 29, 355.3, 3.7, 0.4, 0.00,
365, 62, 34, 30, 316.1, 6.2, 0.4, 0.00,

Climate Data (1999)

1, 61, 42, 25, 326.7, 14.9, 0.5, 0.00,
2, 57, 31, 26, 338.9, 4.9, 0.4, 0.00,
3, 47, 28, 18, 359.7, 5.1, 0.5, 0.00,
4, 53, 21, 17, 196.4, 5.6, 0.4, 0.00,
5, 60, 22, 14, 279.8, 7.5, 0.5, 0.00,
6, 63, 26, 17, 271.0, 3.4, 0.5, 0.00,
7, 66, 26, 17, 343.4, 6.1, 0.4, 0.00,
8, 66, 43, 20, 306.8, 8.2, 0.4, 0.00,
9, 53, 31, 26, 365.6, 5.1, 0.4, 0.00,
10, 61, 24, 23, 256.6, 4.4, 0.4, 0.00,
11, 64, 30, 23, 263.8, 5.5, 0.4, 0.00,
12, 67, 43, 23, 281.7, 11.6, 0.4, 0.00,
13, 60, 35, 28, 128.6, 4.0, 0.4, 0.00,
14, 59, 33, 24, 356.4, 5.2, 0.3, 0.00,
15, 62, 25, 22, 341.5, 7.0, 0.4, 0.00,
16, 69, 38, 22, 252.8, 1.4, 0.4, 0.00,
17, 66, 48, 28, 174.3, 14.9, 0.5, 0.00,
18, 70, 36, 32, 213.1, 9.1, 0.4, 0.00,
19, 72, 38, 32, 265.8, 8.2, 0.4, 0.00,
20, 71, 41, 30, 390.8, 13.8, 0.5, 0.00,
21, 64, 43, 31, 368.3, 25.8, 0.4, 0.00,
22, 55, 40, 19, 274.6, 1.9, 0.4, 0.00,
23, 63, 26, 17, 332.9, 7.3, 0.4, 0.00,
24, 77, 40, 20, 246.7, 5.1, 0.3, 0.00,
25, 77, 40, 20, 269.0, 5.3, 0.3, 0.00,
26, 63, 42, 25, 391.6, 9.1, 0.3, 0.00,
27, 64, 37, 23, 409.5, 4.5, 0.4, 0.00,
28, 58, 30, 20, 412.4, 5.8, 0.4, 0.00,
29, 43, 34, 34, 415.3, 6.3, 0.4, 0.10,
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31, 58, 32, 34, 209.3, 6.6, 0.5, 0.00,
32, 64, 38, 25, 318.8, 7.4, 0.4, 0.00,
33, 63, 37, 20, 363.9, 8.4, 0.5, 0.00,
34, 67, 33, 19, 342.4, 6.1, 0.4, 0.00,
35, 70, 33, 22, 273.8, 4.1, 0.4, 0.00,
36, 71, 46, 30, 336.6, 8.0, 0.4, 0.00,
37, 63, 48, 28, 427.9, 16.1, 0.5, 0.00,
38, 68, 34, 26, 444.5, 1.2, 0.4, 0.00,
39, 72, 49, 30, 369.0, 1.4, 0.5, 0.00,
40, 74, 46, 30, 262.9, 7.5, 0.4, 0.00,
41, 77, 41, 24, 251.1, 16.3, 0.4, 0.00,
42, 48, 31, 4, 458.7, 13.2, 0.3, 0.00,
43, 56, 20, 6, 462.3, 5.8, 0.3, 0.00,
44, 64, 27, 10, 383.3, 7.2, 0.4, 0.00,
45, 72, 31, 19, 469.7, 4.7, 0.4, 0.00,
46, 75, 39, 21, 448.2, 12.2, 0.4, 0.00,
47, 61, 37, 21, 298.6, 4.7, 0.4, 0.00,
48, 68, 30, 19, 359.6, 1.8, 0.3, 0.00,
49, 73, 41, 21, 246.2, 9.9, 0.4, 0.00,
50, 76, 52, 23, 321.7, 12.6, 0.4, 0.00,
51, 71, 49, 29, 270.4, 7.4, 0.4, 0.00,
52, 67, 43, 31, 496.6, 8.5, 0.4, 0.00,
53, 71, 44, 24, 280.6, 9.9, 0.4, 0.00,

54, 67, 35, 11, 192.6, 7.5, 0.4, 0.00,
55, 73, 31, 11, 101.7, 4.4, 0.4, 0.00,
56, 73, 39, 18, 281.6, 6.7, 0.4, 0.00,
57, 75, 48, 20, 357.3, 13.4, 0.5, 0.00,
58, 70, 37, 17, 444.0, 5.5, 0.4, 0.00,
59, 75, 37, 20, 341.4, 7.3, 0.4, 0.00,
60, 80, 45, 22, 410.7, 13.8, 0.4, 0.00,
61, 76, 49, 20, 438.7, 9.2, 0.5, 0.00,
62, 74, 40, 24, 536.5, 6.9, 0.4, 0.00,
63, 75, 54, 18, 340.6, 16.8, 0.3, 0.00,
64, 74, 51, 27, 544.7, 9.2, 0.3, 0.00,
65, 68, 45, 26, 272.8, 7.6, 0.3, 0.00,
66, 73, 46, 37, 360.5, 14.1, 0.3, 0.00,
67, 62, 42, 28, 556.9, 14.3, 0.4, 0.00,
68, 74, 35, 24, 531.3, 5.1, 0.4, 0.00,
69, 72, 40, 22, 520.2, 6.2, 0.5, 0.00,
70, 77, 43, 21, 448.7, 1.6, 0.4, 0.00,
71, 60, 45, 24, 364.7, 15.9, 0.3, 0.00,
72, 62, 36, 26, 202.4, 6.0, 0.3, 0.00,
73, 71, 32, 23, 581.0, 3.9, 0.4, 0.00,
74, 77, 34, 21, 511.3, 4.1, 0.4, 0.00,
75, 79, 43, 24, 429.0, 1.3, 0.3, 0.00,
76, 54, 40, 36, 134.9, 8.2, 0.3, 0.04,
77, 45, 31, 35, 356.2, 7.7, 0.4, 0.00,
78, 63, 30, 31, 600.8, 5.6, 0.4, 0.00,
79, 73, 36, 33, 383.6, 5.9, 0.4, 0.00,
80, 82, 42, 33, 250.9, 7.7, 0.4, 0.00,
81, 81, 45, 27, 594.4, 12.0, 0.3, 0.00,
82, 80, 56, 25, 616.2, 11.5, 0.3, 0.00,
83, 77, 49, 25, 620.0, 8.2, 0.3, 0.00,
84, 72, 47, 43, 490.4, 8.8, 0.3, 0.00,
85, 74, 48, 46, 535.0, 1.4, 0.4, 0.00,
86, 74, 49, 42, 330.3, 9.9, 0.4, 0.00,
87, 77, 40, 32, 528.8, 5.7, 0.3, 0.00,
88, 79, 46, 39, 638.5, 9.1, 0.3, 0.00,
89, 83, 46, 34, 567.9, 8.8, 0.3, 0.00,
90, 80, 60, 28, 501.2, 22.6, 0.2, 0.00,
91, 78, 57, 30, 403.7, 18.8, 0.3, 0.00,
92, 73, 47, 30, 443.4, 19.4, 0.2, 0.00,
93, 60, 41, 17, 518.7, 12.7, 0.3, 0.00,
94, 70, 38, 20, 616.0, 14.8, 0.3, 0.00,
95, 65, 38, 20, 549.7, 11.0, 0.3, 0.00,
96, 81, 35, 21, 353.7, 5.4, 0.4, 0.00,
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108, 81, 41, 25, 439.9, 3.8, 0.3, 0.00,
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128,92,54,32,655.1,8.0,0.2,0.00,
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133,90,58,38,756.8,12.3,0.2,0.00,
134,90,66,30,485.9,16.7,0.3,0.00,
135,90,63,30,717.8,15.4,0.3,0.00,
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137,87,55,27,644.8,6.9,0.4,0.00,
138,90,61,48,589.8,13.0,0.3,0.00,
139,96,66,42,765.2,12.3,0.4,0.00,
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152,91,70,36,777.8,8.3,0.2,0.00,
153,92,63,39,760.3,11.2,0.3,0.00,
154,98,65,43,704.9,12.5,0.4,0.00,
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160,92,63,37,636.4,9.2,0.3,0.00,
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166,86,57,52,783.2,4.8,0.3,0.00,
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172,93,67,60,783.2,6.6,0.3,0.00,
173,91,71,58,783.0,8.5,0.4,0.00,
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175,100,72,56,782.6,6.2,0.3,0.00,
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177,103,76,55,752.6,1.2,0.2,0.00,
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179,104,77,59,781.3,9.2,0.4,0.26,
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192,81,62,59,772.7,11.2,0.5,0.06,
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194,92,71,63,770.8,8.1,0.4,0.00,
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352, 61, 29, 26, 277.9, 5.8, 0.5, 0.00,
353, 55, 33, 19, 350.9, 8.1, 0.4, 0.00,
354, 54, 25, 19, 350.9, 4.0, 0.4, 0.00,
355, 48, 26, 22, 351.0, 4.6, 0.4, 0.00,
356, 50, 28, 23, 320.2, 9.2, 0.4, 0.00,
357, 49, 25, 25, 243.5, 7.8, 0.4, 0.00,
358, 44, 32, 30, 351.7, 5.9, 0.4, 0.62,
359, 41, 34, 36, 352.1, 6.2, 0.5, 0.01,
360, 46, 39, 38, 352.6, 7.9, 0.6, 0.00,
361, 54, 37, 37, 353.1, 7.0, 0.5, 0.00,
362, 57, 34, 34, 353.8, 4.7, 0.5, 0.00,
363, 59, 33, 36, 354.5, 6.3, 0.5, 0.00,
364, 61, 41, 34, 355.3, 4.4, 0.4, 0.00,
365, 66, 43, 37, 316.1, 4.6, 0.4, 0.00,

Climate Data (2000)

1, 66, 44, 34, 326.7, 13.5, 0.5, 0.00,
2, 59, 33, 26, 338.9, 16.6, 0.4, 0.00,
3, 47, 34, 13, 359.7, 13.7, 0.5, 0.00,
4, 46, 26, 12, 196.4, 6.6, 0.4, 0.00,
5, 55, 21, 16, 279.8, 4.9, 0.5, 0.00,
6, 54, 30, 20, 271.0, 12.8, 0.5, 0.00,
7, 49, 32, 25, 343.4, 5.2, 0.4, 0.00,
8, 55, 24, 24, 306.8, 7.7, 0.4, 0.00,
9, 59, 39, 13, 365.6, 12.8, 0.4, 0.00,
10, 65, 43, 12, 256.6, 9.4, 0.4, 0.00,
11, 67, 32, 17, 263.8, 8.0, 0.4, 0.00,
12, 70, 34, 21, 281.7, 9.4, 0.4, 0.00,
13, 68, 32, 23, 128.6, 5.8, 0.4, 0.00,
14, 60, 35, 24, 356.4, 6.9, 0.3, 0.00,
15, 67, 34, 29, 341.5, 5.3, 0.4, 0.00,
16, 70, 35, 31, 252.8, 5.1, 0.4, 0.00,
17, 72, 35, 30, 174.3, 4.7, 0.5, 0.00,
18, 73, 39, 30, 213.1, 4.2, 0.4, 0.00,
19, 74, 37, 30, 265.8, 4.4, 0.4, 0.00,
20, 69, 40, 32, 390.8, 4.0, 0.5, 0.00,
21, 70, 34, 32, 368.3, 8.8, 0.4, 0.00,
22, 66, 54, 35, 274.6, 1.4, 0.4, 0.00,
23, 68, 46, 28, 332.9, 8.9, 0.4, 0.00,
24, 71, 38, 29, 246.7, 8.2, 0.3, 0.00,
25, 70, 41, 31, 269.0, 7.8, 0.3, 0.00,
26, 74, 45, 33, 391.6, 14.8, 0.3, 0.00,
27, 62, 47, 28, 409.5, 14.9, 0.4, 0.00,
28, 62, 33, 20, 412.4, 11.6, 0.4, 0.00,
29, 53, 26, 21, 415.3, 3.1, 0.4, 0.00,
30, 62, 27, 20, 266.4, 5.8, 0.5, 0.00,
31, 62, 45, 26, 209.3, 11.8, 0.5, 0.00,
32, 50, 31, 34, 318.8, 1.8, 0.4, 0.03,
33, 53, 24, 29, 363.9, 3.3, 0.5, 0.00,
34, 63, 25, 26, 342.4, 3.1, 0.4, 0.00,
35, 55, 30, 25, 273.8, 1.2, 0.4, 0.00,
36, 61, 30, 26, 336.6, 3.9, 0.4, 0.00,
37, 69, 37, 26, 427.9, 5.0, 0.5, 0.00,
38, 70, 35, 24, 444.5, 6.7, 0.4, 0.00,
39, 68, 33, 24, 369.0, 4.5, 0.5, 0.00,
40, 77, 41, 25, 262.9, 8.9, 0.4, 0.00,
41, 72, 48, 23, 251.1, 1.7, 0.4, 0.00,
42, 70, 46, 22, 458.7, 11.0, 0.3, 0.00,
43, 70, 36, 20, 462.3, 15.6, 0.3, 0.00,
44, 64, 48, 31, 383.3, 12.9, 0.4, 0.00,
45, 73, 55, 38, 469.7, 13.7, 0.4, 0.00,
46, 78, 51, 31, 448.2, 8.9, 0.4, 0.00,
47, 78, 40, 26, 298.6, 7.2, 0.4, 0.00,
48, 77, 48, 33, 359.6, 18.0, 0.3, 0.00,
49, 64, 39, 24, 246.2, 6.3, 0.4, 0.00,
50, 73, 36, 22, 321.7, 5.8, 0.4, 0.00,
51, 75, 40, 34, 270.4, 5.8, 0.4, 0.00,
52, 79, 44, 37, 496.6, 8.8, 0.4, 0.00,
53, 63, 49, 34, 280.6, 13.8, 0.4, 0.00,

54, 67, 43, 29, 192.6, 8.3, 0.4, 0.00,
55, 72, 41, 25, 101.7, 14.4, 0.4, 0.00,
56, 59, 45, 26, 281.6, 18.4, 0.4, 0.00,
57, 60, 40, 18, 357.3, 8.0, 0.5, 0.00,
58, 74, 30, 17, 444.0, 3.7, 0.4, 0.00,
59, 78, 45, 20, 341.4, 14.3, 0.4, 0.00,
60, 66, 40, 16, 410.7, 4.3, 0.4, 0.00,
61, 75, 41, 20, 438.7, 1.8, 0.5, 0.00,
62, 67, 47, 24, 536.5, 13.5, 0.4, 0.00,
63, 70, 36, 24, 340.6, 5.7, 0.3, 0.00,
64, 76, 39, 28, 544.7, 5.5, 0.3, 0.00,
65, 66, 51, 30, 272.8, 13.6, 0.3, 0.00,
66, 73, 39, 29, 360.5, 5.8, 0.3, 0.00,
67, 63, 41, 29, 556.9, 2.5, 0.4, 0.06,
68, 63, 36, 25, 531.3, 9.7, 0.4, 0.00,
69, 69, 33, 24, 520.2, 6.7, 0.5, 0.00,
70, 71, 47, 20, 448.7, 11.4, 0.4, 0.00,
71, 64, 39, 23, 364.7, 5.4, 0.3, 0.00,
72, 75, 34, 22, 202.4, 5.0, 0.3, 0.00,
73, 73, 43, 23, 581.0, 5.3, 0.4, 0.00,
74, 76, 45, 23, 511.3, 7.2, 0.4, 0.00,
75, 79, 37, 23, 429.0, 9.8, 0.3, 0.00,
76, 68, 41, 28, 134.9, 13.4, 0.3, 0.00,
77, 73, 36, 30, 356.2, 1.3, 0.4, 0.00,
78, 76, 43, 21, 600.8, 14.5, 0.4, 0.00,
79, 67, 34, 21, 383.6, 5.8, 0.4, 0.00,
80, 79, 45, 23, 250.9, 14.9, 0.4, 0.00,
81, 63, 41, 34, 594.4, 1.7, 0.3, 0.00,
82, 59, 39, 36, 616.2, 9.3, 0.3, 0.00,
83, 64, 39, 29, 620.0, 1.2, 0.3, 0.00,
84, 74, 36, 27, 490.4, 3.2, 0.3, 0.00,
85, 80, 47, 27, 535.0, 8.1, 0.4, 0.00,
86, 80, 43, 26, 330.3, 9.7, 0.4, 0.00,
87, 80, 52, 28, 528.8, 7.4, 0.3, 0.00,
88, 76, 60, 37, 638.5, 18.0, 0.3, 0.00,
89, 74, 54, 35, 567.9, 1.7, 0.3, 0.00,
90, 79, 45, 29, 501.2, 8.5, 0.2, 0.00,
91, 76, 50, 25, 403.7, 12.3, 0.3, 0.00,
92, 65, 43, 38, 443.4, 11.9, 0.2, 0.28,
93, 63, 42, 34, 518.7, 8.2, 0.3, 0.00,
94, 67, 40, 33, 616.0, 7.4, 0.3, 0.00,
95, 78, 41, 32, 549.7, 3.7, 0.3, 0.00,
96, 86, 49, 32, 353.7, 8.7, 0.4, 0.00,
97, 83, 63, 30, 451.8, 13.6, 0.3, 0.00,
98, 86, 60, 32, 291.3, 11.5, 0.3, 0.00,
99, 71, 50, 27, 459.9, 14.7, 0.3, 0.00,
100, 81, 49, 30, 561.0, 7.0, 0.2, 0.00,
101, 84, 67, 30, 678.5, 12.7, 0.3, 0.00,
102, 78, 53, 34, 539.9, 9.7, 0.3, 0.00,
103, 74, 46, 40, 656.1, 4.5, 0.3, 0.00,
104, 82, 47, 30, 436.6, 5.7, 0.3, 0.00,
105, 88, 49, 24, 453.7, 13.3, 0.3, 0.00,
106, 77, 57, 26, 578.7, 16.2, 0.4, 0.00,
107, 83, 44, 24, 677.2, 6.4, 0.3, 0.00,
108, 87, 48, 26, 439.9, 6.4, 0.3, 0.00,
109, 92, 57, 30, 583.4, 14.8, 0.3, 0.00,
110, 82, 51, 30, 705.2, 14.4, 0.2, 0.00,

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114,83,60,36,718.6,16.4,0.3,0.00,
115,89,62,35,543.5,7.6,0.3,0.00,
116,90,58,36,723.5,7.5,0.3,0.00,
117,94,60,46,725.8,6.1,0.3,0.00,
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119,94,62,49,730.4,1.0,0.3,0.00,
120,92,63,39,502.9,15.5,0.4,0.00,
121,82,59,29,375.0,1.9,0.3,0.00,
122,75,51,39,509.6,6.7,0.4,0.00,
123,87,51,37,544.6,5.8,0.3,0.00,
124,95,59,37,657.9,6.6,0.3,0.00,
125,96,58,36,513.0,6.6,0.4,0.00,
126,96,63,26,743.4,9.3,0.4,0.00,
127,95,69,27,746.7,12.4,0.3,0.00,
128,93,71,19,655.1,15.9,0.2,0.00,
129,94,69,24,750.2,17.6,0.2,0.00,
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131,96,69,30,598.6,15.7,0.2,0.00,
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133,83,63,25,756.8,12.4,0.2,0.00,
134,82,55,29,485.9,12.6,0.3,0.00,
135,94,60,39,717.8,6.2,0.3,0.00,
136,102,64,43,693.8,8.1,0.3,0.00,
137,95,76,30,644.8,17.1,0.4,0.00,
138,86,62,22,589.8,19.3,0.3,0.00,
139,85,61,21,765.2,6.8,0.4,0.00,
140,83,60,33,627.4,7.1,0.3,0.00,
141,90,56,37,721.3,5.5,0.3,0.00,
142,93,62,38,768.8,5.6,0.4,0.00,
143,96,66,41,769.9,7.6,0.3,0.00,
144,102,68,37,709.6,1.8,0.4,0.00,
145,102,77,37,771.9,14.8,0.3,0.00,
146,95,79,32,579.5,18.7,0.3,0.00,
147,89,72,32,690.3,13.1,0.3,0.00,
148,95,65,36,595.1,8.1,0.3,0.00,
149,97,71,46,680.9,5.9,0.3,0.00,
150,99,70,40,776.3,5.4,0.3,0.00,
151,100,67,47,460.9,7.8,0.3,0.00,
152,94,74,53,777.8,1.3,0.2,0.00,
153,93,70,54,760.3,1.0,0.3,0.00,
154,92,64,57,704.9,8.7,0.4,0.76,
155,86,63,57,623.3,5.9,0.3,0.13,
156,95,65,50,562.5,6.3,0.4,0.00,
157,88,68,53,631.7,9.0,0.4,0.00,
158,90,68,50,454.8,6.2,0.3,0.00,
159,92,68,47,729.1,6.8,0.3,0.00,
160,94,70,48,636.4,9.9,0.3,0.00,
161,89,66,53,508.3,1.7,0.2,0.04,
162,91,72,43,518.5,8.4,0.2,0.00,
163,96,70,45,689.5,7.3,0.2,0.00,
164,97,65,58,783.0,7.9,0.2,0.77,
165,96,64,52,733.6,7.9,0.2,0.00,
166,91,66,44,783.2,8.4,0.3,0.00,
167,100,69,43,670.1,7.7,0.2,0.00,

168,101,81,37,725.4,1.3,0.2,0.00,
169,90,62,56,637.9,1.8,0.3,0.14,
170,82,62,59,653.3,6.1,0.3,0.00,
171,93,68,58,574.5,6.6,0.3,0.12,
172,91,67,58,783.2,9.0,0.3,0.02,
173,93,68,56,783.0,7.4,0.4,0.00,
174,92,68,55,738.6,9.1,0.3,0.00,
175,92,72,54,782.6,11.0,0.3,0.00,
176,95,76,48,782.3,1.6,0.3,0.00,
177,100,71,46,752.6,4.9,0.2,0.00,
178,93,75,56,781.7,13.2,0.3,0.00,
179,87,67,60,781.3,9.2,0.4,0.00,
180,91,71,60,459.7,6.4,0.4,0.00,
181,86,67,64,780.4,5.7,0.4,0.46,
182,87,68,64,779.9,7.3,0.4,0.01,
183,92,67,64,779.4,9.2,0.4,1.36,
184,93,70,60,653.5,1.1,0.4,0.00,
185,95,74,53,717.2,9.7,0.4,0.00,
186,97,74,52,314.9,6.5,0.4,0.00,
187,96,76,56,776.8,8.0,0.4,0.00,
188,95,68,56,597.2,7.3,0.4,0.20,
189,91,68,59,377.8,6.4,0.4,0.00,
190,91,69,59,684.1,6.9,0.4,0.00,
191,90,68,58,760.5,4.6,0.5,0.00,
192,95,72,58,772.7,8.1,0.5,0.00,
193,95,72,56,771.8,9.4,0.4,0.00,
194,97,74,58,770.8,9.0,0.4,0.00,
195,92,70,60,769.8,7.2,0.4,0.00,
196,94,73,57,663.4,8.6,0.5,0.00,
197,95,74,53,767.6,8.7,0.5,0.00,
198,98,77,53,765.0,1.4,0.5,0.00,
199,98,70,54,493.9,6.1,0.4,0.00,
200,100,73,53,636.3,4.8,0.5,0.00,
201,98,74,49,705.9,7.5,0.5,0.00,
202,99,73,50,553.5,5.7,0.5,0.00,
203,101,76,50,758.7,7.4,0.5,0.00,
204,99,73,51,662.9,6.8,0.5,0.00,
205,97,73,49,688.2,8.1,0.5,0.00,
206,99,70,50,755.7,5.3,0.5,0.00,
207,103,73,47,607.0,6.4,0.5,0.00,
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209,100,75,52,404.9,8.3,0.6,0.03,
210,98,71,56,749.3,5.4,0.5,0.00,
211,95,72,53,495.7,9.5,0.4,0.00,
212,93,71,52,745.9,8.9,0.5,0.00,
213,92,69,49,744.1,8.8,0.6,0.00,
214,94,65,46,720.5,4.4,0.6,0.00,
215,96,70,49,621.6,5.8,0.5,0.00,
216,98,70,42,551.6,5.0,0.5,0.00,
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218,96,76,49,513.5,6.3,0.4,0.00,
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225, 97, 69, 53, 500.4, 4.2, 0.5, 0.00,
226, 96, 69, 48, 506.2, 6.9, 0.5, 0.00,
227, 96, 72, 45, 639.9, 6.2, 0.5, 0.00,
228, 96, 69, 45, 526.3, 7.9, 0.5, 0.00,
229, 92, 72, 57, 709.2, 9.2, 0.4, 0.00,
230, 82, 66, 65, 706.6, 8.9, 0.5, 0.29,
231, 92, 65, 60, 584.0, 6.2, 0.5, 0.00,
232, 96, 71, 55, 533.0, 4.5, 0.4, 0.00,
233, 99, 69, 50, 692.9, 4.4, 0.4, 0.00,
234, 97, 72, 46, 610.9, 7.9, 0.5, 0.00,
235, 93, 73, 52, 693.1, 12.0, 0.4, 0.00,
236, 92, 71, 54, 619.7, 8.8, 0.5, 0.00,
237, 92, 66, 54, 464.6, 5.3, 0.4, 0.00,
238, 94, 65, 52, 684.5, 3.6, 0.4, 0.00,
239, 96, 74, 53, 681.5, 5.8, 0.4, 0.00,
240, 95, 70, 55, 526.0, 7.6, 0.4, 0.00,
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242, 89, 65, 59, 672.4, 7.9, 0.4, 0.26,
243, 89, 65, 58, 564.2, 6.7, 0.4, 0.01,
244, 88, 60, 50, 436.5, 6.9, 0.4, 0.00,
245, 96, 62, 46, 580.5, 5.8, 0.5, 0.00,
246, 96, 67, 48, 525.9, 4.4, 0.5, 0.00,
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248, 98, 70, 43, 612.4, 5.1, 0.5, 0.00,
249, 97, 71, 44, 642.5, 6.6, 0.4, 0.00,
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255, 95, 71, 46, 558.6, 9.2, 0.4, 0.00,
256, 97, 65, 39, 528.1, 6.7, 0.4, 0.00,
257, 95, 68, 45, 214.4, 7.3, 0.5, 0.00,
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262, 92, 65, 45, 562.2, 5.7, 0.3, 0.00,
263, 92, 65, 47, 475.6, 6.9, 0.3, 0.00,
264, 89, 68, 48, 595.5, 11.2, 0.4, 0.00,
265, 87, 62, 49, 591.7, 6.3, 0.4, 0.00,
266, 93, 69, 50, 438.1, 13.0, 0.4, 0.00,
267, 86, 70, 53, 344.6, 11.9, 0.3, 0.00,
268, 85, 60, 43, 580.2, 9.2, 0.3, 0.00,
269, 74, 50, 35, 576.3, 8.7, 0.3, 0.00,
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271, 90, 58, 40, 544.9, 3.2, 0.3, 0.00,
272, 90, 68, 33, 564.6, 5.4, 0.3, 0.00,
273, 89, 57, 28, 475.3, 5.1, 0.3, 0.00,
274, 90, 57, 30, 258.3, 4.4, 0.3, 0.00,
275, 94, 59, 35, 389.0, 5.8, 0.3, 0.00,
276, 95, 59, 36, 313.4, 5.7, 0.3, 0.00,
277, 94, 61, 39, 452.0, 5.3, 0.3, 0.00,
278, 95, 60, 44, 428.5, 9.0, 0.4, 0.08,
279, 88, 61, 44, 537.0, 7.4, 0.3, 0.00,
280, 76, 55, 49, 455.5, 11.5, 0.3, 0.00,
281, 56, 42, 41, 529.1, 13.6, 0.2, 0.00,

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285, 77, 51, 53, 367.1, 6.3, 0.2, 0.03,
286, 83, 58, 52, 448.9, 9.8, 0.3, 0.00,
287, 80, 53, 46, 388.6, 5.2, 0.2, 0.00,
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289, 79, 56, 48, 312.0, 5.4, 0.3, 0.09,
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291, 80, 53, 41, 316.1, 6.4, 0.3, 0.00,
292, 75, 51, 47, 335.5, 7.5, 0.3, 0.00,
293, 64, 55, 53, 482.6, 5.4, 0.4, 0.02,
294, 76, 53, 52, 478.9, 7.7, 0.4, 0.00,
295, 67, 56, 52, 475.2, 5.4, 0.4, 0.03,
296, 71, 52, 47, 405.5, 7.6, 0.3, 0.05,
297, 73, 58, 51, 285.6, 1.5, 0.3, 0.08,
298, 72, 45, 42, 425.2, 5.7, 0.3, 0.00,
299, 73, 47, 41, 165.4, 5.2, 0.3, 0.00,
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304, 70, 40, 41, 284.4, 3.5, 0.2, 0.00,
305, 65, 47, 35, 389.5, 11.2, 0.3, 0.00,
306, 61, 41, 24, 377.1, 6.7, 0.2, 0.00,
307, 66, 36, 29, 346.2, 4.6, 0.3, 0.00,
308, 70, 49, 42, 241.9, 9.2, 0.2, 0.18,
309, 67, 51, 50, 419.3, 5.2, 0.2, 0.32,
310, 61, 49, 40, 423.6, 16.3, 0.3, 0.00,
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312, 47, 31, 35, 417.5, 11.4, 0.3, 0.17,
313, 44, 31, 26, 298.6, 6.4, 0.2, 0.00,
314, 54, 33, 29, 411.6, 8.1, 0.3, 0.00,
315, 66, 34, 35, 363.5, 7.1, 0.3, 0.00,
316, 59, 42, 35, 406.0, 12.1, 0.3, 0.00,
317, 55, 38, 26, 403.2, 8.4, 0.4, 0.00,
318, 55, 32, 18, 400.5, 8.3, 0.3, 0.00,
319, 59, 33, 32, 381.4, 5.3, 0.4, 0.00,
320, 61, 44, 30, 395.3, 9.3, 0.4, 0.00,
321, 58, 40, 28, 268.8, 5.9, 0.4, 0.00,
322, 58, 38, 24, 390.4, 6.2, 0.4, 0.00,
323, 48, 31, 25, 100.7, 1.3, 0.3, 0.00,
324, 54, 24, 18, 358.0, 3.6, 0.3, 0.00,
325, 59, 26, 18, 269.1, 4.9, 0.4, 0.00,
326, 59, 30, 24, 381.3, 7.0, 0.4, 0.00,
327, 64, 43, 29, 379.2, 5.9, 0.5, 0.00,
328, 57, 37, 28, 302.6, 1.2, 0.3, 0.00,
329, 59, 32, 26, 156.0, 5.4, 0.4, 0.00,
330, 59, 30, 22, 217.4, 6.4, 0.3, 0.00,
331, 60, 27, 20, 137.2, 5.2, 0.3, 0.00,
332, 64, 28, 21, 344.8, 5.4, 0.3, 0.00,
333, 68, 37, 21, 73.6, 5.3, 0.3, 0.00,
334, 62, 34, 28, 200.7, 5.6, 0.3, 0.00,
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336, 59, 40, 28, 290.9, 1.6, 0.3, 0.00,
337, 48, 36, 23, 203.2, 9.2, 0.3, 0.05,
338, 47, 34, 34, 360.8, 3.3, 0.3, 0.01,

339, 57, 29, 34, 359.6, 2.6, 0.4, 0.00,
340, 58, 31, 33, 253.1, 4.1, 0.2, 0.00,
341, 56, 36, 24, 235.2, 5.6, 0.3, 0.00,
342, 61, 28, 24, 356.4, 4.8, 0.4, 0.00,
343, 64, 34, 27, 355.5, 5.1, 0.4, 0.00,
344, 64, 40, 27, 354.7, 6.9, 0.4, 0.00,
345, 65, 34, 27, 354.0, 5.5, 0.4, 0.00,
346, 59, 41, 32, 353.3, 8.6, 0.4, 0.00,
347, 51, 33, 25, 326.9, 6.9, 0.4, 0.03,
348, 57, 43, 34, 263.9, 11.2, 0.4, 0.27,
349, 56, 34, 36, 252.8, 3.8, 0.3, 0.00,
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351, 60, 38, 17, 280.4, 7.7, 0.4, 0.00,
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354, 50, 21, 4, 350.9, 3.6, 0.4, 0.00,
355, 64, 26, 5, 351.0, 9.1, 0.4, 0.00,
356, 53, 32, 19, 320.2, 3.7, 0.4, 0.00,
357, 62, 25, 20, 243.5, 5.7, 0.4, 0.00,
358, 65, 31, 20, 351.7, 4.8, 0.4, 0.00,
359, 60, 32, 22, 352.1, 4.6, 0.5, 0.00,
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362, 46, 23, 24, 353.8, 2.8, 0.5, 0.00,
363, 52, 23, 25, 354.5, 3.2, 0.5, 0.00,
364, 51, 27, 23, 355.3, 3.3, 0.4, 0.00,
365, 54, 24, 23, 316.1, 3.1, 0.4, 0.00,
366, 58, 26, 23, 300.0, 5.7, 0.4, 0.00,

Climate Data (2001)

1, 54, 25, 23, 326.7, 2.8, 0.5, 0.00,
2, 48, 30, 26, 338.9, 7.6, 0.4, 0.00,
3, 50, 23, 22, 359.7, 4.0, 0.5, 0.00,
4, 56, 22, 20, 196.4, 3.3, 0.4, 0.00,
5, 63, 28, 21, 279.8, 2.9, 0.5, 0.00,
6, 62, 34, 28, 271.0, 7.2, 0.5, 0.00,
7, 58, 38, 31, 343.4, 9.0, 0.4, 0.00,
8, 54, 31, 24, 306.8, 6.0, 0.4, 0.00,
9, 59, 37, 26, 365.6, 9.5, 0.4, 0.00,
10, 53, 38, 33, 256.6, 7.6, 0.4, 0.00,
11, 56, 28, 31, 263.8, 4.4, 0.4, 0.00,
12, 63, 30, 29, 281.7, 1.2, 0.4, 0.00,
13, 51, 35, 25, 128.6, 15.8, 0.4, 0.00,
14, 52, 24, 23, 356.4, 5.9, 0.3, 0.00,
15, 60, 25, 21, 341.5, 6.4, 0.4, 0.00,
16, 55, 28, 20, 252.8, 8.9, 0.4, 0.00,
17, 38, 30, 26, 174.3, 1.9, 0.5, 0.00,
18, 42, 24, 20, 213.1, 7.8, 0.4, 0.00,
19, 45, 18, 15, 265.8, 2.2, 0.4, 0.00,
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21, 53, 29, 15, 368.3, 5.8, 0.4, 0.00,
22, 51, 26, 17, 274.6, 6.9, 0.4, 0.00,
23, 61, 34, 24, 332.9, 7.4, 0.4, 0.00,
24, 61, 30, 31, 246.7, 6.5, 0.3, 0.00,
25, 64, 37, 27, 269.0, 8.5, 0.3, 0.00,
26, 62, 28, 17, 391.6, 4.4, 0.3, 0.00,
27, 55, 40, 38, 409.5, 8.2, 0.4, 0.01,
28, 46, 33, 32, 412.4, 9.5, 0.4, 0.05,
29, 45, 33, 26, 415.3, 18.8, 0.4, 0.00,
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31, 49, 29, 22, 209.3, 7.5, 0.5, 0.00,
32, 51, 29, 15, 318.8, 12.5, 0.4, 0.00,
33, 52, 23, 12, 363.9, 5.3, 0.5, 0.00,
34, 62, 22, 14, 342.4, 4.0, 0.4, 0.00,
35, 67, 31, 23, 273.8, 5.4, 0.4, 0.00,
36, 69, 30, 24, 336.6, 5.7, 0.4, 0.00,
37, 74, 43, 22, 427.9, 1.1, 0.5, 0.00,
38, 71, 49, 29, 444.5, 11.0, 0.4, 0.00,
39, 63, 34, 28, 369.0, 2.5, 0.5, 0.00,
40, 52, 30, 16, 262.9, 8.2, 0.4, 0.00,
41, 62, 26, 14, 251.1, 4.0, 0.4, 0.00,
42, 68, 38, 17, 458.7, 8.1, 0.3, 0.00,
43, 71, 37, 19, 462.3, 5.9, 0.3, 0.00,
44, 55, 43, 44, 383.3, 9.2, 0.4, 0.17,
45, 65, 42, 32, 469.7, 11.0, 0.4, 0.00,
46, 53, 33, 24, 448.2, 11.3, 0.4, 0.00,
47, 54, 28, 23, 298.6, 4.9, 0.4, 0.00,
48, 60, 33, 27, 359.6, 7.5, 0.3, 0.00,
49, 69, 38, 28, 246.2, 4.4, 0.4, 0.00,
50, 74, 41, 23, 321.7, 6.9, 0.4, 0.00,
51, 74, 38, 21, 270.4, 5.9, 0.4, 0.00,
52, 74, 39, 17, 496.6, 6.3, 0.4, 0.00,
53, 73, 34, 18, 280.6, 4.3, 0.4, 0.00,

54, 72, 45, 25, 192.6, 16.1, 0.4, 0.00,
55, 56, 38, 20, 101.7, 17.4, 0.4, 0.00,
56, 58, 37, 20, 281.6, 6.1, 0.4, 0.00,
57, 66, 45, 32, 357.3, 9.2, 0.5, 0.00,
58, 65, 47, 44, 444.0, 1.8, 0.4, 0.07,
59, 59, 41, 36, 341.4, 6.2, 0.4, 0.00,
60, 57, 37, 30, 410.7, 5.5, 0.4, 0.01,
61, 52, 41, 39, 438.7, 6.9, 0.5, 0.38,
62, 56, 41, 29, 536.5, 15.1, 0.4, 0.00,
63, 61, 36, 28, 340.6, 4.2, 0.3, 0.00,
64, 67, 38, 29, 544.7, 8.2, 0.3, 0.00,
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66, 75, 46, 33, 360.5, 8.1, 0.3, 0.00,
67, 60, 42, 36, 556.9, 13.2, 0.4, 0.00,
68, 67, 37, 34, 531.3, 4.3, 0.4, 0.00,
69, 72, 43, 26, 520.2, 12.6, 0.5, 0.00,
70, 59, 44, 25, 448.7, 13.0, 0.4, 0.00,
71, 64, 42, 22, 364.7, 11.4, 0.3, 0.00,
72, 67, 35, 24, 202.4, 6.4, 0.3, 0.00,
73, 71, 50, 27, 581.0, 2.5, 0.4, 0.00,
74, 63, 38, 1, 511.3, 9.3, 0.4, 0.00,
75, 66, 37, 14, 429.0, 6.5, 0.3, 0.00,
76, 66, 41, 28, 134.9, 9.7, 0.3, 0.00,
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79, 73, 38, 23, 383.6, 2.8, 0.4, 0.00,
80, 83, 43, 21, 250.9, 6.0, 0.4, 0.00,
81, 82, 56, 21, 594.4, 8.6, 0.3, 0.00,
82, 80, 48, 20, 616.2, 8.8, 0.3, 0.00,
83, 71, 47, 33, 620.0, 11.0, 0.3, 0.00,
84, 73, 43, 39, 490.4, 4.4, 0.3, 0.00,
85, 82, 47, 30, 535.0, 8.0, 0.4, 0.00,
86, 79, 47, 31, 330.3, 13.8, 0.4, 0.00,
87, 73, 49, 33, 528.8, 11.4, 0.3, 0.00,
88, 78, 47, 31, 638.5, 14.6, 0.3, 0.00,
89, 77, 52, 37, 567.9, 13.8, 0.3, 0.01,
90, 77, 48, 21, 501.2, 5.4, 0.2, 0.00,
91, 85, 48, 24, 403.7, 9.9, 0.3, 0.00,
92, 81, 60, 27, 443.4, 14.8, 0.2, 0.00,
93, 83, 58, 25, 518.7, 11.3, 0.3, 0.00,
94, 83, 50, 21, 616.0, 5.7, 0.3, 0.00,
95, 84, 58, 24, 549.7, 1.4, 0.3, 0.00,
96, 70, 51, 32, 353.7, 17.1, 0.4, 0.00,
97, 74, 40, 28, 451.8, 1.0, 0.3, 0.00,
98, 82, 56, 21, 291.3, 15.4, 0.3, 0.00,
99, 82, 49, 19, 459.9, 9.7, 0.3, 0.00,
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104, 84, 51, 22, 436.6, 1.4, 0.3, 0.00,
105, 83, 45, 19, 453.7, 3.9, 0.3, 0.00,
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113, 75, 42, 21, 545.1, 5.4, 0.3, 0.00,
114, 79, 52, 22, 718.6, 12.0, 0.3, 0.00,
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117, 84, 55, 33, 725.8, 5.7, 0.3, 0.00,
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120, 89, 53, 36, 502.9, 3.4, 0.4, 0.00,
121, 93, 54, 23, 375.0, 8.6, 0.3, 0.00,
122, 88, 67, 23, 509.6, 12.7, 0.4, 0.00,
123, 86, 62, 21, 544.6, 12.3, 0.3, 0.00,
124, 75, 57, 21, 657.9, 15.3, 0.3, 0.00,
125, 78, 52, 15, 513.0, 14.1, 0.4, 0.00,
126, 84, 51, 22, 743.4, 7.3, 0.4, 0.00,
127, 90, 51, 27, 746.7, 6.8, 0.3, 0.00,
128, 92, 61, 47, 655.1, 1.8, 0.2, 0.00,
129, 90, 58, 41, 750.2, 7.2, 0.2, 0.00,
130, 92, 61, 39, 751.9, 5.8, 0.3, 0.00,
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132, 84, 64, 47, 755.2, 9.4, 0.3, 0.00,
133, 85, 61, 51, 756.8, 11.5, 0.2, 0.00,
134, 87, 59, 50, 485.9, 8.7, 0.3, 0.00,
135, 90, 55, 41, 717.8, 9.9, 0.3, 0.00,
136, 94, 69, 28, 693.8, 11.6, 0.3, 0.00,
137, 96, 71, 21, 644.8, 15.2, 0.4, 0.00,
138, 94, 68, 30, 589.8, 12.1, 0.3, 0.00,
139, 85, 64, 48, 765.2, 12.5, 0.4, 0.18,
140, 86, 61, 43, 627.4, 14.6, 0.3, 0.00,
141, 77, 60, 37, 721.3, 14.4, 0.3, 0.00,
142, 85, 56, 31, 768.8, 6.1, 0.4, 0.00,
143, 94, 57, 30, 769.9, 4.9, 0.3, 0.00,
144, 97, 55, 27, 709.6, 8.1, 0.4, 0.00,
145, 96, 67, 37, 771.9, 7.2, 0.3, 0.00,
146, 100, 65, 34, 579.5, 9.5, 0.3, 0.00,
147, 101, 72, 34, 690.3, 9.3, 0.3, 0.00,
148, 98, 70, 30, 595.1, 12.1, 0.3, 0.00,
149, 93, 68, 24, 680.9, 13.1, 0.3, 0.00,
150, 97, 64, 30, 776.3, 6.3, 0.3, 0.00,
151, 95, 68, 47, 460.9, 8.0, 0.3, 0.00,
152, 101, 69, 38, 777.8, 1.0, 0.2, 0.00,
153, 100, 75, 28, 760.3, 15.8, 0.3, 0.00,
154, 96, 76, 25, 704.9, 19.0, 0.4, 0.00,
155, 95, 74, 36, 623.3, 19.2, 0.3, 0.00,
156, 94, 73, 22, 562.5, 1.9, 0.4, 0.00,
157, 97, 66, 25, 631.7, 4.5, 0.4, 0.00,
158, 98, 64, 38, 454.8, 11.1, 0.3, 0.11,
159, 90, 71, 53, 729.1, 8.8, 0.3, 0.00,
160, 93, 68, 53, 636.4, 6.9, 0.3, 0.00,
161, 101, 71, 42, 508.3, 6.3, 0.2, 0.00,
162, 102, 71, 35, 518.5, 1.9, 0.2, 0.00,
163, 98, 78, 43, 689.5, 15.5, 0.2, 0.00,
164, 95, 75, 36, 783.0, 23.5, 0.2, 0.00,
165, 89, 67, 32, 733.6, 9.6, 0.2, 0.00,
166, 96, 62, 28, 783.2, 7.2, 0.3, 0.00,
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168, 94, 70, 50, 725.4, 7.9, 0.2, 0.00,
169, 96, 72, 48, 637.9, 8.9, 0.3, 0.00,
170, 99, 72, 47, 653.3, 9.1, 0.3, 0.02,
171, 97, 69, 48, 574.5, 6.5, 0.3, 0.00,
172, 95, 69, 47, 783.2, 8.7, 0.3, 0.00,
173, 95, 71, 48, 783.0, 7.2, 0.4, 0.00,
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175, 100, 75, 49, 782.6, 9.6, 0.3, 0.00,
176, 97, 67, 56, 782.3, 9.1, 0.3, 0.16,
177, 85, 67, 60, 752.6, 6.5, 0.2, 0.01,
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179, 98, 69, 55, 781.3, 6.6, 0.4, 0.00,
180, 98, 69, 54, 459.7, 6.2, 0.4, 0.00,
181, 98, 72, 52, 780.4, 7.0, 0.4, 0.00,
182, 100, 74, 50, 779.9, 9.8, 0.4, 0.00,
183, 93, 75, 53, 779.4, 11.6, 0.4, 0.00,
184, 92, 70, 52, 653.5, 11.4, 0.4, 0.00,
185, 94, 71, 53, 717.2, 1.4, 0.4, 0.00,
186, 94, 72, 57, 314.9, 7.3, 0.4, 0.01,
187, 92, 70, 58, 776.8, 8.5, 0.4, 0.00,
188, 95, 70, 58, 597.2, 9.2, 0.4, 0.06,
189, 96, 67, 55, 377.8, 1.4, 0.4, 0.00,
190, 95, 68, 57, 684.1, 7.6, 0.4, 0.22,
191, 94, 65, 57, 760.5, 4.6, 0.5, 0.00,
192, 99, 73, 54, 772.7, 7.9, 0.5, 0.00,
193, 102, 72, 49, 771.8, 6.0, 0.4, 0.00,
194, 102, 73, 44, 770.8, 8.2, 0.4, 0.00,
195, 100, 77, 49, 769.8, 7.5, 0.4, 0.00,
196, 102, 75, 51, 663.4, 9.6, 0.5, 0.00,
197, 100, 74, 53, 767.6, 8.1, 0.5, 0.00,
198, 95, 71, 56, 765.0, 8.8, 0.5, 0.00,
199, 94, 77, 56, 493.9, 8.2, 0.4, 0.00,
200, 92, 70, 60, 636.3, 8.9, 0.5, 0.00,
201, 93, 70, 63, 705.9, 7.7, 0.5, 0.02,
202, 95, 69, 59, 553.5, 5.6, 0.5, 0.00,
203, 99, 73, 57, 758.7, 6.6, 0.5, 0.00,
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206, 96, 71, 56, 755.7, 6.2, 0.5, 0.00,
207, 97, 76, 55, 607.0, 9.6, 0.5, 0.00,
208, 93, 72, 60, 276.5, 5.9, 0.6, 0.04,
209, 94, 71, 61, 404.9, 6.5, 0.6, 0.01,
210, 96, 73, 59, 749.3, 8.7, 0.5, 0.00,
211, 99, 74, 58, 495.7, 8.1, 0.4, 0.00,
212, 94, 76, 58, 745.9, 9.7, 0.5, 0.00,
213, 91, 70, 58, 744.1, 7.7, 0.6, 0.00,
214, 97, 74, 55, 720.5, 7.2, 0.6, 0.00,
215, 95, 73, 55, 621.6, 7.7, 0.5, 0.00,
216, 95, 74, 48, 551.6, 7.4, 0.5, 0.00,
217, 97, 70, 47, 617.6, 6.6, 0.5, 0.00,
218, 97, 72, 45, 513.5, 7.2, 0.4, 0.00,
219, 93, 70, 51, 593.8, 9.4, 0.5, 0.35,
220, 93, 68, 54, 607.3, 6.3, 0.5, 0.04,
221, 92, 65, 56, 509.3, 8.5, 0.5, 0.37,
222, 85, 64, 61, 481.4, 4.8, 0.5, 0.03,
223, 87, 73, 60, 481.1, 6.3, 0.5, 0.00,
224, 94, 69, 62, 518.5, 8.0, 0.5, 0.28,

225, 94, 70, 57, 500.4, 8.5, 0.5, 0.00,
226, 93, 72, 57, 506.2, 7.5, 0.5, 0.00,
227, 92, 70, 60, 639.9, 7.3, 0.5, 0.00,
228, 90, 68, 61, 526.3, 8.4, 0.5, 0.60,
229, 89, 68, 61, 709.2, 6.4, 0.4, 0.00,
230, 82, 71, 62, 706.6, 3.9, 0.5, 0.00,
231, 92, 66, 57, 584.0, 4.5, 0.5, 0.00,
232, 93, 70, 55, 533.0, 6.0, 0.4, 0.00,
233, 84, 70, 56, 692.9, 9.2, 0.4, 0.00,
234, 95, 66, 53, 610.9, 5.3, 0.5, 0.00,
235, 97, 69, 51, 693.1, 5.0, 0.4, 0.00,
236, 99, 68, 50, 619.7, 5.3, 0.5, 0.00,
237, 101, 72, 52, 464.6, 7.7, 0.4, 0.00,
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239, 94, 70, 56, 681.5, 7.4, 0.4, 0.00,
240, 92, 69, 54, 526.0, 8.1, 0.4, 0.00,
241, 89, 69, 57, 675.5, 9.6, 0.4, 0.01,
242, 91, 66, 55, 672.4, 7.3, 0.4, 0.00,
243, 92, 67, 55, 564.2, 5.3, 0.4, 0.04,
244, 92, 63, 55, 436.5, 4.8, 0.4, 0.00,
245, 96, 67, 47, 580.5, 6.9, 0.5, 0.00,
246, 97, 67, 45, 525.9, 4.0, 0.5, 0.00,
247, 93, 70, 55, 607.6, 8.1, 0.4, 0.02,
248, 91, 64, 54, 612.4, 4.6, 0.5, 0.00,
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250, 94, 77, 44, 617.0, 18.4, 0.4, 0.00,
251, 93, 76, 38, 244.9, 13.1, 0.4, 0.00,
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253, 85, 60, 55, 586.9, 11.9, 0.4, 0.00,
254, 87, 66, 57, 535.2, 7.8, 0.4, 0.00,
255, 90, 70, 57, 558.6, 7.6, 0.4, 0.00,
256, 82, 67, 63, 528.1, 14.2, 0.4, 0.08,
257, 82, 67, 65, 214.4, 5.5, 0.5, 0.04,
258, 88, 67, 63, 618.0, 7.3, 0.4, 0.00,
259, 92, 66, 60, 551.1, 7.0, 0.3, 0.16,
260, 90, 64, 59, 299.3, 4.7, 0.3, 0.00,
261, 93, 64, 53, 546.7, 6.1, 0.3, 0.00,
262, 94, 65, 48, 562.2, 5.6, 0.3, 0.00,
263, 95, 70, 46, 475.6, 7.5, 0.3, 0.00,
264, 94, 65, 48, 595.5, 7.2, 0.4, 0.00,
265, 91, 67, 46, 591.7, 6.2, 0.4, 0.00,
266, 85, 64, 47, 438.1, 1.4, 0.4, 0.00,
267, 83, 59, 46, 344.6, 8.8, 0.3, 0.00,
268, 82, 55, 42, 580.2, 5.8, 0.3, 0.00,
269, 85, 52, 30, 576.3, 2.9, 0.3, 0.00,
270, 88, 52, 25, 572.4, 3.1, 0.3, 0.00,
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273, 79, 66, 40, 475.3, 14.5, 0.3, 0.00,
274, 69, 63, 41, 258.3, 9.3, 0.3, 0.00,
275, 81, 59, 40, 389.0, 3.6, 0.3, 0.00,
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333,43,23,22,73.6,9.1,0.3,0.00,
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343, 51, 24, 11, 355.5, 4.2, 0.4, 0.00,
344, 56, 25, 21, 354.7, 6.4, 0.4, 0.00,
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346, 46, 34, 27, 353.3, 12.9, 0.4, 0.00,
347, 47, 31, 21, 326.9, 7.2, 0.4, 0.00,
348, 48, 22, 21, 263.9, 3.6, 0.4, 0.00,
349, 57, 27, 22, 252.8, 8.3, 0.3, 0.00,
350, 50, 32, 29, 351.5, 7.0, 0.4, 0.00,
351, 53, 24, 20, 280.4, 4.6, 0.4, 0.00,
352, 56, 23, 21, 277.9, 4.0, 0.5, 0.00,
353, 58, 24, 15, 350.9, 4.8, 0.4, 0.00,
354, 63, 30, 17, 350.9, 7.7, 0.4, 0.00,
355, 70, 29, 16, 351.0, 14.1, 0.4, 0.00,
356, 54, 32, 14, 320.2, 6.8, 0.4, 0.00,
357, 53, 28, 12, 243.5, 5.8, 0.4, 0.00,
358, 44, 29, 23, 351.7, 9.9, 0.4, 0.00,
359, 48, 19, 21, 352.1, 3.5, 0.5, 0.00,
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362, 60, 21, 16, 353.8, 4.2, 0.5, 0.00,
363, 64, 41, 20, 354.5, 7.0, 0.5, 0.00,
364, 65, 36, 23, 355.3, 9.3, 0.4, 0.00,
365, 48, 27, 21, 316.1, 3.7, 0.4, 0.08,

Climate Data (2002)

1, 43, 32, 28, 326.7, 5.6, 0.5, 0.00,
2, 39, 29, 25, 338.9, 6.3, 0.4, 0.00,
3, 50, 23, 26, 359.7, 3.3, 0.5, 0.00,
4, 59, 34, 26, 196.4, 12.6, 0.4, 0.00,
5, 52, 30, 20, 279.8, 3.5, 0.5, 0.00,
6, 57, 25, 17, 271.0, 3.6, 0.5, 0.00,
7, 63, 28, 19, 343.4, 3.0, 0.4, 0.00,
8, 64, 30, 24, 306.8, 3.5, 0.4, 0.00,
9, 68, 33, 21, 365.6, 5.6, 0.4, 0.00,
10, 65, 43, 24, 256.6, 12.3, 0.4, 0.00,
11, 53, 37, 29, 263.8, 5.9, 0.4, 0.00,
12, 56, 27, 22, 281.7, 5.0, 0.4, 0.00,
13, 65, 35, 18, 128.6, 8.4, 0.4, 0.00,
14, 62, 28, 13, 356.4, 5.5, 0.3, 0.00,
15, 67, 34, 14, 341.5, 7.3, 0.4, 0.00,
16, 69, 49, 16, 252.8, 15.3, 0.4, 0.00,
17, 67, 44, 28, 174.3, 8.0, 0.5, 0.00,
18, 66, 40, 23, 213.1, 13.9, 0.4, 0.00,
19, 52, 34, 3, 265.8, 8.6, 0.4, 0.00,
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21, 57, 23, 3, 368.3, 3.2, 0.4, 0.00,
22, 68, 34, 11, 274.6, 12.0, 0.4, 0.00,
23, 65, 33, 14, 332.9, 11.2, 0.4, 0.00,
24, 50, 35, 27, 246.7, 1.4, 0.3, 0.00,
25, 53, 24, 16, 269.0, 2.9, 0.3, 0.00,
26, 59, 22, 14, 391.6, 4.6, 0.3, 0.00,
27, 69, 32, 20, 409.5, 5.8, 0.4, 0.00,
28, 72, 43, 23, 412.4, 11.2, 0.4, 0.00,
29, 56, 46, 37, 415.3, 1.2, 0.4, 0.00,
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31, 46, 30, 15, 209.3, 12.7, 0.5, 0.00,
32, 50, 23, 15, 318.8, 8.6, 0.4, 0.00,
33, 52, 36, 25, 363.9, 6.0, 0.5, 0.14,
34, 49, 40, 42, 342.4, 6.0, 0.4, 0.30,
35, 45, 41, 40, 273.8, 6.4, 0.4, 0.47,
36, 48, 37, 35, 336.6, 9.0, 0.4, 0.31,
37, 52, 31, 24, 427.9, 3.4, 0.5, 0.00,
38, 57, 27, 26, 444.5, 3.1, 0.4, 0.00,
39, 64, 30, 25, 369.0, 7.6, 0.5, 0.00,
40, 57, 37, 7, 262.9, 15.2, 0.4, 0.00,
41, 51, 31, 3, 251.1, 8.9, 0.4, 0.00,
42, 53, 23, 4, 458.7, 5.4, 0.3, 0.00,
43, 58, 24, 10, 462.3, 2.3, 0.3, 0.00,
44, 52, 32, 18, 383.3, 7.4, 0.4, 0.00,
45, 67, 30, 22, 469.7, 6.3, 0.4, 0.00,
46, 58, 42, 20, 448.2, 7.9, 0.4, 0.00,
47, 63, 38, 25, 298.6, 3.6, 0.4, 0.00,
48, 72, 46, 29, 359.6, 7.4, 0.3, 0.00,
49, 67, 48, 29, 246.2, 2.6, 0.4, 0.00,
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51, 67, 34, 21, 270.4, 1.1, 0.4, 0.00,
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53, 62, 28, 17, 280.6, 6.0, 0.4, 0.00,

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150,102,60,32,776.3,6.4,0.3,0.00,
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156,90,65,46,562.5,8.3,0.4,0.00,
157,89,65,55,631.7,9.4,0.4,0.00,
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160,102,73,40,636.4,1.4,0.3,0.00,
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162,100,71,34,518.5,5.5,0.2,0.00,
163,102,74,51,689.5,7.6,0.2,0.00,
164,104,69,42,783.0,8.6,0.2,0.00,
165,94,70,62,733.6,12.4,0.2,0.18,
166,102,66,52,783.2,1.7,0.3,0.00,
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169,104,77,28,637.9,1.8,0.3,0.00,
170,103,77,35,653.3,1.7,0.3,0.00,
171,102,79,50,574.5,12.4,0.3,0.00,
172,96,74,58,783.2,13.2,0.3,0.00,
173,100,74,55,783.0,9.3,0.4,0.00,
174,101,74,55,738.6,7.9,0.3,0.00,
175,99,70,52,782.6,5.8,0.3,0.00,
176,103,74,43,782.3,4.7,0.3,0.00,
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180,95,66,56,459.7,4.6,0.4,0.00,
181,102,73,54,780.4,6.4,0.4,0.00,
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183,103,71,51,779.4,8.5,0.4,0.00,
184,103,75,52,653.5,7.1,0.4,0.00,
185,96,68,59,717.2,7.9,0.4,0.54,
186,96,64,52,314.9,6.1,0.4,0.00,
187,99,70,55,776.8,6.3,0.4,0.00,
188,84,72,61,597.2,8.2,0.4,0.00,
189,87,69,64,377.8,9.1,0.4,0.02,
190,93,72,58,684.1,7.1,0.4,0.00,
191,95,71,53,760.5,7.3,0.5,0.00,
192,94,71,54,772.7,8.1,0.5,0.00,
193,97,71,57,771.8,1.4,0.4,0.00,
194,95,70,58,770.8,6.4,0.4,0.00,
195,96,70,58,769.8,9.0,0.4,0.01,
196,93,71,58,663.4,6.3,0.5,0.01,
197,90,69,59,767.6,9.1,0.5,0.03,
198,90,68,65,765.0,6.9,0.5,0.01,
199,91,67,65,493.9,9.7,0.4,0.32,
200,86,67,67,636.3,6.8,0.5,0.10,
201,83,68,68,705.9,6.6,0.5,0.26,
202,88,68,67,553.5,5.7,0.5,0.04,
203,91,70,64,758.7,6.8,0.5,0.00,
204,90,70,61,662.9,8.7,0.5,0.00,
205,94,71,55,688.2,5.6,0.5,0.00,
206,97,74,55,755.7,6.9,0.5,0.00,
207,99,76,56,607.0,8.8,0.5,0.00,
208,96,74,58,276.5,12.6,0.6,0.00,
209,96,73,56,404.9,11.4,0.6,0.00,
210,97,74,54,749.3,11.6,0.5,0.00,
211,93,70,60,495.7,5.8,0.4,0.00,
212,95,71,57,745.9,7.9,0.5,0.00,
213,100,76,57,744.1,11.7,0.6,0.01,
214,88,64,63,720.5,9.0,0.6,0.54,
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216,92,71,61,551.6,5.0,0.5,0.02,
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218,93,69,54,513.5,6.8,0.4,0.00,
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220,94,72,59,607.3,5.9,0.5,0.00,
221,97,73,59,509.3,4.5,0.5,0.00,
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225,102,79,56,500.4,9.7,0.5,0.00,
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228,95,75,51,526.3,1.2,0.5,0.00,
229,96,78,51,709.2,7.8,0.4,0.00,
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232,95,75,59,533.0,12.5,0.4,0.00,
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303,70,43,42,380.1,5.7,0.2,0.00,
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314,71,54,41,411.6,21.4,0.3,0.00,
315,66,39,31,363.5,7.9,0.3,0.00,
316,60,41,30,406.0,8.2,0.3,0.00,
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318,70,45,27,400.5,8.1,0.3,0.00,
319,60,38,24,381.4,13.8,0.4,0.00,
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323,66,34,17,100.7,5.2,0.3,0.00,
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326,70,39,21,381.3,5.3,0.4,0.00,
327,71,32,22,379.2,3.8,0.5,0.00,
328,69,44,19,302.6,8.9,0.3,0.00,
329,54,36,31,156.0,7.5,0.4,0.00,
330,47,38,28,217.4,11.3,0.3,0.00,
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332,53,30,30,344.8,5.7,0.3,0.00,
333,58,42,34,73.6,5.8,0.3,0.00,
334,65,38,36,200.7,5.0,0.3,0.00,
335,67,38,38,298.6,4.1,0.3,0.00,
336,66,45,44,290.9,6.9,0.3,0.38,
337,59,42,46,203.2,9.6,0.3,0.27,
338,53,39,38,360.8,5.8,0.3,0.00,

339, 51, 34, 36, 359.6, 3.0, 0.4, 0.00,
340, 52, 32, 37, 253.1, 3.8, 0.2, 0.00,
341, 56, 34, 39, 235.2, 5.5, 0.3, 0.00,
342, 58, 41, 40, 356.4, 1.8, 0.4, 0.26,
343, 50, 35, 35, 355.5, 3.1, 0.4, 0.00,
344, 52, 32, 35, 354.7, 2.4, 0.4, 0.00,
345, 56, 32, 32, 354.0, 6.1, 0.4, 0.00,
346, 57, 34, 25, 353.3, 5.8, 0.4, 0.00,
347, 58, 32, 29, 326.9, 3.2, 0.4, 0.00,
348, 60, 31, 32, 263.9, 3.6, 0.4, 0.00,
349, 62, 35, 30, 252.8, 3.9, 0.3, 0.00,
350, 66, 35, 26, 351.5, 8.7, 0.4, 0.00,
351, 69, 45, 29, 280.4, 2.6, 0.4, 0.00,
352, 49, 39, 32, 277.9, 17.3, 0.5, 0.12,
353, 49, 35, 23, 350.9, 11.7, 0.4, 0.00,
354, 51, 25, 22, 350.9, 3.6, 0.4, 0.00,
355, 54, 35, 17, 351.0, 1.5, 0.4, 0.00,
356, 49, 32, 22, 320.2, 8.6, 0.4, 0.19,
357, 45, 30, 36, 243.5, 5.6, 0.4, 0.33,
358, 43, 29, 29, 351.7, 3.9, 0.4, 0.10,
359, 40, 25, 28, 352.1, 6.5, 0.5, 0.00,
360, 46, 25, 26, 352.6, 3.5, 0.6, 0.00,
361, 50, 27, 25, 353.1, 4.1, 0.5, 0.00,
362, 55, 25, 26, 353.8, 3.7, 0.5, 0.00,
363, 53, 28, 28, 354.5, 6.5, 0.5, 0.00,
364, 54, 35, 27, 355.3, 13.6, 0.4, 0.00,
365, 56, 25, 25, 316.1, 9.0, 0.4, 0.00,

Climate Data (2003)

1, 56, 36, 21, 326.7, 11.5, 0.5, 0.00,
2, 53, 26, 23, 338.9, 4.5, 0.4, 0.00,
3, 58, 26, 23, 359.7, 4.4, 0.5, 0.00,
4, 63, 29, 26, 196.4, 3.1, 0.4, 0.00,
5, 65, 28, 27, 279.8, 4.9, 0.5, 0.00,
6, 56, 37, 33, 271.0, 13.2, 0.5, 0.00,
7, 59, 42, 36, 343.4, 9.2, 0.4, 0.00,
8, 61, 39, 40, 306.8, 6.6, 0.4, 0.00,
9, 64, 44, 36, 365.6, 9.2, 0.4, 0.00,
10, 62, 33, 27, 256.6, 3.8, 0.4, 0.00,
11, 64, 38, 34, 263.8, 4.7, 0.4, 0.00,
12, 61, 36, 33, 281.7, 6.5, 0.4, 0.00,
13, 61, 33, 27, 128.6, 3.8, 0.4, 0.00,
14, 65, 30, 27, 356.4, 1.7, 0.3, 0.00,
15, 71, 33, 24, 341.5, 7.8, 0.4, 0.00,
16, 55, 37, 19, 252.8, 8.0, 0.4, 0.00,
17, 56, 26, 17, 174.3, 3.5, 0.5, 0.00,
18, 59, 27, 20, 213.1, 5.4, 0.4, 0.00,
19, 67, 28, 23, 265.8, 5.0, 0.4, 0.00,
20, 70, 37, 30, 390.8, 8.2, 0.5, 0.00,
21, 65, 40, 34, 368.3, 1.1, 0.4, 0.00,
22, 65, 42, 34, 274.6, 6.0, 0.4, 0.00,
23, 60, 34, 29, 332.9, 3.4, 0.4, 0.00,
24, 65, 38, 30, 246.7, 4.6, 0.3, 0.00,
25, 68, 36, 30, 269.0, 4.8, 0.3, 0.00,
26, 63, 38, 27, 391.6, 4.3, 0.3, 0.00,
27, 65, 30, 24, 409.5, 4.7, 0.4, 0.00,
28, 73, 35, 21, 412.4, 11.2, 0.4, 0.00,
29, 67, 36, 21, 415.3, 4.6, 0.4, 0.00,
30, 70, 31, 23, 266.4, 5.3, 0.5, 0.00,
31, 67, 37, 25, 209.3, 7.1, 0.5, 0.00,
32, 72, 32, 26, 318.8, 6.1, 0.4, 0.00,
33, 76, 48, 34, 363.9, 18.4, 0.5, 0.00,
34, 59, 37, 13, 342.4, 12.2, 0.4, 0.00,
35, 64, 32, 15, 273.8, 4.2, 0.4, 0.00,
36, 58, 43, 28, 336.6, 16.1, 0.4, 0.00,
37, 56, 37, 18, 427.9, 9.6, 0.5, 0.00,
38, 46, 29, 24, 444.5, 9.1, 0.4, 0.00,
39, 44, 32, 35, 369.0, 5.6, 0.5, 0.20,
40, 54, 36, 27, 262.9, 12.8, 0.4, 0.00,
41, 57, 28, 24, 251.1, 5.7, 0.4, 0.00,
42, 67, 35, 29, 458.7, 4.9, 0.3, 0.00,
43, 66, 44, 30, 462.3, 7.2, 0.3, 0.00,
44, 64, 49, 40, 383.3, 8.8, 0.4, 0.02,
45, 63, 47, 42, 469.7, 15.9, 0.4, 0.00,
46, 60, 42, 40, 448.2, 5.5, 0.4, 0.00,
47, 60, 37, 35, 298.6, 4.0, 0.4, 0.00,
48, 72, 39, 34, 359.6, 6.1, 0.3, 0.00,
49, 74, 52, 33, 246.2, 15.9, 0.4, 0.00,
50, 64, 49, 37, 321.7, 6.6, 0.4, 0.04,
51, 56, 39, 43, 270.4, 8.9, 0.4, 0.99,
52, 61, 40, 35, 496.6, 8.8, 0.4, 0.03,
53, 66, 36, 26, 280.6, 17.1, 0.4, 0.00,

54, 61, 43, 24, 192.6, 7.5, 0.4, 0.00,
55, 60, 34, 31, 101.7, 7.8, 0.4, 0.01,
56, 58, 29, 27, 281.6, 5.4, 0.4, 0.00,
57, 57, 41, 35, 357.3, 13.4, 0.5, 0.08,
58, 59, 43, 29, 444.0, 13.6, 0.4, 0.00,
59, 61, 42, 30, 341.4, 8.9, 0.4, 0.00,
60, 59, 44, 29, 410.7, 8.2, 0.4, 0.00,
61, 61, 36, 28, 438.7, 6.9, 0.5, 0.04,
62, 58, 38, 34, 536.5, 6.8, 0.4, 0.00,
63, 67, 45, 27, 340.6, 19.6, 0.3, 0.00,
64, 61, 43, 27, 544.7, 14.7, 0.3, 0.00,
65, 63, 40, 23, 272.8, 1.2, 0.3, 0.00,
66, 68, 35, 24, 360.5, 4.1, 0.3, 0.00,
67, 72, 39, 25, 556.9, 6.1, 0.4, 0.00,
68, 74, 38, 22, 531.3, 4.4, 0.4, 0.00,
69, 77, 42, 21, 520.2, 5.8, 0.5, 0.00,
70, 78, 41, 22, 448.7, 6.6, 0.4, 0.00,
71, 79, 50, 24, 364.7, 9.3, 0.3, 0.00,
72, 79, 43, 28, 202.4, 6.5, 0.3, 0.00,
73, 80, 55, 37, 581.0, 8.8, 0.4, 0.00,
74, 77, 53, 33, 511.3, 6.9, 0.4, 0.00,
75, 75, 55, 34, 429.0, 14.9, 0.3, 0.00,
76, 62, 42, 37, 134.9, 2.1, 0.3, 0.05,
77, 54, 38, 32, 356.2, 21.7, 0.4, 0.00,
78, 61, 45, 31, 600.8, 18.1, 0.4, 0.00,
79, 64, 43, 35, 383.6, 4.8, 0.4, 0.00,
80, 57, 43, 35, 250.9, 7.8, 0.4, 0.09,
81, 69, 37, 31, 594.4, 5.5, 0.3, 0.00,
82, 79, 41, 24, 616.2, 5.3, 0.3, 0.00,
83, 78, 48, 21, 620.0, 13.5, 0.3, 0.00,
84, 72, 51, 31, 490.4, 9.9, 0.3, 0.00,
85, 78, 41, 32, 535.0, 8.1, 0.4, 0.00,
86, 82, 44, 27, 330.3, 18.4, 0.4, 0.00,
87, 49, 40, 22, 528.8, 16.4, 0.3, 0.00,
88, 54, 37, 15, 638.5, 8.1, 0.3, 0.00,
89, 64, 31, 19, 567.9, 4.8, 0.3, 0.00,
90, 78, 32, 18, 501.2, 4.3, 0.2, 0.00,
91, 85, 44, 24, 403.7, 9.2, 0.3, 0.00,
92, 84, 61, 39, 443.4, 17.2, 0.2, 0.00,
93, 76, 58, 33, 518.7, 23.9, 0.3, 0.00,
94, 71, 49, 19, 616.0, 11.5, 0.3, 0.00,
95, 77, 38, 16, 549.7, 14.8, 0.3, 0.00,
96, 69, 49, 17, 353.7, 1.8, 0.4, 0.00,
97, 72, 44, 16, 451.8, 8.8, 0.3, 0.00,
98, 65, 43, 27, 291.3, 1.9, 0.3, 0.00,
99, 71, 38, 19, 459.9, 6.8, 0.3, 0.00,
100, 71, 44, 21, 561.0, 5.9, 0.2, 0.00,
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103, 88, 58, 31, 656.1, 1.8, 0.3, 0.00,
104, 86, 60, 42, 436.6, 1.1, 0.3, 0.02,
105, 77, 55, 37, 453.7, 23.3, 0.3, 0.00,
106, 78, 62, 18, 578.7, 8.0, 0.4, 0.00,
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133,98,56,33,756.8,8.1,0.2,0.00,
134,94,64,32,485.9,5.6,0.3,0.00,
135,96,66,27,717.8,17.3,0.3,0.00,
136,93,68,31,693.8,8.5,0.3,0.00,
137,99,62,35,644.8,4.6,0.4,0.00,
138,98,62,35,589.8,12.0,0.3,0.00,
139,95,68,36,765.2,8.4,0.4,0.00,
140,72,55,45,627.4,14.9,0.3,0.00,
141,83,53,46,721.3,4.9,0.3,0.00,
142,96,59,45,768.8,4.0,0.4,0.00,
143,99,69,48,769.9,7.0,0.3,0.00,
144,98,69,43,709.6,9.6,0.4,0.00,
145,92,65,38,771.9,9.3,0.3,0.00,
146,86,64,45,579.5,6.6,0.3,0.00,
147,87,62,52,690.3,9.8,0.3,0.00,
148,86,62,50,595.1,1.4,0.3,0.00,
149,91,64,45,680.9,4.6,0.3,0.00,
150,95,69,45,776.3,6.7,0.3,0.00,
151,98,73,39,460.9,7.8,0.3,0.00,
152,99,69,40,777.8,8.2,0.2,0.00,
153,99,73,43,760.3,7.2,0.3,0.00,
154,101,68,40,704.9,9.5,0.4,0.00,
155,99,70,40,623.3,8.0,0.3,0.00,
156,95,71,46,562.5,1.4,0.4,0.00,
157,87,63,46,631.7,1.9,0.4,0.00,
158,96,62,38,454.8,7.9,0.3,0.00,
159,95,65,49,729.1,1.2,0.3,0.00,
160,94,68,52,636.4,7.2,0.3,0.00,
161,94,61,41,508.3,13.1,0.2,0.00,
162,92,76,36,518.5,16.1,0.2,0.00,
163,93,67,31,689.5,14.1,0.2,0.00,
164,93,71,32,783.0,1.6,0.2,0.00,
165,95,64,44,733.6,5.6,0.2,0.00,
166,95,71,49,783.2,1.2,0.3,0.00,
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168, 91, 63, 54, 725.4, 9.2, 0.2, 0.01,
169, 90, 64, 53, 637.9, 6.4, 0.3, 0.00,
170, 96, 69, 50, 653.3, 9.7, 0.3, 0.00,
171, 97, 71, 46, 574.5, 11.7, 0.3, 0.00,
172, 96, 65, 37, 783.2, 1.4, 0.3, 0.00,
173, 99, 69, 35, 783.0, 8.9, 0.4, 0.00,
174, 100, 65, 36, 738.6, 8.6, 0.3, 0.00,
175, 99, 67, 34, 782.6, 8.7, 0.3, 0.00,
176, 98, 67, 30, 782.3, 7.4, 0.3, 0.00,
177, 95, 67, 50, 752.6, 12.7, 0.2, 0.00,
178, 95, 68, 58, 781.7, 9.4, 0.3, 0.32,
179, 93, 64, 55, 781.3, 6.9, 0.4, 0.10,
180, 94, 67, 53, 459.7, 7.5, 0.4, 0.00,
181, 92, 67, 53, 780.4, 9.4, 0.4, 0.00,
182, 94, 70, 52, 779.9, 5.7, 0.4, 0.00,
183, 99, 73, 50, 779.4, 5.5, 0.4, 0.00,
184, 102, 71, 51, 653.5, 5.6, 0.4, 0.08,
185, 99, 67, 51, 717.2, 5.1, 0.4, 0.00,
186, 100, 74, 50, 314.9, 7.3, 0.4, 0.00,
187, 99, 72, 54, 776.8, 7.1, 0.4, 0.00,
188, 96, 71, 58, 597.2, 9.6, 0.4, 0.00,
189, 95, 70, 60, 377.8, 8.4, 0.4, 0.00,
190, 100, 72, 58, 684.1, 7.0, 0.4, 0.00,
191, 101, 76, 57, 760.5, 9.3, 0.5, 0.00,
192, 101, 75, 48, 772.7, 8.8, 0.5, 0.00,
193, 100, 75, 44, 771.8, 5.1, 0.4, 0.00,
194, 103, 74, 42, 770.8, 5.8, 0.4, 0.00,
195, 106, 76, 42, 769.8, 8.8, 0.4, 0.00,
196, 103, 74, 45, 663.4, 1.3, 0.5, 0.00,
197, 97, 72, 48, 767.6, 14.2, 0.5, 0.00,
198, 91, 66, 62, 765.0, 13.9, 0.5, 0.35,
199, 92, 67, 62, 493.9, 5.0, 0.4, 0.00,
200, 96, 71, 59, 636.3, 6.7, 0.5, 0.00,
201, 99, 75, 52, 705.9, 6.2, 0.5, 0.00,
202, 101, 74, 51, 553.5, 4.9, 0.5, 0.00,
203, 102, 81, 50, 758.7, 9.3, 0.5, 0.00,
204, 102, 77, 48, 662.9, 7.9, 0.5, 0.00,
205, 97, 73, 54, 688.2, 9.4, 0.5, 0.00,
206, 101, 73, 52, 755.7, 7.1, 0.5, 0.00,
207, 95, 71, 58, 607.0, 7.0, 0.5, 0.08,
208, 93, 68, 54, 276.5, 8.8, 0.6, 0.00,
209, 91, 67, 54, 404.9, 5.5, 0.6, 0.01,
210, 87, 67, 58, 749.3, 5.1, 0.5, 0.00,
211, 93, 68, 57, 495.7, 6.2, 0.4, 0.00,
212, 96, 73, 59, 745.9, 8.4, 0.5, 0.03,
213, 96, 73, 58, 744.1, 7.3, 0.6, 0.00,
214, 97, 72, 59, 720.5, 11.0, 0.6, 0.31,
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216, 102, 74, 52, 551.6, 6.7, 0.5, 0.00,
217, 103, 74, 49, 617.6, 7.9, 0.5, 0.00,
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219, 99, 79, 48, 593.8, 7.6, 0.5, 0.00,
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221, 106, 74, 45, 509.3, 6.6, 0.5, 0.00,
222, 99, 80, 55, 481.4, 6.8, 0.5, 0.00,
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224, 97, 74, 50, 518.5, 7.1, 0.5, 0.00,

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322,61,43,27,390.4,8.3,0.4,0.00,
323,64,38,26,100.7,3.0,0.3,0.00,
324,70,36,29,358.0,7.1,0.3,0.00,
325,74,47,25,269.1,1.6,0.4,0.00,
326,72,49,24,381.3,16.5,0.4,0.00,
327,53,30,4,379.2,12.0,0.5,0.00,
328,53,21,3,302.6,3.3,0.3,0.00,
329,66,34,19,156.0,7.6,0.4,0.00,
330,65,48,25,217.4,12.2,0.3,0.00,
331,54,32,9,137.2,11.8,0.3,0.00,
332,52,26,15,344.8,5.2,0.3,0.00,
333,58,29,15,73.6,5.9,0.3,0.00,
334,66,30,17,200.7,3.7,0.3,0.00,
335,70,38,22,298.6,6.9,0.3,0.00,
336,67,37,31,290.9,5.6,0.3,0.00,
337,65,39,23,203.2,6.9,0.3,0.00,
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339, 52, 36, 27, 359.6, 9.0, 0.4, 0.00,
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341, 70, 32, 33, 235.2, 6.9, 0.3, 0.00,
342, 66, 43, 37, 356.4, 17.0, 0.4, 0.00,
343, 54, 32, 16, 355.5, 9.3, 0.4, 0.00,
344, 58, 26, 15, 354.7, 3.6, 0.4, 0.00,
345, 63, 29, 21, 354.0, 7.6, 0.4, 0.00,
346, 54, 39, 25, 353.3, 16.4, 0.4, 0.01,
347, 55, 28, 22, 326.9, 6.4, 0.4, 0.00,
348, 62, 28, 19, 263.9, 6.8, 0.4, 0.00,
349, 57, 36, 14, 252.8, 22.5, 0.3, 0.00,
350, 47, 24, 5, 351.5, 5.1, 0.4, 0.00,
351, 52, 20, 3, 280.4, 3.9, 0.4, 0.00,
352, 57, 22, 9, 277.9, 5.6, 0.5, 0.00,
353, 58, 27, 11, 350.9, 5.1, 0.4, 0.00,
354, 62, 27, 12, 350.9, 4.6, 0.4, 0.00,
355, 68, 29, 14, 351.0, 6.9, 0.4, 0.00,
356, 61, 39, 26, 320.2, 12.3, 0.4, 0.00,
357, 55, 27, 23, 243.5, 4.6, 0.4, 0.00,
358, 55, 31, 22, 351.7, 7.0, 0.4, 0.00,
359, 63, 43, 28, 352.1, 11.0, 0.5, 0.00,
360, 72, 37, 26, 352.6, 12.6, 0.6, 0.00,
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362, 40, 23, 0, 353.8, 8.9, 0.5, 0.00,
363, 46, 13, -1, 354.5, 5.1, 0.5, 0.00,
364, 53, 19, -2, 355.3, 5.8, 0.4, 0.00,
365, 55, 31, 3, 316.1, 7.9, 0.4, 0.00,

Climate Data (2004)

1, 62, 40, 34, 326.7, 6.8, 0.5, 0.0,
2, 66, 31, 34, 338.9, 4.7, 0.4, 0.0,
3, 70, 32, 27, 359.7, 12.1, 0.5, 0.0,
4, 55, 34, 21, 196.4, 9.4, 0.4, 0.0,
5, 54, 27, 4, 279.8, 8.9, 0.5, 0.0,
6, 53, 28, 15, 271.0, 6.7, 0.5, 0.0,
7, 60, 26, 23, 343.4, 3.7, 0.4, 0.0,
8, 60, 36, 25, 306.8, 7.5, 0.4, 0.0,
9, 62, 32, 18, 365.6, 8.7, 0.4, 0.0,
10, 63, 33, 15, 256.6, 7.9, 0.4, 0.0,
11, 61, 36, 21, 263.8, 5.7, 0.4, 0.0,
12, 67, 38, 34, 281.7, 4.0, 0.4, 0.0,
13, 66, 36, 30, 128.6, 7.0, 0.4, 0.0,
14, 51, 45, 37, 356.4, 1.2, 0.3, 0.2,
15, 51, 45, 46, 341.5, 7.9, 0.4, 0.1,
16, 56, 45, 42, 252.8, 7.9, 0.4, 0.0,
17, 54, 40, 35, 174.3, 5.6, 0.5, 0.0,
18, 55, 40, 34, 213.1, 6.4, 0.4, 0.0,
19, 57, 37, 33, 265.8, 7.8, 0.4, 0.0,
20, 59, 36, 32, 390.8, 6.2, 0.5, 0.0,
21, 55, 36, 32, 368.3, 6.1, 0.4, 0.0,
22, 57, 38, 33, 274.6, 9.0, 0.4, 0.0,
23, 51, 35, 37, 332.9, 5.2, 0.4, 0.0,
24, 55, 37, 34, 246.7, 11.4, 0.3, 0.0,
25, 53, 41, 31, 269.0, 18.1, 0.3, 0.0,
26, 46, 32, 11, 391.6, 9.8, 0.3, 0.0,
27, 51, 24, 8, 409.5, 4.1, 0.4, 0.0,
28, 56, 25, 15, 412.4, 4.8, 0.4, 0.0,
29, 59, 38, 22, 415.3, 6.0, 0.4, 0.0,
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34, 59, 30, 16, 342.4, 8.2, 0.4, 0.0,
35, 48, 36, 29, 273.8, 13.3, 0.4, 0.0,
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37, 49, 27, 22, 427.9, 4.8, 0.5, 0.0,
38, 53, 24, 18, 444.5, 5.3, 0.4, 0.0,
39, 62, 33, 15, 369.0, 9.0, 0.5, 0.0,
40, 59, 34, 8, 262.9, 7.9, 0.4, 0.0,
41, 53, 30, 24, 251.1, 8.0, 0.4, 0.0,
42, 58, 27, 25, 458.7, 6.4, 0.3, 0.0,
43, 46, 26, 21, 462.3, 12.6, 0.3, 0.0,
44, 37, 24, 21, 383.3, 8.4, 0.4, 0.0,
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49, 75, 35, 14, 246.2, 6.5, 0.4, 0.0,
50, 67, 49, 19, 321.7, 18.7, 0.4, 0.0,
51, 63, 39, 23, 270.4, 4.5, 0.4, 0.0,
52, 63, 45, 28, 496.6, 6.1, 0.4, 0.0,
53, 68, 49, 24, 280.6, 8.8, 0.4, 0.0,

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57, 67, 32, 22, 357.3, 6.3, 0.5, 0.0,
58, 72, 36, 21, 444.0, 9.4, 0.4, 0.0,
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62, 71, 33, 21, 536.5, 9.4, 0.4, 0.0,
63, 66, 47, 36, 340.6, 12.7, 0.3, 0.0,
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67, 69, 38, 26, 556.9, 8.6, 0.4, 0.0,
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69, 74, 43, 26, 520.2, 11.0, 0.5, 0.0,
70, 79, 44, 31, 448.7, 5.3, 0.4, 0.0,
71, 64, 43, 38, 364.7, 13.1, 0.3, 0.1,
72, 49, 44, 44, 202.4, 6.5, 0.3, 0.6,
73, 65, 38, 43, 581.0, 5.7, 0.4, 0.0,
74, 70, 44, 44, 511.3, 5.7, 0.4, 0.0,
75, 77, 47, 39, 429.0, 7.9, 0.3, 0.0,
76, 78, 47, 23, 134.9, 7.8, 0.3, 0.0,
77, 82, 51, 24, 356.2, 9.0, 0.4, 0.0,
78, 82, 49, 24, 600.8, 5.3, 0.4, 0.0,
79, 85, 49, 26, 383.6, 4.6, 0.4, 0.0,
80, 88, 51, 27, 250.9, 9.7, 0.4, 0.0,
81, 68, 52, 39, 594.4, 13.3, 0.3, 0.0,
82, 66, 52, 47, 616.2, 9.3, 0.3, 0.0,
83, 79, 53, 46, 620.0, 6.1, 0.3, 0.0,
84, 85, 57, 39, 490.4, 8.1, 0.3, 0.0,
85, 84, 60, 31, 535.0, 8.3, 0.4, 0.0,
86, 85, 54, 26, 330.3, 12.6, 0.4, 0.0,
87, 80, 62, 21, 528.8, 11.5, 0.3, 0.0,
88, 74, 53, 14, 638.5, 11.3, 0.3, 0.0,
89, 77, 50, 20, 567.9, 11.1, 0.3, 0.0,
90, 78, 49, 28, 501.2, 9.2, 0.2, 0.0,
91, 80, 54, 39, 403.7, 6.5, 0.3, 0.0,
92, 80, 60, 40, 443.4, 9.6, 0.2, 0.0,
93, 74, 50, 44, 518.7, 7.2, 0.3, 0.1,
94, 73, 49, 44, 616.0, 9.5, 0.3, 0.1,
95, 59, 48, 46, 549.7, 13.2, 0.3, 0.2,
96, 53, 46, 45, 353.7, 9.1, 0.4, 0.2,
97, 68, 46, 41, 451.8, 11.4, 0.3, 0.0,
98, 73, 51, 41, 291.3, 6.9, 0.3, 0.0,
99, 77, 52, 34, 459.9, 8.8, 0.3, 0.0,
100, 76, 51, 34, 561.0, 11.1, 0.2, 0.0,
101, 65, 45, 40, 678.5, 8.3, 0.3, 0.1,
102, 46, 39, 38, 539.9, 9.4, 0.3, 0.5,
103, 63, 39, 35, 656.1, 5.0, 0.3, 0.0,
104, 72, 45, 36, 436.6, 5.7, 0.3, 0.0,
105, 82, 53, 29, 453.7, 6.8, 0.3, 0.0,
106, 82, 56, 29, 578.7, 8.4, 0.4, 0.0,
107, 85, 65, 29, 677.2, 7.2, 0.3, 0.0,
108, 84, 58, 41, 439.9, 11.6, 0.3, 0.0,
109, 80, 61, 35, 583.4, 7.5, 0.3, 0.0,
110, 83, 50, 28, 705.2, 12.0, 0.2, 0.0,

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114,76,54,25,718.6,8.1,0.3,0.0,
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116,81,48,28,723.5,6.9,0.3,0.0,
117,80,55,31,725.8,11.5,0.3,0.0,
118,78,57,37,726.0,1.2,0.3,0.0,
119,83,55,41,730.4,13.9,0.3,0.0,
120,81,61,34,502.9,17.9,0.4,0.0,
121,79,58,27,375.0,16.6,0.3,0.0,
122,72,51,32,509.6,9.6,0.4,0.0,
123,75,48,27,544.6,5.3,0.3,0.0,
124,83,48,24,657.9,4.5,0.3,0.0,
125,89,52,26,513.0,5.0,0.4,0.0,
126,92,61,29,743.4,6.2,0.4,0.0,
127,93,57,34,746.7,6.9,0.3,0.0,
128,92,62,37,655.1,6.4,0.2,0.0,
129,95,63,38,750.2,6.9,0.2,0.0,
130,92,74,40,751.9,11.2,0.3,0.0,
131,93,66,44,598.6,1.9,0.2,0.0,
132,90,66,40,755.2,16.2,0.3,0.0,
133,89,67,34,756.8,18.0,0.2,0.0,
134,84,66,29,485.9,12.5,0.3,0.0,
135,83,55,36,717.8,9.7,0.3,0.0,
136,89,61,49,693.8,1.4,0.3,0.0,
137,93,61,41,644.8,6.9,0.4,0.0,
138,95,63,21,589.8,9.1,0.3,0.0,
139,97,60,24,765.2,7.3,0.4,0.0,
140,100,71,37,627.4,9.8,0.3,0.0,
141,98,67,38,721.3,7.6,0.3,0.0,
142,94,65,36,768.8,12.2,0.4,0.0,
143,91,69,32,769.9,17.3,0.3,0.0,
144,92,68,27,709.6,11.8,0.4,0.0,
145,94,68,32,771.9,16.4,0.3,0.0,
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147,91,70,35,690.3,12.1,0.3,0.0,
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149,89,56,38,680.9,1.4,0.3,0.0,
150,88,68,30,776.3,19.4,0.3,0.0,
151,89,70,33,460.9,15.5,0.3,0.0,
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154,102,66,32,704.9,5.7,0.4,0.0,
155,95,72,52,623.3,11.8,0.3,0.0,
156,96,67,50,562.5,6.1,0.4,0.0,
157,101,70,43,631.7,8.8,0.4,0.0,
158,101,72,40,454.8,8.5,0.3,0.0,
159,100,74,40,729.1,13.1,0.3,0.0,
160,97,74,44,636.4,13.6,0.3,0.0,
161,95,70,44,508.3,13.8,0.2,0.0,
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164,95,61,32,783.0,8.5,0.2,0.0,
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166,102,65,25,783.2,7.6,0.3,0.0,
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169,97,73,43,637.9,1.2,0.3,0.0,
170,100,71,46,653.3,7.2,0.3,0.0,
171,97,71,54,574.5,9.9,0.3,0.0,
172,97,65,52,783.2,6.3,0.3,0.0,
173,97,68,45,783.0,15.1,0.4,0.0,
174,83,69,52,738.6,1.8,0.3,0.0,
175,88,67,52,782.6,7.6,0.3,0.0,
176,93,68,50,782.3,7.4,0.3,0.0,
177,91,64,50,752.6,7.4,0.2,0.0,
178,93,69,48,781.7,9.2,0.3,0.0,
179,93,69,50,781.3,6.8,0.4,0.0,
180,84,62,57,459.7,9.9,0.4,0.3,
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182,92,66,49,779.9,7.7,0.4,0.0,
183,96,66,42,779.4,4.7,0.4,0.0,
184,99,66,46,653.5,6.0,0.4,0.0,
185,94,72,46,717.2,7.7,0.4,0.0,
186,97,72,41,314.9,9.4,0.4,0.0,
187,99,67,39,776.8,6.9,0.4,0.0,
188,101,73,41,597.2,6.7,0.4,0.0,
189,102,68,44,377.8,8.5,0.4,0.0,
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192,96,73,56,772.7,9.0,0.5,0.0,
193,94,72,56,771.8,6.3,0.4,0.0,
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199,98,75,45,493.9,8.5,0.4,0.0,
200,100,73,46,636.3,5.3,0.5,0.0,
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202,103,79,51,553.5,8.9,0.5,0.0,
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204,95,74,55,662.9,9.3,0.5,0.0,
205,92,69,55,688.2,12.1,0.5,0.1,
206,83,67,61,755.7,12.6,0.5,0.0,
207,81,69,61,607.0,11.6,0.5,0.1,
208,73,63,61,276.5,8.3,0.6,0.1,
209,85,64,63,404.9,5.2,0.6,1.3,
210,91,63,58,749.3,8.6,0.5,0.1,
211,90,65,55,495.7,4.8,0.4,0.0,
212,94,69,54,745.9,5.2,0.5,0.0,
213,94,70,50,744.1,7.7,0.6,0.0,
214,92,72,59,720.5,8.1,0.6,0.2,
215,93,70,63,621.6,6.0,0.5,0.0,
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225, 94, 66, 55, 500.4, 4.7, 0.5, 0.0,
226, 90, 60, 56, 506.2, 9.6, 0.5, 1.4,
227, 75, 63, 61, 639.9, 5.6, 0.5, 0.6,
228, 78, 66, 59, 526.3, 7.7, 0.5, 0.0,
229, 81, 63, 60, 709.2, 6.2, 0.4, 0.6,
230, 80, 63, 59, 706.6, 4.2, 0.5, 0.0,
231, 87, 68, 58, 584.0, 5.1, 0.5, 0.0,
232, 91, 66, 49, 533.0, 9.9, 0.4, 0.0,
233, 92, 66, 48, 692.9, 7.6, 0.4, 0.0,
234, 92, 68, 52, 610.9, 6.0, 0.5, 0.0,
235, 92, 68, 47, 693.1, 9.6, 0.4, 0.0,
236, 94, 67, 43, 619.7, 9.1, 0.5, 0.0,
237, 85, 70, 53, 464.6, 9.7, 0.4, 0.0,
238, 91, 63, 48, 684.5, 6.8, 0.4, 0.0,
239, 94, 64, 44, 681.5, 8.1, 0.4, 0.0,
240, 96, 65, 42, 526.0, 6.3, 0.4, 0.0,
241, 88, 67, 51, 675.5, 9.0, 0.4, 0.0,
242, 90, 66, 57, 672.4, 6.8, 0.4, 0.0,
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244, 85, 62, 54, 436.5, 6.8, 0.4, 0.0,
245, 83, 62, 55, 580.5, 7.9, 0.5, 0.0,
246, 85, 61, 54, 525.9, 5.0, 0.5, 0.0,
247, 91, 63, 51, 607.6, 6.3, 0.4, 0.0,
248, 85, 67, 56, 612.4, 8.8, 0.5, 0.0,
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252, 85, 62, 39, 516.4, 8.1, 0.4, 0.0,
253, 86, 55, 36, 586.9, 5.3, 0.4, 0.0,
254, 87, 56, 37, 535.2, 4.1, 0.4, 0.0,
255, 93, 57, 39, 558.6, 2.7, 0.4, 0.0,
256, 93, 61, 44, 528.1, 5.1, 0.4, 0.0,
257, 97, 66, 49, 214.4, 5.8, 0.5, 0.0,
258, 94, 71, 49, 618.0, 12.9, 0.4, 0.0,
259, 93, 70, 43, 551.1, 7.8, 0.3, 0.0,
260, 96, 62, 40, 299.3, 3.3, 0.3, 0.0,
261, 94, 67, 49, 546.7, 5.8, 0.3, 0.0,
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265, 86, 63, 53, 591.7, 6.0, 0.4, 0.0,
266, 83, 61, 45, 438.1, 6.5, 0.4, 0.0,
267, 85, 61, 37, 344.6, 8.3, 0.3, 0.0,
268, 88, 61, 51, 580.2, 7.8, 0.3, 0.2,
269, 68, 60, 56, 576.3, 7.9, 0.3, 0.0,
270, 70, 59, 55, 572.4, 7.0, 0.3, 0.1,
271, 75, 59, 54, 544.9, 3.2, 0.3, 0.0,
272, 72, 59, 54, 564.6, 6.0, 0.3, 0.0,
273, 78, 56, 55, 475.3, 9.4, 0.3, 0.1,
274, 77, 57, 55, 258.3, 5.1, 0.3, 0.0,
275, 81, 58, 47, 389.0, 5.8, 0.3, 0.0,
276, 73, 60, 54, 313.4, 11.1, 0.3, 0.0,
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279, 85, 64, 56, 537.0, 9.0, 0.3, 0.0,
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281, 81, 61, 48, 529.1, 7.0, 0.2, 0.0,

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317,62,40,35,403.2,11.7,0.4,0.0,
318,51,39,40,400.5,9.9,0.3,0.4,
319,45,35,39,381.4,13.7,0.4,0.9,
320,49,42,44,395.3,8.7,0.4,0.5,
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323,65,42,46,100.7,4.2,0.3,0.0,
324,64,42,43,358.0,5.5,0.3,0.0,
325,64,42,39,269.1,7.8,0.4,0.0,
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328,48,42,38,302.6,16.8,0.3,0.0,
329,56,34,37,156.0,7.3,0.4,0.0,
330,59,34,37,217.4,5.8,0.3,0.0,
331,63,45,31,137.2,18.4,0.3,0.0,
332,62,37,32,344.8,8.3,0.3,0.0,
333,63,48,34,73.6,16.0,0.3,0.0,
334,52,32,16,200.7,13.1,0.3,0.0,
335,45,27,14,298.6,5.5,0.3,0.0,
336,51,22,17,290.9,4.6,0.3,0.0,
337,54,27,20,203.2,8.3,0.3,0.0,
338,55,31,23,360.8,5.7,0.3,0.0,

339, 53, 39, 33, 359.6, 4.6, 0.4, 0.2,
340, 54, 42, 37, 253.1, 7.8, 0.2, 0.1,
341, 50, 38, 35, 235.2, 15.3, 0.3, 0.1,
342, 53, 38, 33, 356.4, 6.8, 0.4, 0.0,
343, 58, 40, 33, 355.5, 14.8, 0.4, 0.0,
344, 64, 43, 35, 354.7, 9.2, 0.4, 0.0,
345, 64, 40, 33, 354.0, 7.0, 0.4, 0.0,
346, 64, 34, 34, 353.3, 3.6, 0.4, 0.0,
347, 67, 35, 35, 326.9, 3.6, 0.4, 0.0,
348, 52, 38, 25, 263.9, 1.6, 0.4, 0.0,
349, 50, 32, 20, 252.8, 7.0, 0.3, 0.0,
350, 54, 27, 24, 351.5, 4.0, 0.4, 0.0,
351, 54, 35, 27, 280.4, 12.4, 0.4, 0.0,
352, 51, 31, 26, 277.9, 4.9, 0.5, 0.0,
353, 55, 27, 22, 350.9, 4.2, 0.4, 0.0,
354, 57, 27, 19, 350.9, 3.8, 0.4, 0.0,
355, 59, 28, 26, 351.0, 8.1, 0.4, 0.0,
356, 61, 39, 32, 320.2, 1.6, 0.4, 0.0,
357, 51, 30, 30, 243.5, 11.8, 0.4, 0.0,
358, 33, 25, 24, 351.7, 9.2, 0.4, 0.0,
359, 32, 16, 15, 352.1, 4.4, 0.5, 0.0,
360, 45, 19, 18, 352.6, 3.3, 0.6, 0.0,
361, 52, 22, 24, 353.1, 5.5, 0.5, 0.0,
362, 56, 32, 28, 353.8, 6.4, 0.5, 0.0,
363, 59, 34, 31, 354.5, 4.0, 0.5, 0.0,
364, 59, 43, 36, 355.3, 6.3, 0.4, 0.0,
365, 67, 45, 44, 316.1, 9.0, 0.4, 0.0,
366, 65, 35, 39, 300.0, 3.0, 0.4, 0.0,

Climate Data (2005)

1, 64, 38, 38, 326.7, 4.8, 0.5, 0.00,
2, 56, 43, 43, 338.9, 4.9, 0.4, 0.04,
3, 55, 40, 46, 359.7, 5.9, 0.5, 0.05,
4, 63, 44, 46, 196.4, 1.6, 0.4, 0.16,
5, 51, 38, 26, 279.8, 1.8, 0.5, 0.00,
6, 52, 28, 30, 271.0, 6.3, 0.5, 0.00,
7, 59, 34, 24, 343.4, 4.4, 0.4, 0.00,
8, 67, 33, 30, 306.8, 4.2, 0.4, 0.00,
9, 67, 32, 32, 365.6, 2.8, 0.4, 0.00,
10, 71, 42, 30, 256.6, 5.3, 0.4, 0.00,
11, 74, 44, 27, 263.8, 14.4, 0.4, 0.00,
12, 62, 40, 25, 281.7, 23.6, 0.4, 0.00,
13, 53, 29, 20, 128.6, 4.5, 0.4, 0.00,
14, 54, 30, 19, 356.4, 3.0, 0.3, 0.00,
15, 60, 33, 20, 341.5, 6.7, 0.4, 0.00,
16, 63, 30, 24, 252.8, 4.7, 0.4, 0.00,
17, 63, 32, 27, 174.3, 6.3, 0.5, 0.00,
18, 61, 33, 31, 213.1, 2.9, 0.4, 0.00,
19, 65, 35, 30, 265.8, 5.8, 0.4, 0.00,
20, 63, 34, 29, 390.8, 1.5, 0.5, 0.00,
21, 63, 44, 44, 368.3, 5.9, 0.4, 0.07,
22, 60, 44, 35, 274.6, 11.8, 0.4, 0.00,
23, 51, 38, 20, 332.9, 4.2, 0.4, 0.00,
24, 62, 41, 40, 246.7, 4.0, 0.3, 0.00,
25, 67, 43, 35, 269.0, 8.2, 0.3, 0.00,
26, 51, 42, 42, 391.6, 4.6, 0.3, 0.22,
27, 58, 47, 45, 409.5, 7.0, 0.4, 0.12,
28, 59, 40, 34, 412.4, 8.9, 0.4, 0.00,
29, 63, 33, 33, 415.3, 6.0, 0.4, 0.00,
30, 54, 38, 26, 266.4, 1.4, 0.5, 0.00,
31, 52, 31, 28, 209.3, 9.7, 0.5, 0.00,
32, 44, 34, 31, 318.8, 5.5, 0.4, 0.00,
33, 46, 30, 25, 363.9, 4.6, 0.5, 0.00,
34, 52, 26, 23, 342.4, 8.6, 0.4, 0.00,
35, 53, 35, 27, 273.8, 8.1, 0.4, 0.01,
36, 45, 39, 39, 336.6, 8.7, 0.4, 0.97,
37, 53, 39, 39, 427.9, 11.2, 0.5, 0.09,
38, 59, 37, 36, 444.5, 6.3, 0.4, 0.00,
39, 61, 36, 34, 369.0, 6.4, 0.5, 0.00,
40, 58, 41, 31, 262.9, 9.0, 0.4, 0.00,
41, 53, 43, 39, 251.1, 9.9, 0.4, 0.06,
42, 55, 44, 47, 458.7, 7.3, 0.3, 0.20,
43, 63, 46, 45, 462.3, 12.0, 0.3, 0.18,
44, 62, 46, 39, 383.3, 13.5, 0.4, 0.00,
45, 66, 40, 40, 469.7, 9.6, 0.4, 0.00,
46, 71, 43, 39, 448.2, 5.6, 0.4, 0.00,
47, 69, 48, 41, 298.6, 4.3, 0.4, 0.00,
48, 59, 48, 41, 359.6, 8.2, 0.3, 0.00,
49, 62, 46, 44, 246.2, 3.3, 0.4, 0.00,
50, 72, 47, 43, 321.7, 11.2, 0.4, 0.02,
51, 70, 47, 38, 270.4, 1.5, 0.4, 0.00,
52, 67, 41, 36, 496.6, 4.6, 0.4, 0.00,
53, 69, 49, 40, 280.6, 6.7, 0.4, 0.02,

54, 66, 45, 45, 192.6, 7.0, 0.4, 0.09,
55, 52, 40, 39, 101.7, 1.3, 0.4, 0.28,
56, 48, 40, 37, 281.6, 8.2, 0.4, 0.00,
57, 57, 40, 38, 357.3, 6.6, 0.5, 0.00,
58, 57, 43, 34, 444.0, 1.1, 0.4, 0.00,
59, 62, 33, 31, 341.4, 6.0, 0.4, 0.00,
60, 65, 40, 29, 410.7, 9.8, 0.4, 0.00,
61, 66, 40, 31, 438.7, 4.4, 0.5, 0.00,
62, 67, 45, 31, 536.5, 1.5, 0.4, 0.00,
63, 65, 42, 31, 340.6, 5.0, 0.3, 0.00,
64, 67, 48, 38, 544.7, 7.4, 0.3, 0.05,
65, 64, 45, 45, 272.8, 6.8, 0.3, 0.01,
66, 65, 39, 34, 360.5, 5.5, 0.3, 0.00,
67, 71, 39, 33, 556.9, 7.9, 0.4, 0.00,
68, 66, 44, 31, 531.3, 5.2, 0.4, 0.00,
69, 75, 41, 31, 520.2, 4.0, 0.5, 0.00,
70, 70, 48, 29, 448.7, 6.6, 0.4, 0.00,
71, 79, 44, 28, 364.7, 15.9, 0.3, 0.00,
72, 76, 58, 31, 202.4, 2.6, 0.3, 0.00,
73, 73, 48, 33, 581.0, 12.8, 0.4, 0.00,
74, 55, 34, 29, 511.3, 16.1, 0.4, 0.02,
75, 55, 29, 14, 429.0, 4.8, 0.3, 0.00,
76, 67, 36, 13, 134.9, 12.7, 0.3, 0.00,
77, 64, 47, 22, 356.2, 11.5, 0.4, 0.00,
78, 67, 50, 33, 600.8, 14.1, 0.4, 0.00,
79, 71, 47, 35, 383.6, 15.7, 0.4, 0.00,
80, 66, 48, 26, 250.9, 16.5, 0.4, 0.00,
81, 68, 39, 22, 594.4, 6.6, 0.3, 0.00,
82, 77, 41, 25, 616.2, 17.0, 0.3, 0.00,
83, 69, 50, 29, 620.0, 15.5, 0.3, 0.00,
84, 67, 42, 28, 490.4, 12.0, 0.3, 0.00,
85, 60, 41, 27, 535.0, 16.7, 0.4, 0.00,
86, 66, 33, 25, 330.3, 6.1, 0.4, 0.00,
87, 75, 39, 24, 528.8, 9.3, 0.3, 0.00,
88, 68, 56, 27, 638.5, 22.6, 0.3, 0.00,
89, 69, 43, 22, 567.9, 17.4, 0.3, 0.00,
90, 61, 42, 16, 501.2, 13.4, 0.2, 0.00,
91, 62, 35, 20, 403.7, 5.9, 0.3, 0.00,
92, 71, 33, 21, 443.4, 4.5, 0.2, 0.00,
93, 82, 42, 27, 518.7, 8.7, 0.3, 0.00,
94, 82, 62, 25, 616.0, 23.5, 0.3, 0.00,
95, 75, 51, 17, 549.7, 17.7, 0.3, 0.00,
96, 74, 47, 21, 353.7, 7.5, 0.4, 0.00,
97, 78, 49, 21, 451.8, 7.1, 0.3, 0.00,
98, 87, 58, 23, 291.3, 14.1, 0.3, 0.00,
99, 80, 54, 26, 459.9, 22.2, 0.3, 0.00,
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104, 83, 54, 34, 436.6, 7.0, 0.3, 0.00,
105, 85, 52, 40, 453.7, 9.0, 0.3, 0.00,
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108, 86, 58, 32, 439.9, 13.1, 0.3, 0.00,
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117,82,50,26,725.8,15.0,0.3,0.00,
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119,78,53,28,730.4,16.1,0.3,0.00,
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124,79,47,41,657.9,5.6,0.3,0.00,
125,87,58,48,513.0,9.7,0.4,0.00,
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127,79,63,29,746.7,12.2,0.3,0.00,
128,80,53,27,655.1,1.2,0.2,0.00,
129,86,58,23,750.2,8.8,0.2,0.00,
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131,85,60,29,598.6,1.3,0.2,0.00,
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133,88,51,21,756.8,5.8,0.2,0.00,
134,88,51,41,485.9,1.2,0.3,0.00,
135,82,58,51,717.8,12.6,0.3,0.17,
136,88,52,47,693.8,5.9,0.3,0.00,
137,89,66,33,644.8,17.3,0.4,0.00,
138,88,69,39,589.8,11.9,0.3,0.00,
139,96,61,41,765.2,5.3,0.4,0.00,
140,100,65,44,627.4,5.6,0.3,0.00,
141,101,71,46,721.3,4.3,0.3,0.00,
142,105,70,48,768.8,8.0,0.4,0.00,
143,105,70,43,769.9,6.7,0.3,0.00,
144,101,79,38,709.6,1.8,0.4,0.00,
145,99,76,41,771.9,7.9,0.3,0.00,
146,86,61,56,579.5,12.7,0.3,0.02,
147,72,61,60,690.3,6.4,0.3,0.61,
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150,90,67,48,776.3,12.8,0.3,0.00,
151,90,71,35,460.9,13.9,0.3,0.00,
152,93,65,36,777.8,9.5,0.2,0.00,
153,93,67,35,760.3,12.9,0.3,0.00,
154,89,69,35,704.9,17.2,0.4,0.00,
155,89,70,36,623.3,1.6,0.3,0.00,
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157,95,63,40,631.7,9.3,0.4,0.00,
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160,95,66,31,636.4,12.4,0.3,0.00,
161,92,68,32,508.3,12.5,0.2,0.00,
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163,90,72,43,689.5,13.3,0.2,0.00,
164,96,65,39,783.0,4.9,0.2,0.00,
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166,100,70,50,783.2,7.5,0.3,0.00,
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171,102,73,45,574.5,7.7,0.3,0.00,
172,95,73,48,783.2,11.4,0.3,0.00,
173,95,71,43,783.0,7.3,0.4,0.00,
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177,98,78,50,752.6,9.1,0.2,0.00,
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183,106,76,45,779.4,1.8,0.4,0.00,
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194,98,69,53,770.8,6.9,0.4,0.00,
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200,101,72,55,636.3,8.5,0.5,0.00,
201,101,78,57,705.9,1.3,0.5,0.00,
202,94,75,58,553.5,11.6,0.5,0.00,
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226, 79, 63, 64, 506.2, 7.5, 0.5, 0.46,
227, 84, 66, 63, 639.9, 5.6, 0.5, 0.00,
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231, 84, 66, 64, 584.0, 6.9, 0.5, 0.64,
232, 83, 67, 64, 533.0, 5.8, 0.4, 0.00,
233, 89, 68, 62, 692.9, 7.3, 0.4, 0.00,
234, 85, 72, 63, 610.9, 5.0, 0.5, 0.00,
235, 89, 70, 61, 693.1, 7.8, 0.4, 0.07,
236, 89, 67, 60, 619.7, 5.3, 0.5, 0.00,
237, 95, 73, 63, 464.6, 3.9, 0.4, 0.00,
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338,60,41,16,360.8,1.8,0.3,0.00,

339, 50, 27, -6, 359.6, 8.7, 0.4, 0.00,
340, 55, 22, -3, 253.1, 6.9, 0.2, 0.00,
341, 49, 23, 2, 235.2, 7.4, 0.3, 0.00,
342, 41, 13, 2, 356.4, 6.2, 0.4, 0.00,
343, 51, 20, 4, 355.5, 5.3, 0.4, 0.00,
344, 59, 21, 5, 354.7, 4.3, 0.4, 0.00,
345, 55, 34, 7, 354.0, 4.0, 0.4, 0.00,
346, 60, 35, 10, 353.3, 3.6, 0.4, 0.00,
347, 63, 49, 27, 326.9, 11.5, 0.4, 0.00,
348, 59, 36, 20, 263.9, 6.6, 0.4, 0.00,
349, 51, 33, 3, 252.8, 1.8, 0.3, 0.00,
350, 56, 35, 17, 351.5, 7.8, 0.4, 0.00,
351, 58, 40, 20, 280.4, 8.9, 0.4, 0.00,
352, 63, 30, 20, 277.9, 4.5, 0.5, 0.00,
353, 65, 34, 17, 350.9, 4.9, 0.4, 0.00,
354, 62, 30, 19, 350.9, 3.8, 0.4, 0.00,
355, 63, 29, 21, 351.0, 3.3, 0.4, 0.00,
356, 67, 29, 21, 320.2, 3.5, 0.4, 0.00,
357, 73, 39, 21, 243.5, 7.5, 0.4, 0.00,
358, 64, 39, 19, 351.7, 5.9, 0.4, 0.00,
359, 66, 28, 16, 352.1, 4.1, 0.5, 0.00,
360, 69, 46, 21, 352.6, 1.5, 0.6, 0.00,
361, 67, 49, 21, 353.1, 1.0, 0.5, 0.00,
362, 67, 39, 15, 353.8, 5.4, 0.5, 0.00,
363, 70, 37, 23, 354.5, 9.7, 0.5, 0.00,
364, 64, 36, 17, 355.3, 6.1, 0.4, 0.00,
365, 70, 43, 19, 316.1, 1.5, 0.4, 0.00,

Climate Data (2006)

1, 67, 50, 15, 326.7, 18.5, 0.5, 0.00,
2, 70, 46, 15, 338.9, 8.2, 0.4, 0.00,
3, 72, 43, 18, 359.7, 7.4, 0.5, 0.00,
4, 69, 42, 8, 196.4, 6.9, 0.4, 0.00,
5, 59, 39, 13, 279.8, 9.2, 0.5, 0.00,
6, 61, 28, 12, 271.0, 2.7, 0.5, 0.00,
7, 67, 27, 11, 343.4, 4.6, 0.4, 0.00,
8, 72, 48, 7, 306.8, 9.9, 0.4, 0.00,
9, 56, 32, 0, 365.6, 12.4, 0.4, 0.00,
10, 56, 20, 5, 256.6, 1.9, 0.4, 0.00,
11, 63, 20, 1, 263.8, 5.0, 0.4, 0.00,
12, 68, 36, 5, 281.7, 11.7, 0.4, 0.00,
13, 61, 33, 10, 128.6, 6.0, 0.4, 0.00,
14, 59, 35, 13, 356.4, 5.5, 0.3, 0.00,
15, 70, 43, 18, 341.5, 14.8, 0.4, 0.00,
16, 51, 32, 15, 252.8, 16.3, 0.4, 0.00,
17, 53, 24, 7, 174.3, 6.7, 0.5, 0.00,
18, 62, 25, 3, 213.1, 5.8, 0.4, 0.00,
19, 71, 40, 3, 265.8, 13.9, 0.4, 0.00,
20, 53, 33, 10, 390.8, 8.5, 0.5, 0.00,
21, 58, 26, 14, 368.3, 6.9, 0.4, 0.00,
22, 59, 28, 15, 274.6, 6.3, 0.4, 0.00,
23, 57, 29, 18, 332.9, 7.6, 0.4, 0.00,
24, 63, 35, 15, 246.7, 8.5, 0.3, 0.00,
25, 63, 45, 33, 269.0, 11.0, 0.3, 0.02,
26, 65, 42, 34, 391.6, 5.5, 0.3, 0.00,
27, 65, 35, 25, 409.5, 8.7, 0.4, 0.00,
28, 57, 42, 11, 412.4, 13.7, 0.4, 0.00,
29, 64, 41, 14, 415.3, 17.7, 0.4, 0.00,
30, 66, 39, 20, 266.4, 6.1, 0.5, 0.00,
31, 72, 35, 19, 209.3, 10.7, 0.5, 0.00,
32, 65, 36, 24, 318.8, 12.7, 0.4, 0.00,
33, 72, 52, 21, 363.9, 15.5, 0.5, 0.00,
34, 66, 44, 15, 342.4, 10.1, 0.4, 0.00,
35, 66, 39, 8, 273.8, 7.6, 0.4, 0.00,
36, 75, 35, 7, 336.6, 14.7, 0.4, 0.00,
37, 57, 33, 4, 427.9, 6.9, 0.5, 0.00,
38, 60, 24, 1, 444.5, 4.2, 0.4, 0.00,
39, 69, 28, -2, 369.0, 5.7, 0.5, 0.00,
40, 68, 41, 7, 262.9, 8.1, 0.4, 0.00,
41, 55, 39, 29, 251.1, 7.8, 0.4, 0.05,
42, 50, 29, 11, 458.7, 6.6, 0.3, 0.00,
43, 57, 20, 7, 462.3, 3.7, 0.3, 0.00,
44, 65, 24, 1, 383.3, 7.6, 0.4, 0.00,
45, 71, 34, 8, 469.7, 8.8, 0.4, 0.00,
46, 75, 54, 19, 448.2, 19.9, 0.4, 0.00,
47, 73, 49, 13, 298.6, 13.3, 0.4, 0.00,
48, 54, 37, 12, 359.6, 7.6, 0.3, 0.00,
49, 53, 40, 19, 246.2, 5.9, 0.4, 0.01,
50, 66, 39, 34, 321.7, 12.4, 0.4, 0.04,
51, 69, 41, 29, 270.4, 10.7, 0.4, 0.00,
52, 68, 49, 19, 496.6, 12.7, 0.4, 0.00,
53, 66, 44, 17, 280.6, 8.0, 0.4, 0.00,

54, 58, 47, 32, 192.6, 8.0, 0.4, 0.16,
55, 65, 43, 44, 101.7, 6.0, 0.4, 0.02,
56, 68, 38, 33, 281.6, 6.0, 0.4, 0.00,
57, 68, 41, 34, 357.3, 6.7, 0.5, 0.00,
58, 76, 42, 29, 444.0, 6.6, 0.4, 0.00,
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60, 81, 50, 29, 410.7, 8.3, 0.4, 0.00,
61, 79, 53, 33, 438.7, 4.7, 0.5, 0.00,
62, 75, 52, 35, 536.5, 5.8, 0.4, 0.00,
63, 81, 55, 30, 340.6, 11.9, 0.3, 0.00,
64, 77, 45, 11, 544.7, 5.6, 0.3, 0.00,
65, 83, 45, 8, 272.8, 6.8, 0.3, 0.00,
66, 78, 57, 17, 360.5, 12.3, 0.3, 0.00,
67, 71, 46, 25, 556.9, 25.3, 0.4, 0.00,
68, 62, 42, 13, 531.3, 17.3, 0.4, 0.00,
69, 67, 51, 19, 520.2, 27.1, 0.5, 0.00,
70, 70, 45, 18, 448.7, 15.0, 0.4, 0.00,
71, 61, 44, 19, 364.7, 19.5, 0.3, 0.00,
72, 58, 37, 5, 202.4, 7.0, 0.3, 0.00,
73, 71, 35, 5, 581.0, 8.8, 0.4, 0.00,
74, 79, 45, 16, 511.3, 9.5, 0.4, 0.00,
75, 79, 45, 15, 429.0, 6.3, 0.3, 0.00,
76, 75, 53, 21, 134.9, 5.2, 0.3, 0.00,
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79, 59, 37, 20, 383.6, 20.7, 0.4, 0.00,
80, 70, 35, 18, 250.9, 7.1, 0.4, 0.00,
81, 59, 39, 17, 594.4, 10.6, 0.3, 0.00,
82, 59, 32, 23, 616.2, 9.7, 0.3, 0.00,
83, 67, 34, 18, 620.0, 4.7, 0.3, 0.00,
84, 78, 36, 17, 490.4, 5.7, 0.3, 0.00,
85, 78, 55, 9, 535.0, 14.3, 0.4, 0.00,
86, 75, 58, 23, 330.3, 8.0, 0.4, 0.00,
87, 75, 51, 36, 528.8, 7.8, 0.3, 0.00,
88, 79, 42, 28, 638.5, 14.7, 0.3, 0.00,
89, 74, 55, 29, 567.9, 13.5, 0.3, 0.00,
90, 82, 47, 22, 501.2, 5.0, 0.2, 0.00,
91, 80, 54, 23, 403.7, 15.0, 0.3, 0.00,
92, 79, 54, 21, 443.4, 8.8, 0.2, 0.00,
93, 81, 50, 16, 518.7, 8.7, 0.3, 0.00,
94, 88, 53, 28, 616.0, 6.8, 0.3, 0.00,
95, 83, 65, 30, 549.7, 14.3, 0.3, 0.01,
96, 71, 51, 11, 353.7, 21.6, 0.4, 0.00,
97, 76, 51, 12, 451.8, 11.0, 0.3, 0.00,
98, 77, 46, 24, 291.3, 7.4, 0.3, 0.00,
99, 87, 47, 17, 459.9, 6.9, 0.3, 0.00,
100, 82, 63, 23, 561.0, 16.1, 0.2, 0.00,
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103, 91, 60, 34, 656.1, 5.8, 0.3, 0.00,
104, 93, 61, 23, 436.6, 10.0, 0.3, 0.00,
105, 86, 64, 21, 453.7, 14.3, 0.3, 0.00,
106, 84, 64, 16, 578.7, 12.8, 0.4, 0.00,
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110, 83, 56, 10, 705.2, 11.0, 0.2, 0.00,

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127,88,62,11,746.7,11.5,0.3,0.00,
128,90,65,15,655.1,13.5,0.2,0.00,
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130,88,63,27,751.9,7.9,0.3,0.00,
131,85,58,33,598.6,10.8,0.2,0.00,
132,95,62,25,755.2,5.1,0.3,0.00,
133,97,69,17,756.8,10.4,0.2,0.00,
134,93,63,36,485.9,10.7,0.3,0.58,
135,84,60,48,717.8,13.0,0.3,0.16,
136,83,61,44,693.8,5.9,0.3,0.00,
137,89,63,33,644.8,4.6,0.4,0.00,
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139,98,64,34,765.2,7.7,0.4,0.00,
140,97,67,32,627.4,8.5,0.3,0.00,
141,99,68,26,721.3,7.5,0.3,0.00,
142,98,73,28,768.8,11.9,0.4,0.00,
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144,100,62,19,709.6,6.9,0.4,0.00,
145,102,67,21,771.9,7.7,0.3,0.00,
146,96,73,19,579.5,12.6,0.3,0.00,
147,92,72,28,690.3,16.3,0.3,0.00,
148,91,70,26,595.1,13.9,0.3,0.00,
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150,96,65,20,776.3,6.4,0.3,0.00,
151,95,63,41,460.9,9.0,0.3,0.15,
152,90,60,48,777.8,11.1,0.2,0.00,
153,93,67,45,760.3,6.9,0.3,0.00,
154,94,68,41,704.9,4.7,0.4,0.00,
155,99,70,34,623.3,6.0,0.3,0.00,
156,102,72,32,562.5,6.0,0.4,0.00,
157,101,68,35,631.7,9.5,0.4,0.00,
158,99,75,41,454.8,9.6,0.3,0.00,
159,97,69,43,729.1,8.0,0.3,0.00,
160,97,72,45,636.4,8.9,0.3,0.00,
161,99,67,42,508.3,7.3,0.2,0.00,
162,102,68,24,518.5,6.6,0.2,0.00,
163,105,70,22,689.5,4.6,0.2,0.00,
164,104,72,32,783.0,6.7,0.2,0.00,
165,106,75,31,733.6,8.7,0.2,0.00,
166,105,77,31,783.2,14.2,0.3,0.00,
167,95,80,25,670.1,16.0,0.2,0.00,

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169,102,70,21,637.9,6.5,0.3,0.00,
170,102,75,43,653.3,9.1,0.3,0.00,
171,103,70,36,574.5,5.9,0.3,0.00,
172,103,82,37,783.2,10.3,0.3,0.00,
173,99,74,44,783.0,9.1,0.4,0.00,
174,93,70,52,738.6,10.1,0.3,0.00,
175,97,70,45,782.6,8.5,0.3,0.00,
176,92,72,49,782.3,13.2,0.3,0.00,
177,79,62,55,752.6,10.5,0.2,0.13,
178,87,63,52,781.7,8.7,0.3,0.00,
179,85,66,54,781.3,9.8,0.4,0.00,
180,90,67,55,459.7,6.3,0.4,0.08,
181,94,67,54,780.4,4.4,0.4,0.06,
182,95,71,48,779.9,8.0,0.4,0.00,
183,95,72,47,779.4,7.0,0.4,0.00,
184,98,75,49,653.5,6.3,0.4,0.00,
185,97,77,51,717.2,7.8,0.4,0.00,
186,94,70,59,314.9,10.2,0.4,0.11,
187,89,68,62,776.8,7.7,0.4,0.30,
188,87,71,63,597.2,5.4,0.4,0.01,
189,91,70,64,377.8,7.8,0.4,0.01,
190,95,70,58,684.1,9.0,0.4,0.00,
191,97,72,54,760.5,8.5,0.5,0.00,
192,101,76,51,772.7,5.6,0.5,0.00,
193,104,79,50,771.8,11.1,0.4,0.01,
194,103,79,49,770.8,8.2,0.4,0.00,
195,102,73,45,769.8,8.2,0.4,0.00,
196,90,68,57,663.4,7.7,0.5,0.81,
197,91,67,57,767.6,5.4,0.5,0.00,
198,94,73,53,765.0,5.7,0.5,0.00,
199,100,75,50,493.9,7.9,0.4,0.00,
200,98,78,47,636.3,11.5,0.5,0.00,
201,99,77,45,705.9,8.8,0.5,0.00,
202,100,75,45,553.5,8.3,0.5,0.00,
203,95,77,50,758.7,9.5,0.5,0.00,
204,94,73,51,662.9,6.4,0.5,0.00,
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226, 89, 73, 61, 506.2, 8.9, 0.5, 0.00,
227, 85, 68, 64, 639.9, 8.7, 0.5, 0.12,
228, 83, 66, 64, 526.3, 8.1, 0.5, 0.28,
229, 87, 65, 64, 709.2, 6.9, 0.4, 0.00,
230, 90, 70, 61, 706.6, 6.0, 0.5, 0.00,
231, 83, 65, 63, 584.0, 10.7, 0.5, 1.06,
232, 87, 68, 62, 533.0, 7.0, 0.4, 0.00,
233, 87, 70, 63, 692.9, 8.7, 0.4, 0.00,
234, 88, 67, 62, 610.9, 10.7, 0.5, 0.00,
235, 92, 70, 57, 693.1, 4.0, 0.4, 0.00,
236, 93, 69, 57, 619.7, 7.0, 0.5, 0.00,
237, 90, 71, 58, 464.6, 11.1, 0.4, 0.00,
238, 89, 69, 62, 684.5, 4.4, 0.4, 0.18,
239, 93, 70, 60, 681.5, 7.0, 0.4, 0.00,
240, 89, 69, 60, 526.0, 8.0, 0.4, 0.00,
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242, 87, 68, 59, 672.4, 5.8, 0.4, 0.19,
243, 87, 66, 63, 564.2, 7.1, 0.4, 0.09,
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245, 75, 64, 62, 580.5, 8.5, 0.5, 0.18,
246, 69, 61, 62, 525.9, 7.7, 0.5, 1.33,
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253, 87, 64, 54, 586.9, 4.8, 0.4, 0.00,
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255, 84, 65, 58, 558.6, 9.3, 0.4, 0.00,
256, 83, 62, 59, 528.1, 7.9, 0.4, 0.79,
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258, 84, 66, 52, 618.0, 9.2, 0.4, 0.00,
259, 85, 60, 48, 551.1, 7.5, 0.3, 0.00,
260, 83, 57, 42, 299.3, 7.5, 0.3, 0.00,
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262, 85, 52, 44, 562.2, 3.1, 0.3, 0.00,
263, 87, 61, 47, 475.6, 12.2, 0.3, 0.00,
264, 83, 69, 44, 595.5, 15.7, 0.4, 0.00,
265, 87, 64, 46, 591.7, 16.1, 0.4, 0.00,
266, 80, 60, 45, 438.1, 9.6, 0.4, 0.04,
267, 71, 59, 45, 344.6, 11.0, 0.3, 0.01,
268, 80, 54, 47, 580.2, 5.9, 0.3, 0.00,
269, 86, 58, 52, 576.3, 5.6, 0.3, 0.00,
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271, 82, 58, 45, 544.9, 7.3, 0.3, 0.00,
272, 87, 55, 42, 564.6, 5.0, 0.3, 0.00,
273, 87, 54, 37, 475.3, 3.7, 0.3, 0.00,
274, 90, 55, 39, 258.3, 4.9, 0.3, 0.00,
275, 89, 57, 43, 389.0, 4.4, 0.3, 0.00,
276, 90, 58, 46, 313.4, 4.2, 0.3, 0.00,
277, 89, 60, 50, 452.0, 8.6, 0.3, 0.00,
278, 84, 62, 52, 428.5, 11.4, 0.4, 0.00,
279, 84, 63, 48, 537.0, 9.2, 0.3, 0.00,
280, 83, 61, 52, 455.5, 8.2, 0.3, 0.14,
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282, 68, 58, 53, 494.2, 8.1, 0.2, 0.00,
283, 75, 52, 47, 282.0, 7.3, 0.3, 0.00,
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289, 71, 50, 39, 312.0, 14.6, 0.3, 0.00,
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317, 66, 44, 28, 403.2, 8.4, 0.4, 0.00,
318, 73, 50, 31, 400.5, 14.6, 0.3, 0.00,
319, 61, 38, 14, 381.4, 8.1, 0.4, 0.00,
320, 67, 34, 16, 395.3, 5.7, 0.4, 0.00,
321, 73, 38, 19, 268.8, 4.8, 0.4, 0.00,
322, 74, 37, 23, 390.4, 4.1, 0.4, 0.00,
323, 70, 48, 28, 100.7, 10.9, 0.3, 0.00,
324, 67, 40, 36, 358.0, 5.0, 0.3, 0.00,
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326, 71, 37, 32, 381.3, 2.9, 0.4, 0.00,
327, 72, 36, 29, 379.2, 3.4, 0.5, 0.00,
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336, 58, 25, 14, 290.9, 6.0, 0.3, 0.00,
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344, 64, 34, 32, 354.7, 10.5, 0.4, 0.00,
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346, 58, 28, 17, 353.3, 4.3, 0.4, 0.00,
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357, 54, 34, 27, 243.5, 9.8, 0.4, 0.00,
358, 57, 24, 25, 351.7, 9.4, 0.4, 0.00,
359, 52, 26, 18, 352.1, 5.6, 0.5, 0.00,
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363, 50, 25, 26, 354.5, 6.1, 0.5, 0.00,
364, 46, 32, 28, 355.3, 7.8, 0.4, 0.00,
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Climate Data (2007)

1, 57, 27, 26, 326.7, 9.2, 0.5, 0.00,
2, 44, 32, 31, 338.9, 5.8, 0.4, 0.25,
3, 52, 36, 33, 359.7, 6.6, 0.5, 0.00,
4, 65, 33, 27, 196.4, 12.1, 0.4, 0.00,
5, 68, 41, 25, 279.8, 9.8, 0.5, 0.00,
6, 49, 36, 29, 271.0, 6.2, 0.5, 0.00,
7, 52, 30, 18, 343.4, 8.9, 0.4, 0.00,
8, 58, 26, 16, 306.8, 3.0, 0.4, 0.00,
9, 59, 31, 20, 365.6, 7.1, 0.4, 0.00,
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13, 67, 40, 28, 128.6, 8.7, 0.4, 0.00,
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15, 43, 27, 15, 341.5, 1.1, 0.4, 0.00,
16, 33, 28, 13, 252.8, 1.8, 0.4, 0.00,
17, 39, 28, 22, 174.3, 4.8, 0.5, 0.00,
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23, 39, 28, 28, 332.9, 4.0, 0.4, 0.17,
24, 50, 30, 27, 246.7, 6.3, 0.3, 0.00,
25, 49, 31, 27, 269.0, 7.7, 0.3, 0.00,
26, 46, 32, 33, 391.6, 1.0, 0.3, 0.28,
27, 56, 34, 31, 409.5, 6.8, 0.4, 0.00,
28, 55, 31, 32, 412.4, 2.2, 0.4, 0.00,
29, 61, 36, 32, 415.3, 5.0, 0.4, 0.00,
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31, 55, 35, 34, 209.3, 9.1, 0.5, 0.02,
32, 51, 39, 30, 318.8, 16.5, 0.4, 0.03,
33, 50, 33, 24, 363.9, 9.2, 0.5, 0.00,
34, 57, 24, 19, 342.4, 2.9, 0.4, 0.00,
35, 62, 27, 20, 273.8, 3.8, 0.4, 0.00,
36, 65, 30, 22, 336.6, 2.6, 0.4, 0.00,
37, 69, 32, 25, 427.9, 3.0, 0.5, 0.00,
38, 74, 34, 25, 444.5, 4.7, 0.4, 0.00,
39, 73, 38, 24, 369.0, 7.5, 0.5, 0.00,
40, 73, 42, 27, 262.9, 8.1, 0.4, 0.00,
41, 72, 45, 32, 251.1, 5.9, 0.4, 0.00,
42, 69, 46, 34, 458.7, 9.3, 0.3, 0.00,
43, 63, 47, 31, 462.3, 16.4, 0.3, 0.00,
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45, 50, 34, 32, 469.7, 9.3, 0.4, 0.04,
46, 55, 32, 24, 448.2, 5.9, 0.4, 0.00,
47, 62, 29, 22, 298.6, 6.8, 0.4, 0.00,
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232,103,78,56,533.0,9.8,0.4,0.00,
233,104,77,57,692.9,7.7,0.4,0.00,
234,96,74,59,610.9,1.3,0.5,0.00,
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239,93,72,57,681.5,5.6,0.4,0.00,
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343, 65, 46, 36, 355.5, 7.8, 0.4, 0.00,
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345, 52, 39, 33, 354.0, 7.9, 0.4, 0.00,
346, 54, 36, 33, 353.3, 4.4, 0.4, 0.00,
347, 53, 32, 29, 326.9, 5.6, 0.4, 0.00,
348, 56, 33, 24, 263.9, 13.8, 0.4, 0.00,
349, 46, 28, 10, 252.8, 6.8, 0.3, 0.00,
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351, 57, 28, 18, 280.4, 5.9, 0.4, 0.00,
352, 63, 29, 21, 277.9, 5.3, 0.5, 0.00,
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355, 66, 37, 22, 351.0, 16.9, 0.4, 0.00,
356, 45, 31, 12, 320.2, 11.2, 0.4, 0.00,
357, 50, 21, 13, 243.5, 4.7, 0.4, 0.00,
358, 52, 26, 14, 351.7, 4.7, 0.4, 0.00,
359, 62, 30, 15, 352.1, 13.8, 0.5, 0.00,
360, 46, 23, 10, 352.6, 5.8, 0.6, 0.00,
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362, 42, 22, 3, 353.8, 6.2, 0.5, 0.00,
363, 50, 23, 11, 354.5, 3.9, 0.5, 0.00,
364, 56, 27, 19, 355.3, 11.6, 0.4, 0.00,
365, 64, 37, 19, 316.1, 9.8, 0.4, 0.00,

Climate Data (2008)

1, 48, 27, 3, 326.7, 9.6, 0.5, 0.00,
2, 49, 31, 5, 338.9, 9.6, 0.4, 0.00,
3, 51, 28, 13, 359.7, 4.5, 0.5, 0.00,
4, 62, 32, 25, 196.4, 5.7, 0.4, 0.00,
5, 68, 41, 33, 279.8, 9.7, 0.5, 0.00,
6, 69, 51, 32, 271.0, 19.0, 0.5, 0.00,
7, 66, 46, 31, 343.4, 16.9, 0.4, 0.00,
8, 57, 38, 24, 306.8, 8.2, 0.4, 0.00,
9, 63, 29, 23, 365.6, 7.8, 0.4, 0.00,
10, 57, 37, 17, 256.6, 7.2, 0.4, 0.00,
11, 60, 30, 18, 263.8, 6.0, 0.4, 0.00,
12, 55, 32, 11, 281.7, 7.8, 0.4, 0.00,
13, 55, 31, 10, 128.6, 11.5, 0.4, 0.00,
14, 55, 35, 13, 356.4, 11.4, 0.3, 0.00,
15, 54, 31, 15, 341.5, 8.7, 0.4, 0.00,
16, 57, 35, 12, 252.8, 8.6, 0.4, 0.00,
17, 42, 26, 10, 174.3, 6.9, 0.5, 0.00,
18, 48, 20, 3, 213.1, 6.5, 0.4, 0.00,
19, 46, 25, 3, 265.8, 6.5, 0.4, 0.00,
20, 56, 18, 6, 390.8, 4.5, 0.5, 0.00,
21, 60, 30, 12, 368.3, 8.0, 0.4, 0.00,
22, 55, 32, 12, 274.6, 1.0, 0.4, 0.00,
23, 60, 34, 15, 332.9, 4.5, 0.4, 0.00,
24, 48, 41, 32, 246.7, 5.2, 0.3, 0.05,
25, 59, 38, 36, 269.0, 4.4, 0.3, 0.00,
26, 59, 35, 29, 391.6, 5.2, 0.3, 0.00,
27, 64, 42, 29, 409.5, 4.6, 0.4, 0.00,
28, 62, 51, 39, 412.4, 19.1, 0.4, 0.09,
29, 57, 43, 26, 415.3, 14.1, 0.4, 0.00,
30, 63, 39, 20, 266.4, 19.5, 0.5, 0.00,
31, 46, 25, -2, 209.3, 9.5, 0.5, 0.00,
32, 59, 21, 1, 318.8, 5.4, 0.4, 0.00,
33, 65, 31, 16, 363.9, 11.8, 0.5, 0.00,
34, 70, 40, 18, 342.4, 17.4, 0.4, 0.00,
35, 71, 40, 22, 273.8, 18.3, 0.4, 0.00,
36, 49, 35, 17, 336.6, 16.9, 0.4, 0.00,
37, 54, 22, 9, 427.9, 7.5, 0.5, 0.00,
38, 61, 34, 16, 444.5, 9.5, 0.4, 0.00,
39, 71, 46, 16, 369.0, 11.3, 0.5, 0.00,
40, 67, 39, 10, 262.9, 6.0, 0.4, 0.00,
41, 72, 35, 12, 251.1, 6.3, 0.4, 0.00,
42, 73, 33, 12, 458.7, 9.8, 0.3, 0.00,
43, 65, 38, 17, 462.3, 4.9, 0.3, 0.00,
44, 72, 33, 16, 383.3, 7.4, 0.4, 0.00,
45, 74, 46, 12, 469.7, 12.7, 0.4, 0.00,
46, 62, 38, 21, 448.2, 9.0, 0.4, 0.00,
47, 54, 37, 30, 298.6, 16.7, 0.4, 0.00,
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49, 62, 31, 20, 246.2, 4.6, 0.4, 0.00,
50, 71, 35, 20, 321.7, 5.6, 0.4, 0.00,
51, 70, 47, 22, 270.4, 15.3, 0.4, 0.00,
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53, 65, 45, 25, 280.6, 1.6, 0.4, 0.00,

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58,67,32,16,444.0,3.6,0.4,0.00,
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60,78,48,17,410.7,7.6,0.4,0.00,
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62,72,40,20,536.5,18.5,0.4,0.00,
63,52,36,11,340.6,9.7,0.3,0.00,
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92,78,46,19,443.4,7.2,0.2,0.00,
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160,98,75,29,636.4,11.9,0.3,0.00,
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165,99,70,17,733.6,8.2,0.2,0.00,
166,103,65,26,783.2,5.3,0.3,0.00,
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171,104,79,20,574.5,13.0,0.3,0.00,
172,95,73,48,783.2,12.6,0.3,0.00,
173,95,73,48,783.0,12.7,0.4,0.00,
174,96,67,45,738.6,5.9,0.3,0.00,
175,100,75,42,782.6,9.1,0.3,0.00,
176,101,76,42,782.3,9.6,0.3,0.01,
177,99,75,42,752.6,1.1,0.2,0.00,
178,99,78,43,781.7,11.7,0.3,0.00,
179,96,77,45,781.3,9.3,0.4,0.00,
180,100,73,43,459.7,1.0,0.4,0.00,
181,81,67,54,780.4,1.9,0.4,0.02,
182,83,66,57,779.9,9.6,0.4,0.45,
183,90,65,57,779.4,4.4,0.4,0.00,
184,94,72,57,653.5,6.8,0.4,0.00,
185,94,70,54,717.2,1.6,0.4,0.00,
186,93,71,55,314.9,8.5,0.4,0.00,
187,95,72,53,776.8,6.3,0.4,0.00,
188,97,75,54,597.2,1.0,0.4,0.00,
189,95,68,59,377.8,9.5,0.4,0.48,
190,84,68,63,684.1,1.5,0.4,0.01,
191,78,67,66,760.5,7.2,0.5,0.98,
192,82,67,65,772.7,11.8,0.5,0.17,
193,88,68,61,771.8,7.6,0.4,0.00,
194,92,71,60,770.8,9.9,0.4,0.00,
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196,89,66,60,663.4,7.8,0.5,0.37,
197,92,70,59,767.6,1.3,0.5,0.00,
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199,93,71,62,493.9,6.4,0.4,0.04,
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201,86,70,62,705.9,5.1,0.5,0.25,
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204,95,72,58,662.9,6.4,0.5,0.00,
205,95,72,58,688.2,6.4,0.5,0.00,
206,94,72,55,755.7,5.9,0.5,0.02,
207,90,71,60,607.0,9.5,0.5,0.01,
208,76,68,67,276.5,13.8,0.6,1.77,
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212,97,74,54,745.9,7.5,0.5,0.00,
213,96,71,55,744.1,4.8,0.6,0.00,
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226, 93, 68, 59, 506.2, 4.6, 0.5, 0.00,
227, 94, 69, 60, 639.9, 8.6, 0.5, 0.29,
228, 89, 67, 61, 526.3, 8.2, 0.5, 0.07,
229, 81, 66, 62, 709.2, 7.1, 0.4, 0.29,
230, 86, 64, 61, 706.6, 5.9, 0.5, 0.02,
231, 91, 66, 57, 584.0, 6.4, 0.5, 0.00,
232, 89, 70, 58, 533.0, 6.0, 0.4, 0.00,
233, 91, 69, 55, 692.9, 7.4, 0.4, 0.00,
234, 90, 67, 57, 610.9, 8.0, 0.5, 0.00,
235, 92, 68, 56, 693.1, 8.0, 0.4, 0.00,
236, 90, 70, 56, 619.7, 7.5, 0.5, 0.00,
237, 85, 69, 58, 464.6, 8.6, 0.4, 0.00,
238, 88, 69, 54, 684.5, 8.0, 0.4, 0.00,
239, 89, 67, 58, 681.5, 6.7, 0.4, 0.32,
240, 80, 66, 62, 526.0, 5.8, 0.4, 0.00,
241, 89, 65, 62, 675.5, 3.6, 0.4, 0.26,
242, 83, 67, 59, 672.4, 12.9, 0.4, 0.00,
243, 79, 66, 62, 564.2, 8.7, 0.4, 0.38,
244, 79, 64, 63, 436.5, 9.1, 0.4, 0.21,
245, 87, 63, 60, 580.5, 5.8, 0.5, 0.00,
246, 91, 65, 60, 525.9, 7.9, 0.5, 0.04,
247, 81, 65, 59, 607.6, 5.0, 0.4, 0.02,
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249, 91, 65, 52, 642.5, 4.5, 0.4, 0.00,
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251, 88, 61, 59, 244.9, 11.3, 0.4, 1.22,
252, 83, 63, 60, 516.4, 4.9, 0.4, 0.03,
253, 79, 65, 59, 586.9, 8.9, 0.4, 0.00,
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255, 72, 66, 62, 558.6, 6.3, 0.4, 0.21,
256, 82, 64, 59, 528.1, 5.7, 0.4, 0.00,
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258, 73, 59, 51, 618.0, 1.4, 0.4, 0.00,
259, 71, 57, 50, 551.1, 8.8, 0.3, 0.00,
260, 77, 53, 47, 299.3, 8.1, 0.3, 0.00,
261, 79, 57, 46, 546.7, 7.1, 0.3, 0.00,
262, 80, 56, 48, 562.2, 3.7, 0.3, 0.00,
263, 85, 58, 49, 475.6, 4.6, 0.3, 0.00,
264, 87, 59, 49, 595.5, 4.4, 0.4, 0.00,
265, 86, 62, 49, 591.7, 4.2, 0.4, 0.00,
266, 86, 61, 47, 438.1, 5.3, 0.4, 0.00,
267, 88, 62, 47, 344.6, 5.4, 0.3, 0.00,
268, 87, 59, 47, 580.2, 9.4, 0.3, 0.00,
269, 83, 60, 49, 576.3, 9.2, 0.3, 0.00,
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274, 82, 55, 37, 258.3, 6.9, 0.3, 0.00,
275, 84, 53, 34, 389.0, 5.1, 0.3, 0.00,
276, 84, 50, 31, 313.4, 4.1, 0.3, 0.00,
277, 87, 53, 35, 452.0, 4.7, 0.3, 0.00,
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324,71,35,20,358.0,3.0,0.3,0.00,
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326,55,31,21,381.3,2.9,0.4,0.00,
327,64,35,23,379.2,4.6,0.5,0.00,
328,72,36,22,302.6,3.9,0.3,0.00,
329,64,42,17,156.0,8.7,0.4,0.00,
330,64,36,18,217.4,4.6,0.3,0.00,
331,69,41,25,137.2,2.7,0.3,0.00,
332,64,45,45,344.8,4.8,0.3,0.17,
333,60,44,37,73.6,1.0,0.3,0.00,
334,61,37,33,200.7,6.9,0.3,0.00,
335,67,36,29,298.6,8.9,0.3,0.00,
336,67,35,28,290.9,4.1,0.3,0.00,
337,72,35,25,203.2,8.7,0.3,0.00,
338,67,42,24,360.8,1.4,0.3,0.00,

339, 62, 36, 23, 359.6, 2.6, 0.4, 0.00,
340, 55, 32, 15, 253.1, 4.2, 0.2, 0.00,
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342, 66, 28, 17, 356.4, 6.8, 0.4, 0.00,
343, 65, 45, 27, 355.5, 11.4, 0.4, 0.02,
344, 54, 32, 32, 354.7, 9.3, 0.4, 0.24,
345, 48, 27, 26, 354.0, 3.8, 0.4, 0.00,
346, 58, 28, 28, 353.3, 1.4, 0.4, 0.00,
347, 62, 30, 29, 326.9, 2.9, 0.4, 0.00,
348, 68, 43, 28, 263.9, 17.1, 0.4, 0.00,
349, 67, 44, 32, 252.8, 2.7, 0.3, 0.00,
350, 64, 38, 28, 351.5, 5.4, 0.4, 0.00,
351, 66, 32, 21, 280.4, 1.7, 0.4, 0.00,
352, 62, 50, 33, 277.9, 6.4, 0.5, 0.00,
353, 70, 43, 35, 350.9, 11.7, 0.4, 0.00,
354, 57, 33, 29, 350.9, 6.6, 0.4, 0.00,
355, 65, 35, 16, 351.0, 7.9, 0.4, 0.00,
356, 60, 28, 6, 320.2, 4.9, 0.4, 0.00,
357, 56, 25, 14, 243.5, 4.6, 0.4, 0.00,
358, 64, 39, 24, 351.7, 2.2, 0.4, 0.00,
359, 61, 40, 33, 352.1, 4.3, 0.5, 0.00,
360, 66, 37, 33, 352.6, 1.1, 0.6, 0.00,
361, 66, 35, 31, 353.1, 18.3, 0.5, 0.00,
362, 45, 28, 7, 353.8, 9.5, 0.5, 0.01,
363, 51, 22, 7, 354.5, 2.9, 0.5, 0.00,
364, 60, 24, 12, 355.3, 2.0, 0.4, 0.00,
365, 64, 27, 17, 316.1, 4.5, 0.4, 0.00,
366, 59, 29, 18, 300.0, 4.6, 0.4, 0.00,

Climate Data (2009)

1, 68, 27, 17, 326.7, 5.1, 0.5, 0.00,
2, 65, 28, 22, 338.9, 5.3, 0.4, 0.00,
3, 66, 43, 29, 359.7, 9.3, 0.5, 0.00,
4, 57, 33, 20, 196.4, 6.4, 0.4, 0.00,
5, 53, 31, 20, 279.8, 8.9, 0.5, 0.00,
6, 53, 39, 26, 271.0, 15.4, 0.5, 0.01,
7, 60, 30, 23, 343.4, 5.1, 0.4, 0.00,
8, 66, 31, 22, 306.8, 3.5, 0.4, 0.00,
9, 70, 42, 18, 365.6, 9.5, 0.4, 0.00,
10, 51, 30, 24, 256.6, 5.5, 0.4, 0.00,
11, 56, 20, 13, 263.8, 2.6, 0.4, 0.00,
12, 63, 23, 14, 281.7, 4.7, 0.4, 0.00,
13, 56, 30, 14, 128.6, 4.1, 0.4, 0.00,
14, 59, 23, 16, 356.4, 2.4, 0.3, 0.00,
15, 64, 24, 14, 341.5, 2.2, 0.4, 0.00,
16, 62, 27, 21, 252.8, 3.8, 0.4, 0.00,
17, 66, 31, 16, 174.3, 5.9, 0.5, 0.00,
18, 66, 37, 12, 213.1, 5.5, 0.4, 0.00,
19, 67, 38, 11, 265.8, 5.5, 0.4, 0.00,
20, 68, 37, 12, 390.8, 5.8, 0.5, 0.00,
21, 70, 35, 13, 368.3, 4.0, 0.4, 0.00,
22, 65, 42, 27, 274.6, 4.2, 0.4, 0.00,
23, 70, 51, 46, 332.9, 7.0, 0.4, 0.00,
24, 69, 44, 39, 246.7, 6.2, 0.3, 0.00,
25, 72, 48, 33, 269.0, 7.7, 0.3, 0.00,
26, 74, 42, 22, 391.6, 12.5, 0.3, 0.00,
27, 59, 39, 17, 409.5, 11.7, 0.4, 0.00,
28, 57, 26, 5, 412.4, 3.0, 0.4, 0.00,
29, 59, 29, 6, 415.3, 8.8, 0.4, 0.00,
30, 59, 22, 4, 266.4, 3.6, 0.5, 0.00,
31, 63, 28, 6, 209.3, 4.8, 0.5, 0.00,
32, 67, 32, 10, 318.8, 5.4, 0.4, 0.00,
33, 61, 29, 12, 363.9, 3.3, 0.5, 0.00,
34, 67, 26, 9, 342.4, 1.5, 0.4, 0.00,
35, 69, 34, 6, 273.8, 4.6, 0.4, 0.00,
36, 72, 37, 8, 336.6, 4.5, 0.4, 0.00,
37, 77, 42, 12, 427.9, 6, 0.5, 0.00,
38, 79, 45, 10, 444.5, 4.6, 0.4, 0.00,
39, 66, 44, 23, 369.0, 11, 0.5, 0.00,
40, 61, 38, 22, 262.9, 9.2, 0.4, 0.00,
41, 51, 34, 18, 251.1, 17.5, 0.4, 0.00,
42, 55, 27, 16, 458.7, 8, 0.3, 0.00,
43, 68, 34, 10, 462.3, 8.2, 0.3, 0.00,
44, 66, 36, 10, 383.3, 6.7, 0.4, 0.00,
45, 67, 39, 6, 469.7, 9.2, 0.4, 0.00,
46, 62, 36, 10, 448.2, 5, 0.4, 0.00,
47, 65, 43, 21, 298.6, 5.2, 0.4, 0.00,
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49, 63, 36, 18, 246.2, 6.8, 0.4, 0.00,
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51, 67, 31, -2, 270.4, 5, 0.4, 0.00,
52, 61, 33, 8, 496.6, 6.4, 0.4, 0.00,
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54, 78, 39, 13, 192.6, 3.8, 0.4, 0.00,
55, 83, 43, 22, 101.7, 6.6, 0.4, 0.00,
56, 83, 55, 24, 281.6, 4.9, 0.4, 0.00,
57, 83, 55, 16, 357.3, 11.2, 0.5, 0.00,
58, 78, 57, 4, 444.0, 9.5, 0.4, 0.00,
59, 67, 41, 11, 341.4, 9.4, 0.4, 0.00,
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61, 78, 37, 9, 438.7, 5, 0.5, 0.00,
62, 85, 38, 10, 536.5, 2.8, 0.4, 0.00,
63, 84, 44, 16, 340.6, 10.9, 0.3, 0.00,
64, 81, 61, 23, 544.7, 13, 0.3, 0.00,
65, 79, 54, 25, 272.8, 9.6, 0.3, 0.00,
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68, 62, 51, 45, 531.3, 8.2, 0.4, 0.01,
69, 69, 48, 32, 520.2, 6.8, 0.5, 0.00,
70, 59, 38, 29, 448.7, 6.4, 0.4, 0.05,
71, 66, 33, 30, 364.7, 4.5, 0.3, 0.00,
72, 64, 40, 34, 202.4, 7.3, 0.3, 0.00,
73, 63, 35, 30, 581.0, 4.9, 0.4, 0.00,
74, 69, 42, 23, 511.3, 7.2, 0.4, 0.00,
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78, 81, 48, 27, 600.8, 7.2, 0.4, 0.00,
79, 83, 57, 37, 383.6, 6.6, 0.4, 0.00,
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81, 83, 59, 22, 594.4, 12.6, 0.3, 0.00,
82, 79, 57, 12, 616.2, 16.5, 0.3, 0.00,
83, 68, 47, 7, 620.0, 5.5, 0.3, 0.00,
84, 74, 53, 4, 490.4, 11.7, 0.3, 0.00,
85, 76, 47, 6, 535.0, 17.1, 0.4, 0.00,
86, 57, 40, 15, 330.3, 10.7, 0.4, 0.00,
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88, 79, 40, 7, 638.5, 13.7, 0.3, 0.00,
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91, 72, 48, 12, 403.7, 16.6, 0.3, 0.00,
92, 74, 41, 13, 443.4, 5.8, 0.2, 0.00,
93, 81, 57, 27, 518.7, 17.7, 0.3, 0.00,
94, 74, 57, 24, 616.0, 23.8, 0.3, 0.00,
95, 66, 46, 7, 549.7, 6.0, 0.3, 0.00,
96, 65, 43, 11, 353.7, 7.2, 0.4, 0.00,
97, 79, 37, 15, 451.8, 5.1, 0.3, 0.00,
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122,89,73,24,509.6,16.3,0.4,0.00,
123,89,66,30,544.6,9.2,0.3,0.00,
124,92,67,26,657.9,11.7,0.3,0.00,
125,92,69,25,513.0,11.8,0.4,0.00,
126,94,68,21,743.4,7.4,0.4,0.00,
127,99,68,22,746.7,10.5,0.3,0.00,
128,99,67,19,655.1,9.5,0.2,0.00,
129,93,68,37,750.2,6.3,0.2,0.00,
130,98,67,29,751.9,5.0,0.3,0.00,
131,96,64,35,598.6,5.7,0.2,0.00,
132,96,68,27,755.2,12.8,0.3,0.00,
133,95,74,17,756.8,12.0,0.2,0.00,
134,92,66,23,485.9,6.2,0.3,0.00,
135,97,67,28,717.8,7.7,0.3,0.00,
136,84,62,44,693.8,12.4,0.3,0.00,
137,86,60,48,644.8,6.8,0.4,0.00,
138,90,63,37,589.8,5.7,0.3,0.00,
139,90,65,36,765.2,7.7,0.4,0.00,
140,87,63,41,627.4,6.0,0.3,0.00,
141,80,62,53,721.3,6.6,0.3,0.09,
142,76,56,54,768.8,6.1,0.4,0.59,
143,82,56,49,769.9,2.8,0.3,0.00,
144,88,63,45,709.6,5.3,0.4,0.04,
145,88,60,42,771.9,6.3,0.3,0.00,
146,88,59,34,579.5,7.7,0.3,0.00,
147,89,64,39,690.3,7.0,0.3,0.00,
148,90,65,45,595.1,6.4,0.3,0.05,
149,88,60,46,680.9,6.2,0.3,0.00,
150,87,67,44,776.3,6.2,0.3,0.00,
151,93,62,36,460.9,8.2,0.3,0.00,
152,92,62,26,777.8,6.2,0.2,0.00,
153,94,61,22,760.3,5.2,0.3,0.00,
154,92,66,42,704.9,6.4,0.4,0.00,
155,98,70,42,623.3,4.5,0.3,0.00,
156,96,74,37,562.5,9.2,0.4,0.00,
157,97,66,30,631.7,13.6,0.4,0.00,
158,94,76,23,454.8,14.9,0.3,0.00,
159,93,69,22,729.1,10.3,0.3,0.00,
160,88,74,38,636.4,8.0,0.3,0.00,
161,93,66,35,508.3,12.5,0.2,0.00,
162,94,71,30,518.5,14.0,0.2,0.00,
163,95,71,33,689.5,10.6,0.2,0.00,
164,98,68,35,783.0,8.0,0.2,0.00,
165,100,73,43,733.6,7.3,0.2,0.00,
166,99,70,32,783.2,10.5,0.3,0.00,
167,97,67,27,670.1,4.4,0.2,0.00,

168,96,74,34,725.4,6.4,0.2,0.00,
169,88,71,51,637.9,7.1,0.3,0.00,
170,85,67,54,653.3,5.6,0.3,0.00,
171,92,68,45,574.5,8.8,0.3,0.00,
172,98,67,42,783.2,4.7,0.3,0.00,
173,98,73,57,783.0,7.3,0.4,0.05,
174,87,71,63,738.6,5.3,0.3,0.09,
175,94,70,60,782.6,4.9,0.3,0.00,
176,97,72,50,782.3,7.0,0.3,0.00,
177,98,72,53,752.6,5.5,0.2,0.00,
178,99,74,55,781.7,7.9,0.3,0.02,
179,92,68,63,781.3,9.8,0.4,1.85,
180,90,68,62,459.7,4.7,0.4,0.07,
181,90,67,61,780.4,6.5,0.4,0.16,
182,92,69,57,779.9,7.1,0.4,0.00,
183,93,75,60,779.4,6.5,0.4,0.00,
184,94,75,62,653.5,7.7,0.4,0.00,
185,91,70,62,717.2,4.4,0.4,0.08,
186,92,73,60,314.9,5.8,0.4,0.00,
187,95,74,57,776.8,5.8,0.4,0.00,
188,100,78,54,597.2,9.1,0.4,0.00,
189,102,77,53,377.8,6.5,0.4,0.00,
190,103,81,53,684.1,7.2,0.4,0.00,
191,102,77,43,760.5,6.6,0.5,0.00,
192,100,76,44,772.7,6.8,0.5,0.00,
193,99,75,48,771.8,4.2,0.4,0.00,
194,102,76,49,770.8,3.5,0.4,0.00,
195,105,79,46,769.8,6.8,0.4,0.00,
196,105,80,48,663.4,6.8,0.5,0.00,
197,100,80,54,767.6,8.6,0.5,0.02,
198,96,72,53,765.0,5.5,0.5,0.00,
199,99,74,50,493.9,7.1,0.4,0.00,
200,100,75,49,636.3,6.9,0.5,0.00,
201,102,74,46,705.9,7.7,0.5,0.00,
202,98,72,51,553.5,6.0,0.5,0.12,
203,92,68,62,758.7,7.5,0.5,0.23,
204,92,72,61,662.9,5.5,0.5,0.00,
205,97,73,57,688.2,4.6,0.5,0.00,
206,101,75,52,755.7,3.7,0.5,0.00,
207,103,76,51,607.0,5.3,0.5,0.01,
208,100,78,55,276.5,4.6,0.6,0.00,
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210,102,74,54,749.3,9.4,0.5,0.00,
211,98,77,52,495.7,8.3,0.4,0.00,
212,95,70,56,745.9,6.2,0.5,0.00,
213,97,75,57,744.1,7.5,0.6,0.01,
214,96,70,56,720.5,6.4,0.6,0.00,
215,97,71,58,621.6,5.1,0.5,0.00,
216,102,74,56,551.6,5.6,0.5,0.00,
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218,99,73,56,513.5,5.9,0.4,0.00,
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221,98,76,50,509.3,7.8,0.5,0.00,
222,98,73,54,481.4,5.2,0.5,0.21,
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224,94,73,58,518.5,5.6,0.5,0.00,

225,95,72,58,500.4,6.6,0.5,0.03,
226,92,66,59,506.2,7.2,0.5,0.32,
227,97,74,51,639.9,6.3,0.5,0.00,
228,99,75,46,526.3,4.9,0.5,0.00,
229,102,76,47,709.2,5.0,0.4,0.00,
230,101,75,50,706.6,7.5,0.5,0.00,
231,99,76,47,584.0,7.1,0.5,0.00,
232,101,76,48,533.0,6.6,0.4,0.00,
233,95,74,57,692.9,7.8,0.4,0.00,
234,93,72,57,610.9,4.8,0.5,0.00,
235,96,70,55,693.1,4.4,0.4,0.00,
236,87,71,58,619.7,6.7,0.5,0.02,
237,86,72,56,464.6,7.9,0.4,0.00,
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239,95,69,51,681.5,6.2,0.4,0.00,
240,95,69,45,526.0,6.4,0.4,0.00,
241,94,66,46,675.5,5.1,0.4,0.00,
242,93,72,43,672.4,4.9,0.4,0.00,
243,91,69,44,564.2,6.9,0.4,0.00,
244,93,69,45,436.5,5.1,0.4,0.00,
245,93,68,50,580.5,3.5,0.5,0.00,
246,93,74,50,525.9,5.1,0.5,0.00,
247,90,71,52,607.6,6.5,0.4,0.00,
248,89,66,50,612.4,6.0,0.5,0.00,
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250,91,68,56,617.0,5.0,0.4,0.00,
251,90,64,55,244.9,5.6,0.4,0.26,
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253,88,64,58,586.9,8.5,0.4,0.29,
254,84,64,59,535.2,4.7,0.4,0.00,
255,87,65,53,558.6,5.6,0.4,0.00,
256,84,63,53,528.1,3.4,0.4,0.00,
257,90,65,50,214.4,4.0,0.5,0.00,
258,93,70,47,618.0,5.9,0.4,0.00,
259,88,65,53,551.1,7.3,0.3,0.26,
260,77,62,59,299.3,11.4,0.3,0.80,
261,79,61,57,546.7,6.2,0.3,0.47,
262,83,61,56,562.2,4.8,0.3,0.38,
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265,73,55,36,591.7,9.2,0.4,0.00,
266,73,55,35,438.1,7.4,0.4,0.00,
267,77,58,47,344.6,5.2,0.3,0.00,
268,85,61,49,580.2,2.8,0.3,0.00,
269,89,61,43,576.3,2.5,0.3,0.00,
270,92,59,37,572.4,4.0,0.3,0.00,
271,86,59,39,544.9,6.6,0.3,0.00,
272,91,61,51,564.6,4.1,0.3,0.00,
273,94,68,48,475.3,11.2,0.3,0.00,
274,87,64,33,258.3,8.6,0.3,0.00,
275,85,57,28,389.0,5.2,0.3,0.00,
276,75,59,45,313.4,8.8,0.3,0.02,
277,80,55,61,452.0,5.8,0.3,0.07,
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282, 77, 54, 25, 494.2, 7.1, 0.2, 0.00,
283, 81, 49, 31, 282.0, 3.2, 0.3, 0.00,
284, 82, 57, 42, 222.5, 9.4, 0.2, 0.00,
285, 79, 56, 50, 367.1, 9.0, 0.2, 0.00,
286, 83, 60, 57, 448.9, 7.3, 0.3, 0.00,
287, 86, 63, 48, 388.6, 8.1, 0.2, 0.00,
288, 86, 59, 38, 417.5, 3.7, 0.3, 0.00,
289, 87, 58, 39, 312.0, 7.3, 0.3, 0.00,
290, 79, 56, 40, 340.2, 8.2, 0.2, 0.00,
291, 82, 56, 45, 316.1, 3.3, 0.3, 0.00,
292, 86, 60, 48, 335.5, 7.6, 0.3, 0.00,
293, 84, 57, 50, 482.6, 9.7, 0.4, 0.04,
294, 71, 53, 38, 478.9, 6.7, 0.4, 0.00,
295, 73, 47, 40, 475.2, 4.5, 0.4, 0.00,
296, 74, 50, 34, 405.5, 5.0, 0.3, 0.00,
297, 79, 47, 25, 285.6, 9.0, 0.3, 0.00,
298, 78, 56, 28, 425.2, 8.8, 0.3, 0.00,
299, 61, 44, 34, 165.4, 6.1, 0.3, 0.00,
300, 78, 39, 30, 259.7, 11.2, 0.3, 0.00,
301, 65, 36, 32, 357.3, 9.9, 0.3, 0.07,
302, 53, 35, 21, 214.5, 11.1, 0.3, 0.01,
303, 59, 38, 14, 380.1, 8.5, 0.2, 0.00,
304, 65, 33, 23, 284.4, 2.0, 0.2, 0.00,
305, 73, 40, 27, 389.5, 2.9, 0.3, 0.00,
306, 78, 38, 29, 377.1, 2.2, 0.2, 0.00,
307, 77, 45, 28, 346.2, 3.1, 0.3, 0.00,
308, 79, 45, 29, 241.9, 4.0, 0.2, 0.00,
309, 79, 50, 31, 419.3, 3.8, 0.2, 0.00,
310, 79, 42, 28, 423.6, 2.0, 0.3, 0.00,
311, 74, 48, 28, 420.5, 4.8, 0.4, 0.00,
312, 77, 43, 33, 417.5, 2.5, 0.3, 0.00,
313, 79, 44, 30, 298.6, 2.9, 0.2, 0.00,
314, 76, 50, 43, 411.6, 4.6, 0.3, 0.00,
315, 73, 46, 42, 363.5, 3.9, 0.3, 0.00,
316, 77, 50, 38, 406.0, 5.2, 0.3, 0.00,
317, 73, 57, 39, 403.2, 10.1, 0.4, 0.00,
318, 68, 51, 40, 400.5, 8.1, 0.3, 0.00,
319, 65, 44, 24, 381.4, 11.5, 0.4, 0.00,
320, 57, 33, 11, 395.3, 6.8, 0.4, 0.00,
321, 62, 29, 11, 268.8, 4.0, 0.4, 0.00,
322, 68, 34, 16, 390.4, 6.0, 0.4, 0.00,
323, 70, 39, 22, 100.7, 3.6, 0.3, 0.00,
324, 65, 37, 21, 358.0, 2.5, 0.3, 0.00,
325, 68, 34, 22, 269.1, 4.1, 0.4, 0.00,
326, 69, 39, 19, 381.3, 5.5, 0.4, 0.00,
327, 71, 40, 18, 379.2, 7.2, 0.5, 0.00,
328, 59, 37, 13, 302.6, 5.5, 0.3, 0.00,
329, 62, 34, 8, 156.0, 7.0, 0.4, 0.00,
330, 63, 37, 11, 217.4, 5.9, 0.3, 0.00,
331, 66, 41, 22, 137.2, 4.6, 0.3, 0.00,
332, 67, 40, 38, 344.8, 4.0, 0.3, 0.01,
333, 54, 40, 42, 73.6, 9.8, 0.3, 0.27,
334, 41, 33, 33, 200.7, 8.5, 0.3, 0.68,
335, 50, 32, 33, 298.6, 6.6, 0.3, 0.33,
336, 50, 29, 32, 290.9, 4.0, 0.3, 0.00,
337, 39, 28, 29, 203.2, 7.6, 0.3, 0.07,
338, 38, 23, 22, 360.8, 5.1, 0.3, 0.00,

339, 46, 21, 26, 359.6, 3.4, 0.4, 0.00,
340, 59, 36, 26, 253.1, 8.7, 0.2, 0.00,
341, 62, 32, 27, 235.2, 5.8, 0.3, 0.00,
342, 61, 39, 33, 356.4, 16.5, 0.4, 0.00,
343, 59, 35, 28, 355.5, 5.9, 0.4, 0.00,
344, 59, 34, 28, 354.7, 4.6, 0.4, 0.00,
345, 62, 33, 31, 354.0, 4.7, 0.4, 0.00,
346, 62, 35, 31, 353.3, 6.2, 0.4, 0.00,
347, 64, 36, 29, 326.9, 6.8, 0.4, 0.00,
348, 64, 39, 30, 263.9, 5.6, 0.4, 0.00,
349, 58, 39, 28, 252.8, 10.5, 0.3, 0.00,
350, 60, 36, 29, 351.5, 4.9, 0.4, 0.00,
351, 63, 32, 31, 280.4, 2.9, 0.4, 0.00,
352, 62, 33, 24, 277.9, 4.9, 0.5, 0.00,
353, 58, 39, 26, 350.9, 4.9, 0.4, 0.00,
354, 60, 30, 26, 350.9, 3.2, 0.4, 0.00,
355, 63, 35, 29, 351.0, 4.5, 0.4, 0.00,
356, 62, 48, 28, 320.2, 10.2, 0.4, 0.00,
357, 51, 38, 31, 243.5, 11.3, 0.4, 0.15,
358, 51, 30, 26, 351.7, 5.4, 0.4, 0.00,
359, 51, 24, 20, 352.1, 4.2, 0.5, 0.00,
360, 49, 27, 13, 352.6, 4.9, 0.6, 0.00,
361, 50, 24, 14, 353.1, 4.7, 0.5, 0.00,
362, 51, 30, 19, 353.8, 8.5, 0.5, 0.00,
363, 40, 33, 32, 354.5, 5.0, 0.5, 0.29,
364, 54, 32, 30, 355.3, 8.9, 0.4, 0.00,
365, 52, 33, 23, 316.1, 10.3, 0.4, 0.00,

Climate Data (2010)

1, 52, 25, 23, 326.7, 0.9, 0.5, 0.00,
2, 56, 26, 21, 338.9, 2.2, 0.4, 0.00,
3, 57, 33, 24, 359.7, 3.7, 0.5, 0.00,
4, 55, 29, 25, 196.4, 4.8, 0.4, 0.00,
5, 57, 28, 26, 279.8, 2.9, 0.5, 0.00,
6, 62, 28, 25, 271.0, 2.8, 0.5, 0.00,
7, 44, 30, 17, 343.4, 8.3, 0.4, 0.00,
8, 39, 25, 10, 306.8, 5.6, 0.4, 0.00,
9, 47, 18, 18, 365.6, 1.4, 0.4, 0.00,
10, 56, 23, 18, 256.6, 6.0, 0.4, 0.00,
11, 56, 34, 16, 263.8, 5.5, 0.4, 0.00,
12, 59, 28, 15, 281.7, 2.6, 0.4, 0.00,
13, 57, 25, 16, 128.6, 2.5, 0.4, 0.00,
14, 57, 30, 22, 356.4, 5.0, 0.3, 0.00,
15, 59, 33, 23, 341.5, 4.3, 0.4, 0.00,
16, 60, 28, 22, 252.8, 3.7, 0.4, 0.00,
17, 62, 32, 20, 174.3, 6.4, 0.5, 0.00,
18, 63, 43, 24, 213.1, 7.2, 0.4, 0.00,
19, 65, 42, 23, 265.8, 10.0, 0.4, 0.00,
20, 58, 41, 26, 390.8, 12.7, 0.5, 0.01,
21, 66, 42, 31, 368.3, 11.5, 0.4, 0.00,
22, 59, 42, 37, 274.6, 11.2, 0.4, 0.18,
23, 49, 39, 29, 332.9, 20.9, 0.4, 0.17,
24, 50, 35, 21, 246.7, 12.9, 0.3, 0.00,
25, 52, 28, 20, 269.0, 2.3, 0.3, 0.00,
26, 56, 29, 22, 391.6, 2.3, 0.3, 0.00,
27, 59, 34, 28, 409.5, 6.9, 0.4, 0.08,
28, 48, 30, 38, 412.4, 10.3, 0.4, 0.22,
29, 47, 30, 28, 415.3, 5.4, 0.4, 0.00,
30, 54, 29, 30, 266.4, 3.4, 0.5, 0.00,
31, 59, 38, 34, 209.3, 3.3, 0.5, 0.00,
32, 63, 40, 35, 318.8, 4.0, 0.4, 0.00,
33, 64, 40, 33, 363.9, 7.9, 0.5, 0.00,
34, 46, 43, 40, 342.4, 8.0, 0.4, 0.78,
35, 56, 42, 36, 273.8, 7.0, 0.4, 0.03,
36, 61, 43, 33, 336.6, 6.8, 0.4, 0.00,
37, 64, 39, 31, 427.9, 5.2, 0.5, 0.00,
38, 65, 39, 28, 444.5, 9.7, 0.4, 0.00,
39, 55, 39, 22, 369.0, 8.7, 0.5, 0.00,
40, 56, 32, 30, 262.9, 5.0, 0.4, 0.00,
41, 58, 35, 33, 251.1, 4.8, 0.4, 0.41,
42, 56, 41, 33, 458.7, 8.8, 0.3, 0.10,
43, 58, 34, 26, 462.3, 5.1, 0.3, 0.00,
44, 62, 36, 26, 383.3, 2.6, 0.4, 0.00,
45, 62, 36, 25, 469.7, 6.8, 0.4, 0.00,
46, 52, 31, 20, 448.2, 4.3, 0.4, 0.00,
47, 58, 35, 20, 298.6, 4.3, 0.4, 0.00,
48, 63, 31, 23, 359.6, 1.6, 0.3, 0.00,
49, 70, 39, 26, 246.2, 4.6, 0.4, 0.00,
50, 67, 45, 22, 321.7, 9.6, 0.4, 0.00,
51, 67, 42, 26, 270.4, 14.0, 0.4, 0.00,
52, 62, 43, 29, 496.6, 10.1, 0.4, 0.00,
53, 59, 44, 32, 280.6, 12.1, 0.4, 0.06,

54, 47, 29, 19, 192.6, 9.2, 0.4, 0.01,
55, 56, 30, 17, 101.7, 6.7, 0.4, 0.00,
56, 65, 41, 22, 281.6, 13.3, 0.4, 0.00,
57, 59, 39, 20, 357.3, 6.4, 0.5, 0.00,
58, 65, 39, 23, 444.0, 4.3, 0.4, 0.00,
59, 60, 44, 30, 341.4, 13.3, 0.4, 0.04,
60, 59, 41, 32, 410.7, 9.1, 0.4, 0.00,
61, 61, 37, 28, 438.7, 1.9, 0.5, 0.00,
62, 70, 38, 26, 536.5, 4.0, 0.4, 0.00,
63, 74, 42, 25, 340.6, 7.2, 0.3, 0.00,
64, 70, 47, 21, 544.7, 7.2, 0.3, 0.00,
65, 73, 40, 26, 272.8, 6.9, 0.3, 0.00,
66, 75, 52, 37, 360.5, 7.1, 0.3, 0.00,
67, 59, 45, 29, 556.9, 17.7, 0.4, 0.01,
68, 66, 42, 24, 531.3, 19.7, 0.4, 0.00,
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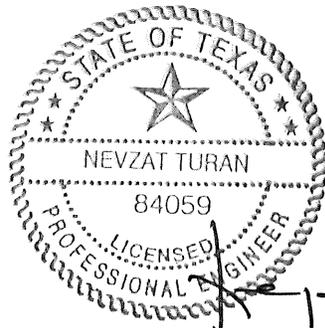
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APPENDIX C

UNSAT-H MODEL INPUT



7-24-14

Includes pages C-1 through C-12

1 INTRODUCTION

This appendix (Appendix C) includes the design input files used in the Equivalency Design Demonstration. The input files are included in both “.inp” and “.lis” file formats that are used by UNSAT-H. The files shown on pages C-3 through C-8 are the actual input files used in the UNSAT-H model with the header and page number added. Also, a summary table for the input parameters is included on pages C-9 through C-12.

UNSAT-H MODEL .INP FILE

Fort Bliss: Water Balance Final Cover Design

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1.0,1.0E-10,0.0, DELMAX, DELMIN, OUTTIM
1.8,1.0E-06,0.0,0.0,0.0, RFACT, RAINIF, DHTOL, DHMAX, DHFACT
4,3,0.0, KOPT, KEST, WTF
0,1,2,1, ITOPBC, IEVOPT, NFHOUR, LOWER
0.0,1.0E+06,0.0,0.40, HIRRI, HDRY, HTOP, RHA
1,1,0, IETOPT, ICLOUD, ISHOPT
1,5.0, IRAIN, HPR
0,0,0,0,0, IHYS, AIRTOL, HYSTOL, HYSMXH, HYFILE
0,0,0, IHEAT, ICONVH, DMAXHE
0,0,0,0, UPPERH, TSMEAN, TSAMP, QHCTOP
0,0,0,0.0, LOWERH, QHLEAK, TGRAD
1,0.66,291.0,0.24, IVAPOR, TORT, TSOIL, VAPDIF
1,30, matn,npt
1, 0.10,1, 0.25,1, 0.48,1, 0.81,
1, 1.32,1, 2.08,1, 3.22,1, 4.93,
1, 7.49,1, 11.33,1, 17.10,1, 25.75,
1, 34.75,1, 43.75,1, 52.75,1, 61.75,
1, 70.75,1, 76.20,1, 89.70,1, 95.47,
1, 99.31,1, 101.87,1, 103.58,1, 104.72,
1, 105.48,1, 105.99,1, 106.33,1, 106.55,
1, 106.70,1, 106.80,
SMCC PARAMETERS
0.39, 0.04, 0.01, 1.27,
CONDUCTIVITY
2, 0.828, 0.01, 1.27, 0.5,
0, NDAY
15000.0,15000.0,15000.0,15000.0,
15000.0,15000.0,15000.0,15000.0,
15000.0,15000.0,15000.0,15000.0,
15000.0,15000.0,15000.0,15000.0,
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15000.0,15000.0,15000.0,15000.0,
15000.0,15000.0,
0,1,1,2,66,243, LEAF,NFROOT, NUPTAK, NFPET, NSOW, NHRVST
0.90, BARE
1.2,0.13,0.02, A,B1,B2
1, 1, 1, 1, 1, 2, 3, 6, 8, 11,
14, 20, 28, 37, 48, 56,125,166,365,365,
365,365,365,365,365,365,365,365,365,365,
15000.0,3000.0,300.0, HW, HD, HN
220.0, BIOMAS
2.0E-01,1206.4,10.0,1000.0, ALBEDO,ALT,ZU,PMB
1981.txt
1982.txt
1983.txt
1984.txt
1985.txt
1986.txt
1987.txt
1988.txt

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1989.txt
1990.txt
1991.txt
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1993.txt
1994.txt
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2002.txt
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2007.txt
2008.txt
2009.txt
2010.txt

UNSAT-H MODEL .LIS FILE

! Program DATAINH !
! Version 3.01 !

Input Filename: C:\FTB\Design.inp
Date Processed: 09 May 2014
Time Processed: 12:46:15.16
Title:
Fort Bliss: Water Balance Final Cover Design

General options:

IPLANT = 1 NGRAV = 1
IFDEND = 365 IDTBEG = 1 IDTEND = 365
 IYS = 1981 NYEARS = 30 ISTEAD = 0
IFLIST = 2 NFLIST = 30
NPRINT = 0 STOPHR = 0.000E+00
ISMETH = 1 INMAX = 2 ISWDIF = 1 DMAXBA = 0.100E-03
DELMAX = 1.000E+00 DELMIN = 1.000E-10 OUTTIM = 1.000E+00
RFACT = 1.800E+00 RAINIF = 1.000E-06 DHTOL = 0.000E+00
DHMAX = 0.000E+00 DHFACT = 0.000E+00
 KOPT = 4 KEST = 3 WTF = 0.000E+00
ITOPBC = 0 IEVOPT = 1 NFHOUR = 2 LOWER = 1
 HIRRI = 0.000E+00 HDRY = 1.000E+06 HTOP = 0.000E+00 RHA = 4.000E-01
IETOPT = 1 ICLOUD = 1 ISHOPT = 0
IRAIN = 1 HPR = 5.000E+00

Hysteresis options:

 IHYS = 0 AIRTOL = 0.000E+00 HYSTOL = 0.000E+00 HYSMXH = 0.000E+00

Heat flow options:

 IHEAT = 0 ICONVH = 0 DMAXHE = 0.000E+00
UPPERH = 0 TSMEAN = 0.000E+00 TSAMP = 0.000E+00 QHCTOP = 0.000E+00
LOWERH = 0 QHLEAK = 0.000E+00 TGRAD = 0.000E+00

Vapor flow options:

IVAPOR = 1 TORT = 6.600E-01 TSOIL = 2.910E+02 VAPDIF = 2.400E-01

Grid options:

 MATN = 1 NPT = 30

Soil hydraulic properties:

 KOPT = 4: van Genuchten hydraulic functions

Material No. 1
 THETA = f(H), SMCC PARAMETERS
 THET = 0.39000 THTR = 4.00000E-02 ALPHA = 1.00000E-02
 N = 1.2700 M = 0.21260
 K = f(H), CONDUCTIVITY
 RKM0D = 2.00000E-16 SK = 0.82800 A = 1.00000E-02
 N = 1.2700 M = 0.21260 EPIT = 0.50000

Surface node bounding values:

HIRRI = 0.000E+00 THETA = 3.900E-01 K = 8.280E-01 C = -1.786E-08
HDRV = 1.000E+06 THETA = 6.911E-02 K = 7.467E-13 C = -7.860E-09

Initial Conditions:

NDAY = 0

NODE	Z	MAT	HEAD	CONDUCTIVITY	CAPACITY	THETA	TEMP
1	0.10	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
2	0.25	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
3	0.48	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
4	0.81	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
5	1.32	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
6	2.08	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
7	3.22	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
8	4.93	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
9	7.49	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
10	11.33	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
11	17.10	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
12	25.75	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
13	34.75	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
14	43.75	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
15	52.75	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
16	61.75	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
17	70.75	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
18	76.20	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
19	89.70	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
20	95.47	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
21	99.31	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
22	101.87	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
23	103.58	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
24	104.72	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
25	105.48	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
26	105.99	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
27	106.33	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
28	106.55	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
29	106.70	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0
30	106.80	1	1.5000E+04	5.6379E-08	-1.6251E-06	0.1304	291.0

Total Initial Storage (cm) = 1.391845E+01

Plant parameters:

MXROOT (deepest node that roots penetrate) = 18

ET parameters:

Lower Boundary Option:

LOWER = 1: unit gradient

PET partitioning:

Totals: PET = 239.9376
PTRANS = 3.3146
PEVAPO = 236.6231

Precipitation/irrigation parameters:

NWATER (number of days of rain/irrigation) = 61

Total Water Applied (cm) = 3.208020E+01

Program DATAINH terminated normally.

UNSAT-H MODEL INPUT SUMMARY TABLE

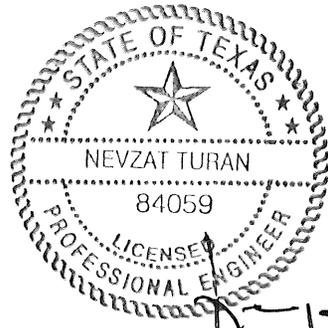
Variables	Description	Value Used in Model
IPLANT	Option for plants. "0" signifies no plants and "1" signifies plants.	1
NGRAV	Domain Orientation. "0" is for horizontal and "1" is for vertical.	1
IFDEND	Last day of the last year of the simulation	365
IDTBEG	First day for which data have been provided	1
IDTEND	Last day for which data have been provided	365
IYS	Year of the simulation	1981
NYEARS	Number of years to simulate	30
ISTEAD	Steady state option. "0" signifies transient solution and "1" signifies steady state solution.	0
IFLIST	Option for entering meteorological information. "2" signifies meteorological data in separate files with file names listed in input file.	2
NFLIST	Number of file names	30
NPRINT	Option for level of output. "0" signifies daily summaries and end-of-simulation summary.	0
STOPHR	Stopping time when IDAY = IDTEND and NPRINT = 1	0
ISMETH	Option for method of solution. "0" is for Crank-Nicholson and "1" is for Modified Picard Iteration.	1
INMAX	Number of iteration allowed for solving the water flow equation	3
ISWDIF	Option for time step control. "0" signifies check all nodes to see if the relative change in Theta of every node is less than DMAXBA	0
DMAXBA	Time Step Control parameter. If ISWDIF = 0 DMAXBA is the maximum allowable relative change in the water content of any node.	1×10^{-4}
DELMAX	Maximum allowable time step	1.0
DELMIN	Minimum allowable time step	1×10^{-10}
OUTTIM	Determines the size of the DELSUB period, which is used to divide each day into equal increments for calculations.	0
RFACT	Maximum time-step factor	1.8
RAINIF	Rainfall time-step reduction factor	1×10^{-6}
DHTOL	Iteration control parameter; if "0," this parameter is not used.	0
DHMAX	Iteration control parameter	0
DHFACT	Time step reduction factor	0
KOPT	Options for describing the soil hydraulic properties. "4" signifies van Genuchten parameters.	4
KEST	Option for estimating the liquid conductivity at the midpoint between nodes. "3" signifies geometric mean.	3
WTF	Weighting factor used to weight conductivity of the upstream node in the calculation of conductivities between nodes.	0
ITOPBC	Option for the surface-boundary condition. "0" signifies flux and "1" signifies constant head equal to HTOP.	0
IEVOPT	Option to allow evaporation. "1" signifies evaporation.	1
NFHOUR	Option to distribute the daily PET value over the 24 hours of the day. "2" signifies hourly factors are generated with a sine wave function for the hours between 0600 and 1800, while the remaining hourly factors are set to equal to 0.01.	2
LOWER	Lower boundary condition option. "1" signifies unit gradient.	1
HIRRI	Minimum head to which the soil can wet up	0

Variables	Description	Value Used in Model
HDRY	Maximum head to which the soil can dryout.	1×10^6
HTOP	Constant head value of the surface node	0
RHA	Relative humidity of the air	0.99
IETOPT	Option to input daily meteorological data. "1" signifies that meteorological data is entered.	1
ICLOUD	Option to use cloud cover data from the meteorological record. "1" signifies that cloud cover data is used.	1
ISHOPT	Option for the upper surface head limit when IHEAT = 0. "0" signifies constant surface head equal to HDRY.	0
IRAIN	Option for water application information. "1" signifies daily precipitation data is used and applied at the HPR rate.	1
HPR	Hourly precipitation rate when IETOPT = 1. Value of 5 cm/hr is used – refer to Section 3.2 of WB Final Cover Design narrative.	5
IHYS	Option for hysteresis. "0" signifies no hysteresis.	0
AIRTOL	Tolerance limit on entrapped air content	0
HYSTOL	Tolerance limit on head changes	0
HYSMXH	Maximum head value for all materials	0
HYFILE	Name of restart file when IHYS = 1	0
IHEAT	Option for simulating heat flow. "0" signifies no heat flow.	0
ICONVH	Option to allow convective heat flow via water flow. "0" signifies no convective heat flow allowed.	0
DMAXHE	Time step control parameter when greater than zero and IHEAT = 1. Represents the maximum allowable heat balance error.	0
UPPERH	Option for the upper boundary condition for heat flow. "0" signifies flux that is calculated based on weather and soil parameters.	0
TSMEAN	Daily mean surface temperature when UPPERH = 2	0
TSAMP	Daily surface temperature amplitude	0
QHCTOP	User-specified surface heat flux when UPPERH = 3	0
LOWERH	Option for the lower boundary condition for heat flux	0
QHLEAK	Heat flux at the bottom boundary when LOWERH = 3	0
TGRAD	Temperature gradient of the bottom boundary when IHEAT equals 1	0
IVAPOR	Option to allow vapor flow. "1" signifies vapor flow allowed.	1
TORT	Tortuosity	0.66
TSOIL	Average temperature of the soil	291K
VAPDIF	Diffusion coefficient of vapor in air	$0.24 \text{ cm}^2/\text{s}$
MATN	Number of different soil materials	1
NPT	Number of nodes	30
THET	Saturated water content	0.39
THTR	Residual water content	0.04
VGA	Coefficient "α" of the van Genuchten function	0.01
VGN	Coefficient "n" of the van Genuchten function	1.27
RKMOD	Conductivity model options. "2" signifies Mualem.	2
SK	Saturated hydraulic conductivity	0.828 cm/hr
EPIT	Exponent of the pore interaction term. For Mualem, it is 0.5.	0.5
NDAY	Day for which end-of-day suction head values are specified as initial conditions.	0

Variables	Description	Value Used in Model
LEAF	Option for leaf area index. "0" signifies that LAI values are not needed (i.e., NFPET equals 2).	0
NFROOT	Option for root growth. "1" signifies exponential relationship.	1
NUPTAK	Option for plant water uptake. "1" signifies sink term approximation proposed by Feddes et al.	1
NFPET	Option for partitioning PET into transpiration and evaporation components. "2" signifies user supplies daily PET values and program partitions it into PT AND PE based on the cheatgrass data of Hinds (1975).	2
NSOW	Day of the year on which seeds germinate	66
NHRVST	Day of the year on which plants cease transpiring	243
BARE	Fraction of soil surface that is bare of plants	0.90
AA	Coefficient a in the root growth equation	1.2
B1	Coefficient b in the root growth equation	0.13
B2	Coefficient c in the root growth equation	0.2
HW	Head corresponding to water content below which plants wilt and stop transpiring	15,000
HD	Head corresponding to water content below which plant transpiration starts to decrease	330
HN	Head corresponding to water content above which plants do not transpire because of anaerobic conditions	10

APPENDIX D

UNSAT-H MODEL OUTPUT



7-24-14

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Includes pages D-1 through D-97

1 INTRODUCTION

This appendix (Appendix D) includes the output summary and output files for the Equivalency Design Demonstration. The UNSAT-H model output summary is included on page D-3. The files shown on pages D-7 through D-97 are the actual output files for years 1981 through 2010 from the the UNSAT-H model with the header and page number added.

UNSAT-H MODEL OUTPUT SUMMARY

Purpose: Evaluate the performance of WB final cover using UNSAT-H (Version 3.01) computer program for the following main criteria:
1. Annual maximum drainage rate, and
2. Annual peak water storage

Method:

1. Run the UNSAT-H simulation for a period of 30 years using site specific precipitation and evapotranspiration data for the soil saturated moisture content used and generate an annual summary table for a period of 30 years by using "BSUM301.EXE" included in the UNSAT-H Computer Program.
2. Determine average annual drainage (percolation) through the final cover modeled with the design conditions for a period of 30 years for the soil saturated moisture content used.
3. Determine the maximum adjusted drainage modeled with the design conditions for a single year.
4. Determine the annual average and peak water storage in the final cover modeled with the design conditions for a period of 30 years.
5. Determine the average and maximum runoff coefficient for the 30 year period simulated.
6. Determine the relationship between the water storage capacity provided and water storage capacity required as estimated by UNSAT-H.
7. Conclusion for the simulation.

References:

1. UNSAT-H Version 3.0: *Unsaturated Soil Water and Heat Flow Model, Theory, User Manual, and Examples*. Pacific Northwest National Laboratory, Richland, Washington, June 2000.
2. Quian, Xuede, R.M. Koerner, D. H. Gray, "Geotechnical Aspects of Landfill Design and Construction", Prentice-Hall, Inc., New Jersey, 2002.
3. The Hydrologic Evaluation of Landfill Performance (HELP) Model, Engineering Documentation for Version 3. US EPA Office of Research and Development, Washington, DC, EPA/600/R-94/168b, September 1994.
4. *Cover Design Using Storage Capacity & Unsaturated Soil Properties*. Craig H. Benson, Water Balance Covers. September 26, 27, and 28, 2006, Austin, Texas.

FORT BLISS LANDFILL
WB ALTERNATIVE FINAL COVER
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Solution:

1. Run the UNSAT-H simulation for a period of 30 years using site specific precipitation and evapotranspiration data for the soil saturated moisture content used and generate an annual summary table for a period of 30 years by using "BSUM501.EXE" included in the UNSAT-H Computer Program.

UNSAT-H input files are included in Appendix C. UNSAT-H output files are included in this appendix (refer to pages D-7 through D-124).

The annual summary table for a period of 30 years obtained from the BSUM501.EXE file included in the UNSAT-H program is presented below. All units are cm unless indicated otherwise.

Initial Storage = 11.915 cm (calculated by UNSAT-H, listed in input file in Appendix C)

Year	Precipitation	PET	P/PET	Transpiration ¹	Evaporation ¹	Runoff ¹	% Runoff	Drainage ¹	Storage	Time Steps	Mass Balance Error ¹
1980	32.080	239.938	0.134	1.038	24.923	3.593	11.2	0.001	14.55	13159	0.109
1981	27.864	236.062	0.118	0.569	18.153	6.101	21.9	0.009	17.67	12367	0.089
1982	20.295	230.265	0.088	1.321	20.321	0.634	3.1	0.035	15.75	12380	0.095
1983	41.072	218.383	0.188	1.291	30.311	5.641	13.7	0.149	19.543	13260	0.114
1984	20.726	189.147	0.110	1.142	20.887	1.504	7.3	0.200	16.628	12447	0.092
1985	30.912	196.269	0.157	1.321	25.582	2.495	8.1	0.081	18.175	13237	0.114
1986	27.788	207.251	0.134	1.505	22.771	3.038	10.9	0.092	18.659	12905	0.102
1987	28.092	211.756	0.133	1.207	26.730	1.864	6.6	0.113	16.945	12935	0.107
1988	18.440	224.974	0.082	1.324	17.404	1.110	6.0	0.066	15.566	12046	0.085
1989	32.659	226.790	0.144	0.742	25.284	4.204	12.9	0.081	17.988	12638	0.094
1990	31.445	224.820	0.140	1.259	25.543	3.008	9.6	0.116	19.626	13215	0.118
1991	28.956	225.833	0.128	1.909	24.506	4.755	16.4	0.156	17.372	13623	0.116
1992	24.460	239.475	0.102	1.376	22.602	1.135	4.6	0.071	16.754	12814	0.105
1993	13.919	251.763	0.055	1.472	12.799	0.233	1.7	0.040	16.194	11272	0.065
1994	15.392	248.486	0.062	0.727	14.688	1.131	7.3	0.019	15.085	11283	0.064
1995	21.311	260.543	0.082	1.058	18.236	1.829	8.6	0.022	15.322	11842	0.072
1996	24.460	226.377	0.108	1.299	21.447	0.549	2.2	0.025	16.573	13103	0.111
1997	17.196	236.926	0.073	0.869	16.289	0.982	5.7	0.024	15.685	11823	0.081
1998	20.726	238.020	0.087	0.946	17.382	1.739	8.4	0.024	16.39	11552	0.070
1999	18.821	240.065	0.078	1.309	16.415	1.930	10.3	0.031	15.6	11608	0.072
2000	10.897	240.838	0.045	0.641	11.380	0.012	0.1	0.022	14.5	11200	0.059
2001	17.501	241.242	0.073	0.786	15.588	0.003	0.0	0.013	15.695	11718	0.083
2002	10.693	251.668	0.042	0.839	11.008	0.613	5.7	0.013	13.97	11041	0.055
2003	30.988	236.192	0.131	1.451	22.916	3.738	12.1	0.012	16.937	12100	0.096
2004	32.690	238.215	0.137	1.412	24.937	6.246	19.1	0.097	17.031	12506	0.096
2005	44.475	260.375	0.171	1.359	28.866	12.887	29.0	0.306	18.177	12530	0.088
2006	25.705	241.122	0.107	1.821	23.142	1.872	7.3	0.156	16.988	12576	0.098
2007	25.019	255.251	0.098	1.049	20.416	4.258	17.0	0.066	16.297	12029	0.079
2008	22.047	244.936	0.090	1.111	16.637	3.182	14.4	0.046	17.439	11632	0.071
2009	16.942	240.720	0.070	1.231	16.021	1.595	9.4	0.061	15.54	11664	0.068
SUM=	733.551	7023.702	0.104	35.384	613.184	81.881	290.736	2.147	498.649		2.669
Average=	24.452	234.123		1.179	20.439	2.729	11.162	0.072	16.622		0.089
Peak=	44.475	260.543		1.909	30.311	12.887	28.976	0.306	19.626		0.118

¹ The mass balance error shown in the last column has been added proportionately to the percolation, surface runoff, and evapotranspiration (transpiration and evaporation) in accordance with Section 4.0 of the Guidance for Requesting a Water Balance Alternative Final Cover for a Municipal Solid Waste Landfill dated January 2012.

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2. Determine average annual drainage (basal percolation) through the final cover for a period of 30 years for the soil saturated moisture content used.

The average annual drainage for a period of 30 years
 = Total drainage obtained for 30 years (cm)/30 years * 10mm/cm
 = (2.147 cm/30 yrs)*10mm/cm
 = 0.716 mm/yr

3. Determine the maximum drainage modeled for a single year.

The maximum drainage modeled for a single year
 = Maximum drainage value modeled (cm) * 10mm/cm
 = (0.306 cm)*10mm/cm
 = 3.06 mm (year 1998)

4. Determine the annual average and peak water storage in the final cover for a period of 30 years.

The annual average water storage for a period of 30 years
 = Total storage obtained for 30 years from the model (cm)/30 years
 = 498.649cm/30 yrs
 = 16.622 cm/yr
 = 6.5 in/yr

The peak annual water storage for a period of 30 years

= Peak storage obtained for a single year from the model (cm)
 = 19.626 cm
 = 7.7 in

5. Determine the average and maximum runoff coefficient for the 30 year period simulated.

The average runoff coefficient for the 30 year period
 = [Average runoff for 30 years (cm) / Average precipitation for 30 years (cm)] * 100
 = 44.559cm/91.600 cm*100 = 2.729 cm/24.452 cm*100
 = 11.2 percent

The runoff coefficient for a period of 30 years

= Maximum runoff coefficient obtained for a single year from the model
 = 29.0 percent

FORT BLISS LANDFILL
WB ALTERNATIVE FINAL COVER
UNSAT-H MODEL SUMMARY
2449-310-11-00-01

(Based on Evaporation PET Data)

6. Determine the relationship between the storage capacity provided and water storage capacity required as estimated by UNSAT-H.

The following procedure is used to calculate storage capacity provided and storage capacity required for comparison

Saturated Water Content = 0.39 vol/vol 36 inches, total thickness as modeled by UNSAT-H.

Saturated Water Content (in) = 36 in x 0.39 vol/vol = 14.04 in

Required Storage (in) = Storage Estimated by UNSAT-H (cm)/2.54 cm/in
Storage estimated by UNSAT-H is included on page D-4 under the column heading "Storage".

Years	Storage at Saturated Water Content (in)	Available Storage Capacity (in)	Storage Utilized (in)
1981	14.04	11.93	5.73
1982	14.04	11.93	6.96
1983	14.04	11.93	6.20
1984	14.04	11.93	7.69
1985	14.04	11.93	6.55
1986	14.04	11.93	7.16
1987	14.04	11.93	7.35
1988	14.04	11.93	6.67
1989	14.04	11.93	6.13
1990	14.04	11.93	7.08
1991	14.04	11.93	7.73
1992	14.04	11.93	6.84
1993	14.04	11.93	6.60
1994	14.04	11.93	6.38
1995	14.04	11.93	5.94
1996	14.04	11.93	6.03
1997	14.04	11.93	6.52
1998	14.04	11.93	6.18
1999	14.04	11.93	6.45
2000	14.04	11.93	6.14
2001	14.04	11.93	5.71
2002	14.04	11.93	6.18
2003	14.04	11.93	5.50
2004	14.04	11.93	6.67
2005	14.04	11.93	6.71
2006	14.04	11.93	7.16
2007	14.04	11.93	6.69
2008	14.04	11.93	6.42
2009	14.04	11.93	6.87
2010	14.04	11.93	6.12

7. Conclusion.

As shown in steps 2 and 3, the average annual and maximum adjusted drainage rate is less than 4mm/yr in accordance with TCEQ draft guidelines.
As shown in step 6, the actual storage capacity provided by the WB final cover is greater than the storage required as calculated by UNSAT-H.

UNSAT-H MODEL OUTPUT FILES
(1981 THROUGH 2010)

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1981.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.500E+04	0.1304	291.00	2	2.500E-01	1.500E+04	0.1304	291.00
3	4.800E-01	1.500E+04	0.1304	291.00	4	8.100E-01	1.500E+04	0.1304	291.00
5	1.320E+00	1.500E+04	0.1304	291.00	6	2.080E+00	1.500E+04	0.1304	291.00
7	3.220E+00	1.500E+04	0.1304	291.00	8	4.930E+00	1.500E+04	0.1304	291.00
9	7.490E+00	1.500E+04	0.1304	291.00	10	1.133E+01	1.500E+04	0.1304	291.00
11	1.710E+01	1.500E+04	0.1304	291.00	12	2.575E+01	1.500E+04	0.1304	291.00
13	3.475E+01	1.500E+04	0.1304	291.00	14	4.375E+01	1.500E+04	0.1304	291.00
15	5.275E+01	1.500E+04	0.1304	291.00	16	5.820E+01	1.500E+04	0.1304	291.00
17	6.365E+01	1.500E+04	0.1304	291.00	18	6.910E+01	1.500E+04	0.1304	291.00
19	7.620E+01	1.500E+04	0.1304	291.00	20	8.036E+01	1.500E+04	0.1304	291.00
21	8.419E+01	1.500E+04	0.1304	291.00	22	8.676E+01	1.500E+04	0.1304	291.00
23	8.847E+01	1.500E+04	0.1304	291.00	24	8.961E+01	1.500E+04	0.1304	291.00
25	9.037E+01	1.500E+04	0.1304	291.00	26	9.088E+01	1.500E+04	0.1304	291.00
27	9.122E+01	1.500E+04	0.1304	291.00	28	9.144E+01	1.500E+04	0.1304	291.00

Initial Water Storage = 11.9148 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-3.46298E-03
IsoVapor Flow (cm)=-5.42921E-02
Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
11.9148+	0.0000+	0.0000	- 0.0624-	0.0000-	0.0000 =	11.8525 vs.	11.8525

Mass Balance = -1.7911E-05 cm; Time step attempts = 67 and successes = 67

Evaporation: Potential = 0.3934 cm, Actual = 0.0624 cm

Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm

RHMEAN = 39.5 %; TMEAN = 283.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 18

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-8.71431E-06
IsoVapor Flow (cm)=-1.06694E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
14.5602+ 0.0000+ 0.0000 - 0.0107- 0.0000- 0.0000 = 14.5495 vs. 14.5495

Mass Balance = -1.0682E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.3487 cm, Actual = 0.0107 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 38.6 %; TMEAN = 283.4 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

1

UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3994E+02 [cm]
Potential Transpiration = 3.3146E+00 [cm]
Actual Transpiration = 1.0383E+00 [cm]
Potential Evaporation = 2.3662E+02 [cm]
Actual Evaporation = 2.4923E+01 [cm]
Evaporation during Growth = 1.6061E+01 [cm]
Total Runoff = 3.5929E+00 [cm]
Total Infiltration = 2.8487E+01 [cm]
Total Basal Liquid Flux (drainage) = 8.2503E-04 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 3.2080E+01 [cm]
Actual Rainfall = 3.2080E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.4550E+01 [cm]
Mass Balance Error = -1.0936E-01 [cm]
Total Successful Time Steps = 13139
Total Attempted Time Steps = 15029
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8130
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	3.5645E+00	0.175	1.7003E+01	0.365	1.2837E+01
0.645	9.9848E+00	1.065	7.6055E+00	1.700	5.7248E+00
2.650	4.4045E+00	4.075	3.7276E+00	6.210	3.4971E+00
9.410	3.2334E+00	14.215	2.8946E+00	21.425	2.5012E+00
30.250	2.1095E+00	39.250	1.7327E+00	48.250	1.3654E+00
55.475	1.0829E+00	60.925	8.7858E-01	66.375	6.8574E-01
72.650	4.8037E-01	78.280	3.1905E-01	82.275	2.1435E-01
85.475	1.3678E-01	87.615	8.7099E-02	89.040	5.4706E-02
89.990	3.3314E-02	90.625	1.9072E-02	91.050	9.5544E-03
91.330	3.2870E-03	91.440	8.2503E-04		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	3.6698E-03	0.480	7.2004E-03
0.810	1.4721E-02	1.320	2.9001E-02	2.080	5.4492E-02
3.220	9.4667E-02	4.930	1.4803E-01	7.490	2.0878E-01
11.330	2.1991E-01	17.100	1.6417E-01	25.750	6.3438E-02
34.750	2.0432E-02	43.750	7.0258E-03	52.750	1.8881E-03
58.200	6.1607E-04	63.650	2.4756E-04	69.100	4.6003E-05
76.200	6.6914E-06	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1982.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	9.339E+05	0.0697	291.00
3	4.800E-01	8.381E+05	0.0705	291.00	4	8.100E-01	7.111E+05	0.0719	291.00
5	1.320E+00	5.348E+05	0.0745	291.00	6	2.080E+00	3.070E+05	0.0800	291.00
7	3.220E+00	4.572E+04	0.1070	291.00	8	4.930E+00	1.312E+04	0.1338	291.00
9	7.490E+00	8.371E+03	0.1458	291.00	10	1.133E+01	6.184E+03	0.1548	291.00
11	1.710E+01	4.925E+03	0.1620	291.00	12	2.575E+01	4.177E+03	0.1675	291.00
13	3.475E+01	3.881E+03	0.1701	291.00	14	4.375E+01	3.830E+03	0.1705	291.00
15	5.275E+01	3.967E+03	0.1693	291.00	16	5.820E+01	4.143E+03	0.1678	291.00
17	6.365E+01	4.402E+03	0.1658	291.00	18	6.910E+01	4.760E+03	0.1632	291.00
19	7.620E+01	5.396E+03	0.1591	291.00	20	8.036E+01	5.819E+03	0.1567	291.00
21	8.419E+01	6.190E+03	0.1548	291.00	22	8.676E+01	6.387E+03	0.1538	291.00
23	8.847E+01	6.479E+03	0.1534	291.00	24	8.961E+01	6.519E+03	0.1532	291.00
25	9.037E+01	6.536E+03	0.1531	291.00	26	9.088E+01	6.542E+03	0.1531	291.00
27	9.122E+01	6.544E+03	0.1531	291.00	28	9.144E+01	6.545E+03	0.1531	291.00

Initial Water Storage = 14.5495 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-8.59793E-06
 IsoVapor Flow (cm)=-1.05361E-02
 Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
14.5495+	0.0000+	0.0000	- 0.0105-	0.0000-	0.0000 =	14.5390 vs.	14.5390

Mass Balance = -1.0317E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.4327 cm, Actual = 0.0105 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 36.2 %; TMEAN = 285.1 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.25268
Head (cm) = 5.84409E+02
LiqWater Flow (cm) = 6.55629E-01
IsoVapor Flow (cm) = -5.74619E-06
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
17.0092+ 0.7874+ 0.0000 - 0.1281- 0.0000- 0.0000 = 17.6685 vs. 17.6702

Mass Balance = -1.7174E-03 cm; Time step attempts = 79 and successes = 71
Evaporation: Potential = 0.1293 cm, Actual = 0.1281 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 80.7 %; TMEAN = 272.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 0

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3606E+02 [cm]
Potential Transpiration = 3.2415E+00 [cm]
Actual Transpiration = 5.6906E-01 [cm]
Potential Evaporation = 2.3282E+02 [cm]
Actual Evaporation = 1.8153E+01 [cm]
Evaporation during Growth = 4.9054E+00 [cm]
Total Runoff = 6.1010E+00 [cm]
Total Infiltration = 2.1763E+01 [cm]
Total Basal Liquid Flux (drainage) = 8.7388E-03 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.7864E+01 [cm]
Actual Rainfall = 2.7864E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.7670E+01 [cm]
Mass Balance Error = -8.9034E-02 [cm]
Total Successful Time Steps = 12367
Total Attempted Time Steps = 13892
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8014
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	3.6095E+00	0.175	1.4184E+01	0.365	1.1289E+01
0.645	8.8820E+00	1.065	6.8827E+00	1.700	5.4528E+00
2.650	4.3587E+00	4.075	3.4750E+00	6.210	2.8787E+00
9.410	2.4069E+00	14.215	1.8928E+00	21.425	1.3385E+00
30.250	9.4539E-01	39.250	6.7506E-01	48.250	4.8635E-01
55.475	3.8013E-01	60.925	3.1486E-01	66.375	2.5839E-01
72.650	2.0829E-01	78.280	1.5750E-01	82.275	1.1720E-01
85.475	8.1175E-02	87.615	5.5735E-02	89.040	3.8376E-02
89.990	2.6682E-02	90.625	1.8832E-02	91.050	1.3570E-02
91.330	1.0102E-02	91.440	8.7388E-03		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	5.4380E-04	0.480	1.3459E-03
0.810	3.2399E-03	1.320	6.6890E-03	2.080	1.1960E-02
3.220	1.6691E-02	4.930	3.0138E-02	7.490	5.5653E-02
11.330	1.0113E-01	17.100	1.1980E-01	25.750	7.9532E-02
34.750	4.8278E-02	43.750	3.5502E-02	52.750	2.3990E-02
58.200	1.6006E-02	63.650	1.4460E-02	69.100	3.1018E-03
76.200	9.9534E-04	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1983.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	5.844E+02	0.2527	291.00	2	2.500E-01	7.457E+02	0.2402	291.00
3	4.800E-01	7.005E+02	0.2434	291.00	4	8.100E-01	6.860E+02	0.2444	291.00
5	1.320E+00	6.875E+02	0.2443	291.00	6	2.080E+00	6.837E+02	0.2446	291.00
7	3.220E+00	6.812E+02	0.2448	291.00	8	4.930E+00	6.827E+02	0.2447	291.00
9	7.490E+00	6.987E+02	0.2435	291.00	10	1.133E+01	7.665E+02	0.2389	291.00
11	1.710E+01	1.085E+03	0.2220	291.00	12	2.575E+01	1.658E+03	0.2030	291.00
13	3.475E+01	2.022E+03	0.1947	291.00	14	4.375E+01	2.419E+03	0.1875	291.00
15	5.275E+01	2.893E+03	0.1807	291.00	16	5.820E+01	3.209E+03	0.1768	291.00
17	6.365E+01	3.525E+03	0.1735	291.00	18	6.910E+01	3.818E+03	0.1706	291.00
19	7.620E+01	4.130E+03	0.1679	291.00	20	8.036E+01	4.270E+03	0.1668	291.00
21	8.419E+01	4.365E+03	0.1660	291.00	22	8.676E+01	4.408E+03	0.1657	291.00
23	8.847E+01	4.426E+03	0.1656	291.00	24	8.961E+01	4.434E+03	0.1655	291.00
25	9.037E+01	4.437E+03	0.1655	291.00	26	9.088E+01	4.439E+03	0.1655	291.00
27	9.122E+01	4.439E+03	0.1655	291.00	28	9.144E+01	4.439E+03	0.1655	291.00

Initial Water Storage = 17.6702 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.24097
 Head (cm) = 7.34936E+02
 LiqWater Flow (cm)=-4.68316E-02
 IsoVapor Flow (cm)=-4.79965E-06
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
17.6702+	0.0000+	0.0000	- 0.0478-	0.0000-	0.0000 =	17.6224 vs.	17.6225

Mass Balance = -7.5186E-05 cm; Time step attempts = 24 and successes = 24

Evaporation: Potential = 0.0478 cm, Actual = 0.0478 cm

Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm

RHMEAN = **** %; TMEAN = 268.7 K; HDRY = 1.0000E+06 cm; DAYUEC = 0

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = -3.01026E-05
IsoVapor Flow (cm) = -3.13631E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.7816+ 0.0000+ 0.0000 - 0.0315- 0.0000- 0.0001 = 15.7500 vs. 15.7500

Mass Balance = 4.5865E-08 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2206 cm, Actual = 0.0315 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 58.5 %; TMEAN = 277.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

1

UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3026E+02 [cm]
Potential Transpiration = 3.0460E+00 [cm]
Actual Transpiration = 1.3205E+00 [cm]
Potential Evaporation = 2.2722E+02 [cm]
Actual Evaporation = 2.0321E+01 [cm]
Evaporation during Growth = 7.9548E+00 [cm]
Total Runoff = 6.3361E-01 [cm]
Total Infiltration = 1.9661E+01 [cm]
Total Basal Liquid Flux (drainage) = 3.4753E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.0295E+01 [cm]
Actual Rainfall = 2.0295E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5750E+01 [cm]
Mass Balance Error = -9.4628E-02 [cm]
Total Successful Time Steps = 12380
Total Attempted Time Steps = 13869
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7970
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
-----	-----	-----	-----	-----	-----
0.100	-6.5963E-01	0.175	1.2603E+01	0.365	9.1512E+00
0.645	6.1255E+00	1.065	3.4863E+00	1.700	1.5250E+00
2.650	3.6445E-01	4.075	-9.8450E-02	6.210	-9.8495E-02
9.410	-2.3877E-02	14.215	9.6170E-02	21.425	2.5145E-01
30.250	3.7043E-01	39.250	4.4843E-01	48.250	4.6868E-01
55.475	4.3685E-01	60.925	3.9475E-01	66.375	3.3725E-01
72.650	2.7516E-01	78.280	2.0846E-01	82.275	1.5823E-01
85.475	1.1593E-01	87.615	8.7034E-02	89.040	6.7616E-02
89.990	5.4623E-02	90.625	4.5924E-02	91.050	4.0099E-02
91.330	3.6261E-02	91.440	3.4753E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
-----	-----	-----	-----	-----	-----
0.100	0.0000E+00	0.250	1.4270E-03	0.480	3.3386E-03
0.810	7.4620E-03	1.320	1.6036E-02	2.080	3.2819E-02
3.220	6.4734E-02	4.930	1.2337E-01	7.490	2.0765E-01
11.330	2.5854E-01	17.100	2.4012E-01	25.750	1.3955E-01
34.750	7.8380E-02	43.750	5.5274E-02	52.750	3.7762E-02
58.200	2.5139E-02	63.650	2.2380E-02	69.100	4.9533E-03
76.200	1.5875E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1984.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.348E+05	0.0706	291.00
3	4.800E-01	6.137E+05	0.0732	291.00	4	8.100E-01	3.472E+05	0.0787	291.00
5	1.320E+00	4.174E+04	0.1086	291.00	6	2.080E+00	1.380E+04	0.1325	291.00
7	3.220E+00	9.448E+03	0.1424	291.00	8	4.930E+00	7.559E+03	0.1488	291.00
9	7.490E+00	6.445E+03	0.1535	291.00	10	1.133E+01	5.297E+03	0.1597	291.00
11	1.710E+01	4.233E+03	0.1671	291.00	12	2.575E+01	3.504E+03	0.1737	291.00
13	3.475E+01	3.168E+03	0.1773	291.00	14	4.375E+01	3.015E+03	0.1791	291.00
15	5.275E+01	2.958E+03	0.1798	291.00	16	5.820E+01	2.949E+03	0.1800	291.00
17	6.365E+01	2.954E+03	0.1799	291.00	18	6.910E+01	2.966E+03	0.1797	291.00
19	7.620E+01	2.987E+03	0.1795	291.00	20	8.036E+01	2.997E+03	0.1794	291.00
21	8.419E+01	3.005E+03	0.1793	291.00	22	8.676E+01	3.008E+03	0.1792	291.00
23	8.847E+01	3.010E+03	0.1792	291.00	24	8.961E+01	3.010E+03	0.1792	291.00
25	9.037E+01	3.011E+03	0.1792	291.00	26	9.088E+01	3.011E+03	0.1792	291.00
27	9.122E+01	3.011E+03	0.1792	291.00	28	9.144E+01	3.011E+03	0.1792	291.00

Initial Water Storage = 15.7500 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-2.34648E-05
IsoVapor Flow (cm)=-2.58872E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.7500+	0.0000+	0.0000	- 0.0259-	0.0000-	0.0001 =	15.7240	vs. 15.7240

Mass Balance = -1.4151E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2947 cm, Actual = 0.0259 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 50.1 %; TMEAN = 281.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.38224E-04
IsoVapor Flow (cm)=-7.07370E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
19.6157+ 0.0000+ 0.0000 - 0.0713- 0.0000- 0.0015 = 19.5428 vs. 19.5428

Mass Balance = -3.1581E-06 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2916 cm, Actual = 0.0713 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 55.7 %; TMEAN = 283.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 18

1

UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.1838E+02 [cm]
Potential Transpiration = 3.1712E+00 [cm]
Actual Transpiration = 1.2912E+00 [cm]
Potential Evaporation = 2.1521E+02 [cm]
Actual Evaporation = 3.0311E+01 [cm]
Evaporation during Growth = 1.7521E+01 [cm]
Total Runoff = 5.6412E+00 [cm]
Total Infiltration = 3.5431E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.4924E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 4.1072E+01 [cm]
Actual Rainfall = 4.1072E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.9543E+01 [cm]
Mass Balance Error = -1.1353E-01 [cm]
Total Successful Time Steps = 13260
Total Attempted Time Steps = 15173
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7405
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
-----	-----	-----	-----	-----	-----
0.100	5.1198E+00	0.175	1.9196E+01	0.365	1.4206E+01
0.645	1.0288E+01	1.065	7.8112E+00	1.700	6.5150E+00
2.650	5.8841E+00	4.075	5.1672E+00	6.210	4.6886E+00
9.410	4.3554E+00	14.215	3.9332E+00	21.425	3.4396E+00
30.250	2.9639E+00	39.250	2.5265E+00	48.250	2.1023E+00
55.475	1.7631E+00	60.925	1.5084E+00	66.375	1.2538E+00
72.650	9.7702E-01	78.280	7.2910E-01	82.275	5.5349E-01
85.475	4.1248E-01	87.615	3.1808E-01	89.040	2.5519E-01
89.990	2.1326E-01	90.625	1.8522E-01	91.050	1.6646E-01
91.330	1.5410E-01	91.440	1.4924E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
-----	-----	-----	-----	-----	-----
0.100	0.0000E+00	0.250	4.9196E-03	0.480	9.3303E-03
0.810	1.7949E-02	1.320	3.3231E-02	2.080	5.8950E-02
3.220	9.6195E-02	4.930	1.4264E-01	7.490	1.9158E-01
11.330	2.2380E-01	17.100	1.9890E-01	25.750	1.1694E-01
34.750	6.7654E-02	43.750	4.8849E-02	52.750	3.3122E-02
58.200	2.1817E-02	63.650	1.9715E-02	69.100	4.2864E-03
76.200	1.3415E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1985.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	6.624E+05	0.0725	291.00
3	4.800E-01	2.617E+05	0.0818	291.00	4	8.100E-01	1.233E+04	0.1353	291.00
5	1.320E+00	6.845E+03	0.1517	291.00	6	2.080E+00	4.704E+03	0.1635	291.00
7	3.220E+00	3.483E+03	0.1739	291.00	8	4.930E+00	2.688E+03	0.1835	291.00
9	7.490E+00	2.141E+03	0.1924	291.00	10	1.133E+01	1.756E+03	0.2006	291.00
11	1.710E+01	1.483E+03	0.2078	291.00	12	2.575E+01	1.284E+03	0.2143	291.00
13	3.475E+01	1.174E+03	0.2184	291.00	14	4.375E+01	1.113E+03	0.2208	291.00
15	5.275E+01	1.081E+03	0.2222	291.00	16	5.820E+01	1.070E+03	0.2227	291.00
17	6.365E+01	1.063E+03	0.2230	291.00	18	6.910E+01	1.059E+03	0.2232	291.00
19	7.620E+01	1.056E+03	0.2233	291.00	20	8.036E+01	1.056E+03	0.2233	291.00
21	8.419E+01	1.055E+03	0.2233	291.00	22	8.676E+01	1.055E+03	0.2233	291.00
23	8.847E+01	1.055E+03	0.2233	291.00	24	8.961E+01	1.055E+03	0.2233	291.00
25	9.037E+01	1.055E+03	0.2233	291.00	26	9.088E+01	1.055E+03	0.2233	291.00
27	9.122E+01	1.055E+03	0.2233	291.00	28	9.144E+01	1.055E+03	0.2233	291.00

Initial Water Storage = 19.5428 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm) = 1.14942E-02
 IsoVapor Flow (cm) = -6.06095E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
19.5428+	0.0254+	0.0000	- 0.0746-	0.0000-	0.0015 =	19.4921 vs.	19.4924

Mass Balance = -3.0691E-04 cm; Time step attempts = 68 and successes = 60
 Evaporation: Potential = 0.2564 cm, Actual = 0.0746 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 58.8 %; TMEAN = 278.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 12

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.04776E-05
IsoVapor Flow (cm)=-1.26603E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.6407+ 0.0000+ 0.0000 - 0.0127- 0.0000- 0.0003 = 16.6277 vs. 16.6277

Mass Balance = -1.5540E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.3312 cm, Actual = 0.0127 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 44.6 %; TMEAN = 287.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 1.8915E+02 [cm]
Potential Transpiration = 2.7078E+00 [cm]
Actual Transpiration = 1.1424E+00 [cm]
Potential Evaporation = 1.8644E+02 [cm]
Actual Evaporation = 2.0887E+01 [cm]
Evaporation during Growth = 8.0445E+00 [cm]
Total Runoff = 1.5038E+00 [cm]
Total Infiltration = 1.9223E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.9995E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.0726E+01 [cm]
Actual Rainfall = 2.0726E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6628E+01 [cm]
Mass Balance Error = -9.1971E-02 [cm]
Total Successful Time Steps = 12447
Total Attempted Time Steps = 13880
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7497
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-1.6647E+00	0.175	1.1217E+01	0.365	7.5855E+00
0.645	4.3975E+00	1.065	1.8538E+00	1.700	1.4757E-01
2.650	-7.3205E-01	4.075	-1.1959E+00	6.210	-1.4170E+00
9.410	-1.4833E+00	14.215	-1.5528E+00	21.425	-1.5402E+00
30.250	-1.3895E+00	39.250	-1.1810E+00	48.250	-9.5671E-01
55.475	-7.7514E-01	60.925	-6.3737E-01	66.375	-4.9960E-01
72.650	-3.2469E-01	78.280	-1.6748E-01	82.275	-5.5588E-02
85.475	3.3747E-02	87.615	9.3405E-02	89.040	1.3311E-01
89.990	1.5957E-01	90.625	1.7725E-01	91.050	1.8909E-01
91.330	1.9689E-01	91.440	1.9995E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.0504E-03	0.480	2.2671E-03
0.810	4.7657E-03	1.320	9.5200E-03	2.080	1.8245E-02
3.220	3.9800E-02	4.930	8.7984E-02	7.490	1.7432E-01
11.330	2.3742E-01	17.100	2.3065E-01	25.750	1.3441E-01
34.750	7.3383E-02	43.750	4.9886E-02	52.750	3.2739E-02
58.200	2.1502E-02	63.650	1.9340E-02	69.100	3.8655E-03
76.200	1.2764E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1986.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	9.219E+05	0.0698	291.00
3	4.800E-01	8.098E+05	0.0708	291.00	4	8.100E-01	6.631E+05	0.0725	291.00
5	1.320E+00	4.623E+05	0.0759	291.00	6	2.080E+00	2.075E+05	0.0845	291.00
7	3.220E+00	1.746E+04	0.1268	291.00	8	4.930E+00	8.996E+03	0.1438	291.00
9	7.490E+00	6.079E+03	0.1553	291.00	10	1.133E+01	4.486E+03	0.1651	291.00
11	1.710E+01	3.475E+03	0.1740	291.00	12	2.575E+01	2.797E+03	0.1819	291.00
13	3.475E+01	2.449E+03	0.1870	291.00	14	4.375E+01	2.252E+03	0.1904	291.00
15	5.275E+01	2.133E+03	0.1925	291.00	16	5.820E+01	2.085E+03	0.1935	291.00
17	6.365E+01	2.049E+03	0.1942	291.00	18	6.910E+01	2.023E+03	0.1947	291.00
19	7.620E+01	2.001E+03	0.1951	291.00	20	8.036E+01	1.992E+03	0.1953	291.00
21	8.419E+01	1.987E+03	0.1954	291.00	22	8.676E+01	1.985E+03	0.1955	291.00
23	8.847E+01	1.984E+03	0.1955	291.00	24	8.961E+01	1.984E+03	0.1955	291.00
25	9.037E+01	1.984E+03	0.1955	291.00	26	9.088E+01	1.983E+03	0.1955	291.00
27	9.122E+01	1.983E+03	0.1955	291.00	28	9.144E+01	1.983E+03	0.1955	291.00

Initial Water Storage = 16.6277 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = 1.49027E-02
IsoVapor Flow (cm) = -2.17216E-02
Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
16.6277+	0.0254+	0.0000	- 0.0323-	0.0000-	0.0003 =	16.6205 vs.	16.6208

Mass Balance = -2.5982E-04 cm; Time step attempts = 68 and successes = 60
Evaporation: Potential = 0.2175 cm, Actual = 0.0323 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 63.4 %; TMEAN = 282.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 17

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07196
Head (cm) = 7.07637E+05
LiqWater Flow (cm)=-8.82662E-05
IsoVapor Flow (cm)=-5.04746E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
18.2259+ 0.0000+ 0.0000 - 0.0505- 0.0000- 0.0003 = 18.1751 vs. 18.1751

Mass Balance = -9.5397E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1732 cm, Actual = 0.0505 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 55.2 %; TMEAN = 277.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 11

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 1.9627E+02 [cm]
Potential Transpiration = 2.7912E+00 [cm]
Actual Transpiration = 1.3210E+00 [cm]
Potential Evaporation = 1.9348E+02 [cm]
Actual Evaporation = 2.5582E+01 [cm]
Evaporation during Growth = 1.4806E+01 [cm]
Total Runoff = 2.4951E+00 [cm]
Total Infiltration = 2.8417E+01 [cm]
Total Basal Liquid Flux (drainage) = 8.0614E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 3.0912E+01 [cm]
Actual Rainfall = 3.0912E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.8175E+01 [cm]
Mass Balance Error = -1.1428E-01 [cm]
Total Successful Time Steps = 13237
Total Attempted Time Steps = 15007
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7472
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	2.8347E+00	0.175	1.6337E+01	0.365	1.1927E+01
0.645	8.4462E+00	1.065	5.9348E+00	1.700	4.3641E+00
2.650	3.5074E+00	4.075	2.7481E+00	6.210	2.3123E+00
9.410	1.9886E+00	14.215	1.5969E+00	21.425	1.1680E+00
30.250	8.0946E-01	39.250	5.4392E-01	48.250	3.5199E-01
55.475	2.4604E-01	60.925	1.8503E-01	66.375	1.3863E-01
72.650	1.1329E-01	78.280	9.9864E-02	82.275	9.3067E-02
85.475	8.8425E-02	87.615	8.5543E-02	89.040	8.3686E-02
89.990	8.2464E-02	90.625	8.1653E-02	91.050	8.1111E-02
91.330	8.0754E-02	91.440	8.0614E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	4.8082E-03	0.480	9.1732E-03
0.810	1.8325E-02	1.320	3.6302E-02	2.080	6.2678E-02
3.220	9.8650E-02	4.930	1.4298E-01	7.490	1.9596E-01
11.330	2.3089E-01	17.100	2.0351E-01	25.750	1.1805E-01
34.750	6.8751E-02	43.750	4.9967E-02	52.750	3.3758E-02
58.200	2.2059E-02	63.650	1.9506E-02	69.100	4.2282E-03
76.200	1.4148E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1987.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	7.076E+05	0.0720	291.00	2	2.500E-01	4.991E+05	0.0751	291.00
3	4.800E-01	2.311E+05	0.0832	291.00	4	8.100E-01	1.666E+04	0.1279	291.00
5	1.320E+00	8.033E+03	0.1470	291.00	6	2.080E+00	5.294E+03	0.1597	291.00
7	3.220E+00	3.833E+03	0.1705	291.00	8	4.930E+00	2.913E+03	0.1804	291.00
9	7.490E+00	2.290E+03	0.1897	291.00	10	1.133E+01	1.860E+03	0.1982	291.00
11	1.710E+01	1.578E+03	0.2051	291.00	12	2.575E+01	1.439E+03	0.2092	291.00
13	3.475E+01	1.448E+03	0.2089	291.00	14	4.375E+01	1.542E+03	0.2061	291.00
15	5.275E+01	1.677E+03	0.2025	291.00	16	5.820E+01	1.754E+03	0.2006	291.00
17	6.365E+01	1.818E+03	0.1991	291.00	18	6.910E+01	1.865E+03	0.1980	291.00
19	7.620E+01	1.900E+03	0.1973	291.00	20	8.036E+01	1.912E+03	0.1970	291.00
21	8.419E+01	1.918E+03	0.1969	291.00	22	8.676E+01	1.921E+03	0.1968	291.00
23	8.847E+01	1.922E+03	0.1968	291.00	24	8.961E+01	1.923E+03	0.1968	291.00
25	9.037E+01	1.923E+03	0.1968	291.00	26	9.088E+01	1.923E+03	0.1968	291.00
27	9.122E+01	1.923E+03	0.1968	291.00	28	9.144E+01	1.923E+03	0.1968	291.00

Initial Water Storage = 18.1751 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-6.51017E-05
 IsoVapor Flow (cm)=-5.13257E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
18.1751+	0.0000+	0.0000	- 0.0516-	0.0000-	0.0003 =	18.1232 vs.	18.1232

Mass Balance = -5.3952E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.2100 cm, Actual = 0.0516 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 53.3 %; TMEAN = 278.4 K; HDRY = 1.0000E+06 cm; DAYUBC = 17

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07500
Head (cm) = 5.05517E+05
LiqWater Flow (cm)=-6.80418E-03
IsoVapor Flow (cm)=-8.75047E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
18.7538+ 0.0000+ 0.0000 - 0.0945- 0.0000- 0.0002 = 18.6591 vs. 18.6592

Mass Balance = -9.9963E-05 cm; Time step attempts = 26 and successes = 25
Evaporation: Potential = 0.2852 cm, Actual = 0.0945 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 52.7 %; TMEAN = 276.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 12

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.0725E+02 [cm]
Potential Transpiration = 2.8327E+00 [cm]
Actual Transpiration = 1.5051E+00 [cm]
Potential Evaporation = 2.0442E+02 [cm]
Actual Evaporation = 2.2771E+01 [cm]
Evaporation during Growth = 1.2909E+01 [cm]
Total Runoff = 3.0379E+00 [cm]
Total Infiltration = 2.4750E+01 [cm]
Total Basal Liquid Flux (drainage) = 9.2130E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.7788E+01 [cm]
Actual Rainfall = 2.7788E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.8659E+01 [cm]
Mass Balance Error = -1.0217E-01 [cm]
Total Successful Time Steps = 12905
Total Attempted Time Steps = 14686
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7797
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	1.9791E+00	0.175	1.5848E+01	0.365	1.2086E+01
0.645	8.8276E+00	1.065	5.8992E+00	1.700	3.6008E+00
2.650	2.3351E+00	4.075	1.8250E+00	6.210	1.6000E+00
9.410	1.3089E+00	14.215	9.6756E-01	21.425	6.3279E-01
30.250	3.9355E-01	39.250	2.2686E-01	48.250	9.9524E-02
55.475	2.6417E-02	60.925	-1.1999E-02	66.375	-3.3262E-02
72.650	-2.1440E-02	78.280	6.0559E-03	82.275	3.0272E-02
85.475	5.1298E-02	87.615	6.5795E-02	89.040	7.5567E-02
89.990	8.2113E-02	90.625	8.6498E-02	91.050	8.9435E-02
91.330	9.1370E-02	91.440	9.2130E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.9552E-03	0.480	6.5143E-03
0.810	1.4034E-02	1.320	2.9707E-02	2.080	5.8082E-02
3.220	1.0544E-01	4.930	1.7401E-01	7.490	2.4479E-01
11.330	2.7596E-01	17.100	2.4205E-01	25.750	1.3697E-01
34.750	7.5578E-02	43.750	5.3103E-02	52.750	3.5154E-02
58.200	2.3232E-02	63.650	2.1229E-02	69.100	4.7597E-03
76.200	1.5009E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1988.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	5.055E+05	0.0750	291.00	2	2.500E-01	2.164E+05	0.0840	291.00
3	4.800E-01	1.372E+04	0.1326	291.00	4	8.100E-01	7.381E+03	0.1495	291.00
5	1.320E+00	4.871E+03	0.1624	291.00	6	2.080E+00	3.507E+03	0.1736	291.00
7	3.220E+00	2.643E+03	0.1841	291.00	8	4.930E+00	2.058E+03	0.1940	291.00
9	7.490E+00	1.650E+03	0.2032	291.00	10	1.133E+01	1.366E+03	0.2115	291.00
11	1.710E+01	1.186E+03	0.2179	291.00	12	2.575E+01	1.116E+03	0.2207	291.00
13	3.475E+01	1.158E+03	0.2190	291.00	14	4.375E+01	1.281E+03	0.2144	291.00
15	5.275E+01	1.485E+03	0.2078	291.00	16	5.820E+01	1.643E+03	0.2034	291.00
17	6.365E+01	1.818E+03	0.1991	291.00	18	6.910E+01	1.988E+03	0.1954	291.00
19	7.620E+01	2.155E+03	0.1921	291.00	20	8.036E+01	2.219E+03	0.1909	291.00
21	8.419E+01	2.256E+03	0.1903	291.00	22	8.676E+01	2.270E+03	0.1900	291.00
23	8.847E+01	2.277E+03	0.1899	291.00	24	8.961E+01	2.279E+03	0.1899	291.00
25	9.037E+01	2.280E+03	0.1899	291.00	26	9.088E+01	2.280E+03	0.1899	291.00
27	9.122E+01	2.281E+03	0.1899	291.00	28	9.144E+01	2.281E+03	0.1899	291.00

Initial Water Storage = 18.6592 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07334
Head (cm) = 6.05171E+05
LiqWater Flow (cm)=-5.76359E-04
IsoVapor Flow (cm)=-7.95899E-02
Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
18.6592+	0.0000+	0.0000	- 0.0803-	0.0000-	0.0002 =	18.5787 vs.	18.5787

Mass Balance = -1.1864E-05 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2600 cm, Actual = 0.0803 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 57.3 %; TMEAN = 276.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 11

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = -1.55639E-05
IsoVapor Flow (cm) = -1.81266E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.9632+ 0.0000+ 0.0000 - 0.0181- 0.0000- 0.0003 = 16.9447 vs. 16.9447

Mass Balance = -2.3312E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2484 cm, Actual = 0.0181 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 29.8 %; TMEAN = 275.4 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.1176E+02 [cm]
Potential Transpiration = 2.9067E+00 [cm]
Actual Transpiration = 1.2072E+00 [cm]
Potential Evaporation = 2.0885E+02 [cm]
Actual Evaporation = 2.6730E+01 [cm]
Evaporation during Growth = 1.4096E+01 [cm]
Total Runoff = 1.8644E+00 [cm]
Total Infiltration = 2.6228E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.1311E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.8092E+01 [cm]
Actual Rainfall = 2.8092E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6945E+01 [cm]
Mass Balance Error = -1.0743E-01 [cm]
Total Successful Time Steps = 12935
Total Attempted Time Steps = 14745
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7806
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
-----	-----	-----	-----	-----	-----
0.100	-5.0168E-01	0.175	1.4653E+01	0.365	9.4229E+00
0.645	5.6080E+00	1.065	3.0282E+00	1.700	1.2052E+00
2.650	2.8090E-01	4.075	-1.6495E-01	6.210	-3.1320E-01
9.410	-3.6209E-01	14.215	-3.9726E-01	21.425	-3.3723E-01
30.250	-1.5862E-01	39.250	3.2010E-02	48.250	1.7868E-01
55.475	2.4095E-01	60.925	2.6187E-01	66.375	2.5706E-01
72.650	2.4393E-01	78.280	2.1255E-01	82.275	1.8547E-01
85.475	1.6115E-01	87.615	1.4417E-01	89.040	1.3267E-01
89.990	1.2494E-01	90.625	1.1977E-01	91.050	1.1630E-01
91.330	1.1401E-01	91.440	1.1311E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
-----	-----	-----	-----	-----	-----
0.100	0.0000E+00	0.250	3.1151E-03	0.480	6.5656E-03
0.810	1.3168E-02	1.320	2.3178E-02	2.080	3.7138E-02
3.220	5.5812E-02	4.930	9.9363E-02	7.490	1.7118E-01
11.330	2.2712E-01	17.100	2.2142E-01	25.750	1.3433E-01
34.750	7.6525E-02	43.750	5.3211E-02	52.750	3.5219E-02
58.200	2.3222E-02	63.650	2.0998E-02	69.100	4.3061E-03
76.200	1.2902E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

 UNSAT-H Version 3.01
 INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1989.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.898E+05	0.0700	291.00
3	4.800E-01	7.359E+05	0.0716	291.00	4	8.100E-01	5.405E+05	0.0744	291.00
5	1.320E+00	2.827E+05	0.0809	291.00	6	2.080E+00	2.606E+04	0.1179	291.00
7	3.220E+00	1.029E+04	0.1401	291.00	8	4.930E+00	6.670E+03	0.1525	291.00
9	7.490E+00	4.865E+03	0.1624	291.00	10	1.133E+01	3.767E+03	0.1711	291.00
11	1.710E+01	3.048E+03	0.1787	291.00	12	2.575E+01	2.568E+03	0.1852	291.00
13	3.475E+01	2.312E+03	0.1893	291.00	14	4.375E+01	2.153E+03	0.1922	291.00
15	5.275E+01	2.044E+03	0.1943	291.00	16	5.820E+01	1.993E+03	0.1953	291.00
17	6.365E+01	1.953E+03	0.1961	291.00	18	6.910E+01	1.921E+03	0.1968	291.00
19	7.620E+01	1.891E+03	0.1975	291.00	20	8.036E+01	1.879E+03	0.1977	291.00
21	8.419E+01	1.872E+03	0.1979	291.00	22	8.676E+01	1.868E+03	0.1980	291.00
23	8.847E+01	1.867E+03	0.1980	291.00	24	8.961E+01	1.866E+03	0.1980	291.00
25	9.037E+01	1.866E+03	0.1980	291.00	26	9.088E+01	1.866E+03	0.1980	291.00
27	9.122E+01	1.866E+03	0.1980	291.00	28	9.144E+01	1.866E+03	0.1980	291.00

Initial Water Storage = 16.9447 cm

NOTE: There are no temperature data when plants are modelled.

 DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm) = -1.52153E-05
 IsoVapor Flow (cm) = -1.77643E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
16.9447+	0.0000+	0.0000	- 0.0178-	0.0000-	0.0003 =	16.9265 vs.	16.9265

Mass Balance = -2.2954E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.3537 cm, Actual = 0.0178 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 31.5 %; TMEAN = 279.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-3.77774E-05
IsoVapor Flow (cm)=-3.64317E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.6027+ 0.0000+ 0.0000 - 0.0366- 0.0000- 0.0001 = 15.5660 vs. 15.5660

Mass Balance = 8.1219E-08 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1812 cm, Actual = 0.0366 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 68.4 %; TMEAN = 277.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 19

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.2497E+02 [cm]
Potential Transpiration = 3.1107E+00 [cm]
Actual Transpiration = 1.3237E+00 [cm]
Potential Evaporation = 2.2186E+02 [cm]
Actual Evaporation = 1.7404E+01 [cm]
Evaporation during Growth = 1.1330E+01 [cm]
Total Runoff = 1.1101E+00 [cm]
Total Infiltration = 1.7330E+01 [cm]
Total Basal Liquid Flux (drainage) = 6.6293E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.8440E+01 [cm]
Actual Rainfall = 1.8440E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5566E+01 [cm]
Mass Balance Error = -8.4970E-02 [cm]
Total Successful Time Steps = 12046
Total Attempted Time Steps = 13426
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8343
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-7.3685E-02	0.175	1.1314E+01	0.365	7.9456E+00
0.645	5.5826E+00	1.065	3.7884E+00	1.700	2.3948E+00
2.650	1.0841E+00	4.075	1.3215E-01	6.210	-2.6157E-01
9.410	-4.1669E-01	14.215	-5.7138E-01	21.425	-6.6767E-01
30.250	-6.5708E-01	39.250	-5.9530E-01	48.250	-5.1474E-01
55.475	-4.4278E-01	60.925	-3.8435E-01	66.375	-3.2262E-01
72.650	-2.2969E-01	78.280	-1.4258E-01	82.275	-7.9394E-02
85.475	-2.8601E-02	87.615	5.4226E-03	89.040	2.8094E-02
89.990	4.3213E-02	90.625	5.3320E-02	91.050	6.0085E-02
91.330	6.4542E-02	91.440	6.6293E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.8581E-03	0.480	4.7953E-03
0.810	1.0236E-02	1.320	2.1169E-02	2.080	4.2270E-02
3.220	7.8477E-02	4.930	1.3419E-01	7.490	2.0281E-01
11.330	2.4578E-01	17.100	2.2467E-01	25.750	1.3382E-01
34.750	7.7666E-02	43.750	5.5657E-02	52.750	3.7438E-02
58.200	2.4655E-02	63.650	2.2127E-02	69.100	4.6011E-03
76.200	1.4488E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1990.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.270E+05	0.0706	291.00
3	4.800E-01	5.972E+05	0.0735	291.00	4	8.100E-01	3.232E+05	0.0795	291.00
5	1.320E+00	3.261E+04	0.1133	291.00	6	2.080E+00	1.432E+04	0.1316	291.00
7	3.220E+00	1.117E+04	0.1379	291.00	8	4.930E+00	1.100E+04	0.1383	291.00
9	7.490E+00	9.645E+03	0.1419	291.00	10	1.133E+01	6.893E+03	0.1515	291.00
11	1.710E+01	5.116E+03	0.1608	291.00	12	2.575E+01	4.026E+03	0.1688	291.00
13	3.475E+01	3.492E+03	0.1738	291.00	14	4.375E+01	3.195E+03	0.1770	291.00
15	5.275E+01	3.016E+03	0.1791	291.00	16	5.820E+01	2.943E+03	0.1800	291.00
17	6.365E+01	2.888E+03	0.1807	291.00	18	6.910E+01	2.848E+03	0.1813	291.00
19	7.620E+01	2.813E+03	0.1817	291.00	20	8.036E+01	2.800E+03	0.1819	291.00
21	8.419E+01	2.792E+03	0.1820	291.00	22	8.676E+01	2.788E+03	0.1821	291.00
23	8.847E+01	2.787E+03	0.1821	291.00	24	8.961E+01	2.786E+03	0.1821	291.00
25	9.037E+01	2.786E+03	0.1821	291.00	26	9.088E+01	2.786E+03	0.1821	291.00
27	9.122E+01	2.786E+03	0.1821	291.00	28	9.144E+01	2.786E+03	0.1821	291.00

Initial Water Storage = 15.5660 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-2.41716E-05
IsoVapor Flow (cm)=-2.65395E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.5660+	0.0000+	0.0000	- 0.0266-	0.0000-	0.0001 =	15.5393 vs.	15.5393

Mass Balance = -1.0555E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1519 cm, Actual = 0.0266 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 69.3 %; TMEAN = 275.1 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm3/cm3) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-3.31939E-05
IsoVapor Flow (cm)=-3.43998E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
18.0230+ 0.0000+ 0.0000 - 0.0344- 0.0000- 0.0007 = 17.9879 vs. 17.9879

Mass Balance = -2.8849E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2824 cm, Actual = 0.0344 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 52.1 %; TMEAN = 281.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.2679E+02 [cm]
Potential Transpiration = 3.2448E+00 [cm]
Actual Transpiration = 7.4243E-01 [cm]
Potential Evaporation = 2.2354E+02 [cm]
Actual Evaporation = 2.5284E+01 [cm]
Evaporation during Growth = 1.1324E+01 [cm]
Total Runoff = 4.2036E+00 [cm]
Total Infiltration = 2.8435E+01 [cm]
Total Basal Liquid Flux (drainage) = 8.0664E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 3.2639E+01 [cm]
Actual Rainfall = 3.2639E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.7988E+01 [cm]
Mass Balance Error = -9.3976E-02 [cm]
Total Successful Time Steps = 12638
Total Attempted Time Steps = 14331
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7865
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	3.1510E+00	0.175	1.5869E+01	0.365	1.1659E+01
0.645	8.5286E+00	1.065	6.2222E+00	1.700	4.8096E+00
2.650	4.1341E+00	4.075	3.4968E+00	6.210	3.1312E+00
9.410	2.8579E+00	14.215	2.5949E+00	21.425	2.2574E+00
30.250	1.9274E+00	39.250	1.6298E+00	48.250	1.3445E+00
55.475	1.1176E+00	60.925	9.4754E-01	66.375	7.7862E-01
72.650	6.0279E-01	78.280	4.4610E-01	82.275	3.3538E-01
85.475	2.4652E-01	87.615	1.8704E-01	89.040	1.4741E-01
89.990	1.2099E-01	90.625	1.0333E-01	91.050	9.1511E-02
91.330	8.3723E-02	91.440	8.0664E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.8481E-03	0.480	3.8179E-03
0.810	7.3720E-03	1.320	1.3255E-02	2.080	2.1649E-02
3.220	3.1339E-02	4.930	4.6042E-02	7.490	7.1815E-02
11.330	1.1797E-01	17.100	1.4124E-01	25.750	9.7171E-02
34.750	6.0898E-02	43.750	4.6856E-02	52.750	3.3156E-02
58.200	2.2684E-02	63.650	2.0459E-02	69.100	3.7254E-03
76.200	1.1311E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1991.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.115E+05	0.0708	291.00
3	4.800E-01	5.636E+05	0.0740	291.00	4	8.100E-01	2.698E+05	0.0815	291.00
5	1.320E+00	1.789E+04	0.1262	291.00	6	2.080E+00	8.938E+03	0.1440	291.00
7	3.220E+00	6.094E+03	0.1552	291.00	8	4.930E+00	4.574E+03	0.1645	291.00
9	7.490E+00	3.608E+03	0.1726	291.00	10	1.133E+01	2.927E+03	0.1802	291.00
11	1.710E+01	2.404E+03	0.1878	291.00	12	2.575E+01	2.003E+03	0.1951	291.00
13	3.475E+01	1.777E+03	0.2001	291.00	14	4.375E+01	1.640E+03	0.2035	291.00
15	5.275E+01	1.549E+03	0.2059	291.00	16	5.820E+01	1.509E+03	0.2071	291.00
17	6.365E+01	1.479E+03	0.2080	291.00	18	6.910E+01	1.455E+03	0.2087	291.00
19	7.620E+01	1.433E+03	0.2094	291.00	20	8.036E+01	1.424E+03	0.2096	291.00
21	8.419E+01	1.419E+03	0.2098	291.00	22	8.676E+01	1.417E+03	0.2099	291.00
23	8.847E+01	1.416E+03	0.2099	291.00	24	8.961E+01	1.415E+03	0.2099	291.00
25	9.037E+01	1.415E+03	0.2099	291.00	26	9.088E+01	1.415E+03	0.2099	291.00
27	9.122E+01	1.415E+03	0.2099	291.00	28	9.144E+01	1.415E+03	0.2099	291.00

Initial Water Storage = 17.9879 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-2.83142E-05
 IsoVapor Flow (cm)=-3.02752E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
17.9879+	0.0000+	0.0000	- 0.0303-	0.0000-	0.0007 =	17.9569	vs. 17.9569

Mass Balance = -3.7600E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.2797 cm, Actual = 0.0303 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 50.8 %; TMEAN = 280.4 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.11255
Head (cm) = 3.39671E+04
LiqWater Flow (cm) = -6.62662E-02
IsoVapor Flow (cm) = -8.81385E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
19.7850+ 0.0000+ 0.0000 - 0.1590- 0.0000- 0.0002 = 19.6258 vs. 19.6261

Mass Balance = -3.2681E-04 cm; Time step attempts = 41 and successes = 34
Evaporation: Potential = 0.3479 cm, Actual = 0.1590 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 46.6 %; TMEAN = 282.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 14

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.2482E+02 [cm]
Potential Transpiration = 3.2281E+00 [cm]
Actual Transpiration = 1.2585E+00 [cm]
Potential Evaporation = 2.2159E+02 [cm]
Actual Evaporation = 2.5543E+01 [cm]
Evaporation during Growth = 1.0315E+01 [cm]
Total Runoff = 3.0077E+00 [cm]
Total Infiltration = 2.8437E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.1620E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 3.1445E+01 [cm]
Actual Rainfall = 3.1445E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.9626E+01 [cm]
Mass Balance Error = -1.1836E-01 [cm]
Total Successful Time Steps = 13215
Total Attempted Time Steps = 15107
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7632
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	2.8946E+00	0.175	1.6634E+01	0.365	1.1899E+01
0.645	8.6692E+00	1.065	6.2494E+00	1.700	4.4058E+00
2.650	3.4898E+00	4.075	2.9140E+00	6.210	2.5134E+00
9.410	2.1880E+00	14.215	1.7242E+00	21.425	1.1522E+00
30.250	6.3117E-01	39.250	2.2417E-01	48.250	-7.2823E-02
55.475	-2.0995E-01	60.925	-2.6235E-01	66.375	-2.6570E-01
72.650	-2.0394E-01	78.280	-1.1760E-01	82.275	-4.9305E-02
85.475	7.7347E-03	87.615	4.6455E-02	89.040	7.2389E-02
89.990	8.9718E-02	90.625	1.0131E-01	91.050	1.0908E-01
91.330	1.1419E-01	91.440	1.1620E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.7735E-03	0.480	4.1720E-03
0.810	9.5474E-03	1.320	1.9243E-02	2.080	3.3421E-02
3.220	5.4995E-02	4.930	9.2362E-02	7.490	1.7251E-01
11.330	2.4141E-01	17.100	2.4199E-01	25.750	1.4800E-01
34.750	8.4811E-02	43.750	6.0339E-02	52.750	3.9509E-02
58.200	2.5761E-02	63.650	2.2936E-02	69.100	4.3036E-03
76.200	1.4168E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1992.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	3.397E+04	0.1125	291.00	2	2.500E-01	1.003E+04	0.1408	291.00
3	4.800E-01	6.476E+03	0.1534	291.00	4	8.100E-01	4.555E+03	0.1646	291.00
5	1.320E+00	3.298E+03	0.1759	291.00	6	2.080E+00	2.470E+03	0.1867	291.00
7	3.220E+00	1.899E+03	0.1973	291.00	8	4.930E+00	1.494E+03	0.2075	291.00
9	7.490E+00	1.203E+03	0.2172	291.00	10	1.133E+01	9.952E+02	0.2261	291.00
11	1.710E+01	8.556E+02	0.2334	291.00	12	2.575E+01	7.904E+02	0.2373	291.00
13	3.475E+01	8.146E+02	0.2358	291.00	14	4.375E+01	9.221E+02	0.2298	291.00
15	5.275E+01	1.147E+03	0.2194	291.00	16	5.820E+01	1.352E+03	0.2120	291.00
17	6.365E+01	1.606E+03	0.2044	291.00	18	6.910E+01	1.860E+03	0.1982	291.00
19	7.620E+01	2.069E+03	0.1938	291.00	20	8.036E+01	2.133E+03	0.1925	291.00
21	8.419E+01	2.163E+03	0.1920	291.00	22	8.676E+01	2.174E+03	0.1918	291.00
23	8.847E+01	2.178E+03	0.1917	291.00	24	8.961E+01	2.179E+03	0.1917	291.00
25	9.037E+01	2.180E+03	0.1917	291.00	26	9.088E+01	2.180E+03	0.1916	291.00
27	9.122E+01	2.180E+03	0.1916	291.00	28	9.144E+01	2.180E+03	0.1916	291.00

Initial Water Storage = 19.6261 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.07948
 Head (cm) = 3.23483E+05
 LiqWater Flow (cm)=-3.65497E-02
 IsoVapor Flow (cm)=-8.72809E-02
 Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
19.6261+	0.0000+	0.0000	- 0.1265-	0.0000-	0.0002 =	19.4994 vs.	19.4998

Mass Balance = -3.2248E-04 cm; Time step attempts = 33 and successes = 29

Evaporation: Potential = 0.3407 cm, Actual = 0.1265 cm

Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm

RHMEAN = 48.7 %; TMEAN = 279.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 12

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.12640
Head (cm) = 1.77732E+04
LiqWater Flow (cm) = 2.26072E-01
IsoVapor Flow (cm) = -4.50771E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
17.1862+ 0.3048+ 0.0000 - 0.1204- 0.0000- 0.0002 = 17.3704 vs. 17.3725

Mass Balance = -2.0968E-03 cm; Time step attempts = 128 and successes = 96
Evaporation: Potential = 0.1360 cm, Actual = 0.1204 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 93.1 %; TMEAN = 282.6 K; HDRY = 1.0000E+06 cm; DAYUBC = 5

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.2583E+02 [cm]
Potential Transpiration = 3.0049E+00 [cm]
Actual Transpiration = 1.9090E+00 [cm]
Potential Evaporation = 2.2283E+02 [cm]
Actual Evaporation = 2.4506E+01 [cm]
Evaporation during Growth = 1.4070E+01 [cm]
Total Runoff = 4.7549E+00 [cm]
Total Infiltration = 2.4201E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.5585E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.8956E+01 [cm]
Actual Rainfall = 2.8956E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.7372E+01 [cm]
Mass Balance Error = -1.1642E-01 [cm]
Total Successful Time Steps = 13623
Total Attempted Time Steps = 15509
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7722
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-3.0523E-01	0.175	1.4397E+01	0.365	1.0017E+01
0.645	6.5074E+00	1.065	3.8027E+00	1.700	1.2704E+00
2.650	-1.1066E-01	4.075	-4.3155E-01	6.210	-6.2321E-01
9.410	-8.1512E-01	14.215	-9.4550E-01	21.425	-9.1319E-01
30.250	-6.8398E-01	39.250	-4.0689E-01	48.250	-1.5857E-01
55.475	-1.6590E-02	60.925	5.8446E-02	66.375	9.9710E-02
72.650	1.3237E-01	78.280	1.4368E-01	82.275	1.4885E-01
85.475	1.5166E-01	87.615	1.5325E-01	89.040	1.5424E-01
89.990	1.5488E-01	90.625	1.5531E-01	91.050	1.5559E-01
91.330	1.5578E-01	91.440	1.5585E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	5.2152E-03	0.480	1.1145E-02
0.810	2.2911E-02	1.320	4.5043E-02	2.080	8.4439E-02
3.220	1.5606E-01	4.930	2.4672E-01	7.490	3.2024E-01
11.330	3.4563E-01	17.100	2.9286E-01	25.750	1.5353E-01
34.750	8.0683E-02	43.750	5.5710E-02	52.750	3.6738E-02
58.200	2.4029E-02	63.650	2.1390E-02	69.100	5.0973E-03
76.200	1.5603E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1993.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.777E+04	0.1264	291.00	2	2.500E-01	1.319E+04	0.1336	291.00
3	4.800E-01	9.364E+03	0.1427	291.00	4	8.100E-01	6.821E+03	0.1518	291.00
5	1.320E+00	5.106E+03	0.1609	291.00	6	2.080E+00	4.040E+03	0.1687	291.00
7	3.220E+00	3.425E+03	0.1745	291.00	8	4.930E+00	3.193E+03	0.1770	291.00
9	7.490E+00	3.235E+03	0.1765	291.00	10	1.133E+01	2.862E+03	0.1811	291.00
11	1.710E+01	2.377E+03	0.1882	291.00	12	2.575E+01	2.061E+03	0.1939	291.00
13	3.475E+01	1.956E+03	0.1961	291.00	14	4.375E+01	1.960E+03	0.1960	291.00
15	5.275E+01	2.022E+03	0.1947	291.00	16	5.820E+01	2.069E+03	0.1938	291.00
17	6.365E+01	2.115E+03	0.1929	291.00	18	6.910E+01	2.154E+03	0.1921	291.00
19	7.620E+01	2.190E+03	0.1915	291.00	20	8.036E+01	2.203E+03	0.1912	291.00
21	8.419E+01	2.211E+03	0.1911	291.00	22	8.676E+01	2.215E+03	0.1910	291.00
23	8.847E+01	2.216E+03	0.1910	291.00	24	8.961E+01	2.216E+03	0.1910	291.00
25	9.037E+01	2.217E+03	0.1910	291.00	26	9.088E+01	2.217E+03	0.1910	291.00
27	9.122E+01	2.217E+03	0.1910	291.00	28	9.144E+01	2.217E+03	0.1910	291.00

Initial Water Storage = 17.3725 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.20586
 Head (cm) = 1.55179E+03
 LiqWater Flow (cm) = 5.21148E-01
 IsoVapor Flow (cm) = -1.20342E-05
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
17.3725+	0.6604+	0.0000	- 0.1342-	0.0000-	0.0002 =	17.8984 vs.	17.9005

Mass Balance = -2.1127E-03 cm; Time step attempts = 113 and successes = 88
 Evaporation: Potential = 0.1356 cm, Actual = 0.1342 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 93.0 %; TMEAN = 279.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 0

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07423
Head (cm) = 5.49172E+05
LiqWater Flow (cm) = -4.35447E-03
IsoVapor Flow (cm) = -7.18927E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.8309+ 0.0000+ 0.0000 - 0.0766- 0.0000- 0.0002 = 16.7541 vs. 16.7542

Mass Balance = -1.0377E-04 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2103 cm, Actual = 0.0766 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 70.3 %; TMEAN = 279.5 K; HDRY = 1.0000E+06 cm; DAYUBC = 10

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SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3948E+02 [cm]
Potential Transpiration = 3.3448E+00 [cm]
Actual Transpiration = 1.3756E+00 [cm]
Potential Evaporation = 2.3613E+02 [cm]
Actual Evaporation = 2.2602E+01 [cm]
Evaporation during Growth = 1.0550E+01 [cm]
Total Runoff = 1.1349E+00 [cm]
Total Infiltration = 2.3325E+01 [cm]
Total Basal Liquid Flux (drainage) = 7.1236E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.4460E+01 [cm]
Actual Rainfall = 2.4460E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6754E+01 [cm]
Mass Balance Error = -1.0493E-01 [cm]
Total Successful Time Steps = 12814
Total Attempted Time Steps = 14520
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7918
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	7.2362E-01	0.175	1.4376E+01	0.365	1.0043E+01
0.645	6.6015E+00	1.065	4.3835E+00	1.700	2.6091E+00
2.650	1.5089E+00	4.075	9.5557E-01	6.210	6.0901E-01
9.410	3.7172E-01	14.215	8.7530E-02	21.425	-1.2110E-01
30.250	-1.5488E-01	39.250	-1.1384E-01	48.250	-6.6283E-02
55.475	-4.0131E-02	60.925	-2.5654E-02	66.375	-1.6520E-02
72.650	9.3349E-03	78.280	2.9270E-02	82.275	4.2949E-02
85.475	5.3119E-02	87.615	5.9699E-02	89.040	6.4018E-02
89.990	6.6880E-02	90.625	6.8789E-02	91.050	7.0065E-02
91.330	7.0905E-02	91.440	7.1236E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.2091E-03	0.480	5.1653E-03
0.810	1.1551E-02	1.320	2.4415E-02	2.080	4.5226E-02
3.220	7.5453E-02	4.930	1.1988E-01	7.490	1.9392E-01
11.330	2.5824E-01	17.100	2.4612E-01	25.750	1.4814E-01
34.750	8.5482E-02	43.750	6.1613E-02	52.750	4.0716E-02
58.200	2.6834E-02	63.650	2.4108E-02	69.100	4.9241E-03
76.200	1.6305E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

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INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1994.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	5.492E+05	0.0742	291.00	2	2.500E-01	3.261E+05	0.0794	291.00
3	4.800E-01	5.559E+04	0.1035	291.00	4	8.100E-01	1.104E+04	0.1382	291.00
5	1.320E+00	6.749E+03	0.1521	291.00	6	2.080E+00	4.818E+03	0.1627	291.00
7	3.220E+00	3.705E+03	0.1717	291.00	8	4.930E+00	3.020E+03	0.1791	291.00
9	7.490E+00	2.629E+03	0.1843	291.00	10	1.133E+01	2.520E+03	0.1859	291.00
11	1.710E+01	2.728E+03	0.1829	291.00	12	2.575E+01	2.873E+03	0.1809	291.00
13	3.475E+01	2.793E+03	0.1820	291.00	14	4.375E+01	2.660E+03	0.1839	291.00
15	5.275E+01	2.552E+03	0.1854	291.00	16	5.820E+01	2.504E+03	0.1862	291.00
17	6.365E+01	2.466E+03	0.1868	291.00	18	6.910E+01	2.438E+03	0.1872	291.00
19	7.620E+01	2.412E+03	0.1876	291.00	20	8.036E+01	2.402E+03	0.1878	291.00
21	8.419E+01	2.396E+03	0.1879	291.00	22	8.676E+01	2.393E+03	0.1880	291.00
23	8.847E+01	2.392E+03	0.1880	291.00	24	8.961E+01	2.392E+03	0.1880	291.00
25	9.037E+01	2.391E+03	0.1880	291.00	26	9.088E+01	2.391E+03	0.1880	291.00
27	9.122E+01	2.391E+03	0.1880	291.00	28	9.144E+01	2.391E+03	0.1880	291.00

Initial Water Storage = 16.7542 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.14395E-04
IsoVapor Flow (cm)=-5.99459E-02
Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
16.7542+	0.0000+	0.0000	- 0.0604-	0.0000-	0.0002 =	16.6935 vs.	16.6935

Mass Balance = -1.7101E-06 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2391 cm, Actual = 0.0604 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 67.8 %; TMEAN = 280.1 K; HDRY = 1.0000E+06 cm; DAYUBC = 18

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07337
Head (cm) = 6.02814E+05
LiqWater Flow (cm)=-2.55806E-02
IsoVapor Flow (cm)=-7.53903E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.2981+ 0.0000+ 0.0000 - 0.1046- 0.0000- 0.0001 = 16.1934 vs. 16.1937

Mass Balance = -2.4127E-04 cm; Time step attempts = 30 and successes = 28
Evaporation: Potential = 0.3030 cm, Actual = 0.1046 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 53.7 %; TMEAN = 279.5 K; HDRY = 1.0000E+06 cm; DAYUBC = 13

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SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.5176E+02 [cm]
Potential Transpiration = 3.3620E+00 [cm]
Actual Transpiration = 1.4723E+00 [cm]
Potential Evaporation = 2.4840E+02 [cm]
Actual Evaporation = 1.2799E+01 [cm]
Evaporation during Growth = 6.4491E+00 [cm]
Total Runoff = 2.3302E-01 [cm]
Total Infiltration = 1.3686E+01 [cm]
Total Basal Liquid Flux (drainage) = 3.9944E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.3919E+01 [cm]
Actual Rainfall = 1.3919E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6194E+01 [cm]
Mass Balance Error = -6.4507E-02 [cm]
Total Successful Time Steps = 11272
Total Attempted Time Steps = 12350
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8340
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	8.8720E-01	0.175	9.4988E+00	0.365	7.5800E+00
0.645	6.1925E+00	1.065	4.9352E+00	1.700	3.5864E+00
2.650	2.1843E+00	4.075	1.1827E+00	6.210	6.4791E-01
9.410	2.7175E-01	14.215	-1.0441E-01	21.425	-5.0871E-01
30.250	-7.2425E-01	39.250	-6.8262E-01	48.250	-5.7821E-01
55.475	-4.8977E-01	60.925	-4.2213E-01	66.375	-3.5445E-01
72.650	-2.5677E-01	78.280	-1.6809E-01	82.275	-1.0457E-01
85.475	-5.3994E-02	87.615	-2.0260E-02	89.040	2.1776E-03
89.990	1.7129E-02	90.625	2.7121E-02	91.050	3.3808E-02
91.330	3.8213E-02	91.440	3.9944E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.5647E-03	0.480	5.7025E-03
0.810	1.2144E-02	1.320	2.5032E-02	2.080	4.7585E-02
3.220	8.7518E-02	4.930	1.5436E-01	7.490	2.4282E-01
11.330	2.8306E-01	17.100	2.4649E-01	25.750	1.3696E-01
34.750	7.6880E-02	43.750	5.6549E-02	52.750	3.8367E-02
58.200	2.5766E-02	63.650	2.3566E-02	69.100	5.2175E-03
76.200	1.6644E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

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INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA1995.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	6.028E+05	0.0734	291.00	2	2.500E-01	2.799E+05	0.0811	291.00
3	4.800E-01	1.575E+04	0.1293	291.00	4	8.100E-01	7.791E+03	0.1479	291.00
5	1.320E+00	5.092E+03	0.1609	291.00	6	2.080E+00	3.680E+03	0.1719	291.00
7	3.220E+00	2.805E+03	0.1818	291.00	8	4.930E+00	2.226E+03	0.1908	291.00
9	7.490E+00	1.842E+03	0.1986	291.00	10	1.133E+01	1.617E+03	0.2041	291.00
11	1.710E+01	1.599E+03	0.2046	291.00	12	2.575E+01	2.286E+03	0.1898	291.00
13	3.475E+01	4.025E+03	0.1688	291.00	14	4.375E+01	4.376E+03	0.1660	291.00
15	5.275E+01	4.135E+03	0.1679	291.00	16	5.820E+01	3.998E+03	0.1690	291.00
17	6.365E+01	3.885E+03	0.1700	291.00	18	6.910E+01	3.797E+03	0.1708	291.00
19	7.620E+01	3.716E+03	0.1716	291.00	20	8.036E+01	3.683E+03	0.1719	291.00
21	8.419E+01	3.663E+03	0.1721	291.00	22	8.676E+01	3.654E+03	0.1722	291.00
23	8.847E+01	3.650E+03	0.1722	291.00	24	8.961E+01	3.648E+03	0.1722	291.00
25	9.037E+01	3.648E+03	0.1722	291.00	26	9.088E+01	3.648E+03	0.1722	291.00
27	9.122E+01	3.648E+03	0.1722	291.00	28	9.144E+01	3.648E+03	0.1722	291.00

Initial Water Storage = 16.1937 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.07223
 Head (cm) = 6.85941E+05
 LiqWater Flow (cm)=-3.54904E-04
 IsoVapor Flow (cm)=-7.61877E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
16.1937+	0.0000+	0.0000	- 0.0766-	0.0000-	0.0001 =	16.1170 vs.	16.1170

Mass Balance = -5.9369E-06 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.2531 cm, Actual = 0.0766 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 60.0 %; TMEAN = 278.4 K; HDRY = 1.0000E+06 cm; DAYUBC = 11

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = 5.10916E-02
IsoVapor Flow (cm) = -4.48582E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.0782+ 0.0762+ 0.0000 - 0.0703- 0.0000- 0.0001 = 15.0840 vs. 15.0848

Mass Balance = -8.2996E-04 cm; Time step attempts = 88 and successes = 71
Evaporation: Potential = 0.6961 cm, Actual = 0.0703 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 38.3 %; TMEAN = 284.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 19

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SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.4849E+02 [cm]
Potential Transpiration = 3.4980E+00 [cm]
Actual Transpiration = 7.2741E-01 [cm]
Potential Evaporation = 2.4499E+02 [cm]
Actual Evaporation = 1.4688E+01 [cm]
Evaporation during Growth = 4.2961E+00 [cm]
Total Runoff = 1.1311E+00 [cm]
Total Infiltration = 1.4261E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.9221E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.5392E+01 [cm]
Actual Rainfall = 1.5392E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5085E+01 [cm]
Mass Balance Error = -6.4015E-02 [cm]
Total Successful Time Steps = 11283
Total Attempted Time Steps = 12361
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8313
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-4.2623E-01	0.175	8.9331E+00	0.365	6.8387E+00
0.645	4.9135E+00	1.065	3.2835E+00	1.700	1.9780E+00
2.650	9.8285E-01	4.075	4.1143E-01	6.210	1.9187E-01
9.410	1.0922E-01	14.215	2.1069E-01	21.425	3.5795E-01
30.250	4.3951E-01	39.250	3.4720E-01	48.250	2.2945E-01
55.475	1.5019E-01	60.925	9.9871E-02	66.375	5.8050E-02
72.650	3.6474E-02	78.280	2.6686E-02	82.275	2.2933E-02
85.475	2.1149E-02	87.615	2.0321E-02	89.040	1.9875E-02
89.990	1.9607E-02	90.625	1.9436E-02	91.050	1.9323E-02
91.330	1.9250E-02	91.440	1.9221E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.5781E-04	0.480	6.0415E-04
0.810	1.4691E-03	1.320	3.1738E-03	2.080	5.7310E-03
3.220	1.3149E-02	4.930	3.1145E-02	7.490	6.5942E-02
11.330	1.2971E-01	17.100	1.6526E-01	25.750	1.1211E-01
34.750	6.7071E-02	43.750	4.9731E-02	52.750	3.3874E-02
58.200	2.2399E-02	63.650	2.0427E-02	69.100	4.0757E-03
76.200	1.2955E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1996.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.679E+05	0.0702	291.00
3	4.800E-01	6.882E+05	0.0722	291.00	4	8.100E-01	4.736E+05	0.0756	291.00
5	1.320E+00	2.372E+05	0.0829	291.00	6	2.080E+00	1.452E+05	0.0890	291.00
7	3.220E+00	3.458E+04	0.1122	291.00	8	4.930E+00	1.355E+04	0.1330	291.00
9	7.490E+00	8.908E+03	0.1441	291.00	10	1.133E+01	6.575E+03	0.1529	291.00
11	1.710E+01	5.106E+03	0.1609	291.00	12	2.575E+01	4.155E+03	0.1677	291.00
13	3.475E+01	3.718E+03	0.1716	291.00	14	4.375E+01	3.521E+03	0.1735	291.00
15	5.275E+01	3.456E+03	0.1742	291.00	16	5.820E+01	3.456E+03	0.1742	291.00
17	6.365E+01	3.476E+03	0.1740	291.00	18	6.910E+01	3.509E+03	0.1736	291.00
19	7.620E+01	3.560E+03	0.1731	291.00	20	8.036E+01	3.587E+03	0.1728	291.00
21	8.419E+01	3.605E+03	0.1727	291.00	22	8.676E+01	3.614E+03	0.1726	291.00
23	8.847E+01	3.618E+03	0.1725	291.00	24	8.961E+01	3.619E+03	0.1725	291.00
25	9.037E+01	3.620E+03	0.1725	291.00	26	9.088E+01	3.620E+03	0.1725	291.00
27	9.122E+01	3.620E+03	0.1725	291.00	28	9.144E+01	3.620E+03	0.1725	291.00

Initial Water Storage = 15.0848 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.37260E-05
IsoVapor Flow (cm)=-1.61619E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.0848+	0.0000+	0.0000	- 0.0162-	0.0000-	0.0001 =	15.0686 vs.	15.0686

Mass Balance = 5.2169E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2720 cm, Actual = 0.0162 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 62.5 %; TMEAN = 279.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-7.41157E-06
IsoVapor Flow (cm)=-9.16447E-03
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.3311+ 0.0000+ 0.0000 - 0.0092- 0.0000- 0.0001 = 15.3218 vs. 15.3218

Mass Balance = -5.9988E-08 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2843 cm, Actual = 0.0092 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 36.9 %; TMEAN = 282.9 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.6054E+02 [cm]
Potential Transpiration = 3.6287E+00 [cm]
Actual Transpiration = 1.0584E+00 [cm]
Potential Evaporation = 2.5691E+02 [cm]
Actual Evaporation = 1.8236E+01 [cm]
Evaporation during Growth = 1.1993E+01 [cm]
Total Runoff = 1.8288E+00 [cm]
Total Infiltration = 1.9482E+01 [cm]
Total Basal Liquid Flux (drainage) = 2.2190E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.1311E+01 [cm]
Actual Rainfall = 2.1311E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5322E+01 [cm]
Mass Balance Error = -7.2036E-02 [cm]
Total Successful Time Steps = 11842
Total Attempted Time Steps = 13162
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8434
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	1.2455E+00	0.175	1.1936E+01	0.365	8.1843E+00
0.645	5.9211E+00	1.065	4.6432E+00	1.700	3.6362E+00
2.650	2.7161E+00	4.075	1.7840E+00	6.210	1.2103E+00
9.410	9.8137E-01	14.215	7.9127E-01	21.425	6.0630E-01
30.250	4.8287E-01	39.250	3.9990E-01	48.250	3.2744E-01
55.475	2.6811E-01	60.925	2.2361E-01	66.375	1.7818E-01
72.650	1.4106E-01	78.280	1.0639E-01	82.275	8.1556E-02
85.475	6.1068E-02	87.615	4.7187E-02	89.040	3.7892E-02
89.990	3.1681E-02	90.625	2.7525E-02	91.050	2.4743E-02
91.330	2.2910E-02	91.440	2.2190E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	3.6935E-03	0.480	7.4453E-03
0.810	1.4267E-02	1.320	2.6334E-02	2.080	4.4745E-02
3.220	7.0788E-02	4.930	1.0257E-01	7.490	1.3665E-01
11.330	1.8048E-01	17.100	1.7465E-01	25.750	1.0868E-01
34.750	6.3483E-02	43.750	4.6660E-02	52.750	3.2506E-02
58.200	2.1310E-02	63.650	1.9242E-02	69.100	3.6440E-03
76.200	1.2197E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1997.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	9.431E+05	0.0696	291.00
3	4.800E-01	8.601E+05	0.0703	291.00	4	8.100E-01	7.489E+05	0.0715	291.00
5	1.320E+00	5.926E+05	0.0735	291.00	6	2.080E+00	3.880E+05	0.0776	291.00
7	3.220E+00	1.324E+05	0.0903	291.00	8	4.930E+00	1.578E+04	0.1292	291.00
9	7.490E+00	9.137E+03	0.1434	291.00	10	1.133E+01	6.444E+03	0.1535	291.00
11	1.710E+01	4.922E+03	0.1620	291.00	12	2.575E+01	3.968E+03	0.1693	291.00
13	3.475E+01	3.500E+03	0.1737	291.00	14	4.375E+01	3.253E+03	0.1764	291.00
15	5.275E+01	3.121E+03	0.1779	291.00	16	5.820E+01	3.074E+03	0.1784	291.00
17	6.365E+01	3.046E+03	0.1788	291.00	18	6.910E+01	3.030E+03	0.1790	291.00
19	7.620E+01	3.023E+03	0.1790	291.00	20	8.036E+01	3.022E+03	0.1791	291.00
21	8.419E+01	3.021E+03	0.1791	291.00	22	8.676E+01	3.022E+03	0.1791	291.00
23	8.847E+01	3.022E+03	0.1791	291.00	24	8.961E+01	3.022E+03	0.1791	291.00
25	9.037E+01	3.022E+03	0.1791	291.00	26	9.088E+01	3.022E+03	0.1791	291.00
27	9.122E+01	3.022E+03	0.1791	291.00	28	9.144E+01	3.022E+03	0.1791	291.00

Initial Water Storage = 15.3218 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-7.29193E-06
IsoVapor Flow (cm)=-9.02478E-03
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.3218+	0.0000+	0.0000	- 0.0090-	0.0000-	0.0001 =	15.3127 vs.	15.3127

Mass Balance = -5.9100E-08 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.4549 cm, Actual = 0.0090 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 36.2 %; TMEAN = 287.6 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07150
Head (cm) = 7.46753E+05
LiqWater Flow (cm)=-1.72830E-04
IsoVapor Flow (cm)=-6.08278E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.6340+ 0.0000+ 0.0000 - 0.0613- 0.0000- 0.0001 = 16.5727 vs. 16.5727

Mass Balance = -3.2807E-06 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1989 cm, Actual = 0.0613 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 66.2 %; TMEAN = 278.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 11

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.2638E+02 [cm]
Potential Transpiration = 3.1122E+00 [cm]
Actual Transpiration = 1.2992E+00 [cm]
Potential Evaporation = 2.2326E+02 [cm]
Actual Evaporation = 2.1447E+01 [cm]
Evaporation during Growth = 1.0533E+01 [cm]
Total Runoff = 5.4868E-01 [cm]
Total Infiltration = 2.3912E+01 [cm]
Total Basal Liquid Flux (drainage) = 2.5418E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.4460E+01 [cm]
Actual Rainfall = 2.4460E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6573E+01 [cm]
Mass Balance Error = -1.1102E-01 [cm]
Total Successful Time Steps = 13103
Total Attempted Time Steps = 14994
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7909
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	2.4645E+00	0.175	1.6029E+01	0.365	1.2226E+01
0.645	8.9969E+00	1.065	6.4492E+00	1.700	4.3229E+00
2.650	2.8821E+00	4.075	2.1708E+00	6.210	1.8312E+00
9.410	1.4589E+00	14.215	1.0229E+00	21.425	5.6099E-01
30.250	2.1771E-01	39.250	3.2679E-02	48.250	-5.1725E-02
55.475	-8.1109E-02	60.925	-9.1386E-02	66.375	-9.3122E-02
72.650	-7.1799E-02	78.280	-4.5633E-02	82.275	-2.4883E-02
85.475	-7.5819E-03	87.615	4.1850E-03	89.040	1.2076E-02
89.990	1.7353E-02	90.625	2.0884E-02	91.050	2.3248E-02
91.330	2.4806E-02	91.440	2.5418E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.3070E-03	0.480	5.7336E-03
0.810	1.2886E-02	1.320	2.7748E-02	2.080	5.4669E-02
3.220	9.8958E-02	4.930	1.6500E-01	7.490	2.2170E-01
11.330	2.3242E-01	17.100	1.9337E-01	25.750	1.0643E-01
34.750	5.9833E-02	43.750	4.3647E-02	52.750	3.0451E-02
58.200	2.0413E-02	63.650	1.8572E-02	69.100	3.8465E-03
76.200	1.1774E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1998.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	7.468E+05	0.0715	291.00	2	2.500E-01	5.047E+05	0.0750	291.00
3	4.800E-01	2.030E+05	0.0848	291.00	4	8.100E-01	1.345E+04	0.1331	291.00
5	1.320E+00	7.367E+03	0.1495	291.00	6	2.080E+00	5.035E+03	0.1613	291.00
7	3.220E+00	3.729E+03	0.1715	291.00	8	4.930E+00	2.893E+03	0.1807	291.00
9	7.490E+00	2.335E+03	0.1889	291.00	10	1.133E+01	1.979E+03	0.1956	291.00
11	1.710E+01	1.814E+03	0.1992	291.00	12	2.575E+01	1.954E+03	0.1961	291.00
13	3.475E+01	2.414E+03	0.1876	291.00	14	4.375E+01	2.878E+03	0.1809	291.00
15	5.275E+01	3.133E+03	0.1777	291.00	16	5.820E+01	3.234E+03	0.1766	291.00
17	6.365E+01	3.314E+03	0.1757	291.00	18	6.910E+01	3.382E+03	0.1749	291.00
19	7.620E+01	3.454E+03	0.1742	291.00	20	8.036E+01	3.485E+03	0.1739	291.00
21	8.419E+01	3.506E+03	0.1737	291.00	22	8.676E+01	3.515E+03	0.1736	291.00
23	8.847E+01	3.519E+03	0.1735	291.00	24	8.961E+01	3.521E+03	0.1735	291.00
25	9.037E+01	3.521E+03	0.1735	291.00	26	9.088E+01	3.522E+03	0.1735	291.00
27	9.122E+01	3.522E+03	0.1735	291.00	28	9.144E+01	3.522E+03	0.1735	291.00

Initial Water Storage = 16.5727 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07041
Head (cm) = 8.50429E+05
LiqWater Flow (cm)=-7.99691E-05
IsoVapor Flow (cm)=-5.18109E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
16.5727+	0.0000+	0.0000	- 0.0520-	0.0000-	0.0001 =	16.5207 vs.	16.5207

Mass Balance = -7.2676E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1921 cm, Actual = 0.0520 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 66.3 %; TMEAN = 279.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 12

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.45466E-05
IsoVapor Flow (cm)=-1.70646E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.7024+ 0.0000+ 0.0000 - 0.0171- 0.0000- 0.0001 = 15.6852 vs. 15.6852

Mass Balance = -2.0360E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2846 cm, Actual = 0.0171 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 51.3 %; TMEAN = 282.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3693E+02 [cm]
Potential Transpiration = 3.3912E+00 [cm]
Actual Transpiration = 8.6939E-01 [cm]
Potential Evaporation = 2.3353E+02 [cm]
Actual Evaporation = 1.6289E+01 [cm]
Evaporation during Growth = 7.3315E+00 [cm]
Total Runoff = 9.8204E-01 [cm]
Total Infiltration = 1.6214E+01 [cm]
Total Basal Liquid Flux (drainage) = 2.4377E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.7196E+01 [cm]
Actual Rainfall = 1.7196E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5685E+01 [cm]
Mass Balance Error = -8.1311E-02 [cm]
Total Successful Time Steps = 11823
Total Attempted Time Steps = 13115
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8065
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-7.5032E-02	0.175	1.0684E+01	0.365	7.9840E+00
0.645	5.7872E+00	1.065	3.8733E+00	1.700	2.1970E+00
2.650	1.0225E+00	4.075	4.6326E-01	6.210	1.6624E-01
9.410	9.6209E-02	14.215	7.9689E-02	21.425	9.3592E-02
30.250	1.3615E-01	39.250	1.3444E-01	48.250	9.3192E-02
55.475	5.4490E-02	60.925	2.8161E-02	66.375	5.8531E-03
72.650	3.8383E-03	78.280	7.5492E-03	82.275	1.2011E-02
85.475	1.6116E-02	87.615	1.9021E-02	89.040	2.1001E-02
89.990	2.2333E-02	90.625	2.3228E-02	91.050	2.3827E-02
91.330	2.4222E-02	91.440	2.4377E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.3836E-03	0.480	3.1469E-03
0.810	7.0392E-03	1.320	1.4963E-02	2.080	2.8333E-02
3.220	4.5838E-02	4.930	6.2103E-02	7.490	8.8528E-02
11.330	1.4627E-01	17.100	1.6365E-01	25.750	1.0746E-01
34.750	6.5786E-02	43.750	4.9783E-02	52.750	3.4692E-02
58.200	2.3604E-02	63.650	2.1593E-02	69.100	4.0309E-03
76.200	1.1810E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA1999.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.961E+05	0.0700	291.00
3	4.800E-01	7.502E+05	0.0715	291.00	4	8.100E-01	5.639E+05	0.0740	291.00
5	1.320E+00	3.164E+05	0.0797	291.00	6	2.080E+00	3.986E+04	0.1095	291.00
7	3.220E+00	1.168E+04	0.1368	291.00	8	4.930E+00	7.376E+03	0.1495	291.00
9	7.490E+00	5.356E+03	0.1593	291.00	10	1.133E+01	4.172E+03	0.1676	291.00
11	1.710E+01	3.437E+03	0.1744	291.00	12	2.575E+01	3.023E+03	0.1790	291.00
13	3.475E+01	2.909E+03	0.1805	291.00	14	4.375E+01	2.952E+03	0.1799	291.00
15	5.275E+01	3.087E+03	0.1783	291.00	16	5.820E+01	3.190E+03	0.1771	291.00
17	6.365E+01	3.302E+03	0.1758	291.00	18	6.910E+01	3.413E+03	0.1746	291.00
19	7.620E+01	3.539E+03	0.1733	291.00	20	8.036E+01	3.596E+03	0.1727	291.00
21	8.419E+01	3.635E+03	0.1724	291.00	22	8.676E+01	3.652E+03	0.1722	291.00
23	8.847E+01	3.660E+03	0.1721	291.00	24	8.961E+01	3.663E+03	0.1721	291.00
25	9.037E+01	3.664E+03	0.1721	291.00	26	9.088E+01	3.664E+03	0.1721	291.00
27	9.122E+01	3.665E+03	0.1721	291.00	28	9.144E+01	3.665E+03	0.1721	291.00

Initial Water Storage = 15.6852 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.42116E-05
IsoVapor Flow (cm)=-1.67116E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.6852+	0.0000+	0.0000	- 0.0167-	0.0000-	0.0001 =	15.6684 vs.	15.6684

Mass Balance = -1.9500E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.6121 cm, Actual = 0.0167 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 37.3 %; TMEAN = 284.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = -5.01100E-05
IsoVapor Flow (cm) = -4.71421E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.4375+ 0.0000+ 0.0000 - 0.0472- 0.0000- 0.0001 = 16.3902 vs. 16.3902

Mass Balance = -6.3703E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2758 cm, Actual = 0.0472 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 53.3 %; TMEAN = 285.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3802E+02 [cm]
Potential Transpiration = 3.3430E+00 [cm]
Actual Transpiration = 9.4552E-01 [cm]
Potential Evaporation = 2.3468E+02 [cm]
Actual Evaporation = 1.7382E+01 [cm]
Evaporation during Growth = 9.4383E+00 [cm]
Total Runoff = 1.7390E+00 [cm]
Total Infiltration = 1.8987E+01 [cm]
Total Basal Liquid Flux (drainage) = 2.4402E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.0726E+01 [cm]
Actual Rainfall = 2.0726E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6390E+01 [cm]
Mass Balance Error = -6.9649E-02 [cm]
Total Successful Time Steps = 11552
Total Attempted Time Steps = 12837
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8311
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	1.6052E+00	0.175	1.1904E+01	0.365	8.9085E+00
0.645	6.7319E+00	1.065	4.8927E+00	1.700	3.5992E+00
2.650	2.7553E+00	4.075	1.9840E+00	6.210	1.4548E+00
9.410	1.0951E+00	14.215	8.4161E-01	21.425	5.7752E-01
30.250	4.3869E-01	39.250	3.8432E-01	48.250	3.4075E-01
55.475	2.9384E-01	60.925	2.5343E-01	66.375	2.0781E-01
72.650	1.6716E-01	78.280	1.2644E-01	82.275	9.6591E-02
85.475	7.1748E-02	87.615	5.4862E-02	89.040	4.3541E-02
89.990	3.5971E-02	90.625	3.0906E-02	91.050	2.7515E-02
91.330	2.5280E-02	91.440	2.4402E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.7182E-03	0.480	5.3571E-03
0.810	1.0491E-02	1.320	2.0860E-02	2.080	4.0076E-02
3.220	6.4769E-02	4.930	8.9251E-02	7.490	1.1011E-01
11.330	1.5220E-01	17.100	1.6175E-01	25.750	1.0262E-01
34.750	6.2263E-02	43.750	4.5693E-02	52.750	3.1881E-02
58.200	2.1330E-02	63.650	1.9435E-02	69.100	3.5162E-03
76.200	1.2047E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2000.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	7.398E+05	0.0716	291.00
3	4.800E-01	4.146E+05	0.0769	291.00	4	8.100E-01	5.805E+04	0.1028	291.00
5	1.320E+00	1.054E+04	0.1395	291.00	6	2.080E+00	6.543E+03	0.1531	291.00
7	3.220E+00	4.675E+03	0.1637	291.00	8	4.930E+00	3.580E+03	0.1729	291.00
9	7.490E+00	2.895E+03	0.1807	291.00	10	1.133E+01	2.493E+03	0.1864	291.00
11	1.710E+01	2.372E+03	0.1883	291.00	12	2.575E+01	2.715E+03	0.1831	291.00
13	3.475E+01	2.981E+03	0.1796	291.00	14	4.375E+01	2.972E+03	0.1797	291.00
15	5.275E+01	2.919E+03	0.1803	291.00	16	5.820E+01	2.902E+03	0.1806	291.00
17	6.365E+01	2.899E+03	0.1806	291.00	18	6.910E+01	2.904E+03	0.1805	291.00
19	7.620E+01	2.920E+03	0.1803	291.00	20	8.036E+01	2.929E+03	0.1802	291.00
21	8.419E+01	2.935E+03	0.1801	291.00	22	8.676E+01	2.939E+03	0.1801	291.00
23	8.847E+01	2.940E+03	0.1801	291.00	24	8.961E+01	2.941E+03	0.1801	291.00
25	9.037E+01	2.941E+03	0.1801	291.00	26	9.088E+01	2.941E+03	0.1801	291.00
27	9.122E+01	2.941E+03	0.1801	291.00	28	9.144E+01	2.941E+03	0.1801	291.00

Initial Water Storage = 16.3902 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-4.22782E-05
 IsoVapor Flow (cm)=-4.15352E-02
 Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
16.3902+	0.0000+	0.0000	- 0.0416-	0.0000-	0.0001 =	16.3485 vs.	16.3485

Mass Balance = -4.4975E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.5399 cm, Actual = 0.0416 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 46.8 %; TMEAN = 285.9 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.57147E-05
IsoVapor Flow (cm)=-1.82823E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.6180+ 0.0000+ 0.0000 - 0.0183- 0.0000- 0.0001 = 15.5997 vs. 15.5997

Mass Balance = -1.7888E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2416 cm, Actual = 0.0183 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 48.4 %; TMEAN = 278.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.4006E+02 [cm]
Potential Transpiration = 3.3011E+00 [cm]
Actual Transpiration = 1.3087E+00 [cm]
Potential Evaporation = 2.3676E+02 [cm]
Actual Evaporation = 1.6415E+01 [cm]
Evaporation during Growth = 9.1760E+00 [cm]
Total Runoff = 1.9296E+00 [cm]
Total Infiltration = 1.6892E+01 [cm]
Total Basal Liquid Flux (drainage) = 3.1207E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.8821E+01 [cm]
Actual Rainfall = 1.8821E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5600E+01 [cm]
Mass Balance Error = -7.2095E-02 [cm]
Total Successful Time Steps = 11608
Total Attempted Time Steps = 12841
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8312
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	4.7734E-01	0.175	1.1255E+01	0.365	8.6102E+00
0.645	6.5396E+00	1.065	4.6468E+00	1.700	2.8222E+00
2.650	1.5796E+00	4.075	8.1099E-01	6.210	4.2164E-01
9.410	2.7334E-01	14.215	1.3881E-01	21.425	5.1452E-02
30.250	3.0899E-04	39.250	-4.3768E-02	48.250	-7.1703E-02
55.475	-8.1386E-02	60.925	-8.2945E-02	66.375	-8.0425E-02
72.650	-5.6036E-02	78.280	-3.0968E-02	82.275	-1.2071E-02
85.475	3.0539E-03	87.615	1.3159E-02	89.040	1.9884E-02
89.990	2.4366E-02	90.625	2.7362E-02	91.050	2.9367E-02
91.330	3.0688E-02	91.440	3.1207E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	3.1276E-03	0.480	6.6875E-03
0.810	1.4265E-02	1.320	2.8995E-02	2.080	5.4551E-02
3.220	9.3194E-02	4.930	1.3873E-01	7.490	1.8970E-01
11.330	2.3438E-01	17.100	2.1248E-01	25.750	1.2337E-01
34.750	7.1061E-02	43.750	5.1861E-02	52.750	3.5336E-02
58.200	2.3549E-02	63.650	2.1418E-02	69.100	4.5340E-03
76.200	1.4870E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2001.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.902E+05	0.0700	291.00
3	4.800E-01	7.368E+05	0.0716	291.00	4	8.100E-01	5.421E+05	0.0743	291.00
5	1.320E+00	2.857E+05	0.0808	291.00	6	2.080E+00	2.805E+04	0.1164	291.00
7	3.220E+00	1.130E+04	0.1376	291.00	8	4.930E+00	7.517E+03	0.1489	291.00
9	7.490E+00	5.646E+03	0.1576	291.00	10	1.133E+01	4.518E+03	0.1649	291.00
11	1.710E+01	3.803E+03	0.1708	291.00	12	2.575E+01	3.391E+03	0.1748	291.00
13	3.475E+01	3.235E+03	0.1765	291.00	14	4.375E+01	3.195E+03	0.1770	291.00
15	5.275E+01	3.214E+03	0.1768	291.00	16	5.820E+01	3.238E+03	0.1765	291.00
17	6.365E+01	3.265E+03	0.1762	291.00	18	6.910E+01	3.292E+03	0.1759	291.00
19	7.620E+01	3.320E+03	0.1756	291.00	20	8.036E+01	3.331E+03	0.1755	291.00
21	8.419E+01	3.339E+03	0.1754	291.00	22	8.676E+01	3.342E+03	0.1754	291.00
23	8.847E+01	3.343E+03	0.1754	291.00	24	8.961E+01	3.344E+03	0.1753	291.00
25	9.037E+01	3.344E+03	0.1753	291.00	26	9.088E+01	3.344E+03	0.1753	291.00
27	9.122E+01	3.344E+03	0.1753	291.00	28	9.144E+01	3.344E+03	0.1753	291.00

Initial Water Storage = 15.5997 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-1.50202E-05
 IsoVapor Flow (cm)=-1.75608E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.5997+	0.0000+	0.0000	- 0.0176-	0.0000-	0.0001 =	15.5820 vs.	15.5820

Mass Balance = -1.8651E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.1853 cm, Actual = 0.0176 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 53.0 %; TMEAN = 277.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm3/cm3) = 0.07216
Head (cm) = 6.91747E+05
LiqWater Flow (cm) = 1.65411E-01
IsoVapor Flow (cm) = -5.57307E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
14.3895+ 0.2032+ 0.0000 - 0.0938- 0.0000- 0.0000 = 14.4989 vs. 14.5004

Mass Balance = -1.5646E-03 cm; Time step attempts = 117 and successes = 90
Evaporation: Potential = 0.1857 cm, Actual = 0.0938 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 52.7 %; TMEAN = 276.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 10

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.4084E+02 [cm]
Potential Transpiration = 3.4006E+00 [cm]
Actual Transpiration = 6.4122E-01 [cm]
Potential Evaporation = 2.3744E+02 [cm]
Actual Evaporation = 1.1380E+01 [cm]
Evaporation during Growth = 6.2337E+00 [cm]
Total Runoff = 1.1891E-02 [cm]
Total Infiltration = 1.0885E+01 [cm]
Total Basal Liquid Flux (drainage) = 2.1585E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.0897E+01 [cm]
Actual Rainfall = 1.0897E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.4500E+01 [cm]
Mass Balance Error = -5.8618E-02 [cm]
Total Successful Time Steps = 11200
Total Attempted Time Steps = 12190
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8397
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-4.9503E-01	0.175	7.7814E+00	0.365	6.0496E+00
0.645	4.6345E+00	1.065	3.4970E+00	1.700	2.2941E+00
2.650	1.0831E+00	4.075	5.3975E-03	6.210	-4.0191E-01
9.410	-4.2858E-01	14.215	-4.5483E-01	21.425	-4.7341E-01
30.250	-4.3377E-01	39.250	-3.6662E-01	48.250	-2.9775E-01
55.475	-2.4888E-01	60.925	-2.1455E-01	66.375	-1.8268E-01
72.650	-1.3022E-01	78.280	-8.4137E-02	82.275	-5.1463E-02
85.475	-2.5773E-02	87.615	-8.7316E-03	89.040	2.5764E-03
89.990	1.0104E-02	90.625	1.5133E-02	91.050	1.8498E-02
91.330	2.0714E-02	91.440	2.1585E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	7.5353E-04	0.480	1.9807E-03
0.810	4.3859E-03	1.320	8.2686E-03	2.080	1.3784E-02
3.220	1.6628E-02	4.930	2.3799E-02	7.490	4.4233E-02
11.330	1.0531E-01	17.100	1.3734E-01	25.750	9.7594E-02
34.750	6.1019E-02	43.750	4.5766E-02	52.750	3.2142E-02
58.200	2.2199E-02	63.650	2.0625E-02	69.100	4.0922E-03
76.200	1.3053E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

 UNSAT-H Version 3.01
 INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2002.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	6.917E+05	0.0722	291.00	2	2.500E-01	4.787E+05	0.0755	291.00
3	4.800E-01	2.218E+05	0.0837	291.00	4	8.100E-01	2.782E+04	0.1166	291.00
5	1.320E+00	1.638E+04	0.1283	291.00	6	2.080E+00	1.824E+04	0.1258	291.00
7	3.220E+00	8.767E+04	0.0962	291.00	8	4.930E+00	1.958E+04	0.1242	291.00
9	7.490E+00	1.104E+04	0.1382	291.00	10	1.133E+01	7.965E+03	0.1473	291.00
11	1.710E+01	6.340E+03	0.1540	291.00	12	2.575E+01	5.376E+03	0.1592	291.00
13	3.475E+01	4.888E+03	0.1623	291.00	14	4.375E+01	4.604E+03	0.1643	291.00
15	5.275E+01	4.427E+03	0.1656	291.00	16	5.820E+01	4.352E+03	0.1661	291.00
17	6.365E+01	4.297E+03	0.1666	291.00	18	6.910E+01	4.256E+03	0.1669	291.00
19	7.620E+01	4.220E+03	0.1672	291.00	20	8.036E+01	4.206E+03	0.1673	291.00
21	8.419E+01	4.197E+03	0.1674	291.00	22	8.676E+01	4.193E+03	0.1674	291.00
23	8.847E+01	4.192E+03	0.1674	291.00	24	8.961E+01	4.191E+03	0.1674	291.00
25	9.037E+01	4.191E+03	0.1674	291.00	26	9.088E+01	4.191E+03	0.1674	291.00
27	9.122E+01	4.191E+03	0.1674	291.00	28	9.144E+01	4.191E+03	0.1674	291.00

Initial Water Storage = 14.5004 cm

NOTE: There are no temperature data when plants are modelled.

 DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-4.82325E-05
 IsoVapor Flow (cm)=-3.78101E-02
 Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
14.5004+	0.0000+	0.0000	- 0.0381-	0.0000-	0.0000 =	14.4623 vs.	14.4623

Mass Balance = 2.6190E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.1789 cm, Actual = 0.0381 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 69.6 %; TMEAN = 276.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 18

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = -5.59927E-05
IsoVapor Flow (cm) = -5.10492E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.7459+	0.0000+	0.0000	- 0.0511-	0.0000-	0.0000 =	15.6948	vs. 15.6948

Mass Balance = -7.1006E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2797 cm, Actual = 0.0511 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 55.3 %; TMEAN = 277.9 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is:	=	1	
Potential Evapotranspiration	=	2.4124E+02	[cm]
Potential Transpiration	=	3.4674E+00	[cm]
Actual Transpiration	=	7.8558E-01	[cm]
Potential Evaporation	=	2.3777E+02	[cm]
Actual Evaporation	=	1.5588E+01	[cm]
Evaporation during Growth	=	5.8925E+00	[cm]
Total Runoff	=	2.9269E-03	[cm]
Total Infiltration	=	1.7498E+01	[cm]
Total Basal Liquid Flux (drainage)	=	1.3202E-02	[cm]
Total Basal Vapor Flux (temp-grad)	=	0.0000E+00	[cm]
Total Applied Water	=	1.7501E+01	[cm]
Actual Rainfall	=	1.7501E+01	[cm]
Actual Irrigation	=	0.0000E+00	[cm]
Total Final Moisture Storage	=	1.5695E+01	[cm]
Mass Balance Error	=	-8.3371E-02	[cm]
Total Successful Time Steps	=	11718	
Total Attempted Time Steps	=	12980	
Total Time Step Reductions (DHMAX)	=	0	
Total Changes in Surface Boundary	=	7969	
Total Time Actually Simulated	=	3.6500E+02	[days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	1.9097E+00	0.175	1.1785E+01	0.365	9.1512E+00
0.645	7.2901E+00	1.065	5.5764E+00	1.700	4.1628E+00
2.650	3.0150E+00	4.075	2.2894E+00	6.210	1.7422E+00
9.410	1.3991E+00	14.215	1.0403E+00	21.425	5.9671E-01
30.250	2.3987E-01	39.250	5.2937E-02	48.250	-2.7185E-02
55.475	-5.4158E-02	60.925	-6.3962E-02	66.375	-6.7594E-02
72.650	-5.1670E-02	78.280	-3.3693E-02	82.275	-1.9689E-02
85.475	-8.2758E-03	87.615	-5.8957E-04	89.040	4.5435E-03
89.990	7.9697E-03	90.625	1.0261E-02	91.050	1.1795E-02
91.330	1.2805E-02	91.440	1.3202E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.1178E-03	0.480	2.4366E-03
0.810	5.0754E-03	1.320	1.0116E-02	2.080	1.9062E-02
3.220	3.0715E-02	4.930	5.1386E-02	7.490	8.8719E-02
11.330	1.4164E-01	17.100	1.5698E-01	25.750	1.0131E-01
34.750	5.9936E-02	43.750	4.4322E-02	52.750	3.0433E-02
58.200	1.9834E-02	63.650	1.7935E-02	69.100	3.4112E-03
76.200	1.1577E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA2003.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	7.192E+05	0.0718	291.00
3	4.800E-01	3.730E+05	0.0780	291.00	4	8.100E-01	2.859E+04	0.1160	291.00
5	1.320E+00	9.284E+03	0.1429	291.00	6	2.080E+00	5.897E+03	0.1563	291.00
7	3.220E+00	4.245E+03	0.1670	291.00	8	4.930E+00	3.253E+03	0.1764	291.00
9	7.490E+00	2.617E+03	0.1845	291.00	10	1.133E+01	2.228E+03	0.1908	291.00
11	1.710E+01	2.080E+03	0.1935	291.00	12	2.575E+01	2.384E+03	0.1881	291.00
13	3.475E+01	3.251E+03	0.1764	291.00	14	4.375E+01	4.093E+03	0.1682	291.00
15	5.275E+01	4.490E+03	0.1651	291.00	16	5.820E+01	4.598E+03	0.1643	291.00
17	6.365E+01	4.646E+03	0.1640	291.00	18	6.910E+01	4.665E+03	0.1638	291.00
19	7.620E+01	4.669E+03	0.1638	291.00	20	8.036E+01	4.668E+03	0.1638	291.00
21	8.419E+01	4.667E+03	0.1638	291.00	22	8.676E+01	4.666E+03	0.1638	291.00
23	8.847E+01	4.666E+03	0.1638	291.00	24	8.961E+01	4.666E+03	0.1638	291.00
25	9.037E+01	4.666E+03	0.1638	291.00	26	9.088E+01	4.666E+03	0.1638	291.00
27	9.122E+01	4.666E+03	0.1638	291.00	28	9.144E+01	4.666E+03	0.1638	291.00

Initial Water Storage = 15.6948 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = -4.89515E-05
IsoVapor Flow (cm) = -4.63475E-02
Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
15.6948+	0.0000+	0.0000	- 0.0464-	0.0000-	0.0000 =	15.6483 vs.	15.6483

Mass Balance = -6.2709E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.4577 cm, Actual = 0.0464 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 38.6 %; TMEAN = 280.9 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-5.89616E-06
IsoVapor Flow (cm)=-7.37614E-03
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
13.9779+ 0.0000+ 0.0000 - 0.0074- 0.0000- 0.0000 = 13.9705 vs. 13.9705

Mass Balance = -5.4352E-08 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.4016 cm, Actual = 0.0074 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 20.1 %; TMEAN = 279.3 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.5167E+02 [cm]
Potential Transpiration = 3.4458E+00 [cm]
Actual Transpiration = 8.3850E-01 [cm]
Potential Evaporation = 2.4822E+02 [cm]
Actual Evaporation = 1.1008E+01 [cm]
Evaporation during Growth = 5.2111E+00 [cm]
Total Runoff = 6.1327E-01 [cm]
Total Infiltration = 1.0080E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.3157E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.0693E+01 [cm]
Actual Rainfall = 1.0693E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.3970E+01 [cm]
Mass Balance Error = -5.4847E-02 [cm]
Total Successful Time Steps = 11041
Total Attempted Time Steps = 11986
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8452
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-9.2747E-01	0.175	7.4964E+00	0.365	5.9395E+00
0.645	4.6153E+00	1.065	3.2388E+00	1.700	1.7009E+00
2.650	5.9643E-01	4.075	-1.1611E-01	6.210	-4.9969E-01
9.410	-5.2571E-01	14.215	-4.5743E-01	21.425	-3.1560E-01
30.250	-1.3077E-01	39.250	-2.1410E-02	48.250	1.6457E-02
55.475	1.8004E-02	60.925	1.3443E-02	66.375	5.2416E-03
72.650	8.7394E-03	78.280	1.0614E-02	82.275	1.1943E-02
85.475	1.2543E-02	87.615	1.2812E-02	89.040	1.2953E-02
89.990	1.3037E-02	90.625	1.3090E-02	91.050	1.3125E-02
91.330	1.3148E-02	91.440	1.3157E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	7.3364E-04	0.480	1.7675E-03
0.810	3.7649E-03	1.320	7.3949E-03	2.080	1.5245E-02
3.220	3.2313E-02	4.930	6.0226E-02	7.490	9.7820E-02
11.330	1.5116E-01	17.100	1.6738E-01	25.750	1.1052E-01
34.750	6.5892E-02	43.750	4.7258E-02	52.750	3.2100E-02
58.200	2.0963E-02	63.650	1.8699E-02	69.100	3.9457E-03
76.200	1.3214E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

 UNSAT-H Version 3.01
 INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2004.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	9.539E+05	0.0695	291.00
3	4.800E-01	8.861E+05	0.0701	291.00	4	8.100E-01	7.941E+05	0.0710	291.00
5	1.320E+00	6.627E+05	0.0725	291.00	6	2.080E+00	4.873E+05	0.0753	291.00
7	3.220E+00	2.605E+05	0.0819	291.00	8	4.930E+00	3.086E+04	0.1144	291.00
9	7.490E+00	1.295E+04	0.1341	291.00	10	1.133E+01	8.952E+03	0.1439	291.00
11	1.710E+01	7.136E+03	0.1505	291.00	12	2.575E+01	6.232E+03	0.1546	291.00
13	3.475E+01	5.786E+03	0.1569	291.00	14	4.375E+01	5.451E+03	0.1588	291.00
15	5.275E+01	5.174E+03	0.1604	291.00	16	5.820E+01	5.039E+03	0.1613	291.00
17	6.365E+01	4.926E+03	0.1620	291.00	18	6.910E+01	4.836E+03	0.1626	291.00
19	7.620E+01	4.750E+03	0.1632	291.00	20	8.036E+01	4.716E+03	0.1635	291.00
21	8.419E+01	4.694E+03	0.1636	291.00	22	8.676E+01	4.684E+03	0.1637	291.00
23	8.847E+01	4.680E+03	0.1637	291.00	24	8.961E+01	4.678E+03	0.1637	291.00
25	9.037E+01	4.678E+03	0.1637	291.00	26	9.088E+01	4.678E+03	0.1637	291.00
27	9.122E+01	4.677E+03	0.1637	291.00	28	9.144E+01	4.677E+03	0.1637	291.00

Initial Water Storage = 13.9705 cm

NOTE: There are no temperature data when plants are modelled.

 DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-5.83165E-06
 IsoVapor Flow (cm)=-7.29909E-03
 Plant Sink (cm) = 0.00000E+00

					LIQUID		
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE
13.9705+	0.0000+	0.0000	- 0.0073-	0.0000-	0.0000 =	13.9631	vs. 13.9631

Mass Balance = -5.6012E-08 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.3137 cm, Actual = 0.0073 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 53.8 %; TMEAN = 283.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.88292E-05
IsoVapor Flow (cm)=-2.14362E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.9586+ 0.0000+ 0.0000 - 0.0215- 0.0000- 0.0001 = 16.9370 vs. 16.9370

Mass Balance = -2.7034E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1788 cm, Actual = 0.0215 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 67.2 %; TMEAN = 283.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3619E+02 [cm]
Potential Transpiration = 3.3840E+00 [cm]
Actual Transpiration = 1.4509E+00 [cm]
Potential Evaporation = 2.3281E+02 [cm]
Actual Evaporation = 2.2916E+01 [cm]
Evaporation during Growth = 1.3038E+01 [cm]
Total Runoff = 3.7384E+00 [cm]
Total Infiltration = 2.7250E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.2499E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 3.0988E+01 [cm]
Actual Rainfall = 3.0988E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6937E+01 [cm]
Mass Balance Error = -9.5865E-02 [cm]
Total Successful Time Steps = 12100
Total Attempted Time Steps = 13694
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7902
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	4.3341E+00	0.175	1.7068E+01	0.365	1.3379E+01
0.645	1.0242E+01	1.065	7.8949E+00	1.700	6.0474E+00
2.650	5.0534E+00	4.075	4.3737E+00	6.210	3.8135E+00
9.410	3.4068E+00	14.215	2.9480E+00	21.425	2.4557E+00
30.250	2.0069E+00	39.250	1.6023E+00	48.250	1.2283E+00
55.475	9.5425E-01	60.925	7.6243E-01	66.375	5.8625E-01
72.650	4.1456E-01	78.280	2.8195E-01	82.275	1.9535E-01
85.475	1.2989E-01	87.615	8.7317E-02	89.040	5.9321E-02
89.990	4.0757E-02	90.625	2.8375E-02	91.050	2.0095E-02
91.330	1.4642E-02	91.440	1.2499E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.8448E-03	0.480	6.3360E-03
0.810	1.3898E-02	1.320	2.9757E-02	2.080	5.8013E-02
3.220	1.0646E-01	4.930	1.8100E-01	7.490	2.6362E-01
11.330	2.9177E-01	17.100	2.3368E-01	25.750	1.1194E-01
34.750	5.5150E-02	43.750	3.6643E-02	52.750	2.4708E-02
58.200	1.6295E-02	63.650	1.4801E-02	69.100	3.0621E-03
76.200	9.3838E-04	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2005.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.710E+05	0.0702	291.00
3	4.800E-01	6.933E+05	0.0721	291.00	4	8.100E-01	4.716E+05	0.0757	291.00
5	1.320E+00	1.849E+05	0.0859	291.00	6	2.080E+00	1.409E+04	0.1320	291.00
7	3.220E+00	7.868E+03	0.1476	291.00	8	4.930E+00	5.398E+03	0.1591	291.00
9	7.490E+00	4.001E+03	0.1690	291.00	10	1.133E+01	3.104E+03	0.1781	291.00
11	1.710E+01	2.505E+03	0.1862	291.00	12	2.575E+01	2.124E+03	0.1927	291.00
13	3.475E+01	1.974E+03	0.1957	291.00	14	4.375E+01	1.948E+03	0.1962	291.00
15	5.275E+01	2.011E+03	0.1949	291.00	16	5.820E+01	2.083E+03	0.1935	291.00
17	6.365E+01	2.181E+03	0.1916	291.00	18	6.910E+01	2.301E+03	0.1895	291.00
19	7.620E+01	2.477E+03	0.1866	291.00	20	8.036E+01	2.573E+03	0.1851	291.00
21	8.419E+01	2.645E+03	0.1841	291.00	22	8.676E+01	2.679E+03	0.1836	291.00
23	8.847E+01	2.694E+03	0.1834	291.00	24	8.961E+01	2.701E+03	0.1833	291.00
25	9.037E+01	2.704E+03	0.1832	291.00	26	9.088E+01	2.705E+03	0.1832	291.00
27	9.122E+01	2.705E+03	0.1832	291.00	28	9.144E+01	2.705E+03	0.1832	291.00

Initial Water Storage = 16.9370 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-1.82948E-05
 IsoVapor Flow (cm)=-2.09045E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID									
PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	DRAIN	NEWSTOR	STORAGE		
16.9370+	0.0000+	0.0000	- 0.0209-	0.0000-	0.0001 =	16.9160	vs.	16.9160	

Mass Balance = -2.7032E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.2452 cm, Actual = 0.0209 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 62.5 %; TMEAN = 283.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.05272E-05
IsoVapor Flow (cm)=-1.27156E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
17.0438+ 0.0000+ 0.0000 - 0.0127- 0.0000- 0.0005 = 17.0306 vs. 17.0306

Mass Balance = -1.7597E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2489 cm, Actual = 0.0127 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 24.7 %; TMEAN = 286.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.3821E+02 [cm]
Potential Transpiration = 3.4248E+00 [cm]
Actual Transpiration = 1.4119E+00 [cm]
Potential Evaporation = 2.3479E+02 [cm]
Actual Evaporation = 2.4937E+01 [cm]
Evaporation during Growth = 1.0364E+01 [cm]
Total Runoff = 6.2464E+00 [cm]
Total Infiltration = 2.6443E+01 [cm]
Total Basal Liquid Flux (drainage) = 9.7274E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 3.2690E+01 [cm]
Actual Rainfall = 3.2690E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.7031E+01 [cm]
Mass Balance Error = -9.6393E-02 [cm]
Total Successful Time Steps = 12506
Total Attempted Time Steps = 14168
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7863
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	1.5064E+00	0.175	1.4800E+01	0.365	1.0735E+01
0.645	7.6581E+00	1.065	5.2445E+00	1.700	3.5631E+00
2.650	2.3086E+00	4.075	1.6463E+00	6.210	1.4811E+00
9.410	1.2956E+00	14.215	1.0661E+00	21.425	8.6940E-01
30.250	7.8094E-01	39.250	7.3601E-01	48.250	6.8518E-01
55.475	6.2412E-01	60.925	5.6721E-01	66.375	4.9756E-01
72.650	4.2118E-01	78.280	3.3496E-01	82.275	2.6774E-01
85.475	2.0989E-01	87.615	1.6995E-01	89.040	1.4300E-01
89.990	1.2493E-01	90.625	1.1283E-01	91.050	1.0472E-01
91.330	9.9374E-02	91.440	9.7274E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.7344E-03	0.480	3.6010E-03
0.810	7.5406E-03	1.320	1.5166E-02	2.080	3.0236E-02
3.220	5.8708E-02	4.930	1.2376E-01	7.490	2.1966E-01
11.330	2.8109E-01	17.100	2.6669E-01	25.750	1.5553E-01
34.750	8.8059E-02	43.750	6.2744E-02	52.750	4.0788E-02
58.200	2.6661E-02	63.650	2.3599E-02	69.100	4.8717E-03
76.200	1.4734E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
Results File: C:\FTB\DesignA2006.res
Date of Run: 09 May 2014
Time of Run: 13:42:38.16
Title:
Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	9.213E+05	0.0698	291.00
3	4.800E-01	8.086E+05	0.0708	291.00	4	8.100E-01	6.609E+05	0.0726	291.00
5	1.320E+00	4.588E+05	0.0759	291.00	6	2.080E+00	2.022E+05	0.0848	291.00
7	3.220E+00	1.662E+04	0.1280	291.00	8	4.930E+00	8.633E+03	0.1450	291.00
9	7.490E+00	5.803E+03	0.1568	291.00	10	1.133E+01	4.246E+03	0.1670	291.00
11	1.710E+01	3.251E+03	0.1764	291.00	12	2.575E+01	2.578E+03	0.1851	291.00
13	3.475E+01	2.222E+03	0.1909	291.00	14	4.375E+01	2.012E+03	0.1949	291.00
15	5.275E+01	1.879E+03	0.1977	291.00	16	5.820E+01	1.821E+03	0.1990	291.00
17	6.365E+01	1.776E+03	0.2001	291.00	18	6.910E+01	1.742E+03	0.2009	291.00
19	7.620E+01	1.711E+03	0.2017	291.00	20	8.036E+01	1.699E+03	0.2020	291.00
21	8.419E+01	1.691E+03	0.2022	291.00	22	8.676E+01	1.688E+03	0.2022	291.00
23	8.847E+01	1.686E+03	0.2023	291.00	24	8.961E+01	1.686E+03	0.2023	291.00
25	9.037E+01	1.686E+03	0.2023	291.00	26	9.088E+01	1.685E+03	0.2023	291.00
27	9.122E+01	1.685E+03	0.2023	291.00	28	9.144E+01	1.685E+03	0.2023	291.00

Initial Water Storage = 17.0306 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm3/cm3) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.04488E-05
IsoVapor Flow (cm)=-1.26282E-02
Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
17.0306+	0.0000+	0.0000	- 0.0126-	0.0000-	0.0005 =	17.0176 vs.	17.0176

Mass Balance = -1.7528E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.9737 cm, Actual = 0.0126 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 19.5 %; TMEAN = 287.9 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-2.17691E-05
IsoVapor Flow (cm)=-2.42905E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
18.2024+ 0.0000+ 0.0000 - 0.0243- 0.0000- 0.0010 = 18.1770 vs. 18.1770

Mass Balance = -1.6957E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.1782 cm, Actual = 0.0243 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 64.5 %; TMEAN = 276.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.6038E+02 [cm]
Potential Transpiration = 3.6491E+00 [cm]
Actual Transpiration = 1.3587E+00 [cm]
Potential Evaporation = 2.5673E+02 [cm]
Actual Evaporation = 2.8866E+01 [cm]
Evaporation during Growth = 1.5351E+01 [cm]
Total Runoff = 1.2887E+01 [cm]
Total Infiltration = 3.1588E+01 [cm]
Total Basal Liquid Flux (drainage) = 3.0552E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 4.4475E+01 [cm]
Actual Rainfall = 4.4475E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.8177E+01 [cm]
Mass Balance Error = -8.7968E-02 [cm]
Total Successful Time Steps = 12530
Total Attempted Time Steps = 14199
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8167
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	2.7226E+00	0.175	1.6416E+01	0.365	1.1333E+01
0.645	8.0338E+00	1.065	6.1057E+00	1.700	4.6137E+00
2.650	3.7209E+00	4.075	2.8349E+00	6.210	2.4481E+00
9.410	2.2099E+00	14.215	1.9102E+00	21.425	1.5997E+00
30.250	1.3591E+00	39.250	1.1676E+00	48.250	9.9316E-01
55.475	8.5707E-01	60.925	7.5735E-01	66.375	6.5897E-01
72.650	5.6867E-01	78.280	4.8944E-01	82.275	4.3385E-01
85.475	3.8912E-01	87.615	3.5915E-01	89.040	3.3917E-01
89.990	3.2585E-01	90.625	3.1695E-01	91.050	3.1099E-01
91.330	3.0706E-01	91.440	3.0552E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	3.2685E-03	0.480	6.5195E-03
0.810	1.2809E-02	1.320	2.4023E-02	2.080	4.3815E-02
3.220	7.2676E-02	4.930	1.1479E-01	7.490	1.8978E-01
11.330	2.5109E-01	17.100	2.3763E-01	25.750	1.4540E-01
34.750	8.7963E-02	43.750	6.4773E-02	52.750	4.3746E-02
58.200	2.8381E-02	63.650	2.5561E-02	69.100	5.0253E-03
76.200	1.4101E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2007.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.600E+05	0.0703	291.00
3	4.800E-01	6.691E+05	0.0724	291.00	4	8.100E-01	4.339E+05	0.0765	291.00
5	1.320E+00	1.377E+05	0.0897	291.00	6	2.080E+00	1.458E+04	0.1311	291.00
7	3.220E+00	8.435E+03	0.1456	291.00	8	4.930E+00	5.822E+03	0.1567	291.00
9	7.490E+00	4.273E+03	0.1668	291.00	10	1.133E+01	3.229E+03	0.1766	291.00
11	1.710E+01	2.494E+03	0.1863	291.00	12	2.575E+01	1.969E+03	0.1958	291.00
13	3.475E+01	1.683E+03	0.2024	291.00	14	4.375E+01	1.509E+03	0.2071	291.00
15	5.275E+01	1.396E+03	0.2105	291.00	16	5.820E+01	1.347E+03	0.2121	291.00
17	6.365E+01	1.308E+03	0.2134	291.00	18	6.910E+01	1.278E+03	0.2145	291.00
19	7.620E+01	1.250E+03	0.2155	291.00	20	8.036E+01	1.239E+03	0.2159	291.00
21	8.419E+01	1.232E+03	0.2161	291.00	22	8.676E+01	1.229E+03	0.2163	291.00
23	8.847E+01	1.228E+03	0.2163	291.00	24	8.961E+01	1.227E+03	0.2163	291.00
25	9.037E+01	1.227E+03	0.2163	291.00	26	9.088E+01	1.227E+03	0.2163	291.00
27	9.122E+01	1.227E+03	0.2163	291.00	28	9.144E+01	1.227E+03	0.2163	291.00

Initial Water Storage = 18.1770 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-1.93152E-05
 IsoVapor Flow (cm)=-2.19140E-02
 Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
18.1770+	0.0000+	0.0000	- 0.0219-	0.0000-	0.0010 =	18.1541 vs.	18.1541

Mass Balance = -1.6449E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.3035 cm, Actual = 0.0219 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 54.5 %; TMEAN = 278.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm) = -2.02556E-05
IsoVapor Flow (cm) = -2.28361E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
17.0115+ 0.0000+ 0.0000 - 0.0229- 0.0000- 0.0002 = 16.9884 vs. 16.9884

Mass Balance = -2.5059E-07 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.4812 cm, Actual = 0.0229 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 30.4 %; TMEAN = 283.4 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

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UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.4112E+02 [cm]
Potential Transpiration = 3.2657E+00 [cm]
Actual Transpiration = 1.8214E+00 [cm]
Potential Evaporation = 2.3786E+02 [cm]
Actual Evaporation = 2.3142E+01 [cm]
Evaporation during Growth = 1.1004E+01 [cm]
Total Runoff = 1.8720E+00 [cm]
Total Infiltration = 2.3833E+01 [cm]
Total Basal Liquid Flux (drainage) = 1.5629E-01 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.5705E+01 [cm]
Actual Rainfall = 2.5705E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6988E+01 [cm]
Mass Balance Error = -9.8211E-02 [cm]
Total Successful Time Steps = 12576
Total Attempted Time Steps = 14191
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 7817
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	6.9088E-01	0.175	1.4801E+01	0.365	1.0780E+01
0.645	7.5860E+00	1.065	4.6456E+00	1.700	2.3971E+00
2.650	1.0660E+00	4.075	5.6069E-01	6.210	3.1929E-01
9.410	5.7748E-03	14.215	-3.4462E-01	21.425	-6.4178E-01
30.250	-7.6566E-01	39.250	-7.7161E-01	48.250	-7.1066E-01
55.475	-6.2341E-01	60.925	-5.4193E-01	66.375	-4.4811E-01
72.650	-3.0929E-01	78.280	-1.7433E-01	82.275	-7.5291E-02
85.475	5.1400E-03	87.615	5.9248E-02	89.040	9.5368E-02
89.990	1.1947E-01	90.625	1.3559E-01	91.050	1.4638E-01
91.330	1.5349E-01	91.440	1.5629E-01		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	3.1421E-03	0.480	7.0168E-03
0.810	1.5273E-02	1.320	3.2900E-02	2.080	6.4297E-02
3.220	1.2378E-01	4.930	2.1632E-01	7.490	3.0370E-01
11.330	3.4315E-01	17.100	3.0354E-01	25.750	1.6606E-01
34.750	8.7946E-02	43.750	6.0360E-02	52.750	3.9348E-02
58.200	2.5471E-02	63.650	2.2904E-02	69.100	4.6859E-03
76.200	1.5191E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2008.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	8.642E+05	0.0703	291.00
3	4.800E-01	6.783E+05	0.0723	291.00	4	8.100E-01	4.478E+05	0.0762	291.00
5	1.320E+00	1.527E+05	0.0884	291.00	6	2.080E+00	1.314E+04	0.1337	291.00
7	3.220E+00	7.645E+03	0.1484	291.00	8	4.930E+00	5.320E+03	0.1595	291.00
9	7.490E+00	3.982E+03	0.1692	291.00	10	1.133E+01	3.122E+03	0.1778	291.00
11	1.710E+01	2.557E+03	0.1854	291.00	12	2.575E+01	2.217E+03	0.1910	291.00
13	3.475E+01	2.095E+03	0.1933	291.00	14	4.375E+01	2.078E+03	0.1936	291.00
15	5.275E+01	2.109E+03	0.1930	291.00	16	5.820E+01	2.135E+03	0.1925	291.00
17	6.365E+01	2.160E+03	0.1920	291.00	18	6.910E+01	2.182E+03	0.1916	291.00
19	7.620E+01	2.203E+03	0.1912	291.00	20	8.036E+01	2.211E+03	0.1911	291.00
21	8.419E+01	2.216E+03	0.1910	291.00	22	8.676E+01	2.218E+03	0.1910	291.00
23	8.847E+01	2.219E+03	0.1909	291.00	24	8.961E+01	2.219E+03	0.1909	291.00
25	9.037E+01	2.219E+03	0.1909	291.00	26	9.088E+01	2.219E+03	0.1909	291.00
27	9.122E+01	2.219E+03	0.1909	291.00	28	9.144E+01	2.219E+03	0.1909	291.00

Initial Water Storage = 16.9884 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm)=-1.92651E-05
 IsoVapor Flow (cm)=-2.18667E-02
 Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
16.9884+	0.0000+	0.0000	- 0.0219-	0.0000-	0.0002 =	16.9663 vs.	16.9663

Mass Balance = -2.5340E-07 cm; Time step attempts = 24 and successes = 24

Evaporation: Potential = 0.3964 cm, Actual = 0.0219 cm

Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm

RHMEAN = 24.7 %; TMEAN = 276.2 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 366, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-1.19584E-05
IsoVapor Flow (cm)=-1.42929E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
16.3116+ 0.0000+ 0.0000 - 0.0143- 0.0000- 0.0002 = 16.2971 vs. 16.2971

Mass Balance = -9.8632E-08 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.2575 cm, Actual = 0.0143 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 36.7 %; TMEAN = 279.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

1

UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.5525E+02 [cm]
Potential Transpiration = 3.6743E+00 [cm]
Actual Transpiration = 1.0490E+00 [cm]
Potential Evaporation = 2.5158E+02 [cm]
Actual Evaporation = 2.0416E+01 [cm]
Evaporation during Growth = 1.2318E+01 [cm]
Total Runoff = 4.2580E+00 [cm]
Total Infiltration = 2.0761E+01 [cm]
Total Basal Liquid Flux (drainage) = 6.6228E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.5019E+01 [cm]
Actual Rainfall = 2.5019E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.6297E+01 [cm]
Mass Balance Error = -7.8849E-02 [cm]
Total Successful Time Steps = 12029
Total Attempted Time Steps = 13374
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8265
Total Time Actually Simulated = 3.6600E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6600E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	3.4505E-01	0.175	1.1855E+01	0.365	7.7320E+00
0.645	5.2396E+00	1.065	3.8486E+00	1.700	2.6757E+00
2.650	1.4591E+00	4.075	8.7455E-01	6.210	4.9004E-01
9.410	2.9861E-01	14.215	1.8900E-01	21.425	8.9738E-02
30.250	6.9179E-02	39.250	8.3765E-02	48.250	9.4899E-02
55.475	8.9777E-02	60.925	8.1353E-02	66.375	6.8653E-02
72.650	7.1946E-02	78.280	7.1683E-02	82.275	7.0986E-02
85.475	6.9630E-02	87.615	6.8493E-02	89.040	6.7671E-02
89.990	6.7106E-02	90.625	6.6722E-02	91.050	6.6465E-02
91.330	6.6295E-02	91.440	6.6228E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	2.7261E-03	0.480	5.7930E-03
0.810	1.1710E-02	1.320	2.1652E-02	2.080	3.4574E-02
3.220	4.9570E-02	4.930	6.5377E-02	7.490	9.9815E-02
11.330	1.7208E-01	17.100	2.0033E-01	25.750	1.3631E-01
34.750	8.4135E-02	43.750	6.2177E-02	52.750	4.2925E-02
58.200	2.8431E-02	63.650	2.5379E-02	69.100	4.4840E-03
76.200	1.5286E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2009.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	1.000E+06	0.0691	291.00	2	2.500E-01	9.131E+05	0.0698	291.00
3	4.800E-01	7.895E+05	0.0710	291.00	4	8.100E-01	6.290E+05	0.0730	291.00
5	1.320E+00	4.124E+05	0.0770	291.00	6	2.080E+00	1.446E+05	0.0891	291.00
7	3.220E+00	1.534E+04	0.1299	291.00	8	4.930E+00	8.825E+03	0.1443	291.00
9	7.490E+00	6.199E+03	0.1547	291.00	10	1.133E+01	4.713E+03	0.1635	291.00
11	1.710E+01	3.766E+03	0.1711	291.00	12	2.575E+01	3.127E+03	0.1778	291.00
13	3.475E+01	2.774E+03	0.1823	291.00	14	4.375E+01	2.553E+03	0.1854	291.00
15	5.275E+01	2.406E+03	0.1877	291.00	16	5.820E+01	2.341E+03	0.1888	291.00
17	6.365E+01	2.290E+03	0.1897	291.00	18	6.910E+01	2.251E+03	0.1904	291.00
19	7.620E+01	2.216E+03	0.1910	291.00	20	8.036E+01	2.201E+03	0.1913	291.00
21	8.419E+01	2.193E+03	0.1914	291.00	22	8.676E+01	2.189E+03	0.1915	291.00
23	8.847E+01	2.187E+03	0.1915	291.00	24	8.961E+01	2.186E+03	0.1915	291.00
25	9.037E+01	2.186E+03	0.1915	291.00	26	9.088E+01	2.186E+03	0.1915	291.00
27	9.122E+01	2.186E+03	0.1915	291.00	28	9.144E+01	2.186E+03	0.1915	291.00

Initial Water Storage = 16.2971 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

Node Number = 1
 Depth (cm) = 0.10000
 Water (cm³/cm³) = 0.06911
 Head (cm) = 1.00000E+06
 LiqWater Flow (cm) = -1.14980E-05
 IsoVapor Flow (cm) = -1.37890E-02
 Plant Sink (cm) = 0.00000E+00

LIQUID							
PRESTOR	INFIL	RUNOFF	EVAP0	TRANS	DRAIN	NEWSTOR	STORAGE
16.2971+	0.0000+	0.0000	- 0.0138-	0.0000-	0.0002 =	16.2831 vs.	16.2831

Mass Balance = -1.0015E-07 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.3239 cm, Actual = 0.0138 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 31.1 %; TMEAN = 281.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 24

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.07078
Head (cm) = 8.13266E+05
LiqWater Flow (cm)=-2.98243E-02
IsoVapor Flow (cm)=-7.99828E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
17.5538+ 0.0000+ 0.0000 - 0.1149- 0.0000- 0.0001 = 17.4388 vs. 17.4390

Mass Balance = -2.7238E-04 cm; Time step attempts = 32 and successes = 28
Evaporation: Potential = 0.3504 cm, Actual = 0.1149 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 47.5 %; TMEAN = 279.0 K; HDRY = 1.0000E+06 cm; DAYUBC = 13

1

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SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.4494E+02 [cm]
Potential Transpiration = 3.4475E+00 [cm]
Actual Transpiration = 1.1114E+00 [cm]
Potential Evaporation = 2.4149E+02 [cm]
Actual Evaporation = 1.6637E+01 [cm]
Evaporation during Growth = 7.0379E+00 [cm]
Total Runoff = 3.1821E+00 [cm]
Total Infiltration = 1.8865E+01 [cm]
Total Basal Liquid Flux (drainage) = 4.6149E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 2.2047E+01 [cm]
Actual Rainfall = 2.2047E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.7439E+01 [cm]
Mass Balance Error = -7.1102E-02 [cm]
Total Successful Time Steps = 11632
Total Attempted Time Steps = 12855
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8180
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	2.2284E+00	0.175	1.2292E+01	0.365	9.7290E+00
0.645	7.5312E+00	1.065	5.6430E+00	1.700	4.3187E+00
2.650	3.3062E+00	4.075	2.4942E+00	6.210	1.8321E+00
9.410	1.4756E+00	14.215	1.0960E+00	21.425	7.0514E-01
30.250	4.1934E-01	39.250	2.1676E-01	48.250	6.7208E-02
55.475	-1.4829E-02	60.925	-5.8193E-02	66.375	-8.3639E-02
72.650	-7.4610E-02	78.280	-4.7570E-02	82.275	-2.2296E-02
85.475	5.6906E-04	87.615	1.6635E-02	89.040	2.7555E-02
89.990	3.4896E-02	90.625	3.9820E-02	91.050	4.3120E-02
91.330	4.5295E-02	91.440	4.6149E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.8259E-03	0.480	3.8625E-03
0.810	8.2231E-03	1.320	1.6770E-02	2.080	3.1612E-02
3.220	5.7570E-02	4.930	9.4430E-02	7.490	1.4291E-01
11.330	2.0704E-01	17.100	2.0190E-01	25.750	1.2430E-01
34.750	7.3451E-02	43.750	5.4605E-02	52.750	3.7926E-02
58.200	2.5558E-02	63.650	2.3054E-02	69.100	4.7972E-03
76.200	1.5535E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

UNSAT-H Version 3.01
INITIAL CONDITIONS

Input File: C:\FTB\DesignA.inp
 Results File: C:\FTB\DesignA2010.res
 Date of Run: 09 May 2014
 Time of Run: 13:42:38.16
 Title:
 Fort Bliss: Water Balance Final Cover Design

Initial Conditions					Initial Conditions				
NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)	NODE	DEPTH (cm)	HEAD (cm)	THETA (vol.)	TEMP (K)
1	1.000E-01	8.133E+05	0.0708	291.00	2	2.500E-01	3.994E+05	0.0773	291.00
3	4.800E-01	1.883E+04	0.1251	291.00	4	8.100E-01	8.047E+03	0.1470	291.00
5	1.320E+00	5.194E+03	0.1603	291.00	6	2.080E+00	3.772E+03	0.1711	291.00
7	3.220E+00	2.909E+03	0.1805	291.00	8	4.930E+00	2.354E+03	0.1886	291.00
9	7.490E+00	2.009E+03	0.1950	291.00	10	1.133E+01	1.851E+03	0.1984	291.00
11	1.710E+01	1.906E+03	0.1971	291.00	12	2.575E+01	1.957E+03	0.1960	291.00
13	3.475E+01	1.931E+03	0.1966	291.00	14	4.375E+01	1.961E+03	0.1960	291.00
15	5.275E+01	2.065E+03	0.1938	291.00	16	5.820E+01	2.157E+03	0.1921	291.00
17	6.365E+01	2.265E+03	0.1901	291.00	18	6.910E+01	2.380E+03	0.1882	291.00
19	7.620E+01	2.521E+03	0.1859	291.00	20	8.036E+01	2.586E+03	0.1849	291.00
21	8.419E+01	2.631E+03	0.1843	291.00	22	8.676E+01	2.651E+03	0.1840	291.00
23	8.847E+01	2.660E+03	0.1839	291.00	24	8.961E+01	2.663E+03	0.1838	291.00
25	9.037E+01	2.665E+03	0.1838	291.00	26	9.088E+01	2.665E+03	0.1838	291.00
27	9.122E+01	2.666E+03	0.1838	291.00	28	9.144E+01	2.666E+03	0.1838	291.00

Initial Water Storage = 17.4390 cm

NOTE: There are no temperature data when plants are modelled.

DAILY SUMMARY: Day = 1, Simulated Time = 24.0000 hr

 Node Number = 1
 Depth (cm) = 0.10000
 Water (cm3/cm3) = 0.07942
 Head (cm) = 3.25497E+05
 LiqWater Flow (cm)=-1.17691E-03
 IsoVapor Flow (cm)=-6.40014E-02
 Plant Sink (cm) = 0.00000E+00

PRESTOR	INFIL	RUNOFF	EVAPO	TRANS	LIQUID DRAIN	NEWSTOR	STORAGE
17.4390+	0.0000+	0.0000	- 0.0645-	0.0000-	0.0001 =	17.3744	vs. 17.3744

Mass Balance = -4.0906E-05 cm; Time step attempts = 24 and successes = 24
 Evaporation: Potential = 0.1480 cm, Actual = 0.0645 cm
 Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
 RHMEAN = 55.0 %; TMEAN = 276.8 K; HDRY = 1.0000E+06 cm; DAYUBC = 10

DAILY SUMMARY: Day = 365, Simulated Time = 24.0000 hr

Node Number = 1
Depth (cm) = 0.10000
Water (cm³/cm³) = 0.06911
Head (cm) = 1.00000E+06
LiqWater Flow (cm)=-5.48051E-05
IsoVapor Flow (cm)=-4.95389E-02
Plant Sink (cm) = 0.00000E+00

LIQUID
PRESTOR INFIL RUNOFF EVAPO TRANS DRAIN NEWSTOR STORAGE
15.5900+ 0.0000+ 0.0000 - 0.0496- 0.0000- 0.0001 = 15.5403 vs. 15.5403

Mass Balance = -1.0202E-06 cm; Time step attempts = 24 and successes = 24
Evaporation: Potential = 0.3047 cm, Actual = 0.0496 cm
Transpiration: Potential = 0.0000 cm, Actual = 0.0000 cm
RHMEAN = 50.9 %; TMEAN = 273.7 K; HDRY = 1.0000E+06 cm; DAYUBC = 23

1

UNSAT-H Version 3.01
SIMULATION SUMMARY

Title:
Fort Bliss: Water Balance Final Cover Design

Transpiration Scheme is: = 1
Potential Evapotranspiration = 2.4072E+02 [cm]
Potential Transpiration = 3.3735E+00 [cm]
Actual Transpiration = 1.2311E+00 [cm]
Potential Evaporation = 2.3735E+02 [cm]
Actual Evaporation = 1.6021E+01 [cm]
Evaporation during Growth = 6.3894E+00 [cm]
Total Runoff = 1.5955E+00 [cm]
Total Infiltration = 1.5346E+01 [cm]
Total Basal Liquid Flux (drainage) = 6.1077E-02 [cm]
Total Basal Vapor Flux (temp-grad) = 0.0000E+00 [cm]
Total Applied Water = 1.6942E+01 [cm]
Actual Rainfall = 1.6942E+01 [cm]
Actual Irrigation = 0.0000E+00 [cm]
Total Final Moisture Storage = 1.5540E+01 [cm]
Mass Balance Error = -6.7903E-02 [cm]
Total Successful Time Steps = 11664
Total Attempted Time Steps = 12854
Total Time Step Reductions (DHMAX) = 0
Total Changes in Surface Boundary = 8177
Total Time Actually Simulated = 3.6500E+02 [days]

Total liquid water flow (cm) across different depths at the end of 3.6500E+02 days:

DEPTH	FLOW	DEPTH	FLOW	DEPTH	FLOW
0.100	-6.7445E-01	0.175	9.9041E+00	0.365	7.3889E+00
0.645	5.1283E+00	1.065	3.2498E+00	1.700	1.7559E+00
2.650	5.5422E-01	4.075	-1.6876E-01	6.210	-4.8160E-01
9.410	-5.0884E-01	14.215	-5.3265E-01	21.425	-5.2024E-01
30.250	-4.3074E-01	39.250	-3.1077E-01	48.250	-1.9801E-01
55.475	-1.2813E-01	60.925	-8.5894E-02	66.375	-5.4499E-02
72.650	-1.0307E-02	78.280	1.7279E-02	82.275	3.3460E-02
85.475	4.4040E-02	87.615	5.0412E-02	89.040	5.4454E-02
89.990	5.7093E-02	90.625	5.8842E-02	91.050	6.0008E-02
91.330	6.0776E-02	91.440	6.1077E-02		

Total plant water uptake (cm) at different depths:

DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE	DEPTH	WATER UPTAKE
0.100	0.0000E+00	0.250	1.4449E-03	0.480	2.8878E-03
0.810	6.2842E-03	1.320	1.3116E-02	2.080	2.3490E-02
3.220	4.4733E-02	4.930	9.0301E-02	7.490	1.6444E-01
11.330	2.4317E-01	17.100	2.4596E-01	25.750	1.4961E-01
34.750	8.6263E-02	43.750	6.1136E-02	52.750	4.0639E-02
58.200	2.7192E-02	63.650	2.4117E-02	69.100	4.7023E-03
76.200	1.5953E-03	80.360	0.0000E+00	84.190	0.0000E+00
86.760	0.0000E+00	88.470	0.0000E+00	89.610	0.0000E+00
90.370	0.0000E+00	90.880	0.0000E+00	91.220	0.0000E+00
91.440	0.0000E+00				

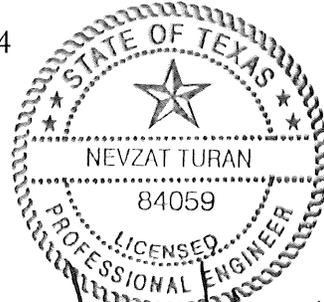
**U.S. ARMY FORT BLISS
MUNICIPAL SOLID WASTE LANDFILL
EL PASO COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1422**

**APPENDIX E
WB FINAL COVER SYSTEM
QUALITY CONTROL PLAN**

Prepared for

U.S. Army Corps of Engineers, Fort Worth District

May 2014



[Handwritten signature]
7-24-14

Prepared by

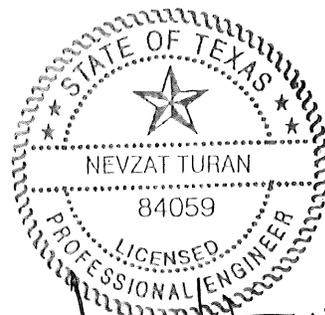
Weaver Boos Consultants, LLC—Southwest
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WBC Project No. 2449-310-11-00-01

This document is intended for permitting purposes only.

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1 INTRODUCTION

1.1 Purpose

This Water Balance Final Cover System Quality Control Plan (WBFCSQCP) has been prepared to provide the Owner, Design Engineer, Construction Quality Assurance Professional of Record, and the Contractor the means to govern the construction quality of the water balance (WB) final cover system and to satisfy the environmental protection requirements under Texas Commission on Environmental Quality (TCEQ) regulations. More specifically, the WBFCSQCP addresses the required procedures to construct WB cover, including establishment of vegetation.

This WBFCSQCP is divided into the following parts:

- Section 1 – Introduction
- Section 2 – Construction Quality Assurance for Earthwork
- Section 3 – Vegetation Establishment
- Section 4 – Verification of Established Vegetation
- Section 5 – Documentation

This WBFCSQCP ensures that the WB final cover will be constructed consistent with the design conditions as well as the requirements of the TCEQ guidance document titled, “Guidance for Requesting a Water Balance Alternative Final Cover for A Municipal Solid Waste Landfill,” dated January 2012. The Professional of Record (POR) will verify that the WB final cover is constructed consistent with the conditions, parameters, and assumptions used in the WB final cover model and design. This WBFCSQCP has also been developed to ensure that vegetation will be established consistent with the vegetation parameters used in the WB final cover model and design.

1.2 Definitions

Whenever the terms listed below are used, the intent and meaning will be interpreted as indicated.

ASTM

American Society for Testing and Materials.

Construction Quality Assurance (CQA)

A planned system of activities that provides the Owner and permitting agency assurance that the facility was constructed as specified in the design. Construction quality assurance includes observations and evaluations of materials, and workmanship necessary to determine and document the quality of the constructed facility. Construction quality assurance (CQA) refers to measures taken by the CQA organization to assess if the installer or contractor is in compliance with the plans and specifications for a project.

Construction Quality Assurance Professional of Record (POR)

The POR is an authorized representative of the Owner and has overall responsibility for construction quality assurance and confirming that the facility was constructed in general accordance with plans and specifications approved by the permitting agency. The POR must be licensed as a Professional Engineer in Texas and experienced in geotechnical testing and its interpretations. Experience and education should include geotechnical engineering, engineering geology, soil mechanics, geotechnical laboratory testing, construction quality assurance and quality control testing, and hydrogeology. The credentials of the POR must meet or exceed the minimum requirements of the permitting agency. Any references to monitoring, testing, or observations to be performed by the POR should be interpreted to mean the POR or CQA monitors working under the POR's direction.

The POR may also be known in applicable regulations as the CQA Engineer or Resident Project Representative.

Construction Quality Assurance (CQA) Monitors

These are representatives of the POR who work under direct supervision of the POR. The CQA monitor is responsible for quality assurance monitoring and performing onsite tests and observations. The CQA monitor is on site full-time during construction and reports directly to the POR. The CQA monitor performing daily quality assurance/quality control observation and testing must be NICWB-certified in geotechnical engineering technology at level two or higher for soils testing; a CQA monitor with a minimum of four years of directly related experience; or a graduate engineer or geologist with one year of related experience. Field observations, testing, or other activities associated with CQA may be performed by the CQA monitor(s) on behalf of the POR.

Additional CQA monitors may be used if they work under the direction of a qualified CQA monitor who is onsite full-time.

Contractor

This is the person or persons, firm, partnership, corporation, or any combination, private or public, who, as an independent contractor, has entered into a contract with the Owner, and who is referred to throughout the contract documents by singular number and masculine gender.

Design Engineer

These individuals or firms are responsible for the design and preparation of the project construction drawings and specifications. Also referred to as "designer" or "engineer."

Earthwork

This is a construction activity involving the use of soil materials as defined in the construction specifications and Section 2 of this plan.

Nonconformance

This is a deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. Examples of non-conformances include, but are not limited to, physical defects, test failures, and inadequate documentation.

Operator

U.S. Army Fort Bliss

Owner

U.S. Army Fort Bliss

Owner's Representative

This is the person that is an official representative of the owner responsible for planning, organizing, and controlling the design and construction activities.

Quality Assurance

This is a planned and systematic pattern of procedures and documentation to ensure that items of work or services meet the requirements of the contract documents. Quality assurance includes quality control. Quality assurance will be performed by the POR and CQA monitor.

Quality Control

These actions provide a means to measure and regulate the characteristics of an item or service to comply with the requirements of the contract documents. Quality control will be performed by the contractor.

Vegetation Establishment Contractor

This is a person or persons, firm, partnership, corporation, or any combination, private or public, who, as an independent contractor, has entered into a contract with the Owner and who is qualified in the establishment of vegetation similar to vegetation required by this plan.

Water Balance Final Cover System Evaluation Report (WBFCSER)

Upon completion of the installation of final cover, the certification will be in the form of the WBFCSER which will be signed by the POR and include all documentation necessary for certification for final cover installation.

2 CONSTRUCTION QUALITY ASSURANCE FOR EARTHWORK

2.1 Introduction

This section of the WBFCSQCP Plan addresses the construction of the soil components of the WB final cover system and outlines the program to be implemented with regard to materials selection and evaluation, laboratory test requirements, field test requirements and treatment of problems.

2.2 Earthwork Construction

The following paragraphs describe general construction procedures to be used for earthwork for the final cover system. The testing requirements set forth in this section must be met at the time of construction. The earthwork construction will be performed in a systematic and timely fashion. Delays will be avoided in completion of each lift and construction of the overlying lift.

After the landfill reaches the permitted bottom of final cover grades in each area to receive final cover, operational cover soils will be placed according to the facility operation plan. Twelve inches (minimum) of soil meeting the requirements listed in this section will be placed over the entire final cover area prior to installing the additional 24 inches of soil in 12-inch lifts.

If the existing cover soil is utilized as the bottom 12 inches, the contractor will re-work the cover soils to provide a smooth, uniformly graded surface upon completion. The initial 12-inch-thick soil layer will be tested in accordance with Section 2.4 and will be approved by the POR prior to placement of the second 12-inch-thick layer. Rock particles will only exist in incidental amounts in the soil used for this layer.

Quality Assurance/Quality Control (QA/QC) for the second 12-inch-thick layer will be performed under the supervision of the POR. QA/QC procedures to be performed during preparation of the second 12-inch-thick layer will include observation of the final grading of the initial layer. Upon completion of grading activities for the second 12-inch-thick layer, the POR will determine that this layer has been prepared in accordance with this plan and is acceptable for the final 12-inch-thick layer, which will be used for vegetation establishment. The CQA monitor will visually evaluate the physical properties (e.g., color, texture, etc.) of this layer for its suitability for replacement of the top 12-inch-thick layer.

The POR will approve the prepared initial 24-inch-thick soil layer prior to the placement of the top 12-inch-thick soil layer, which will be vegetated.

Surveying will be performed to verify that the completed layers meet the minimum required thickness. The thickness verification will be performed using a 100-foot grid to ensure that the minimum soil layer thicknesses are present at each location. If existing soils are used, the survey will only verify that the required soil layer is in place, not the total thickness of the existing layer (if, for example, the initial layer is thicker than 12 inches, only the top 12 inches will be incorporated into the final cover). The in-place soils cannot be used for more than the 24-inch-thick lower portion of the WB cover.

After the approval of the initial 24-inch-thick lower portion of the WB cover, the top 12-inch-thick layer that will be suitable for sustaining vegetative growth will be installed. Material used for the initial 24-inch-thick layer will be tested in accordance with Table 2-1 in Section 2.4. The soil will be inspected as placed by the CQA monitor to be free of debris and rocks greater than 2 inches in diameter. Rock particles will only exist in incidental amounts in the soil used for this layer.

QA/QC for the preparation of the initial 24-inch-thick layer will be performed under the supervision of the POR. QA/QC procedures for the installation of this layer will include observation of soil being placed for color and texture as well as testing in accordance with Section 2.4. During the observation of this layer's placement, the CQA monitor may require additional testing in accordance with Section 2.4 if any change in soil physical properties (e.g., color, texture) is observed. The material will be compacted by "tracking-in" the material by 2 to 4 passes of the low pressure earth moving equipment. The earth moving equipment used to place this layer will exert a ground pressure of 16 psi or less.

The initial 24-inch-thick layer will be compacted to a density no more than 90 percent of the maximum dry density determined by Standard Proctor (ASTM D 698) at a moisture content less than the optimum moisture content.

Over-compacted soils will be disked or ripped (or any other method approved by the POR) and recompact to a density that is no more than 90 percent of the maximum dry density. If a density test fails (i.e., density is more than 90 percent of the maximum dry density), additional tests may be performed to delineate the overcompacted area. The area to be re-worked will encompass the area between passing density tests.

The field density results will be reported in the Water Balance Final Cover System Evaluation Report (WBFCSER).

Prior to the installation of the top 12-inch-thick layer, surveying will be performed on a 100-foot grid to ensure that a minimum 24-inch-thick soil layer is in place. Surveying will be performed by a State of Texas registered professional land surveyor using an instrument survey method to verify that the soil layer has the required minimum thickness.

The 12-inch-thick top layer (vegetation layer) will be placed over the initial 24-inch-thick soil layer. The soil is placed in one lift (12-inch minimum thickness) over the entire surface of the initial 24-inch-thick soil layer and is compacted in place with a dozer (ground pressure of 16 psi or less). At a minimum, one moisture/density relationship test (standard Proctor) will be performed for each source of soil borrow material to be used for the vegetation layer. The vegetation layer will meet the requirements set forth in Section 2.4. The vegetation layer will be placed as a single lift and compacted to a density that is no more than 90 percent of the maximum dry density determined by Standard Proctor (ASTM D 698) at a moisture content less than the optimum moisture content. The installed vegetation layer density testing will be in accordance with Section 2.4. The surface of the soil cover will be graded to achieve the desired final grades and disked parallel to the proposed contours, in preparation for seeding and to prevent excessive loss due to heavy rainfall.

The soil cover will be placed under the observation of QA/QC personnel to determine that the minimum thickness is applied.

Placement of the vegetation layer will cease during rainfall events to prevent over compaction of the vegetation layer. This layer will not be reworked after a rainfall event until the CQA monitor confirms that the soil can be effectively disked. To prevent erosion, the CQA monitor will ensure that the procedures detailed in the Vegetation Establishment section (refer to Section 3) are followed.

Surveying will be performed to verify that the completed vegetation layer is a minimum of 12 inches thick. The vegetation layer will be surveyed on a 100-foot grid to verify that a minimum 12-inch-thick vegetation layer is in place. Surveying will be performed by a State of Texas registered professional land surveyor using an instrument survey method to verify that the complete vegetation layer has the required minimum thickness.

Final cover drainage structures (e.g., swales) will be constructed by hauling soil with trucks and compacting berms with dozers or similar equipment. The vegetation layer may be disked as deemed necessary after the placement of the final cover drainage structure and prior to vegetation seeding.

2.3 Survey and Final Topography

Upon completion of the installation of the final cover, a final topographic survey of the cover is to be completed by a qualified land surveyor. The final topographic map will be included in the final cover certification report and will include as-built final contours for the certification area, location of gas vents, gas monitoring wells, groundwater monitoring wells, drainage structures, fences and gates, access roads and all other pertinent site features as applicable.

A cover thickness drawing showing thicknesses of the installed cover at each of the survey measurement grid points will be provided. Coordinates defining the perimeter of the final cover will be called out on one of the final drawings.

2.4 Construction Testing

2.4.1 Procedures

CQA monitors will perform field and laboratory tests in accordance with this WB Final Cover System Quality Control Plan. The following test standards apply as called out in this manual and in the technical specifications:

<u>Standard Test</u>	<u>Test Description</u>
ASTM D 422	Particle size analysis of soils
ASTM D 698	Moisture-density relationship of soils and soil-aggregate mixtures, using 5-½ lb hammer and 12-inch drop
ASTM D 2487	Classification of soils for engineering purposes
ASTM D 2488	Description and identification of soils (visual-manual procedure)
ASTM D 2216	Laboratory determination of water (moisture) content of soil, rock, and soil-aggregate mixtures (not applicable if nuclear gauge reads both density and moisture)
EM 1110-2-1906 Appendix VII	U.S. Army Corps of Engineers test method for measurement of hydraulic conductivity of saturated porous materials
ASTM D 5084	Test methods for measurement of hydraulic conductivity of saturated porous materials using flexible wall permeameter
ASTM D 6938	In-place density and water content of soil and soil-aggregate by nuclear methods (shallow depth)

2.4.2 Test Frequencies

The test frequencies for the soil used for the construction are listed in Table 2-1. Additional testing will be conducted whenever work or materials are suspect, marginal, or of poor quality. Additional testing may also be performed to provide additional data for engineering evaluation. The minimum number of tests is interpreted to mean minimum number of passing tests, and any tests that do not meet the requirements will not contribute to the total number of tests performed to satisfy the minimum test frequency.

2.5 Reporting

The POR on behalf of the Owner will submit to the TCEQ a WBFCSER for approval of the constructed final cover system. Section 5 describes the documentation requirements.

**Table 2-1
Minimum Tests and Observations for WB Final Cover Layers for Preconstruction and During Construction**

Soil Parameter	Testing Method	Initial 12-inch-thick Layer		Second 12-inch-thick Layer		Top 12-inch-thick Layer (Vegetation Layer)	
		Testing Frequency	Passing Criteria	Testing Frequency	Passing Criteria	Testing Frequency	Passing Criteria
Soil classification (borrow source testing)	ASTM D 2487	Each 10,000 cy	SM SC, or SM-SC ³	Each 10,000 cy	SM, SC, SM-SC ³	Each 10,000 cy	SM, SC, or SM-SC ³
Moisture density relationship (preconstruction testing – borrow source testing)	ASTM D 698	1 per soil type ¹	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below. ¹	1 per soil type	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.	1 per soil type	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.
Percentage (% volume) of rock particles between 1 inch and 2 inches in diameter (borrow source testing)	ASTM D 422	1 per soil type	10% or less	1 per soil type	10% or less	1 per soil type	10% or less
Saturated hydraulic conductivity ⁴ (cm/s), K_s (borrow source testing will also be completed as noted in footnote 4)	ASTM D 5084 or EM1110-2-1806, Appendix VII	1 per each 10,000 cy borrow soil placed (samples to be obtained from installed material)	$K_s \leq 2.4 \times 10^{-4}$ cm/s	1 per each 10,000 cy borrow soil placed (samples to be obtained from installed material)	$K_s \leq 2.4 \times 10^{-4}$ cm/s	1 per each 10,000 cy borrow soil placed (samples to be obtained from installed material)	$K_s \leq 2.4 \times 10^{-4}$ cm/s
Field density and moisture	ASTM D 6938	Each 10,000 sf	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.	Each 10,000 sf	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.	Each 10,000 sf	Maximum 90 percent of standard proctor dry density. Standard proctor optimum moisture content or below.
Thickness verification (minimum)	Instrument survey methods	1 per each 10,000 sf	12 inches	Each 10,000 sf	12 inches	Each 10,000 sf	12 inches

¹ If the existing cover soil is utilized as the initial 12-inch-thick layer and if recompaction of the initial 12-inch-thick layer is required by the POR, then a moisture density relationship test and field density measurements will be required. If this condition occurs then saturated hydraulic conductivity test will also be performed on the recompacted soil; otherwise, testing will be performed on undisturbed samples from the installed cover.

² All surveying will be performed by a State of Texas registered professional land surveyor using an instrument survey method. The method, such as those utilizing thickness measurement plates, must be able to determine the lift thickness of the surveyed layer.

³ Soils will be classified in accordance with the Unified Soil Classification System (USCS) to verify consistency of soil used in the initial 12-inch-thick layer or soils that will be obtained from the soil borrow area.

⁴ Unless otherwise indicated, the laboratory testing will be performed on undisturbed samples recovered from the installed layers. The frequency of sampling area for the installed cover will be determined for the installed thickness. For example, for a 1-foot-thick layer, 10,000 cy corresponds to 6.2 acres. A saturated hydraulic conductivity test will also be performed on the borrow soil (1 per soil type). The borrow soil material will be recompacted to meet the compaction specification listed in Section 2.2.

3 VEGETATION ESTABLISHMENT

The purpose of this section is to detail the procedures to be used for the initial planting on the WB final cover system. This section sets forth seed mix recommendations and also allows for alternative seed mixes as long as the alternatives used can meet the vegetation performance specification set forth in Section 3 of the WB Final Cover Design narrative. The two target grass species for the perennial seed mix are the Red threeawn and Mesa dropseed (the latin names for these species are *Aristida purpurea* Nutt. and *Sporobolus Flexuosus*, respectively); these species are shown in bold-faced text in Table 3-2.

3.1 Soil Preparation and Seeding

All seeds must conform to the requirements of the U.S. Department of Agriculture rules and regulations set forth in the Federal Seed Act and Texas seed law. Cultivation area preparation will start as soon as practicable after completion of the final cover installation and grades specified in the construction plans which will be developed based on the TCEQ permitted final completion plans for the site. Unless otherwise requested by the vegetation establishment contractor and approved by the POR to ensure required ground cover and root penetration, the vegetated area will be cultivated to a typical depth of 4 inches before placement of seed or seed mixture. If temporary seeding is utilized, the area covered with temporary grass will be prepared according to permanent seeding requirements before placement of permanent seeds.

Table 3-1 includes the recommended schedule for seeding. The schedule may vary depending on the type of vegetation and climatic conditions during the final cover construction. Table 3-2 includes the seed application rate of pure live seed (PLS) per acre.

**Table 3-1
Recommended Schedule for Vegetation Establishment**

Dates	Seed Mix to Use
February 1 – May 15	Perennial
May 16 – August 31	Warm Season (Summer)
September 1 – November 30	Cool Season (Winter)

**Table 3-2
Recommended Seed Mix for Vegetation Establishment¹**

Seed Mix	Species and Rates ² (lb Pure Live Seed/ac)
Perennial	Green Sprangletop (<i>Leptochlia dubia</i>) 0.3
	Red threeawn (<i>Aristida purpurea</i> Nutt.) 0.4
	Mesa dropseed (<i>Sporobolus flexuosus</i>) 0.9
	Blue Grama (<i>Bouteloua gracilis</i>) 1.0
	Indian Ricegrass (<i>Oryzopsis hymenoides</i>) 1.6
	Purple Prairieclover (<i>Dalea purpurea</i>) 0.5
Warm Season (Summer)	Buffalo Grass (<i>Buchloe dactyloides</i>) 50
Cool Season (Winter)	Plairs Bristlegrass (<i>Setaria vulpiseta</i>) 4.0

¹ Given that the purpose of vegetation establishment is to provide complete surface coverage and required root penetration, other appropriate seed mixes may be used upon the approval of the POR. The above list does not indicate the complete content of the seed mix that will be used. The list includes the rate of application for each species to be used.

² Latin Name for seed species is included in parentheses.

Unless otherwise requested by POR for meeting the performance specifications, plant seeding will utilize the following method, as suggested by the Texas Department of Transportation in its “Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges” (Revised June 1, 2004).

- **Broadcast Seeding.** Distribute the seed or seed mixture uniformly over the areas shown on the plans using hand or mechanical distribution or hydro-seeding on top of the soil. When seed and water are to be distributed as a slurry during hydro-seeding, apply the mixture to the area to be seeded within 30 min. of placement of components in the equipment. Roll the planted area with a light roller or other suitable equipment. Roll sloped areas along the contour of the slope.

3.2 Fertilizer Recommendations

The purpose of this section is to provide fertilizer recommendations that could be used to enhance the final cover to ensure suitable soil conditions for vegetation establishment. The use of fertilizer is optional and may be used on an area-specific basis. The installed final cover may be tested for fertilizer need prior to seeding. Initial fertilization will occur prior to seeding (except broadcast seeding). Fertilizer needs for the installed final cover will be determined by collecting one soil sample per every 10 acres of installed final cover. Soil nutrient needs will be tested by a qualified agronomic testing laboratory (e.g., Texas A&M University Soil, Water, and Forage Testing Laboratory). The laboratory testing report will determine macro and micro nutrient needs and may also contain suggestions for soil inoculants, organic matter, etc. Unless different application rates required by the agronomics laboratory testing results, nitrogen (N), phosphoric acid (P) and potash (K) ratio is 2:1:1, and will be applied at a rate of 100 pounds of nitrogen, 50 pounds of phosphoric acid, and 50 pounds of potash per acre. If soil nutrient testing is

not performed, at a minimum, micro nutrients will be applied at a rate of 1 pound per acre of boron, 1 pound per acre of magnesium and 1 pound per acre of calcium. Seed and fertilizer may be distributed simultaneously during “Broadcast Seeding” operations, provided each component is applied at the specified rate. When temporary and permanent seeding are both specified for the same area, half of the required fertilizer may be applied during the temporary seeding operation and the other half during the permanent seeding operation. Fertilization will occur at intervals of no more than six months after initial seeding and until vegetation is established or as otherwise recommended by the soil nutrient testing laboratories. Fertilizer will be applied to areas with established vegetations using turf type line equipment to prevent damage.

A fertilizer containing nitrogen (N), phosphoric acid (P), and potash (K) nutrients unless otherwise recommended by the soil nutrient testing laboratory. Unless otherwise dictated by the soils laboratory, at least 50 percent of the nitrogen component must be of a slow-release formulation such as urea-based and plastic resin-coated fertilizers. The vegetation establishment contractor will ensure that fertilizer is in an acceptable condition for distribution in containers labeled with the analysis. Fertilizer is subject to testing by the Texas A&M Feed and Fertilizer Control Service (or other agencies approved by POR) in accordance with the Texas Fertilizer Law.

4 VERIFICATION OF ESTABLISHED VEGETATION

The purpose of this section is to set forth the procedures that will be used to verify that the vegetation is established consistent with the parameters used in the Water Balance (WB) Final Cover Demonstration. Section 2 details the construction of the WB Final Cover System. This section details the maintenance activities that will be required to establish the vegetation planted in accordance with Section 3 and verifies that the established vegetation conforms with the requirements of the WB cover design. The following subsections of this plan detail the following.

- Vegetation Establishment Period
- Maintenance activities to be completed during the Vegetation Establishment Period
- Vegetation Verification

4.1 Vegetation Establishment Period

The maintenance period will start immediately after seeding and will continue until the POR's verification of consistency with the required vegetation in the TCEQ approved WB cover design occurs. During this period, the specified vegetative cover will be established. Vegetative cover is considered to be established when surface coverage population of mature plants cover no less than 10 percent of the WB final ground cover area.

The vegetation establishment period begins after the Final Cover Certification Report is approved by the TCEQ and ends when the POR verifies that the established vegetation is consistent with the approved WB cover requirements.

4.2 Maintenance Activities to be Completed During the Vegetation Establishment Period

The following maintenance activities will be performed to ensure that the vegetation planted during the construction of the final cover system is maintained so that it will meet the vegetation performance specification established for this project.

- Following application of perennial seed mix, the POR will visit the site on a monthly basis for a period of 4 months to inspect the cover surface and to check for any damage to the installed cover soils.

- After the initial monthly inspections, the POR will visit the site on a quarterly basis for a period of 9 months (total of 1 year with the initial monthly visits) to inspect the installed final cover soils and the vegetation being developed. Areas with excessive erosion will be regraded by replenishing the topsoil and re-seeded.
- Vegetation will be maintained and mowed as appropriate, depending on the season. No mowing will be allowed until grasses establish mature seed.
- Areas of significant differential settlement will be regraded and re-seeded.
- Areas that experience erosion will be promptly repaired.
- All activities including but not limited to site visits by the POR will be documented in the Site Operating Record.

4.3 Vegetation Verification

For the vegetation to be considered “established” a professional engineer will complete an evaluation of the vegetation layer at the end of the vegetation establishment period (i.e., 1 year). The performance specification for the vegetation layer is discussed in Section 3 of the WB Final Cover Design narrative and is summarized below.

- **Percent Vegetation Cover** – The vegetative coverage specification is based upon a demonstration of a satisfactory population of mature plants covering no less than 10 percent of the WB final ground cover area. Vegetation cover will be determined using quantitative assessment of vegetative cover over a given transect across the landfill. Vegetation cover will be measured by estimating the percentage of cover along a minimum of three (3) 10’ by 10’ square quadrat placed along the transect. Each quadrat will be placed within the geographical extent of the planted area.

At the end of the vegetation establishment period, the POR will perform field work to verify the above-listed parameters for the established final cover vegetation. The POR will document the results of the field study and any other findings in the Site Operating Record.

5 DOCUMENTATION

The quality assurance plan depends on thorough monitoring and documentation of construction activities. Therefore, the POR and CQA monitor will document that quality assurance requirements have been addressed and satisfied. Documentation will consist of daily recordkeeping, testing and installation reports, nonconformance reports (if necessary), progress reports, photographic records, and design and specification revisions. The appropriate documentation will be included in the WBFCSER. Standard report forms will be provided by the POR prior to construction.

5.1 Preparation of WBFCSER

The POR, on behalf of the Owner, will submit to the TCEQ a WBFCSER for approval after each increment of the final cover system constructed. During the active life of the landfill, a portion of the site (or “increment”) may receive WB final cover. The WBFCSER will be submitted upon completion of the WB final cover construction for that increment. After construction of final cover for the last increment, a WBFCSER will be submitted along with other required certification for closure and, upon TCEQ approval, the site will be closed. Final cover QA/QC testing will be performed in accordance with this WBFCSQCP and should be part of the WBFCSER which will be prepared in accordance with this WBFCSQCP.

At a minimum, the WBFCSER will contain:

- A summary of construction activities.
- A summary of the initial installation of vegetation.
- Laboratory and field test results.
- Sampling and testing location drawings.
- A description of significant construction problems and the resolution of these problems.
- As-built record drawings.
- A statement of compliance with the permit WBFCSQCP and construction plans.
- A discussion regarding how the laboratory results are consistent with the design requirements will be included.
- The reports will be signed and sealed by a professional engineer(s) licensed in the state of Texas.

The as-built record drawings will accurately site the constructed location of work items. The POR will review and verify that as-built drawings are correct. As-built drawings will be included in the WBFCSER.

5.2 Reporting Requirements

The WBFCSER will be signed and sealed by the POR and submitted to the MSW Permits Section of Waste Permits Division of the TCEQ for approval. The vegetation establishment period ends when the POR demonstrates that the established vegetation meets the design requirements for the TCEQ approved WB cover. Documentation of the POR's demonstration will be kept in the Site Operating Record.

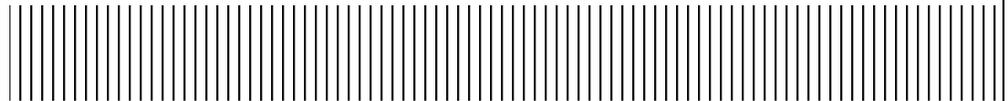


U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102

Appendix R – Post-Closure Use Report

Fort Bliss Municipal Solid Waste Landfill Permit 1422

July 2014



Infrastructure · Water · Environment · Buildings

Prepared By:

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04675026.0000

ARCADIS U.S., Inc.
TX Engineering License # F-533

Engineering Certification

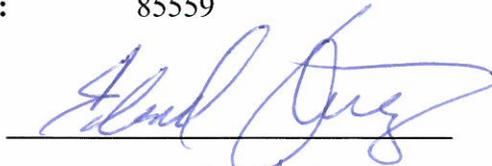
I attest that this Application has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Chapter §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Application.

Certifying Engineer: Eduardo Quiroz, P.E.

State: Texas

Registration Number: 85559

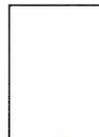
Signature:



Certification Date:

07/30/14

Engineering Seal:



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Acronym List

C&D	Construction and Demolition
ET	Evapotranspiration
MSW	Municipal Solid Waste
MSWLF	Municipal Solid Waste Landfill Facility
MW	Megawatt
PV	PhotoVoltaic
TCEQ	Texas Commission on Environmental Quality

1. Introduction

1.1. Background and Description of Proposed Use

The Fort Bliss Municipal Solid Waste (MSW) Landfill is an approximately 106 acre facility consisting of several cells as follows:

- § An active 10.6-acre Subtitle D Type I Cell;
- § A closed 3-acre Non-Subtitle D Type I Cell (Texas Commission on Environmental Quality (TCEQ) closure approval received February 24, 1999);
- § An Active 5-acre Non-Subtitle D Type IV C&D Cell;
- § Approximately 83 acres of 1970's era previously filled and operationally closed areas; and
- § Approximately 7 acres designated for landfill roads, access areas and guard shack/scale house, etc.

A potential post-closure use of the landfill for PhotoVoltaic (PV) development on the landfill cap system is planned. The purpose of this report is to seek TCEQ approval of the future PV development as part of this permit modification application. This report documents the design parameters for the future PV system, demonstrates that the landfill cap will not be disturbed during PV development, and demonstrates that the cap integrity will be maintained throughout the life of the PV project.

The PV development will be performed at some point in the future after landfill closure, when it is determined to be an economically feasible project. It has not yet been determined whether Fort Bliss will own the PV development or if Fort Bliss will lease the final cover surface for PV development by another entity. It is understood that if a private entity is to own the PV development, that entity will be required to obtain a registration from the TCEQ.

2. Regulatory Requirements

This report has been prepared in accordance with TAC 330 Subchapter T – Use of Land over Closed Municipal Solid Waste Landfills. In preparation of this report, we have reviewed the regulations and have included data in support of the relevant requirements to facilitate the post closure use of PV development. Specifically, we have provided data within the report that addresses the following regulatory requirements contained within the Subchapter T regulations:

Section 330.954(c)(2) – Requirements for permit modification application and work plan. This section of the regulations requires a permit modification application for the closure plan and post closure care plan and a work plan including items listed in §330.960 (see below).

- § Revisions to the Closure Plan are not required because the PV development will not require changes to the landfill cover system. We do not propose and impacts to the final cover system or disturbance of the final cover as part of the PV development.
- § Revisions to the Post Closure Care Plan are required to account for the PV development. The Post Closure Care Plan presented in Appendix A of this document is the Post Closure Care Plan from Appendix P of the permit application revised to include the PV development.

Section 330.954(e) - Authorization to disturb final cover for non-enclosed structures; and

Section 330.960 – Contents of authorization request to disturb final cover over a closed municipal solid waste landfill for non-enclosed structures. The contents required by this section of the regulations are provided in Section 3 of this report.



3. Work Plan Including Items Listed in §330.960

Section 330.960 requires submittal of the following items:

1. A certification as set forth in §330.957(b);
2. The existing conditions summary as set forth in §330.957(c);
3. Proposed project description including location related to the closed landfill;
4. Description of the construction/investigation process including, but not limited to, work schedule and safety issues during construction;
5. Description of the procedures for water and/or methane monitoring and excavated material disposal during construction;
6. Maps and drawings, site drawing, and general location map to indicate the landfill location; and
7. Engineering plans, sealed and signed by a licensed professional engineer indicating the proposed project description and its location relative to the landfill

Each of these items is presented in the following sections.

3.1. Certification

I, Eduardo Quiroz, P.E. # 85559, certify that the proposed development is necessary to reduce a potential threat to public health or the environment, or that the proposed development will not increase or create a potential threat to public health or the environment. Further, I certify that the proposed development will/will not damage the integrity or function of any component of the Closed Municipal Solid Waste Landfill Unit, including, but not limited to, the final cover, containment systems, monitoring systems, or liners. This certification includes all documentation of all studies and data on which I relied in making these determinations.

Signed:  Date: 07/30/14

(Affix PE Stamp)



3.1.1. Supporting Documentation

3.2. Existing Conditions Summary

In accordance with §330.957(c), the following land use, environmental, or special issues that affect the facility are as follows:

Condition of the final cover – The final cover has not been constructed to date. A permit modification has been submitted in conjunction with this Post-Closure Use Report that seeks the approval of a monolithic ET final cover system. This final cover system is anticipated to be constructed and the landfill will be in the post-closure care period prior to the implementation of any use of the closed MSW landfill.

Waste Characterization – The waste materials consist of both MSW and C&D materials that were disposed of in various areas of the landfill. A description of the each cell and the waste placed in the cells has been previously included in the permit modification application.

Gas Production – The potential for gas production at the site has been investigated and is assumed to be low as evidenced by 1) the lack of organic waste in the majority of the landfill areas and 2) the arid conditions at the landfill which do not provide moisture to enhance the decomposition of the waste. The monolithic ET cover system will allow for the passive ventilation of landfill gas through the cap system. The proposed PV development **does not include the construction of occupied structures on the final cover system or the development of any structure that would allow for the accumulation of landfill gas.** The PV panels and combiner boxes will have low and medium voltage power contained within them. These systems will be designed in a manner to reduce the potential for landfill gas conveyance or accumulation, thereby reducing the risk of a hazardous atmosphere being developed. All voltage containing systems will be secured within the fenced landfill or support area to allow access only to authorized personnel.

Potential Environmental Impacts – There are no identified environmental impacts as a result of the proposed PV development. The PV development will not disturb the final cover. As a result, no impacts are anticipated from the PV development. The existing landfill facility currently has no known impacts to the environment.

3.3. Proposed Project Description

The proposed PV system will generally consist of PV panels that are ground mounted on a non-penetrating, self-ballasting rack system and supporting infrastructure. The PV development will be constructed in a series of phased developments. The conceptual layout shown in Appendix B supports an estimated 10 Megawatt (MW) system. It is assumed the initial phase will be a minimum of 1 MW and subsequent phases will be developed up to the potential maximum development of 10 MW. The PV system will include development on the landfill cover, as well as development of a PV system

support area on land adjacent to the landfill. The development on the landfill final cover will be limited to that of PV panels, combiner boxes and necessary wiring to connect to inverter stations and the power grid off of the final cover.

The PV system development will include installation of the following components:

PV panels mounted on non-penetrating, self-ballasting racking systems bearing directly on the ground (top of final cover) or on pre-cast or cast-in-place concrete ballast (that bear on the top of the final cover). The intent is that the rack system will not penetrate the existing final cover system. Several examples of the non-penetrating racks are included in Appendix C;

Necessary combiner boxes mounted on surface installed concrete pads that bear on the top of the final cover;

Surface mounted conduit and/or cable trays that will all be located on top of the final cover system. These systems will be designed to be installed on top of the final cover with no excavation of the final cover system. Access over these conduits and trenches will be achieved in a manner where additional fill is placed over the conduits and/or cable trays to allow for required vehicular access for maintenance vehicles;

A PV system support area, established off the landfill cap system in an area outside of the landfill permitted limits and buffer area. The PV support area will contain the inverter stations, a maintenance/support structure, a potential weather station, telemetry systems for remote PV system monitoring and control and a substation for interconnection to the utility. This PV support area is anticipated to be installed within a fenced area to protect the system from vandalism and to provide restricted access to high voltage equipment.

The landfill perimeter fence required by MSW regulations for site security and access control will also serve for the security and access control to the PV panels and systems located on the landfill final cover.

3.4. Construction/Investigation Process

3.4.1. Proposed Work Schedule for PV System Development

PV development will not start until the post-closure period of the MSW landfill has begun. The PV development will not be performed until the project is determined to be economically feasible. It is anticipated that, at a minimum, the initial phase of PV development will not occur until a year or two after the completion of the landfill closure construction. Additional PV development may occur over the period of 2 to 10 years after the completion of the landfill closure construction. The anticipated life of the PV system is estimated to be 20 to 25-years, after which extensive system refurbishment would be required. Based on this assumption, it is likely the PV system will be still be in place following the 30-year post-closure period and permit revocation.

3.4.2. Investigation and Construction/Maintenance Considerations

Since the PV development will not disturb the final cover system and the final cover system will have been recently constructed, it is assumed that no investigation will be required to define the final cover prior to the PV development. The PV development construction and maintenance will be coordinated to maintain the integrity of the final cover. To ensure maintenance of final cover integrity:

The final cover will not be disturbed or excavated as part of the PV development or maintenance of the system.

Wind and water erosion are typical to soil cap systems. The permit modification has addressed the potential for wind and water erosion on the final cover system. The addition of the PV panels to the final cover is not anticipated to increase the potential for erosion.

Cover maintenance required as a result of wind and/or water erosion will be performed around the PV system. If extensive damage to the cover has occurred, removal of PV panels/rack systems, etc. to access the areas for repairs may be required.

The PV development will be designed so that it will not affect the potential for overall cover system erosion.

- Water erosion. The PV panels will not adversely increase the concentration of runoff to the cover system that would thereby contribute to erosion. Each panel may be installed so that the panel area is discharged to the cover surface, rather than having a series of panels drain to one edge of the array which would concentrate the runoff to a specific area. It is anticipated that the resulting runoff from the panels will percolate into the cover and/or runoff in a similar fashion as the exposed final cover prior to PV development. In the event of erosion from water and/or wind, the maintenance of the final cover system will be similar to the maintenance proposed as part of the final cover post-closure care plan. Any cap erosions identified will be promptly fixed to maintain the final cover integrity.
- Wind Erosion. To account for the possibility that the landfill after closure may be utilized for PV generation via solar panels, a comparative analysis of the expected soil erosion from wind was prepared for both cases (i.e., with and without PV land use). Soil erosion (i.e. soil loss) due to wind was estimated utilizing the Wind Erosion Equation (WEQ) and is included in Appendix D. The analysis compared the expected wind erosion for the landfill cover at closure with the expected wind erosion for the landfill cover at closure with PV land use in place. As shown by the calculations included in Appendix D, the soil loss due to wind is actually reduced by the application of the PV land use due to the reduced wind speeds caused by the solar panels working as wind breaks across the landfill cover, among other factors. The WEQ uses factors that represent the soil erodibility, ridge roughness factor, climatic factor, equivalent unsheltered distance across the field along the prevailing wind direction, and equivalent soil cover to

compute soil loss and erosion. It is assumed at this time that the panel tilt will be optimized for peak output during the periods of highest base demand charges which is May to September noon to 6 PM. To maximum the output during this period will result in a flatter tilt on the panels (likely 5 to 15 degrees) which will also reduce the wind loading from the panels.

Access ways will be provided between panel arrays to allow for construction and maintenance related access. Crossing of conduits, wire chase, and/or cable trays will be performed by building up a permeable material at these locations.

The anticipated maintenance will consist of periodic inspections of the system to look for deterioration or in response to component failure. In addition, it is anticipated that periodic cleaning of the PV panels to remove dust and other fouling of the panels will be performed to maximize the panel output. It is currently anticipated that panel cleaning would occur once per year.

The proposed Photovoltaic (PV) system will add additional load to the cover and the soil beneath. The load was estimated at 1.5 psi (210 psf). The additional settlement due to the load of PV system was estimated at less than 2 inches. This amount of settlement will not cause negative disruption to the cap such as ponding of storm water runoff.

3.4.3. Construction Safety

The following assumptions have been made regarding safety issues during construction and maintenance associated with the PV development at the final cover system:

No excavation of the final cover system will occur. As a result, no exposure to waste or leachate is anticipated.

No PV development will occur within the area of the existing leachate evaporation pond. As a result no contact with leachate is anticipated.

The monolithic ET cap will passively vent the minimal landfill gas that is expected to be generated. As a result it is suggested that personnel during the PV development and maintenance utilize a personnel monitor that will monitor the workers breathing zone for the presence of hydrogen sulfide, methane and an explosive atmosphere. It is not anticipated that the passive venting of the cover system to the atmosphere will result in the accumulation of landfill gas in the breathing zone of the workers. However, the monitoring will provide the means to verify and respond to any potential exposure or potential for an explosive atmosphere given the PV system would provide a potential source of ignition of methane between the lower and higher explosive limits.

Since the final cover will not be disturbed, storm water will not contact waste and, as a result, no monitoring or management of water is required as a result of contact with waste.

3.5. Water and/or Methane Monitoring and Excavated Material Disposal

Given the non-intrusive activities associated with the PV development on the final cover, it is assumed that the PV development activities will not result in contact with any contaminated water, landfill gas or waste materials and no excavated material will be generated during construction that will require disposal.

3.6. Maps and Drawings, Site Drawing, and General Location Maps

Refer to Appendix B which contains the drawings and details of the conceptual PV development.

3.7. Engineering Plans

The conceptual engineering plans are contained in Appendix B as previously noted. Final PV system development design drawings will be submitted for TCEQ review and approval as part of the PV development.

Appendix A

Post-Closure Care Plan



U.S. Army Corps of Engineers, Fort Worth District
Appendix R – Post Closure Use Report – Fort Bliss Municipal Solid
Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014





U.S. Army Corps of Engineers, Fort Worth District
819 Taylor Street, Fort Worth, TX 76102

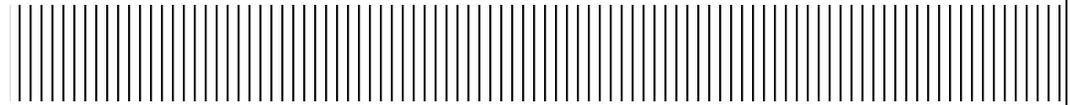
Post-Closure Care Plan

Fort Bliss Municipal Solid Waste Landfill

Permit 1422

Revised July 2014

Sub-Appendix of Appendix R



Report Prepared By:

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2929 Briarpark Drive
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04675026

ARCADIS U.S., Inc.
TX Engineering License # F-533

Engineering Certification

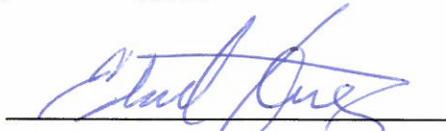
I attest that this Plan has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of Title 30 of the Texas Administrative Code (Title 30 TAC) Chapter §330. This certification in no way relieves Fort Bliss of its duty to prepare and fully implement this Plan.

Certifying Engineer: Eduardo Quiroz, P.E.

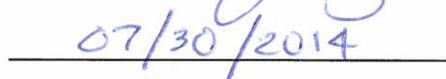
State: Texas

Registration Number: 85559

Signature:



Certification Date:



Engineering Seal:



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1. Introduction

This Post-Closure Care Plan has been prepared to provide general guidance for Fort Bliss in meeting the Texas Commission on Environmental Quality (TCEQ) rules listed in Title 30 of the Texas Administrative Code Chapter 330 Rule 463 (Title 30 TAC §330.463) in reference to the post-closure care maintenance requirements for Municipal Solid Waste Landfill (MSWLF) units. A copy of this Post-Closure Care Plan will be maintained in the operating record.



2. Maintenance and Monitoring

2.1. Post-Closure Care

Title 30 TAC §330.463(b)(1)

After professional engineer certification of the completion of closure requirements for the MSWLF is accepted by the executive director, Fort Bliss shall begin conducting post-closure care maintenance for 30 years unless the executive director specifies otherwise. Post closure care shall consist, at a minimum, of the following:

2.1.1. General Maintenance

Title 30 TAC §330.463(b)(1)(A)

Fort Bliss (the owner) or operator shall retain the right of entry to the closed unit or facility and shall maintain all rights-of-way and conduct maintenance and/or remediation activities as needed, in order to maintain the integrity and effectiveness of all final cover and drainage control system(s); to correct any effects of settlement, subsidence, ponded water, erosion, or other events or failures detrimental to the integrity of the closed unit or facility; and to prevent surface run-on and run-off from eroding or otherwise damaging the final cover system.

Fort Bliss is considering the installation of a photovoltaic system (PV Development) on top of the landfill final cover system. The PV Development is anticipated to commence at some point after the closure is completed while the facility is in the post-closure care period. It is expected, given the anticipated life of a PV system, the PV Development would be operated throughout the remaining 30-year post-closure period and may likely continue past the 30-year period and revocation of the facility permit.

Should PV development come to fulfillment over the closed landfill, then the post-closure care outlined herein would be maintained throughout the life of the PV Development to ensure the integrity of the landfill is maintained.

The PV Development proposed will not disturb the final cover system. All PV panels, combiner units and conduit/wiring will be installed on top of the existing final cover system. The wire systems are proposed to be installed on wire trays that would utilize UV stabilized wire jacketing and be installed in a manner that complies with National Electrical Code (NEC) Standards to minimize maintenance. The following maintenance and care will be followed during the post-closure care period to ensure the final cover system integrity is not adversely impacted by the PV Development and operations. Maintenance activities include but are not limited to the following:



- Tilled soil windrows will be created at right angles to the prevailing wind direction for the site. These windrows will be parallel to the slope of the cover to facilitate drainage but still provide a wind buffer minimizing wind erosion.
- At a minimum the solar array (panel installation) will be inspected semi-annually and any areas of soil erosion and/or loss will be address by re-grading to soil surface and/or the adding more SC or SM soils.
- The panels will be at a minimum tilt to optimize the generation of power during the summer months. In addition the rack structures used to support the panels, allow for the panel installation to occur above the ground surface by several feet thus preventing the creation of an enclosure structure over the landfill.

As mentioned, routine maintenance and inspection of the PV system will occur throughout the operational life of the PV Development. These maintenance activities will provide ample opportunity for inspection, identification and repair of cover maintenance issues in addition to the routine PV system maintenance being completed. It is anticipated that cover maintenance will be performed around the PV development as required to maintain the cover system integrity. An exception to this assumption would be in the event of erosion damage that underlies a component of the PV system. In this event, this may require the temporary dismantling of the PV system, repair of the cover system and re-installation of the PV equipment. If erosion issues become an issue under the PV panels, then other measures may be employed such as the installation of an erosion control blanket to minimize the erosion.

2.1.2. Leachate Collection System Monitoring

Title 30 TAC §330.463(b)(1)(B)

Fort Bliss shall maintain and operate the leachate collection system (LCS) in accordance with the requirements listed in Title 30 TAC §330.331 and §330.333 (relating to Design Criteria and Leachate Collection System, respectively).

Leachate shall be measured at least once a year by a scaled dip stick into the on-site vertical leachate monitoring pipe. The watermark on the stick measures the depth of leachate that collected on the liner. If the leachate is more than 12 inches (30 centimeters) deep in the landfill, it will be pumped out through the leachate transfer pipe and spread on the Subtitle D cell for evaporation.

The leachate measurement shall be kept in the site operating record. These measurements shall also be reported to the TCEQ. The executive director may allow Fort Bliss to stop managing leachate if Fort Bliss demonstrates to the approval of the

executive director that leachate no longer poses a threat to human health and the environment.

2.1.3. Groundwater Monitoring

Title 30 TAC §330.463(b)(1)(C)

Ground-water monitoring requirements under Title 30 TAC §330.403 (relating to Ground-Water Monitoring Systems), §330.405 (relating to Groundwater Sampling and Analysis Requirements), §330.407 (relating to Detection Monitoring Program for Type I Landfills), and §330.409 (relating to Assessment Monitoring Program) were suspended by the executive director on May 22, 1996, since Fort Bliss demonstrated that there is no potential for migration of hazardous constituents from the MSWLF unit to the uppermost aquifer as defined in Title 30 TAC §330.3 (relating to Definitions) during the active life and the closure and post-closure care period of the unit. A copy of the May 22, 1996 letter is provided in Appendix F of the permit modification application.

2.1.4. Gas Monitoring

Title 30 TAC §330.463(b)(1)(D)

Fort Bliss shall maintain and operate the gas monitoring system in accordance with the requirements listed in 30 TAC §330 Subchapter I and the current approved Landfill Gas Management Plan.

2.1.5. Electrical Resistivity Surveys

Title 30 TAC §330.463(b)(1)(E)

Fort Bliss is not subject to electrical resistivity surveys.

2.1.6. Vegetation Establishment Monitoring

A Vegetation Establishment Report shall be submitted semi-annually during the cover vegetation start-up period indicating the type and quantity of vegetation established, the percent vegetative cover, and the vegetative root structure. If the type or quantity of vegetation or root structure does not meet specifications, then corrective action shall be taken to improve the vegetation consistent with the optimized ET final cover design in accordance with the Fort Bliss MSWLF Closure Plan.

2.1.7. Schedule

Title 30 TAC §330.463(b)(3)(A)

Post-closure activities required for the MSWLF are described below:



**Table 2-1
Post-Closure Monitoring and Inspection Activities**

Items	Inspection period	Action	Remark
Erosion	Quarterly and after any major storm	Correct	-----
Methane	Quarterly	Report to TCEQ	Monitoring
Leachate	Annually	Report to TCEQ	Measuring
Vegetation Establishment - As defined in the Closure Plan	During establishment period: - Periodically during the initial month - Periodically during the first year	Report to TCEQ	Monitoring/Measuring

2.1.8. Post Closure Care Period

Title 30 TAC §330.463(b)(2)

Following the professional engineer certification of the completion of closure as accepted by the executive director of the TCEQ Waste Permits Division, Fort Bliss DPW-ENV shall commence the 30-year post-closure care period. The length of the Post-Closure Care maintenance period of the MSWLF may be decreased by the executive director if Fort Bliss submits to the executive director for review and approval a documented certification, signed by an independent registered professional engineer and including all applicable documentation necessary to support the certification that demonstrates that the reduced period is sufficient to protect human health and the environment. The post-closure maintenance period may be increased by the executive director if it is determined that the lengthened period is necessary to protect human health and the environment. If there is evidence of a release from the MSWLF, the executive director may require an investigation into the nature and extent to the release and an assessment of measures necessary to correct an impact to groundwater.



3. Post - Closure Cost Estimate

Title 30 TAC §330.463(b)(3)(D)

As an agency of the Federal Government, Fort Bliss is not required to complete financial assurance mechanism requirements. Therefore, a post-closure cost estimate is not required per Title 30 TAC §37.8001.



4. Completion of Post - Closure Care

Title 30 TAC §330.465

Following completion of the post-closure care maintenance period for the MSWLF, Fort Bliss will submit to the executive director for review and approval a documented certification, signed by an independent registered professional engineer verifying that post-closure care maintenance has been completed in accordance with the approved post-closure care plan. The submittal to the executive director shall include all applicable and supporting documentation necessary for the certification of completion of post-closure care maintenance.

Upon completion of the post-closure care period for the MSWLF Fort Bliss shall also submit to the executive director a request for voluntary revocation of the facility permit.

Title 30 TAC §330.463(b)(3)(C)

Fort Bliss is considering future development of the site as a photovoltaic installation (PV Development). The PV Development would consist of a series of photovoltaic solar panel arrays constructed across the landfill on top of the optimized ET cover system.

All land use and development plans shall comply with the requirements set forth in Title 30 TAC Chapter 330, Subchapter T: Use of Land Over Closed Municipal Solid Waste Landfills. A Post-Closure Use Report presenting further information concerning potential future use of the landfill for the PV Development is presented in Appendix R of the permit modification application. This Post-Closure Care Plan has been edited to provide post-closure care requirements associated with the PV development that will also maintain the integrity of the monolithic ET cover system throughout the active Post-Closure End Use period. In the event the 30-year post closure period expires and the permit is revoked, it is anticipated that this plan will be complied with throughout the duration of the PV development period and until which time the PV system is removed from the landfill facility.



Appendix B

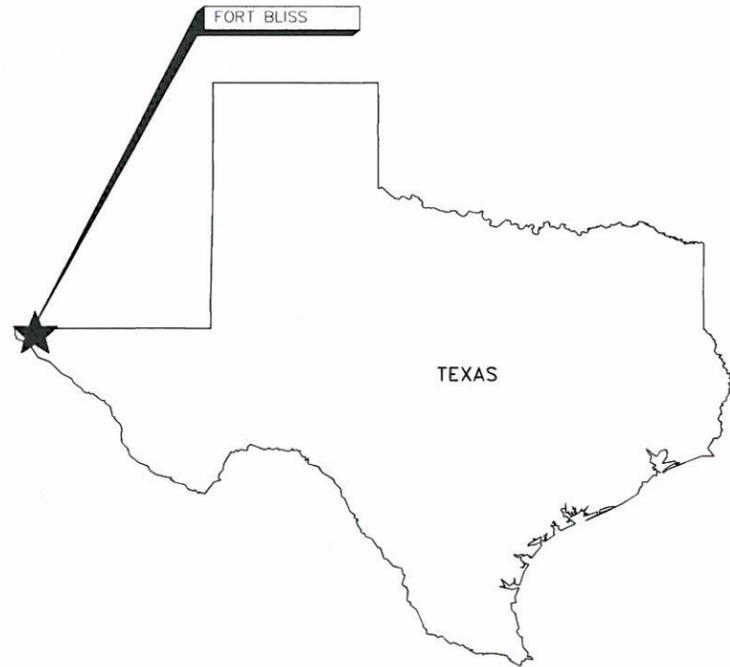
PV Development Drawings



U.S. Army Corps of Engineers, Fort Worth District
Appendix R – Post Closure Use Report – Fort Bliss Municipal Solid
Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014

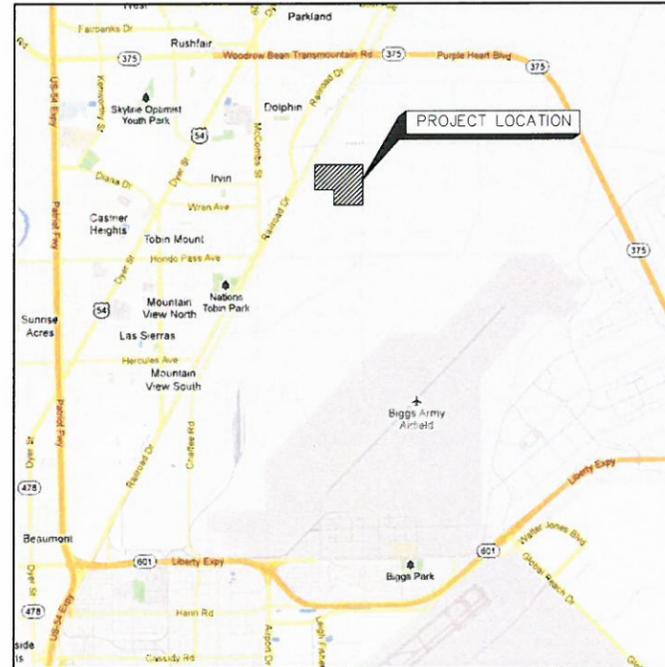


PERMIT MODIFICATION APPLICATION APPENDIX R- PV DEVELOPMENT OVER OPTIMIZED EVAPO-TRANSPIRATION (ET) ALTERNATIVE COVER SYSTEM FORT BLISS MUNICIPAL SOLID WASTE LANDFILL EL PASO, EL PASO COUNTY, TEXAS



VICINITY MAP

NOT TO SCALE



LOCAL VICINITY MAP

NOT TO SCALE

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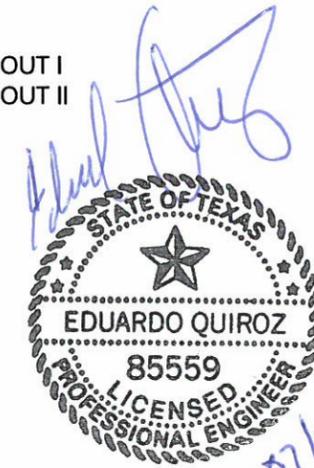
US ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT,
819 TAYLOR STREET ROOM 2A19
FORT WORTH, TEXAS 76102-0300

ENGINEER OF RECORD:

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PHONE: (713) 953-4800
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ARCADIS US, INC
TX ENGINEERING LICENSE No. F-533

SHEET INDEX:

- G-1 COVER SHEET
- P-1 FINAL COVER SYSTEM SOLAR PANEL LAYOUT I
- P-2 FINAL COVER SYSTEM SOLAR PANEL LAYOUT II
- P-3 SOLAR SYSTEM DETAILS I
- P-4 SOLAR SYSTEM DETAILS II



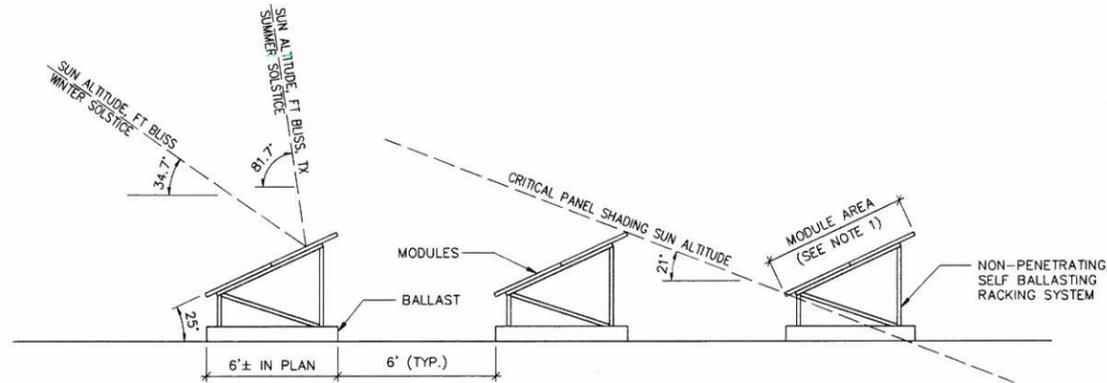
LIST OF ABBREVIATIONS: "Sealed for Permitting Purposes Only"

- | | |
|--|---|
| <p>@ = AT
A.D. = ALGEBRAIC DIFFERENCE
ASTM = AMERICAN SOCIETY FOR TESTING AND MATERIALS
BM = BENCHMARK
BP = BEGIN POINT
BVCE = BEGINNING OF VERTICAL CURVE ELEVATION
BVCS = BEGINNING OF VERTICAL CURVE STATION
CL = CENTERLINE
DIA = DIAMETER
E = EAST OR EASTING
EG = EXISTING GRADE ELEVATION
ELEV = ELEVATION
EP = END POINT
ET = EVAPOTRANSPIRATION COVER SYSTEM
EVCE = END OF VERTICAL CURVE ELEVATION
EVCS = END OF VERTICAL CURVE STATION
FFE = FINISH FLOOR ELEVATION
FG = FINISH GRADE ELEVATION
FL = FLOW LINE ELEVATION
INV = INVERT ELEVATION
K = VERTICAL CURVE K-VALUE
LF = LINEAR FEET
LT = LEFT
MAX = MAXIMUM
MIN = MINIMUM
MUTCD = MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES
N = NORTH OR NORTHING</p> | <p>N.E.C. = NATIONAL ELECTRICAL CODE
N.T.S. = NOT TO SCALE
O.C. = ON CENTER
PC = POINT OF CURVE
PB = PULL BOX
P.E. = PROFESSIONAL ENGINEER
PI = POINT OF INTERSECTION
PLS = PROFESSIONAL LAND SURVEYOR
PNM = PUBLIC SERVICE COMPANY OF NEW MEXICO
P.S.I. = POUNDS PER SQUARE INCH
PT = POINT OF TANGENT
PVC = POLYVINYL CHLORIDE
PVI = POINT OF VERTICAL INTERSECTION
R = RADIUS LENGTH
RE = REFERENCE
RT = RIGHT
SF = SQUARE FEET
STA = STATION
S = SOUTH
TC = TOP OF CURB ELEVATION
TF = TOP OF FOOTING ELEVATION
TW = TOP OF WALL ELEVATION
TYP = TYPICAL
UE = UNDERGROUND ELECTRIC
VC = VERTICAL CURVE LENGTH
VOR = VILLAGE OF RUIDOSO
W = WEST</p> |
|--|---|

THIS DOCUMENT RELEASED FOR PERMIT APPROVAL UNDER THE AUTHORITY OF EDUARDO QUIROZ, P.E. LICENSE NO. 85559 ON DATE: JULY 2014. IT IS NOT TO BE USED FOR CONSTRUCTION OR BIDDING PURPOSES

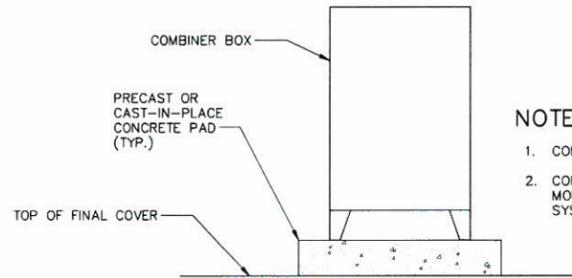
US Army Corps of Engineers												
ARCADIS US, INC. TX ENGINEERING LICENSE NO. F-533												
EDUARDO QUIROZ P.E. # 85559												
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>MARK</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> <tr> <td style="text-align: center;">B</td> <td>REVISED FOR TCEG SUBMISSION</td> <td style="text-align: center;">07/25/14</td> </tr> <tr> <td style="text-align: center;">A</td> <td>PRELIMINARY REVIEW</td> <td style="text-align: center;">07/11/14</td> </tr> </table>	MARK	DESCRIPTION	DATE	B	REVISED FOR TCEG SUBMISSION	07/25/14	A	PRELIMINARY REVIEW	07/11/14			
MARK	DESCRIPTION	DATE										
B	REVISED FOR TCEG SUBMISSION	07/25/14										
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>DESIGNED BY: TAM</td> <td>DATE: JULY 2014</td> </tr> <tr> <td>DRAWN BY: TAM</td> <td>SOLICITATION NO.:</td> </tr> <tr> <td>SUBMITTED BY:</td> <td>CONTRACT NO.:</td> </tr> <tr> <td>FILE NUMBER:</td> <td>FILE NUMBER:</td> </tr> <tr> <td>FILE NAME:</td> <td>FILE NUMBER:</td> </tr> <tr> <td>ANSI D</td> <td>ANSI D</td> </tr> </table>	DESIGNED BY: TAM	DATE: JULY 2014	DRAWN BY: TAM	SOLICITATION NO.:	SUBMITTED BY:	CONTRACT NO.:	FILE NUMBER:	FILE NUMBER:	FILE NAME:	FILE NUMBER:	ANSI D	ANSI D
DESIGNED BY: TAM	DATE: JULY 2014											
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<p>U.S. ARMY CORPS OF ENGINEERS FORT WORTH DISTRICT FORT WORTH, TEXAS</p> <p>ARCADIS 2929 BRIARPARK DRIVE, SUITE 300 HOUSTON, TEXAS 77042</p>												
<p>FORT BLISS MUNICIPAL SOLID WASTE LANDFILL PERMIT MODIFICATION APPLICATION APPENDIX R- PV DEVELOPMENT OVER OPTIMIZED EVAPO-TRANSPIRATION (ET) ALTERNATIVE COVER SYSTEM</p> <p style="text-align: right;">COVER SHEET</p>												
<p>SHEET IDENTIFICATION G-1 SHEET 1 OF 5</p>												

User: Tili Spec:PRIME STANDARD File: I:\ENVCAD\WhitePlans-NY\ACT\04675026\Fort Bliss Autocad Files\DWG-ETSC-04675026-ETSC-C08.DWG Scale: 1:1 Date: 05/21/2014 Time: 07:04 Layout: Layout1



- NOTES:**
- 1, 2, OR 4 MODULES IN LANDSCAPE MODE GAP AT EACH PANEL TO ALLOW RUNOFF TO EXIT EACH PANEL AS UN-CONCENTRATED FLOW.
 - OPTIMIZED RACK TILT WILL BE FOR SUMMER PEAK GENERATION CONDITIONS.

INITIAL SOLAR ASSESSMENT DETAIL
NOT TO SCALE

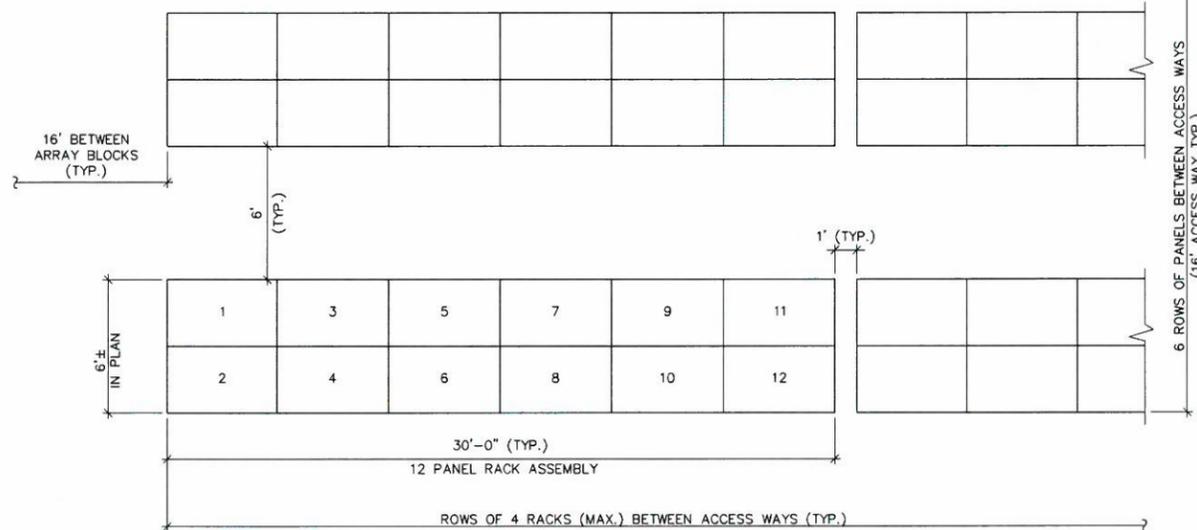


- NOTES:**
- COMBINER BOX DIMENSIONS VARY.
 - COMBINER BOXES MAY BE GROUND MOUNTED OR MOUNTED ON PV RACK SYSTEM.

COMBINER BOX DETAIL
NOT TO SCALE

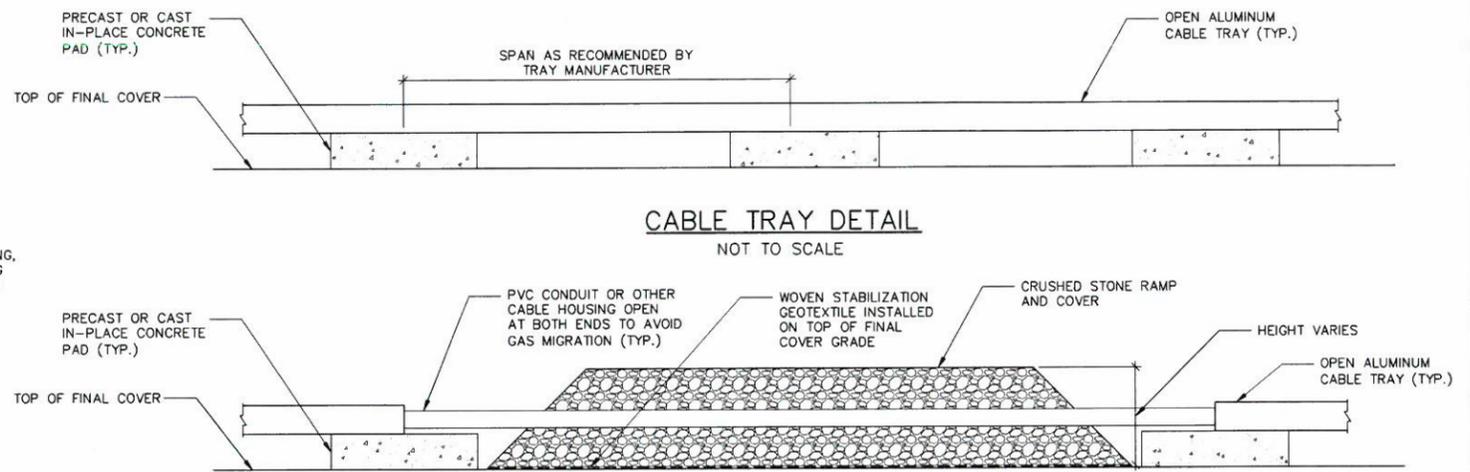


"Sealed for Permitting Purposes Only"



- NOTE:**
- PANELS IN LANDSCAPE FORMAT.
 - ARRAY BLOCK CONSISTS OF 24 RACKS.

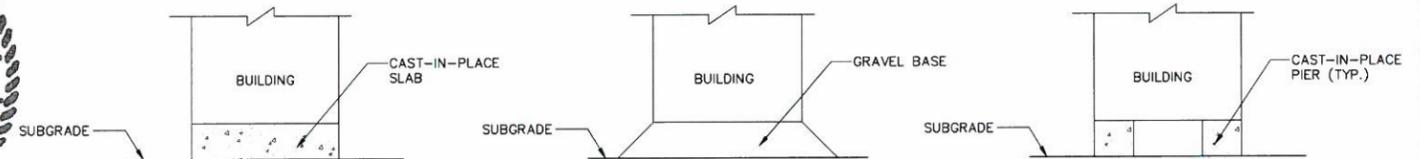
TYPICAL PHOTOVOLTAIC ARRAY BLOCK
NOT TO SCALE



CABLE TRAY DETAIL
NOT TO SCALE

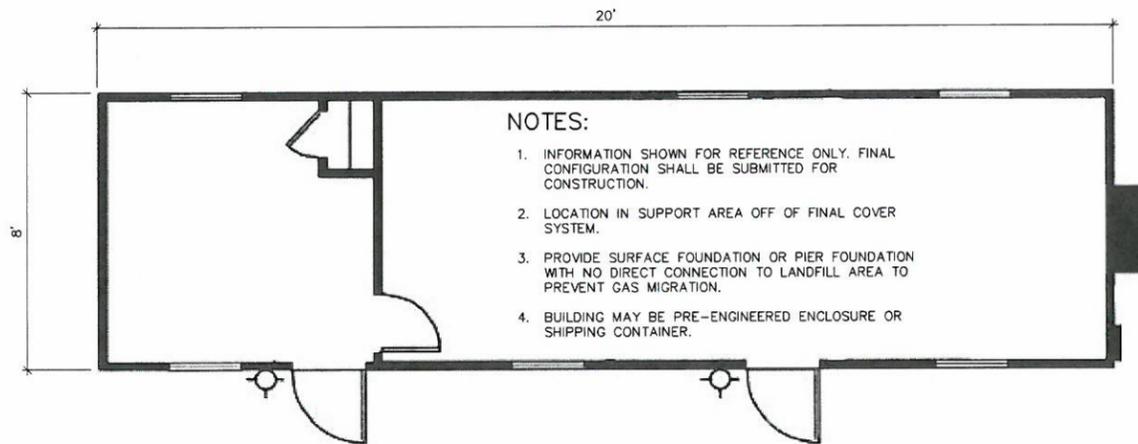


TYPICAL CABLE CROSSING AT ACCESS WAY
NOT TO SCALE



TYPICAL BUILDING FOUNDATION OPTIONS
NOT TO SCALE

NOTE: POTENTIAL FOUNDATION OPTIONS FOR BUILDINGS LOCATED IN SUPPORT AREA. FINAL DESIGN WILL BE BASED ON BUILDING REQUIREMENTS.



- NOTES:**
- INFORMATION SHOWN FOR REFERENCE ONLY. FINAL CONFIGURATION SHALL BE SUBMITTED FOR CONSTRUCTION.
 - LOCATION IN SUPPORT AREA OFF OF FINAL COVER SYSTEM.
 - PROVIDE SURFACE FOUNDATION OR PIER FOUNDATION WITH NO DIRECT CONNECTION TO LANDFILL AREA TO PREVENT GAS MIGRATION.
 - BUILDING MAY BE PRE-ENGINEERED ENCLOSURE OR SHIPPING CONTAINER.

SUPERVISORS CONTROL AND DATA ACQUISITION (SCADA) FACILITY
NOT TO SCALE



ARCADIS US, INC.
TX ENGINEERING
LICENSE NO. F-553

EDUARDO QUIROZ P.E. # 85559

MARK	DESCRIPTION	DATE
B	REVISED FOR TCEQ SUBMISSION	07/25/14
A	PRELIMINARY REVIEW	07/11/14

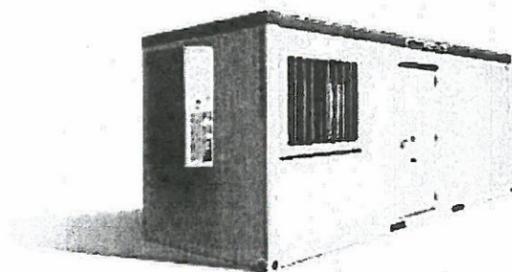
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DWN BY:	SOLICITATION NO.:	
IT:	SCOURING:	
FORWARDED BY:	CONTRACT NO.:	
FILED BY:	FILE NUMBER:	
FILED BY:	FILE NUMBER:	
ANSI D:	ANSI D:	

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
PERMIT MODIFICATION APPLICATION APPENDIX R-
PV DEVELOPMENT COVER OPTIMIZED
EVAPO-TRANSPARATION (ET) ALTERNATIVE COVER SYSTEM

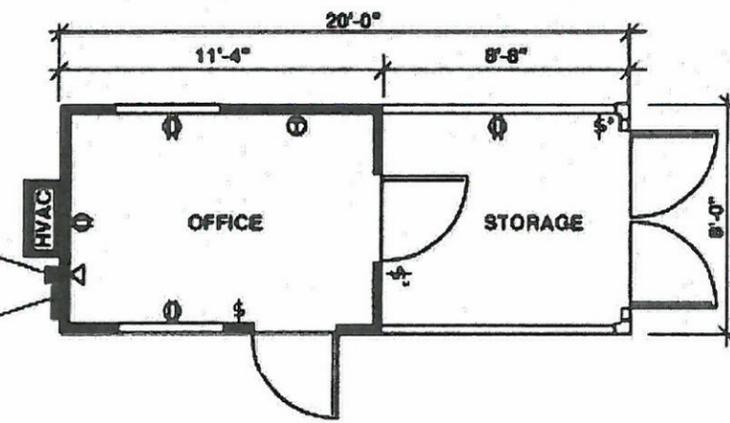
SHEET IDENTIFICATION
P-3
SHEET 4 OF 5

STRUCTURE SPECIFICATIONS

Specifications	
Size	Electric
20' Long	Fluorescent ceiling lights
20' Box Size	125 amp breaker panel
8' Wide	120/240 Volt, single-phase
8' Ceiling Height	Exterior phone/data jack access
Ground Mounted	Windows & Doors
Exterior Finish	Horizontal slider windows with screens
16 gauge steel siding	Exterior Security Bars
10 - 16 Gauge Floor Joist 12" on Center	Mini Blinds
Standard Drip Rail Gutters	Hydraulic door closures
1 1/8" Plywood Sub Floor	MMI High-Security Door System w/3 Part Interior Locking System
All Steel Structural Components	Heating & Cooling
Interior Finish	Verical HVAC
Drywall Textured	
Vinyl Tile Floors	
Drywall Textured Flat Ceiling	



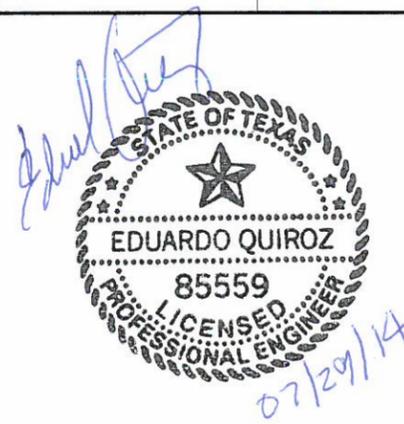
ORTHOGRAPHIC ELEVATION



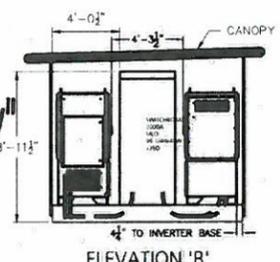
PLAN VIEW

OPERATIONS & MAINTENANCE STRUCTURE

NOT TO SCALE

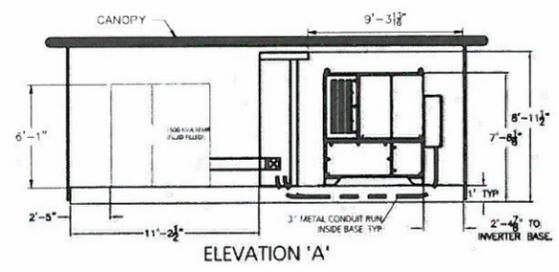


"Sealed for Permitting Purposes Only"

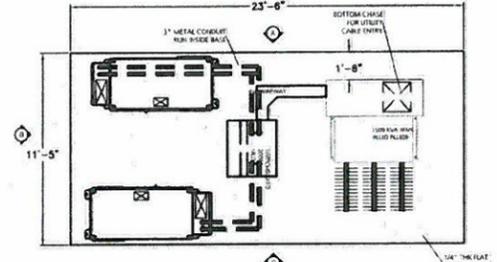


ELEVATION 'B'

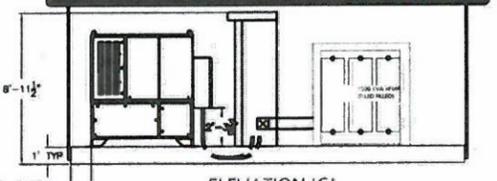
APPROX WGT XFMR: 12,500 LBS
 APPROX WGT EACH INVERTER: 4,100 LBS
 APPROX WGT OF SWITCHBOARD: 1000 LBS
 APPROX TOTAL WGT: 26,100 LBS



ELEVATION 'A'



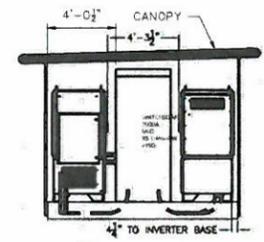
PLAN VIEW



ELEVATION 'C'

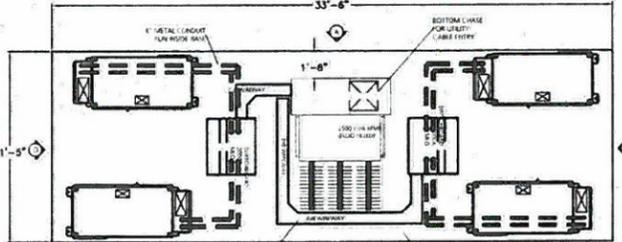
ONE MW INVERTER SKID

NOT TO SCALE

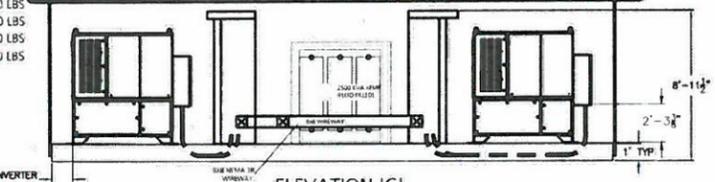


ELEVATION 'D'

APPROX WGT XFMR: 12,500 LBS
 APPROX WGT EACH INVERTER: 4,100 LBS
 APPROX WGT OF EACH SWITCHBOARD: 1000 LBS
 APPROX TOTAL WGT: 40,000 LBS



PLAN VIEW



ELEVATION 'C'

TWO MW INVERTER SKID

NOT TO SCALE

NOTES:

1. INFORMATION SHOWN FOR REFERENCE ONLY. FINAL CONFIGURATION SHALL BE SUBMITTED FOR CONSTRUCTION.
2. INVERTERS AND O&M STRUCTURE TO BE LOCATED OFF OF FINAL COVER SYSTEM.
3. BUILDINGS WILL HAVE SURFACE FOUNDATION OR PIER FOUNDATION WITH NO DIRECT CONNECTION TO LANDFILL AREA TO PREVENT GAS MIGRATION.
4. BUILDINGS MAY BE PRE-ENGINEERED ENCLOSURES OR SHIPPING CONTAINERS.

US Army Corps of Engineers

ARCADIS US, INC. TX ENGINEERING LICENSE NO. F-553

EDUARDO QUIROZ P.E. # 85559

MARK	DATE	DESCRIPTION
B	07/29/14	REVISED FOR TCEQ SUBMISSION
A	07/11/14	PRELIMINARY REVIEW

DESIGNED BY: JULY 2014
 DWN BY: FAM
 SUBMITTED BY: FAM
 PLOT SCALE: 1/8" = 1'-0"
 DATE: 7/29/2014
 FILE NAME: 04675026-PV-04
 SIZE: A
 ANSID: 04675026-PV-04

U.S. ARMY CORPS OF ENGINEERS
 FORT WORTH DISTRICT
 FORT WORTH, TEXAS

ARCADIS
 2529 BRIARPARK DRIVE, SUITE 300
 HOUSTON, TEXAS 77042

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
 PERMIT MODIFICATION APPLICATION APPENDIX R
 PV DEVELOPMENT OVER OPTIMIZED
 EMVAO-TRANSPARATION (ET) ALTERNATIVE COVER SYSTEM

SOLAR SYSTEM
 DETAILS II

SHEET IDENTIFICATION
P-4
 SHEET 5 OF 5

Appendix C

PV Racking System Data



U.S. Army Corps of Engineers, Fort Worth District
Appendix R – Post Closure Use Report – Fort Bliss Municipal Solid
Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



GC Paver Rail Ballasted Ground System



GC Paver Rail Ballasted Ground System
Ground system that utilizes standard pavers and a minimal component count; simple design allows for rapid installation

System Information

Features:

- Standard inexpensive 74 pound pavers stack on ballast trays
- Large ballast footprint reduces landfill cap loading
- Fast top down panel attachment to aluminum rails
- Integrated wire management tray on robust rails
- Tilt adjustability when mounting tubes to pans to accommodate uneven ground
- 5 to 35° tilt with multiple inter-row spacing options
- Integrated grounding with module grounding strips included - approved by ETL to UL 467
- Full layout and engineering analysis for every project
- No machinery required for installation
- Just place ballast trays with rail supports, bolt on rails, place pavers and mount panels
- Made in the U.S.A.

Installation:

- Fast installation with minimum components count and simple design
- Five men install 180 panels, racks and pavers per day: 900 per week
- Three inch vertical adjustability when mounting rails onto tubes
- Turnkey installation available

Testing & Certifications:

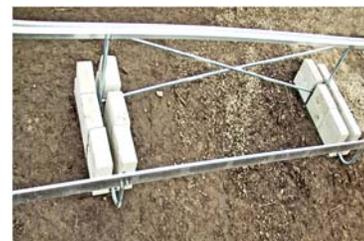
- Wind tunnel tested and rated for 120mph wind speed
- Unique design innovations with patents pending
- ETL/UL 2703 testing in process
- ETL/UL 467 GameChange grounding strips or teeth panel mounting clips included
- Meets IBC and ASME standards for structural loading
- Warranty 20 years - simply the best in the industry

Pricing:

Volume purchases start from \$.199/watt, \$.229/watt including ballast



Standard pavers placed on tray



Aluminum rails mount quickly



Panels attach quickly and easily which drastically reduces labor costs



Panels rapidly mount using T-bolts into slots

Technical Data

Material:

- Tray, Tube, Tube Clamp, Tray Plate, Cross Brace Mounting Plate, Cross Brace: G90 galvanized steel
- Panel Mounting Rails: 6063T6 aluminum
- Grounding Strip, Stiffening Strip: 304 stainless steel
- U Bolts, 3/8 inch diameter: hot dip galvanized or Magnacoat
- Nuts, Washer, Lock Washers 3/8 inch: hot dip galvanized or Magnacoat serrated flange nuts
- Plate mounting hardware:
- Panel mounting clips: 5052 aluminum or stainless steel teathed clips
- 1/4-20 x 2.5" T bolts, 1/4 -20 serrated flange nuts: stainless steel or Magnacoat

Calculations:

- 100% code compliant designs for any locality
- Third-party structural PE, stamped drawings and calculations
- Individual system structural calculations
- Individual system design calculations based on regional load values
- Design loads according to IBC 2006 or 2009
- Patent pending profile geometries with optimum material utilization

Grounding:

- Racking system has integrated grounding utilizing provided grounding strips or teathed clips to end of each row
- Grounding must be done by electrician at row ends



Integrated wire management tray on robust aluminum rails

GC Pour-in-Place™ Ballasted Ground System



GC Pour-In-Place™ Ballasted Ground System

Ground system suitable for landfill and brownfields which utilizes self-leveling recycled plastic forms, drastically reducing install time

System Information

Features:

Self-leveling technology: 68% faster install than precast

Large ballast footprint reduces landfill cap loading

Leave-behind patent-pending recycled HMWPE plastic Pour-in-Place™ forms

Available in both 1 and 2 panels up portrait

Substantial labor savings by eliminating moving and shimming heavy, precast blocks

Just place Pour-in-Place™ forms, place rail supports, bolt on rails, pour concrete and mount panels

Panels rapidly mount using T-bolts in slots and top mount clamps

Integrated wire management tray on robust aluminum rails

5 to 35° tilt with multiple inter-row spacing options

Integrated grounding with module grounding strips included - approved by ETL to UL 467

Full layout and engineering analysis for every project

51% overall lower cost than competitors

Made in the U.S.A.

Installation:

Fastest install of any ballasted ground system, period

68% faster install than precast systems

Five men install 200 panels and racks per day: 1,000 per week

Self-leveling technology enables 7" total vertical adjustability

Five slots enables additional 3" vertical adjustability

Rapid install using concrete truck to fill Pour-in-Place™ forms around supports, or for weight sensitive landfill caps or narrow row spacing using pump or tracked skid bobcats with gravity feed buckets

Turnkey installation available

Testing & Certifications:

Wind tunnel tested and rated for 150mph wind speed

ETL/UL 2703 tested

ETL/UL 467 GameChange grounding strips or teeth panel mounting clamps included

Unique design innovations with patents pending

Meets IBC and ASME standards for structural loading

Warranty 20 years - simply the best in the industry

Pricing:

Starts \$.129/w for panel racks, \$.199/w for complete system including ballast



Place racking supports into Pour-in-Place™ forms



Aluminum rails simply bolt onto supports, enable 7" vertical adjustability



Pouring bucket on bobcat for concrete pouring on sensitive landfill caps or for small inter-row spacing

Technical Data

Material:

Rail support structure components: G90 galvanized steel

Panel mounting rails: 6063T6 aluminum

Recycled HMWPE forms

Grounding Strips, Stiffening Strips: 304 stainless steel

Nuts, washer, lock washers 3/8 inch: hot dip galvanized or Magnacoat bolts and flange nuts

Panel mounting hardware:

Panel mounting clips: aluminum or stainless steel toothed clips

1/4 - 20 x 2.5" T bolts, stainless steel 1/4 - 20 serrated flange nuts: stainless steel

Use freeze thaw rated concrete where applicable

Calculations:

100% code compliant designs for any locality

Third-party structural PE, stamped drawings and calculations

Individual system structural calculations

Individual system design calculations based on regional load values

Design loads according to IBC 2006 or 2009

Grounding:

Racking system has integrated grounding utilizing provided grounding strips or toothed clips to end of each row

Grounding must be done by electrician at row ends



Panels rapidly mount using T-bolts in slots and top mount clamps



Integrated wire management tray on robust aluminum rails

Panda Bear

Ballasted Ground Mount Solution

3 COMPONENTS | 2 NUTS + BOLTS

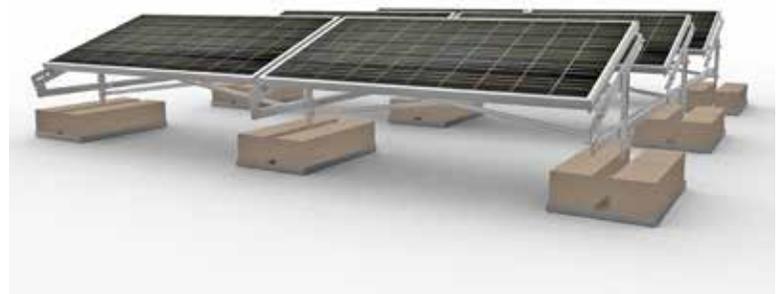


Smart Non-Penetrating Solution

Panda Bear® ground mount system is an eco-friendly, ballasted mounting solution ideal for landfills and installations where the ground cannot be penetrated. Its streamlined design features just three major components and significant factory pre-assembly--innovations that turn construction projects into simple installations.

Suits Challenging Ground Applications

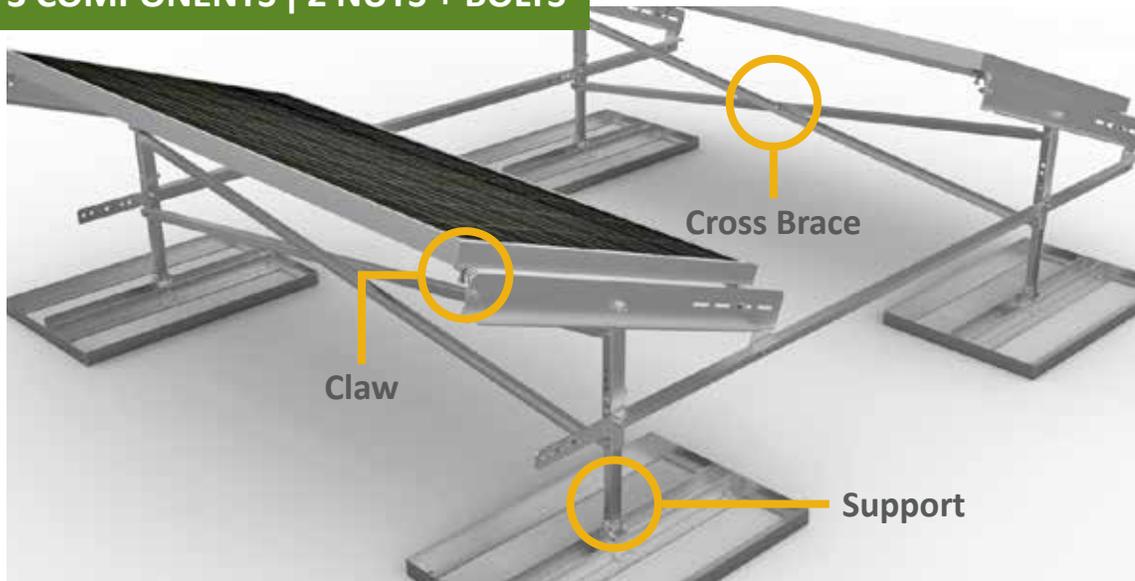
- Low, evenly distributed platform loads
- No piles or drilling required
- Adjustable posts to accommodate ground undulations
- Allows free water flow and natural drainage



Panda Bear Ballasted Ground Mount Solution



3 COMPONENTS | 2 NUTS + BOLTS



Overcome Land Constraints

The Panda Bear ballasted design allows for solar installation on poor soil conditions. The Supports are equipped with features to address uneven terrain and ground undulations, including an adjustable post to address variations in surface height and a ballast tray that automatically conforms to the ground slope. The system's modular design allows for easy array layout adjustments and ability to fit into odd shaped areas of land. These features give installers extensive in-field options, further boosting installation speed and overall project efficiency.

For Product and Sales Information:

978.688.4900
sales@panelclaw.com
www.panelclaw.com

Three Components

Support

- Ballast pan, post, and bracket pre-assembled
- Adjustable posts and pivoting ballast pan accommodates uneven terrain
- Pre-installed PEM® studs for easy cross brace attachment
- Available in aluminum or G90 steel

Cross Brace

- Factory pre-assembled to speed installation
- Chamfered edges and light-weight construction facilitate easy handling and safe installation
- Slotted mounting holes to accommodate uneven terrain

Claw

- Factory-installed stainless steel screw to attach Claw to Module
- UL 2703 certified for electric bonding and grounding

Specifications

Application

Landfill, brownfields, open fields

Installation Speed

140-180 modules per day (4 person crew)

Module Tilt Angle

10, 20, 30 degrees

Module Orientation

Landscape

Basic Wind Speed

Up to 120 MPH
(193 km/h)

Wind Exposure Category

B and C
(D upon request)

Array Platform Load

7 - 12 PSF (racking, ballast, and modules)

Standard Warranty

10 years



Made in USA

© 2013 PanelClaw, Inc.



Printed on recycled paper

Appendix D

Wind Erosion Analysis



U.S. Army Corps of Engineers, Fort Worth District
Appendix R – Post Closure Use Report – Fort Bliss Municipal Solid
Waste Landfill
Permit Modification Application – Permit No. 1422
July 31, 2014



Wind Erosion Equation (WEQ)

$E = f(I', K', C', L', V')$ where E is the soil loss rate (in tons/acre/year)

I' - soil erodibility index

K' - soil ridge roughness factor

C' - climatic factor

L' - field length along prevailing wind direction

V' - quality of vegetative cover

We will investigate soil loss due to wind erosion on the southern slope of Cell 5 for two cases:

Case 1: Top of Landfill Cover without solar panels.

Case 2: Top of Landfill Cover with solar panels present.

Case 1: Top of Landfill Cover without solar panels.

I' = 86 tons/acre for slopes greater than 500 ft or slope gradient is less than 3%; this value is based off of Table 1 of "A Wind Erosion Equation" attached at the end of this calculation. The soil used is assumed to have 25% of dry soil fractions larger than 0.84 mm.

K' = 1.0, roughness is assumed to be low based on the uniform finished surface

C' = 90 for El Paso, TX;

L' is the unsheltered distance along the prevailing wind direction; for this calculation, the prevailing wind direction is assumed to be in the direction of the slope. Therefore, L' will be equivalent to the length of the slope - approx. 600 feet. The value for L' was measured from Sheet P-2.

V' = is assumed to be 0 because there is no vegetation

Summary:

I' = 86 tons/acre (2% slope)

K' = 1.0

C' = 90

L' = 590 feet

V' = 0

Use the National Agronomy Manual (NAM), 3rd Edition, Subpart G, E-tables to determine the soil loss.

E = 61.0 tons/acre/year

Case 2: Top of Landfill Cover with solar panels present.

$I' = 86$ tons/acre for slopes greater than 500 ft or slope gradient is less than 3%; this value is based off of Table 1 of "A Wind Erosion Equation" attached at the end of this calculation. The soil used is assumed to have 25% of dry soil fractions larger than 0.84 mm.

$K' = 1.0$, roughness is assumed to be low based on the uniform finished surface

$C' = 90$ for El Paso, TX;

L' is the unsheltered distance along the prevailing wind direction; for this calculation, the prevailing wind direction is assumed to be in the direction of the slope. The 5' tall Photo-Voltaic cells effectively act as a wind break. According to the NAM, Paragraph 502.34, item 3, when a barrier is present it will provide a sheltered distance at 10 times the barrier height along the prevailing wind direction. The effective L' is reduced to 125' on the lower southwest corner (circled on Sheet P-2).

$V' = 0$ is assumed to be 0 because there is no vegetation

Summary:

$I' = 86$ tons/acre (2% slope)

$K' = 1.0$

$C' = 90$

$L' = 125$ feet

$V' = 0$

Use the National Agronomy Manual, 3rd Edition, Subpart G, E-tables to determine the soil loss.

$E = 37.0$ tons/acre/year

A Wind Erosion Equation¹

N. P. WOODRUFF AND F. H. SIDDOWNAY²

ABSTRACT

The amount of erosion, E , expressed in tons per acre per annum, that will occur from a given agricultural field can be expressed in terms of equivalent variables as: $E = f(I', K', C', L', V)$ where I' is a soil erodibility index, K' is a soil ridge roughness factor, C' is a climatic factor, L' is field length along the prevailing wind erosion direction, and V is equivalent quantity of vegetative cover. The 5 equivalent variables are obtained by grouping some and converting others of the 11 primary variables now known to govern wind erodibility. Relations among variables are extremely complex. Charts and tables have been developed to permit graphical solutions of the equation. The equation is designed to serve the twofold purpose of providing a tool to (i) determine the potential erosion from a particular field, and (ii) determine what field conditions of soil cloddiness, roughness, vegetative cover, sheltering by barriers, or width and orientation of field are necessary to reduce potential erosion to a tolerable amount. Examples of these applications of the equation are presented. Weaknesses in the equation and areas needing further research are discussed.

THE WIND EROSION EQUATION was developed by the late Dr. W. S. Chepil. It is the result of nearly 30 years of research to determine the primary variables or factors that influence erosion of soil by wind.

The first wind erosion equation was a simple exponential expressing the amount of soil loss in a wind tunnel as a function of per cent soil cloddiness, amount of surface residue, and degree of surface roughness. The equation has been modified continually as new research data became available and now is a complex equation indicating the relation between potential soil loss from a field and some 11 individual primary field and climatic variables.

The equation is designed to serve the twofold purpose of determining (i) if a particular field is adequately protected from wind erosion, and (ii) the different field conditions of cloddiness, roughness, vegetative cover, sheltering from wind barriers, or width and orientation of field required to reduce potential soil loss to a tolerable amount under different climates.

This paper discusses the present status of the equation, points out some applications and uses of the equation, and indicates some weaknesses and areas needing further research.

PRIMARY WIND EROSION VARIABLES

The wind erodibility of land surfaces is governed by 11 primary variables. A brief description of each follows.

Soil Erodibility Index, I , and Knoll Erodibility, I_s

Soil erodibility, I , is the potential soil loss in tons per acre per annum from a *wide, unsheltered*, isolated field

¹ Contribution from the Soil and Water Conservation Research Division, ARS, USDA, and the Kansas Agr. Exp. Sta., Department of Agronomy Contribution no. 897. Received Jan. 6, 1965. Approved Mar. 30, 1965.

² Agricultural Engineer, USDA, Manhattan, Kan., and Soil Scientist, USDA, Sidney, Mont., respectively.

with a *bare, smooth, noncrusted* surface. It has been developed from wind tunnel and field measures of erodibility and is based on climatic conditions for the vicinity of Garden City, Kans., during 1954-56 (4, 7, 8, 9, 10). It is related to soil cloddiness and its value increases as the percentage of soil fractions greater than 0.84 mm in diameter decreases. It can be determined by standard dry sieving procedure and use of Table 1.

Knoll erodibility, I_s , is a factor needed to compute erodibility for windward slopes less than about 500 feet long. It varies with slope and is expressed in terms of per cent slope, Fig. 1. The erosion rate for windward slopes longer than 500 feet is about the same as from level land; therefore, I_s is taken as 100% for this situation (13, 14).

Surface Crust Stability, F_s

The mechanical stability of the surface crust, F_s , if a crust is present, is of little consequence because it disintegrates readily due to abrasion after wind erosion has started.

Table 1—Soil erodibility I for soils with different percentages of nonerodible fractions as determined by standard dry sieving*

Percentage of dry soil fractions > 0.84 mm	Units									
	0	1	2	3	4	5	6	7	8	9
tens	tons/acre									
0	---	310	250	220	195	180	170	160	150	140
10	134	131	128	125	121	117	113	109	106	102
20	98	95	92	90	88	86	83	81	79	76
30	74	72	71	69	67	65	63	62	60	58
40	56	54	52	51	50	48	47	45	43	41
50	38	36	33	31	29	27	25	24	23	22
60	21	20	19	18	17	16	16	15	14	13
70	12	11	10	8	7	6	4	3	3	2
80	2	---	---	---	---	---	---	---	---	---

* For a fully crusted soil surface, regardless of soil texture, the erodibility I is, on the average, about 1/6 of that shown.

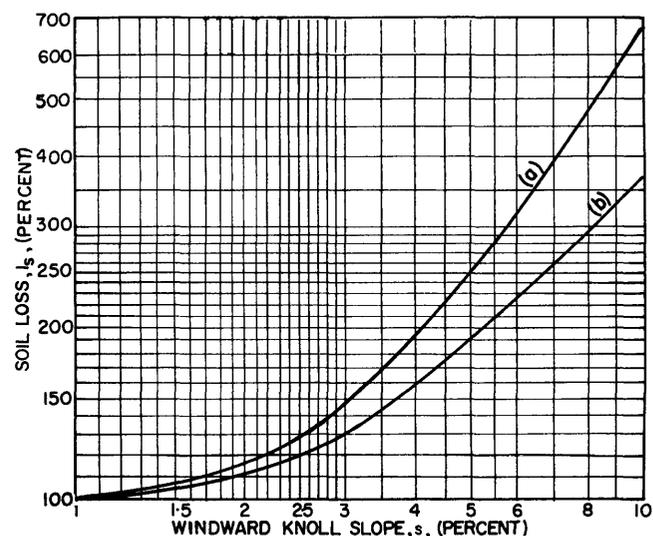
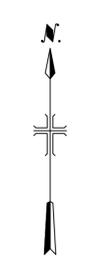
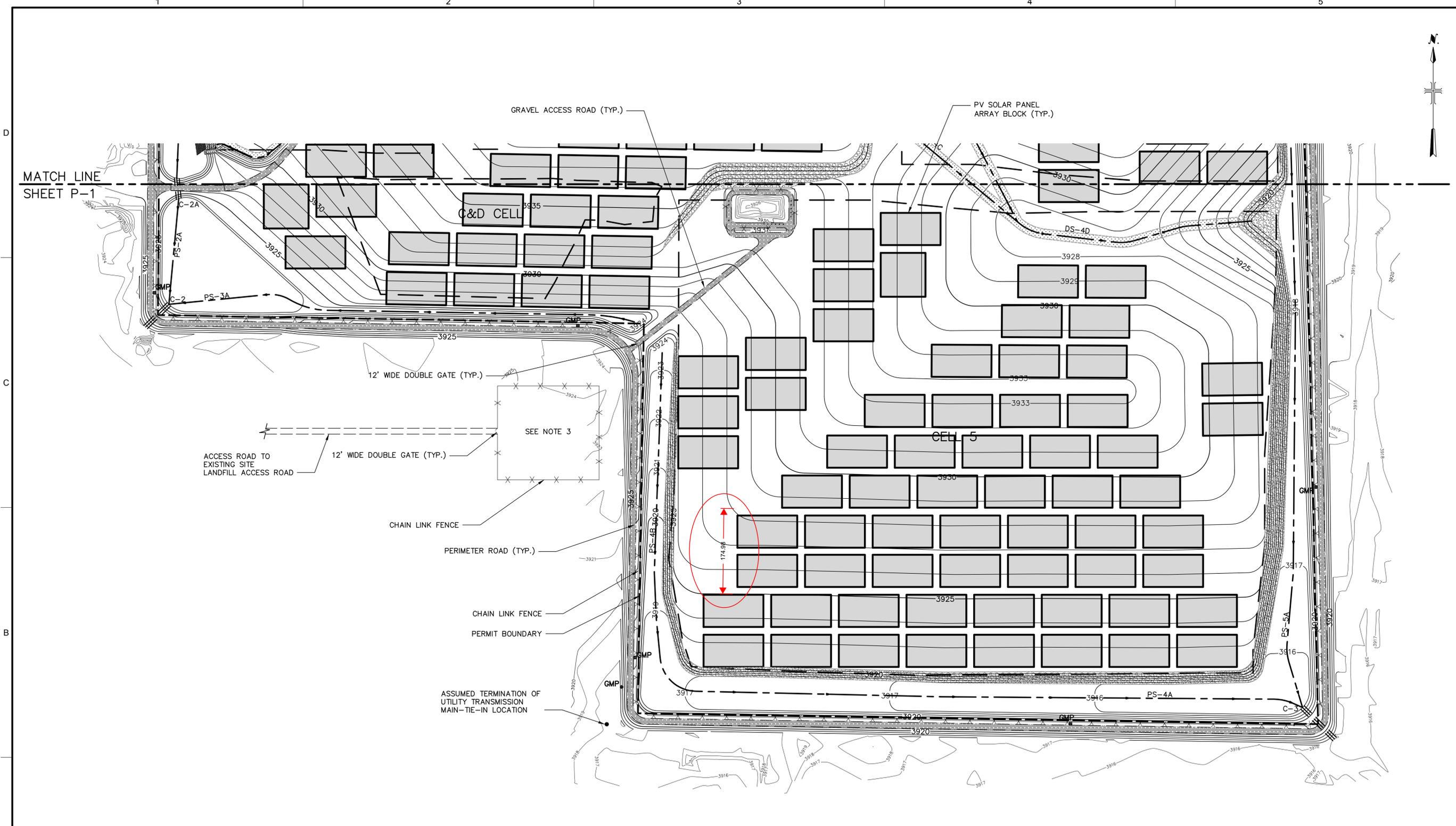


Fig. 1—Potential soil loss from knolls, expressed as per cent of that on level ground: (a) from top of knoll, (b) from that portion of windward slope where drag velocity and wind drag are the same as on top of knoll (from about the upper third of the slope).

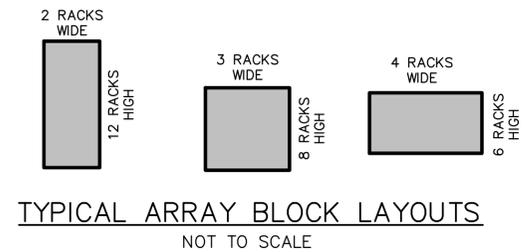
User: T:\Spec\PIR\IE STANDARD File:\ENV\CAD\WhitePlains-NY\ACT\04675026\Fort Bliss Autocad Files\DWGS-ETSC\04675026-ETSC-C07.DWG Scale: 1:1 Date: 05/21/2014 Time: 07:03 Layout: Layout1



LEGEND

— 3924 —	PROPOSED TOP OF FINAL COVER 1' GRADES
— 3924 —	PROPOSED TOP OF FINAL COVER 5' GRADES
	PROPOSED GRAVEL ACCESS ROAD
— X — X — X —	PROPOSED CHAIN LINK FENCE
---	PERMIT BOUNDARY
---	APPROXIMATE LANDFILL CELL LIMITS

- NOTES:**
1. ALL ARRAY BLOCKS SHOWN CONSIST OF 24 RACK ASSEMBLIES. ORIENTATION MAY CHANGE TO ACCOMMODATE SITE CONDITIONS.
 2. ARRAY LAYOUT SUPPORTS CONCEPTUAL 10MW PV SYSTEM LAYOUT AT COVER SYSTEM.
 3. AREA DESIGNATED FOR SOLAR DEVELOPER SUPPORT AREA CONTAINING INVERTERS, WEATHER STATION, SWITCH GEAR, SCADA FACILITY AND UTILITY SWITCH BOARD. FINAL LOCATION AND EXTENTS MAY VARY.





US Army Corps of Engineers

ARCADIS US, INC.
TX ENGINEERING
LICENSING NO. F-533

ED QUIROZ P.E. # 68566

MARK	PRELIMINARY REVIEW	DESCRIPTION	DATE
A	X		07/11/14

DESIGNED BY: TAM	DATE: JULY 2014	SOLICITATION NO.:	SOLICITATION NO.:
OWN BY: TT	CKD BY: TAM	CONTRACT NO.:	CONTRACT NO.:
SUBMITTED BY:	FILE NUMBER:	FILE NUMBER:	FILE NUMBER:
PLOT SCALE:	FILE NAME:	FILE NUMBER:	FILE NUMBER:
SIZE:	ANSI D:	ANSI D:	ANSI D:

U.S. ARMY CORPS OF ENGINEERS
FORT WORTH DISTRICT
FORT WORTH, TEXAS

ARCADIS
Infrastructure - Water-Environment-Buildings
2929 BRIDGEPARK DRIVE, SUITE 300
HOUSTON, TEXAS 77042

FORT BLISS MUNICIPAL SOLID WASTE LANDFILL
PERMIT MODIFICATION APPLICATION APPENDIX R-
PV DEVELOPMENT OVER MONOLITHIC
EVAPO-TRANSPARATION (ET) ALTERNATIVE COVER SYSTEM

**FINAL COVER SYSTEM
SOLAR PANEL LAYOUT II**

SHEET IDENTIFICATION
P-2
SHEET 3 OF 5

SUBPART G - EXHIBITS

502.60(a)

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR JANUARY, 1998

C = 90

I = 86

SURFACE - K =1.00

(L) (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

UNSHeltered DISTANCE IN FEET	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	77.4	67.5	54.0	40.7	24.4	14.0	7.1	3.6	2.0	0.7			
8000	77.4	67.5	54.0	40.7	24.4	14.0	7.1	3.6	2.0	0.7			
6000	77.4	67.5	54.0	40.7	24.4	14.0	7.1	3.6	2.0	0.7			
4000	77.4	67.5	54.0	40.7	24.4	14.0	7.1	3.6	2.0	0.7			
3000	77.0	67.1	53.7	40.4	24.3	13.9	7.0	3.6	1.9	0.7			
2000	74.7	65.0	51.8	38.9	23.2	13.1	6.6	3.3	1.8	0.7			
1000	68.7	59.6	47.2	35.1	20.6	11.4	5.6	2.8	1.5	0.5			
800	66.4	57.5	45.4	33.6	19.6	10.7	5.3	2.6	1.3	0.5			
600	61.0	52.7	41.3	30.2	17.4	9.3	4.5	2.1	1.1				
400	55.5	47.8	37.2	26.9	15.2	7.9	3.7	1.7	0.9				
300	51.4	44.1	34.1	24.4	13.6	6.9	3.2	1.4	0.7				
200	45.1	38.5	29.4	20.7	11.3	5.5	2.5	1.1	0.3				
150	39.4	33.4	25.3	17.5	9.3	4.4	1.9	0.8	0.3				
100	34.7	29.3	21.9	14.9	7.7	3.5	1.5	0.5					
80	31.9	26.9	20.0	13.5	6.9	3.1	1.2	0.4					
60	26.3	22.0	16.1	10.6	5.2	2.2	0.8						
50	23.4	19.5	14.1	9.2	4.4	1.8	0.7						
40	21.0	17.4	12.5	8.0	3.8	1.5	0.5						
30	17.5	14.4	10.2	6.3	2.9	1.1							
20	13.1	10.7	7.4	4.4	1.9	0.4							
10	7.0	5.5	3.6	2.0	0.7								

(E)* SOIL LOSS FROM WIND EROSION IN TONS PER ACRE PER YEAR

JANUARY, 1998

C = 90

I = 86

SURFACE - K =0.90

(L) (V)** - FLAT SMALL GRAIN RESIDUE IN POUNDS PER ACRE

UNSHeltered DISTANCE IN FEET	0	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000
10000	69.7	60.5	47.9	35.7	21.0	11.7	5.8	2.9	1.5	0.6			
8000	69.7	60.5	47.9	35.7	21.0	11.7	5.8	2.9	1.5	0.6			
6000	69.7	60.5	47.9	35.7	21.0	11.7	5.8	2.9	1.5	0.6			
4000	69.0	59.9	47.4	35.2	20.7	11.5	5.7	2.8	1.5	0.5			
3000	67.9	58.9	46.6	34.5	20.2	11.2	5.5	2.7	1.4	0.5			
2000	65.3	56.5	44.6	32.9	19.1	10.4	5.1	2.5	1.3	0.5			
1000	59.0	50.9	39.8	29.0	16.6	8.8	4.2	2.0	1.0				
800	57.2	49.3	38.4	27.9	15.8	8.3	3.9	1.8	0.9				
600	53.4	45.9	35.6	25.6	14.4	7.4	3.4	1.6	0.8				
400	48.6	41.6	32.0	22.8	12.5	6.3	2.8	1.3	0.4				
300	44.5	38.0	29.0	20.4	11.1	5.4	2.4	1.0	0.3				
200	38.5	32.7	24.7	17.0	9.0	4.2	1.8	0.7	0.2				
150	34.0	28.7	21.4	14.6	7.5	3.4	1.4	0.5					
100	29.9	25.1	18.5	12.4	6.2	2.7	1.1						
80	26.0	21.7	15.9	10.4	5.1	2.1	0.8						
60	22.1	18.3	13.2	8.5	4.1	1.6	0.6						
50	19.6	16.2	11.6	7.3	3.4	1.3							
40	17.0	14.0	9.9	6.2	2.8	1.0							
30	13.9	11.4	7.9	4.8	2.1	0.7							
20	10.2	8.2	5.5	3.2	1.3	0.3							
10	4.4	3.5	2.2	1.1	0.4								

* NOTE: SOIL LOSS FOR VALUES WHERE 'E' IS LESS THAN 0.1 OR GREATER THAN 440.0 ARE NOT SHOWN; OTHER VALUES NOT SHOWN ARE INVALID

** NOTE: VALUES SHOWN ARE FLAT SMALL GRAIN EQUIVALENT, NOT 'V'