PERMIT DOCUMENTS
FOR
TRAIL RIDGE LANDFILL
SECOND RENEWAL

PREPARED FOR:

TRAIL RIDGE LANDFILL, INC.

PREPARED BY:

England-Thims & Miller, Inc.
Consulting & Design Engineers
14775 St. Augustine Road
Jacksonville, Florida 32258
Certificate of Authorization Number: 2584
Phone Number (904) 642-8990

SEPTEMBER 25, 2002
PROJECT NUMBER: E 02-025

Permitting Application - Permit Detail and Log Permit

SITE Permit

Site Name: TRAIL RIDGE LF WASTE TIRE (WTP)
Site #: 0126289
County: DUVAL
Comments:
RPAs:
Cases:

Project

Permit #: - -
Project #: 001
Received: 09/27/2002
CRA#:
Permit Office: NED (DISTRICT)
Agency Action: Pending
Project Name: TRAIL RIDGE LANDFILL WASTE
Desc: TIRE SITE WTP
Type/Sub/Des: WT / 02 W/T PROCESSING FACILITY
COE #:
Logged: 09/27/2002
Issued:
Expires:
OGC:
Fee: 0.00
Fee Recd:
Dele:
Override: SMALL CO. WAIV

Related Party

Role: APPLICANT
Begin: 09/27/2002
End:
Name: CAMPAGNA, CHARLES
Company: WASTE MANAGEMENT
Addr: 2859 PACES FERRY ROAD, SUITE 1600
City: ATLANTA
State: GA
Zip: 30339 -
Country: U.S.A.
Phone: 770-805-4130
Fax: 770-805-4116

Processors

Processor: NOGAS_M Y
Active: 09/27/2002
Inactive:
Events

Comments

Comments

Site # 0126289

Project # 001

09/27/02 - WAIVED FEE PER JB.

Permitting Application - Permit Detail and Log Permit

SITE Permit

Site Name	TRAIL RIDGE LANDFILL LF1					Site #	0013493
County	DUVAL	Comments	Y	RPAs	N	# Cases	0

Project

Permit #	- -	Project #	011	Received	09/26/2002	CRA#	
Permit Office	NED (DISTRICT)					Agency Action	Pending
Project Name	TRAIL RIDGE LANDFILL LF1	Desc					
Type/Sub/Des	SO / 01	SANI. LANDFILL CLASS I				COE #	
Logged	09/27/2002	Issued		Expires		OGC	
Fee	10000.00	Fee Recd		Dele		Override	NONE

Related Party

Role	APPLICANT	Begin	09/27/2002	End			
Name	CAMPAGNA, CHARLES	Company	WASTE MANAGEMENT				
Addr	2859 PACES FERRY ROAD, SUITE 1600						
City	ATLANTA	State	GA	Zip	30339 -	Country	U.S.A.
Phone	770-805-4130	Fax	770-805-4116				

Processors

Processor	NOGAS_M	Y	Active	09/27/2002	Inactive	Events

DEP005297

Comments

Comments

Site # 0013493 Project # 011

09/26/02 - REC'D $20,000.00 (ONE CHECK FOR TWO APPLICATIONS) $10,000.00 FOR SO/01, RECEIPT #393293.
$10,000.00 FOR SC/01, RECEIPT #393293.

Cash Receiving Application - Collection Point Log Remittance

Collection Point Log Remittance

CRAF006A

AREA: NED

Tot: $32,018.45

Remittance	487961	Type *	CP	Recved Date *	09/26/2002
Status	RECEIVED				
SYS$RCPT	393293	PNR		Check # *	00447535
Amount *	20,000.00				
SSN/FEI#		Name *	CITY OF JACKSONVILLE		
First		Middle		Title	
Suf					
Address1	CHRIS PEARSON				
Address2	140 W MONROE STREET SUITE 200				
City	JACKSONVILLE	ST	FL	Zip	32202
Country					

Short Comments: ETAW/SO0013493/SC0013493

PAYMENT(S)

Payment#	Distr CL Area	Object Code/Description		Payment Amount	Reference#	Applic/	Fund *	status
522268	NED	002245	SOLID WASTE-OPE	$10,000.00	SO0013493/S	PA	PFTF	COMPLETE
522269	NED	002244	SOLID WASTE-CON	$10,000.00	SO0013493/S	PA	PFTF	COMPLETE

COMMIT FREQUENTLY

$20,000.00 Payment total

DEP005299

Vendor Number: 596007353 03 Check Date: 08/29/2002 Check Number: 00447535

Document Number	Document Reference Number	Index Code	Sub Object	Description	Net Amount
VPSW0200085401		SWLF441LFAD	04938	*CONTRUCTION PERMIT RENEWAL TRAIL RIDGE LANFILL*	10,000.00
VPSW0200085402		SWLF441LFAD	04938	*OPERATION PERMIT RENEWAL TRAIL RIDGE LANDFILL*	10,000.00

Total >>> *****20,000.00

393293

CITY OF JACKSONVILLE

Bank of America
Bank of America
Jacksonville, FL
63-4/630

Check Number	Check Date
00447535	08/29/2002

Net Amount

$ *****20,000.00

Check Void After 90 Days

Vendor No. 596007353 03

PAY ***Twenty Thousand and 00/100 Dollars***

TO THE ORDER OF
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHEAST DISTRICT
7825 BAYMEADOWS WAY SUITE B200
JACKSONVILLE FL 32256-7590

MAYOR

DIRECTOR ADM & FINANCE

Shari A. Shuman TREASURER

SIGNATURE HAS A COLORED BACKGROUND • BORDER CONTAINS MICROPRINTING

⑈00447535⑈ ⑆063000047⑆ 003448277104⑈

England-Thims & Miller, Inc.

ENGINEERS • PLANNERS • SURVEYORS • GIS • LANDSCAPE ARCHITECTS

Principals
James E. England, P.E., CEO
Douglas C. Miller, P.E., President
N. Hugh Mathews, P.E., Exec., V.P.
Joseph A. Tarver, Exec., V.P.
Juanitta Bader Clem, P.E., V.P.
Scott A. Wild, P.E., PSM, V.P.
Samuel R. Crissinger, CPA, V.P.
Robert A. Mizell, Jr., P.E., V.P.
Bryan R. Stewart, V.P.

September 25, 2002

Ms. Mary C. Nogas, P.E.
Waste Management Section
Department of Environmental Protection
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256

Reference: Trail Ridge Landfill - Second Permit Renewal
FDEP Permit No. 0013493-001 and 0013493-002
ET&M No. E02-25-1

Dear Ms. Nogas:

Pursuant to Chapter 62-701, F.A.C. and on behalf of Trail Ridge Landfill, Inc., please find herewith the Application for a Permit to Construct Operate, Modify or Close a Solid Waste Management Facility for the operation and construction of the referenced landfill as well as the continued operation of the waste tire processing facility.

The preparation of the permit application has been under the direction of Trail Ridge Landfill, Inc. in concert with the City of Jacksonville.

I would respectfully request that any questions regarding this application be directed to me.

Sincerely,

ENGLAND, THIMS & MILLER, INC.

Juanitta Bader Clem

Juanitta Bader Clem, P.E.
Vice President

2002 SEP 26 P 2:03

Attachments: Permit Document - 4 copies
Permit Drawings - 4 copies
Permit Application - 4 copies
Application Fee for Operation/Construction - $20,000.00

cc: Greg Mathes w/attachments
Achaya Kelapanda w/attachments
Chris Pearson w/attachments

Permitting Application - Permit Detail and Log Permit

SITE Permit

Site Name: TRAIL RIDGE LANDFILL LF1 | Site #: 0013493

County: DUVAL | Comments: Y | RPAs: N | # Cases: 0

Project

Permit #: - - | Project #: 010 | Received: 09/26/2002 | CRA#:

Permit Office: NED (DISTRICT) | Agency Action: Pending

Project Name: TRAIL RIDGE LANDFILL LFI | Desc:

Type/Sub/Des: SC / 01 SANI. LANDFILL CLASS I | COE #:

Logged: 09/27/2002 | Issued: | Expires: | OGC:

Fee: 10000.00 | Fee Recd: | Dele: | Override: NONE

Related Party

Role: APPLICANT | Begin: 09/27/2002 | End:

Name: CAMPAGNA, CHARLES | Company: WASTE MANAGEMENT

Addr: 2859 PACES FERRY ROAD, SUITE 1600

City: ATLANTA | State: GA | Zip: 30339 - | Country: U.S.A.

Phone: 770-805-4130 | Fax: 770-805-4116

Processors

Processor: NOGAS_M | Y | Active: 09/27/2002 | Inactive: | Events

Comments

Comments

Site # 0013493 Project # 010

09/2[illegible]/02 - REC'D $20,000.00 (ONE CHECK FOR TWO APPLICATIONS). $10,000.00 FOR SC/O1, RECEIPT #393293.
$10,000.00 FOR SO/01, RECEIPT #393293.

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Tot: $32,018.45

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SSN/FEI#				Name *	CITY OF JACKSONVILLE

Status: RECEIVED

Amount *: 20,000.00

First: | Middle: | Title: | Suf:

Address1: CHRIS PEARSON

Address2: 140 W MONROE STREET SUITE 200

City: JACKSONVILLE | ST: FL | Zip: 32202

Short Comments: ETAW/SO0013493/SC0013493

Country:

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COMMIT FREQUENTLY

$20,000.00 Payment total

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VPSW0200085401		SWLF441LFAD	04938	*CONTRUCTION PERMIT RENEWAL TRAIL RIDGE LANFILL*	10,000.00
VPSW0200085402		SWLF441LFAD	04938	*OPERATION PERMIT RENEWAL TRAIL RIDGE LANDFILL*	10,000.00

Total >>> *****20,000.00

The Reliron Company 877-530-2084

THIS CHECK IS VOID WITHOUT A COLORED BACKGROUND AND AN ARTIFICAL WATERMARK ON THE BACK - HOLD AT AN ANGLE TO VIEW

393293

CITY OF JACKSONVILLE

Bank of America
Bank of America
Jacksonville, FL
63-4/630

Check Number	Check Date
00447535	08/29/2002

Net Amount

$ *****20,000.00

Check Void After 90 Days

Vendor No. 596007353 03

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⑈00447535⑈ ⑆063000047⑆ 003448277104⑈

DEP005305

England-Thims & Miller, Inc.
ENGINEERS • PLANNERS • SURVEYORS • GIS • LANDSCAPE ARCHITECTS

September 25, 2002

Ms. Mary C. Nogas, P.E.
Waste Management Section
Department of Environmental Protection
7825 Baymeadows Way, Suite 200B
Jacksonville, Florida 32256

Reference: Trail Ridge Landfill - Second Permit Renewal
FDEP Permit No. 0013493-001 and 0013493-002
ET&M No. E02-25-1

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Juanitta Bader Clem

Juanitta Bader Clem, P.E.
Vice President

Attachments: Permit Document - 4 copies
Permit Drawings - 4 copies
Permit Application - 4 copies
Application Fee for Operation/Construction - $20,000.00

cc: Greg Mathes w/attachments
Achaya Kelapanda w/attachments
Chris Pearson w/attachments

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

DEP Form # 62-701.900(1)
Form Title Solid Waste Management Facility Permit
Effective Date

DEP Application No ____________
(Filled by DEP)

RECEIVED
SEP 26 2002
STATE OF FLORIDA
DEPT. OF ENV. PROTECTION
NORTHEAST DISTRICT-JAX

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE A SOLID WASTE MANAGEMENT FACILITY

APPLICATION INSTRUCTIONS AND FORMS

REGfiles: 5/2001

INSTRUCTIONS TO APPLY FOR A SOLID WASTE MANAGEMENT FACILITY PERMIT

I. General

Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Flori Statutes, (FS) and in accordance with Florida Administrative Code (FAC) Chapter 62-701. A minimum of four copies of the application shall be submitted to the Department's District Office having jurisdiction over the facility. The appropriate fee in accordance with Rule 62-701.315, FAC, shall be submitted with the application by check made payable to the Department of Environmental Protection (DEP).

Complete appropriate sections for the type of facility for which application is made. Entries shall be typed or printed in ink. All blanks shall be filled in or marked "not applicable" or "no substantial change". Information provided in support of the application shall be marked "submitted" and the location of this information in the application package indicated. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to complete the application is listed on the attached pages of this form.

II. Application Parts Required for Construction and Operation Permits

A. Landfills and Ash Monofills - Submit parts A,B,D through T
B. Asbestos Monofills - Submit parts A,B,D,E,F,G,J,L,N, P through S, and T
C. Industrial Solid Waste Facilities - Submit parts A,B, D through T
D. Non-Disposal Facilities - Submit parts A,C,D,E,J,N,S and T

NOTE: Portions of some parts may not be applicable.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit, the information required for A,B,C and D type facilities does not have to be resubmitted for an operation permit if the information has not substantially changed during the construction period. The appropriate portion of the form should be marked "no substantial change".

III. Application Parts Required for Closure Permits

A. Landfills and Ash Monofills - Submit parts A,B,M, O through T
B. Asbestos Monofills - Submit parts A,B,N, P through T
C. Industrial Solid Waste Facilities - Submit parts A,B, M through T
D. Non-Disposal Facilities - Submit parts A,C,N,S and T

NOTE: Portions of some parts may not be applicable.

IV. Permit Renewals

The above information shall be submitted at time of permit renewal in support of the new permit. However, facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. Portions of the application not re-submitted shall be marked "no substantial change" on the application form.

V. Application Codes

S	-	Submitted
LOCATION	-	Physical location of information in application
N/A	-	Not Applicable
N/C	-	No Substantial Change

VI. LISTING OF APPLICATION PARTS

PART A: GENERAL INFORMATION

PART B DISPOSAL FACILITY GENERAL INFORMATION

PART C: NON-DISPOSAL FACILITY GENERAL INFORMATION

PART D: PROHIBITIONS

PART E: SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL

PART F: LANDFILL PERMIT REQUIREMENTS

PART G: GENERAL CRITERIA FOR LANDFILLS

PART H: LANDFILL CONSTRUCTION REQUIREMENTS

PART I: HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS

PART J: GEOTECHNICAL INVESTIGATION REQUIREMENTS

PART K: VERTICAL EXPANSION OF LANDFILLS

PART L: LANDFILL OPERATION REQUIREMENTS

PART M: WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

PART N: SPECIAL WASTE HANDLING REQUIREMENTS

PART O: GAS MANAGEMENT SYSTEM REQUIREMENTS

PART P: LANDFILL CLOSURE REQUIREMENTS

PART Q: CLOSURE PROCEDURES

PART R: LONG TERM CARE REQUIREMENTS

PART S: FINANCIAL RESPONSIBILITY REQUIREMENTS

PART T: CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
APPLICATION FOR A PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE
A SOLID WASTE MANAGEMENT FACILITY

Please Type or Print

A. GENERAL INFORMATION

1. Type of facility (check all that apply):

[X] Disposal
- [x] Class I Landfill
- [ ] Class II Landfill
- [ ] Class III Landfill
- [ ] Ash Monofill
- [ ] Asbestos Monofill
- [ ] Industrial Solid Waste
- [x] Other Describe: Waste Tire Processing

[ ] Non-Disposal
- [ ] Incinerator For Non-biomedical Waste
- [ ] Waste to Energy Without Power Plant Certification
- [ ] Other Describe: ______

NOTE: Waste Processing Facilities should apply on Form 62-701.900(4), FAC; Land Clearing Disposal Facilities should notify on Form 62-701.900(3), FAC; Compost Facilities should apply on Form 62-701.900(10), FAC; and C&D Disposal Facilities should apply on Form 62-701.900(6), FAC

2. Type of application:
- [ ] Construction
- [ ] Operation
- [x] Construction/Operation
- [ ] Closure

3. Classification of application:
- [ ] New
- [X] Renewal
- [ ] Substantial Modification
- [ ] Intermediate Modification
- [ ] Minor Modification

4. Facility name: Trail Ridge Landfill

5. DEP ID number: GMS3116P02787 County: Duval

6. Facility location (main entrance): 5110 U.S. Hwy. 301
Baldwin, Florida 32234

7. Location coordinates:
Section: 18, 19, 20, 21 Township: 3S Range: 23E
Latitude: 30 ° 14 ' 00 " Longitude: 82 ° 02 ' 30 "

8. **Applicant name (operating authority):** Trail Ridge Landfill, Inc.

Mailing address: 5110 U.S. Hwy. 301 — Baldwin — Florida — 32234
Street or P. O. Box — City — State — Zip

Contact person: Greg Mathes **Telephone:** (904) 289-9100

Title: General Manager

gmathes@wm.com
E-Mail address (if available)

9. **Authorized ~~agent~~/Consultant:** England, Thims & Miller, Inc.

Mailing address: 14775 St. Augustine Road, Jacksonville, Florida 32258
Street or P. O. Box — City — State — Zip

Contact person: Juanitta Clem **Telephone:** (904) 642-8990

Title: Vice President

clemj@etminc.com
E-Mail address (if available)

10. **Landowner(if different than applicant):** City of Jacksonville

Mailing address: Suite 200 140 W. Monroe Street, Jacksonville, Florida 32202
Street or P. O. Box — City — State — Zip

Contact person: Chris Pearson **Telephone:** (904) 630-4593

chrisp@coj.net
E-Mail address (if available)

11. **Cities, towns and areas to be served:** City of Jacksonville (Duval County), St. Johns County and Northeast Florida

12. **Population to be served:**
Current: 805,469 (2002 Duval) 132,829 (2002 St. Johns) **Five-Year Projection:** 845,580 (2007 Duval) 149,506 (2007 St. Johns)

13. **Date site will be ready to be inspected for completion:** N/A

14. **Expected life of the facility:** 14 **years**

15. **Estimated costs:**

Total Construction: $ N/A **Closing Costs: $** 14.4 Million

16. **Anticipated construction starting and completion dates:**

From: On-Going **To:** On-Going

17. **Expected volume or weight of waste to be received:**

_______ **yds^3/day** 5,000 * (peak) **tons/day** _______ **gallons/day**
3,900 Tons/day (monthly average)

B. DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of disposal facility design and operations planned under this application:

Permit renewal for continued construction/operation of the Class I Landfill.

The project includes construction of a recirculation system.

2. Facility site supervisor: Greg Mathes

Title: General Manager Telephone: (904) 289-9100

gmathes@wm.com
E-Mail address (if available)

3. Disposal area: Total 148 acres; Used 148 acres; Available 0 acres

4. Weighing scales used: [X] Yes [ ] No

5. Security to prevent unauthorized use: [x] Yes [ ] No

6. Charge for waste received: N/A $/yds³ 32.00 $/ton

7. Surrounding land use, zoning:

[ ] Residential
[X] Agricultural
[ ] Commercial
[ ] Industrial
[ ] None
[x] Other Describe: Silviculture

8. Types of waste received:

[X] Residential
[X] Commercial
[ ] Incinerator/WTE ash
[x] Treated biomedical
[X] Water treatment sludge
[ ] Air treatment sludge
[X] Agricultural
[x] Asbestos
[x] Other Describe: Non-Hazardous Special Waste
[X] C & D debris
[X] Shredded/cut tires
[ ] Yard trash
[ ] Septic tank
[x] Industrial
[X] Industrial sludge
[x] Domestic sludge

9. Salvaging permitted: [ ] Yes [X] No

10. Attendant: [X] Yes [ ] No Trained operator: [x] Yes [ ] No

11. Spotters: Yes [X] No [ ] Number of spotters used: 1

12. Site located in: [ ] Floodplain [ ] Wetlands [x] Other Upland Pines Flatwoods

13. Property recorded as a Disposal Site in County Land Records: [ ] Yes [X] No

14. Days of operation: Monday - Saturday

15. Hours of operation: 5:00 A.M. - 10:00 P.M.*

16. Days Working Face covered: Daily with cover dirt or tarpaulin

17. Elevation of water table: varies Ft. (NGVD 1929)

18. Number of monitoring wells: 50 (37 wells monitored)

19. Number of surface monitoring points: 2

20. Gas controls used: [X] Yes [ ] No Type controls: [X] Active [ ] Passive

Gas flaring: [X] Yes [ ] No Gas recovery: [ ] Yes [X] No

21. Landfill unit liner type:

[ ] Natural soils
[ ] Single clay liner
[ ] Single geomembrane
[ ] Single composite
[ ] Slurry wall
[ ] Other Describe: With Bentonite Mat and 6" clay subgrade
[X] Double geomembrane
[ ] Geomembrane & composite
[ ] Double composite
[ ] None

22. Leachate collection method:

[X] Collection pipes
[X] Geonets
[ ] Well points
[ ] Perimeter ditch
[ ] Other Describe:
[ ] Sand layer
[ ] Gravel layer
[ ] Interceptor trench
[ ] None

23. Leachate storage method:

[X] Tanks
[ ] Surface impoundments
[ ] Other Describe:

24. Leachate treatment method:

[ ] Oxidation
[ ] Secondary
[ ] Advanced
[ ] None
[X] Other off-site Treatment at a City Wastewater Treatment Facility
[ ] Chemical treatment
[ ] Settling

* May vary dependent upon waste receipt.

25. Leachate disposal method:

[X] Recirculated
[X] Transported to WWTP
[ ] Injection well
[ ] Evaporation
[ ] Other ______

[ ] Pumped to WWTP
[ ] Discharged to surface water
[ ] Percolation ponds

26. For leachate discharged to surface waters:

Name and Class of receiving water: N/A

27. Storm Water:

Collected: [X] Yes [ ] No

Type of treatment: wet detention

Name and Class of receiving water: Headwaters of Deep Creek - Class III

28. Environmental Resources Permit (ERP) number or status: Permitted as Solid Waste Permit (DEP File Nos. 184444, 184445 and 184447). Pond was permitted, constructed and certified.

C. NON-DISPOSAL FACILITY GENERAL INFORMATION N/A

1. Provide brief description of the non-disposal facility design and operations planned under this application:

____

____

____

____

2. Facility site supervisor: ______________________

Title: ______________ Telephone: (___) ______________

____

E-Mail address (if available)

3. Site area: Facility __________ acres; Property __________ acres

4. Security to prevent unauthorized use: [ ] Yes [ ] No

5. Site located in: [ ] Floodplain [ ] Wetlands [ ] Other __________

6. Days of operation: ______________________

7. Hours of operation: ______________________

8. Number of operating staff: __________

9. Expected useful life: _______Years

10. Weighing scales used: [ ] Yes [ ] No

11. Normal processing rate: _______ yd^3/day _______ tons/day _______ gal/day

12. Maximum processing rate: _______ yd^3/day _______ tons/day _______ gal/day

13. Charge for waste received: ______________________

14. Storm Water Collected: [ ] Yes [ ] No

Type of treatment: ______________________

Name and Class of receiving water: ______________________

15. Environmental Resources Permit (ERP) number or status: ______________

____

16. Final residue produced:

_______% of normal processing rate _______% of maximum processing rate

_______Tons/day _______Tons/day

Disposed of at:

Facility name: ______________ County: ______________

17. Estimated operating costs: $ ______________

Total cost/ton: $ ____________________ Net cost/ton: $______________________

18. Provide a site plan, at a scale not greater than 200 feet to the inch, which shows the facility location and identifies the proposed waste and final residue storage areas, total acreage of the site, and any other features which are relevant to the prohibitions or location restrictions in Rule 62-701.300, FAC, such as water bodies or wetlands on or within 200 feet of the site, and potable water wells on or within 500 feet of the site.

19. Provide a description of how the waste and final residue will be managed to not be expected to cause violations of the Department's ground water, surface water or air standards or criteria.

20. Provide an estimate of the maximum amount of waste and final residue that will be store on-site.

21. Provide a detailed description of the technology use at the facility and the functions of all processing equipment that will be utilized. The descriptions shall explain the flow of waste and residue through all the proposed unit operations and shall include: (1) regular facility operations as they are expected to occur; (2) procedures for start up operations, and scheduled and unscheduled shut down operations; (3) potential safety hazards and control methods, including fire detection and control; (4) a description of any expected air emissions and wastewater discharges from the facility which may be potential pollution sources; (5) a description and usage rate of any chemical or biological additives that will be used in the process; and (6) process flow diagrams for the facility operations.

22. Provide a description of the loading, unloading and processing areas.

23. Provide a description of the leachate control system that will be used to prevent discharge of leachate to the environment and mixing of leachate with stormwater. Note: Ground water monitoring may be required for the facility depending on the method of leachate control used.

24. Provide an operation plan for the facility which includes: (1) a description of general facility operations, the number of personnel responsible for the operations including their respective job descriptions, and the types of equipment that will be used at the facility; (2) procedures to ensure any unauthorized wastes received at the site will be properly managed; (3) a contingency plan to cover operation interruptions and emergencies such as fires, explosions, or natural disasters; (4) procedures to ensure operational records needed for the facility will be adequately prepared and maintained; and (5) procedures to ensure that the wastes and final residue will be managed to not be expected to cause pollution.

25. Provide a closure plan that describes the procedures that will be implemented when the facility closes including: (1) estimated time to complete closure; (2) procedures for removing and properly managing or disposing of all wastes and final residues; (3) notification of the Department upon ceasing operations and completion of final closure.

D. **PROHIBITIONS** (62-701.300, FAC)

S	LOCATION	N/A	N/C		
			X	1.	Provide documentation that each of the siting criteria will be satisfied for the facility; (62-701.300(2), FAC)
		X		2.	If the facility qualifies for any of the exemptions contained in Rules 62-701.300(12) through (16), FAC, then document this qualification(s).
		X		3.	Provide documentation that the facility will be in compliance with the burning restrictions; (62-701.300(3), FAC)
			X	4.	Provide documentation that the facility will be in compliance with the hazardous waste restrictions; (62-701.300(4), FAC)
			X	5.	Provide documentation that the facility will be in compliance with the PCB disposal restrictions; (62-701.300(5), FAC)
			X	6.	Provide documentation that the facility will be in compliance with the biomedical waste restrictions; (62-701.300(6), FAC)
		X		7.	Provide documentation that the facility will be in compliance with the Class I surface water restrictions; (62-701.300(7), FAC)
			X	8.	Provide documentation that the facility will be in compliance with the special waste for landfills restrictions; (62-701.300(8), FAC)
		X		9.	Provide documentation that the facility will be in compliance with the special waste for waste-to-energy facilities restrictions; (62-701.300(9), FAC)
			X	10.	Provide documentation that the facility will be in compliance with the liquid restrictions; (62-701.300(10), FAC)
			X	11.	Provide documentation that the facility will be in compliance with the used oil restrictions; (62-701.300(11), FAC)

E. SOLID WASTE MANAGEMENT FACILITY PERMIT REQUIREMENTS, GENERAL (62-701.320, FAC)

S	LOCATION	N/A	N/C		
X	Attached			1.	Four copies, at minimum, of the completed application form, all supporting data and reports; (62-701.320(5)(a),FAC)
X	Attached			2.	Engineering and/or professional certification (signature, date and seal) provided on the applications and all engineering plans, reports and supporting information for the application; (62-701.320(6),FAC)
X	Attached			3.	A letter of transmittal to the Department; (62-701.320(7)(a),FAC)
X	Attached			4.	A completed application form dated and signed by the applicant; (62-701.320(7)(b),FAC)
X	Attached			5.	Permit fee specified in Rule 62-701.315, FAC in check or money order, payable to the Department; (62-701.320(7)(c),FAC)
X	Attached			6.	An engineering report addressing the requirements of this rule and with the following format: a cover sheet, text printed on 8 1/2 inch by 11 inch consecutively numbered pages, a table of contents or index, the body of the report and all appendices including an operation plan, contingency plan, illustrative charts and graphs, records or logs of tests and investigations, engineering calculations; (62-701.320(7)(d),FAC)
X	Attached			7.	Operation Plan and Closure Plan; (62-701.320(7)(e)1.,FAC)
X	Attached			8.	Contingency Plan; (62-701.320(7)(e)2.,FAC)
				9.	Plans or drawings for the solid waste management facilities in appropriate format (including sheet size restrictions, cover sheet, legends, north arrow, horizontal and vertical scales, elevations referenced to NGVD 1929) showing; (62-702.320(7)(f),FAC)
X	Permit Drawing No. 1			a.	A regional map or plan with the project location;
X	Permit Drawing No. 2			b.	A vicinity map or aerial photograph no more than 1 year old;
			X	c.	A site plan showing all property boundaries certified by a registered Florida land surveyor;

S	LOCATION	N/A	N/C		PART E CONTINUED
			X	d.	Other necessary details to support the engineering report.
			X	10.	Documentation that the applicant either owns the property or has legal authority from the property owner to use the site; (62-701.320(7)(g),FAC)
X	Section II.B.			11.	For facilities owned or operated by a county, provide a description of how, if any, the facilities covered in this application will contribute to the county's achievement of the waste reduction and recycling goals contained in Section 403.706,FS; (62-701.320(7)(h),FAC)
X	Section II.C.			12.	Provide a history and description of any enforcement actions taken by the Department against the applicant for violations of applicable statutes, rules, orders or permit conditions relating to the operation of any solid waste management facility in this state; (62-701.320(7)(i),FAC)
		X		13.	Proof of publication in a newspaper of general circulation of notice of application for a permit to construct or substantially modify a solid waste management facility; (62-702.320(8),FAC)
			X	14.	Provide a description of how the requirements for airport safety will be achieved including proof of required notices if applicable If exempt, explain how the exemption applies; (62-701.320(13),FAC)
X	Section II.F.			15.	Explain how the operator training requirements will be satisfied for the facility; (62-701.320(15), FAC)

F. LANDFILL PERMIT REQUIREMENTS (62-701.330, FAC)

S	LOCATION	N/A	N/C		
X	Permit Drawing No. 2			1.	Vicinity map or aerial photograph no more than 1 year old and of appropriate scale showing land use and local zoning within one mile of the landfill and of sufficient scale to show all homes or other structures, water bodies, and roads other significant features of the vicinity. All significant features shall be labeled; (62-701.330(3)(a),FAC)
		X		2.	Vicinity map or aerial photograph no more than 1 year old showing all airports that are located within five miles of the proposed landfill; (62-701.330(3)(b),FAC)
X	Permit Drawing No. 4			3.	Plot plan with a scale not greater than 200 feet to the inch showing; (62-701.330(3)(c),FAC)
X	Permit Drawings			a.	Dimensions;
X	Permit Drawing No. 3			b.	Locations of proposed and existing water quality monitoring wells;
			X	c.	Locations of soil borings;
			X	d.	Proposed plan of trenching or disposal areas;
X	Permit Drawing No. 10			e.	Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets;
X	Permit Drawing No. 5			f.	Any previously filled waste disposal areas;
X	Permit Drawing No. 4			g.	Fencing or other measures to restrict access.
	Permit Drawing No. 5			4.	Topographic maps with a scale not greater than 200 feet to the inch with 5-foot contour intervals showing; (62-701.330(3)(d),FAC):
X				a.	Proposed fill areas;
		X		b.	Borrow areas;
X				c.	Access roads;
X	Permit Drawing No. 8			d.	Grades required for proper drainage;
X	Permit Drawing No. 10			e.	Cross sections of lifts;

S	LOCATION	N/A	N/C		PART F CONTINUED
	Permit Drawing No. 8			f.	Special drainage devices if necessary;
X	Permit Drawing No. 4			g.	Fencing;
X	Permit Drawing No. 4			h.	Equipment facilities.
				5.	A report on the landfill describing the following; (62-701.330(3)(e),FAC)
X	Section III.			a.	The current and projected population and area to be served by the proposed site;
X	Section III.			b.	The anticipated type, annual quantity, and source of solid waste, expressed in tons;
X	Section III.			c.	The anticipated facility life;
X	Section III.			d.	The source and type of cover material used for the landfill.
X	Section IV.D.			6.	Provide evidence that an approved laboratory shall conduct water quality monitoring for the facility in accordance with Chapter 62-160,FAC; (62-701.330(3)(h),FAC)
X	Section IV.E.			7.	Provide a statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill; (62-701.330(3)(i),FAC)

GENERAL CRITERIA FOR LANDFILLS (62-701.340,FAC)

S	LOCATION	N/A	N/C		
			X	1.	Describe (and show on a Federal Insurance Administration flood map, if available) how the landfill or solid waste disposal unit shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste; (62-701.340(4)(b),FAC)
			X	2.	Describe how the minimum horizontal separation between waste deposits in the landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope; (62-701.340(4)(c),FAC)
			X	3.	Describe what methods shall be taken to screen the landfill from public view where such screening can practically be provided; (62-701.340(4)(d),FAC)

H. LANDFILL CONSTRUCTION REQUIREMENTS (62-701.400,FAC)

S	LOCATION	N/A	N/C		
X	Permit Drawings 14 & 15			1.	Describe how the landfill shall be designed so that solid waste disposal units will be constructed and closed at planned intervals throughout the design period of the landfill; (62-701.400(2),FAC)
				2.	Landfill liner requirements; (62-701.400(3),FAC)
				a.	General construction requirements; (62-701.400(3)(a),FAC):
			X	(1)	Provide test information and documentation to ensure the liner will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure;
			X	(2)	Document foundation is adequate to prevent liner failure;
			X	(3)	Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water;
			X	(4)	Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table;
			X	(5)	Installed to cover all surrounding earth which could come into contact with the waste or leachate.
				b.	Composite liners; (62-701.400(3)(b),FAC)
		X		(1)	Upper geomembrane thickness and properties;
		X		(2)	Design leachate head for primary LCRS including leachate recirculation if appropriate;
		X		(3)	Design thickness in accordance with Table A and number of lifts planned for lower soil component.

S	LOCATION	N/A	N/C	PART H CONTINUED
				c. Double liners; (62-701.400(3)(c),FAC)
			X	(1) Upper and lower geomembrane thicknesses and properties;
			X	(2) Design leachate head for primary LCRS to limit the head to one foot above the liner;
			X	(3) Lower geomembrane sub-base design;
			X	(4) Leak detection and secondary leachate collection system minimum design criteria (k $\geq$ 10 cm/sec, head on lower liner $\leq$ 1 inch, head not to exceed thickness of drainage layer);
				d. Standards for geosynthetic components; (62-701.400(3)(d),FAC)
			X	(1) Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material;
			X	(2) Geomembranes to be used shall pass a continuous spark test by the manufacturer;
			X	(3) Design of 24-inch-thick protective layer above upper geomembrane liner;
			X	(4) Describe operational plans to protect the liner and leachate collection system when placing the first layer of waste above 24-inch-thick protective layer;
			X	(5) HDPE geomembranes, if used, meet the specifications in GRI GM13;
		X		(6) PVC geomembranes, if used, meet the specifications in PGI 1197;
			X	(7) Interface shear strength testing results of the actual components which will be used in the liner system;
			X	(8) Transmissivity testing results of geonets if they are used in the liner system;
			X	(9) Hydraulic conductivity testing results of geosynthetic clay liners if they are used in the liner system;

S	LOCATION	N/A	N/C	PART H CONTINUED
				e. Geosynthetic specification requirements; (62-701.400(3)(e),FAC)
			X	(1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;
			X	(2) Material specifications for geomembranes, geocomposites, geotextiles, geogrids, and geonets;
			X	(3) Manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and nondestructive seam testing, seam testing location, frequency, procedure, sample size and geomembrane repairs;
			X	(4) Geomembrane installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembrane and procedures for lining system acceptance;
			X	(5) Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials and any overlying materials;
			X	(6) Geonet and geocomposite specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials and any overlying materials;
			X	(7) Geosynthetic clay liner specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil material and any overlying materials;
				f. Standards for soil components (62-710.400(3)(f),FAC):
			X	(1) Description of construction procedures including overexcavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil component in layers;

S	LOCATION	N/A	N/C	
			X	(2) Demonstration of compatibility of the soil component with actual or simulated leachate in accordance with EPA Test Method 9100 or an equivalent test method;
		X		(3) Procedures for testing in-situ soils to demonstrate they meet the specifications for soil liners;
				(4) Specifications for soil component of liner including at a minimum:
			X	(a) Allowable particle size distribution, Atterberg limits, shrinkage limit;
			X	(b) Placement moisture and dry density criteria;
			X	(c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;
			X	(d) Minimum thickness of soil liner;
			X	(e) Lift thickness;
		X		(f) Surface preparation (scarification);
			X	(g) Type and percentage of clay mineral within the soil component;
			X	(5) Procedures for constructing and using a field test section to document the desired saturated hydraulic conductivity and thickness can be achieved in the field.
				3. Leachate collection and removal system (LCRS); (62-701.400(4),FAC)
				a. The primary and secondary LCRS requirements; (62-701.400(4)(a),FAC)
			X	(1) Constructed of materials chemically resistant to the waste and leachate;
			X	(2) Have sufficient mechanical properties to prevent collapse under pressure;
			X	(3) Have granular material or synthetic geotextile to prevent clogging;
			X	(4) Have method for testing and cleaning clogged pipes or contingent designs for rerouting leachate around failed areas;

PART H CONTINUED

S	LOCATION	N/A	N/C	Requirement
				b. Primary LCRS requirements; (62-701.400(4)(b),FAC)
			X	(1) Bottom 12 inches having hydraulic conductivity $\geq 1 \times 10^{-3}$ cm/sec;
			X	(2) Total thickness of 24 inches of material chemically resistant to the waste and leachate;
			X	(3) Bottom slope design to accomodate for predicted settlement;
			X	(4, Demonstration that synthetic drainage material, if used, is equivalent or better than granular material in chemical compatibility, flow under load and protection of geomembrane liner.
				4. Leachate recirculation; (62-701.400(5),FAC)
X	Section VII.			a. Describe general procedures for recirculating leachate;
X	Section VII.			b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water;
X	Section VII.			c. Describe procedures for preventing perched water conditions and gas buildup;
X	Section VII.			d. Describe alternate methods for leachate management when it cannot be recirculated due to weather or runoff conditions, surface seeps, wind-blown spray, or elevated levels of leachate head on the liner;
X	Section VII.			e. Describe methods of gas management in accordance with Rule 62-701.530, FAC;
		X		f. If leachate irrigation is proposed, describe treatment methods and standards for leachate treatment prior to irrigation over final cover and provide documentation that irrigation does not contribute significantly to leachate generation.

S	LOCATION	N/A	N/C		PART H CONTINUED
				5	Leachate storage tanks and leachate surface impoundments; (62-701.400(6),FAC)
					a. Surface impoundment requirements; (62-701.400(6)(b),FAC)
___	___	X	___		(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;
___	___	X	___		(2) Designed in segments to allow for inspection and repair as needed without interruption of service;
					(3) General design requirements;
___	___	X	___		(a) Double liner system consisting of a upper and lower 60-mil minimum thickness geomembrane;
___	___	X	___		(b) Leak detection and collection syste with hydraulic conductivity ≥ 1 cm/sec;
___	___	X	___		(c) Lower geomembrane placed on subbase ≥ 6 inches thick with $k \leq 1x10^{-5}$ cm/sec or on an approved geosynthetic clay liner with $k \leq 1x10^{-7}$ cm/sec;
___	___	X	___		(d) Design calculation to predict potential leakage through the upper liner;
___	___	X	___		(e) Daily inspection requirements and notification and corrective action requirements if leakage rates excee that predicted by design calculations;
___	___	X	___		(4) Description of procedures to prevent uplift, if applicable;
___	___	X	___		(5) Design calculations to demonstrate minim two feet of freeboard will be maintained;
___	___	X	___		(6) Procedures for controlling disease vecto and off-site odors.

S	LOCATION	N/A	N/C	PART H CONTINUED
				b. Above-ground leachate storage tanks; (62-701.400(6)(c),FAC)
			X	(1) Describe tank materials of construction and ensure foundation is sufficient to support tank;
		X		(2) Describe procedures for cathodic protection if needed for the tank;
		X		(3) Describe exterior painting and interior lining of the tank to protect it from the weather and the leachate stored;
			X	(4) Describe secondary containment design to ensure adequate capacity will be provided and compatibility of materials of construction;
			X	(5) Describe design to remove and dispose of stormwater from the secondary containment system;
			X	(6) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling;
				(7) Inspections, corrective action and reporting requirements;
			X	(a) Overfill prevention system weekly;
			X	(b) Exposed tank exteriors weekly;
			X	(c) Tank interiors when tank is drained or at least every three years;
			X	(d) Procedures for immediate corrective action if failures detected;
			X	(e) Inspection reports available for department review.
				c. Underground leachate storage tanks; (62-701.400(6)(d),FAC)
		X		(1) Describe materials of construction;
		X		(2) A double-walled tank design system to be used with the following requirements;

S	LOCATION	N/A	N/C	PART H CONTINUED
		X		(a) Interstitial space monitoring at least weekly;
		X		(b) Corrosion protection provided for primary tank interior and external surface of outer shell;
		X		(c) Interior tank coatings compatible with stored leachate;
		X		(d) Cathodic protection inspected weekly and repaired as needed;
		X		(3) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling and provide for weekly inspections;
		X		(4) Inspection reports available for department review.
		X		d. Schedule provided for routine maintenance of LCRS; (62-701.400(6)(e),FAC)
				6. Liner systems construction quality assurance (CQA); (62-701.400(7),FAC)
			X	a. Provide CQA Plan including:
			X	(1) Specifications and construction requirements for liner system;
			X	(2) Detailed description of quality control testing procedures and frequencies;
			X	(3) Identification of supervising professional engineer;
			X	(4) Identify responsibility and authority of all appropriate organizations and key personnel involved in the construction project;
			X	(5) State qualifications of CQA professional engineer and support personnel;
			X	(6) Description of CQA reporting forms and documents;

S	LOCATION	N/A	N/C	PART H CONTINUED
			X	b. An independent laboratory experienced in the testing of geosynthetics to perform required testing;
				7. Soil Liner CQA (62-701.400(8)FAC)
			X	a. Documentation that an adequate borrow source has been located with test results or description of the field exploration and laboratory testing program to define a suitable borrow source;
			X	b. Description of field test section construction and test methods to be implemented prior to liner installation;
			X	c. Description of field test methods including rejection criteria and corrective measures to insure proper liner installation.
				8. Surface water management systems; (62-701.400(9),FAC)
			X	a. Provide a copy of a Department permit for stormwater control or documentation that no such permit is required;
			X	b. Design of surface water management system to isolate surface water from waste filled areas and to control stormwater run-off;
			X	c. Details of stormwater control design including retention ponds, detention ponds, and drainage ways;
				9. Gas control systems; (62-701.400(10),FAC)
			X	a. Provide documentation that if the landfill is receiving degradable wastes, it will have a gas control system complying with the requirements of Rule 62-701.530, FAC;
			N/A	10. For landfills designed in ground water, provide documentation that the landfill will provide a degree of protection equivalent to landfills designed with bottom liners not in contact with ground water; (62-701.400(11),FAC)

I. **HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS** (62-701.410(1), FAC)

	LOCATION	N/A	N/C		
				1.	Submit a hydrogeological investigation and site report including at least the following information:
			X	a.	Regional and site specific geology and hydrogeology;
			X	b.	Direction and rate of ground water and surface water flow including seasonal variations;
			X	c.	Background quality of ground water and surface water;
			X	d.	Any on-site hydraulic connections between aquifers;
			X	e.	Site stratigraphy and aquifer characteristics for confining layers, semi-confining layers, and all aquifers below the landfill site that may be affected by the landfill;
			X	f.	Description of topography, soil types and surface water drainage systems;
			X	g.	Inventory of all public and private water wells within a one-mile radius of the landfill including, where available, well top of casing and bottom elevations, name of owner, age and usage of each well, stratigraphic unit screened, well construction technique and static water level;
			X	h.	Identify and locate any existing contaminated areas on the site;
			X	i.	Include a map showing the locations of all potable wells within 500 feet, and all community water suupply wells within 1000 feet, of the waste storage and disposal areas;
			X	2.	Report signed, sealed and dated by PE or PG.

J. **GEOTECHNICAL INVESTIGATION REQUIREMENTS** (62-701.410(2),FAC)

S	LOCATION	N/A	N/C		
				1.	Submit a geotechnical site investigation report defining the engineering properties of the site including at least the following:
			X	a.	Description of subsurface conditions including soil stratigraphy and ground water table conditions;
			X	b.	Investigate for the presence of muck, previously filled areas, soft ground, lineaments and sink holes;
			X	c.	Estimates of average and maximum high water table across the site;
				d.	Foundation analysis including:
			X	(1)	Foundation bearing capacity analysis;
			X	(2)	Total and differential subgrade settlement analysis;
			X	(3)	Slope stability analysis;
			X	e.	Description of methods used in the investigation and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations and conclusions;
			X	f.	An evaluation of fault areas, seismic impact zones, and unstable areas as described in 40 CFR 258.13, 40 CFR 258.14 and 40 CFR 258.15.
			X	2.	Report signed, sealed and dated by PE or PG.

K. **VERTICAL EXPANSION OF LANDFILLS** (62-701.430,FAC) N/A

	LOCATION	N/A	N/C		
___	___________	___	___	1.	Describe how the vertical expansion shall not cause or contribute to leachate leakage from the existing landfill or adversely affect the closure design of the existing landfill;
___	___________	___	___	2.	Describe how the vertical expansion over unlined landfills will meet the requirements of Rule 62-701.400, FAC with the exceptions of Rule 62-701.430(1)(c),FAC;
___	___________	___	___	3.	Provide foundation and settlement analysis for the vertical expansion;
___	___________	___	___	4.	Provide total settlement calculations demonstrating that the final elevations of the lining system, that gravity drainage, and that no other component of the design will be adversely affected;
___	___________	___	___	5.	Minimum stability safety factor of 1.5 for the lining system component interface stability and deep stability;
___	___________	___	___	6.	Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion;
	___________	___	___	7.	Provide gas control designs to prevent accumulation of gas under the new liner for the vertical expansion.

L. **LANDFILL OPERATION REQUIREMENTS** (62-701.500,FAC)

X	Section VIII.A.			1.		Provide documentation that landfill will have at least one trained operator during operation and at least one trained spotter at each working face; (62-701.500(1),FAC)
				2.		Provide a landfill operation plan including procedures for: (62-701.500(2), FAC)
X	Section VIII.A.				a.	Designating responsible operating and maintenance personnel;
X	Section VIII.B.				b.	Contingency operations for emergencies;
X	Section VIII.C.				c.	Controlling types of waste received at the landfill;
X	Section VIII.D.				d.	Weighing incoming waste;
X	Section VIII.E.				e.	Vehicle traffic control and unloading;
X	Section VIII.F.				f.	Method and sequence of filling waste;
X	Section VIII.G.				g.	Waste compaction and application of cover;
X	Section VIII.H.				h.	Operations of gas, leachate, and stormwater controls;
X	Section VIII.I.				i.	Water quality monitoring;
X	Section VIII.J.				j.	Maintaining and cleaning the leachate collection system;
X	Section VIII.K.			3.		Provide a description of the landfill operation record to be used at the landfill; details as to location of where various operational records will be kept (i.e. FDEP permit, engineering drawings, water quality records, etc.) (62-701.500(3),FAC)
X	Section VIII.L.			4.		Describe the waste records that will be compiled monthly and provided to the Department quarterly; (62-701.500(4),FAC)
X	Section VIII.M.			5.		Describe methods of access control; (62-701.500(5),FAC)
X	Section VIII.N.			6.		Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized wastes at the landfill; (62-701.500(6),FAC)
				7.		Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7),FAC)
X	Section VIII.O.				a.	Waste layer thickness and compaction frequencies;

S	LOCATION	N/A	N/C		PART L CONTINUED
	Section VIII.O.			b.	Special considerations for first layer of waste placed above liner and leachate collection system;
X	Section VIII.O.			c.	Slopes of cell working face and side grades above land surface, planned lift depths during operation;
X	Section VIII.O.			d.	Maximum width of working face;
				e.	Description of type of initial cover to be used at the facility that controls:
X	Section VIII.O.			(1)	Disease vector breeding/animal attraction
X	Section VIII.O.			(2)	Fires
X	Section VIII.O.			(3)	Odors
X	Section VIII.O.			(4)	Blowing litter
X	Section VIII.O.			(5)	Moisture infiltration
X	Section VIII.O.			f.	Procedures for applying initial cover including minimum cover frequencies;
X	Section VIII.O.			g.	Procedures for applying intermediate cover;
X	Section VIII.O.			h.	Time frames for applying final cover;
	Section VIII.O.			i.	Procedures for controlling scavenging and salvaging;
X	Section VIII.O.			j.	Description of litter policing methods;
X	Section VIII.O.			k.	Erosion control procedures.
				8.	Describe operational procedures for leachate management including; (62-701.500(8),FAC)
X	Section VIII.P.			a.	Leachate level monitoring, sampling, analysis and data results submitted to the Department;
X	Section VIII.P.			b.	Operation and maintenance of leachate collection and removal system, and treatment as required;
X	Section VIII.P.			c.	Procedures for managing leachate if it becomes regulated as a hazardous waste;
X	Section VIII.P.			d.	Agreements for off-site discharge and treatment of leachate;
X	Section VIII.P.			e.	Contingency plan for managing leachate during emergencies or equipment problems;

S	LOCATION	N/A	N/C	PART L CONTINUED
X	Section VIII.P.			f. Procedures for recording quantities of leachate generated in gal/day and including this in the operating record;
X	Section VIII.P.			g. Procedures for comparing precipitation experienced at the landfill with leachate generation rates and including this information in the operating record;
X	Section VIII.P.			h. Procedures for water pressure cleaning or video inspecting leachate collection systems.
X	Section V.E.			9. Describe how the landfill receiving degradable wastes shall implement a gas management system meeting the requirements of Rule 62-701.530, FAC; (62-701.500(9),FAC)
X	Section VIII.S.			10. Describe procedures for operating and maintaining the landfill stormwater management system to comply with the requirements of Rule 62-701.400(9); (62-701.500(10),FAC)
				11. Equipment and operation feature requirements; (62-701.500(11),FAC)
X	Section VIII.T.			a. Sufficient equipment for excavating, spreading, compacting and covering waste;
X	Section VIII.T.			b. Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown;
X	Section VIII.U.			c. Communications equipment;
X	Section VIII.U.			d. Dust control methods;
X	Section VIII.U.			e. Fire protection capabilities and procedures for notifying local fire department authorities in emergencies;
X	Section VIII.U.			f. Litter control devices;
X	Section VIII.U.			g. Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions.
X	Section VIII.V.			12. Provide a description of all-weather access road, inside perimeter road and other roads necessary for access which shall be provided at the landfill; (62-701.500(12),FAC)
X	Section VIII.W.			13. Additional record keeping and reporting requirements; (62-701.500(13),FAC)

S	LOCATION	N/A	N/C		
					PART L CONTINUED
X	Section VIII.W.			a.	Records used for developing permit applications and supplemental information maintained for the design period of the landfill;
X	Section VIII.W.			b.	Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;
X	Section VIII.W.			c.	Maintain annual estimates of the remaining life of constructed landfills and of other permitted areas not yet constructed and submit this estimate annually to the Department;
X	Section VIII.W.			d.	Procedures for archiving and retrieving records which are more than five year old.

M. WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS (62-701.510, FAC)

S	LOCATION	N/A	N/C		
			X	1.	Water quality and leachate monitoring plan shall be submitted describing the proposed ground water, surface water and leachate monitoring systems and shall meet at least the following requirements;
			X	a.	Based on the information obtained in the hydrogeological investigation and signed, dated and sealed by the PG or PE who prepared it; (62-701.510(2)(a),FAC)
			X	b.	All sampling and analysis preformed in accordance with Chapter 62-160, FAC; (62-701.510(2)(b),FAC)
				c.	Ground water monitoring requirements; (62-701.510(3),FAC)
			X	(1)	Detection wells located downgradient from and within 50 feet of disposal units;
			X	(2)	Downgradient compliance wells as required;
			X	(3)	Background wells screened in all aquifers below the landfill that may be affected by the landfill;
			X	(4)	Location information for each monitoring well;
			X	(5)	Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells unless site-specific conditions justify alternate well spacings;
			X	(6)	Well screen locations properly selected;
			X	(7)	Procedures for properly abandoning monitoring wells;
		X		(8)	Detailed description of detection sensors if proposed.

PART M CONTINUED

S	LOCATION	N/A	N/C		
				d.	Surface water monitoring requirements; (62-701.510(4),FAC)
			X	(1)	Location of and justification for all proposed surface water monitoring points;
			X	(2)	Each monitoring location to be marked and its position determined by a registered Florida land surveyor;
			X	e.	Leachate sampling locations proposed; (62-701.510(5),FAC)
				f.	Initial and routine sampling frequency and requirements; (62-701.510(6),FAC)
X	See Appendix I			(1)	Initial background ground water and surface water sampling and analysis requirements;
X	See Appendix I			(2)	Routine leachate sampling and analysis requirements;
X	See Appendix I			(3)	Routine monitoring well sampling and analysis requirements;
X	See Appendix I			(4)	Routine surface water sampling and analysis requirements.
X	See Appendix I			g.	Describe procedures for implementing evaluation monitoring, prevention measures and corrective action as required; (62-701.510(7),FAC)
X	See Appendix I			h.	Water quality monitoring report requirements; (62-701.510(9),FAC)
X	See Appendix I			(1)	Semi-annual report requirements;
X	See Appendix I			(2)	Bi-annual report requirements signed, dated and sealed by PG or PE.

*Appendix I contains a review of the existing monitoring plan and proposed modifications.

N. SPECIAL WASTE HANDLING REQUIREMENTS (62-701.520, FAC)

S	LOCATION	N/A	N/C		
		X		1.	Describe procedures for managing motor vehicles; (62-701.520(1),FAC)
X	Section X.C.			2.	Describe procedures for landfilling shredded waste; (62-701.520(2),FAC)
X	Section X.A.			3.	Describe procedures for asbestos waste disposal; (62-701.520(3),FAC)
X	Section X.B.			4.	Describe procedures for disposal or management of contaminated soil; (62-701.520(4), FAC)
X	Section X.C.			5.	Describe procedures for disposal of biological wastes; (62-701.520(5), FAC)

O. GAS MANAGEMENT SYSTEM REQUIREMENTS (62-701.530,FAC)

S	LOCATION	N/A	N/C		
				1.	Provide the design for a gas management systems that will (62-701.530(1), FAC):
			X	a.	Be designed to prevent concentrations of combustible gases from exceeding 25% the LEL in structures and 100% the LEL at the property boundary;
			X	b.	Be designed for site-specific conditions;
			X	c.	Be designed to reduce gas pressure in the interior of the landfill;
			X	d.	Be designed to not interfere with the liner, leachate control system or final cover.
X	Section V.E.2			2.	Provide documentation that will describe locations, construction details and procedures for monitoring gas at ambient monitoring points and with soil monitoring probes; (62-701.530(2), FAC):
X	Section V.E.2			3.	Provide documentation describing how the gas remediation plan and odor remediation plan will be implemented; (62-701.530(3), FAC):
				4.	Landfill gas recovery facilities; (62-701.530(5), FAC):
			X	a.	Information required in Rules 62-701.320(7) and 62-701.330(3), FAC supplied;
			X	b.	Information required in Rule 62-701.600(4), FAC supplied where relevant and practical;
			X	c.	Estimate of current and expected gas generation rates and description of condensate disposal methods provided;

PART O CONTINUED

S	LOCATION	N/A	N/C		
			X	d.	Description of procedures for condensate sampling, analyzing and data reporting provided;

			X	e.	Closure plan provided describing methods to control gas after recovery facility ceases operation and any other requirements contained in Rule 62-701.400(10), FAC;
			X	f.	Performance bond provided to cover closure costs if not already included in other landfill closure costs.

P. LANDFILL FINAL CLOSURE REQUIREMENTS (62-701.600,FAC)

				1.	Closure schedule requirements; (62-701.600(2),FAC)
X	Section XI.A.			a.	Documentation that a written notice including a schedule for closure will be provided to the Department at least one year prior to final receipt of wastes;
X	Section XI.A.			b.	Notice to user requirements within 120 days of final receipt of wastes;
X	Section XI.A.			c.	Notice to public requirements within 10 days of final receipt of wastes.
				2.	Closure permit general requirements; (62-701.600(3),FAC)
		X		a	Application submitted to Department at least 90 days prior to final receipt of wastes;
				b.	Closure plan shall include the following:
		X		(1)	Closure report;
		X		(2)	Closure design plan;
		X		(3)	Closure operation plan;
		X		(4)	Closure procedures;
		X		(5)	Plan for long term care;
		X		(6)	A demonstration that proof of financial responsibility for long term care will be provided.
				3.	Closure report requirements; (62-701.600(4),FAC)
				a.	General information requirements;
		X		(1)	Identification of landfill;

PART B CONTINUED

S	LOCATION	N/A	N/C	
		X		(2) Location, description and vicinity map;
		X		(3) Total acres of disposal areas and landfill property;
		X		(4) Legal property description;
		X		(5) History of landfill;
		X		(6) Identification of types of waste disposed of at the landfill.
		X		b. Geotechnical investigation report and water quality monitoring plan required by Rule 62-701.330(3),FAC;
		X		c. Land use information report indicating: identification of adjacent landowners; zoning; present land uses; and roads, highways right-of-way, or easements;
		X		d. Report on actual or potential gas migration at landfills containing degradable wastes which would allow migration of gas off the landfill property;
		X		e. Report assessing the effectiveness of the landfill design and operation including results of geotechnical investigations, surface water and storm water management, gas migration and concentrations, condition of existing cover, and nature of waste disposed of at the landfill;
				4. Closure design requirements to be included in the closure design plan: (62-701.600(5),FAC)
X	Permit Drawing Nos. 14 & 15			a. Plan sheet showing phases of site closing;
X	Permit Drawing Nos. 5 & 9			b. Drawings showing existing topography and proposed final grades;
X	Section XI.B.			c. Provisions to close units when they reach approved design dimensions;
X	Permit Drawing No. 9			d. Final elevations before settlement;
X	Permit Drawing Nos. 20 & 21			e. Side slope design including benches, terraces, down slope drainage ways, energy dissipators and discussion of expected precipitation effects;
				f. Final cover installation plans including:
X	Appendix J			(1) CQA plan for installing and testing final cover;

S	LOCATION	N/A	N/C	PART P CONTINUED
X	Section XI.B.			(2) Schedule for installing final cover after final receipt of waste;
X	Section XI.B.			(3) Description of drought-resistant species to be used in the vegetative cover;
X	Permit Drawing No. 9			(4) Top gradient design to maximize runoff and minimize erosion;
		X		(5) Provisions for cover material to be used for final cover maintenance.
				g. Final cover design requirements:
X	Section XI.B.			(1) Protective soil layer design;
X	Section XI.B.			(2) Barrier soil layer design;
X	Section XI.B.			(3) Erosion control vegetation;
X	Section XI.B.			(4) Geomembrane barrier layer design;
		X		(5) Geosynthetic clay liner design if used;
			X	(6) Stability analysis of the cover system and the disposed waste.
			X	h. Proposed method of stormwater control;
			X	i. Proposed method of access control;
X	Section XI.C.			j. Description of proposed final use of the closed landfill, if any;
			X	k. Description of the proposed or existing gas management system which complies with Rule 62-701.530, FAC.
				5. Closure operation plan shall include: (62-701.600(6),FAC)
		X		a. Detailed description of actions which will be taken to close the landfill;
		X		b. Time schedule for completion of closing and long term care;
		X		c. Describe proposed method for demonstrating financial responsibility;
		X		d. Indicate any additional equipment and personnel needed to complete closure;

S	LOCATION	N/A	N/C	PART P CONTINUED
		X		e. Development and implementation of the water quality monitoring plan required in Rule 62-701.510, FAC;
		X		f. Development and implementation of gas management system required in Rule 62-701.530, FAC.
		X		6. Justification for and detailed description of procedures to be followed for temporary closure of the landfill, if desired; (62-701.600(7),FAC)

Q. CLOSURE PROCEDURES (62-701.610,FAC)

	LOCATION	N/A	N/C		
		X		1.	Survey monuments; (62-701.610(2),FAC)
		X		2.	Final survey report; (62-701.610(3),FAC)
		X		3.	Certification of closure construction completion; (62-701.610(4),FAC)
		X		4.	Declaration to the public; (62-701.610(5),FAC)
		X		5.	Official date of closing; (62-701.610(6),FAC)
		X		6.	Use of closed landfill areas; (62-701.610(7),FAC)
		X		7.	Relocation of wastes; (62-701.610(8), FAC)

R. LONG TERM CARE REQUIREMENTS (62-701.620,FAC)

	LOCATION	N/A	N/C		
			X	1.	Maintaining the gas collection and monitoring system; (62-701.620(5), FAC)
			X	2.	Right of property access requirements; (62-701.620(6),FAC)
			X	3.	Successors of interest requirements; (62-701.620(7),FAC)
			X	4.	Requirements for replacement of monitoring devices; (62-701.620(9),FAC)
		X		5.	Completion of long term care signed and sealed by professional engineer (62-701.620(10), FAC).

S. FINANCIAL RESPONSIBILITY REQUIREMENTS (62-701.630,FAC)

	LOCATION	N/A	N/C		
X	Appendix I			1.	Provide cost estimates for closing, long-term care, and corrective action costs estimated by a PE for a third party performing the work, on a per unit basis, with the source of estimates indicated; (62-701.630(3)&(7), FAC).
X	Section X.I.F.			2.	Describe procedures for providing annual cost adjustments to the Department based on inflation and changes in the closing, long-term care, and corrective action plans; (62-701.630(4)&(8), FAC).
X	Section X.I.F.			3.	Describe funding mechanisms for providing proof of financial assurance and include appropriate financial assurance forms; (62-701.630(5),(6),&(9), FAC).

T. CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

1. Applicant:

The undersigned applicant or authorized representative of Trail Ridge Landfill, Inc.

______________ is aware that statements made in this form and attached information are an application for a Const/Operate Renewal Permit from the Florida Department of Environmental Protection and certifies that the information in this application is true, correct and complete to the best of his/her knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and the Department will be notified prior to the sale or legal transfer of the permitted facility.

Signature of Applicant or Agent	2859 Paces Ferry Road, Suite 1600 Mailing Address
Charles Campagna, Vice President Name and Title (please type)	Atlanta, GA 30339 City, State, Zip Code
E-Mail address (if available)	(770) 805-4130 Telephone Number
	Date: 9-12-02

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

2. Professional Engineer registered in Florida (or Public Officer if authorized under Sections 403.707 and 403.7075, Florida Statutes):

This is to certify that the engineering features of this solid waste management facility have been designed/examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgment, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.

Signature	England, Thims & Miller, Inc. 14775 St. Augustine Road Mailing Address
Juanitta Bader Clem, P.E. Vice President Name and Title (please type)	Jacksonville, Florida 32234 City, State, Zip Code
	clemj@etminc.com E-Mail address (if available)
43245 Florida Registration Number (please affix seal)	(904) 642-8990 Telephone Number
	Date: Sept. 25, 2002

TRAIL RIDGE LANDFILL
PERMIT DOCUMENTS FOR
OPERATION AND CONSTRUCTION
SECOND RENEWAL

TABLE OF CONTENTS

Jonathan Baden Cam 9/25/00

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LIST OF APPENDICES

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9/25/02

TRAIL RIDGE LANDFILL
PERMIT DOCUMENTS FOR
OPERATION AND CONSTRUCTION
SECOND RENEWAL

I. INTRODUCTION

A. PURPOSE

The purpose of this Operation and Construction Report is to describe the method of continued operation and construction of Trail Ridge Landfill located in Duval County, Florida. Addressed in this report are the types of waste accepted at the landfill, operation plan, leachate management, stormwater management, environmental media monitoring, and closure plan as well as the construction and operation of a proposed leachate recirculation system for the landfill. Trail Ridge Landfill is owned by the City of Jacksonville, Florida and is operated by Trail Ridge Landfill, Inc.

B. SUPPLEMENTAL DOCUMENTS

This Operation and Construction Report is supplementary to the Permit Drawings; prepared by England, Thims & Miller, Inc. in concert with Trail Ridge Landfill, Inc.

This Operation and Construction Report and its associated Permit Drawings have been developed in accordance with the requirements of the Florida Department of Environmental Protection (the Department) and the St. Johns River Water Management District (SJRWMD).

C. GENERAL OBJECTIVES

The intent of this Operation and Construction Report, along with its associated Permit Drawings, is to provide for the continued operation of Trail Ridge Landfill and the construction and operation of a leachate recirculation system, in accordance with applicable Federal, State, and local requirements. The primary design objectives are the control of leachate and surface water, and the phased operation and closure of the landfill. To achieve these requirements, a double geomembrane liner system, leachate collection and containment system, and surface water management system were installed and a leachate recirculation system has been designed for implementation upon approval. Further, a phasing plan for operation and closure has been developed and implemented.

II. GENERAL

A. SITE DESCRIPTION

Trail Ridge Landfill is located in Sections 18, 19, 20 and 21, Township 3 South, Range 23 East, Duval County, Florida. Trail Ridge Landfill is owned by the City of Jacksonville, Florida and operated by Trail Ridge Landfill, Inc. (a Waste Management Company). The total land area is approximately 978 acres of which approximately 148 acres is used for this Class I landfill. A recent aerial photograph and topographic survey of the site are included in **Permit Drawing Nos. 2 and 5**.

The landfill was constructed in five phases, Phase I through Phase V as shown on **Permit Drawing No. 7**. Phases I and II were constructed in six sections. The first section (Phase IA) was constructed in 1992 and certified on May 15, 1992. Whereas, Phase IB was certified on June 22, 1992, Phases IIA and IIB were certified on March 4, 1993, and Phases IC and IIC were certified on June 1, 1993. The construction of Phases I and II included construction of the stormwater treatment facility for the entire landfill as well as the conveyance system for Phases I and II.

Phase IIIA was constructed in 1995 and certified on September 29, 1995. Phases IIIB, IVA and IVB were constructed in 1996 and certified on December 19, 1996. The construction of Phases IIIA, IIIB, IVA and IVB included the completion of the stormwater conveyance system for the entire landfill (with the exception of the downcomer system associated with closure).

The final phases, Phases IIIC, IVC and V were constructed in 2000/01 and certified on July 13, 2001. Solid waste has been placed in all the phases and initial waste placement is anticipated to be complete by the end of 2002.

B. RECYCLING EFFORTS

Duval County has a separate Materials Recovery Facility (MRF). Recyclable materials are picked up curbside and processed at the MRF for recycling. The materials recycled include aluminum, glass, newspaper, HDPE, steel, cardboard, PET, magazines, corrugated cardboard and brown paper bags.

Duval County recycles approximately 37 percent of their waste stream according to *Solid Waste Management in Florida 2000*, which was prepared by the Department of Environmental Protection, Division of Waste Management.

C. HISTORY

Trail Ridge Landfill, Inc. has had only one enforcement action taken against it by the Department of Environmental Protection (the Department) for violations relating to any solid waste management facility. A Consent Order (No. 92-0725) was signed by Trail Ridge Landfill, Inc. in conjunction with The Haskell Company, and Barco-Duval Engineering on July 24, 1992 to resolve that action which related to turbid discharge and erosion, siltation and scouring within adjacent wetland areas. It should be noted that this violation occurred during the first increment of construction and in fact, during the construction of the stormwater management basin.

D. AIRPORT PROXIMITY

Trail Ridge Landfill is not located within 10,000 feet of a licensed and operating airport runway used by turbine powered aircraft, or within 5,000 feet of licensed and operating airport runway used only by piston engine aircraft. There are no proposed changes to the horizontal or vertical limits of the landfill and a clearance letter from the Federal Aviation Administration was provided in the first permit renewal.

E. LOCATION CONSIDERATIONS

1. Foundation

A foundation analysis was conducted in 1990 as part of the original construction permit and due to a vertical expansion of the landfill, the foundation analysis was updated in 1996 as part of the first permit renewal. There are no proposed changes to the horizontal or vertical limits of the landfill as part of this permit renewal and therefore, the foundation analysis was not updated.

2. Floodplain

The Landfill is above the 100-year floodplain as shown on the Floodplain Map in **Appendix A.**

3. Proximity to Property Boundary

At the closest point, the Landfill (measured from the toe of the proposed final cover slope) is more than 200 feet from the landfill property boundary as shown on **Permit Drawing No. 4**.

4. Screening from Public View

The Landfill is located more than one mile from the nearest highway and is thereby screened from public view. Further, the surrounding property is currently utilized for silviculture purposes.

F. OPERATOR TRAINING

Trail Ridge Landfill, Inc. has six trained operators two of whom are also trained spotters. The operators/spotters were trained at the University of Florida TREEO Center which is a Department approved provider of training services. In accordance with Rule 62-701.320 (15), F.A.C., the continued training (16 hours for operators and four hours for spotters) will be conducted, at a minimum, every three years. Please see the certification documents for the existing trained personnel in **Appendix B**. If additional personnel or new personnel require training, the training will be provided by a Department approved provider within sixty days of hiring. In the interim, the new personnel will work under the supervision of a trained operator or trained spotter, whichever applies. The facility also has an in-house training program and all employees are briefed on various environmental, health and safety topics.

III. TYPES AND QUANTITY OF WASTE ACCEPTED

The types of waste accepted at Trail Ridge Landfill typically consist of residential/household, office, commercial, agricultural, and industrial wastes. The materials accepted for disposal include garbage, refuse, treated biomedical waste, construction and demolition debris, shredded waste tires, asbestos, water treatment sludge, industrial sludge, domestic sludge and non-hazardous special waste. The waste stream is monitored as each vehicle enters the site and passes by the ticket office/scale house operator and again at the working face. The waste stream is monitored for prohibited wastes such as hazardous waste, untreated biomedical waste, non-containerized liquid wastes, and special wastes prohibited by Rule 62-701.300(8), F.A.C. Incoming waste quantities are determined by the use of scales.

The site serves the City of Jacksonville, Duval County, St. Johns County and Northeast Florida. According to the Florida Office of Economic and Demographic Research, the 2002 populations of Duval County and St. Johns County are 805,469 and 132,829, respectively. The annual tonnage for 2001 was approximately 852,000 tons, based on facility waste records. The total remaining airspace available for waste is approximately 15,056,000 cubic yards (as of March of 2002). This volume will accommodate approximately 12,000,000 tons of waste (based upon a density of 1,594 lb/cubic yard). It is anticipated that the landfill has a remaining life of approximately 14 years.

Currently, the cover material (a clayey-sand material) for the landfill comes from an off-site borrow pit. This material is transported to the site and stockpiled on the site adjacent to the working face.

IV. FACILITY DESIGN

Trail Ridge Landfill has been designed to meet or exceed all applicable regulatory standards. Details of the design are included in the Permit Drawings. These plans include all maps, plan sheets, drawings, cross-sections and aerial photographs. All Permit Drawings have been signed and sealed by a Florida Registered Professional Engineer.

A. AERIAL PHOTOGRAPH

An aerial photograph by Air Survey Corp., dated March 15, 2002 can be found on **Permit Drawing No. 2.** The aerial photograph includes the existing land uses and zoning within one mile of the facility.

B. PLOT PLAN

1. Dimensions

A dimensioned site plan is contained on **Permit Drawing No. 4.**

2. Location of Monitoring Wells and Soil Borings

The location of all the existing monitoring wells is provided on **Permit Drawing No. 3**, which is a Specific Purpose Survey.

The location and depth of soil borings were provided in the original Hydrogeological Investigation and Groundwater Monitoring Plan prepared by Golder & Associates and submitted as part of the original permit documents. No new borings have been drilled as part of this permit renewal.

3. Plan of Disposal Area

The plan for disposal areas is contained on the Base Grading Plan and Bottom Liner Phasing Plan (**Permit Drawing Nos. 6 and 7**).

4. Cross-Sections

Cross-sections of the original and proposed final elevations are contained on **Permit Drawing No. 10.**

5. Operational (Fill) Areas

The location of the current operational area is shown on **Permit Drawing No. 7**. Further, the Fill Phasing Plans are presented on **Permit Drawing Nos. 11 - 13.**

6. Fencing

The landfill site is fenced in its entirety. **Permit Drawing No. 4** shows the fence and gate locations.

C. TOPOGRAPHIC MAPS

1. Contour Intervals

A topographic map with 2-foot contour intervals on NGVD datum is contained on the Existing Topographic Plan (**Permit Drawing No. 5**).

2. Proposed Fill Areas

The proposed fill areas are delineated on the Base Grading Plan and the Bottom Liner Phasing Plan (**Permit Drawing Nos. 6 and 7).**

3. Borrow Areas

There are no borrow areas on the existing landfill site.

4. Access Road

The primary access road to the site consists of a two-laned paved industrial roadway runs from U. S. Highway 301 west to the ticket office/scale house. This paved roadway continues on site to the perimeter road which encircles the landfill. The perimeter road is an all-weather stabilized roadway that provides continuous access to all landfill locations.

5. Grades

The Master Drainage Plan is included as **Permit Drawing No. 8**. The site is designed to provide positive drainage of stormwater runoff from the landfill to the perimeter ditch and then directly into the stormwater management basin for treatment prior to discharge. Special design features have been incorporated to segregate clean stormwater from any contaminated stormwater which is handled as leachate.

6. Cross-Section of Waste Lift

A typical section is contained on **Permit Drawing No. 13**.

7. Special Drainage Devices

As a part of closure (including close-as you-go), downcomer pipes are installed in the side slopes to carry the stormwater runoff from the drainage terraces on the side slopes to drainage structures at the toe of the slope. These drainage structures discharge to the perimeter ditch and ultimately, the stormwater management basin. These drainage structures which connect to downcomer piping have been designed with baffles to prevent stormwater from exiting the structures. The Master Drainage Plan is contained on **Permit Drawing No. 8** and details of the structures are contained in a detail on **Permit Drawing Nos. 20 and 21**.

8. Fencing

The site is fenced as shown on the Site Plan (**Permit Drawing No. 4**).

9. Equipment Facilities

Facilities for equipment maintenance and storage have been provided as shown on the Site Plan (**Permit Drawing No. 4**).

10. Additional Uses

a. Tire Shredder

A portable tire shredder is operated on the site on a periodic basis. Whole waste tires are temporarily stored and when sufficient tires have accumulated, a portable shredder is brought to the site to shred the tires. The shredded tires are being landfilled or used as initial cover.

D. ENVIRONMENTAL MEDIA MONITORING

The groundwater, surface water and leachate are monitored on a semi-annual basis. The laboratory analysis of the environmental media monitoring (groundwater, surface water and leachate) is conducted by Columbia Analytical Services. Their Department of Health, Bureau of Laboratories Certification Number is E82502 and a copy of the certification is provided in **Appendix C**.

E. FINANCIAL RESPONSIBILITY

The City of Jacksonville (the landfill owner) provides financial responsibility for the closure and long-term care of the landfill by means of a Landfill Management Escrow Account.

V. LANDFILL PERFORMANCE AND DESIGN STANDARDS

The design of the landfill is based on three fundamental principals. These are containment, collection and monitoring. Containment is accomplished by a state-of-the-art liner system which includes both primary and secondary liner systems. Collection of leachate is accomplished through the primary leachate collection piping system as well as the secondary leak detection/leachate collection system. Monitoring of these systems occurs with the sampling and analyses of the leachate and groundwater as outlined in the Environmental Media Monitoring Plan.

A. DOUBLE LINER SYSTEM

The entire liner system for the landfill has been constructed. The double liner system, as constructed and certified, is composed of the following from top to bottom:

Primary
- 24" Protective Soil Cover ($k \leq 1 \times 10^{-3}$ cm/sec)
- Geotextile Fabric
- Drainage Layer (Geonet)
- 60-mil High Density Polyethylene (HDPE) Primary Liner
- Geosynthetic Clay Liner

Secondary (Leak Detection System)
- Geotextile Fabric
- Drainage Layer (Geonet)
- 60-mil HDPE Secondary Liner
- 6" Compacted Subgrade ($k \leq 1 \times 10^{-5}$ cm/sec)

This double composite liner system insures the integrity of the landfill base from leachate contamination. The three impermeable layers and two drainage layers provide reliability for the Class I Landfill.

The liner system covers the entire base of refuse disposal area as well as the leachate containment facilities (storage tanks with concrete containment). Cross sections of the landfill which includes natural ground versus existing base grades are contained on **Permit Drawing No. 10**.

B. LEACHATE COLLECTION AND REMOVAL SYSTEM

The primary leachate collection system is composed of a drainage geonet laid on a minimum 2% cross slope to an 8" HDPE perforated collection pipe laid in a trench (leachate collection trench) sloped at a minimum of 0.85% (**Permit Drawing No. 10**). The secondary leak detection and collection system consists of a geonet which also drains to the leachate collection trench. A 24" layer of protective sand layer is provided above the primary drainage layer. This sand layer provides drainage to the geonet as well as a protective layer for the double synthetic liner system.

The leachate collection piping is accessible at both ends for cleaning via a clean-out. High pressure flushing as well as mechanical cleaning can be used to remove any solids.

In accordance with Rule 62-701.500(8)(h), F.A.C., the leachate collection system has been water pressure cleaned and inspected by video recording and the subsequent report is presented in **Appendix D**.

The primary leachate collection pipes passes through the leachate collection sump and terminates at the leachate vault on the east side of the landfill. The leachate collection sump consists of an 18" or 24" diameter HDPE perforated pipe (riser pipe) surrounded by an aggregate sump. The riser pipe extends from the sump up to the leachate vault. The 8" HDPE leachate collection pipe discharges directly into the riser pipe as well as the sump. A small submersible pump is located inside each riser pipe. Level sensors in the riser pipe are used to control the pump which removes leachate as it accumulates. The pumps are mounted on wheels and can easily be removed for maintenance.

The leak detection system is constructed and operates similarly to the primary collection system with the exception that multiple layers of geonet are provided in lieu of the 8" HDPE perforated collection pipe.

C. LEACHATE STORAGE TANKS

1. Design

Leachate is pumped from each sump into a force main and to the leachate storage area where six 20,000 gallon fiberglass storage tanks provide temporary storage. The leachate storage tanks are surrounded by a concrete secondary containment basin which can hold 140 percent of the total tanks volume plus one foot of free board. These leachate handling facilities including the concrete containment basin are underlain by the liner system.

The leachate storage tanks are emptied by tanker, on an as needed basis, and the leachate is hauled to the Buckman Street Wastewater Treatment Facility for treatment and disposal.

The secondary containment basin includes a sump and discharge pipe for draining stormwater from the basin. The basin is drained of stormwater within 24 hours or when 10 percent of the storage capacity is reached, whichever occurs first. The stormwater is discharged either to a leachate tanker or the stormwater management system, depending upon whether it has been contaminated with leachate.

2. Overfill Prevention System

The existing storage tanks are equipped with an overfill prevention system which includes level sensors and gauges, high level alarms and automatic shutoff controls. This overfill control equipment are inspected weekly by the facility operator to ensure the system is in working order.

3. Inspection and Corrective Action

The exterior of these fiberglass tanks is inspected weekly by the facility operator for leaks and maintenance deficiencies. An interior inspection of the tanks is performed when the tanks are drained or at a minimum of every three years. If the inspection reveals a tank or equipment deficiency, leak, or any other deficiency which could result in failure of the tank to contain leachate, remedial measures will be taken immediately to eliminate the leak or correct the deficiency. Inspection reports will be maintained and made available to the Department upon request for the lifetime of the leachate storage system.

D. SURFACE WATER MANAGEMENT SYSTEM

The stormwater management system is an existing wet detention system which was permitted by the Department. This system was designed and constructed to detail a 25-year, 24-hour storm event and treat stormwater to meet the wet detention criteria of Rule 40C-42.026(5), F.A.C. Further, the facility was designed and constructed with perimeter swales and ditches to direct stormwater to the wet detention basin and away from the landfill, thereby preventing stormwater from coming into contact with waste.

To prevent stormwater contamination, refuse placement operations follow an orderly sequence of steps. In summary, these activities consist of the following:

1. Limit daily operations within an active sector for as long as practical.
2. Maintain only a minimum active working face to allow for daily refuse placement.
3. Apply initial cover to any exposed refuse as soon after disposal as practical.
4. Final cover and seeding of any area completed to designed grade as soon as practical.

A portion of the treated stormwater is discharged via 2" perforated spreader pipes to the wetlands around the stormwater basin. This wetland system is monitored in accordance with the Solid Waste Permit. An assessment of the monitoring results and recommendations for continued monitoring, as prepared by Environment Services, Inc., are contained in **Appendix E**.

E. GAS MANAGEMENT SYSTEM

The Gas Management System for Trail Ridge Landfill consists of the landfill gas collection system and the combustible gas monitoring program which are described below.

1. Landfill Gas Collection System

The landfill gas collection system consists of gas extraction wells, gas collection pipes, a gas extraction blower, flare station and gas condensate pump station. This system was designed, constructed and operated in accordance with the approved Title V Air Operation Permit (Permit No. 0310358-002-AV). This permit was issued by the City of Jacksonville, Regulatory & Environmental Services Department (RESD) on December 1998 and expires on August 31, 2003. This system is monitored on a regular basis in accordance with the Title V Air Operation permit and data is provided to RESD annually.

2. Combustible Gas Monitoring Program

The combustible gas monitoring program has been implemented and includes quarterly monitoring with results submitted to the Department. The location of the monitoring points for the program are provided in **Appendix F**.

If combustible gas levels exceed twenty-five percent of the lower explosive limit in a structure (excluding gas control or recovery components) or the lower explosive limits at or beyond the property boundary, Trail Ridge Landfill will:

a. Immediately take all necessary steps to ensure protection of human health and notify the Department.

b. Within seven days of detection, submit to the Department for approval a remediation plan for the gas releases. The plan will describe the nature and extent of the problem and the proposed remedy. The remedy will be completed within 60 days of detection unless otherwise approved by the Department.

VI. PHASING PLANS

The landfill has been constructed with five phases (Phases I through V) and one surface water management facility as shown on **Permit Drawing No. 7**. The completed landfill, including final contours, is presented on **Permit Drawing No. 9.**

A. FILL PHASING PLAN

The sequence of fill operations initially corresponded to the liner phasing. The overall sequence of the fill operations is shown on **Permit Drawing Nos. 11 - 13**. As shown on the plans, Liner Phases I, II, IIIA, IIIB, IVA and IVB were initially filled to EL. 210± and then Phases I and IIIA were filled to EL. 250±. Next Phase IIIC and IVC were filled to EL. 210±. Currently, Phases VA and VC, followed by Phase VB and VD, are being filled to above the anchor berm (so stormwater will drain from the waste filled areas). Next, Phases VA, VC, VB and then VD will be filled to EL. 210±. Then on the eastern half, the landfill will be filled to EL. 270± which leaves access to the top from the south west corner and western slopes. The next fill phase (the vertical expansion phase) is the filling of the eastern portion to EL. 330±. The final fill phase will include filling the western slope (the operations access location) and the top area.

B. CLOSURE PHASING PLAN

The closure phasing will correspond to the above fill phasing. The Closure Phasing Plans are contained on **Permit Drawing Nos. 14 and 15**. When solid waste disposal units have been filled to their final design grade, they will be closed in a close-as-you-go fashion.

VII. LEACHATE RECIRCULATION

A. DESIGN

The proposed leachate recirculation system consists of a pump, force main and exfiltration trenches as shown on **Permit Drawing No. 19A**. The proposed leachate recirculation system will pump leachate from the existing leachate storage area across the side slopes to the top of the landfill. On top of the landfill, exfiltration trenches will distribute the leachate over a drainage area, which will be a minimum of one acre. The exfiltration trench will allow the leachate to seep back into the waste. The exfiltration trench will consist of a 6-inch perforated pipe, which is embedded in a slag or aggregate trench.

The operator will recirculate an average of 30,000 gallons per day and a maximum of 40,000 gallons per day. The design calculations, including the HELP Model results to demonstrate that the head on the liner will not exceed the requirements of Rule 62-701.400(3)(c)1., F.A.C., are included in **Appendix G**.

The exfiltration trenches will be moved on an as needed basis so they do not conflict with operations and provide a distribution of the recirculation around the landfill. The exfiltration trenches will be a minimum of one acre in size (with 1,100 linear feet of exfiltration pipe) and will be placed over a minimum of 55 feet of waste. The leachate recirculation will not be conducted in areas that have received final cover.

No additional berms or ditches are required to control potential runoff since the leachate will be recirculated subsurface via exfiltration trenches. The exfiltration trench will include slag or aggregate to promote seepage into the waste. The landfill has an active gas collection system, which will collect any additional gasses that are generated due to the leachate recirculation.

B. OPERATIONS

The operator will recirculate an average of 30,000 gallons per day and a maximum of 40,000 gallons per day. Recirculation will be conducted manually by the operator and will not occur after or during rain events. Further, recirculation will be conducted only during landfill operating hours.

VIII. OPERATION PLAN

A. OPERATION PERSONNEL AND HOURS OF OPERATION

The General Manager is responsible for the overall operation of the Trail Ridge Landfill. The General Manager's responsibility is to assure that operations at the site are performed in accordance with the procedures outlined in this Operation Plan.

The General Manager, the Operations Manager and several operators are trained operators under Rule 62-701.320(15), F.A.C. At least one trained operator will be on-site during all times when the landfill receives waste. Further, at least one trained spotter will be at the working face at all times when the landfill receives waste.

1. Hours of Operation

a.	Normal Monday - Friday:	6:00 A.M. to 7:00 P.M.
b.	Normal Saturday:	6:00 A.M. to 3:00 P.M.
c.	Maximum Hours:	5:00 A.M. to 10:00 P.M.

If adjustment to these hours is necessary to accommodate the waste receipt rate, the Florida Department of Environmental Protection will be notified.

2. Personnel

Personnel expected to be at the landfill includes:

Personnel	Total
General Manager	1
Operations Manager	1
Equipment Operators	8
Mechanic	1
Labors/Spotters	6
Compliance Officer	1
Clerical	3

On a normal basis, the personnel present during operating hours on the landfill will include a trained operator, a trained spotter, a material handler (laborer) and three equipment operators. During peak operating hours, the facility will have an additional spotter or laborer and an additional equipment operator.

A work schedule is developed on a weekly basis to ensure that adequate staff is present on the landfill to handle the expected volume of waste.

B. CONTINGENCY OPERATIONS

The on-site entrance road is an all-weather road. The entrance road and administration area are paved. The pavement extends beyond the ticket office/scale house to the perimeter road around the landfill. The perimeter road is a stabilized limerock road. Haul roads beyond this point are maintained for adverse weather condition usage.

Emergency conditions at the facility may be created by a natural disaster (i.e., hurricane or tornado), flooding and fire. Waste is not normally delivered to the site during emergency conditions. The following procedures will be implemented with the imminent threat of a major storm.

1. Initial cover will be applied and compacted over all exposed waste.
2. All landfill equipment will be fueled and parked near natural wind screens, earthen mounds or tree areas.
3. All lightweight signs and equipment will be secured.
4. Work will begin in dry areas only when operations are resumed and waste materials will not be disposed in standing water.

The surface water management system will allow disposal operations to continue during periods of inclement weather. This will include the utilization of temporary berms and ditches to drain stormwater away from the active face.

In the event of a natural disaster in the area, operational hours will be extended as appropriate to meet the needs of the community and the Department will be notified.

C. WASTE CONTROL

The waste stream will be monitored by the scale house operator, as each vehicle passes by the ticket office/scale house and then again at the working face by the spotter(s). In addition, the scale house is equipped with cameras/video monitoring systems which record a time-coded picture of the vehicles entering the site.

There will be at least one trained spotter on the working face to observe the wastes disposed. If any unacceptable wastes are identified by random load checking, or are otherwise discovered to be improperly deposited at the landfill, the landfill owner/operator will promptly notify the person responsible for shipping the wastes to the landfill, and the generator of the wastes, if known for subsequent removal off site. If the waste is deemed hazardous, the area where the wastes are deposited will be immediately cordoned off from public access. If the generator or hauler cannot be identified, the landfill owner/operator will assure the cleanup, transportation, and disposal of the waste at an appropriate waste management facility.

D. WEIGHING WASTE

All incoming waste will be weighed and recorded on a daily basis at the on-site scales prior to disposal. The on-site scales include two scales for incoming vehicles and one scale for outgoing vehicles.

E. VEHICLE TRAFFIC CONTROL

Signs are provided to direct traffic to the disposal area. Further, spotters will direct incoming vehicles to their final disposal area.

F. METHOD AND SEQUENCE OF FILLING WASTE

The working face will be consistent with orderly traffic control, waste spreading, and compaction activities.

All solid waste will be spread in layers of approximately two feet in thickness and compacted to approximately one foot in thickness or as thin a layer as practical before the next layer is applied. Bulky materials which are not easily compacted will be worked into other materials as much as practical.

The first layer of waste placed above the liner and leachate collection system will be a minimum of four feet in compacted layer thickness and will consist of selected waste loads containing no large rigid objects that may damage the liner or leachate collection system. The placement of this initial waste will be supervised by a quality assurance monitor under the supervision of a Florida Registered professional Engineer.

Solid waste will be formed into cells to construct horizontal lifts. The working face of the cell and side grades will be at a slope no greater than three feet horizontal to one foot vertical rise. Lift depth will normally not exceed ten feet but may be deeper, depending on specific operations, daily volume of waste, width of working face, and good safety practices. In general, the initial fill will be placed from east to west in a 300-foot wide section that corresponds to the leachate collection area.

The working face will be only wide enough to accommodate vehicles discharging the waste, and to minimize the exposed area and unnecessary use of cover material.

G. WASTE COMPACTION AND APPLICATION OF COVER

Waste will be spread in layers of approximately two (2) feet in thickness and compacted to approximately one (1) foot in thickness or as thin a layer as practical before the next layer is applied. In general three to five passes with the compactor will be made on each layer of refuse.

Initial cover will be applied and maintained at the landfill in order to minimize any adverse environmental, safety, or health effects such as those resulting birds, unauthorized wastes, blowing litter, odors, disease vectors, or fires. The minimum frequency for applying initial cover is at the end of each work day. A 6" thick initial soil cover or an FDEP approved alternate daily cover may also be applied at the end of each operating day.

For those areas where additional solid waste will be deposited within 18 hours, a temporary cover, such as a tarpaulin, may be placed on the working face at the end of the work day and removed prior to deposition of additional waste. Additionally, waste tires that have been cut into sufficiently small parts may be utilized as initial cover on the landfill, in accordance with Rule 62-711.400(3)(a), F.A.C.

An intermediate cover, in addition to the six (6) inch initial cover, will be applied and maintained within seven (7) days of cell completion if final cover or an additional lift is not to be applied within 180 days of cell completion. All or part of this intermediate cover may be removed before placing additional waste or installing final cover. The intermediate cover will consist of either a 12" compacted layer of soil or a 16" compacted layer of 50/50 mixture of soil/mulch. The mulch/soil mixture will be a fairly homogeneous mixture and the mulch will be ground into sufficiently small pieces (approx. 1" or less).

Final cover will be applied to a solid waste disposal unit once it has been filled to its design dimensions. The final cover including permanent vegetation will be placed over the entire surface of each completed solid waste disposal unit within 180 days after final waste placement. Solid waste disposal units, which are designated by phase, are shown on **Permit Drawings Nos. 14 and 15**.

H. OPERATION OF GAS, LEACHATE AND STORMWATER CONTROLS

1. Gas Collection System

The permanent gas collection system will be installed as each phase reaches its final contour. Further, the temporary gas collection system will be installed within five years of waste placement within a phase. All gas extraction wells are designed and installed for connection to the active gas extraction system including collection lines, blowers and flare station.

2. Leachate

The primary leachate collection system consists of an 8" perforated HDPE collection pipe surrounded by an aggregate encasement which is covered by a geotextile fabric. This collection system is located in a trench on top of the primary liner. Leachate is collected within each leachate sector (300' wide, typical) and directed to the collection system by a geonet drainage blanket located on top of the primary liner.

The primary leachate collection pipes passes through the leachate collection sump and terminates at the leachate vault on the east side of the landfill. The leachate collection sump consists of an 18" or 24" diameter HDPE pipe (riser pipe) surrounded by an aggregate sump. The riser pipe extends from the sump up to the leachate vault. The 8" HDPE leachate collection pipe discharges directly into the riser pipe as well as the sump. A small submersible pump is located inside each riser pipe. Level sensors in the riser pipe are used to control the pump which removes leachate as it accumulates. The pumps are mounted on wheels and can easily be removed for maintenance.

The leachate pumps discharge into a leachate force main which transfer the leachate to the fiberglass storage tanks (20,000 gallons each). Each leachate pump discharges through a flow meter that is monitored daily, Monday through Friday. Therefore, each leachate sector can be monitored for leachate generation. The leachate collection system, including the storage tanks, is located over the liner system. The leachate storage tanks are visually inspected daily, Monday through Friday, by on-site personnel. A daily log (Monday through Friday) is kept outlining leachate generation, storage volumes and leachate recirculation. Leachate will be transported off-site by tanker at regular intervals based on leachate production. The leachate is transported to the Buckman Street Wastewater Treatment Facility for treatment and disposal.

The secondary (detection) leachate collection system is constructed and operates similarly to the primary system. The exceptions for this system include:

a. Multiple layers of geonet were installed in lieu of the 8" HDPE perforated pipe.

b. The secondary leachate collection system is piped to a separate storage tank (20,000 gallons).

3. Stormwater Treatment and Detention

The Stormwater Management System was designed in accordance with Rules 62-25, 40C-4 and 40C-42, F.A.C. for both treatment and peak flow attenuation. The stormwater treatment is provided by wet detention.

In general, a minimum of the first 1" of runoff will be treated prior to discharge. The treated stormwater will be discharged from the stormwater pump station via the wetland irrigation system.

4. Stormwater Management

a. Stormwater/Leachate Separation

Stormwater which falls on a section of the lined landfill which is not currently being used for waste disposal is separated from the leachate collection. This is accomplished by closing the valve upstream of the active phase and isolating this portion of the leachate collection system. A 36" high HDPE flap is welded to the liner at this phase line to prevent stormwater from flowing to the active area. A temporary pump-out is provided upstream of each valve and flap to pump uncontaminated stormwater from the inactive liner into the perimeter ditch. Any stormwater that comes in contact with waste will be considered leachate and handled in accordance with the Leachate Management Plan.

b. Stormwater Collection

All stormwater is collected and directed into the stormwater basin. The collection system includes terraces on the final landfill slopes in conjunction with downcomer piping. This system will control runoff and minimize erosion on the landfill side slopes. Details of this system are shown on the Permit Drawings. The existing wetland discharge of treated stormwater occurs through a 2" perforated spreader pipe. The wetland irrigation occurs adjacent to the stormwater management basin.

I. WATER QUALITY MONITORING

There is an existing Environmental Media Monitoring Plan (Groundwater, Surface Water, and Leachate) for this facility which is part of the current Solid Waste Permit and will continue a part of this renewal permit. This plan includes semi-annual monitoring of each media.

J. MAINTENANCE OF LEACHATE COLLECTION SYSTEM

Each leachate vault box (located at the east end of each leachate collection pipe) has a flow meter for the primary and secondary leachate collection system. These flow meters will be read daily, Monday thru Friday. If the reading in a flow meter is noticeably diminishing or otherwise reduced compared to the other flow meters and daily rainfall records, the flow meter will be checked for proper operation. Prior to the next permit renewal and in the event it is deemed necessary, the leachate collection system will be either videoed to determine if there is a clog or other reason for diminished flow or the leachate collection pipe will be flushed cleaned.

K. OPERATION RECORD

The operating record consists of all records, reports, analytical results, demonstrations, and notifications required by Chapter 62-701, F.A.C., any construction, operation, and closure plans and permits, including all modifications to those permits issued by the Department, Permit Document Plans, as well as training records required by Chapter 62-701.320(15), F.A.C. The record is considered part of the operation plan and will be kept with the plan at the landfill facility. The operating record will be available for inspection at reasonable times by Department personnel.

L. WASTE RECORDS

All solid waste will be weighed as it is received. Landfill operators will record, in tons per day, the amount of solid waste received and will estimate the amount of each waste listed below. Waste reports will be compiled monthly, and copies provided to the Department quarterly.

Types of waste received:

a. Residential/household waste
b. Commercial waste
c. Treated biomedical waste
d. Water treatment sludge
e. Construction and demolition debris
f. Agricultural waste
g. Industrial waste
h. Waste tires
i. Asbestos
j. Industrial sludge
k. Domestic sludge
l. Non-Hazardous special wastes

M. ACCESS CONTROL

Access to the landfill is provided by a paved entrance road from U.S. 301.

The entire site is fenced. Access is restricted by a gate near the entrance off U.S. 301 as well as a second gate closer to the site. All gates will be locked at night and whenever the landfill is closed. Public access and receipt of wastes will occur only when an attendant is on duty.

Traffic control on site is accomplished by signage and site personnel. Spotters will assist with traffic control at the working face by directing in-coming trucks to their final unloading area.

Access to areas restricted from traffic will be controlled by temporary earthen berms and barricades.

N. WASTE MONITORING

1. The operations will include a load checking program to detect and discourage attempts to dispose of unauthorized wastes at the landfill. The load checking program consists of the following minimum requirements:

    a. The landfill operator will examine at least three random loads of solid waste delivered to the landfill each week. The waste collection vehicle drivers selected by the inspector will be directed to discharge their loads at a designated location within the landfill (near the working face). A detailed inspection of the discharged material will be made for any unauthorized wastes.

    b. If unauthorized wastes are found, the facility will contact the generator, hauler, or other party responsible for shipping the waste to the landfill to determine the identity of the waste sources.

2. Handing hazardous wastes.

    a. If any regulated hazardous wastes are identified by random load checking, or are otherwise discovered to be improperly deposited at the landfill, the landfill owner/operator will promptly notify the Department, the person responsible for shipping the wastes to the landfill, and the generator of the wastes, if known. The area where the wastes are deposited will be immediately cordoned off from public access. If the generator or hauler cannot be identified, the landfill owner/operator will assure the cleanup, transportation, and disposal of the waste at a permitted hazardous waste management facility.

    b. Subsequent shipments from sources found or suspected to be previously responsible for shipping regulated hazardous waste will be subject to precautionary measure prior to the solid waste management facility accepting wastes.

3. Recording inspection results. Information and observations resulting from each random inspection will be recorded in writing and retained at the landfill for at least three years. The recorded information will include: the date and time of the inspection; the names of the hauling firm and the driver of the vehicle; the vehicle

license plate number; the source of the waste, as stated by the driver; and observations made by the inspector during the detailed inspection. The written record will be signed by the inspector.

O. WASTE HANDLING

All solid waste will be spread in layers of approximately two feet in thickness and compacted to approximately one foot in thickness or as thin a layer as practical before the next layer is applied. Bulky materials which are not easily compacted will be worked into other materials as much as practical.

The first layer of waste placed above the liner and leachate collection system will be a minimum of four feet in compacted layer thickness and will consist of selected waste loads containing no large rigid objects that may damage the liner or leachate collection system.

Solid waste will be formed into cells to construct horizontal lifts. The working face of the cell and side grades will be at a slope no greater than three feet horizontal to one foot vertical rise. Lift depth will normally not exceed ten feet but may be deeper, depending on specific operations, daily volume of waste, width of working face, and good safety practices.

The working face will be only wide enough to accommodate vehicles discharging the waste, and to minimize the exposed area and unnecessary use of cover material.

Initial cover will be applied and maintained at the landfill in order to minimize any adverse environmental, safety, or health effects such as those resulting birds, unauthorized wastes, blowing litter, odors, disease vectors, or fires. The minimum frequency for applying initial cover is at the end of each work day.

However, for those areas where additional solid waste will be deposited within 18 hours, a temporary cover, such as a tarpaulin, may be placed on the working face at the end of the work day and removed prior to deposition of additional waste. Additionally, waste tires that have been cut into sufficiently small parts may be utilized as initial cover on the landfill, in accordance with Rule 62-711.400(3)(a), F.A.C.

An intermediate cover, in addition to the initial cover, will be applied and maintained within seven days of cell completion if additional solid waste will not be deposited within 180 days of cell completion. The landfill operator may remove all or part of the intermediate cover before placing additional waste or installing final cover. The intermediate cover will consist of either a 12" compacted layer of soil or a 16" compacted layer of 50/50 mixture of soil/mulch. The mulch/soil mixture will be a fairly homogeneous mixture and the mulch will be ground into sufficiently small pieces (approx. 1" or less).

Solid waste disposal units which have been filled to design dimensions will receive final cover within 180 days after attaining final elevation or in accordance with the closure plan for the landfill. The solid waste disposal units are shown on **Permit Drawing Nos. 14 and 15.**

Uncontrolled and unauthorized scavenging is not permitted at the landfill site. Salvaging is also not permitted.

A litter policing operation will be employed to keep litter from leaving the working area of the landfill. Litter outside the working area will be picked up within 24 hours. Some litter may be exposed through the initial cover, if it is in traffic areas and away from public view.

Erosion control measures will be employed to correct any erosion which exposes waste or causes malfunction of the stormwater management system. Erosion control measures will be implemented within three days of occurrences. If the erosion cannot be corrected within seven days of occurrence, the landfill operator will notify the Department and propose a corrective schedule.

P. LEACHATE MANAGEMENT

The landfill operator will monitor the leachate level in the leachate collection sumps on a daily basis, Monday through Friday. The operator/owner will sample and analyze the leachate in accordance with the Environmental Media Monitoring Plan and will submit the results to the Department.

The operator will operate and maintain the leachate collection system to collect and remove leachate from the landfill. The leachate will be stored on site in the six 20,000-gallon leachate storage tanks and will be transported to Buckman Street Wastewater Treatment Facility for treatment and disposal. The leachate may also be recirculated into the landfill via the proposed leachate recirculation system. On an average, 30,000 gallons of leachate may be pumped up to the top of the landfill and recirculated into the landfill.

The quantity of leachate collected by the leachate collection and removal system will be recorded (in gallons) on a daily basis, Monday through Friday. The amount of leachate transported off site as well as the amount recirculated will be recorded on a daily basis, Monday through Friday.

A recording rain gauge is operated and maintained to record precipitation at the landfill. These precipitation records will be maintained and used to compare with leachate generation rates.

Q. LEACHATE SPILLAGE CONTROL PLAN

The leachate storage and pumping facilities are inside a concrete containment area which will hold 140% of the volume of the storage tanks plus one foot of freeboard. This facility is constructed on top of the liner system. Therefore, the Leachate Spillage Control Plan is directed at those spills that would occur outside the containment area.

The Leachate Spillage Control Plan consists of four major elements; Training, Containment, Remediation and Notification as described below:

1. Training

The tanker driver and/or site personnel (the Attendant for the purposes of this subsection) will be trained to prevent spills. The Attendant will perform the following prior to loading the tanker truck:

a. Inspect the tanker for signs of leakage.
b. Verify all tanker discharge valves are closed.
c. Verify the tanker is completely within the leachate loading area containment curbing.
d. Verify the liquid level in the containment sump is at or below the discharge pipe.
e. Verify the containment sump discharge gate valve is closed.
f. Verify the leachate fill hose is securely fastened to the inlet port of the tanker.
g. Verify the available tanker volume.

Upon completion of this inspection, the Attendant will begin the following fill sequence:

1. Operate the leachate loading pump for approximately five minutes or until 500 gallons of leachate has been pumped and then discontinue pumping.
2. Inspect the tanker, fill hose and pumping system for leakage.
3. Upon verification that no spilling or leaking has occurred, restart pumping.
4. Continuously monitor the tanker fill operations.
5. Monitor the leachate flow meter until approximately 95% of the available tanker volume has been filled.
6. Discontinue filling operations and remove fill hose.
7. Perform a final inspection of tanker and tanker fill area.

2. Containment

If a spill occurs, the Attendant will notify the General Manager of the spill and request assistance. The Attendant will institute the following containment sequence:

a. Cease pumping.
b. Place sandbags around drainage structures down slope from the loading area to prevent any spillage from entering the drainage system. (NOTE: The first 500 gallons of spillage inside the containment curb will drain naturally into the 500-gallon containment sump.)
c. Create an earthen berm around the spill with on-site sands taken from the daily cover stockpile.

3. Remediation

After the spill has been securely contained, the following cleanup will begin:

a. Pump the leachate in the containment sump into the on-site storage tanks.
b. Spread absorbent sands across all areas in contact with the spill.
c. Remove the contaminated sand to the landfill disposal area.

4. Notification

In the event of a leachate spill, the Department will be notified.

The outlined Spillage Control Plan focuses primarily on a spill at the tanker truck loading area. However, if a leachate spill is discovered at any location on site, the pertinent containment, remediation and notification procedures described above will be implemented.

R. COMBUSTIBLE GAS MONITORING PROGRAM

The combustible gas monitoring program is provided in **Appendix F** and will be monitored quarterly with the results submitted to the Department.

If combustible gas levels exceed twenty-five percent of the lower explosive limit in structures (excluding gas control or recovery components) or the lower explosive limits at or beyond the property boundary, Trail Ridge Landfill will:

1. Immediately take all necessary steps to ensure protection of human health and notify the Department.

2. Within seven days of detection, submit to the Department for approval a remediation plan for the gas releases. The plan will describe the nature and extent of the problem and the proposed remedy. The remedy will be completed within 60 days of detection unless otherwise approved by the Department.

S. STORMWATER MANAGEMENT

1. Stormwater Handling

The stormwater management system was installed as part of the initial construction and is operated and maintained in accordance with the requirements of the DEP Solid Waste permit. The stormwater management system includes the wet detention basin as well as the swales, drainage ditches and culverts, discharge structures, downcomer pipes and other appurtenances as required. Pertinent features of the stormwater handling system include:

a. Potentially contaminated stormwater will be segregated from clean stormwater and contaminated stormwater will not be discharged from the site;
b. A 24-hour, 25-year rainfall event is detained on site;
c. Stormwater is treated to meet the requirements of Rule 62-25, F.A.C.;

d. The maximum discharge rate following a 25-year, 24-hour storm event does not exceed the pre-development discharge from this design storm.

Stormwater is routed through the internal ditch and culvert network to the wet detention basin for treatment. The discharge structure releases the stormwater at the control rate to a dispersion pond which ultimately discharges to the adjacent wetlands.

The discharge structure was designed to effectively prevent floating materials from being released from the site.

2. Stormwater Treatment

a. Clean Stormwater

Stormwater runoff is treated in the existing wet detention basin. This basin is designed to treat 2.5 inches of runoff from the impervious surfaces and detain a 25-year, 24-hour storm event.

b. Other Stormwater

Stormwater which comes into contact with refuse will be segregated from the clean stormwater and will not be discharged from the site. This potentially contaminated water includes stormwater which falls on uncovered refuse or has otherwise made contact with refuse.

Temporary berms will be constructed in advance of the active fill face to collect stormwater which falls in the active area. This potentially contaminated stormwater will be pumped onto the working face or back into previously filled portions of the landfill.

3. Erosion Control

Stormwater terraces will be constructed on the side slopes of the completed landfill. These berms will route surface water flow to downcomer pipes buried in the final cover, and ultimately to the perimeter drainage ditch. This system of terraces and pipes will minimize erosion of the final cover. Vegetative cover will be established and maintained, as soon as practical, after finish contours are completed.

T. EQUIPMENT

Sufficient equipment (including three compactors, two dozers, an excavator, a loader, a grader, a water wagon, three trucks, a service truck and a tractor) is provided to ensure proper operation of the landfill and for spreading, compacting and covering waste. Substitutions and additions to the equipment listed above may occur. However, equipment capable of performing comparably to the listed equipment will be maintained on site. In addition, equipment is available within 24 hours from other company operations and distributors should any situation dictate the requirement for additional equipment.

U. OPERATION FEATURES

The scale house and the administrative building both have telephones for routine emergency communications. Further, both facilities provide shelter, sanitary facilities and first aid equipment.

Dust originating from haul road surfaces will be controlled by periodic sweeping and/or watering of road surfaces, as required. Additionally, final cover will be vegetated as soon as practical after application of final cover, in order to minimize the blowing of dust on site.

Should a fire occur at the landfill, the application of additional compacted cover will be utilized to cut off the flow of oxygen into the burning area. If this does not contain the fire, the affected area will be thoroughly wetted, excavated, and wetted again prior to reconstructing the cells. The chance of fire occurring at a properly run sanitary landfill is minimal.

Instruction in fire fighting procedures are routinely provided to site personnel, and portable fire extinguishers are located on each machine and vehicle. Local Fire Departments will be employed to assist the site personnel and equipment, if necessary.

Fire hydrants are located on site and are connected to the pump system which draws water from the stormwater basin.

Trail Ridge Landfill, Inc. has developed an extensive program regarding safety and accident prevention. As part of this program, employees are trained in proper operation and emergency procedures. Telephone communication and First Aid equipment are provided at the facility. Operating vehicles are in compliance with current OSHA safety requirements, including caging and shields to protect operators. All appropriate equipment have back-up alarms and those alarms are maintained in good repair.

The problem of blowing litter will be minimized by limiting the active working face and using initial cover or tarpaulins over the active fill areas. Other methods, such as the utilization of casual labor pickers and portable fencing will be employed as required to contain loose paper and other wind-blown refuse during fill operations. Any loose paper or similar refuse blown outside the working area will be picked up on a regular basis.

Signage indicating the name of facility, operating authority, hours of operation and charges for disposal is located adjacent to the gate, prior to the ticket/scale house. Additional signs are placed on site to direct traffic. Warning signs are located in operating areas dealing with leachate and gas collection.

V. ROADS

The entrance road and ticket office/scale house area are paved. Beyond the paved area, all-weather perimeter roads are maintained to the active fill area, monitoring devices, and stormwater controls. Service and haul road construction and maintenance are coordinated with the landfill phasing and development.

W. RECORD KEEPING

The landfill operator will:

1. Keep records of all information used to develop or support the permit applications and any supplemental information pertaining to construction of the landfill throughout the design period. Records pertaining to the operation of the landfill will be kept for the design period of the landfill.

2. Retain records of all monitoring information, including calibration and maintenance records, all original chart recordings for continuous monitoring instrumentation, and copies of all reports required by permit, for at least ten years. Background water quality records will be kept for the design period of the landfill.

3. Maintain an annual estimate of the remaining life and capacity in cubic yards of the existing, constructed landfill and remaining capacity and site life of other permitted areas not yet constructed. The annual estimate will be based on a

summary of the heights, lengths, and widths of the solid waste disposal units. The estimate will be made and reported annually to the Department.

4. Records which are more than five years old and which are required to be retained may be archived, provided that the landfill operator can retrieve them for inspection within seven days.

X. WASTE TIRE PROCESSING

The landfill includes a waste tire processing facility. The permit application and operations plan for the waste tire processing are contained in **Appendix H**.

IX. WATER QUALITY MONITORING

A. SURFACE WATER MONITORING

A surface water monitoring plan was approved as part of the original permit as well as the permit renewal. A summary of the monitoring data and recommendation for continued monitoring is provided in **Appendix I.**

B. GROUNDWATER MONITORING

A groundwater monitoring plan was approved as part of the original permit as well as the permit renewal. A summary of the monitoring data and recommendation for continued monitoring is provided in **Appendix I.**

X. SPECIAL WASTE HANDLING

It is Trail Ridge Landfill, Inc.'s policy to control the disposal of acceptable non-hazardous Special Wastes in the landfill. A written description of each Special Waste must be submitted by the customer. Before certain Special Wastes are accepted, a laboratory analysis of a representative sample may be required. Approval to dispose of a Special Waste is given only after review by Trail Ridge Landfill, Inc. A log of Special Wastes disposal is maintained at the landfill.

A. ASBESTOS

Asbestos will be landfilled in accordance with all requirements of Federal (40 CFR, Part 61.154, Subpart M), local and state regulations. Bags must have the OSHA required label. Each shipment will be accompanied by shipping papers.

Trail Ridge Landfill, Inc. requires that the waste generator make arrangements before disposal of regulated asbestos-containing waste materials and inform the operator of the quantity of the waste and the scheduled date the shipment will arrive at the landfill.

Asbestos containing waste will be disposed in an area separate from the active working face, and covered immediately with a minimum of six inches of soil or appropriate refuse. A coordinate grid system will be used to record the locations of disposed asbestos and a record of the asbestos location will be maintained.

B. CONTAMINATED SOIL

Non-hazardous petroleum contaminated soil may be accepted at the landfill for disposal, upon approval by Trail Ridge Landfill, Inc. However, a laboratory analysis of a representative sample may be required prior to acceptance.

C. OTHER WASTES

Other waste material such as shredded waste and biological waste may be accepted for disposal, upon review by Trail Ridge Landfill, Inc. and in accordance with the requirements of Rule 62-701.520 (2) and (5), F.A.C., respectively.

Ash residue from the burning of solid waste will be handled in accordance with Chapter 62-702, F.A.C. Ash residue which meets the criteria of Rules 62-702.570(6), F.A.C. may be used as initial cover.

XI. CLOSURE

The Trail Ridge Landfill will be closed in accordance with closure requirements of Rule 62-701.600 and 62-701.610, F.A.C.

A. SCHEDULE

1. At least one year prior to the projected date when wastes will no longer be accepted or all solid waste disposal units are expected to reach design dimensions, a written notice will be provided to the Department and the local pollution control agency with a schedule for cessation of waste acceptance and closure of the landfill. If unforeseen circumstances do not allow the one year notification, notice will be provided as soon as the need to close the facility becomes apparent.

2. At least 120 days prior to the date when wastes will no longer be accepted at the landfill, users will be advised of the intent to close the facility by posting signs at the entrance of the facility giving the date of closing, the location of alternative disposal facilities and the name of the person responsible for closing the landfill. These signs will be maintained throughout the closing period.

3. At least 90 days prior to the date when wastes will no longer be accepted, a closure permit application will be submitted to the Department.

B. DESIGN

Final cover will be applied to a solid waste disposal unit once it has been filled to its design dimensions. The final cover including permanent vegetation will be placed over the entire surface of each completed solid waste disposal unit within 180 days after final waste placement. Solid waste disposal units which are designated by phase are shown on **Permit Drawings Nos. 14 and 15**.

The closure design and details are provided in **Permit Drawing Nos. 9, 20 and 21**. The design includes the final cover as described below and the stormwater terraces and downcomer pipes.

1. Intermediate Cover

In areas where active filling will not occur for a period of 180 days or more, a minimum of one foot of intermediate cover will be applied. Intermediate cover will consist of either a 12" compacted layer of soil or a 16" compacted layer of 50/50 mixture of soil/mulch. The mulch/soil mixture will be a fairly homogeneous mixture and the mulch must be ground into sufficiently small pieces (approx. 1" or less).

2. Final Cover

a. Side Slopes

The landfill side slopes will be completed with 2.5 feet of final cover. A twelve-inch intermediate soil layer will first be placed over the refuse and/or initial cover. This will provide a level surface for applying twelve inches of compacted clay (with a maximum permeability of 6.67 x 10^{-8} cm/sec). A 24-inch layer of loosely compacted soil capable of sustaining vegetation will be placed over the compacted clay to complete the final cover construction. Final cover will be applied in accordance with the Phasing Plan as shown on **Permit Drawing Nos. 14 and 15**.

An alternate closure design demonstration for the side slope closure was provided in the previous Permit Renewal. The Quality Assurance/Quality Control Plan for the final cover on the side slopes, which will be installed during operation (close-as-you-go), is provided in **Appendix J**.

b. Top Area

The top area of the landfill will be closed with a geomembrane liner and a 24-inch vegetative cover layer. A 12-inch intermediate soil layer will first be placed over the refuse and/or initial cover. This will provide a level surface for applying the 40-mil (average thickness) textured HDPE liner (with a maximum water vapor transmission rate of 2.4 g/(m^2 x day). A 12-inch sand layer will be placed over the geomembrane liner to provide drainage to the top swale underdrain system. A 12-inch layer of loosely compacted soil capable of sustaining vegetation will be placed over the sand layer. The Quality Assurance/Quality Control Plan including the Project-Specific Addenda for the final cover on top area is provided in **Appendix K**.

3. Vegetation

The final surface of the landfill will be vegetated (with bahia grass and/or bermuda grass) as soon as possible after the final cover has been placed. This will be done progressively with final cover completion. It may be necessary to provide mulch to prevent erosion prior to the seed taking hold. Vegetation, fertilizer, and seed rates will be consistent with the recommendations of the Regional Soil Conservation Service and/or past experience on this site.

C. FINAL USE

The City of Jacksonville does not have a proposed final use at this time. Nevertheless, the City will consult the Department prior to conducting activities at the landfill after closure.

D. CLOSURE OPERATIONS

Upon issuance of the closure permit, the landfill will be closed in accordance with the approved plans and any special permit provisions. The closure operations will include the procedures required by Chapter 62-701.610, F.A.C. including Department closure inspections, a final survey report, certification of closure construction completion, and declaration to the public.

E. LONG TERM CARE

Trail Ridge Landfill will be monitored and maintained for thirty (30) years from the date of closing, in accordance with Chapter 62-701.620, F.A.C.

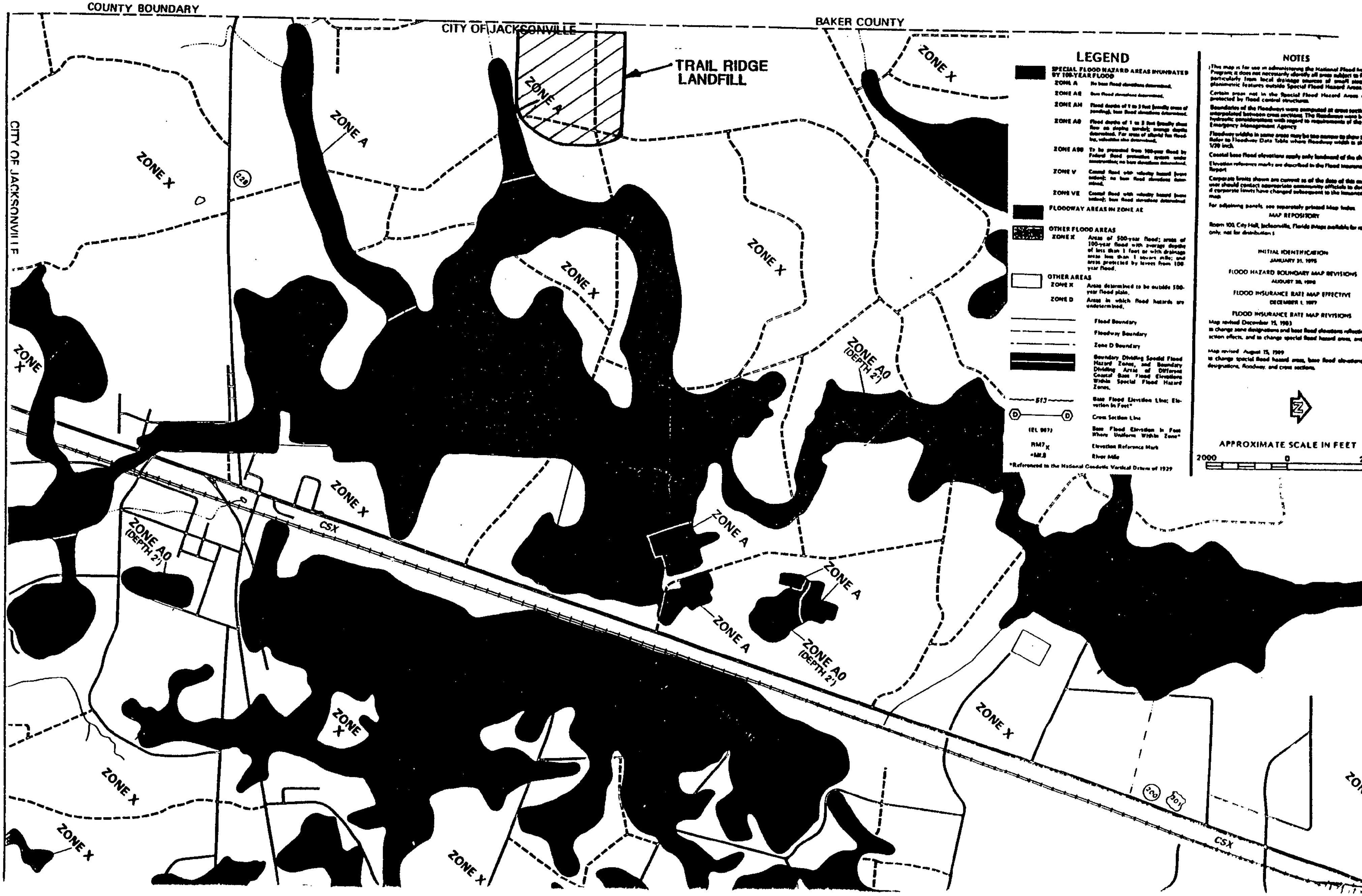
F. FINANCIAL RESPONSIBILITY

Proof of financial responsibility is provided by the City of Jacksonville by means of a Landfill Management Escrow Account, in accordance with Chapter 62-701.630, F.A.C. Cost estimates for both closure and post-closure are provided in **Appendix L**. These cost estimates will be updated annually in accordance with Rule 62-701.630(4), F.A.C.

A

APPENDIX A

FLOODPLAIN MAP


COUNTY BOUNDARY
CITY OF JACKSONVILLE
BAKER COUNTY
TRAIL RIDGE LANDFILL
ZONE A
ZONE X
ZONE A0 (DEPTH 2')
CSX
LEGEND
SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD
ZONE A
ZONE AE
ZONE AH
ZONE AO
ZONE A99
ZONE V
ZONE VE
FLOODWAY AREAS IN ZONE AE
OTHER FLOOD AREAS
ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.
OTHER AREAS
ZONE X Areas determined to be outside 500-year flood plain.
ZONE D Areas in which flood hazards are undetermined.
Flood Boundary
Floodway Boundary
Zone D Boundary
Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
513
Base Flood Elevation Line; Elevation in Feet*
Cross Section Line
(EL 987)
Base Flood Elevation in Feet Where Uniform Within Zone*
RM7
Elevation Reference Mark
River Mile
*Referenced to the National Geodetic Vertical Datum of 1929
NOTES
MAP REPOSITORY
INITIAL IDENTIFICATION
FLOOD HAZARD BOUNDARY MAP REVISIONS
FLOOD INSURANCE RATE MAP EFFECTIVE
FLOOD INSURANCE RATE MAP REVISIONS
APPROXIMATE SCALE IN FEET
2000
0

B

APPENDIX B

TRAINING CERTIFICATION

Florida DEP Solid Waste Management Facility Operator Transcript

Certificate: **Class I, II, III Landfill Operator**
Track: **Standard Landfill Track**

Initial Date: **03/27/95**
Expiration Date: **03/26/04**

Status: **Current**

MATHES , GREGORY W
GENERAL MANAGER & DIV. PRESIDENT
TRAIL RIDGE LANDFILL INC.
5110 U.S. HWY 301
BALDWIN, FL 32234

Phone: 904-289-9100

Time Period: **Prior to Initial Date**

Course #	Course Completed	Course Provided By	Completion Date	Hours
36	Waste Screening and Identification for Landfill Operators and Spotters	University of Florida - TREEO	10/10/94	0

Time Period: **03/27/95 - 03/26/98**

Course #	Course Completed	Course Provided By	Completion Date	Hours
31	Waste Management of North America (Landfill University)	Landfill University	03/27/95	Initial
39	Stormwater Management for Landfills	University of Florida - TREEO	05/16/95	8
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	10/21/97	8

Total Hours Completed: 16

Time Period: **03/27/98 - 03/26/01**

Course #	Course Completed	Course Provided By	Completion Date	Hours
118	Landfill Wildlife Training Course	Applied Technology & Management, Inc.	03/27/00	4
149	Health and Safety Training for Landfill Operations	University of Florida - TREEO	03/27/00	5
182	Air Compliance and LGF System Operations [11/9-10/00]	SCS Engineers	11/10/00	16

Total Hours Completed: 25

Time Period: **03/27/01 - 03/26/04**

Course #	Course Completed	Course Provided By	Completion Date	Hours
	(No courses completed)			

Hours taken prior to your initial course do not count toward your solid waste training.

If you have any questions, please contact djenkin@treeo.doce.ufl.edu or jtoucht@treeo.doce.ufl.edu or call 352.392.9570 extension 127 or 112.

Last Updated: 1/31/02 10:13:00 PM
Date Printed: Wednesday, March 13, 2002

Florida DEP Solid Waste Management Facility Operator Transcript

Certificate: **Class I, II, III Landfill Operator**
Track: **Standard Landfill Track**

Initial Date: **11/20/92**
Expiration Date: **11/19/04**
Status: **Current**

PURVIS , JAMES H
OPERATIONS MGR.
TRAIL RIDGE LANDFILL, INC.
5110 US HWY 301 SOUTH
BALDWIN, FL 32234

Phone: 904-289-9100
Fax: 904-289-9013

Time Period: **11/20/92 - 11/19/95**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/20/92	Initial
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/17/95	20

Total Hours Completed: 20

Time Period: **11/20/95 - 11/19/98**

Course #	Course Completed	Course Provided By	Completion Date	Hours
91	Eight-Hour Spotter Training for Construction and Demolition Sites	University of Florida - TREEO	09/09/98	8
152	Groundwater Issues for Landfill Operators	University of Florida - TREEO	09/10/98	6
75	Landfill Compliance Inspections	University of Florida - TREEO	09/10/98	2
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	10/28/98	8

Total Hours Completed: 24

Time Period: **11/20/98 - 11/19/01**

Course #	Course Completed	Course Provided By	Completion Date	Hours
125	Management of Leachate, Gas, Stormwater and Odor at Class I, II, and III Landfills	University of Florida - TREEO	08/28/01	8
203	8-Hour Initial Training Course for Spotters at Class I, II, III Facilities, Waste Processing Facilities and C&D Facilities	University of Florida - TREEO	08/29/01	8

Total Hours Completed: 16

Time Period: **11/20/01 - 11/19/04**

Course #	Course Completed	Course Provided By	Completion Date	Hours
(No courses completed)				

If you have any questions, please contact djenkin@treeo.doce.ufl.edu or jtoucht@treeo.doce.ufl.edu or call 352.392.9570 extension 127 or 112.

Last Updated: 1/28/02 4:12:00 PM
Date Printed: Wednesday, March 13, 2002

Florida DEP Solid Waste Management Facility Operator Transcript

Certificate: **Class I, II, III Landfill Operator**
Track: **Standard Landfill Track**

Initial Date: **02/11/00**
Expiration Date: **02/10/03**

Status: **Current**

COMPTON , ABRAM
TRAIL RIDGE LANDFILL INC.
5110 U.S. HWY 301
BALDWIN, FL 32234

Phone: 904-289-9100
Fax: 904-289-9013

Time Period: **Prior to Initial Date**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/18/94	0

Time Period: **02/11/00 - 02/10/03**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	02/11/00	Initial

Total Hours Completed: 0

Hours taken prior to your initial course do not count toward your solid waste training.

If you have any questions, please contact djenkin@treeo.doce.ufl.edu or jtoucht@treeo.doce.ufl.edu or call 352.392.9570 extension 127 or 112.

Last Updated: 1/27/02 7:29:00 PM
Date Printed: Wednesday, March 13, 2002

Florida DEP Solid Waste Management Facility Operator Transcript

Certificate: **Class I, II, III Landfill Operator**
Track: **Standard Landfill Track**

Initial Date: **11/20/92**
Expiration Date: **11/19/04**
Status: **Current**

DIXON , CHARLES
OPERATOR
TRAIL RIDGE LANDFILL
5110 US HWY 301
BALDWIN, FL 32234

Phone: 904-289-9100
Fax: 904-289-9013

Time Period: **11/20/92 - 11/19/95**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/20/92	Initial
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/17/95	20

Total Hours Completed: 20

Time Period: **11/20/95 - 11/19/98**

Course #	Course Completed	Course Provided By	Completion Date	Hours
91	Eight-Hour Spotter Training for Construction and Demolition Sites	University of Florida - TREEO	09/09/98	8
49	Landfill Gas and Leachate Systems	University of Florida - TREEO	10/28/98	8

Total Hours Completed: 16

Time Period: **11/20/98 - 11/19/01**

Course #	Course Completed	Course Provided By	Completion Date	Hours
125	Management of Leachate, Gas, Stormwater and Odor at Class I, II, and III Landfills	University of Florida - TREEO	08/28/01	8
203	8-Hour Initial Training Course for Spotters at Class I, II, III Facilities, Waste Processing Facilities and C&D Facilities	University of Florida - TREEO	08/29/01	8

Total Hours Completed: 16

Time Period: **11/20/01 - 11/19/04**

Course #	Course Completed	Course Provided By	Completion Date	Hours
(No courses completed)				

If you have any questions, please contact djenkin@treeo.doce.ufl.edu or jtoucht@treeo.doce.ufl.edu or call 352.392.9570 extension 127 or 112.

Last Updated: 1/7/02 3:45:00 PM
Date Printed: Wednesday, March 13, 2002

Florida DEP Solid Waste Management Facility Operator Transcript

Certificate: **Class I, II, III Landfill Operator** Initial Date: **11/21/97** Status: **Current**
Track: **Standard Landfill Track** Expiration Date: **11/20/03**

HOGAN , ROBERT L
OPERATOR
TRAIL RIDGE LANDFILL
5110 US HWY 301
BALDWIN, FL 32234

Phone: 904-289-9100
Fax: 904-289-9013

Time Period: **Prior to Initial Date**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	05/20/94	0

Time Period: **11/21/97 - 11/20/00**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/21/97	Initial
149	Health and Safety Training for Landfill Operations	University of Florida - TREEO	03/27/00	5
118	Landfill Wildlife Training Course	University of Florida - TREEO	03/27/00	4
36	Waste Screening and Identification for Landfill Operators and Spotters	University of Florida - TREEO	11/09/00	8

Total Hours Completed: 17

Time Period: **11/21/00 - 11/20/03**

Course #	Course Completed	Course Provided By	Completion Date	Hours
(No courses completed)				

Hours taken prior to your initial course do not count toward your solid waste training.

If you have any questions, please contact djenkin@treeo.doce.ufl.edu or jtoucht@treeo.doce.ufl.edu or call 352.392.9570 extension 127 or 112.

Last Updated: 1/21/02 1:01:00 PM
Date Printed: Wednesday, March 13, 2002

Florida DEP Solid Waste Management Facility Operator Transcript

Certificate: **Class I, II, III Landfill Operator**
Track: **Standard Landfill Track**

Initial Date: **05/10/00**
Expiration Date: **05/09/03**

Status: **Current**

JOHNS , ROBERT L
Trail Ridge Landfill, Inc.
5110 US Highway 301 South
Baldwin, FL 32234-3608

Phone: 904-289-9100
Fax: 904-289-9013

Time Period: **Prior to Initial Date**

Course #	Course Completed	Course Provided By	Completion Date	Hours
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	11/20/92	0
21	Solid Waste Landfill Operator's Short School	University of Florida - TREEO	05/21/93	20

Time Period: **05/10/00 - 05/09/03**

Course #	Course Completed	Course Provided By	Completion Date	Hours
138	Solid Waste Facility Operations for Landfill Operators	Kohl Consulting, Inc.	05/10/00	Initial

Total Hours Completed: 0

Hours taken prior to your initial course do not count toward your solid waste training.

If you have any questions, please contact djenkin@treeo.doce.ufl.edu or jtoucht@treeo.doce.ufl.edu or call 352.392.9570 extension 127 or 112.

Last Updated: 3/7/02 8:29:00 PM
Date Printed: Wednesday, March 13, 2002

C

APPENDIX C

LABORATORY CERTIFICATION

FLORIDA DEPARTMENT OF HEALTH

State of Florida

Department of Health, Bureau of Laboratories

This is to certify that

E82502
Columbia Analytical Services, Inc. - FL
8540 Baycenter Road
Jacksonville, FL 32256

has complied with Florida Administrative Code 64E-1, for the examination of Environmental samples in the following categories:

SDWA - Group II Unregulated Contaminants,Group III Unregulated Contaminants,Microbiology,Other Regulated Contaminants,Primary Inorganic Contaminants,Secondary Inorganic Contaminants,Synthetic Organic Contaminants
CWA - Extractable Organics,General Chemistry,Metals,Microbiology,Pesticides-Herbicides-PCB's,Volatile Organics
RCRA/CERCLA - Extractable Organics,General Chemistry,Metals,Pesticides-Herbicides-PCB's,Volatile Organics

Continued certification is contingent upon successful on-going compliance with the NELAC Standards and FAC Rule 64E-1 regulations. Specific methods and analytes certified are on file at the Bureau of Laboratories, P. O. Box 210, Jacksonville, Florida 32231. Clients and customers are urged to verify with this agency the laboratory's certification status in Florida for particular methods and analytes.

EFFECTIVE JULY 1, 2002 **THROUGH JUNE 30, 2003**

Ming S. Chan, Ph.D.
Bureau Chief, Bureau of Laboratories
Florida Department of Health
DH Form 1697, 3/98

NON-TRANSFERABLE N5786E82502

D

APPENDIX D
LEACHATE COLLECTION SYSTEM
MAINTENANCE PROGRAM REPORT

FLORIDA JETCLEAN INC.

HIGH PRESSURE WATER JETTING
VIDEO PIPELINE INSPECTION
NO DIG POINT REPAIRS

37 WINDWARD ISLAND
CLEARWATER, FL 33767-2322
TEL: 800-226-8013 FAX: 727-442-2222

TRAIL RIDGE LANDFILL
PRIMARY LEACHATE COLLECTION SYSTEM
PHASES 1(A-C), 2 (A-C), 3(A-C), 4(A-C) and 5(A-D)
MAINTENANCE PROGRAM – AUGUST 2002

REPORT – GENERAL

All pipes jetcleaned fully to remove biomass buildup. No other materials detected to suggest pipe integrity compromised in any way.

The video log shows that apart from the some "bellies" (common in this type of installation), the pipe lengths inspected appear in good condition and functioning as designed.

While the camera maximum cable length is 1000', the distance actually traveled through the pipe depends on many factors. In any case where the full length of the surveyed pipe is not inspected, the fact that jetcleaning was not restricted in any way, would support the contention that the leachate collection system is in good working order.

E

APPENDIX E

MONITORING SUMMARY REPORT

FOR WETLANDS

TRAIL RIDGE LANDFILL
JACKSONVILLE, FLORIDA

MONITORING SUMMARY REPORT FOR WETLANDS ADJACENT TO A CLASS I STORMWATER POND

September 2002

Prepared for:

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DEP005405

TRAIL RIDGE LANDFILL

SUMMARY REPORT OF WETLANDS MONITORING ADJACENT TO A CLASS I STORMWATER POND

I. INTRODUCTION

The Florida Department of Environmental Protection (DEP) has required that the wetlands adjacent to the Class I stormwater pond at Trail Ridge Landfill be monitored in order to determine if there are any detrimental changes to the wetland vegetation or hydrology due to construction and operation of the pond. The Trail Ridge Landfill is primarily located west of Highway 301 in Township 3 S, Range 23 E, Sections 18 and 19 of Duval County, FL (Figure 1). The monitoring work is required pursuant to conditions 50-52 in permit number 0013493-002-SC; I.D. number GMS3116P02787 (renewal of permit number SC 16-184444; I.D. number GMS3116P03090). A copy of these permit conditions is included as Attachment A.

On 3 January 1992 a baseline study was completed to establish the site conditions prior to pond construction (data collected during December, 1991). Construction of the stormwater pond occurred between January and October 1992. The following report provides a comparison of the wetland vegetation monitoring from the most recent monitoring event, conducted on December 20, 1999, to the baseline study. This report also addressed hydrology monitoring from the baseline study through 1999. Vegetation monitoring was also conducted in 1992 and 1994; however, data from these years are not included in this report because, based on preliminary evaluation, annual variation caused by variable climatic conditions tended to obscure long-term trends. This report includes a description of the stormwater pond, wetland irrigation system, the adjacent wetlands, and the monitoring transects with vegetative sampling plots and piezometers.

II. STORMWATER POND AND WETLAND IRRIGATION SYSTEM

The Class I stormwater pond was constructed east of the Class I landfill within the Trail Ridge Landfill Property(Figure 2). Construction of the pond commenced in January 1992 and was completed in September/October 1992. An irrigation system for wetlands adjacent to the pond berm was installed to mitigate any potential effects to the natural hydroperiod of the adjacent wetland as a result of hydrologic draw down caused by the stormwater pond. The irrigation system extends along the southern and eastern most edges of the pond berm and along a portion of the northern edge of the pond berm (Figure 3).

Figure 4 represents a typical cross-sectional view through the edge of the pond. The pond bottom was excavated to elevation +80.0 feet. There is a 62 foot-wide berm surrounding portions of the pond. The top of the berm was constructed at elevation +112.0 feet. The normal water level is designed to be at elevation +104.0 feet. Following certain storm events the main pond discharges to the south into a smaller dispersion pond. For a detailed description of the design and operation of the Class I stormwater pond, please refer to the engineering plans for the landfill.

There is an 8-inch diameter PVC force main pipe extending along the outer edge of the basin of the main pond (Figure 4). Sections of 2-inch diameter PVC pipe extend at right angles from the force main at intervals, as indicated on the plan. A valve was installed near the connection of the 8-inch and 2-inch PVC pipes to control the flow of water. At the opposite end, the 2-inch PVC pipes connect with 20-foot lengths of perforated 2-inch diameter PVC pipe (spreader pipes). Water discharges from the spreader pipes through 3/8-inch diameter holes. There are two holes per ring with each ring spaced three inches on center. The spreader pipes were installed approximately five (5) feet landward of the wetland jurisdiction line. No portion of the wetland irrigation system extends directly into the wetlands. The flow of water from the spreader pipes has been adjusted to prevent erosion downstream. Based on the results of the interim monitoring reports, the rate of discharge was modified further in order to provide irrigation where it is most needed.

III. ADJACENT WETLANDS

A. Drainage Pattern

Wetlands border the stormwater pond to the south (wetland A), east (wetland B), and north (wetland C), and the wetlands drain off-site to the east (Figure 2). Some of the water eventually flows to the north into Deep Creek, a tributary of St. Mary's River. Some of the water eventually flows to the south into Long Branch, a tributary of the North Fork of Black Creek.

The primary source of water for the wetlands on-site is ground water seepage. A portion of the rain that falls on the uplands along Trail Ridge enters the surficial water table and begins to flow down slope. The wetlands occur where the ground surface intercepts the seasonal high water table. Over time some of the wetlands have eroded uphill into Trail Ridge and formed relatively broad, linear drainageways, oriented east/west and perpendicular to the centerline of the ridge. Part way downslope the wetland drainages broaden and connect with each other, forming a large wetland complex (Hell's Bay).

The wetlands located to the south and east of the Class I stormwater pond (wetlands A and B) are an example of this type of drainage pattern. The upstream drainage basin for this wetland is relatively large (700± acres).

Considering the size of the Class I stormwater pond, any potential draw down effect should be relatively minor to those wetlands.

Other wetlands occur as essentially isolated pockets on the side of the slope. These wetlands may have formed where less permeable layers are located close to the surface. Such layers may consist of silt, loam, clay or a cemented spodic horizon (hardpan). These layers can create a perched water table during the rainy season, but otherwise the water table may occur far below the surface during drier seasons. Other isolated wetlands may occur in shallow depressional areas that naturally formed on the side of the slope. The wetland located north of the stormwater pond (wetland C) may have formed as a result of a combination of slightly lower topography and an underlying, impermeable layer.

B. <u>Elevations and Hydrology</u>

The topography in the project area slopes down from west to east from elevation +120 feet to +100 feet (Figure 5). The deepest portions of the wetlands are approximately 2 to 3 feet lower than the adjacent uplands. The wetlands are roughly concave in cross section except where wetland A connects with wetland B. At this point the wetland floor slopes gradually down from south to north from elevation +112 feet to +108 feet. Wetland B slopes down from south to north from elevation +108 feet to +100 feet.

Through the deeper, central portions of wetlands A and B, there are a number of small drainage channels. These flow ways are generally 5 to 10 feet across and 1 to 2 feet deep and contains some water at almost all times. The surrounding hardwood swamp appears to be saturated at or near the surface for prolonged periods of time and is periodically inundated when the flow ways overflow during the rainy season. Upslope from the hardwood swamp are broad, fringing areas of seepage slope wetlands. These areas appear to be periodically saturated at or near the surface during the rainy season. During much of the year the water table is within 1 to 2 feet of the surface. However, during prolonged droughts the water table recedes to a greater depth. The seepage slopes do not appear to be inundated from the flow ways during most storm events.

The western two thirds of wetland C has a seasonal high water table but is rarely, if ever, inundated. There are small pockets (<0.1 acre) scattered throughout this portion of the wetland that periodically contain shallow puddled water. During much of the year, the water table is more than 12 to 18 inches below the surface. Following prolonged droughts, the water table is 3 or more feet below the surface.

The eastern one third of wetland C (3.0± acres) consists of a deeper pocket of swamp and shrubby/grassy wetlands. Based on stain lines on the trees and past visual observations, this swamp periodically contains 12 to 18 inches of standing water. The water drains east through a narrow, incised channel into wetland B. During much of the year, this portion of wetland C is saturated at or near the surface. However, during drought conditions, the water table may recede at least 2 feet below the surface.

C. Soils

The Soil Survey of City of Jacksonville, Duval County, Florida (U.S. Department of Agriculture, Soil Conservation Service 1978) indicates three soil types in the study area (Figure 6).

(1) Wesconnett fine sand

The main wetland drainage system to the south and east of the pond is mapped as containing Wesconnett fine sand. This soil is nearly level, very poorly drained and was formed in thick deposits of marine sands. It occurs in shallow depressions and large drainageways. Slopes are smooth to concave and range from 0 to 2 percent. Under natural conditions, the water table is at a depth of 0 to 10 inches, or the soil is covered by water for 6 to 12 months during most years.

There is a weakly cemented spodic or hardpan layer typically between 2 and 32 inches below the surface and a second layer usually from 44 inches to at least 80 inches below the surface. Permeability is moderate to moderately rapid (0.6 to 6.0 inches/hour) in the spodic horizons and rapid (6.0 to 20.0 inches/hour) in all other layers. Included with this soil in mapping may be small areas of other soil types such as Maurepas muck and Pamlico muck.

(2) Ridgeland fine sand

Most of the wetland north of the stormwater pond is mapped as containing Ridgeland fine sand. This is a nearly level, poorly drained, acid soil that formed in marine sands. It occurs in broad flatwood areas. Slopes are smooth to convex and range from 0 to 2 percent. Under natural conditions, the water table is at a depth of less than 10 inches for brief periods of 2 to 4 weeks, at a depth of 10 to 20 inches for 2 to 4 months, and at a depth of 20 to 40 inches for most of the remainder of the year. A few small areas of this soil are covered with water for periods of 1 to 2 weeks.

There are two weakly cemented spodic horizons, one between 6 and 16 inches of the surface and the second from 31 to at least 80 inches from the surface. The permeability is moderate to moderately rapid (0.6 to 6.0 inches/hour) in the spodic horizons and rapid (6.0 to 20 inches/hour) in all other layers.

(3) Lynn Haven fine sand

A small portion of wetland C and the upland area where the pond was constructed are mapped as containing Lynn Haven fine sand. This is a nearly level, poorly drained soil that was formed in thick beds of marine sand. It occurs in broad flatwood areas. Slopes are smooth to convex and range from 0 to 2 percent. Under natural conditions, the water table is at a depth of less than 10 inches for 2 to 4 months and at a depth of 10 to 30 inches for 2 to 8 months during most years.

There is a weakly cemented spodic horizon from 21 to at least 80 inches below the surface. Permeability is moderate to moderately rapid (0.6 to 6.0 inches/hour) in the spodic horizon and permeability is rapid (6.0 to 20.0 inches/hour) in the surface horizon.

D. Vegetation

There are five distinct types of wetlands in the study area (Figure 7). Most of the wetlands have been significantly impacted in the past due to the silvicultural practices of the former landowner (Gilman Paper Company).

(1) Mature hardwood swamp

The central portion of wetland A consists of relatively mature hardwood swamp. The canopy is dominated primarily by tupelo (*Nyssa sylvatica var. biflora*) with lesser amounts of sweet bay (*Magnolia virginiana*), swamp bay (*Persea palustris*), red maple (*Acer rubrum*), pond pine (*Pinus serotina*), and slash pine (*Pinus elliottii*). The shrub layer consists of dense patches of sweet gallberry (*Ilex coriacea*) mixed with lesser amounts of fetterbush (*Lyonia lucida*), bitter gallberry (*Ilex glabra*), dog hobble (*Leucothoe axillaris*), opossum haw (*Viburnum nudum*), Virginia willow (*Itea virginica*) and wax myrtle (*Myrica cerifera* and *M. heterophylla*). Ground cover species included dog hobble, fetterbush, cinnamon fern (*Osmunda cinnamomea*), sphagnum moss (*Sphagnum* sp.) and netted chain fern (*Woodwardia areolata*).

(2) Cut-over hardwood swamp

Most of wetland B and portions of wetlands A and C consist of hardwood swamp that was cut in the past by Gilman Paper Company. The trees appear to be approximately 30 years old. The canopy is dominated by a mixture of tupelo and sweet bay with lesser amounts of swamp bay and loblolly bay (*Gordonia lasianthus*). The shrub layer consists of tupelo and bays mixed with wax myrtle, dahoon holly (*Ilex cassine*), fetterbush, and sweet gallberry. Ground cover species include those listed above as well as large mats of sphagnum moss and patches of sedges (*Carex* sp. and *Cyperus* sp.) and grasses (*Andropogon* sp., *Erianthus* sp., *Panicum* sp. and *Aristida* sp.). The swamp within wetland C has a canopy consisting of tupelo and cypress (*Taxodium distichum* and *Taxodium ascendens*).

In general the cut-over swamps have no pines but have more sweet bay and less tupelo in the canopy and shrub layer, more wax myrtle and dahoon holly in the shrub layer, and more sphagnum moss and grasses and sedges in the ground cover as compared with the mature swamp. Over time as the trees mature, the tupelo may gradually increase in dominance. As the canopy closes, the shrub layer and ground cover will thin out and look more like that in the mature swamp.

(3) Pond pine seepage slope

Bordering wetland A on the north and south are broad fringing areas of pond pine seepage slope. The canopy is dominated by pond pine with lesser amounts of slash pine, loblolly pine (*Pinus taeda*), long leaf pine (*Pinus palustris*), swamp bay, sweet bay, and tupelo. The subcanopy consists primarily of swamp bay, sweet bay and tupelo. The shrub layer is relatively dense and consists of a mixture of sweet gallberry and bitter gallberry mixed with scattered wax myrtle, high bush blueberry (*Vaccinium corymbosum*), and Virginia willow. The ground cover consists of the same species listed above as well as scattered cinnamon fern.

(4) Pine/gallberry wetlands

This wetland type occurs as a narrow band around almost all of the wetlands. The band widens into a relatively broad fringe south of wetlands A and B and also comprises most of wetland C. The vegetation in wetland C consists of rows of planted slash pine with a dense shrub layer of bitter gallberry. Sweet bay, swamp bay, loblolly bay and tupelo saplings are widely scattered among the pines. Other shrubs include scattered high bush blueberry, sweet gallberry and choke berry (*Aronia arbutifolia*). Bamboo briar (*Smilax lauifolia*) and cat briar (*Smilax glauca*) are common vines. Widely scattered under the gallberry are bog button (*Eriocaulon* sp.), club moss (*Lycopodium* sp.), hooded pitcher plant (*Sarracenia minor*), meadow beauty (*Rhexia* sp.), sphagnum moss, red root (*Lachnanthes caroliniana*), blue maidencane (*Amphicarpum muhlenbergianum*), wire grass (*Aristida* sp.), yellow-eyed grass (*Xyris* sp.), cinnamon fern, netted chain fern, and St. Johns wort (*Hypericum fasciculatum*). This area has a seasonal high water table at or near the surface during parts of the rainy season as evidenced by the presence of crayfish borrows.

The area south of wetlands A and B consists of pine plantation with widely scattered clusters of bitter gallberry and an open ground cover of wire grass mixed with bog buttons and other herbaceous species listed above. This area has been bedded and planted with rows of slash pine.

Within the pine/gallberry portion of wetland C, there are a number of small (<0.1 acre) open patches vegetated with a mixture of listed and nonlisted species such as red root, St. Johns wort, and blue maidencane. Some of these pockets have enough listed species to be considered jurisdictional wetlands pursuant to Section 40C-4 F.A.C., Management and Storage of Surface Waters (MSSW) permit. All of wetland C is mapped as being jurisdictional in the landfill's MSSW permit. However, most of the pine/gallberry portion of the wetland is dominated by nonlisted vegetation and, therefore, does not truly function as a "water of the State."

Historically the areas of pine/gallberry wetlands may have consisted of open savannahs of wiregrass pine flatwoods. The vegetation was kept open by regular summer wildfires. After the property was converted into pine plantation, the fire regime was altered and summer wildfires were controlled or completely suppressed. As a result of the fire suppression, bitter gallberry may have gradually become the dominant shrub and ground cover plant in most areas. The ground cover vegetation has also been degraded somewhat due to intensive silvicultural practices such as bedding.

During the life span of the landfill, there should continue to be some changes in the vegetation in the pine/gallberry wetlands. The pines will continue to grow to maturity. Hardwoods, such as bays and tupelo, may gradually increase in numbers. Bitter gallberry and vines will continue to dominate and become taller and denser in the shrub and ground cover layers.

(5) Pine/St. John's wort wetlands

Portions of wetlands A, B and C consist of pine/St. John's wort wetlands. This wetland type appears to be a transitional zone between the pine/gallberry wetland and the hardwood swamp. The canopy and subcanopy consist of planted rows of slash pine with scattered swamp bay, sweet bay and tupelo. Due to the wetter condition of this area, the pines are more widely scattered and are smaller and stunted as compared with the pines in the pine/gallberry wetlands. The shrub layer consists primarily of St. John's wort (*Hypericum fasciculatum*) mixed with lesser amounts of bitter gallberry, sweet gallberry, wax myrtle, and titi (*Cyrilla racemiflora*). Ground cover vegetation consists of such species as sphagnum moss, grasses (*Dicanthelium* spp., *Aristida* sp., and *Erianthus* sp.), bog buttons, sedges (*Carex* sp. and *Cyperus* sp.), red root, and Asiatic coinwort (*Centella asiatica*).

Over time some succession may occur in this wetland type. Trees and shrubs may become more dominant and eventually shade out much of the ground cover species. The area may succeed into a transitional edge of bays, fetterbush and sweet gallberry.

IV. METHODS

A. Establishment of Monitoring Transects

Monitoring transects were established in the wetlands adjacent to the proposed stormwater pond (Figure 8). The number and specific locations of the transects were determined in the field by Environmental Services, Inc., (ESI) and the Florida Department of Environmental Regulation on 11 December 1991. The transects extend through all five of the vegetative community types and cover representative areas of each of the main wetlands. Sunshine State Surveyors, Inc., surveyed the location of each transect and cut a line approximate 5 to 10 feet wide for access. Surface elevations were surveyed at intervals approximately 100 feet apart and marked with iron pins and PVC pipe.

(1) Vegetation Monitoring

Sampling stations were established every 100 feet at the survey points, starting on the wetland jurisdiction line, and extending for a minimum length of 200 feet into or through deeper portions of the wetlands. A one square meter sampling plot was established at each sampling station. Square meter sampling plots were permanently marked with short sections of PVC pipe. Each station was established away from the centerline of the transect, in a representative area where the vegetation had not been disturbed. Species and percent cover for all ground cover vegetation within each plot was recorded. When necessary, the herbaceous coverage was estimated separately from the shruby/woody coverage. Combining herbaceous and woody coverages may result in total coverage exceeding 100 percent at times. General notes were made regarding the composition of the canopy, subcanopy and shrub layer in the immediate area and the presence or absence of surface water such as flow channels.

(2) Hydrology Monitoring

A piezometer was installed at each sampling station on each transect. The piezometers consisted of perforated PVC pipe installed from 4 to 6 feet below the surface, depending on the location in the wetland. The initial water table readings from the baseline study were taken several days after the piezometers were installed. Each piezometer was capped after installation to prevent rainwater and debris from entering.

(3) Reference Transects

In order to analyze trends in vegetative cover and hydrology, reference transects were established in non-irrigated portions of the wetlands beyond the calculated potential drawdown influence. Project engineers had calculated the maximum extent of potential drawdown influence to be 200 feet from the edge of the stormwater pond. Transects 2, 6, and 7 are the reference transects. Additionally, sampling stations 4 and 5 along Transect 1 were established beyond the 200-foot extent of potential drawdown influence.

B. Transect Descriptions

(1) Transect 1

Transect 1 is approximately 435 feet long. It extends through a section of pine/gallberry wetland and a St. Johns wort/grass pocket in the western half of Wetland C.

(2) Transect .

Transect 2 is approximately 850 feet long. It extends through sections of pine/St. John's wort, tupelo/cypress, and bay wetlands in the eastern half of Wetland C. Transect 2 is a non-irrigated reference transect, though, because it is in close proximity to and generally down slope of Transect 1, probably receives some influence from the irrigation system at Transect 1.

(3) Transect 3

Transect 3 is 536 feet long. It extends through sections of pine/St. John's wort wetland and cut-over hardwood swamp.

(4) Transect 4

Transect 4 is 400 feet long, beginning in a planted pine/St John's wort community then extending through portions of both cut over and uncut hardwood swamp.

(5) Transect 5

Transect 5 is 400 feet long. This transect is located entirely along a pond pine seepage slope.

(6) Transect 6

Transect 6 is a 400 foot, non-irrigated reference transect. This transect begins along a pond pine seepage slope and extends into uncut hardwood swamp.

(7) Transect 7

Transect 7 is a 400 foot, non-irrigated reference transect. Transect 7 begins in a planted pine/gallberry community, runs down a pond pine seepage slope and terminates in uncut hardwood swamp.

C. Rainfall Data

Daily rainfall measurements were collected on-site at Trail Ridge Landfill for the duration of the study. Values were summarized on a monthly bases and used to calculate annual rainfall values and average monthly and annual values.

D. Quantitative Methods

In-situ data was collected in terms of areal percent cover by species. Because vegetative strata often overlap, estimated areal percent cover for an individual plot often exceeds 100%. Similarly, because natural vegetation is not uniformly distributed within a plot, areas of bare ground (or open water in inundated plots) can exist and result in total areal vegetative cover values less than 100%. Because of these situations, only intra-plot evaluations can be made using areal percent cover estimates. In order to make inter-year, inter-plot, and inter-transect comparisons, data must be normalized to a standard unit. For the purposes of this report, relative percent cover is used for these comparisons. Relative percent cover is defined as the areal percent cover of a given species divided by the sum of the areal percent cover of all species in that plot. The relative percent cover calculation yields an estimate of each species contribution to the total vegetative cover in each plot that is comparable across years, plots, and transects.

Each species was coded as upland (U), transitional (T), or submerged (S) following the indicator status listed in Chapter 62-301.400 F.A.C. To calculate the relative percent wetland vegetation within a plot, the relative percent covers of all transitional and submerged species within that plot were summed. The mean of the relative percent wetland vegetation of all plots on a given transect is reported as the transect's relative percent cover.

V. RESULTS

A. Overall (All Plots Combined)

Relative percent wetland vegetation for all plots combined remained essentially unchanged on Transects 1 and 4, while Transect 6 decreased from 75.0% to 64.7% and Transect 7 decreased from 68.3% to 51.3% between 1991 and 1999 (Figure 9). Transects 2, 3, and 5 demonstrated considerable increases in relative percent wetland vegetation from the baseline to 1999.

B. Transect 1

Relative percent wetland vegetation increased at the 200 ft distance on Transect 1, however at 100 ft relative percent wetland vegetation decreased from 47.4% to 37.5% and at 300 ft decreased from 60.0% to 15.8% (Figure 10). Vegetative data was not collected at the 0 ft plot in 1999 nor at the 400 ft plot in the baseline study so comparisons for these plots could not be generated. At all plots except the 0 ft plot, the water table was above the baseline for all years except 1995 (Figure 11). During 1995, the water table was roughly 2 feet lower than the baseline at the 0 ft and 100 ft plot, though it was nearly the same or higher at other plot distances in that year.

C. Transect 2

Transect 2 demonstrated increases in relative percent wetland vegetation at all plots except the 400 ft plot between the baseline study and 1999 (Figure 12). For all years at all plot distances, the water table was nearly equal to or higher than values recorded in the baseline study (Figure 13).

D. Transect 3

The 0 ft, 300 ft, and 500 ft plots on Transect 3 all showed considerable increases in relative percent wetland vegetation between the baseline study and 1999 (Figure 14). The 100 ft and 400 ft plots both declined in relative percent wetland vegetation. The 200 ft plot on Transect 3 showed little change between monitoring events. During all years except 1999, the water table at Transect 3 was generally higher than or equal to elevations recorded during the baseline study (Figure 15). In 1999, the water table was approximately 2 feet lower than the baseline study at plots from 200 ft and beyond. The water table was similar to the baseline at the 100 ft plot and slightly higher than the baseline at the beginning of the transect in 1999.

E. Transect 4

On Transect 4, the 100 ft and 200 ft plots both increased slightly in relative percent wetland vegetation while the 0 ft plot decreased from 65.0% to 46.2% (Figure 16). Similar to Transect 3, the water table elevations for Transect 4 were generally higher than the baseline for all years except 1999 (Figure 17). In 1999, the water table was approximately 1 foot lower at the 100 ft plot and 2 feet lower than the baseline at the 200 ft plot.

F. Transect 5

Relative percent wetland vegetation increased to 50% from 0% between 1991 and 1999 at the 0 ft plot of Transect 5 (Figure 18). Relative percent wetland vegetation also increased, though to a lesser extent, at the 100 ft plot and decreased from 74.1% to 58.3% at the 200 ft plot. Ground water elevations were approximately 4 feet lower in 1995 and 1999 than in the baseline study for Transect 5 (Figure 19). Water table elevation was approximately 1 foot lower than the baseline at the 0 ft and 100 ft plots in 1996 but was slightly higher than the baseline at the 200 ft plot.

G. Transect 6

Relative percent wetland vegetation decreased from 25.0% to 0% at the 0 ft plot and from 100% to 94.1% at the 100 ft plot on Transect 6 from 1991 to 1999 (Figure 20). The 200 ft plot was 100% wetland vegetation in both the baseline and 1999 study. With the exception of the 0 ft plot in 1999, ground water elevations were equal to or higher than the baseline study at all plots in all years on Transect 6 (Figure 21).

H. Transect 7

Relative percent wetland vegetation decreased from 100% to 58.8% at the 100 ft plot and from 100% to 90.0% at the 200 ft plot between the baseline study and 1999, though it did not change at the 0 ft plot (Figure 22). Similar to Transect 6, ground water elevations were equal to or higher than the baseline study at all plots in all years on Transect 7 except at the 0 ft plot in 1999 (Figure 23).

G. Rainfall

Rainfall data for the entire study period are presented in Table I. Annual rainfall was lowest in 1999 (41.45 inches) and highest in 1991 (79.63 inches) (Figure 24). A downward trend from 70.2 inches in 1995 to the 41.14 inches in 1999 was observed.

VI. DISCUSSION AND CONCLUSIONS

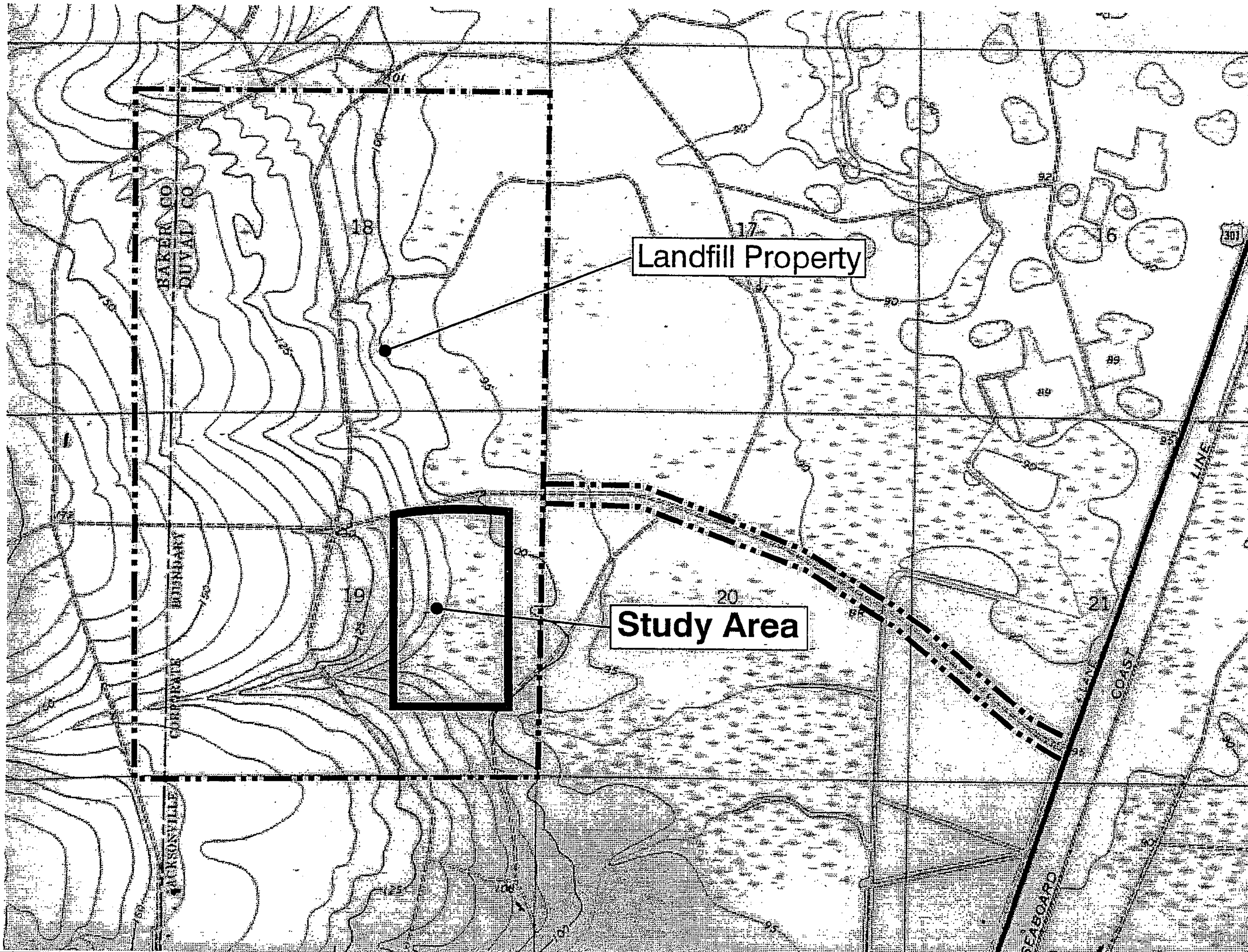
Analysis of the individual transect relative percent wetland vegetation data shows that of the four study transects (1, 3, 4, and 5), two showed overall increases in wetland vegetation (3 and 5) while the other two showed only slight decreases in overall relative percent wetland vegetation. Vegetative cover estimation is an inherently non-precise method of quantification, and slight variances between years are often the result more of inconsistency between observers rather than real differences in vegetative cover. Of the three non-irrigated reference transects (2, 6, and 7), two transects (6 and 7) showed considerable declines in relative percent wetland vegetation. Reference Transect 2 showed an increase in relative percent wetland vegetation.

Rainfall data for the study period indicates a strong trend towards drought conditions from 1994 to 1999, and generally lower ground water elevations in 1999 further reflect this trend. Decreases in wetland vegetation observed at the non-irrigated reference Transects 6 and 7 are likely a response to the drought conditions. Irrigation of the study transects during this period appears to have been sufficient in not only offsetting any potential drawdown effects of the stormwater pond, but also prevented the encroachment of upland vegetation during the drier than normal conditions. Transect 2 was also a non-irrigated transect, though it showed an increase in relative percent wetland vegetation despite the drought conditions. Transect 2 was located adjacent to and down-slope of Transect 1, and, though it was not directly irrigated, probably received inputs of water as seepage from the irrigation of Transect 1, thus offsetting the drought effects.

Ground water elevation data for Transect 5 provides the only evidence of a potential drawdown effect as most values for the 0 ft and 100 ft plots on this transect are below the baseline study elevations. Relative percent cover by wetland vegetation actually increased at the 0 ft and 100 ft plots on transect 5, suggesting that though there may be some drawdown of the ground water on this transect, the irrigation system has sufficiently maintained soil moisture to prevent the encroachment of upland vegetation into this portion of the wetland.

Transects 3, 4, 5, 6, and 7 all reflect drought conditions in 1999 with ground water levels typically at or near the lowest values recorded during the study period. Groundwater elevation data for Transects 1 and 2 do not, however, reflect this same trend with both transects demonstrating higher than average ground water elevations in 1999. Transects 1 and 2 are located in close proximity on the north side of the stormwater pond, while the other transect are either to the east or the south of the pond. The lack of an observed drought effect in the hydrological data for Transects 1 and 2 may be a result of differing geo-physical soil characteristics between the areas to the north of the stormwater pond and those to the east and south.

In conclusion, it appears that vegetative and hydrologic variations observed in the wetlands around the stormwater pond at Trail Ridge Landfill are the result of natural climatic variation and are not attributable to hydrologic drawdown caused by construction of the stormwater pond. While some drawdown may have occurred, the wetland irrigation system has been efficient in mitigating those effects, leaving no discernable trends in the vegetation or hydrology monitoring data collected from the baseline study to 1999. The evidence for the stormwater pond having no long term negative effects on the adjacent wetlands is strengthened by the fact that the baseline vegetative data were gathered during one of the wettest years of the past decade, while the 1999 data were collected during the driest year, at the height of the drought. In addition, vegetative monitoring has been conducted during months (typically December) in which ground cover vegetation is at a minimum. The relative percentages of wetland vegetation would likely be higher if monitored in the summer months, when herbaceous wetland species are more prevalent. With continued operation of the wetland irrigation system, further monitoring of these transects would appear unnecessary, so we recommend that all permit conditions related to monitoring be removed from future permit renewals.



ENVIRONMENTAL SERVICES, INC.

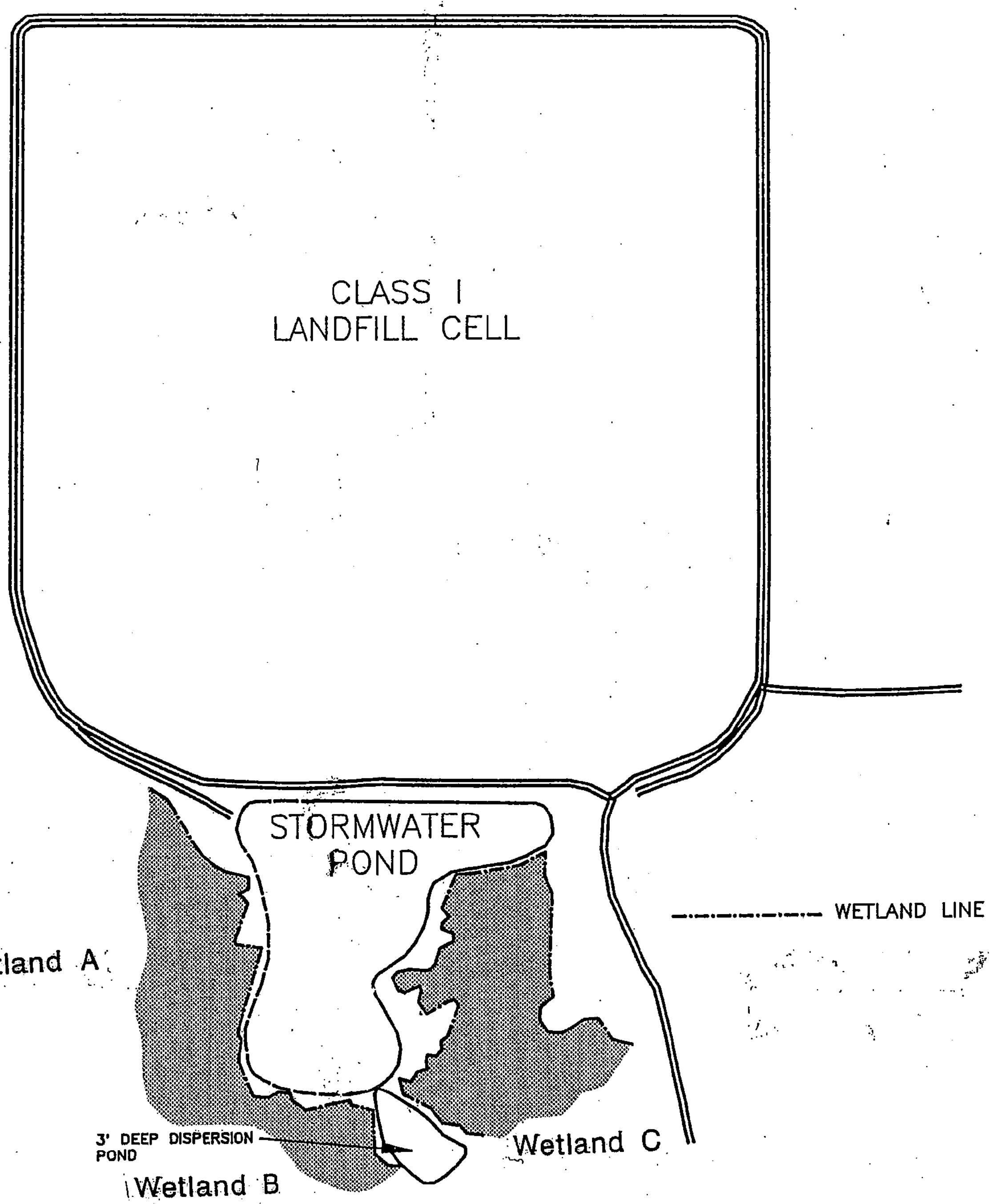
Trail Ridge Landfill

Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No. 1	

ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

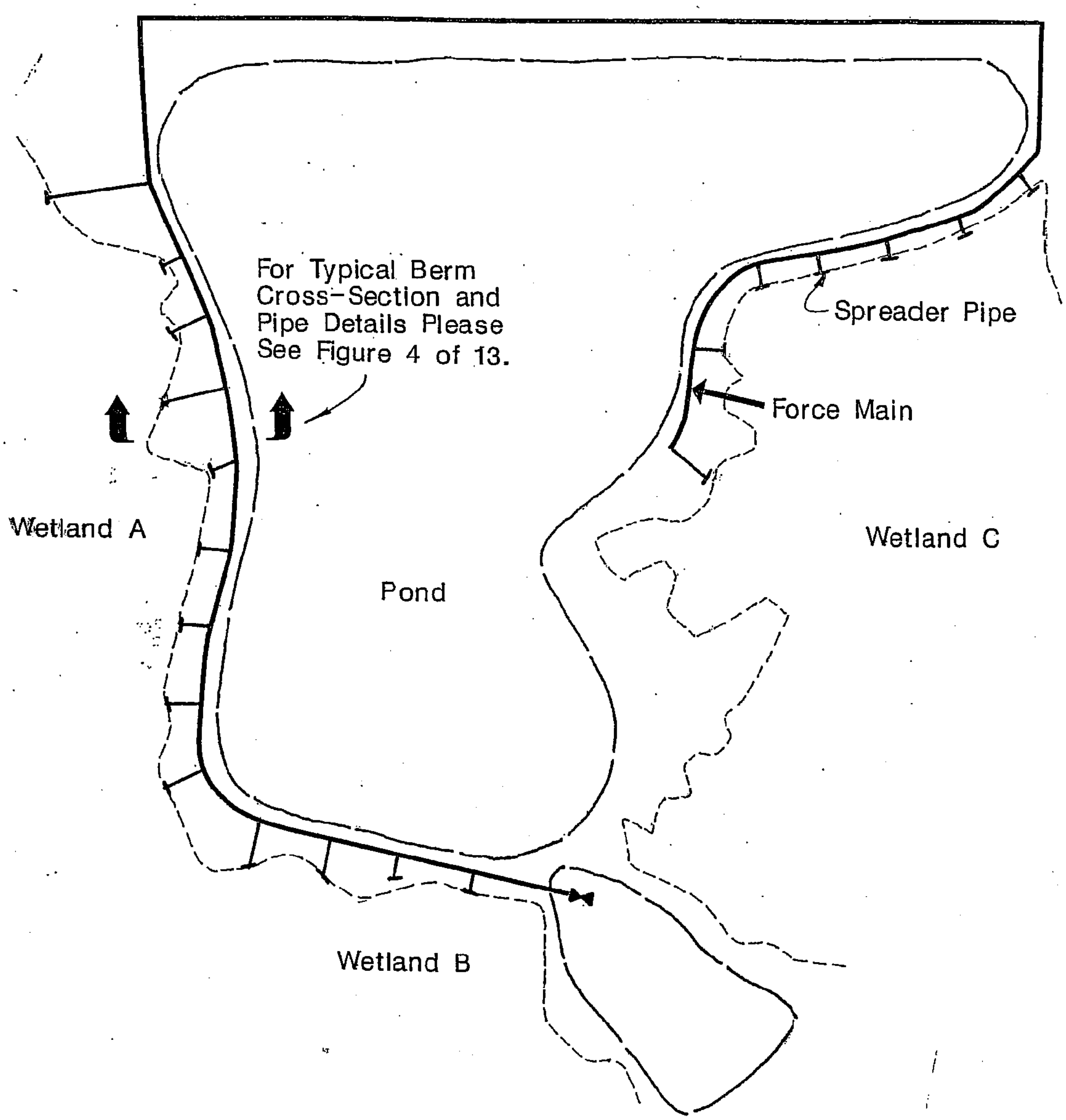


Project No.	EJ02131.00
Date	September 2002
Figure No. 2	

ENVIRONMENTAL SERVICES, INC.

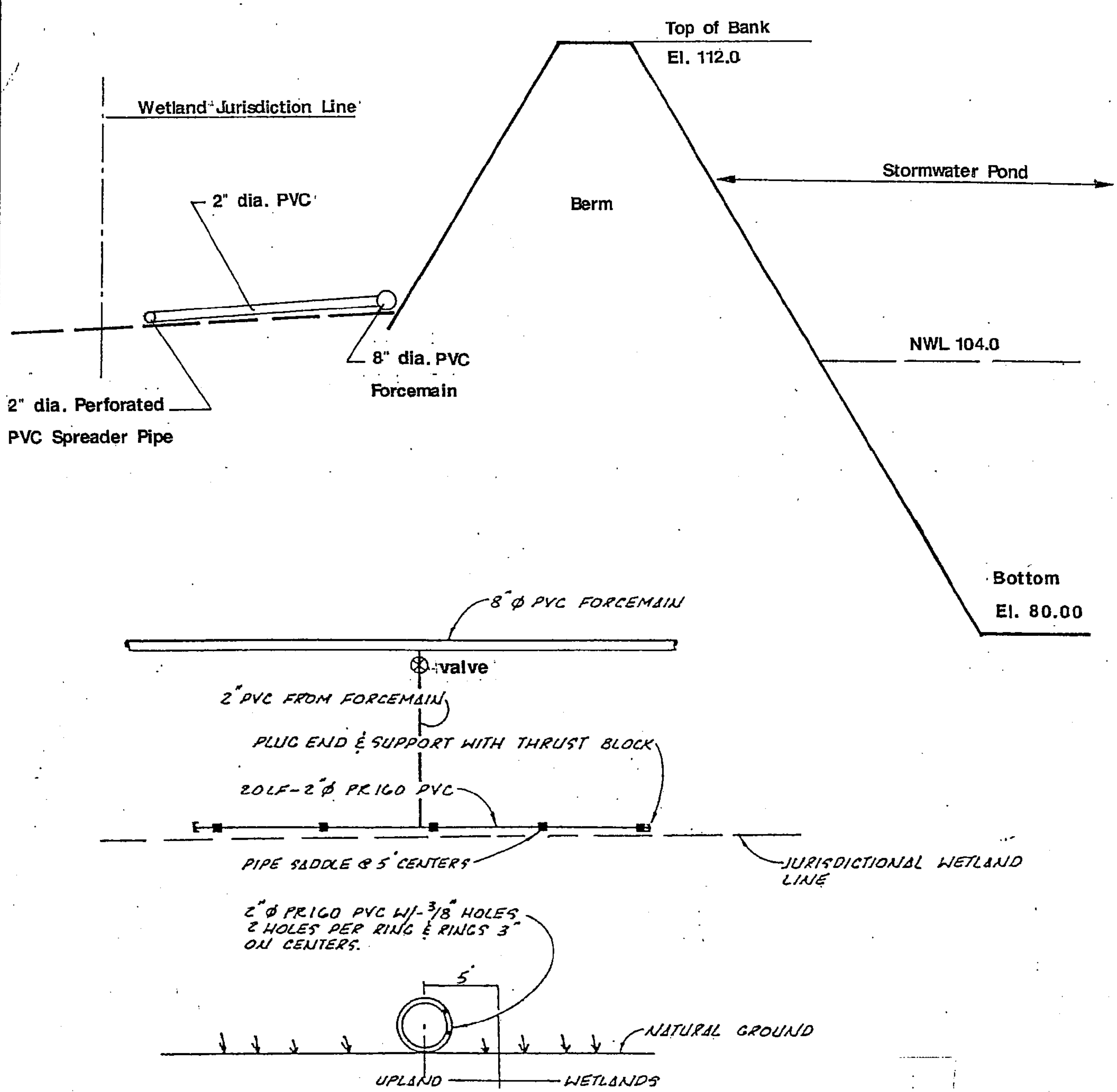
Trail Ridge Landfill

Jacksonville, Florida



Detailed Plan View of Wetland Irrigation System

Project No.	EJ02131.00
Date	September 2002
Figure No. 3	



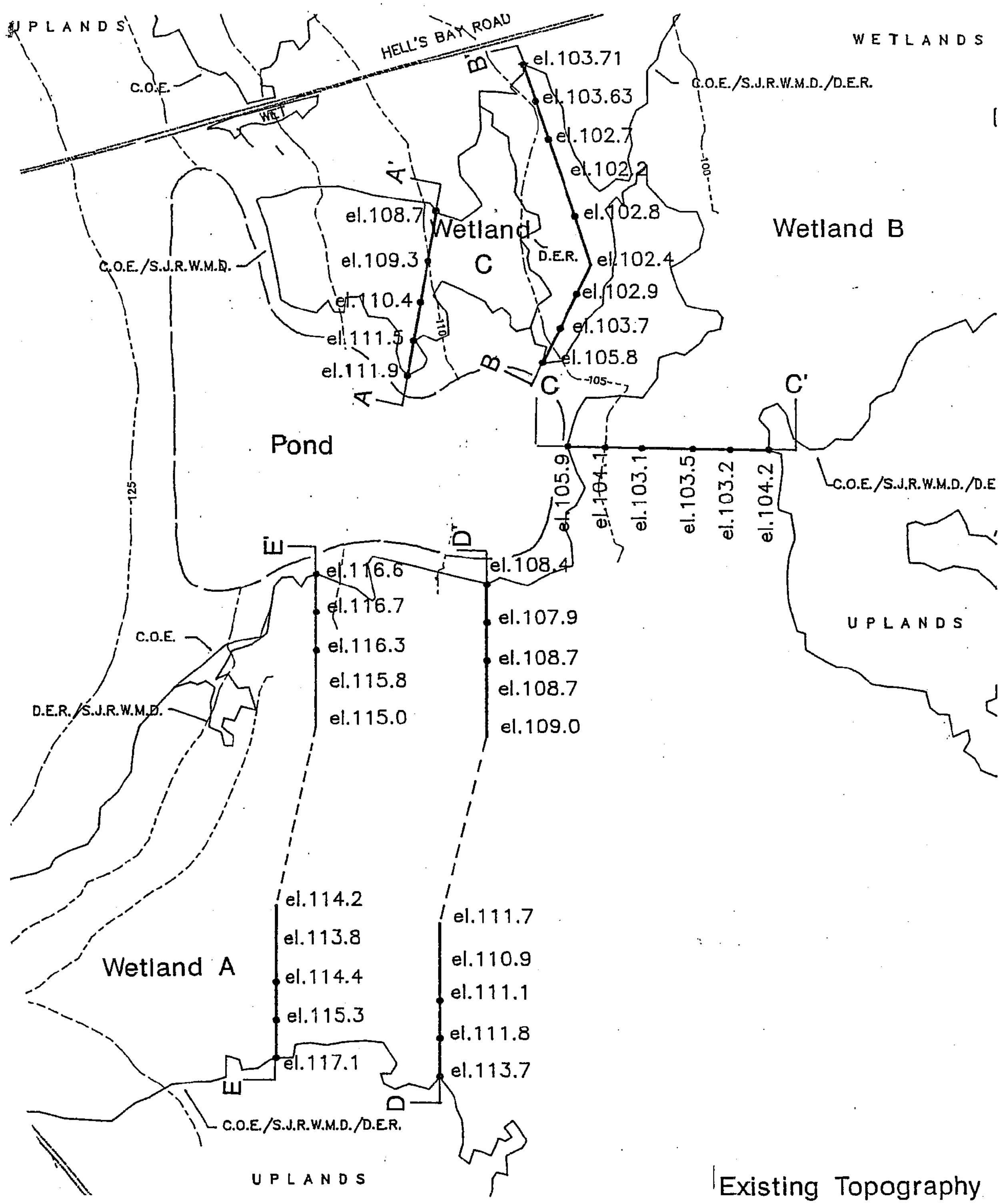
Plans for Wetland Irrigation System

ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No.	4

DEP005423

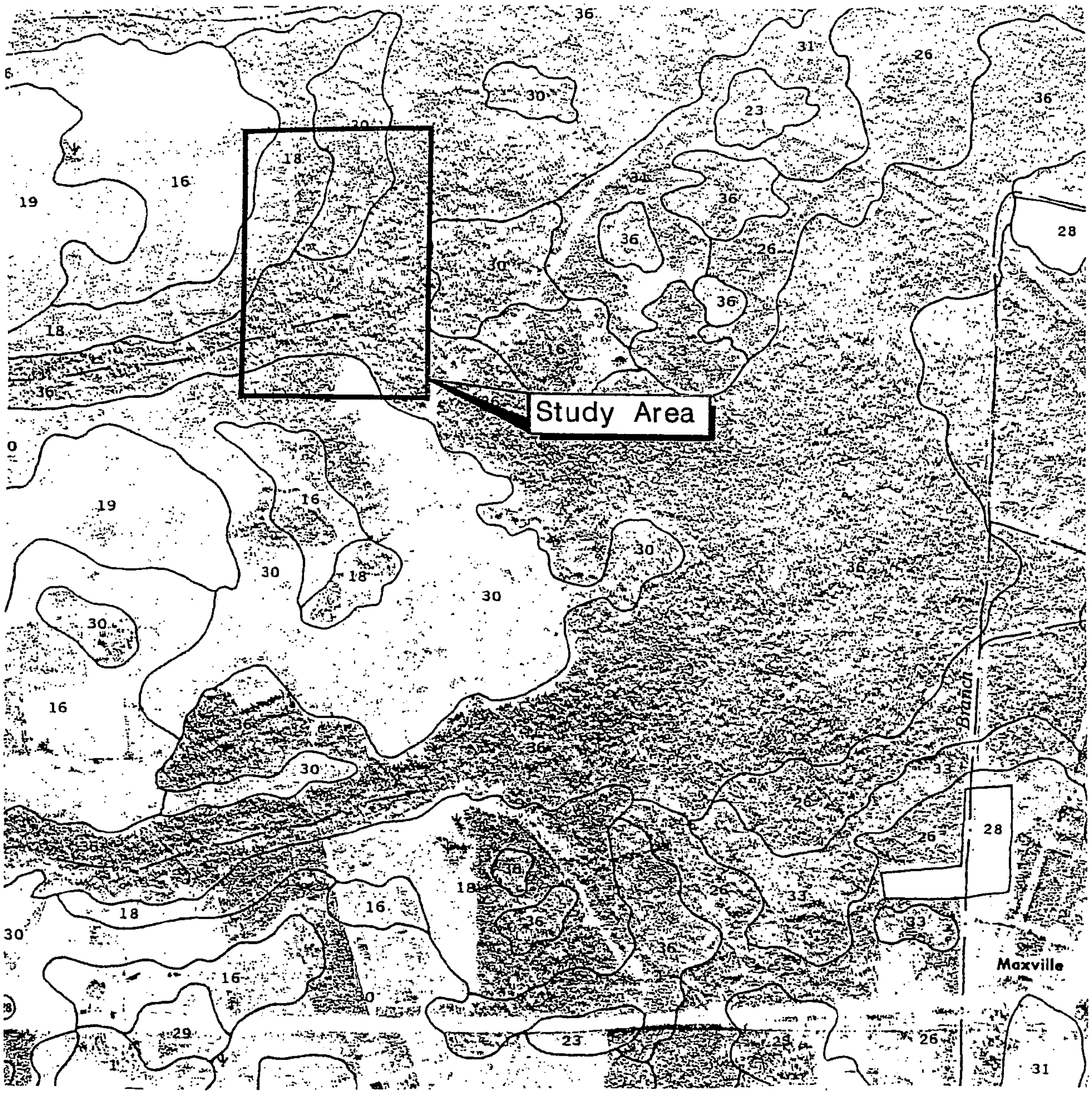


ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill

Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No.	5



Soil Legend:

18 – Lynn Haven fine sand

30 – Ridgeland fine sand

36 – Wesconnett fine sand

Source:U.S.D.A. Soils Survey for Duval County, Fla. (1978)

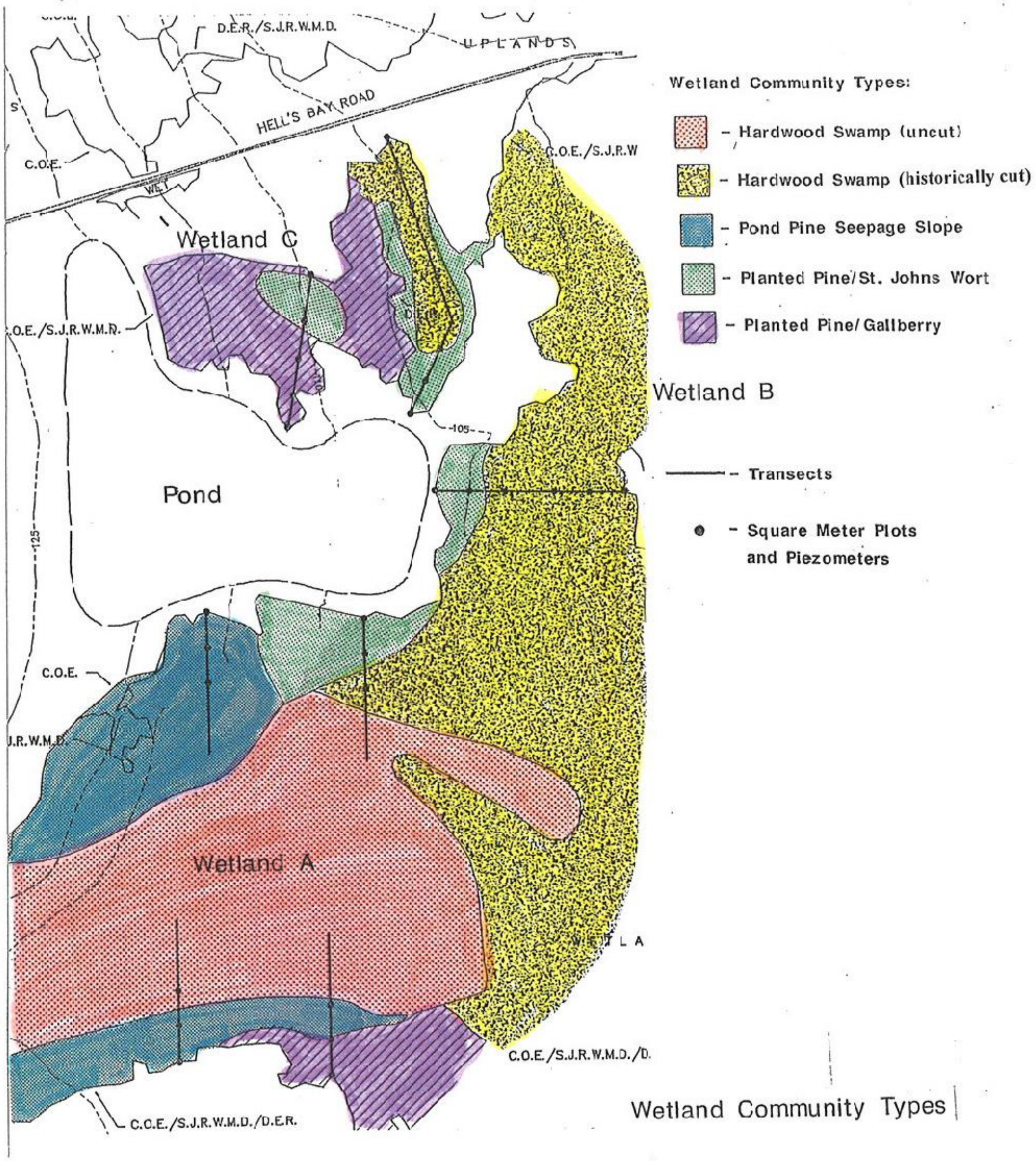
Soils Map

ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill

Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No.	6



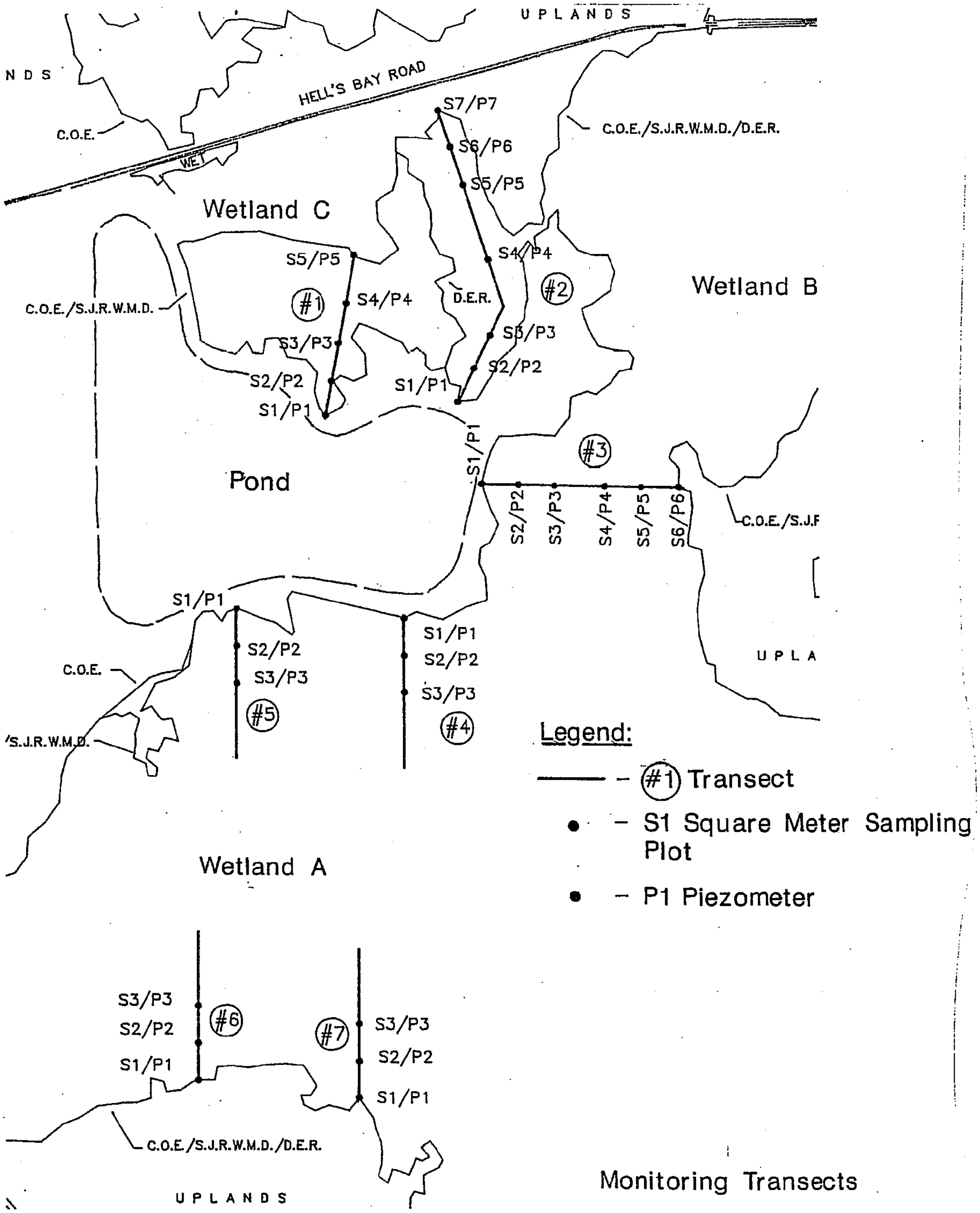
Wetland Community Types

ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No.	7

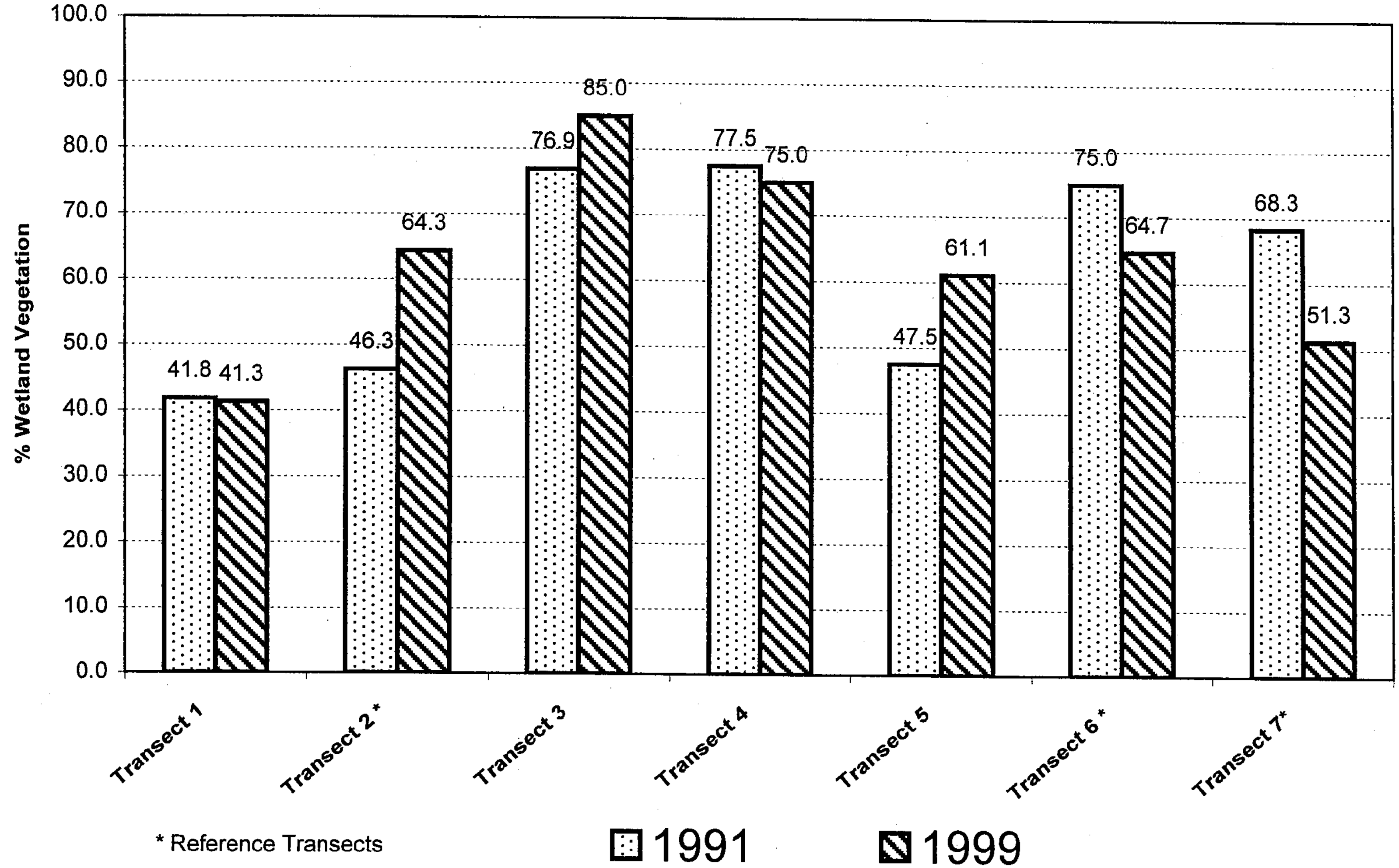
DEP005426



Monitoring Transects

ENVIRONMENTAL SERVICES, INC.	Trail Ridge Landfill Jacksonville, Florida	Project No. EJ02131.00 Date September 2002 Figure No. 8

Relative % Wetland Vegetation

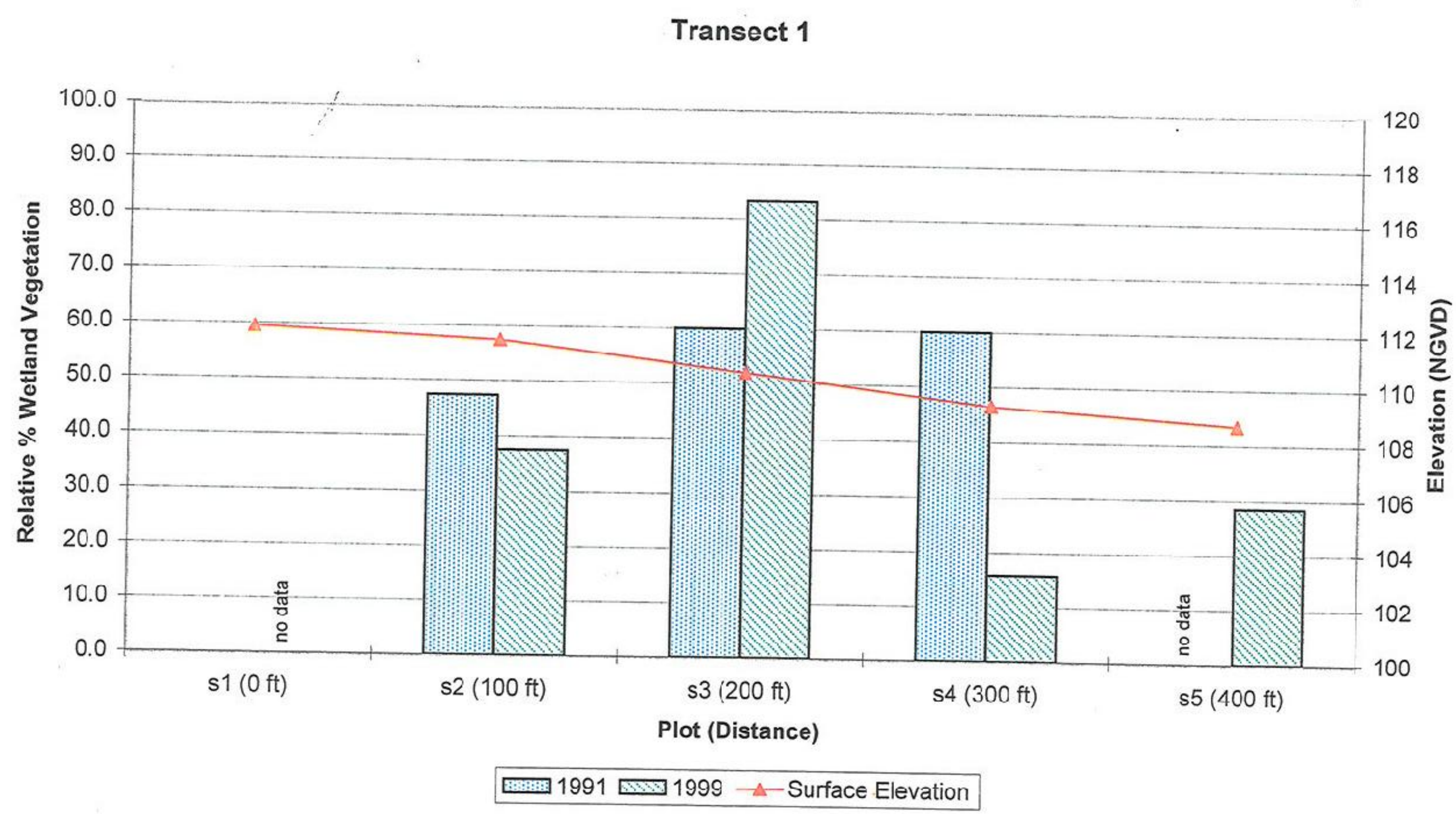


* Reference Transects

ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

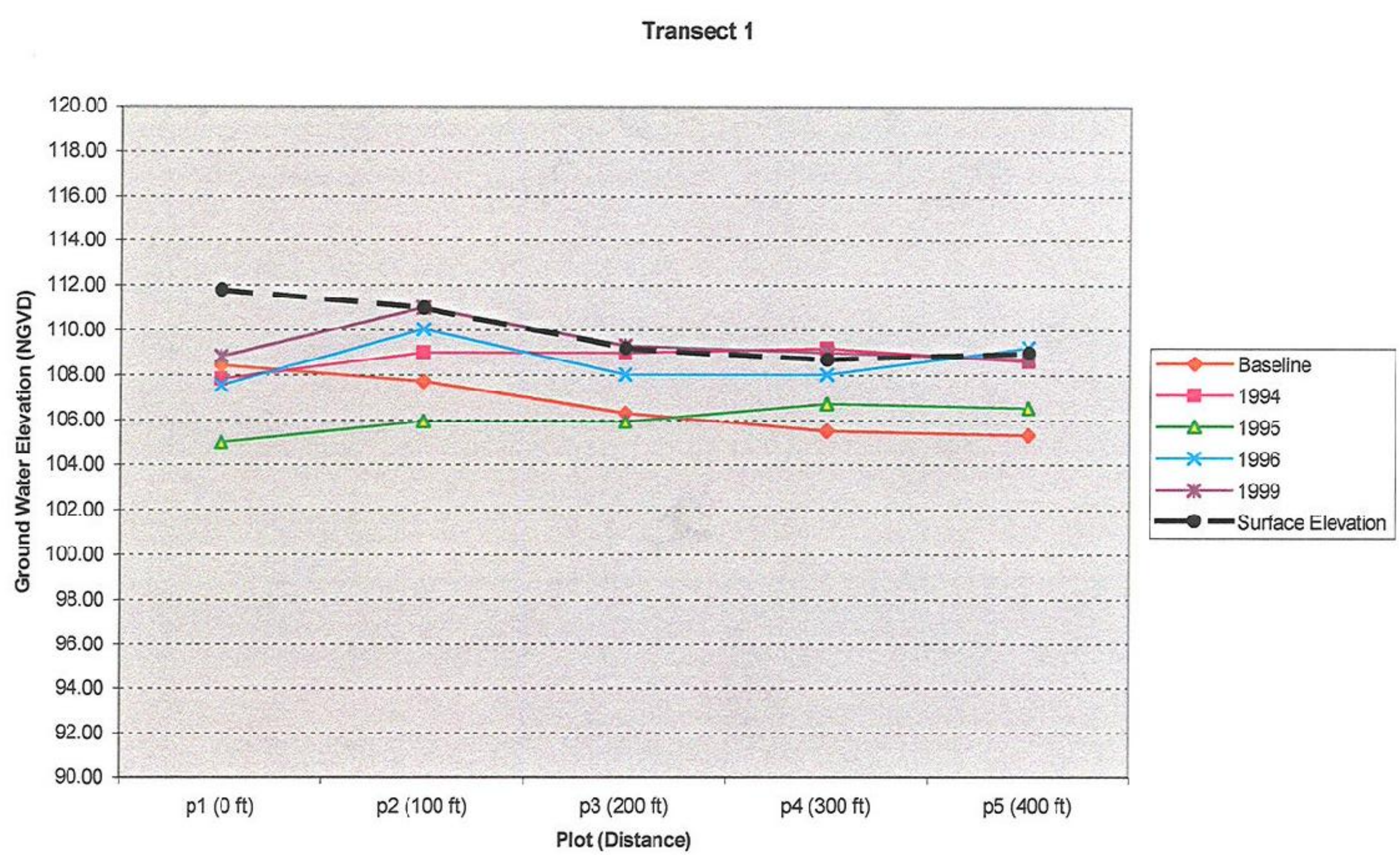
Project No.	EJ02131.00
Date	September 2002
Figure No.	9



ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No. 10	



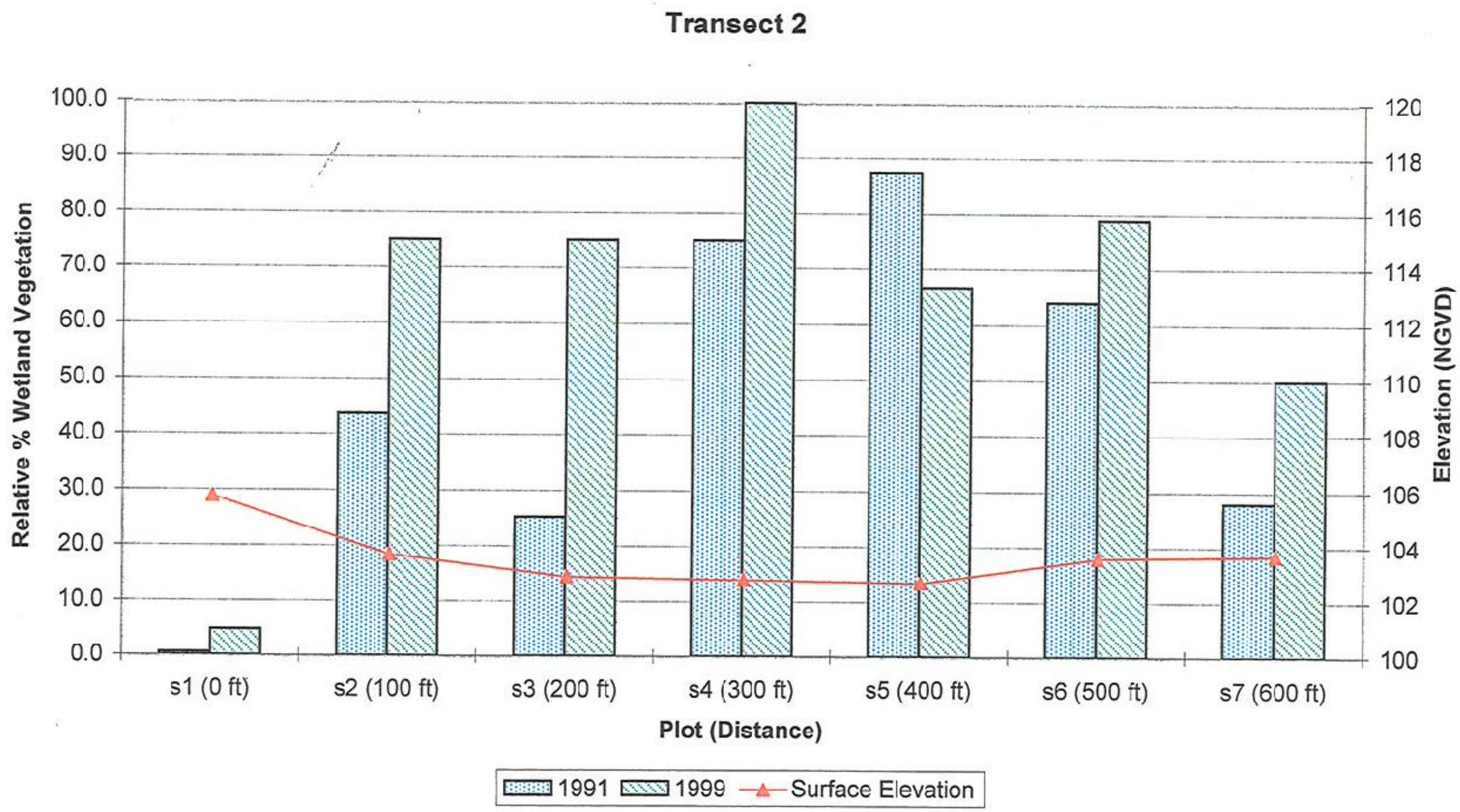
ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill

Jacksonville, Florida

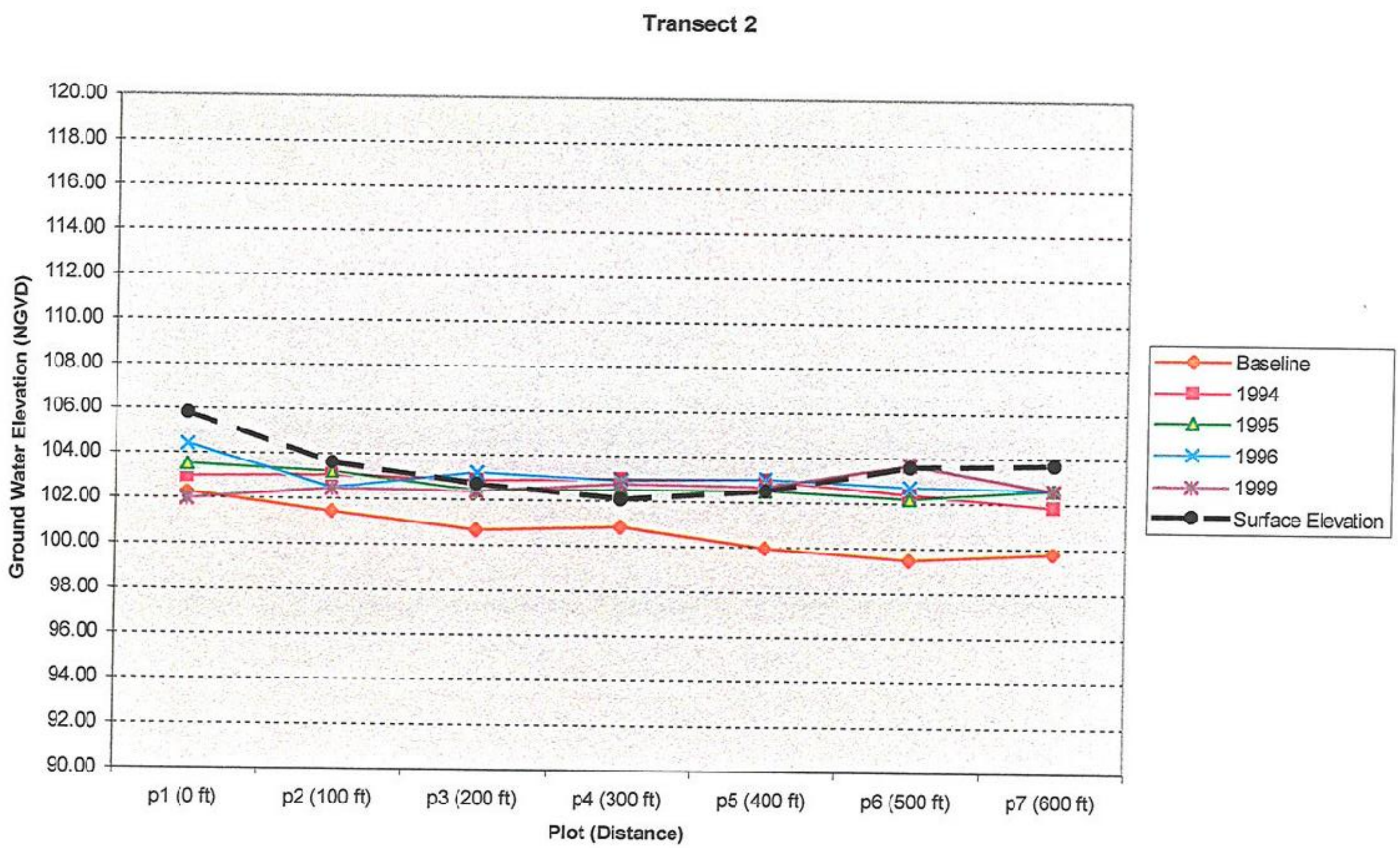
Project No.	EJ02131.00
Date	September 2002
Figure No. 11	

DEP005430



ENVIRONMENTAL SERVICES, INC.	Trail Ridge Landfill Jacksonville, Florida	Project No. EJ02131.00 Date September 2002 Figure No.12

DEP005431

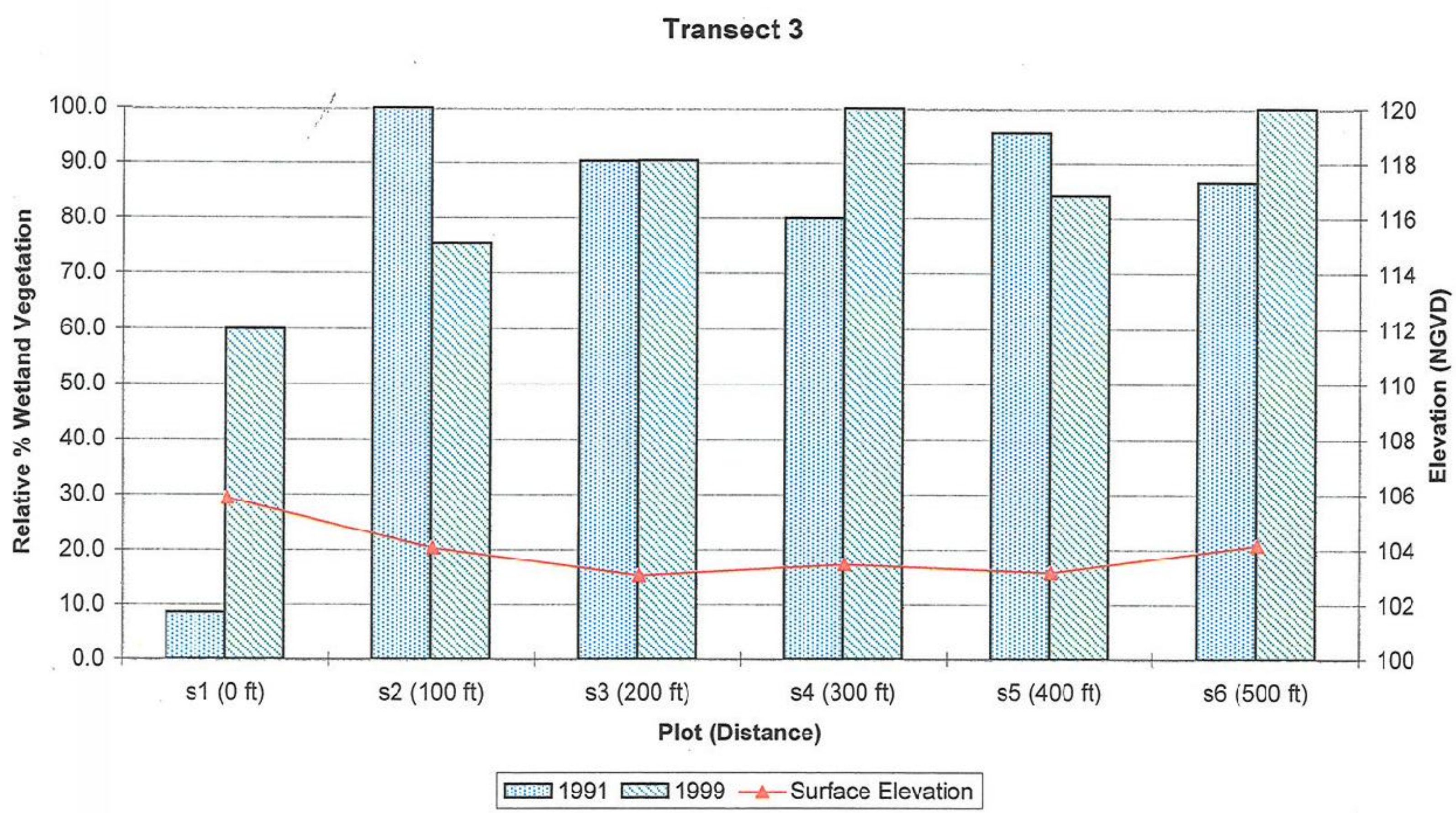


ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

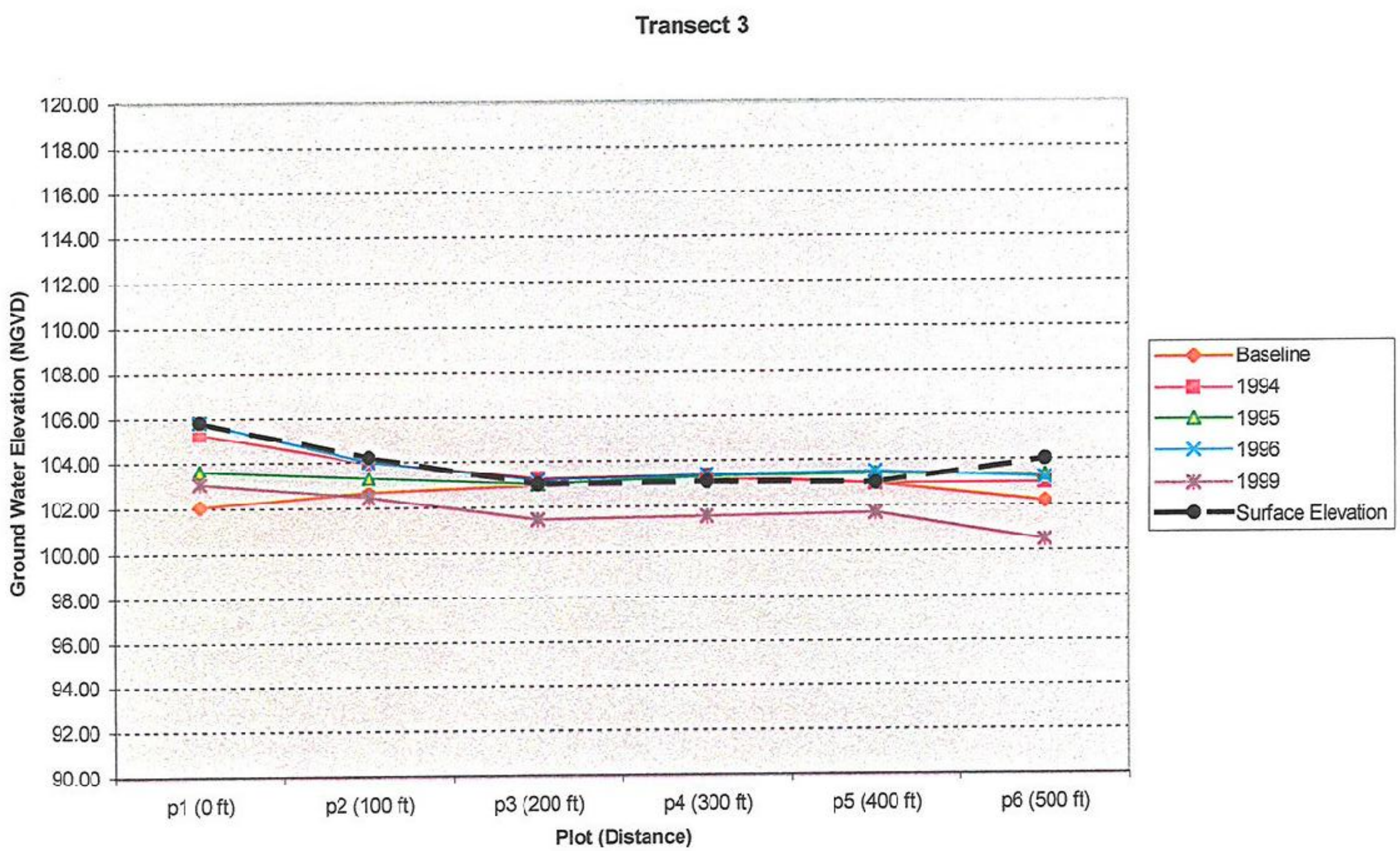
Project No.	EJ02131.00
Date	September 2002
Figure No. 13	

DEP005432

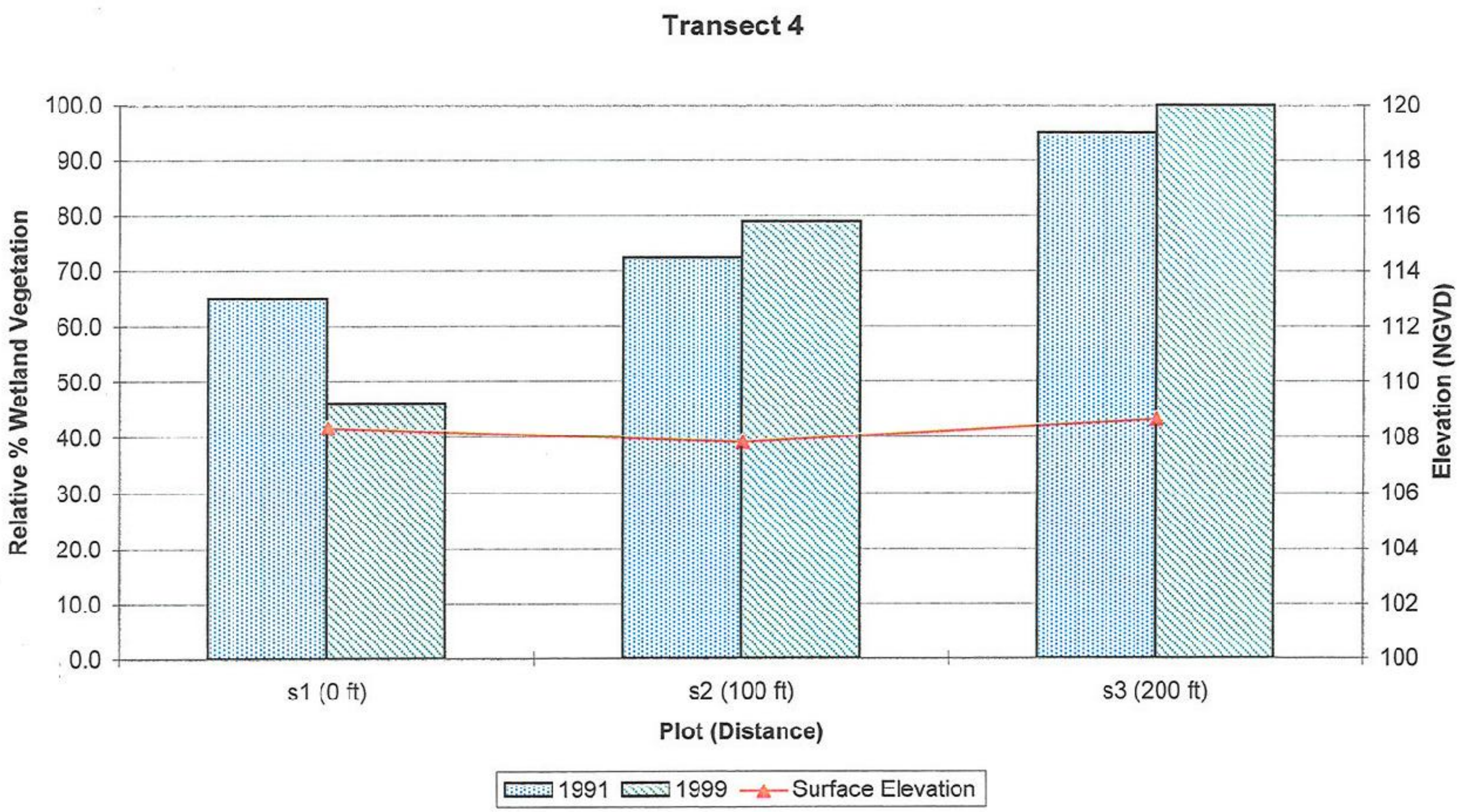


ENVIRONMENTAL SERVICES, INC.	Trail Ridge Landfill Jacksonville, Florida	Project No. EJ02131.00 Date September 2002 Figure No. 14

DEP005433



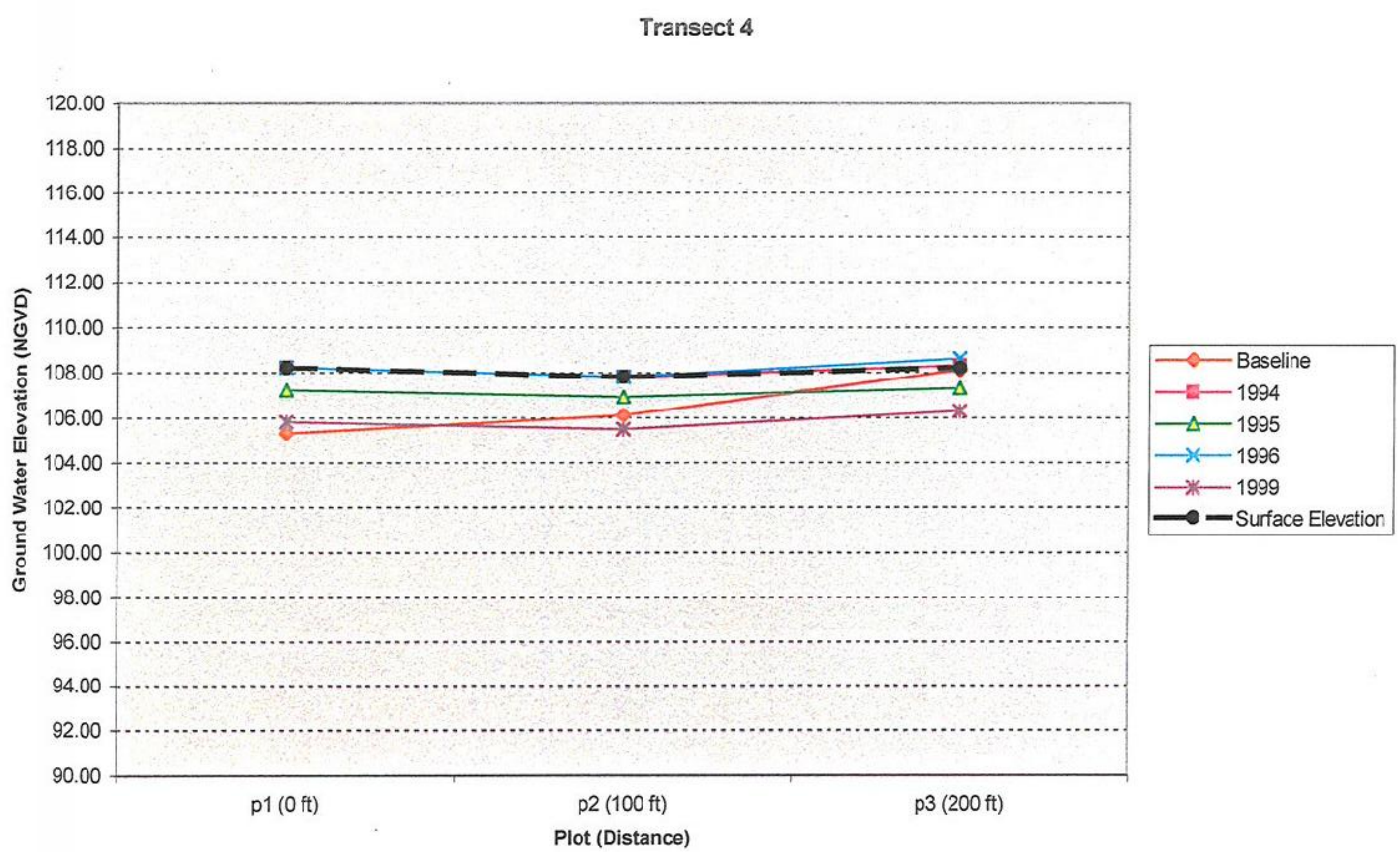
ENVIRONMENTAL SERVICES, INC.	Trail Ridge Landfill Jacksonville, Florida	Project No.	EJ02131.00
		Date	September 2002
		Figure No. 15	



ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No. 16	



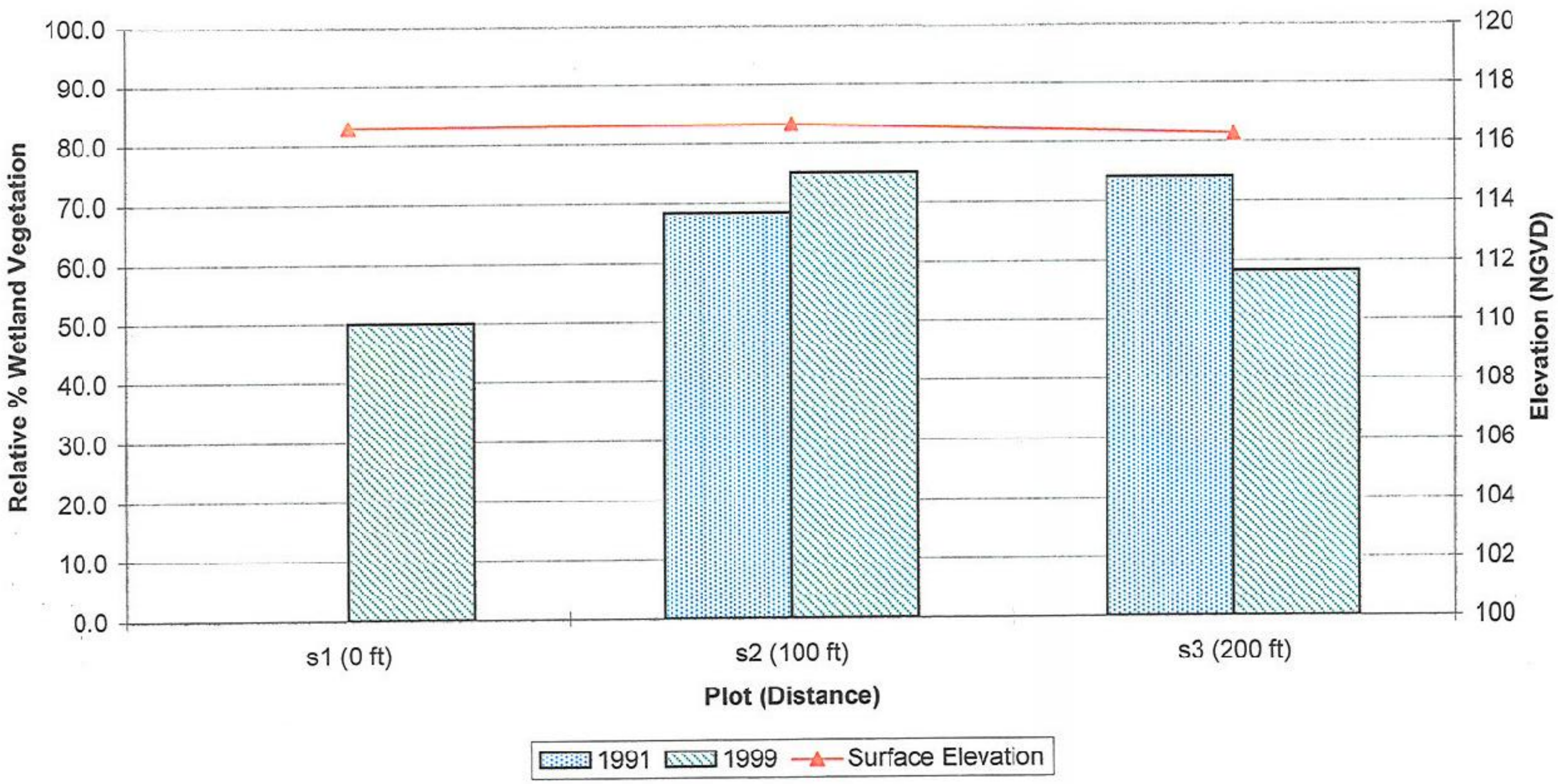
ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill

Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No. 17	

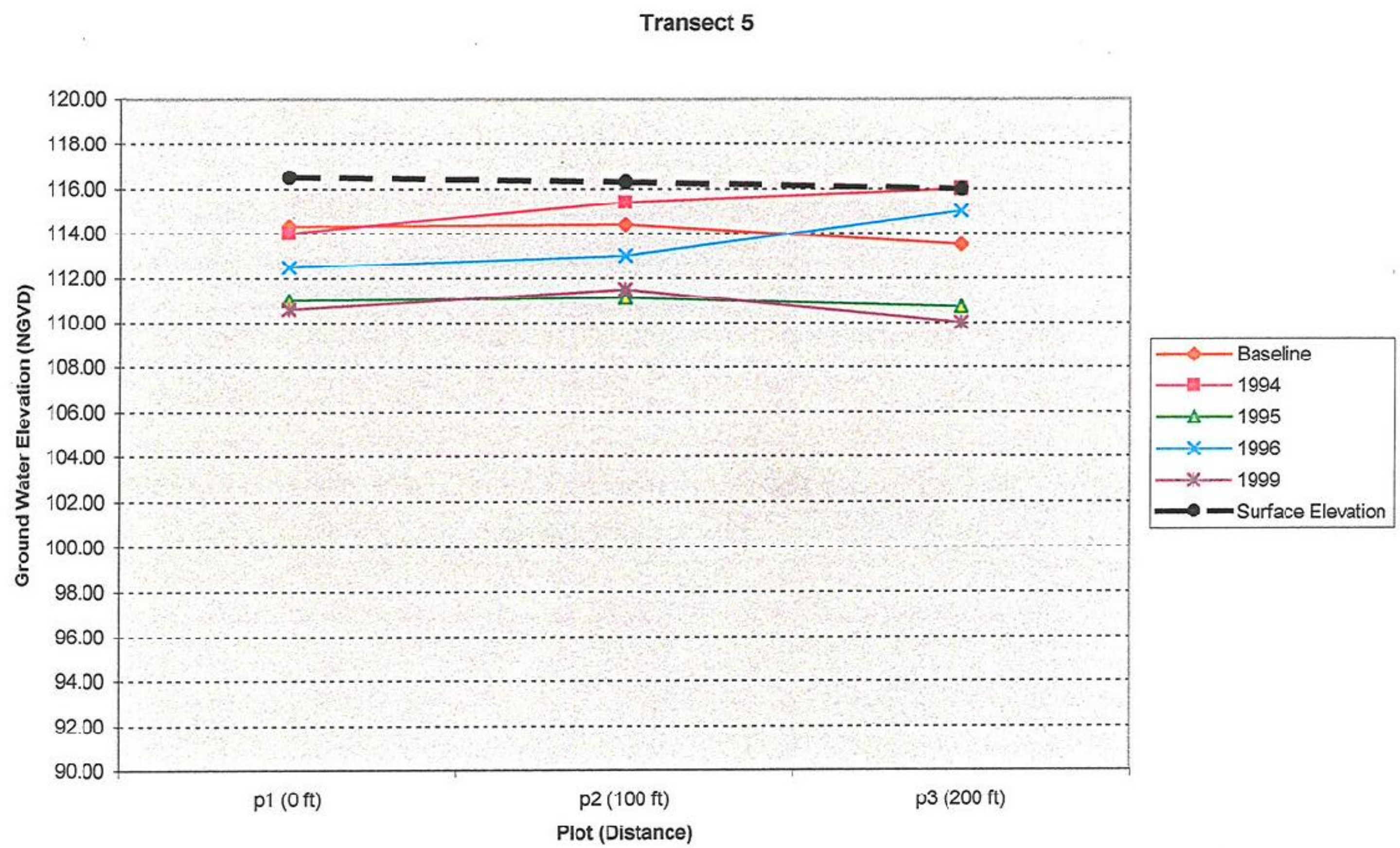
Transect 5



ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

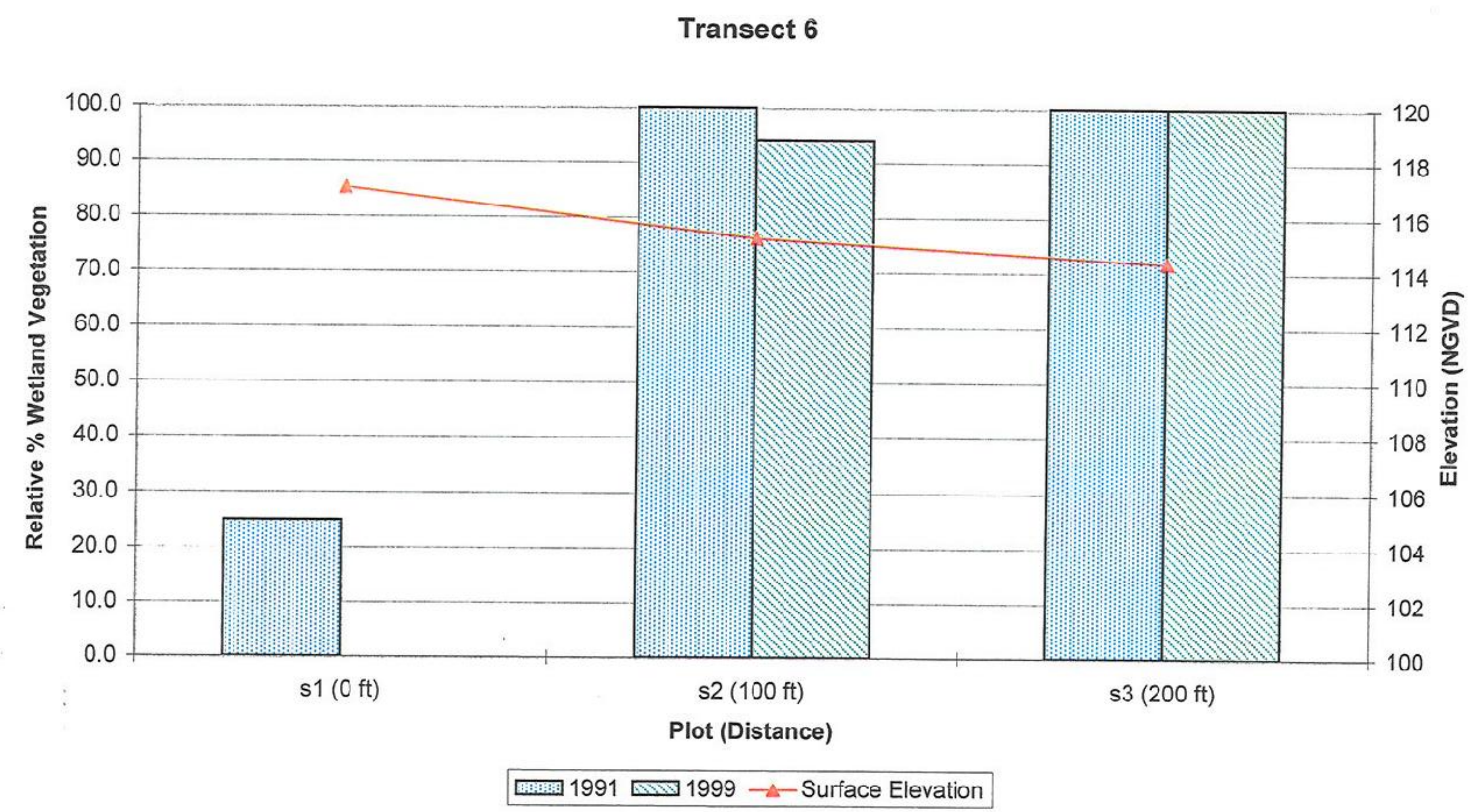
Project No.	EJ02131.00
Date	September 2002
Figure No. 18	



ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No.19	

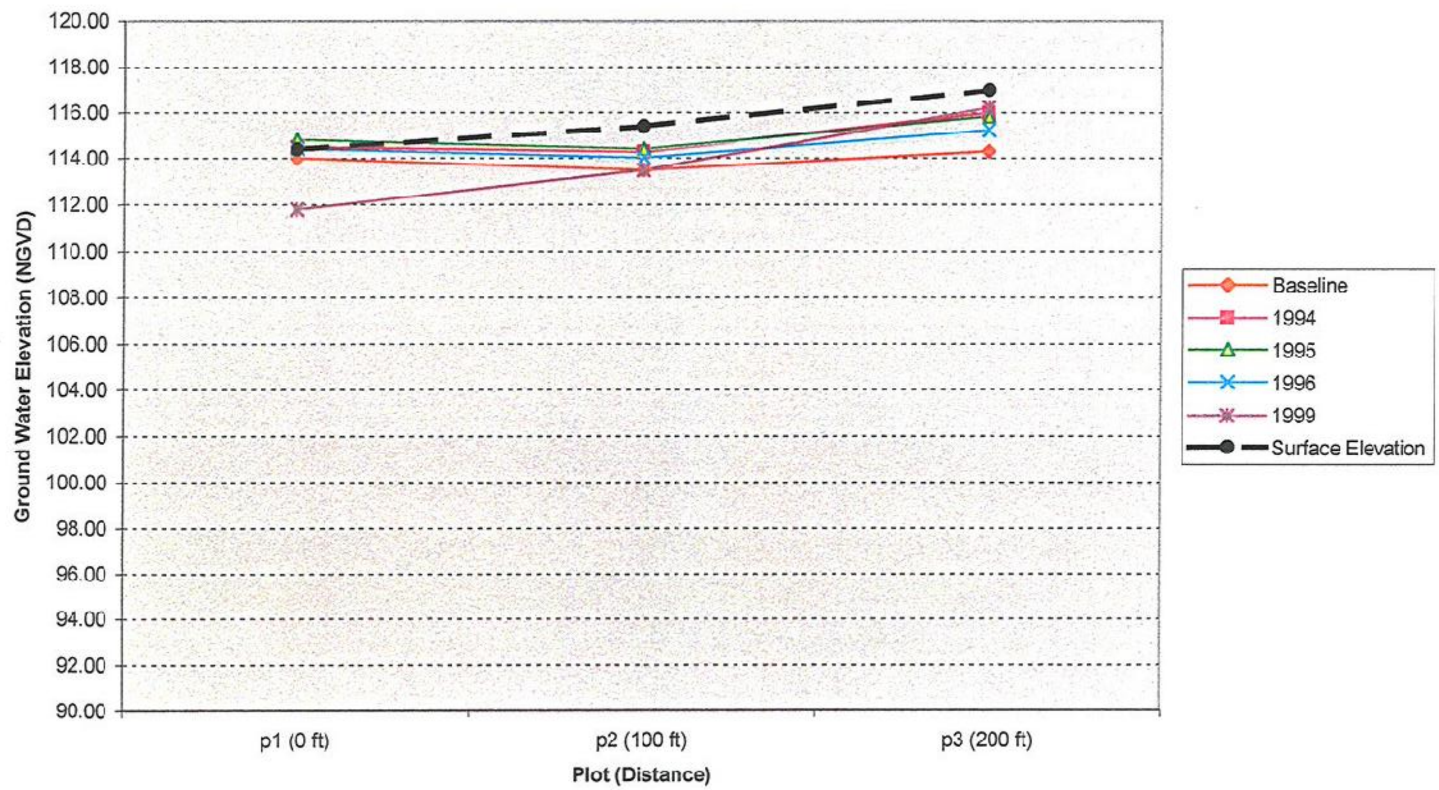


ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No.	20

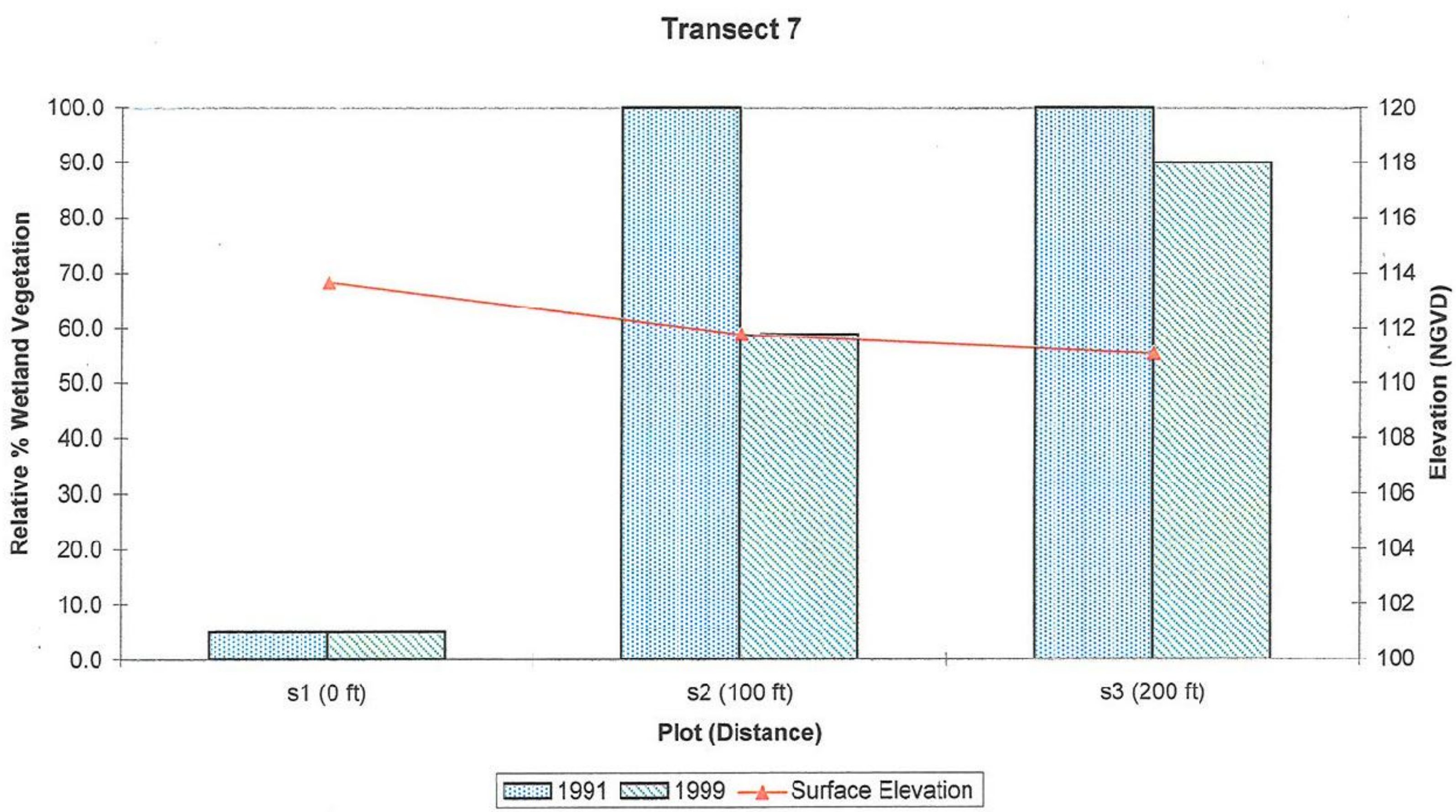
Transect 6



ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

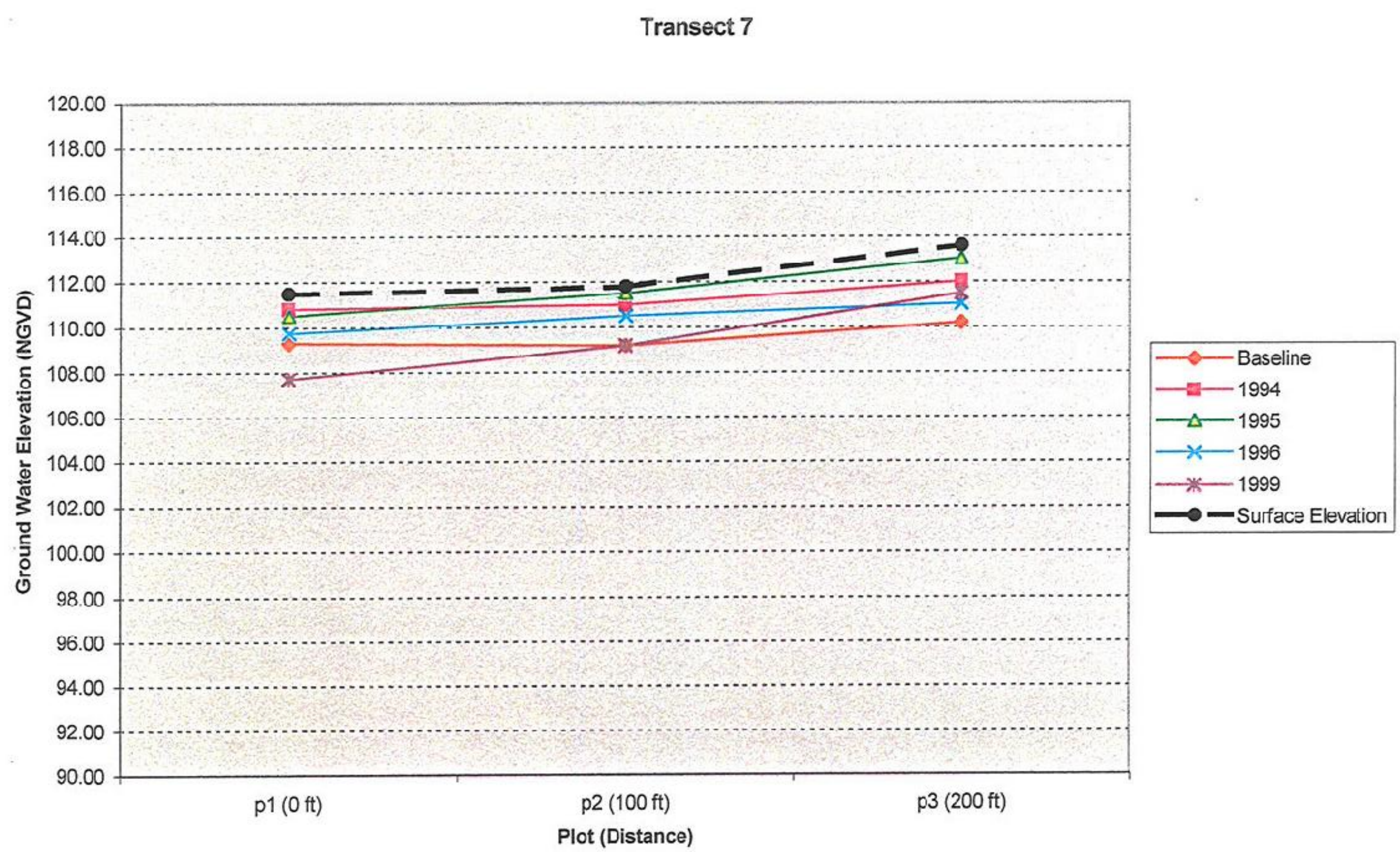
Project No.	EJ02131.00
Date	September 2002
Figure No. 21	



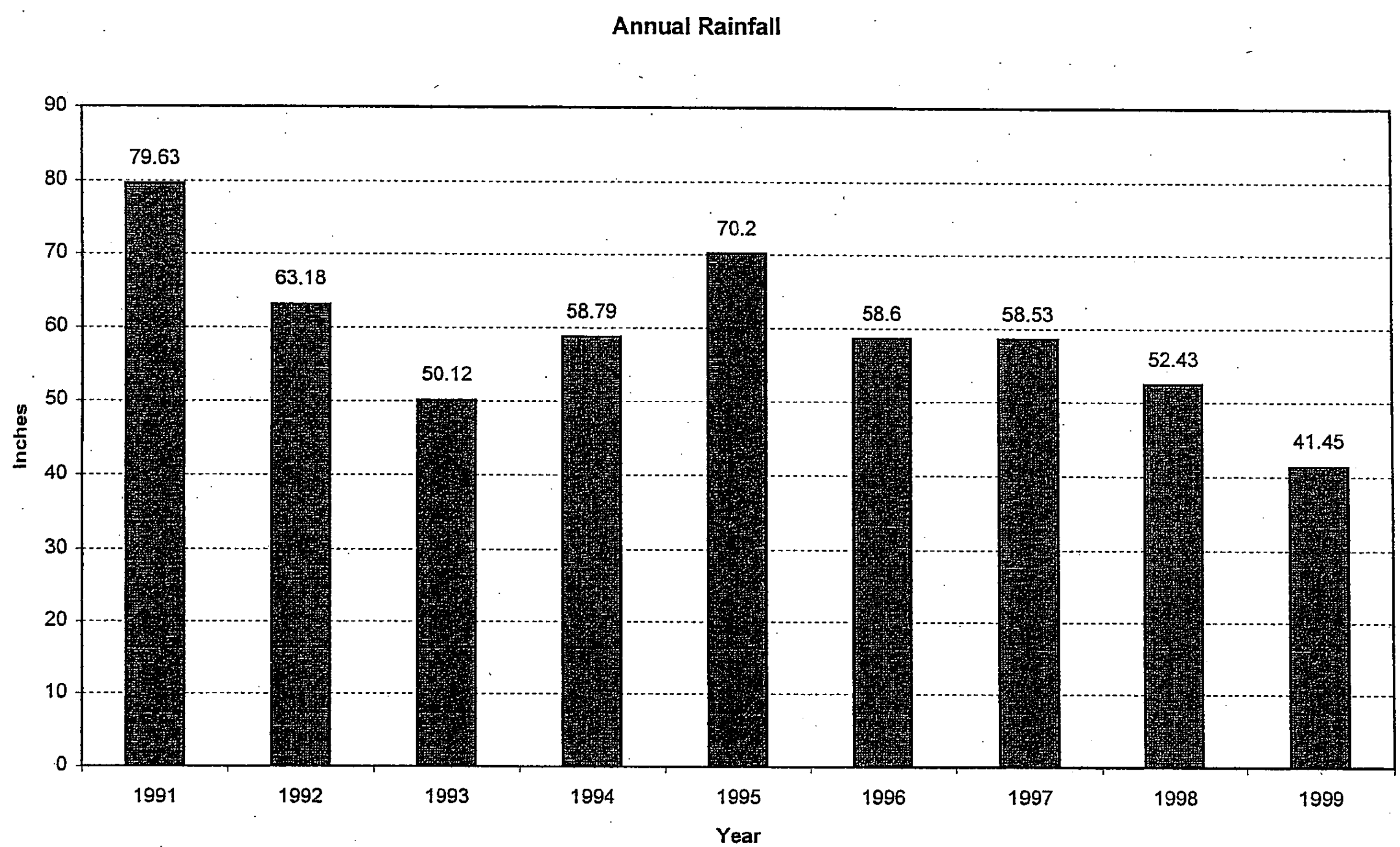
ENVIRONMENTAL SERVICES, INC.

Project No.	EJ02131.00
Date	September 2002
Figure No. 22	

Trail Ridge Landfill
Jacksonville, Florida



ENVIRONMENTAL SERVICES, INC.	Trail Ridge Landfill Jacksonville, Florida	Project No.	EJ02131.00
		Date	September 2002
		Figure No. 23	



ENVIRONMENTAL SERVICES, INC.

Trail Ridge Landfill
Jacksonville, Florida

Project No.	EJ02131.00
Date	September 2002
Figure No. 24	

ATTACHMENT A

Permit Conditions for Monitoring Wetlands
At Trail Ridge Landfill

SPECIFIC CONDITIONS:

construction and every year thereafter. A registered Florida Professional Engineer must sign and seal the report certifying the system is functioning as designed.

b. The reports shall be submitted to the Department's Stormwater Engineer at 7825 Baymeadows Way, Suite B-200, Jacksonville, Florida 32256-7590.

C MS C. If the stormwater management system is not functioning as designed and permitted, operational maintenance must be performed immediately to restore the system. If operational maintenance measures are insufficient to enable the system to meet the design standards, the Permittee must either replace the system or construct an alternative design. In such a case, the Permittee must submit a permit modification application within sixty (60) days of the date the system was determined to be design deficient.

CMS 50. **Hydrology Monitoring Requirement.** All piezometers (installed as part of the requirements of Specific Condition No. 48I(a) of Permit Number SC16-184444) at the wetland/upland boundary and at existing groundwater monitoring locations, installed to determine groundwater elevations in the wetland discharge areas, shall be monitored at 6 month intervals commencing 6 months from the permit receipt date. The hydrology monitoring reports shall be submitted to the Department's Northeast District's Environmental Resource Permitting Section within 45 days from the monitoring event.

C MS 51. **Wetland Vegetation Monitoring.** The vegetation in the wetland areas of discharge shall be monitored every 2 years commencing from the permit receipt date. These vegetation monitoring reports shall utilize the transects established in the Base Line Study (required in Specific Condition Number 48I(a) of Permit Number SC16-184444) and shall include all the required information in this Base Line Study. These vegetation monitoring reports shall be submitted to the Department's Northeast District's Environmental Resource Permitting Section no later than 30 days after each monitoring event.

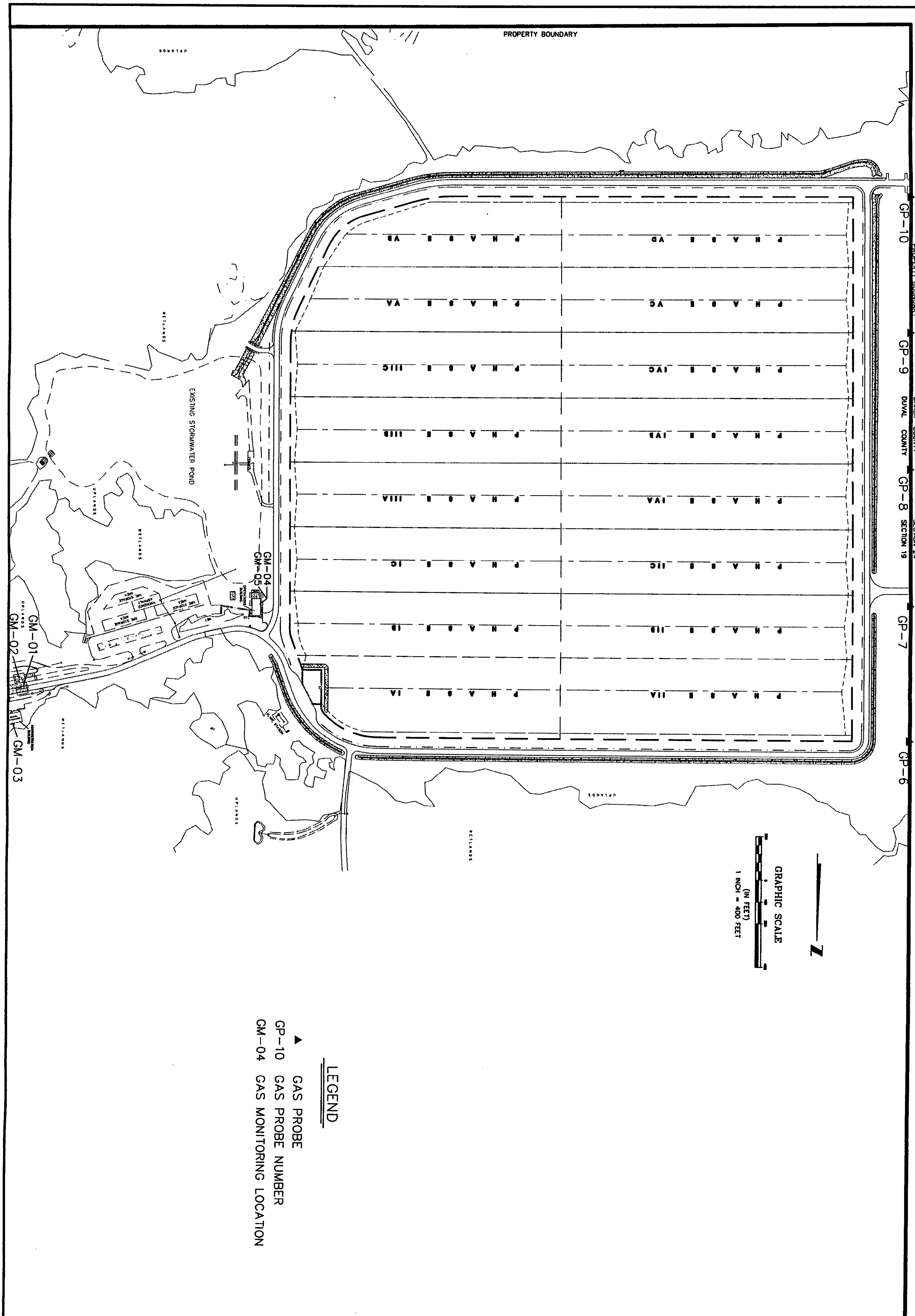
CMS 52. **Monitoring report.** Each vegetative monitoring report shall document any quantitative changes in vegetational composition which indicates any significant changes in the hydroperiod of the wetlands. Monitoring data shall be collected from all previously established quadrants along the existing transects. Each vegetative monitoring report shall contain an explanation of short term trends caused by, but not limited to, rainfall, fire, flooding and or other natural events and an explanation of any potential long term trends based on past reports which indicate potential changes in the hydroperiod of the wetland. The Department shall review the vegetative monitoring reports and the Permittee shall take whatever corrective remedial actions required by the Department in the event of significant indications of changes or potential changes in the hydroperiod of the wetland.

MS 53. **Erosion control.** The Permittee shall take all appropriate measures to insure that the wetland stormwater discharge system does not cause erosion into any wetland area during construction and operation.

F

APPENDIX F

COMBUSTIBLE GAS MONITORING PROGRAM



England-Thims & Miller, Inc.
ENGINEERS - PLANNERS - SURVEYORS - LANDSCAPE ARCHITECTS
14775 ST. AUGUSTINE ROAD JACKSONVILLE, FLORIDA 32258
CERTIFICATE OF AUTHORIZATION NUMBER: 2584
PHONE NUMBER (904) 642-8990 FAX NUMBER (904) 646-9485

GAS PROBE PLAN

TRAIL RIDGE LANDFILL PERMIT RENEWAL
FOR
TRAIL RIDGE LANDFILL, INC.

ETM NO. 02-025	REVISIONS:
DRAWN BY: S.J.L.	
DESIGNED BY: J.B.C.	
CHECKED BY: J.B.C.	
DATE: SEPTEMBER 25, 2002	

DRAWING NO.

APPENDIX F

G

APPENDIX G

LEACHATE RECIRCULATION SYSTEM EVALUATION

TRAIL RIDGE LANDFILL
LEACHATE RECIRCULATION
HELP MODEL

PURPOSE:

The purpose of the HELP Model (Version 3.07) is to demonstrate that the recirculation of leachate will not result in a head on the primary or secondary liner exceeding Rule 62-701.400(3), F.A.C. This means that the head on the primary liner must not exceed one foot and the head on the secondary liner must not exceed the thickness of the drainage layer (a geonet with a thickness of 0.20 inches).

BACKGROUND:

The existing constructed landfill includes a double liner system. The initial construction increment (55± acres) included a geosynthetic liner (bentonite mat) below the secondary liner. Whereas, during the second construction increment (93± acres), the geosynthetic liner was moved to below the primary liner.

ANALYSIS:

Since the liner system is different for the two construction increments, there are two HELP Model analyses. The input for the two analyses is as follows:

First Increment -	1 Acre	
	55 Feet of Waste (660 inches)	
	Liner System -	24" Sand Drainage Layer
		0.2" Drainage Layer (Geonet)
		60 Mil HDPE Synthetic Liner
		0.2" Drainage Layer (Geonet)
		60 Mil HDPE Synthetic Liner
		6" Barrier Soil Layer ($k = 1x10^{-5}$ cm/sec)

Note: A geosynthetic liner (bentonite mat) was installed below the secondary liner (on top of the barrier layer) but due to HELP Model constraints, that layer was not included. Nevertheless, we do not believe that it would affect the results of the HELP Model.

Second Increment -	1 Acre	
	55 Feet of Waste (660 inches)	
	Liner System -	24" Sand Drainage Layer
		0.2" Drainage Layer (Geonet)
		60 Mil HDPE Synthetic Liner
		0.17" Geosynthetic Liner (Bentonite Mat)
		0.2" Drainage Layer (Geonet)
		60 Mil HDPE Synthetic Liner
		6" Barrier Soil Layer ($k = 1x10^{-5}$ cm/sec)

Layer 1 on the HELP Model represents 12 inches of intermediate cover, Layer 2 is the proposed 30 inches of slag or aggregate and Layer 3 represents 660 inches of waste (55 feet). In order to control the amount of leachate that will be recirculated, leachate recirculation was simulated as a subsurface inflow into Layer 2. Since the proposed average recirculation rate is 30,000 gallons per day over a 1-acre area, a subsurface inflow rate of 403 inches per year was used in the HELP Model. The proposed 30,000 gallons per day is equivalent to 4,010.4 cubic feet per day. With a recirculation area of 1 acre (43,560 ft^2), 0.092 ft or 1.10 inches per day of leachate (403 inches per year) is recirculated.

It should be noted that analysis of the Second Increment will provide a higher head on the liner. However, both simulation shows the head on the liner will be below the maximum head allowed per Rule 62-701.400(3), F.A.C.

RESULTS:

First Increment - The maximum head and average head on the primary liner, based upon peak daily values, are 10.0 inches 7.5 inches, respectively. These values are below the maximum allowable head of one foot.

The maximum head and average head on the secondary liner, based upon peak daily values, are 0.030 inches and 0.015 inches, respectively. These values are below the maximum head of 0.2 inches, based upon the thickness of the secondary geonet.

Second Increment - The maximum head and average head on the primary liner, based upon peak daily values are 11.8 inches and 9.1 inches, respectively. These values are below the maximum allowable head of one foot.

The maximum head and average head on the secondary liner, based upon peak daily values, are 0.026 inches and 0.000 inches, respectively. These values are below the maximum head of 0.2 inches, based upon the thickness of the secondary geonet.

Since the results show that the head on the liner system is less than the maximum allowable head per Rule 62-701.400(3), F.A.C., leachate recirculation at Trail Ridge Landfill should be allowed by the Department of Environmental Protection in the Operation Permit.

Gonitta Bade Cam
9/25/08

HELP MODEL RESULTS

FOR

FIRST CONSTRUCTION INCREMENT

```
******************************************************************************
******************************************************************************
**                                                                          **
 *                                                                          **
**             HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**               HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************
```

```
PRECIPITATION DATA FILE:     C:\HELP3~1.07\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3~1.07\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3~1.07\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3~1.07\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3~1.07\DATA10A.D10
OUTPUT DATA FILE:            C:\HELP3~1.07\RECIRC2A.OUT
```

```
TIME:   9:47     DATE:   9/17/2002
```

```
******************************************************************************

     TITLE:  TRAIL RIDGE LANDFILL LEACHATE RECIRCULATION - FIRST INCR.

******************************************************************************
```

```
     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.
```

```
                                       LAYER  1
                                       --------

                         TYPE 1 - VERTICAL PERCOLATION LAYER
                             MATERIAL TEXTURE NUMBER   8
           THICKNESS                    =     12.00    INCHES
           POROSITY                     =      0.4630 VOL/VOL
           FIELD CAPACITY               =      0.2320 VOL/VOL
           WILTING POINT                =      0.1160 VOL/VOL
           INITIAL SOIL WATER CONTENT   =      0.1923 VOL/VOL
           EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC
```

```
                                       LAYER  2
```

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 21

THICKNESS	=	30.00	INCHES
POROSITY	=	0.3970	VOL/VOL
FIELD CAPACITY	=	0.0320	VOL/VOL
WILTING POINT	=	0.0130	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1070	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000012000	CM/SEC
SUBSURFACE INFLOW	=	403.00	INCHES/YR

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	660.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4364	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3228	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7506	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	1.93	PERCENT
DRAINAGE LENGTH	=	150.0	FEET

LAYER 6

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	1.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	2 - EXCELLENT

LAYER 7

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20 INCHES
POROSITY	=	0.8500 VOL/VOL
FIELD CAPACITY	=	0.0100 VOL/VOL
WILTING POINT	=	0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0189 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000 CM/SEC
SLOPE	=	1.93 PERCENT
DRAINAGE LENGTH	=	150.0 FEET

LAYER 8

TYPE 4 - FLEXIBLE MEMBRANE LINER
MATERIAL TEXTURE NUMBER 35

THICKNESS	=	0.06 INCHES
POROSITY	=	0.0000 VOL/VOL
FIELD CAPACITY	=	0.0000 VOL/VOL
WILTING POINT	=	0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY	=	1.00 HOLES/ACRE
FML INSTALLATION DEFECTS	=	1.00 HOLES/ACRE
FML PLACEMENT QUALITY	=	2 - EXCELLENT

LAYER 9

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 15

THICKNESS	=	6.00 INCHES
POROSITY	=	0.4750 VOL/VOL
FIELD CAPACITY	=	0.3780 VOL/VOL
WILTING POINT	=	0.2650 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4750 VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.170000003000E-04 CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	80.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.696	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	2.778	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.696	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	304.284	INCHES
TOTAL INITIAL WATER	=	304.284	INCHES
TOTAL SUBSURFACE INFLOW	=	403.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
JACKSONVILLE FLORIDA

STATION LATITUDE	=	30.50	DEGREES
MAXIMUM LEAF AREA INDEX	=	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	=	367	
EVAPORATIVE ZONE DEPTH	=	6.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	8.20	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	73.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	72.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	79.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	78.00	%

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR JACKSONVILLE FLORIDA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.07	3.48	3.72	3.32	4.91	5.37
6.54	7.15	7.26	3.41	1.94	2.59

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR JACKSONVILLE FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
53.20	55.10	61.30	67.70	74.10	79.00
81.30	81.00	78.20	69.50	60.80	54.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR JACKSONVILLE FLORIDA
AND STATION LATITUDE = 30.50 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.19	171299.687	100.00
RUNOFF	1.074	3897.755	2.28
EVAPOTRANSPIRATION	27.999	101635.648	59.33
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	853.99
DRAINAGE COLLECTED FROM LAYER 5	415.1938	1507153.620	879.83
PERC./LEAKAGE THROUGH LAYER 6	5.928821	21521.621	12.56
AVG. HEAD ON TOP OF LAYER 6	0.2777		
DRAINAGE COLLECTED FROM LAYER 7	5.9288	21521.590	12.56
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.045	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0022		
CHANGE IN WATER STORAGE	-0.005	-18.500	-0.01
SOIL WATER AT START OF YEAR	304.286	1104559.370	
SOIL WATER AT END OF YEAR	304.281	1104540.870	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.439	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	58.69	213044.672	100.00
RUNOFF	4.228	15348.383	7.20
EVAPOTRANSPIRATION	33.479	121527.430	57.04
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	686.66
DRAINAGE COLLECTED FROM LAYER 5	418.2268	1518163.250	712.60
PERC./LEAKAGE THROUGH LAYER 6	5.665176	20564.588	9.65
AVG. HEAD ON TOP OF LAYER 6	0.2270		
DRAINAGE COLLECTED FROM LAYER 7	5.6652	20564.723	9.65
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.043	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0021		
CHANGE IN WATER STORAGE	0.091	330.786	0.16
SOIL WATER AT START OF YEAR	304.281	1104540.870	
SOIL WATER AT END OF YEAR	304.372	1104871.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.071	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.32	186291.578	100.00
RUNOFF	2.296	8333.973	4.47
EVAPOTRANSPIRATION	31.096	112878.195	60.59
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	785.27

DRAINAGE COLLECTED FROM LAYER 5	415.8581	1509564.870	810.32
PERC./LEAKAGE THROUGH LAYER 6	5.647503	20500.436	11.00
AVG. HEAD ON TOP OF LAYER 6	0.2236		
DRAINAGE COLLECTED FROM LAYER 7	5.6476	20500.639	11.00
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.043	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0021		
CHANGE IN WATER STORAGE	-0.577	-2095.824	-1.13
SOIL WATER AT START OF YEAR	304.372	1104871.620	
SOIL WATER AT END OF YEAR	303.795	1102775.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.247	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.97	163241.047	100.00
RUNOFF	0.795	2884.155	1.77
EVAPOTRANSPIRATION	31.300	113618.531	69.60
SUBSURFACE INFLOW INTO LAYER 2	404.104126	1466898.000	898.61
DRAINAGE COLLECTED FROM LAYER 5	413.8103	1502131.250	920.19
PERC./LEAKAGE THROUGH LAYER 6	5.522361	20046.170	12.28
AVG. HEAD ON TOP OF LAYER 6	0.1996		
DRAINAGE COLLECTED FROM LAYER 7	5.5224	20046.242	12.28
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.042	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0021		
CHANGE IN WATER STORAGE	-2.353	-8541.157	-5.23
SOIL WATER AT START OF YEAR	303.795	1102775.750	

SOIL WATER AT END OF YEAR	301.442	1094234.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.063	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	62.56	227092.766	100.00
RUNOFF	2.216	8045.543	3.54
EVAPOTRANSPIRATION	36.119	131113.453	57.74
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	644.18
DRAINAGE COLLECTED FROM LAYER 5	421.7930	1531108.750	674.22
PERC./LEAKAGE THROUGH LAYER 6	5.860175	21272.436	9.37
AVG. HEAD ON TOP OF LAYER 6	0.2600		
DRAINAGE COLLECTED FROM LAYER 7	5.8602	21272.400	9.37
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.044	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0022		
CHANGE IN WATER STORAGE	-0.429	-1557.439	-0.69
SOIL WATER AT START OF YEAR	301.442	1094234.620	
SOIL WATER AT END OF YEAR	301.013	1092677.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.141	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.32	215331.578	100.00
RUNOFF	1.760	6387.773	2.97
EVAPOTRANSPIRATION	34.752	126147.969	58.58
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	679.37
DRAINAGE COLLECTED FROM LAYER 5	417.3901	1515126.250	703.62
PERC./LEAKAGE THROUGH LAYER 6	5.678179	20611.791	9.57
AVG. HEAD ON TOP OF LAYER 6	0.2306		
DRAINAGE COLLECTED FROM LAYER 7	5.6781	20611.344	9.57
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.042	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0021		
CHANGE IN WATER STORAGE	2.740	9947.826	4.62
SOIL WATER AT START OF YEAR	301.013	1092677.250	
SOIL WATER AT END OF YEAR	303.753	1102625.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.507	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT
PRECIPITATION	54.32	197181.656	100.00
RUNOFF	3.135	11379.647	5.77
EVAPOTRANSPIRATION	32.392	117583.039	59.63
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	741.90
DRAINAGE COLLECTED FROM LAYER 5	415.7061	1509013.250	765.29
PERC./LEAKAGE THROUGH LAYER 6	6.225330	22597.947	11.46
AVG. HEAD ON TOP OF LAYER 6	0.3391		
DRAINAGE COLLECTED FROM LAYER 7	6.2253	22597.879	11.46

PERC./LEAKAGE THROUGH LAYER 9	0.000013	0.046	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0023		
CHANGE IN WATER STORAGE	-0.138	-502.050	-0.25
SOIL WATER AT START OF YEAR	303.753	1102625.000	
SOIL WATER AT END OF YEAR	303.615	1102123.000	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.142	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.29	178922.687	100.00
RUNOFF	0.939	3406.876	1.90
EVAPOTRANSPIRATION	29.695	107793.836	60.25
SUBSURFACE INFLOW INTO LAYER 2	404.104126	1466898.000	819.85
DRAINAGE COLLECTED FROM LAYER 5	417.8221	1516694.250	847.68
PERC./LEAKAGE THROUGH LAYER 6	5.546019	20132.047	11.25
AVG. HEAD ON TOP OF LAYER 6	0.2011		
DRAINAGE COLLECTED FROM LAYER 7	5.5461	20132.352	11.25
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.042	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0021		
CHANGE IN WATER STORAGE	-0.608	-2206.271	-1.23
SOIL WATER AT START OF YEAR	303.615	1102123.000	
SOIL WATER AT END OF YEAR	303.007	1099916.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.421	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	55.61	201864.328	100.00
RUNOFF	1.690	6135.767	3.04
EVAPOTRANSPIRATION	33.313	120926.594	59.90
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	724.69
DRAINAGE COLLECTED FROM LAYER 5	419.3636	1522289.870	754.12
PERC./LEAKAGE THROUGH LAYER 6	5.737448	20826.936	10.32
AVG. HEAD ON TOP OF LAYER 6	0.2387		
DRAINAGE COLLECTED FROM LAYER 7	5.7375	20826.979	10.32
PERC./LEAKAGE THROUGH LAYER 9	0.000012	0.043	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0022		
CHANGE IN WATER STORAGE	-1.495	-5425.503	-2.69
SOIL WATER AT START OF YEAR	303.007	1099916.750	
SOIL WATER AT END OF YEAR	301.513	1094491.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0002	0.598	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.57	172679.062	100.00
RUNOFF	1.518	5512.088	3.19
EVAPOTRANSPIRATION	33.452	121430.219	70.32

SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	847.17
DRAINAGE COLLECTED FROM LAYER 5	410.5146	1490167.870	862.97
PERC./LEAKAGE THROUGH LAYER 6	5.445775	19768.162	11.45
AVG. HEAD ON TOP OF LAYER 6	0.1892		
DRAINAGE COLLECTED FROM LAYER 7	5.4458	19768.088	11.45
PERC./LEAKAGE THROUGH LAYER 9	0.000011	0.042	0.00
AVG. HEAD ON TOP OF LAYER 8	0.0020		
CHANGE IN WATER STORAGE	-0.361	-1308.741	-0.76
SOIL WATER AT START OF YEAR	301.513	1094491.250	
SOIL WATER AT END OF YEAR	301.152	1093182.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.405	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.03	3.37	3.01	3.71	4.10	5.78
	7.51	7.10	7.11	3.41	1.53	3.44
STD. DEVIATIONS	1.25	1.37	2.16	2.31	2.70	2.21
	2.02	2.53	2.58	1.93	1.27	1.94
RUNOFF						
TOTALS	0.011	0.049	0.091	0.100	0.378	0.188
	0.174	0.391	0.375	0.045	0.004	0.160
STD. DEVIATIONS	0.018	0.115	0.174	0.151	0.980	0.213
	0.203	0.486	0.558	0.052	0.013	0.278
EVAPOTRANSPIRATION						
TOTALS	1.954	2.291	2.025	2.077	2.357	3.778
	4.657	4.325	4.039	2.345	1.033	1.480

STD. DEVIATIONS	0.616	0.367	0.950	1.119	1.087	1.525
	0.931	1.168	0.410	0.616	0.570	0.577

SUBSURFACE INFLOW INTO LAYER 2

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 5

TOTALS	35.3100	32.0832	34.8541	33.8908	34.9632	34.3041
	35.4380	36.2508	34.9317	36.0481	34.2153	34.2785
STD. DEVIATIONS	1.2164	0.7301	0.7094	1.3583	1.0872	1.3281
	0.9803	1.0457	1.1503	1.4273	1.2112	0.5936

PERCOLATION/LEAKAGE THROUGH LAYER 6

TOTALS	0.4583	0.4176	0.4580	0.4563	0.4815	0.4804
	0.5337	0.5042	0.5452	0.4757	0.4452	0.4695
STD. DEVIATIONS	0.0140	0.0152	0.0230	0.0350	0.0564	0.0451
	0.1204	0.0484	0.2183	0.0268	0.0268	0.0479

LATERAL DRAINAGE COLLECTED FROM LAYER 7

TOTALS	0.4582	0.4177	0.4581	0.4560	0.4816	0.4802
	0.5340	0.5041	0.5449	0.4761	0.4449	0.4699
STD. DEVIATIONS	0.0139	0.0151	0.0231	0.0343	0.0570	0.0452
	0.1203	0.0483	0.2171	0.0274	0.0266	0.0487

PERCOLATION/LEAKAGE THROUGH LAYER 9

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 6

AVERAGES	0.1745	0.1781	0.1792	0.2092	0.2327	0.2624
	0.3477	0.2725	0.4090	0.2073	0.1777	0.2136
STD. DEVIATIONS	0.0323	0.0319	0.0502	0.0715	0.1253	0.1021
	0.2721	0.1081	0.5173	0.0565	0.0523	0.1069

DAILY AVERAGE HEAD ON TOP OF LAYER 8

AVERAGES	0.0020	0.0020	0.0020	0.0021	0.0021	0.0022
	0.0024	0.0022	0.0025	0.0021	0.0020	0.0021

STD. DEVIATIONS	0.0001	0.0001	0.0001	0.0002	0.0003	0.0002
	0.0005	0.0002	0.0010	0.0001	0.0001	0.0002

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.08	(5.930)	192694.9	100.00
RUNOFF	1.965	(1.0645)	7133.20	3.702
EVAPOTRANSPIRATION	32.360	(2.4048)	117465.50	60.959
SUBSURFACE INFLOW INTO LAYER 2	403.00003		1462890.120	759.17426
LATERAL DRAINAGE COLLECTED FROM LAYER 5	416.56781	(3.12685)	1512141.120	784.73334
PERCOLATION/LEAKAGE THROUGH LAYER 6	5.72568	(0.22926)	20784.217	10.78607
AVERAGE HEAD ON TOP OF LAYER 6	0.239	(0.045)		
LATERAL DRAINAGE COLLECTED FROM LAYER 7	5.72568	(0.22927)	20784.225	10.78608
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.00001	(0.00000)	0.043	0.00002
AVERAGE HEAD ON TOP OF LAYER 8	0.002	(0.000)		
CHANGE IN WATER STORAGE	-0.313	(1.3056)	-1137.69	-0.590

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)
PRECIPITATION	4.47	16226.100
RUNOFF	2.196	7972.9204
DRAINAGE COLLECTED FROM LAYER 5	1.46490	5317.57129
PERCOLATION/LEAKAGE THROUGH LAYER 6	0.119779	434.79800
AVERAGE HEAD ON TOP OF LAYER 6	7.517	
MAXIMUM HEAD ON TOP OF LAYER 6	9.999	
LOCATION OF MAXIMUM HEAD IN LAYER 5 (DISTANCE FROM DRAIN)	50.3 FEET	
DRAINAGE COLLECTED FROM LAYER 7	0.11028	400.31635
PERCOLATION/LEAKAGE THROUGH LAYER 9	0.000000	0.00068
AVERAGE HEAD ON TOP OF LAYER 8	0.015	
MAXIMUM HEAD ON TOP OF LAYER 8	0.030	
LOCATION OF MAXIMUM HEAD IN LAYER 7 (DISTANCE FROM DRAIN)	2.1 FEET	
SNOW WATER	0.19	690.8433

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.4630
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1160

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	2.3018	0.1918
2	3.1991	0.1066
3	285.0148	0.4318
4	7.6507	0.3188
5	0.1301	0.6503
6	0.0000	0.0000
7	0.0037	0.0183
8	0.0000	0.0000
9	2.8500	0.4750
SNOW WATER	0.000	

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HELP MODEL RESULTS

FOR

SECOND CONSTRUCTION INCREMENT

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**                                                                          **
 *                                                                          **
**             HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE                **
**               HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                 **
**                 DEVELOPED BY ENVIRONMENTAL LABORATORY                    **
**                   USAE WATERWAYS EXPERIMENT STATION                      **
**            FOR USEPA RISK REDUCTION ENGINEERING LABORATORY               **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:     C:\HELP3~1.07\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3~1.07\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3~1.07\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3~1.07\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3~1.07\DATA10.D10
OUTPUT DATA FILE:            C:\HELP3~1.07\RECIRC.OUT


TIME:  10: 1     DATE:   9/17/2002


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     TITLE:  TRAIL RIDGE LANDFILL LEACHATE RECIRCULATION - SECOND INCR.

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
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                       TYPE 1 - VERTICAL PERCOLATION LAYER
                           MATERIAL TEXTURE NUMBER   8
          THICKNESS                    =      12.00   INCHES
          POROSITY                     =       0.4630 VOL/VOL
          FIELD CAPACITY               =       0.2320 VOL/VOL
          WILTING POINT                =       0.1160 VOL/VOL
          INITIAL SOIL WATER CONTENT   =       0.1923 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.369999994000E-03 CM/SEC


                                  LAYER  2
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TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 21

THICKNESS	=	30.00	INCHES
POROSITY	=	0.3970	VOL/VOL
FIELD CAPACITY	=	0.0320	VOL/VOL
WILTING POINT	=	0.0130	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1070	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.300000012000	CM/SEC
SUBSURFACE INFLOW	=	403.00	INCHES/YR

LAYER 3

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 18

THICKNESS	=	660.00	INCHES
POROSITY	=	0.6710	VOL/VOL
FIELD CAPACITY	=	0.2920	VOL/VOL
WILTING POINT	=	0.0770	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4364	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 5

THICKNESS	=	24.00	INCHES
POROSITY	=	0.4570	VOL/VOL
FIELD CAPACITY	=	0.1310	VOL/VOL
WILTING POINT	=	0.0580	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3228	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.100000005000E-02	CM/SEC

LAYER 5

TYPE 2 - LATERAL DRAINAGE LAYER
MATERIAL TEXTURE NUMBER 20

THICKNESS	=	0.20	INCHES
POROSITY	=	0.8500	VOL/VOL
FIELD CAPACITY	=	0.0100	VOL/VOL
WILTING POINT	=	0.0050	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.7595	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	10.0000000000	CM/SEC
SLOPE	=	1.93	PERCENT
DRAINAGE LENGTH	=	150.0	FEET

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                              LAYER  6
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                  TYPE 4 - FLEXIBLE MEMBRANE LINER
                    MATERIAL TEXTURE NUMBER  35
THICKNESS                    =       0.06    INCHES
POROSITY                     =       0.0000 VOL/VOL
FIELD CAPACITY               =       0.0000 VOL/VOL
WILTING POINT                =       0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =       0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY          =       1.00    HOLES/ACRE
FML INSTALLATION DEFECTS     =       1.00    HOLES/ACRE
FML PLACEMENT QUALITY        =   2 - EXCELLENT


                              LAYER  7
                              --------

                    TYPE 3 - BARRIER SOIL LINER
                    MATERIAL TEXTURE NUMBER  17
THICKNESS                    =       0.17    INCHES
POROSITY                     =       0.7500 VOL/VOL
FIELD CAPACITY               =       0.7470 VOL/VOL
WILTING POINT                =       0.4000 VOL/VOL
INITIAL SOIL WATER CONTENT   =       0.7500 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   0.300000003000E-08 CM/SEC


                              LAYER  8
                              --------

                  TYPE 2 - LATERAL DRAINAGE LAYER
                    MATERIAL TEXTURE NUMBER  20
THICKNESS                    =       0.20    INCHES
POROSITY                     =       0.8500 VOL/VOL
FIELD CAPACITY               =       0.0100 VOL/VOL
WILTING POINT                =       0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =       0.0100 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =    10.0000000000       CM/SEC
SLOPE                        =       1.93    PERCENT
DRAINAGE LENGTH              =     150.0     FEET


                              LAYER  9
                              --------

                  TYPE 4 - FLEXIBLE MEMBRANE LINER
                    MATERIAL TEXTURE NUMBER  35
THICKNESS                    =       0.06    INCHES
POROSITY                     =       0.0000 VOL/VOL
FIELD CAPACITY               =       0.0000 VOL/VOL
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WILTING POINT                   =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT      =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.       =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY             =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS        =      1.00   HOLES/ACRE
FML PLACEMENT QUALITY           =  2 - EXCELLENT
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                      LAYER 10
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             TYPE 3 - BARRIER SOIL LINER
             MATERIAL TEXTURE NUMBER  15
THICKNESS                       =      6.00   INCHES
POROSITY                        =      0.4750 VOL/VOL
FIELD CAPACITY                  =      0.3780 VOL/VOL
WILTING POINT                   =      0.2650 VOL/VOL
INITIAL SOIL WATER CONTENT      =      0.4750 VOL/VOL
EFFECTIVE SAT. HYD. COND.       =  0.170000003000E-04 CM/SEC
```

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          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

NOTE:  SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER              =    80.00
FRACTION OF AREA ALLOWING RUNOFF     =   100.0     PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =     1.000   ACRES
EVAPORATIVE ZONE DEPTH               =     6.0     INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =     0.696   INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =     2.778   INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE   =     0.696   INCHES
INITIAL SNOW WATER                   =     0.000   INCHES
INITIAL WATER IN LAYER MATERIALS     =   304.412   INCHES
TOTAL INITIAL WATER                  =   304.412   INCHES
TOTAL SUBSURFACE INFLOW              =   403.00    INCHES/YEAR
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          EVAPOTRANSPIRATION AND WEATHER DATA
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NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
         JACKSONVILLE          FLORIDA

    STATION LATITUDE                         =  30.50 DEGREES
    MAXIMUM LEAF AREA INDEX                  =   0.00
    START OF GROWING SEASON (JULIAN DATE)    =     0
    END OF GROWING SEASON (JULIAN DATE)      =   367
    EVAPORATIVE ZONE DEPTH                   =   6.0  INCHES
    AVERAGE ANNUAL WIND SPEED                =   8.20 MPH
    AVERAGE 1ST QUARTER RELATIVE HUMIDITY    =  73.00 %
    AVERAGE 2ND QUARTER RELATIVE HUMIDITY    =  72.00 %
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AVERAGE 3RD QUARTER RELATIVE HUMIDITY = 79.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY = 78.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR JACKSONVILLE FLORIDA

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
3.07	3.48	3.72	3.32	4.91	5.37
6.54	7.15	7.26	3.41	1.94	2.59

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR JACKSONVILLE FLORIDA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
53.20	55.10	61.30	67.70	74.10	79.00
81.30	81.00	78.20	69.50	60.80	54.80

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR JACKSONVILLE FLORIDA AND STATION LATITUDE = 30.50 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.19	171299.687	100.00
RUNOFF	1.074	3897.755	2.28
EVAPOTRANSPIRATION	27.999	101635.648	59.33
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	853.99
DRAINAGE COLLECTED FROM LAYER 5	421.1226	1528675.000	892.40
PERC./LEAKAGE THROUGH LAYER 7	0.000024	0.089	0.00
AVG. HEAD ON TOP OF LAYER 6	0.4816		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.085	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00

AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.005	-18.500	-0.01
SOIL WATER AT START OF YEAR	304.412	1105014.870	
SOIL WATER AT END OF YEAR	304.407	1104996.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.225	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	58.69	213044.672	100.00
RUNOFF	4.228	15348.383	7.20
EVAPOTRANSPIRATION	33.479	121527.430	57.04
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	686.66
DRAINAGE COLLECTED FROM LAYER 5	423.8918	1538727.370	722.26
PERC./LEAKAGE THROUGH LAYER 7	0.000012	0.045	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2602		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.041	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	0.091	330.896	0.16
SOIL WATER AT START OF YEAR	304.407	1104996.370	
SOIL WATER AT END OF YEAR	304.498	1105327.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0002	0.590	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	51.32	186291.578	100.00
RUNOFF	2.296	8333.973	4.47
EVAPOTRANSPIRATION	31.096	112878.195	60.59
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	785.27
DRAINAGE COLLECTED FROM LAYER 5	421.5055	1530065.000	821.33
PERC./LEAKAGE THROUGH LAYER 7	0.000012	0.042	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2451		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.038	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.577	-2095.935	-1.13
SOIL WATER AT START OF YEAR	304.498	1105327.250	
SOIL WATER AT END OF YEAR	303.920	1103231.250	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.330	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	44.97	163241.047	100.00
RUNOFF	0.795	2884.155	1.77
EVAPOTRANSPIRATION	31.300	113618.531	69.60
SUBSURFACE INFLOW INTO LAYER 2	404.104126	1466898.000	898.61
DRAINAGE COLLECTED FROM LAYER 5	419.3327	1522177.750	932.47

PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.037	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2175		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.033	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-2.353	-8541.157	-5.23
SOIL WATER AT START OF YEAR	303.920	1103231.250	
SOIL WATER AT END OF YEAR	301.568	1094690.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0001	-0.238	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	62.56	227092.766	100.00
RUNOFF	2.216	8045.543	3.54
EVAPOTRANSPIRATION	36.119	131113.453	57.74
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	644.18
DRAINAGE COLLECTED FROM LAYER 5	427.6531	1552380.870	683.59
PERC./LEAKAGE THROUGH LAYER 7	0.000014	0.052	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2988		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.049	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.429	-1557.328	-0.69
SOIL WATER AT START OF YEAR	301.568	1094690.120	
SOIL WATER AT END OF YEAR	301.139	1093132.870	

SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.233	0.00

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ANNUAL TOTALS FOR YEAR 6

	INCHES	CU. FEET	PERCENT
PRECIPITATION	59.32	215331.578	100.00
RUNOFF	1.760	6387.773	2.97
EVAPOTRANSPIRATION	34.752	126147.969	58.58
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	679.37
DRAINAGE COLLECTED FROM LAYER 5	423.0682	1535737.750	713.20
PERC./LEAKAGE THROUGH LAYER 7	0.000012	0.042	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2483		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.039	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	2.740	9947.826	4.62
SOIL WATER AT START OF YEAR	301.139	1093132.870	
SOIL WATER AT END OF YEAR	303.879	1103080.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0001	0.346	0.00

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ANNUAL TOTALS FOR YEAR 7

	INCHES	CU. FEET	PERCENT

PRECIPITATION	54.32	197181.656	100.00
RUNOFF	3.135	11379.647	5.77
EVAPOTRANSPIRATION	32.392	117583.039	59.63
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	741.90
DRAINAGE COLLECTED FROM LAYER 5	421.9314	1531611.000	776.75
PERC./LEAKAGE THROUGH LAYER 7	0.000032	0.117	0.00
AVG. HEAD ON TOP OF LAYER 6	0.6269		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.113	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.138	-502.050	-0.25
SOIL WATER AT START OF YEAR	303.879	1103080.620	
SOIL WATER AT END OF YEAR	303.741	1102578.620	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.007	0.00

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ANNUAL TOTALS FOR YEAR 8

	INCHES	CU. FEET	PERCENT
PRECIPITATION	49.29	178922.687	100.00
RUNOFF	0.939	3406.876	1.90
EVAPOTRANSPIRATION	29.695	107793.836	60.25
SUBSURFACE INFLOW INTO LAYER 2	404.104126	1466898.000	819.85
DRAINAGE COLLECTED FROM LAYER 5	423.3683	1536827.000	858.93
PERC./LEAKAGE THROUGH LAYER 7	0.000010	0.037	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2206		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.034	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00

AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.608	-2206.271	-1.23
SOIL WATER AT START OF YEAR	303.741	1102578.620	
SOIL WATER AT END OF YEAR	303.133	1100372.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	-0.0002	-0.783	0.00

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ANNUAL TOTALS FOR YEAR 9

	INCHES	CU. FEET	PERCENT
PRECIPITATION	55.61	201864.328	100.00
RUNOFF	1.690	6135.767	3.04
EVAPOTRANSPIRATION	33.313	120926.594	59.90
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	724.69
DRAINAGE COLLECTED FROM LAYER 5	425.1013	1543117.750	764.43
PERC./LEAKAGE THROUGH LAYER 7	0.000013	0.046	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2681		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.043	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-1.495	-5425.614	-2.69
SOIL WATER AT START OF YEAR	303.133	1100372.370	
SOIL WATER AT END OF YEAR	301.638	1094946.750	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.172	0.00

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ANNUAL TOTALS FOR YEAR 10

	INCHES	CU. FEET	PERCENT
PRECIPITATION	47.57	172679.062	100.00
RUNOFF	1.518	5512.088	3.19
EVAPOTRANSPIRATION	33.452	121430.219	70.32
SUBSURFACE INFLOW INTO LAYER 2	403.000031	1462890.120	847.17
DRAINAGE COLLECTED FROM LAYER 5	415.9602	1509935.500	874.42
PERC./LEAKAGE THROUGH LAYER 7	0.000009	0.033	0.00
AVG. HEAD ON TOP OF LAYER 6	0.2009		
DRAINAGE COLLECTED FROM LAYER 8	0.0000	0.030	0.00
PERC./LEAKAGE THROUGH LAYER 10	0.000001	0.004	0.00
AVG. HEAD ON TOP OF LAYER 9	0.0000		
CHANGE IN WATER STORAGE	-0.361	-1308.630	-0.76
SOIL WATER AT START OF YEAR	301.638	1094946.750	
SOIL WATER AT END OF YEAR	301.278	1093638.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.123	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 10

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	3.03	3.37	3.01	3.71	4.10	5.78
	7.51	7.10	7.11	3.41	1.53	3.44

STD. DEVIATIONS	1.25	1.37	2.16	2.31	2.70	2.21
	2.02	2.53	2.58	1.93	1.27	1.94

RUNOFF

TOTALS	0.011	0.049	0.091	0.100	0.378	0.188
	0.174	0.391	0.375	0.045	0.004	0.160
STD. DEVIATIONS	0.018	0.115	0.174	0.151	0.980	0.213
	0.203	0.486	0.558	0.052	0.013	0.278

EVAPOTRANSPIRATION

TOTALS	1.954	2.291	2.025	2.077	2.357	3.778
	4.657	4.325	4.039	2.345	1.033	1.480
STD. DEVIATIONS	0.616	0.367	0.950	1.119	1.087	1.525
	0.931	1.168	0.410	0.616	0.570	0.577

SUBSURFACE INFLOW INTO LAYER 2

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 5

TOTALS	35.7683	32.5009	35.3121	34.3470	35.4447	34.7832
	35.9730	36.7550	35.4206	36.5802	34.6584	34.7501
STD. DEVIATIONS	1.2194	0.7391	0.7234	1.3905	1.1234	1.3490
	1.0511	1.0696	1.1525	1.5800	1.2352	0.6327

PERCOLATION/LEAKAGE THROUGH LAYER 7

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

LATERAL DRAINAGE COLLECTED FROM LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION/LEAKAGE THROUGH LAYER 10

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 6

AVERAGES	0.1833	0.1826	0.1905	0.2326	0.2535	0.3025
	0.6016	0.3182	0.5581	0.4358	0.1868	0.2361
STD. DEVIATIONS	0.0471	0.0373	0.0692	0.1034	0.1546	0.1400
	0.9447	0.1536	0.8819	0.6920	0.0684	0.1443

DAILY AVERAGE HEAD ON TOP OF LAYER 9

AVERAGES	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 10

	INCHES		CU. FEET	PERCENT
PRECIPITATION	53.08	(5.930)	192694.9	100.00
RUNOFF	1.965	(1.0645)	7133.20	3.702
EVAPOTRANSPIRATION	32.360	(2.4048)	117465.50	60.959
SUBSURFACE INFLOW INTO LAYER 2	403.00003		1462890.120	759.17426
LATERAL DRAINAGE COLLECTED FROM LAYER 5	422.29352	(3.19851)	1532925.500	795.51947
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.00001	(0.00001)	0.054	0.00003
AVERAGE HEAD ON TOP OF LAYER 6	0.307	(0.138)		
LATERAL DRAINAGE COLLECTED FROM LAYER 8	0.00001	(0.00001)	0.050	0.00003
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.00000	(0.00000)	0.004	0.00000
AVERAGE HEAD ON TOP OF LAYER 9	0.000	(0.000)		
CHANGE IN WATER STORAGE	-0.313	(1.3056)	-1137.68	-0.590

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 10

	(INCHES)	(CU. FT.)
PRECIPITATION	4.47	16226.100
RUNOFF	2.196	7972.9204
DRAINAGE COLLECTED FROM LAYER 5	1.47940	5370.21924
PERCOLATION/LEAKAGE THROUGH LAYER 7	0.000001	0.00494
AVERAGE HEAD ON TOP OF LAYER 6	9.140	
MAXIMUM HEAD ON TOP OF LAYER 6	11.749	
LOCATION OF MAXIMUM HEAD IN LAYER 5 (DISTANCE FROM DRAIN)	54.5 FEET	
DRAINAGE COLLECTED FROM LAYER 8	0.00000	0.00493
PERCOLATION/LEAKAGE THROUGH LAYER 10	0.000000	0.00001
AVERAGE HEAD ON TOP OF LAYER 9	0.000	
MAXIMUM HEAD ON TOP OF LAYER 9	0.026	
LOCATION OF MAXIMUM HEAD IN LAYER 8 (DISTANCE FROM DRAIN)	0.0 FEET	
SNOW WATER	0.19	690.8433

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4630

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1160

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 10

LAYER	(INCHES)	(VOL/VOL)
1	2.3018	0.1918
2	3.1991	0.1066
3	285.0148	0.4318
4	7.6507	0.3188
5	0.1317	0.6585
6	0.0000	0.0000
7	0.1275	0.7500
8	0.0020	0.0100
9	0.0000	0.0000
10	2.8500	0.4750
SNOW WATER	0.000	

****
****

H

APPENDIX H

WASTE TIRE PROCESSING

Department of Environmental Protection

FLORIDA

DEP Form # 62-701.900(23)
Form Title Waste Tire Processing Facility Permit Application
Effective Date 12/23/96
DEP Application No. ____________ (Filled in by DEP)

Waste Tire Processing Facility Permit Application

Permit No. 0013493-002-SC Renewal ☒ Modification ☐ Existing unpermitted facility ☐ Proposed new facility ☐

Part I-General Information:

A. **Applicant Information:**

1. Applicant Name: Trail Ridge Landfill, Inc.
2. Applicant Street Address 5110 U.S. Highway 301
3. City Baldwin County Duval Zip 32234
4. Applicant Mailing Address 5110 U.S. Highway 301
5. City Baldwin County Duval Zip 32234
6. Contact person Greg Mathes Phone(904) 289-9100
7. Have any enforcement actions been taken by the Department against the applicant relating to the operation of any solid waste management facility in this state? This includes any Complaint, Notice of Violation, or revocation of a permit or registration, as well as any Consent Order in which a violation of Department rules is admitted. It does not include a Warning Letter, Warning Notice, Notice of Noncompliance, or other similar document which does not constitute agency action. Yes ____ No X
If yes, attach a history and description of the enforcement actions.

B. **Facility Information:**

1. Facility Name Trail Ridge Landfill
2. Facility Street Address (Main Entrance) 5110 U.S. Highway 301
3. City Baldwin County Duval Zip 32234
4. Facility Mailing Address Same as above
5. City ____ State ____ Zip ____
6. Contact Person Greg Mathes Phone(904) 289-9100

Facility Location Coordinates

7. Section 18, 19, 20, 21 Township 35 Range 23E
8. Latitude 30° 14' 00" Longitude 82° 02' 30"
9. Anticipated date for starting construction Existing and for completion of construction Existing
10. Anticipated date for receipt of tires On-Going and for start of processing On-Going

Mail completed form to
appropriate district office listed below

Northwest District	Northeast District	Central District	Southwest District	South District	Southeast District
160 Governmental Center	7825 Baymeadows Way, Ste. B200	3319 Maguire Blvd., Ste. 232	3804 Coconut Palm Dr.	2295 Victoria Ave., Ste. 364	400 North Congress Ave.
Pensacola, FL 32501-5794	Jacksonville, FL 32256-7590	Orlando, FL 32803-3767	Tampa, FL 33619	Fort Myers, FL 33901-3881	West Palm Beach, FL 33401
904-444-8360	904-448-4300	407-894-7555	813-744-6100	941-332-6975	561-681-6600

C. **Land Owner information** (if different from applicant):

1. Owner's name City of Jacksonville c/o Department of Solid Waste and Resource Management
2. Land owner's mailing address 140 W. Monroe Street, Suite 200
3. City Jacksonville State Florida Zip 32202
4. Authorized Agent: Chris Pearson Agent's phone(904) 630-4593
5. Current lease expires N/A

D. **Facility Operator Information** (if different from applicant):

1. Operator's name Same as Applicant
2. Operator's mailing address ______
3. City ______ State ______ Zip ______
4. Contact person ______ Phone( )

E. **Preparer of Application:**

1. Name of person preparing application: Juanitta Bader Clem, P.E.
2. Mailing address 14775 St. Augustine Road
3. City Jacksonville State Florida Zip 32258
4. Phone(904) 642-8990
5. Affiliation with facility: Consulting Engineer

Part II-Operations:

A. **Facility type (check appropriate box):**

☐ Waste tire processing facility.

☐ Waste tire processing facility with on-site disposal of processed tires or processing residuals. See Attachment ______

☐ Waste tire processing facility with on-site consumption of waste tires or processing residuals. See attachment F

☒ Permitted solid waste management facility ~~modification to allow~~ including waste tire site and processing.

B. **Type of processing facility (check as many as apply):**

☒ Shredder ☐ Cutter ☐ Chopper ☐ Incinerator only ☐ Incinerator with energy recovery ☐ Pyrolysis

☐ Supplemental fuel user ☐ Other, explain ______

C. **Storage:** Indicate the maximum quantities of whole waste tires, processed waste tires, and processing residuals, expressed in tons, to be stored at the facility, in accordance with Rule 62-711.530(2), F.A.C.

	Outdoor Storage (tons)	Outdoor Storage (sq. ft.)	Indoor Storage (tons)	Indoor Storage (Sq. ft.)	Total Storage (tons)
Whole waste tires:	3,900				3,900
Processed tires:					
Processing residuals:					
TOTALS:	3,900				3,900

DEP005490

D. For reporting quantity of tires in tons, tires will be weighed on site ☒ weighed off site ☐ weights will be calculated ☐

E. Facilities that will not be disposing of processed tires or processing residual on the facility site must indicate the permitted solid waste management facility where processed tires or residuals will be disposed.

1. Name of facility N/A. Disposal is provided on site.
2. Street address ________
3. City ________ County ________ Zip ________

F. Facilities that will be delivering processed tires to consuming facilities must describe the existing or proposed markets for those processed tires.

If recycling becomes available, the tires will be recycled.

Part III-Attachments:

A. Facility design The Facility is existing and there are no proposed changes.

NOTE: All maps, plan sheets, drawings, isometrics, cross sections, or aerial photographs shall be legible; be signed and sealed by a registered professional engineer responsible for their preparation; be of appropriate scale to show clearly all required details; be numbered, referenced to narrative, titled, have a legend of symbols used, contain horizontal and vertical scales (where applicable), and specify drafting or origination dates; and use uniform scales as much as possible, contain a north arrow and use NGVD for all elevations.

1. A topographic or section map of the facility, including the surrounding area for one mile, no more than one year old, showing land use and zoning within one mile of the facility.
2. A plot plan of the facility on a scale of not less than one inch equals 200 feet. At a minimum, the plot plan shall include:
   a. The facility design, including the location and size of all storage and processing areas for used tires, unprocessed waste tires, processed waste tires, and waste tire processing residuals;
   b. All wetlands and water bodies within the facility or within 200 feet of any storage area;
   c. Stormwater control measures, including ditches, dikes, and other structures;
   d. Boundaries of the facility, legal boundaries of the land containing the facility, and any easements or rights of way that are within the facility or within 200 feet of any storage area;
   e. Location, size, and depth of all wells within the facility or within 200 feet of any storage area;
   f. All structures and buildings that are, or will be, constructed at the facility; include those used in storage and processing operations;
   g. All areas used for loading and unloading;
   h. All access roads and internal roads, including fire lanes;
   i. Location of all fences, gates, and other access control measures; and
   j. Location of all disposal areas within the facility.

B. Facility operation. The Facility is existing and there are no proposed changes - see the Operation Plan.

1. A description of the facility's operation, process and products including how waste tires will be received and stored.
2. A description of the equipment used for processing tires. This description shall include the make, model, and hourly capacity of each piece of equipment.
3. Description of the waste from the process, the amount of waste expected and how and where this waste will be disposed of.
4. Statement of the maximum daily throughput and the planned daily and annual throughput.
5. A description of how the operator will maintain compliance with each of the storage requirements of Rule 62-711.540, F.A.C.
6. A copy of the emergency preparedness manual for the facility with a statement of the on site and off site locations where that manual will be maintained.
7. A copy of the fire safety survey.
8. A description of how 75% of the annual accumulation of waste tires will be removed for disposal or recycling.

C. Completed closing plan for the facility as required by Rule 62-711.700(2) and (3), F.A.C.

D. Attach proof of financial responsibility as requirement by Rule 62-711.500(3) OR a calculation showing that financial assurance documents, currently on file with the Department, are sufficient to assure closing of the waste tire site as well as any other solid waste management facility at that location.

E. A letter from the land owner (if different from applicant) authorizing use of the land as a waste tire processing facility.

F. If waste tires will be consumed at the facility, attach a description of the other environmental permits that the applicant has for this use, including, permit number, date of issue, and name of issuing agency.

G. The permit fee as required in Rule 62-4, F.A.C.

Part IV-Certification:

A. Applicant:

The undersigned applicant or authorized representative of Trail Ridge Landfill, Inc. is aware that statements made in this form and attached information are an application for a waste tire processing Permit from the Florida Department of Environmental Protection and certifies that the information in this application is true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Department will be notified prior to the sale or legal transfer of the facility.

Signature of Applicant or Authorized Agent	Charles Compagna, Vice President Name and Title	9/12/02 Date

B. Professional Engineer registered in Florida.

This is to certify that the engineering features of this waste tire processing facility have been designed/examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgment, this facility, when properly maintained and operated will comply with all applicable statues of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions for proper maintenance and operation of the facility.

Juanitta Bader Clem Signature	14775 St. Augustine Rd. Mailing Address
Juanitta Bader Clem, P.E. Name and Title	Jacksonville, FL 32258 City, State, Zip
43245 Florida Registration Number	(904) 642-8990 Telephone number

9/25/02
Date

(please affix seal)

DEP005492

TRAIL RIDGE LANDFILL
WASTE TIRE PROCESSING FACILITY

1. Introduction

Trail Ridge Landfill, Inc. intends to continue operation of a waste tire processing facility in accordance with the requirements of Rule 62-711.530, F.A.C. within the property boundaries of Trail Ridge Landfill, a solid waste management facility.

2. Design

The waste tire processing facility is located south of the non-contract drop off area and east of the operations building. A site plan for this area is provided in Exhibit A. In compliance with Rule 17-711.540(2) (a), F.A.C., the facility is designed with a stormwater management system (since it is located within 200 feet of wetlands). The stormwater control methods meet the stormwater requirements of Rule 62-25, F.A.C. and help maintain water quality standards specified in Chapters 62-302 and 62-520, F.A.C. The stormwater management system for the waste tire processing facility is incorporated into the stormwater management facility for the ancillary facility.

The facility is paved with asphalt and graded away from the wetlands toward a ditch, which drains to the ancillary facility stormwater pond. A twelve-inch concrete header curb was constructed at the southeast corner to prevent discharge to the adjacent wetlands. This curb also prevents liquid runoff from a potential fire from entering the wetlands.

3. Operations and Maintenance

The waste tires brought into the landfill site will be either homogenous loads or incidental to the solid waste loads. Those loads containing strictly waste tires will be directed to the waste tire processing facility and unloaded. Those tires discovered during unloading at the landfill active face will be picked out and taken to the waste tire storage area.

The tires will be stored in accordance with Rule 62-711.540, F.A.C. The storage will be limited to 60 times the daily through-put of the processing equipment. At least 75 percent of both the waste tires and processed tires that are delivered to or are contained on the site at the beginning of each calendar year will be processed and disposed of on site or transported off-site to a permitted facility for recycling/disposal.

The waste tire storage facility will be operated and maintained in accordance with Rule 62-711.540, F.A.C. The site was constructed and will be operated and maintained to divert stormwater or floodwaters around and away from the storage piles.

Each storage pile will be no wider than 50 feet with an area no greater than 10,000 square feet and a height no greater than 10 feet. A 50-foot wide fire lane will be maintained around the perimeters of each waste tire pile. Access to the fire lane for emergency vehicles will be unobstructed at all times. Mosquitos and rodent will be controlled in a manner to protect the public health and welfare.

An attendant will be present at the waste tire site to observe the unloading of waste tires to ensure mixed loads are not deposited. The processed tires will be disposed or recycled at the Class I permitted landfill. The processed tires will meet the size requirements specified under Rule 62-711.400(3) (b), F.A.C., (the tire will be cut into at least eight substantially equal pieces for purposes of disposal).

A mobile tire shredder will be utilized to process the tires at Trail Ridge Landfill on a quarterly basis or the tires will be transported off-site to a permitted facility for disposal or if economically feasible, transported off-site to a recycling facility.

4. Access, Signs and Security

The waste tire processing facility is accessed off the main access road to the landfill. The access is beyond the scale house through the citizens' drop-off area. The access road will be kept passable for any type of motor vehicle at all times.

Signs are posted at the entrance to the solid waste management facility stating operating hours, costs of disposal, and site rules.

The property boundaries of the solid waste management facility which encompasses the waste tire processing facility are fully fenced with a locking gate at the entrance and exit to prevent unauthorized access to the site.

5. Record Keeping

Records will be maintained of the quantity of waste tires and processed tires received at the site, stored at the site, and shipped from the site. Records will also be maintained of the name and waste tire collector registration number of all waste tire collectors who deliver waste tires to the facility, and the quantity of waste tires received from that collector; and if more than five waste tires are delivered by a person who is not a waste tire collector, the number of tires delivered and the person's name, address and telephone number.

Quarterly reports will be submitted to the Department by the 20th of the month following the close of each calendar quarter on Form 17-711.900(4). The information required by Rules 17-711.530(4) (b) and (5), F.A.C. will be included in the report.

6. Fire Protection

The tire site will be kept free of grass, underbrush, and other potentially flammable vegetation. Fire protection for the site will be assured through notification to local fire protection authorities. A fire safety survey will be conducted at least annually and the survey report will be made a part of the next quarterly report.

Communication equipment will be maintained at the site to assure the site personnel can contact local fire protection authorities in case of fire. Fire extinguishers will be conveniently assessable to the tire pile. No operation utilizing an open flame will be conducted within 25 feet of the waste tire site.

7. Emergency Preparedness Manual

An Emergency Preparedness Manual is attached as Exhibit B. A copy of the manual will be maintained at a designated off-site location. This manual will be updated at least once a year and upon changes in operation of the facility.

8. Closure

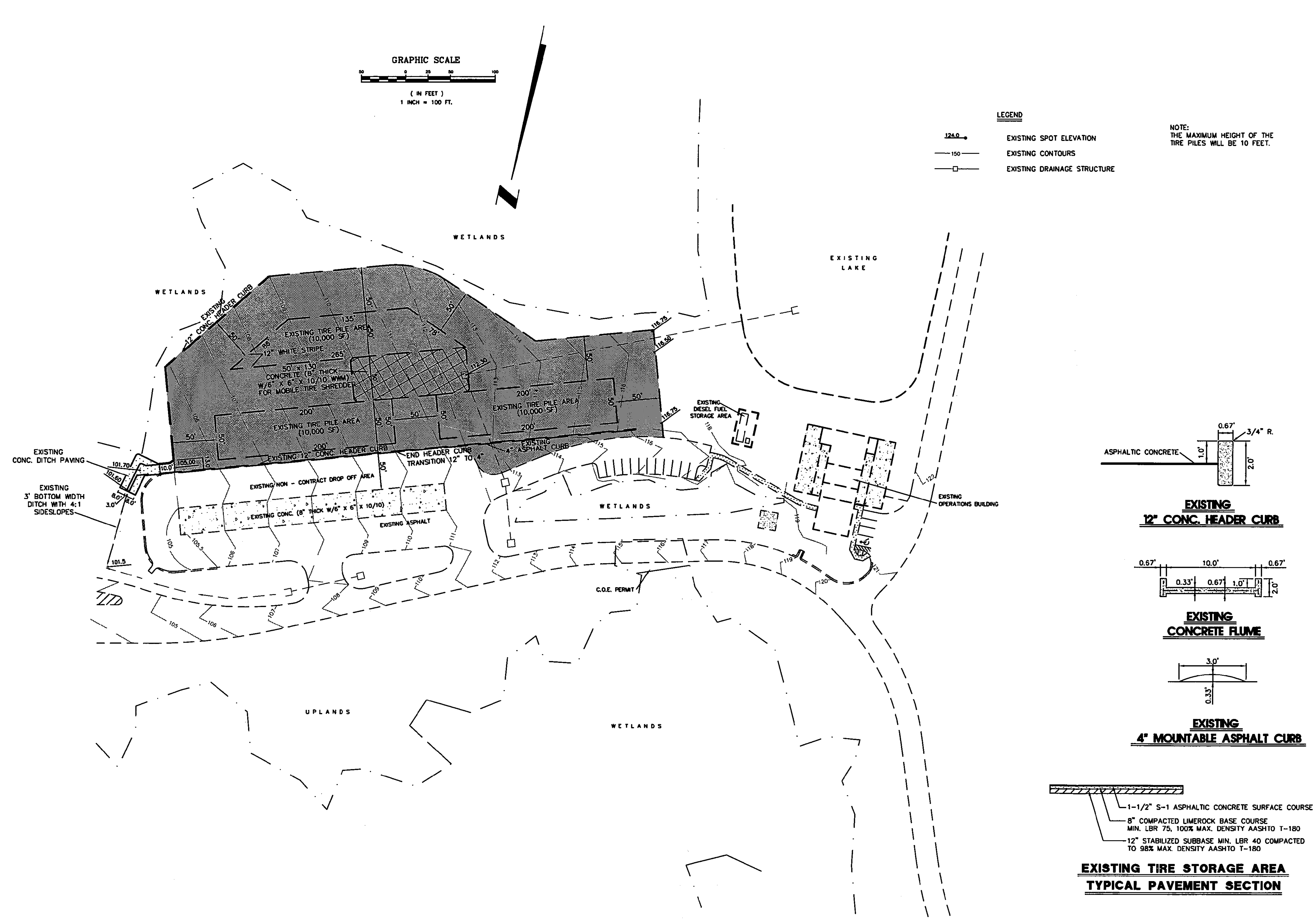
Closure of the waste tire processing facility will be in accordance with Rule 62-711.700, F.A.C.

9. Financial Assurance

Financial responsibility for closure of the solid waste management facility includes closure costs associated with the waste tire site. Therefore, no new documentation is submitted.

10. Permit Fee

No permit fee is required, as specified in Rule 17-711.300(4), F.A.C.



PERMIT DOCUMENT

WASTE TIRE STORAGE AND PROCESSING AREA

TRAIL RIDGE LANDFILL PERMIT RENEWAL FOR TRAIL RIDGE LANDFILL, INC.

England-Thims & Miller, Inc.
ENGINEERS - PLANNERS - SURVEYORS - LANDSCAPE ARCHITECTS
14775 ST. AUGUSTINE ROAD
JACKSONVILLE, FLORIDA 32258
PHONE NUMBER (904) 642-8990 FAX NUMBER (904) 646-9485

ETM NO.: 02-025
DRAWN BY: S.J.L.
DESIGNED BY: J.B.C.
CHECKED BY: D.C.M.
DATE: SEPTEMBER 25, 2002

REVISIONS:
8-22-02 REVISED MAXIMUM HEIGHT.

SUBMITTED TO DEP: 9-25-02

DRAWING NO.

EXHIBIT A

EXHIBIT B
EMERGENCY PREPAREDNESS MANUAL

TRAIL RIDGE LANDFILL
WASTE TIRE PROCESSING FACILITY

1. In the event of a fire or other emergency, the following persons/agencies will be contacted:

   Trail Ridge Landfill Personnel
   Mr. Greg Mathes (904) 269-3986 (Home); (904) 591-6113 (Cell)
   Mr. Jimmy Purvis (904) 879-1282 (Home); (904) 591-6112 (Cell)
   Mr. Bobby Isham (904) 845-7644 (Home); (904) 591-6111 (Cell)

   Fire Department, if necessary
   Phone: 911

   Department of Environmental Protection
   7825 Baymeadows Way, Suite 200B
   Jacksonville, Florida 32256
   (904) 807-3355

2. The tire storage processing facility is located at a Class I sanitary landfill, Trail Ridge Landfill, which is fully equipped with bulldozers, front end loaders, scrapers, and other such equipment available at all times for any emergency. There is an ample stockpile of soil on site for use in smothering a fire, if one occurs.

3. In the event of a fire, the following procedures will be immediately implemented:

   A. Notify the persons/agencies listed in Part 1.

   B. Reinforce the area with soil to contain any runoff and use to extinguish fire, if necessary.

   C. Extinguish the fire with on-site equipment and stockpile dirt. Only personnel trained in fire safety procedures will be utilized to fight fires.

   D. A special and/or hazardous waste contractor will be contacted for cleanup and disposal of any residue generated by the fire.

4. Within two weeks of the emergency, a written report describing the event will be sent to the Department of Environmental Protection. The report will include the origins of the emergency, the actions taken to remedy the situation, the results of the action that was taken, and an analysis of the success or failure of the actions.

I

APPENDIX I

ENVIRONMENTAL MEDIA MONITORING PLAN

Golder Associates Inc.

8933 Western Way, Suite 12
Jacksonville, FL USA 32256
Telephone (904) 363-3430
Fax (904) 363-3445

Golder Associates

September 26, 2002 023-2707

England, Thims & Miller, Inc.
14775 St. Augustine Road
Jacksonville, Florida 32258

Attn: Ms. Juanitta Bader Clem, P.E.
Vice President

RE: EVALUATION OF HISTORICAL DATA AND RECOMMENDATIONS FOR GROUNDWATER, SURFACE WATER AND LEACHATE MONITORING
TRAIL RIDGE LANDFILL
JACKSONVILLE, FLORIDA

Dear Ms. Clem:

In accordance with our proposal to England, Thims & Miller, Inc. (ETM) dated April 18, 2002, Golder Associates Inc. (Golder) has prepared this report to document our review of the historical groundwater, surface water, and leachate data and present our recommendations regarding adequacy of the existing monitoring program for the Trail Ridge Landfill site located in Jacksonville, Florida. In summary, it is our recommendation that the following modifications be made to the monitoring program:

1. Eliminate monitoring well MWB-11I from the sampling schedule. The well has consistently produced turbid samples and attempts to redevelop the well have not been successful.

2. In place of MWB-11I, put monitoring well MWB-11I(R) on the sampling schedule. While it does not produce non-turbid samples, its samples generally contain a lower level of suspended solids than samples from MWB-11I.

3. Consideration should be given to beginning a program of redeveloping select wells that are showing elevated turbidity levels and that have had more than one detected exceedance of the groundwater standard for lead. The wells recommended for redevelopment include MWB-13I, MWB-32I, and MWB-34I. If the redevelopment proves successful it should be expanded to all wells that are producing turbid samples.

BACKGROUND

In preparing this report we have reviewed the following information, which was provided either by ETM, Waste Management, Inc. (WMI), or Columbia Analytical Services, Inc. (CAS):

- Site permit and associated permit modifications;

- Groundwater, Surface Water, and Leachate Data from 1996 through 2002;
- Groundwater potentiometric maps and water level data from 1996 through 2002;
- Report entitled "Evaluation of Historical Data and Recommendations for Groundwater, Surface Water and Leachate Monitoring, Trail Ridge Landfill, Jacksonville, Florida" (Golder, October 24, 1996); and
- Report entitled "Biennial Evaluation of Groundwater, Surface Water and Leachate Monitoring Program (1999-2000), Trail Ridge Landfill, Jacksonville, Florida" (Golder, December 21, 2000).

EXISTING MONITORING PROGRAM

Groundwater

Following the start of landfill operations in 1992, the existing monitoring wells have been sequentially added to the site's sampling program as the various phases of the landfill have been constructed. Presently, there are a total of 38 monitoring wells located on site (see Figure 1).[1] The monitoring wells are installed around the perimeter of the landfill and are screened in three zones within the Surficial Aquifer (designated Shallow, Intermediate, and Deep zones). By zone, there are 16 Shallow wells, 13 Intermediate wells, and 9 Deep wells. Table 1 presents the well construction details for the monitoring wells on site.

Groundwater flow mimics the original site topography and is eastward in all three zones of the Surficial Aquifer. Monitoring wells (or monitoring well clusters) are spaced approximately 1,000 feet apart on the north and south sides of the landfill (relative side-gradient position), approximately every 250 feet on the east side of the landfill (relative down-gradient position), and there are three monitoring well locations (one single deep well and two shallow/intermediate well pairs) on the west side of the landfill (relative up-gradient position).

Surface Water

Surface water flow at the site also mimics the topography, with runoff in a predominantly eastward direction and most natural drainage features trending east-west. There are two surface water monitoring locations on site (designated SW-1 and SW-2). Monitoring location SW-1 is located in a wetland, approximately 200 feet east of the landfill's stormwater retention pond (just east of the spillway structure). Monitoring location SW-2 is located in an east-west trending drainage feature, approximately 500 feet north of the landfill (north-northeast of monitoring well cluster MWB-17). SW-2 is considered a "background" surface water sampling location because it does not receive run-off directly from the landfill area.

[1] This total includes monitoring well MWB-11I(R), which was installed as a potential replacement for MWB-11I which historically has had problems with producing turbid samples. In addition, it includes former monitoring wells MWB-14S, 14I, 14D, 16S, 18S, 23S(R), 24S, 25S, 25I, 25D, 28S, and 30S, which are maintained on site for the collection of piezometric data.

Leachate

Leachate collection pipes that lie on top of the primary liner terminate at the leachate collection sumps. These sumps also collect any leachate flowing along the secondary leak detection system. The sump is designed so that the leachate from the primary and secondary systems is separated. Therefore, it is necessary to have two pumps in each sump; one for the primary leachate collection system and one for the secondary leachate collection system.

The leachate is pumped from the sumps through primary and secondary force mains to six 20,000-gallon above-ground storage tanks. Tanks 1 through 5 (which are interconnected) receive the leachate collected from all of the primary leachate collection sumps via one force main. Tank 6 receives leachate that is pumped through a separate force main from the secondary leachate collection sumps. At the same frequency as the groundwater and surface water samples are collected (semi-annually), a sample from the primary leachate tanks is collected (sample designated LCS) and a sample of the secondary leachate from Tank 6 is collected (sample designated LDSS).

EVALUATION OF HISTORICAL DATA

Groundwater

The groundwater monitoring system for the site was evaluated using two different approaches; hydraulically (i.e., the position of the wells relative to groundwater flow) and analytically (i.e., evaluating sampling results in comparison to Florida regulatory standards and/or background concentrations).

Hydraulic Evaluation

For the evaluation of hydraulics, Golder reviewed the groundwater contour maps generated between 1996 to 2002, that have been provided to the FDEP in semi-annual reports for the site (Attachment A). The contour maps reviewed included separate maps for the shallow, intermediate and deep hydrogeologic zones. This review process included calculating the average gradient across the site (see Table 2).

The calculation of the average horizontal gradients across the site indicates the gradients in the three zones are very similar, with the deep zone, on average, having a slightly flatter gradient than the intermediate and shallow zones. It is noted that this observation may at least partially be a result of having fewer data points for the deep zone, resulting in larger interpolations between data points than in the shallow zone. Also, it is noted that there were some periods when the gradients in the deep zone were steeper than in the intermediate zone, and periods when the intermediate zone were steeper than the shallow zone. There were not any obvious seasonal trends in gradient fluctuations noted. It is noted that these observations are consistent with those made during the previous permit review for the site (Golder, October 24, 1996).

As noted previously, groundwater flow direction in all three zones monitored is predominantly towards the east. In general, the potentiometric maps for the site indicates that the wells on the north and south sides of the landfill footprint are not located downgradient of the footprint. However, they do provide valuable groundwater elevation and ambient groundwater quality data.

A review of the groundwater elevations data produced between 1999 and 2002 (most complete data) indicates that vertical gradients are downward between the shallow and intermediate zones on the west side of the landfill and generally upward on the east side of the landfill (see Table 3). This trend appears to carry through for the intermediate and deep zones as well, where monitoring well clusters MWB-17 and MWB-29 (on the west half of the landfill) have downward gradients between the intermediate and deep zones, and monitoring well clusters MWB-12 and MWB-14 (on the east side of the landfill) have upward gradients. It is noted that this flow regime is consistent with the conceptual groundwater flow model presented in the hydrogeological site characterization report for the site (Golder, July 1990).

Analytical Results Comparison

Table 4 summarizes the number of wells that have had exceedances of Florida Primary Drinking Water Standards (FPDWS) or Secondary Drinking Water Standards (FSDWS) per Chapter 62-550, Florida Administrative Code (FAC) at the site. A complete summary of detections organized by well ID is included as Attachment B. As shown in Table 4, the most common exceedance of drinking water standards in the monitoring wells sampled at the site was for iron (FSDWS = 0.3 mg/L), which was exceeded more than once in 36 of 38 wells since 1996. The next most common exceedance was for pH, which was below the minimum standard (FSDWS >6.5 S.U.) in 32 of 38 wells during more than one sampling event since 1996. The third most common exceedance was for color (FSDWS = 15 C.U.) which was exceeded more than once in 23 of the 38 wells since 1996. It is noted that the groundwater in the shallow and intermediate wells at the site is commonly tinted brown. This condition is most likely the result of tannic acid in the soil, which is produced by the natural degradation of the overlying humic material. Table 5 presents average values for those parameters detected in excess of their respective standards for the period of 1996 to 2002.

These constituents are present in both up-gradient and down-gradient wells, screened in the deep, intermediate, and shallow zones. An exception to this generalization were the deep wells, which had pH's >6.5 S.U. in 6 of the 9 wells and color readings <15 C.U. in 6 of 9 wells screened in that interval. This difference can likely be explained by the different lithology in the deep zone (carbonate material) which likely provides a buffering effect to groundwater which passes through it.

Other metals in addition to iron have been sporadically detected at the site. Of these, only lead has been detected above its established standard more than one time at more than one location. Of the two wells that have had more than one lead exceedance, only one (MWB-11I) has detected it above the FPDWS (0.015 mg/L) on a consistent basis. The other well (MWB-13I) has not detected lead above its FPDWS since 1996. It is noted that the lead detection in MWB-11I has been addressed by attempts at redevelopment (to try and lower the amount of suspended solids that are entrained in samples) and by the installation of a replacement well (MWB-11I(R)). Further, it is noted that many of the soils in northeast Florida have concentrations of metals that are naturally occurring (including lead). This is particularly true on the Trail Ridge geomorphic feature, where mining for "heavy sands" is well documented. The groundwater data for the site over the last 10 years has indicated there is a correlation between the presence of lead (and other metals) and high turbidity levels in the samples.

Surface Water

The surface water data do not appear to vary significantly between the two locations sampled. A summary of surface water analytical data detections from previous reports is included as Attachment C. Of the parameters analyzed, fecal coliform is the most commonly reported exceedance of Class III - Fresh Water Standards (Chapter 62-302, FAC). In addition, iron and lead have been sporadically detected above their respective standards at both sampling locations. The relative consistency in constituents detected and their relative concentrations at both sampling locations would appear to indicate that the detections are indicative of ambient or background conditions.

Leachate

Leachate data from 1998 to 2002 was reviewed as part of this study (see Attachment D). The constituents detected in excess of their respective FPDWS or FSDWS in more than one sampling event included: antimony, arsenic (LCS only), barium (LCS only), chloride, chromium (LCS only), copper (LCS only), iron, lead, mercury, nickel, sodium, TDS, and vanadium. Concentration vs. time plots for some of these constituents are included in Attachment D. In general, the concentrations of these constituents appear to be consistent. It should be noted that some of the variations in the plots are related to non-detect results that are assigned a value equivalent to one-half the method detection limit (MDL). From event to event, the MDL for a given parameter changes due to laboratory dilutions and/or matrix interference.

In accordance with Specific Condition #44 of the Operating Permit, the results of the leachate quality testing are compared to the regulatory limits listed in 40CFR, Part 261.24. A review of the data indicates that there were no parameters detected in excess of the limits established by this regulation between 1998 and 2002.

CONCLUSIONS AND RECOMMENDATIONS

Groundwater

The groundwater flow directions and gradients have been consistent during the last five years of operation and are also consistent with the flow directions and gradients observed during the previous five-year period (1992-1997). Flow directions in all three zones of the surficial aquifer that are monitored (shallow, intermediate, and deep) are predominantly eastward. The wells along the west (up-gradient) side appear to provide adequate background data and the wells along the east (down-gradient) side of the landfill provide adequate coverage. The presence of an upward hydraulic gradient along the east edge of the landfill provides additional assurance that any possible release from the landfill would be detected by wells screened in the three zones monitored at the site.

The groundwater quality data for the site has also been consistent during the last five years of monitoring. With the exception of iron, pH, and color, the groundwater quality at the site meets the state drinking water standards. As noted in the previous section, these constituents are not considered a result of any impact from the operation of the landfill, but rather are related to the natural groundwater quality conditions of the area.

The issue of high turbidity levels in some of the wells should be addressed by redevelopment. Some of the wells are over 10 years old and have likely accumulated fines (silt- and clay-sized particles) in their filter packs. Consideration should be given to beginning a program of redeveloping select wells that are showing elevated turbidity levels and that have had more than one detected exceedance of the groundwater standard for lead. The wells recommended for redevelopment include MWB-13I, MWB-32I, and MWB-34I. If the redevelopment proves successful it should be expanded to all wells that are producing turbid samples.

Surface Water

The surface water quality data is generally consistent with that reported during the previous permit renewal (Golder, October 24, 1996). No changes to the surface water monitoring system are recommended.

Leachate

The leachate quality data is generally consistent with that reported during the previous permit renewal (Golder, October 24, 1996). No changes to the leachate monitoring system are recommended.

If you have any questions or comments regarding this report, please call.

Very truly yours,

GOLDER ASSOCIATES INC.

Kenneth B. Karably

Kenneth B. Karably, P.G. (FL # 1454)
Principal

Table 1 – Well Construction Summary
Table 2 – Summary of Average Horizontal Hydraulic Gradients (1992 to 2002)
Table 3 – Groundwater Vertical Gradients (1999 to 2002)
Table 4 – Number of Wells with Past Exceedances of Drinking Water Standards (1996 to 2002)
Table 5 – Summary of Groundwater Standard Exceedances (1996 to 2002)

Figure 1 – Monitoring Well Location Plan

Attachment A - Groundwater Contour Maps (1996 to 2002)
Attachment B – Summary of Detections - Groundwater Analytical Data
Attachment C – Summary of Detections - Surface Water Analytical Data
Attachment D – Summary of Detections - Leachate Analytical Data

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Table 1

Well Construction Summary

Trail Ridge Landfill
Jacksonville, Florida

Well I.D.	Ground Surface Elevation (Ft. MSL)	Top of Riser Elevation (Ft. MSL)	Bottom of Hole (Ft. BGS)	Stick-Up (Ft)	Screened Interval (Ft. BGS)	Top of Filter Pack (Ft. BGS)	Top of Bentonite Pellets (Ft. BGS)
MWB-2S	144.1	146.64	17.5	2.54	2.5-17.5	2.0	0.0
MWB-2I	143.8	145.73	59.8	1.93	54.3-59.8	52.3	47.5
MWB-3S	151.5	153.49	18.0	1.99	3.0-18.0	2.5	0.0
MWB-3I	151.0	152.50	60.0	1.50	54.7-60.0	53.3	51.0
MWB-7S	120.6	123.29	16.5	2.69	1.5-16.5	1.0	0.0
MWB-7I	119.7	121.53	63.3	1.83	58.0-63.3	56.8	51.8
MWB-7D	119.7	121.65	114.7	1.95	109.7-114.7	108.2	105.0
MWB-11S	118.5	120.81	18.0	2.31	3.0-18.0	1.0	0.0
MWB-11I	118.4	120.43	60.0	2.03	54.5-60.0	53.5	48.5
MWB-11I(R)			52.5	2.50	47.0-52.0	45.0	43.0
MWB-12S	122.9	124.63	25.0	1.73	10.0-25.0	8.0	5.0
MWB-12I	122.9	124.62	69.6	1.72	64.1-69.6	61.0	57.5
MWB-12D	122.9	124.56	112.8	1.66	107.4-112.8	105.0	102.5
MWB-13S	124.1	126.06	24.6	1.96	9.6-24.6	8.0	5.5
MWB-13I	124.1	125.98	58.6	1.88	53.6-58.6	51.0	48.0
MWB-14S	123.4	126.05	16.5	2.65	1.5-16.5	1.0	0.0
MWB-14I	123.4	125.92	60.0	2.52	55.0-60.0	53.0	50.0
MWB-14D	123.4	125.87	106.0	2.47	101.0-106.0	99.0	96.0
MWB-16S	141.7	144.01	17.5	2.31	2.5-17.5	2.0	0.5
MWB-17S	136.1	138.31	16.1	2.21	1.1-16.1	0.5	0.0
MWB-17I	136.2	138.43	57.9	2.23	52.9-57.9	51.0	48.0
MWB-17D	136.0	138.52	124.8	2.52	119.8-124.8	118.0	115.0
MWB-18S	131.1	134.09	16.5	2.99	1.5-16.5	1.0	0.0
MWB-19S	125.7	127.38	18.0	1.68	3.0-18.0	1.5	0.0
MWB-19I	125.5	127.94	56.5	2.44	51.5-56.5	50.0	47.0
MWB-19D	125.5	128.23	109.0	2.73	104.0-109.0	102.0	99.0
MWB-20S	118.9	121.01	18.0	2.11	3.0-18.0	2.5	0.0
MWB-21S	121.0	122.84	18.0	1.84	3.0-18.0	2.5	0.0
MWB-22S	124.5	126.97	25.0	2.47	10.0-25.0	8.0	5.0
MWB-23S	122.5	124.98	25.0	2.48	10.0-25.0	8.0	0.0
MWB-24S	119.4	122.11	16.5	2.74	1.5-16.5	1.0	0.0
MWB-25S	122.1	125.22	17.2	3.12	2.2-17.2	2.2	0.0
MWB-25I	122.1	124.03	58.3	1.93	53.3-58.3	51.0	48.0
MWB-25D	122.1	124.64	106.0	2.54	101.0-106.0	99.0	96.0
MWB-26S	124.4	126.55	16.5	2.15	1.5-16.5	1.0	0.0
MWB-27S	126.4	128.42	16.3	2.02	1.3-16.3	1.0	0.0
MWB-27I	126.5	128.63	60.1	2.13	55.1-60.1	53.0	50.0
MWB-27D	126.1	128.88	107.0	2.78	102.0-107.0	100.0	97.0
MWB-28S	131.4	133.73	17.0	2.33	2.0-17.0	1.5	0.0
MWB-29S	135.5	138.02	16.5	2.52	1.5-16.5	1.0	0.0
MWB-29I	135.4	138.08	60.0	2.68	55.0-60.0	53.0	50.0
MWB-29D	135.4	138.18	109.0	2.78	104.0-109.0	102.0	99.0
MWB-30S	140.2	142.52	16.5	2.32	1.5-16.5	1.0	0.0
MWB-31D	154.0	156.15	129.5	2.15	124.5-129.5	122.5	119.5
MWB-32S	121.8	124.64	22.0	2.88	6.5-21.5	5.0	3.0
MWB-32I	121.9	124.79	62.2	2.86	56.7-61.7	51.0	46.0
MWB-32D	122.1	124.93	106.5	2.81	101.0-106.0	97.0	94.0
MWB-33S	123.2	125.90	22.3	2.75	6.8-21.8	3.7	3.0
MWB-34S	122.9	125.78	20.0	2.92	4.5-19.5	3.0	1.0
MWB-34I	123.0	125.80	60.0	2.81	54.5-59.5	52.0	49.0
MWB-34D	123.1	125.92	106.7	2.87	101.2-106.2	98.0	94.0

Note: Shaded cells indicate well is not part of active groundwater monitoring system but is maintained for piezometric data collection.

Table 2

Summary of Average Horizontal Groundwater Gradients (1992 to 2002)

Trail Ridge Landfill
Jacksonville, Florida

Date	Shallow	Intermediate	Deep
Aug-95	8.90E-03	8.00E-03	7.80E-03
9-Oct-92	9.80E-03	1.06E-02	8.00E-03
16-Oct-92	1.00E-02	9.50E-03	7.80E-03
23-Oct-92	1.00E-02	1.04E-02	8.10E-03
28-Oct-92	1.00E-02	1.06E-02	8.00E-03
5-Nov-92	1.00E-02	1.02E-02	8.00E-03
12-Nov-92	1.00E-02	1.06E-02	7.40E-03
20-Nov-92	9.80E-03	1.07E-02	7.40E-03
27-Nov-92	1.00E-02	1.07E-02	8.10E-03
4-Dec-92	1.00E-02	1.06E-02	8.00E-03
11-Dec-92	1.00E-02	1.11E-02	8.00E-03
18-Dec-92	9.80E-03	1.11E-02	8.00E-03
23-Dec-92	9.80E-03	1.13E-02	8.30E-03
30-Dec-92	9.80E-03	1.11E-02	8.90E-03
7-Jan-93	1.00E-02	1.02E-02	8.90E-03
1st Quarter 1993	9.30E-03	8.70E-03	8.10E-03
2nd Quarter 1993	9.30E-03	8.70E-03	8.00E-03
3rd Quarter 1993	8.90E-03	8.80E-03	7.90E-03
4th Quarter 1993	9.30E-03	7.80E-03	7.40E-03
1st Quarter 1994	1.11E-02	8.40E-03	8.50E-03
2nd Quarter 1994	9.60E-03	8.30E-03	8.10E-03
3rd Quarter 1994	9.60E-03	8.80E-03	7.90E-03
4th Quarter 1994	9.10E-03	9.10E-03	8.00E-03
1st Quarter 1995	1.00E-02	8.70E-03	8.10E-03
3rd Quarter 1995	1.15E-02	8.70E-03	8.20E-03
1st Quarter 1996	9.26E-03	9.26E-03	8.15E-03
3rd Quarter 1996	1.00E-02	8.89E-03	1.00E-02
1st Quarter 1997	9.26E-03	9.26E-03	8.89E-03
3rd Quarter 1997	9.63E-03	8.52E-03	8.15E-03
1st Quarter 1998	1.11E-02	9.26E-03	8.52E-03
3rd Quarter 1998	1.11E-02	9.26E-03	8.89E-03
1st Quarter 1999	1.04E-02	7.04E-03	7.78E-03
3rd Quarter 1999	9.63E-03	8.15E-03	8.15E-03
1st Quarter 2000	8.89E-03	7.41E-03	8.15E-03
3rd Quarter 2000	9.26E-03	7.78E-03	6.67E-03
1st Quarter 2001	8.52E-03	7.04E-03	6.30E-03
3rd Quarter 2001	8.15E-03	7.04E-03	6.67E-03
1st Quarter 2002	8.52E-03	8.15E-03	7.04E-03
3rd Quarter 2002	7.78E-03	7.41E-03	7.04E-03
Minimum Gradient	7.78E-03	7.04E-03	6.30E-03
Maximum Gradient	1.15E-02	1.13E-02	1.00E-02
Average Gradient	9.67E-03	9.16E-03	7.98E-03

Note: 1. Average horizontal gradients calculated from potentiometric maps produced by Golder (1992 and 1998-2002), Rust Environment & Intrastructure (1993-1996), and site personnel (1996-1998).

Table 3

Groundwater Vertical Gradients (1999 to 2002)

Trail Ridge Landfill
Jacksonville, Florida

Well I.D.	Surface Elevation (Ft. MSL)	Top of Screen (Ft. BGS)	Bottom of Screen (Ft. BGS)	Mid-Point of Screen (Ft. MSL)	July 20, 1999		January 26, 2000		September 7, 2000		January 31, 2001		July 18, 2001		January 15, 2002		June 24, 2002		Average Vertical Gradient
					GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	
B-2S	144.1	2.5	17.5	134.1	137.77	0.0291	136.19	0.0120	136.27	0.0300	135.06	0.0315	135.81	0.0456	137.94	0.0348	135.50	0.0389	0.0317
B-2I	143.8	54.3	59.8	86.8	136.39		135.62		134.85		133.57		133.65		136.29		133.66		
B-3S	151.5	3.0	18.0	141.0	143.61	0.1238	142.22	0.1090	142.61	0.1172	141.58	0.1200	141.74	0.1238	145.31	0.1381	142.95	0.1229	0.1221
B-3I	151.0	54.7	60.0	93.7	137.75		137.06		137.06		135.90		135.88		138.77		137.13		
B-7S	120.6	1.5	16.5	111.6	114.38	-0.0358	114.19	-0.0447	114.11	-0.0478	113.02	-0.0510	123.17	0.1391	115.81	-0.0396	114.20	-0.0356	-0.0165
B-7I	119.7	58.0	63.3	59.1	116.26	-0.0506	116.54	2.2607	116.62	-0.0483	115.70	-0.0510	115.86	-0.0458	117.89	-0.0407	116.07	-0.0436	0.2829
B-7D	119.7	109.7	114.7	7.5	118.87				119.11		118.33		118.22		119.99		118.32		
B-11S	118.5	3.0	18.0	108.0	106.71	-0.1904	107.21	-0.1816	107.38	-0.1810	107.12	-0.1678	107.66	-0.1614	109.33	-0.1686	107.59	-0.1701	-0.1744
B-11I	118.4	54.5	60.0	61.2	115.63		115.72		115.86		114.98		115.22		117.23		115.56		
B-12S	122.9	10.0	25.0	105.4	114.44	0.0693	114.54	-0.0122	114.23	-0.0233	113.45	-0.0241	114.07	-0.0174	114.68	-0.0373	114.30	-0.0128	-0.0083
B-12I	122.9	64.1	69.6	56.1	111.02	-0.1519	115.14		115.38	-0.0539	114.64	-0.0571	114.93	-0.0476	116.52	-0.0393	114.93	-0.0472	-0.0662
B-12D	122.9	107.4	112.8	12.8	117.59				117.71		117.11		116.99		118.22		116.97		
B-13S	124.1	9.6	24.6	107.0	113.50	0.1638	113.46	-0.0851	113.57	0.1644	109.53	0.0728	113.27	0.1613	113.73	0.1385	112.92	0.1433	0.1084
B-13I	124.1	53.6	58.6	68.0	107.11		116.78		107.16		106.69		106.98		108.33		107.33		
B-14S	123.4	1.5	16.5	114.4	112.60	-0.0301											112.17	-0.0419	-0.0360
B-14I	123.4	55.0	60.0	65.9	114.06	-0.0004											114.20	0.0000	-0.0002
B-14D	123.4	101.0	106.0	19.9	114.08												114.20		
B-17S	136.1	1.1	16.1	127.5	131.58	-0.0623	131.56	-0.0563	131.44	-0.0576	130.37	-0.0567	130.77	-0.0478	132.62	-0.0615	130.82	-0.0563	-0.0569
B-17I	136.2	52.9	57.9	80.8	134.49	0.0580	134.19		134.13	0.0548	133.02	0.0544	133.00	0.0541	135.49	0.0565	133.45	0.0565	0.0557
B-17D	136.0	119.8	124.8	13.7	130.60				130.45		129.37		129.37		131.70		129.66		

DEP005508

Table 3

Groundwater Vertical Gradients (1999 to 2002)

Trail Ridge Landfill
Jacksonville, Florida

Well I.D.	Surface Elevation (Ft. MSL)	Top of Screen (Ft. BGS)	Bottom of Screen (Ft. BGS)	Mid-Point of Screen (Ft. MSL)	July 20, 1999		January 26, 2000		September 7, 2000		January 31, 2001		July 18, 2001		January 15, 2002		June 24, 2002		Average Vertical Gradient
					GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	GW Elev.	Vert. Grad.	
B-19S	125.7	3.0	18.0	115.2	119.70	0.0041	119.37	-0.0053	119.41	-0.0092	118.60	-0.0064	118.65	-0.0066	121.45	0.0108	118.81	-0.0041	-0.0024
B-19I	125.5	51.5	56.5	71.5	119.52	-0.0063	119.60		119.81	-0.0057	118.88	-0.0090	118.94	-0.0051	120.98	-0.0023	118.99	-0.0048	-0.0055
B-19D	125.5	104.0	109.0	19.0	119.85				120.11		119.35		119.21		121.10		119.24		
B-25S	122.1	2.2	17.2	112.4	117.23	-0.0022											116.34	-0.0059	-0.0040
B-25I	122.1	53.3	58.3	66.3	117.33	-0.0004											116.61	-0.0013	-0.0008
B-25D	122.1	101.0	106.0	18.6	117.35												116.67		
B-27S	126.4	1.3	16.3	117.6	122.22	-0.0064	122.52		122.11	0.0064	121.19	0.0097	121.36	0.0076	122.50	0.0002	121.03	0.0029	0.0034
B-27I	126.5	55.1	60.1	68.9	122.53	0.0040			121.80	0.0032	120.72	-0.0011	120.99	0.0030	122.49	0.0042	120.89	0.0044	0.0030
B-27D	126.1	102.0	107.0	21.6	122.34				121.65		120.77		120.85		122.29		120.68		
B-29S	135.5	1.5	16.5	126.5	130.69	-0.0442	131.10		130.42	-0.0220	129.83	-0.0105	129.80	-0.0091	131.11	-0.0208	130.11	-0.0029	-0.0182
B-29I	135.4	55.0	60.0	77.9	132.84	0.0016			131.49	0.0002	130.34	0.0008	130.24	0.0006	132.12	0.0018	130.25	0.0008	0.0010
B-29D	135.4	104.0	109.0	28.9	132.76				131.48		130.30		130.21		132.03		130.21		
B-32S	121.8	6.5	21.5	107.8													115.36	-0.0084	-0.0084
B-32I	121.9	56.7	61.7	62.7													115.74	0.0052	0.0052
B-32D	122.1	101.0	106.0	18.6													115.51		
B-34S	122.9	4.5	19.5	110.9													115.24	0.0036	0.0036
B-34I	123.0	54.5	59.5	66.0													115.08	0.0004	0.0004
B-34D	123.1	101.2	106.2	19.4													115.06		

Note: 1. Negative value indicates upward gradient.

DEP005509

Table 4

Number of Wells with Past Exceedences of Primary or Secondary Drinking Water Standards (1996 to 2002)

Trail Ridge Landfill
Jacksonville, Florida

	MCL/SMCL		West Wells			East Wells			North Wells			South Wells			# of Wells
Constituent	Value	Units	Deep	Intermediate	Shallow	Deep	Intermediate	Shallow	Deep	Intermediate	Shallow	Deep	Intermediate	Shallow	with Exceedences
Beryllium	4	µg/L													
Chromium	100	µg/L					1								1
Color	15	C.U.			1	2	4	9	1	1	2		2	1	23
Iron	300	µg/L	1	2	2	3	7	9	2	2	2	2	2	2	36
Lead	15	µg/L					2								2
pH	6.5 - 8.5	S.U.		2	2		7	10	1	2	2	2	2	2	32
Vanadium	49	µg/L					1								1
Total # of Wells in Area			1	2	2	4	7	10	2	2	2	2	2	2	38

Notes: Wells were counted which had more than one exceedence of a given primary or secondary standard or guidance concentration (Vanadium).
Other constituents listed, but with no corresponding numbers (e.g., Beryllium) were not detected more than once above its MCL/SMCL in the history of sampling for a particular well.

West Wells = 2I, 2S, 3I, 3S, and 31D [UP-GRADIENT]
East Wells = 7D, 7I, 7S, 20S, 11I, 11I(R), 11S, 21S, 12D, 12I, 12S, 22S, 13I, 13S, 32D, 32I, 32S, 33S, 34D, 34I, and 34S [DOWN-GRADIENT]
North Wells = 17D, 17I, 17S, 19D, 19I, and 19S [SIDE-GRADIENT]
South Wells = 27D, 27I, 27S, 29D, 29I, and 29S [SIDE-GRADIENT]

Table 5

Summary of Groundwater Standard Exceedances (1996 to 2002)

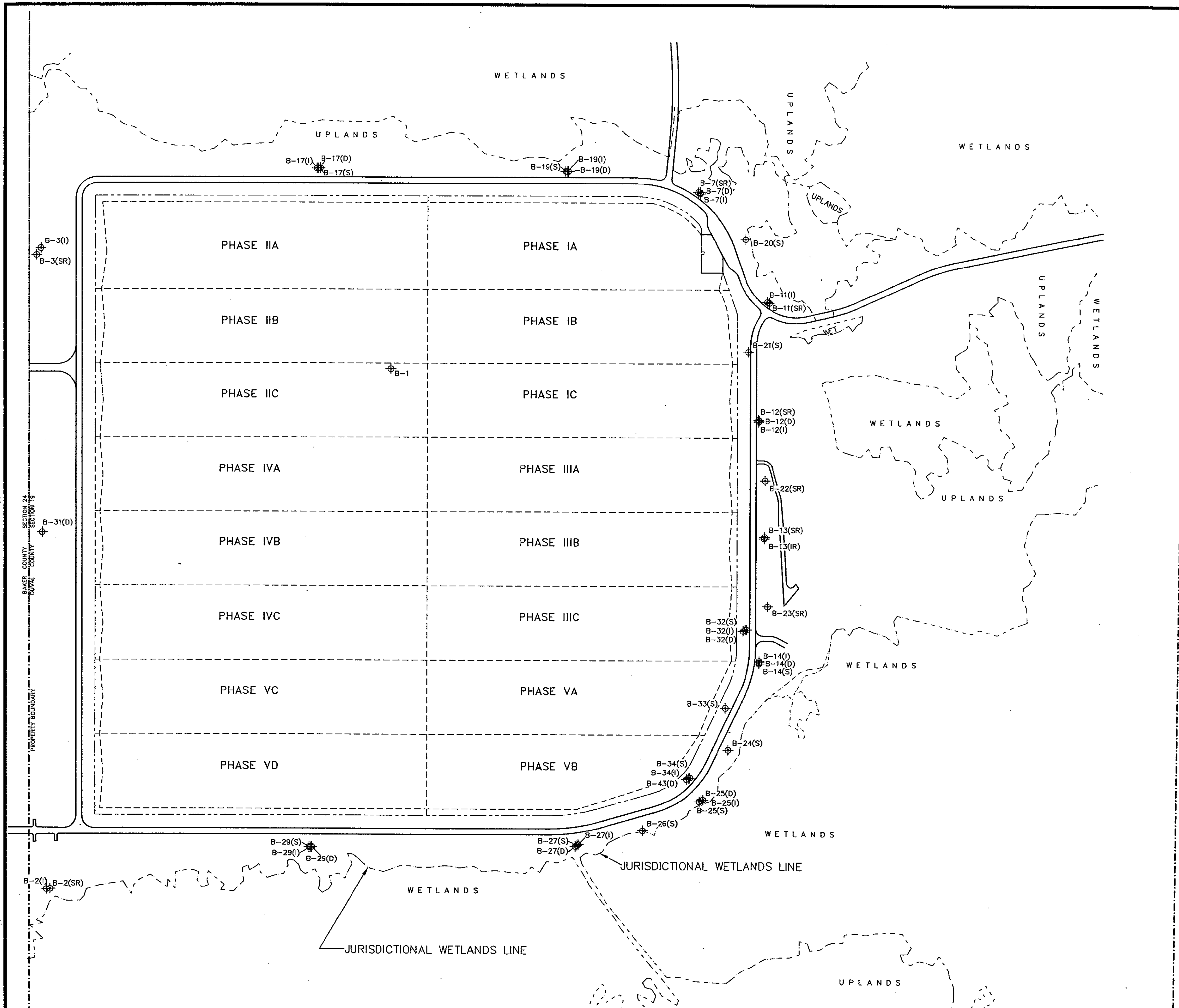
Trail Ridge Landfill
Jacksonville, Florida

Well I.D.	Iron (mg/L)	pH (S.U.)	Beryllium (mg/L)	Chromium (mg/L)	Lead (mg/L)	Vanadium (mg/L)	Color (C.U.)	Turbidity (NTUs)
Standard	0.300	6.5-8.5	0.004	0.100	0.015	0.049	15	N/A
MWB-2S	**0.484**	**4.56**	--	--	--	--	6.0	6.6
MWB-2I	**0.378**	**4.65**	--	--	--	--	9.2	4.2
MWB-3S	**0.723**	**4.60**	--	--	--	--	10.0	13.3
MWB-3I	**0.606**	**4.80**	--	--	--	--	--	0.8
MWB-7S	**0.251**	**4.80**	--	--	--	--	**117.5**	17.2
MWB-7I	**0.383**	**5.24**	--	--	--	--	6.7	3.8
MWB-7D	**0.234**	7.14	--	--	--	--	7.9	0.8
MWB-11S	**0.719**	**4.20**	--	--	--	--	5	1.9
MWB-11I	**2.258**	**5.18**	**0.0034**	**0.0900**	**0.0460**	**0.091**	**316**	2250
MWB-11I(R)	**1.567**	**4.97**	--	--	0.0100	0.039	**500**	64.7
MWB-12S	**0.289**	**4.93**	--	--	--	--	73.3	9.8
MWB-12I	**0.394**	**5.27**	--	--	--	--	5.0	4.4
MWB-12D	**1.411**	6.96	--	--	--	--	16.3	18.6
MWB-13S	**1.035**	**5.02**	--	--	0.0060	**0.027**	**32.5**	7.4
MWB-13I	**0.922**	**5.11**	--	--	**0.0155**	**0.029**	**138.0**	46.1
MWB-17S	**0.371**	**4.92**	--	--	--	--	**103.0**	22.5
MWB-17I	**0.322**	**4.85**	--	--	--	--	5.0	2.0
MWB-17D	**0.657**	**5.71**	--	--	--	--	6.3	3.5
MWB-19S	**0.570**	4.79	--	--	0.0043	--	**46.4**	8.4
MWB-19I	**0.893**	**5.03**	--	0.0083	0.0034	0.0100	**134.2**	148.0
MWB-19D	**1.532**	7.02	--	0.0055	0.0050	0.0090	**12.5**	12.6
MWB-20S	**0.685**	**4.22**	--	--	0.0055	--	**12.5**	3.9
MWB-21S	**0.743**	**4.69**	--	--	0.0065	--	**77.0**	20.0
MWB-22S	**0.325**	**4.84**	--	--	--	--	**37.5**	6.2
MWB-27S	**0.503**	**5.06**	--	--	--	--	**75.8**	27.5
MWB-27I	**0.520**	**5.39**	--	--	--	--	12.5	98.4
MWB-27D	**1.194**	**5.85**	--	--	--	--	6.7	9.8
MWB-29S	**0.329**	**4.66**	--	--	--	--	12.0	3.9
MWB-29I	**0.454**	**4.94**	--	--	0.005	--	13.8	150.0
MWB-29D	**1.299**	**5.41**	--	--	--	--	6.0	3.4
MWB-31D	**0.406**	6.83	--	--	0.006	--	9.2	39.0
MWB-32S	**0.543**	**5.54**	--	--	--	--	--	116.4
MWB-32I	**2.067**	**5.45**	--	--	**0.016**	**0.032**	--	154.0
MWB-32D	**1.787**	6.83	--	--	--	--	--	71.0
MWB-33S	0.152	**4.78**	--	--	--	0.014	**33.3**	16.7
MWB-34S	**0.612**	**5.10**	--	--	--	0.019	**177.5**	35.4
MWB-34I	**1.154**	**5.33**	--	0.020	**0.006**	0.020	**53.3**	112.2
MWB-34D	**0.520**	7.25	--	--	--	--	13.8	3.7

Notes: 1. Averages shown are for those parameters that had an exceedance of a Florida Primary or Secondary Drinking Water Standard (per Chapter 62-550, FAC) in one or more wells during the period reviewed (1996-2002) and that were detected two or more times in a given well during that time period. An exception is the listing of vanadium which only has a guidance standard (0.049 mg/L) and turbidity (see Note 2.).

2. The turbidity values are presented for information purposes only, as the detection of metals are often associated with the presence of suspended solids in the sample.

3. Bold face print indicates more than one value in the calculated average for that particular well had an exceedance of the associated standard.



LEGEND

- PROPERTY BOUNDARY LINE
- B-28(S) MONITORING WELL LOCATION
- EDGE OF CELL
- ROAD

SCALE IN FEET

0 400 800

Golder Associates JACKSONVILLE, FLORIDA

CLIENT/PROJECT

ETM/TRAIL RIDGE PERMIT RENEWAL/FL

TITLE

MONITORING WELL LOCATIONS

DRAWN	TRG	DATE	09/26/02	JOB NO.	023-2707
CHECKED	KBK	SCALE	AS SHOWN	DWG. NO. 2707	REV. NO.
REVIEWED		FILE NO.	023-2707	SUBTITLE	FIGURE NO. 1

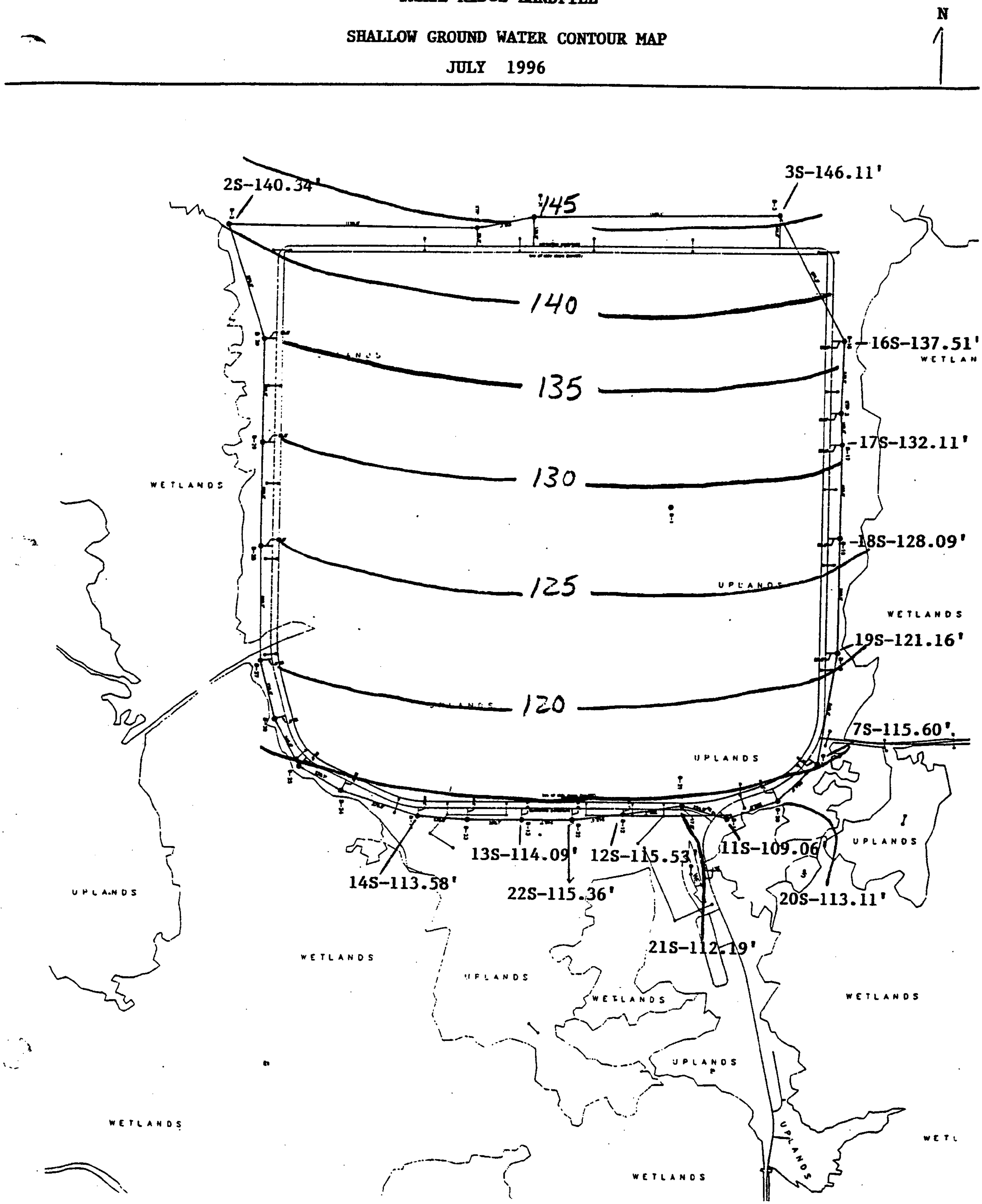
Attachment A

Groundwater Contour Maps

TRAIL RIDGE LANDFILL

SHALLOW GROUND WATER CONTOUR MAP

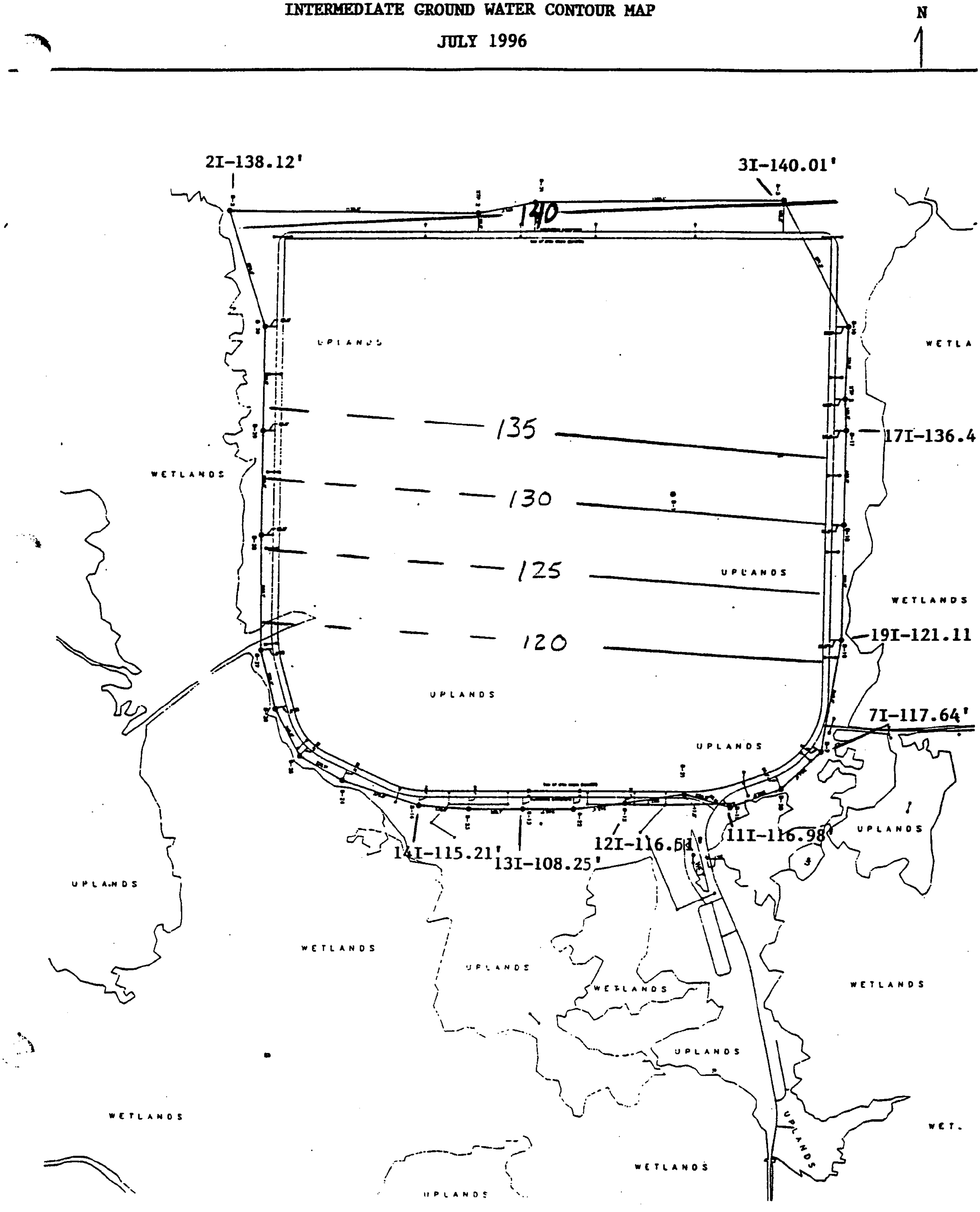
JULY 1996



TRAIL RIDGE LANDFILL

INTERMEDIATE GROUND WATER CONTOUR MAP

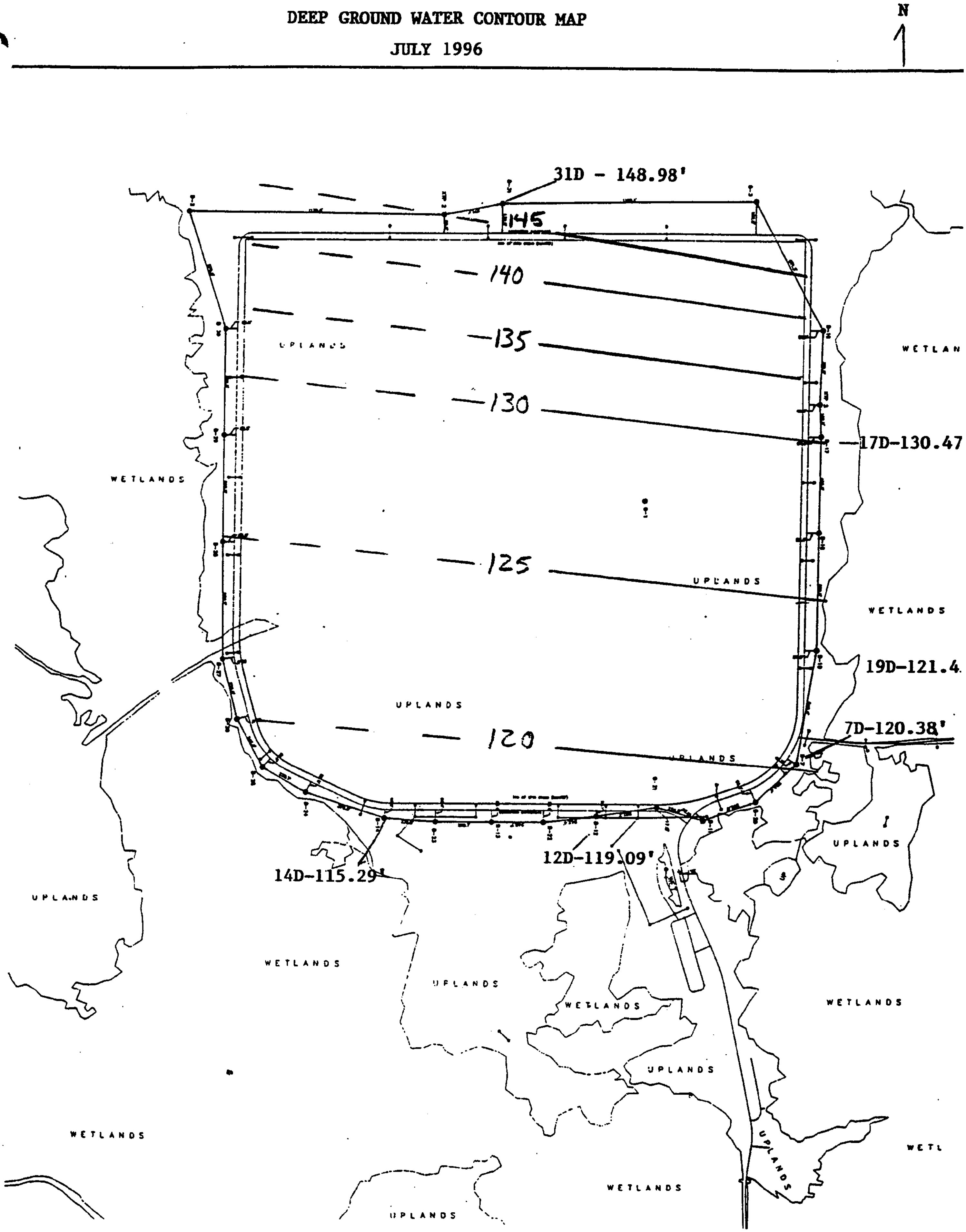
JULY 1996



TRAIL RIDGE LANDFILL

DEEP GROUND WATER CONTOUR MAP

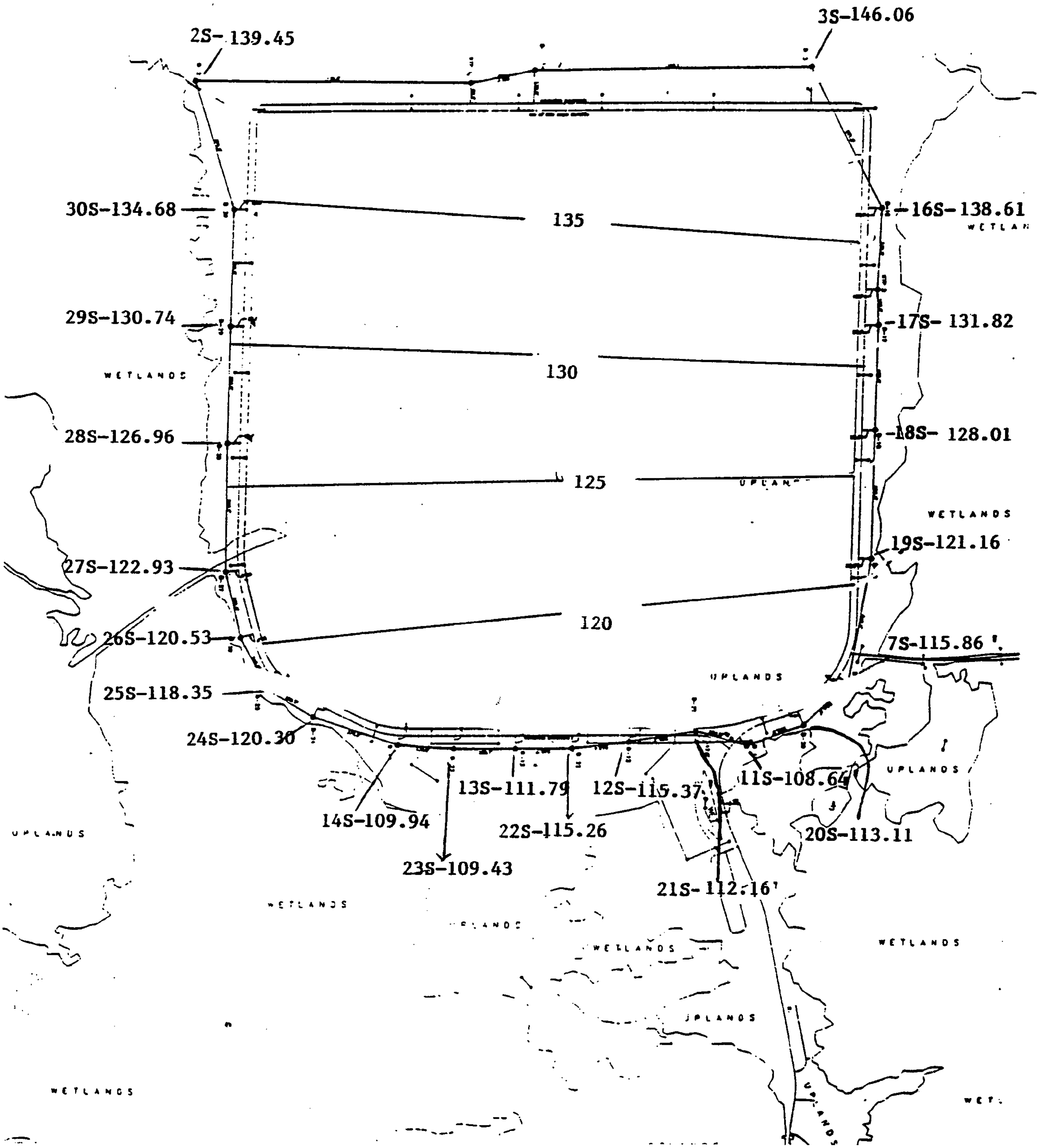
JULY 1996



TRAIL RIDGE LANDFILL

SHALLOW GROUND WATER CONTOUR MAP

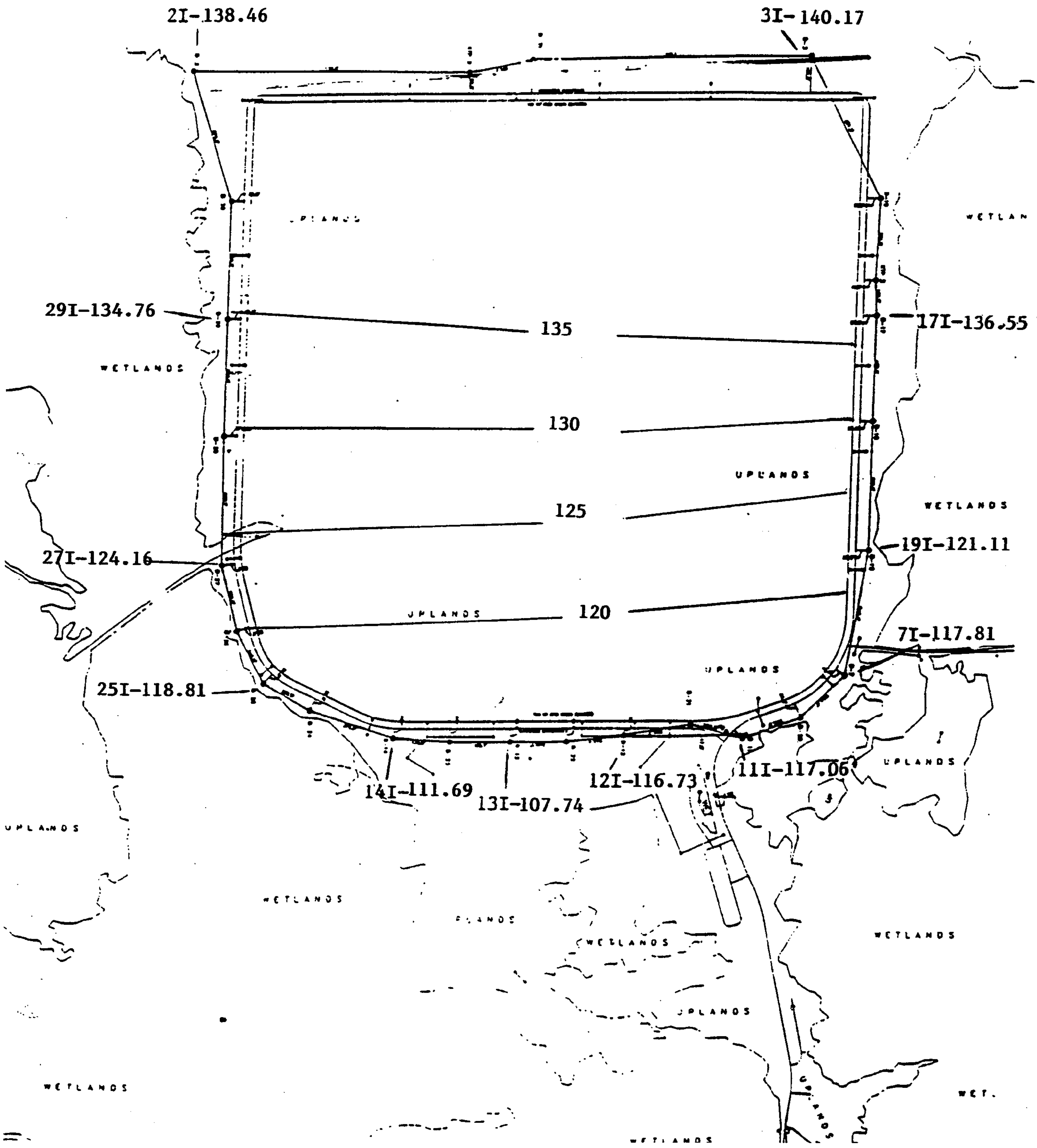
JANUARY 1997



TRAIL RIDGE LANDFILL

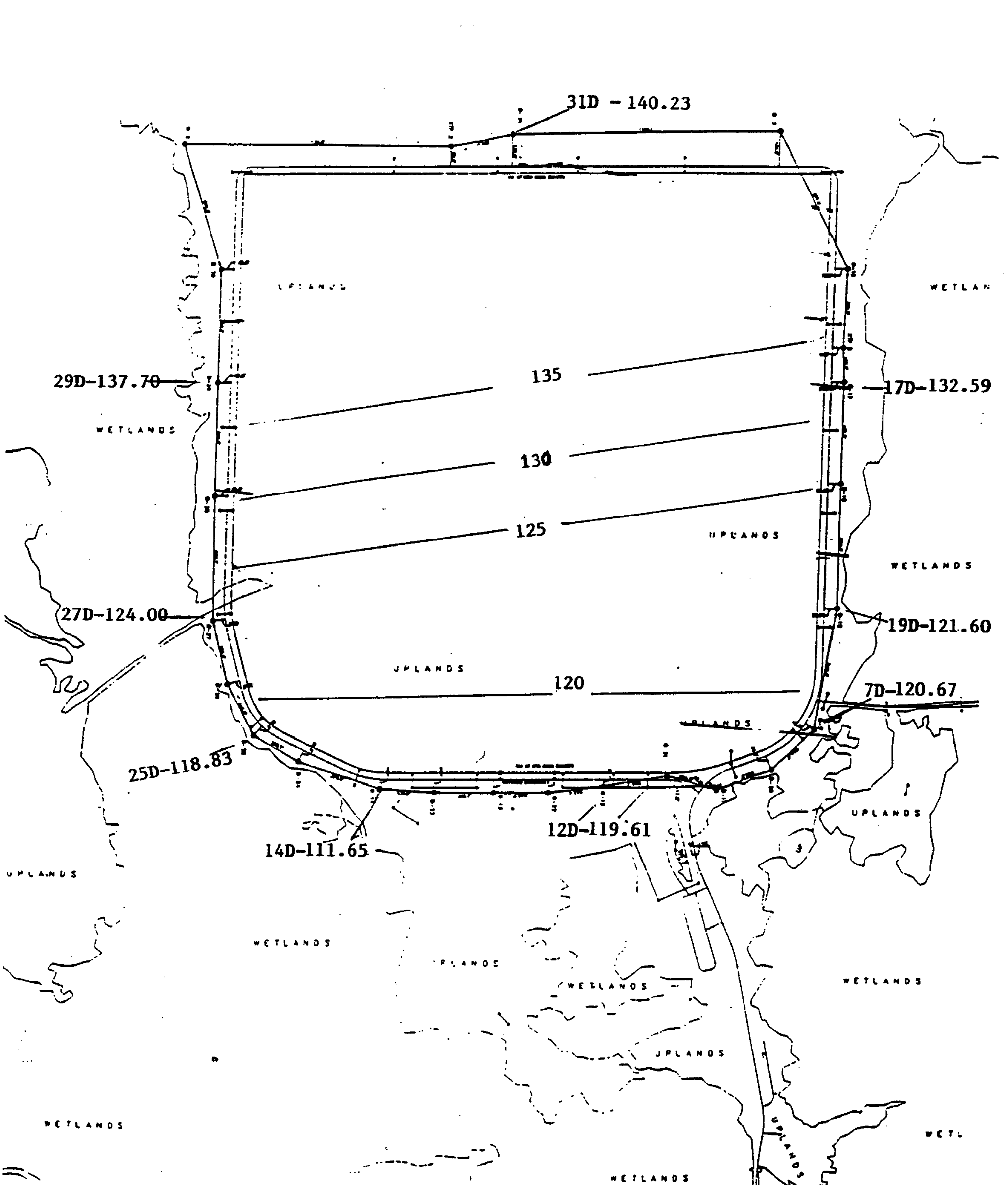
INTERMEDIATE GROUND WATER CONTOUR MAP

JANUARY 1997



TRAIL RIDGE LANDFILL

DEEP GROUND WATER CONTOUR MAP
JANUARY 1997

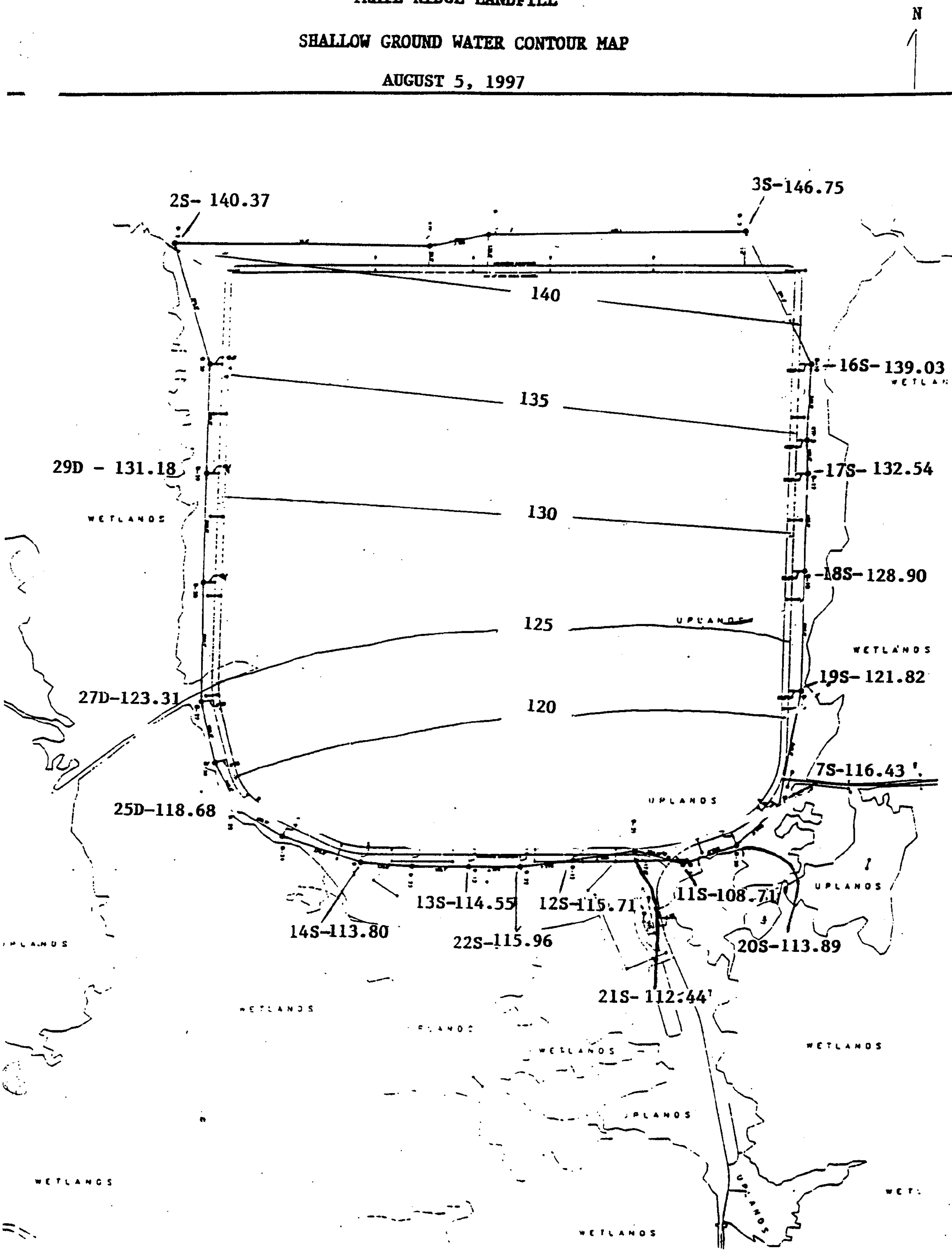


DEP005519

TRAIL RIDGE LANDFILL

SHALLOW GROUND WATER CONTOUR MAP

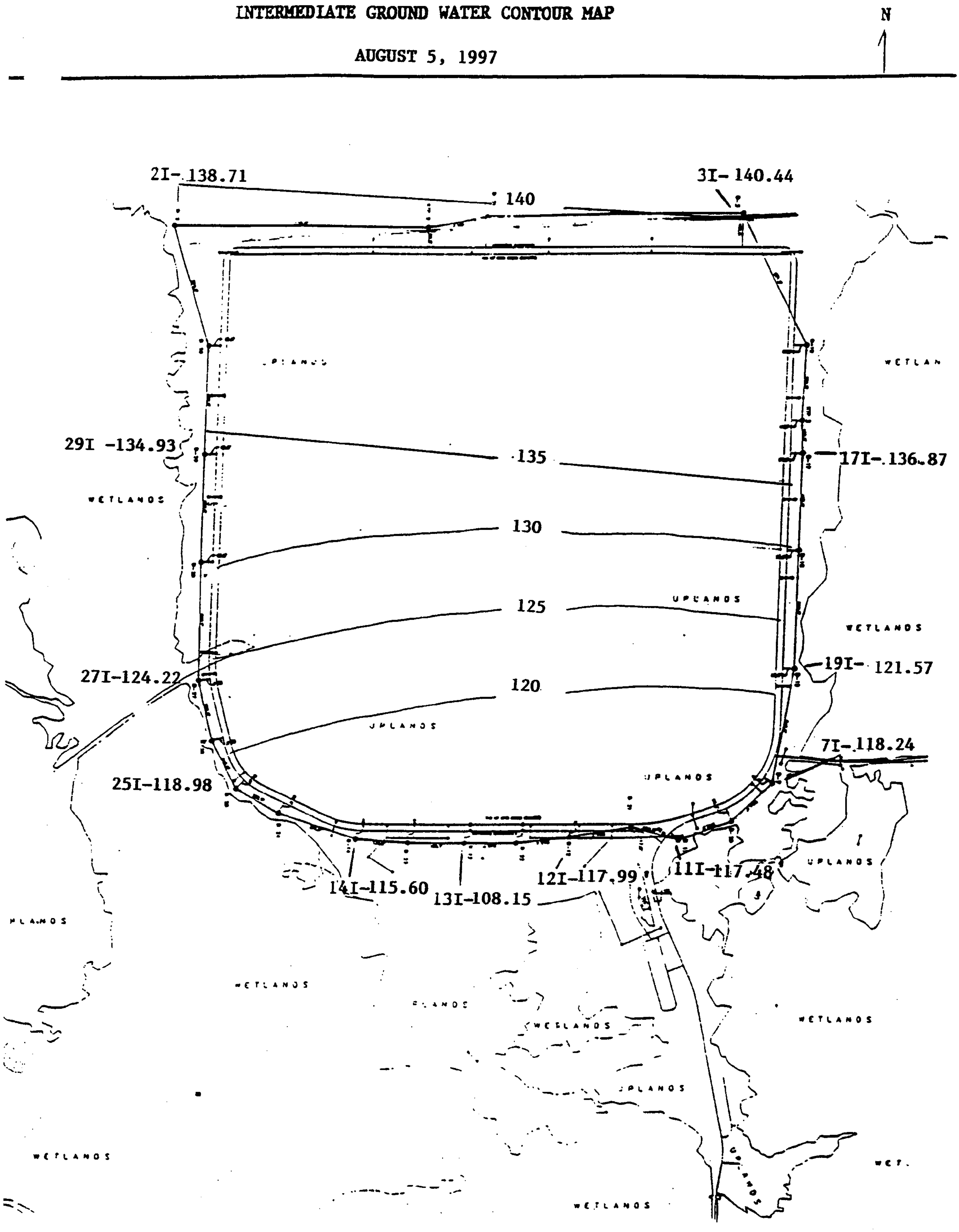
AUGUST 5, 1997



TRAIL RIDGE LANDFILL

INTERMEDIATE GROUND WATER CONTOUR MAP

AUGUST 5, 1997

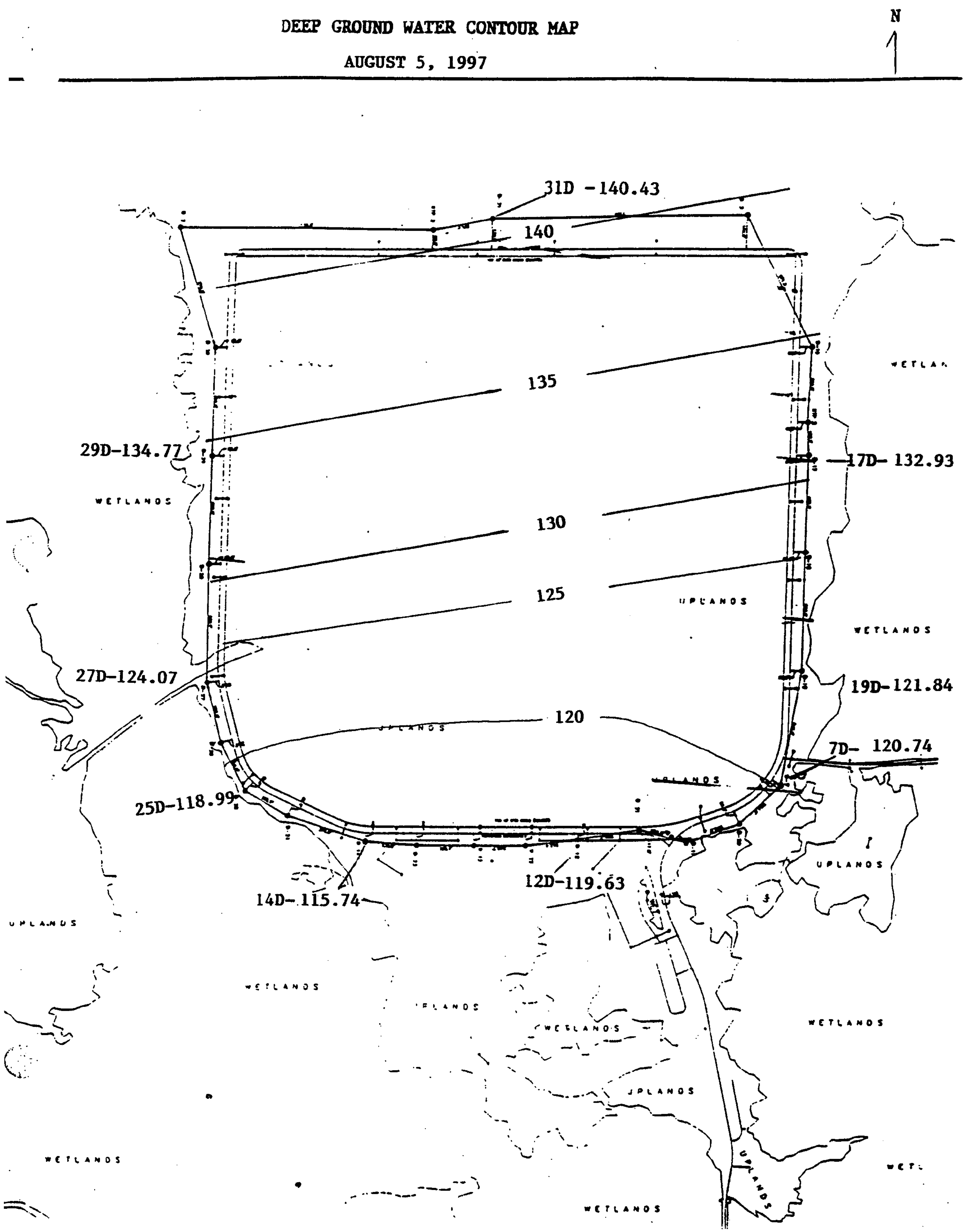


DEP005521

TRAIL RIDGE LANDFILL

DEEP GROUND WATER CONTOUR MAP

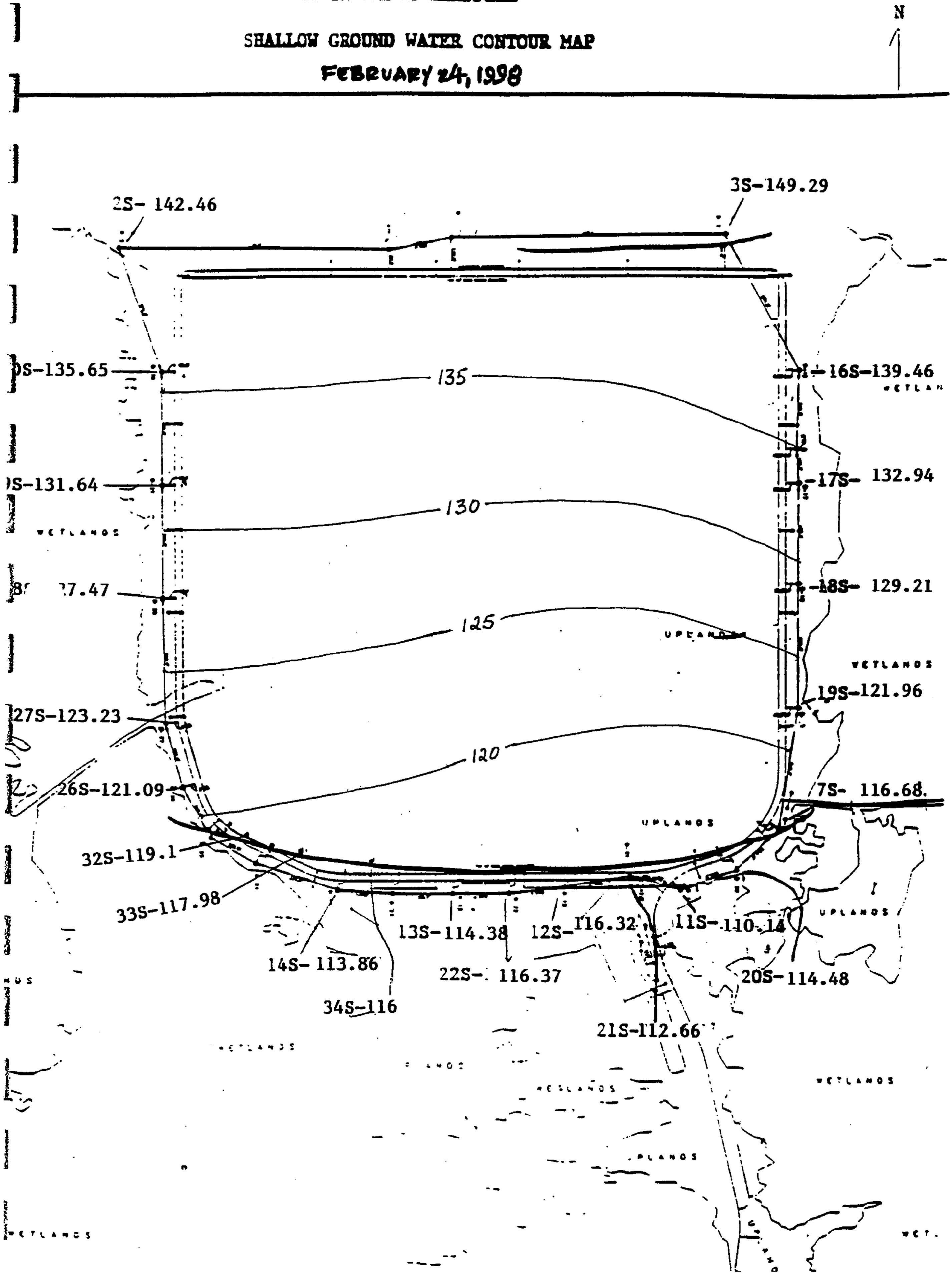
AUGUST 5, 1997



TRAIL RIDGE LANDFILL

SHALLOW GROUND WATER CONTOUR MAP

FEBRUARY 24, 1998

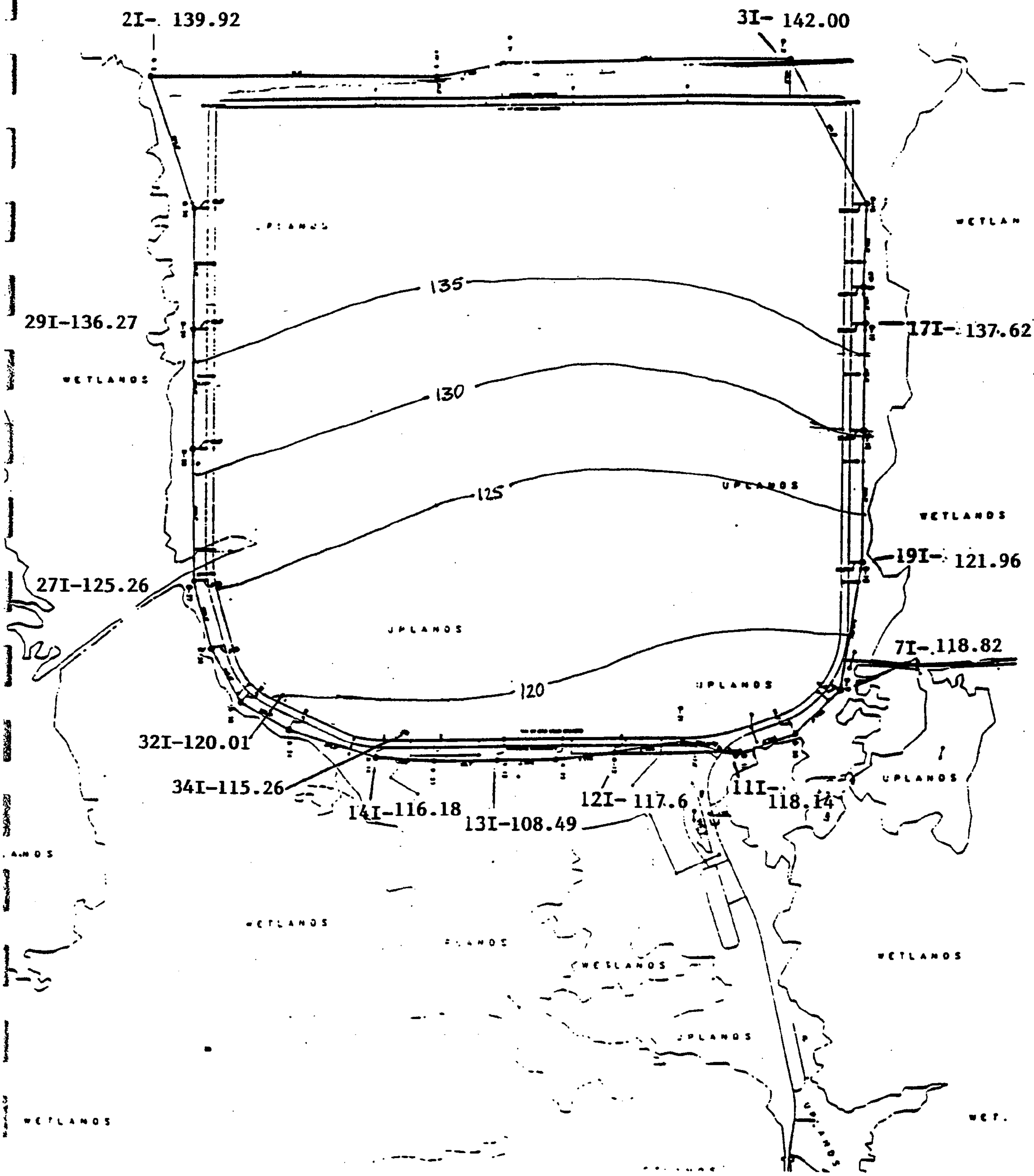


TRAIL RIDGE LANDFILL

INTERMEDIATE GROUND WATER CONTOUR MAP

FEBRUARY 24, 1998

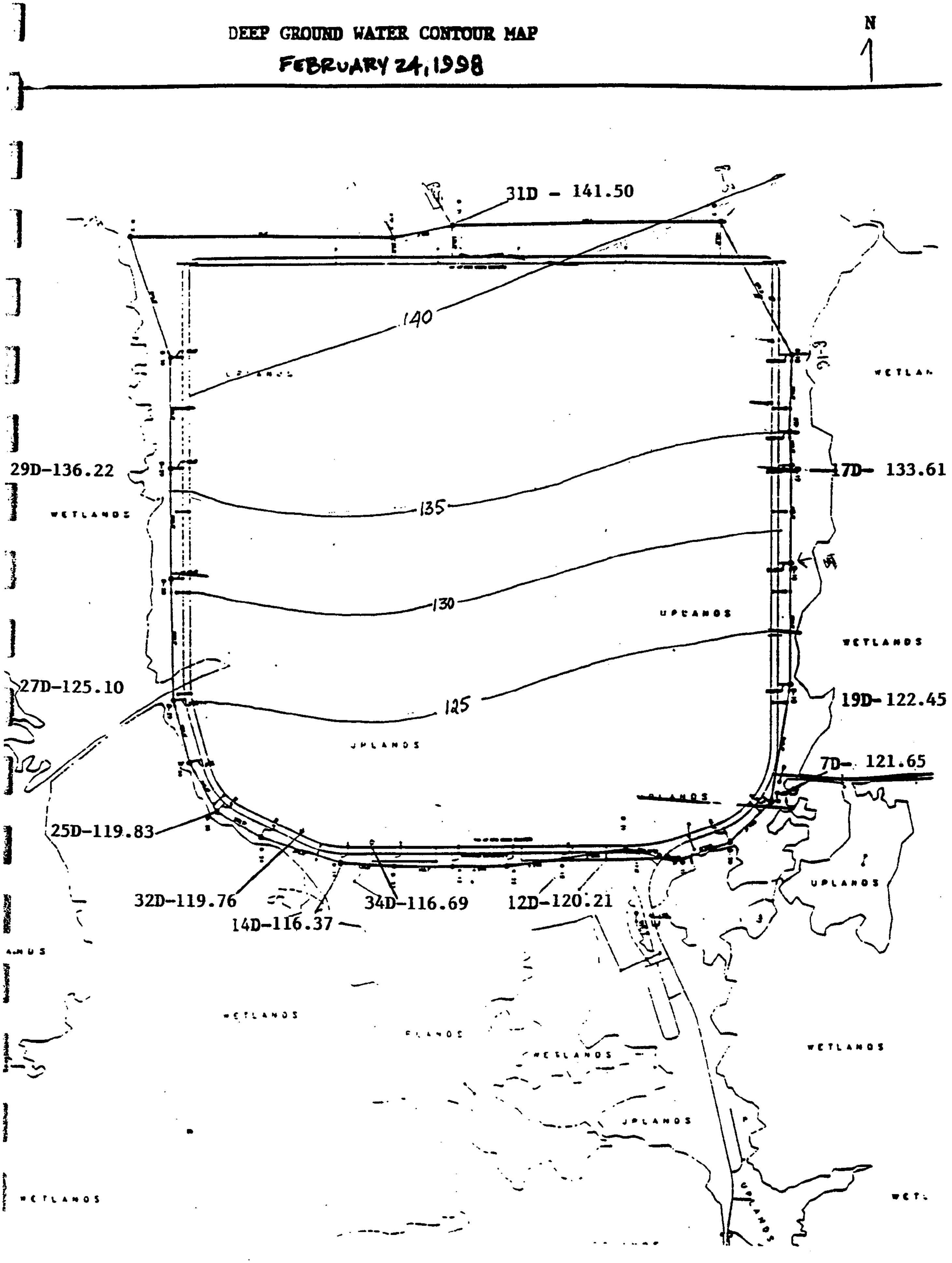
N



TRAIL RIDGE LANDFILL

DEEP GROUND WATER CONTOUR MAP

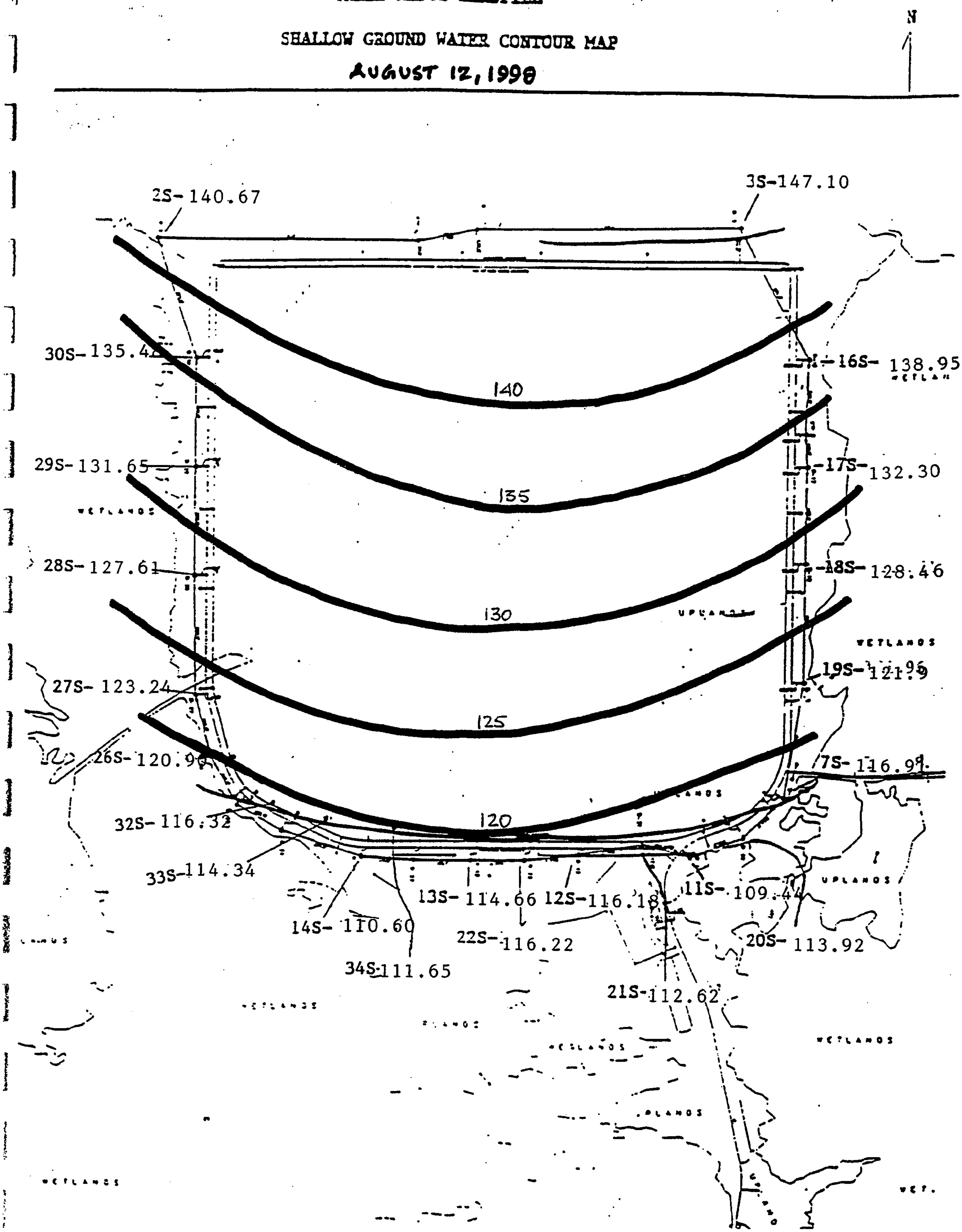
FEBRUARY 24, 1998



TRAIL RIDGE LANDFILL

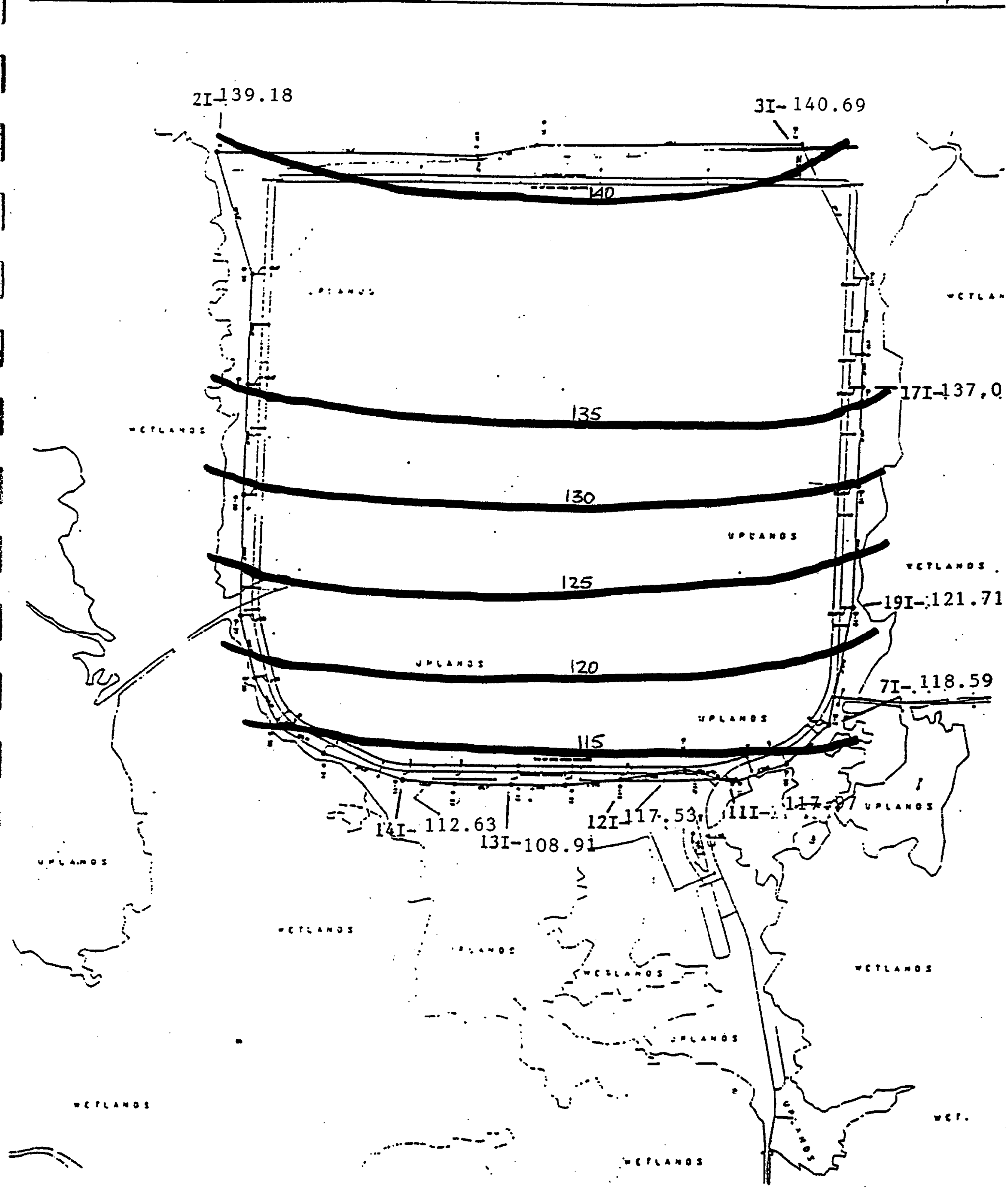
SHALLOW GROUND WATER CONTOUR MAP

AUGUST 12, 1998



INTERMEDIATE GROUND WATER CONTOUR MAP

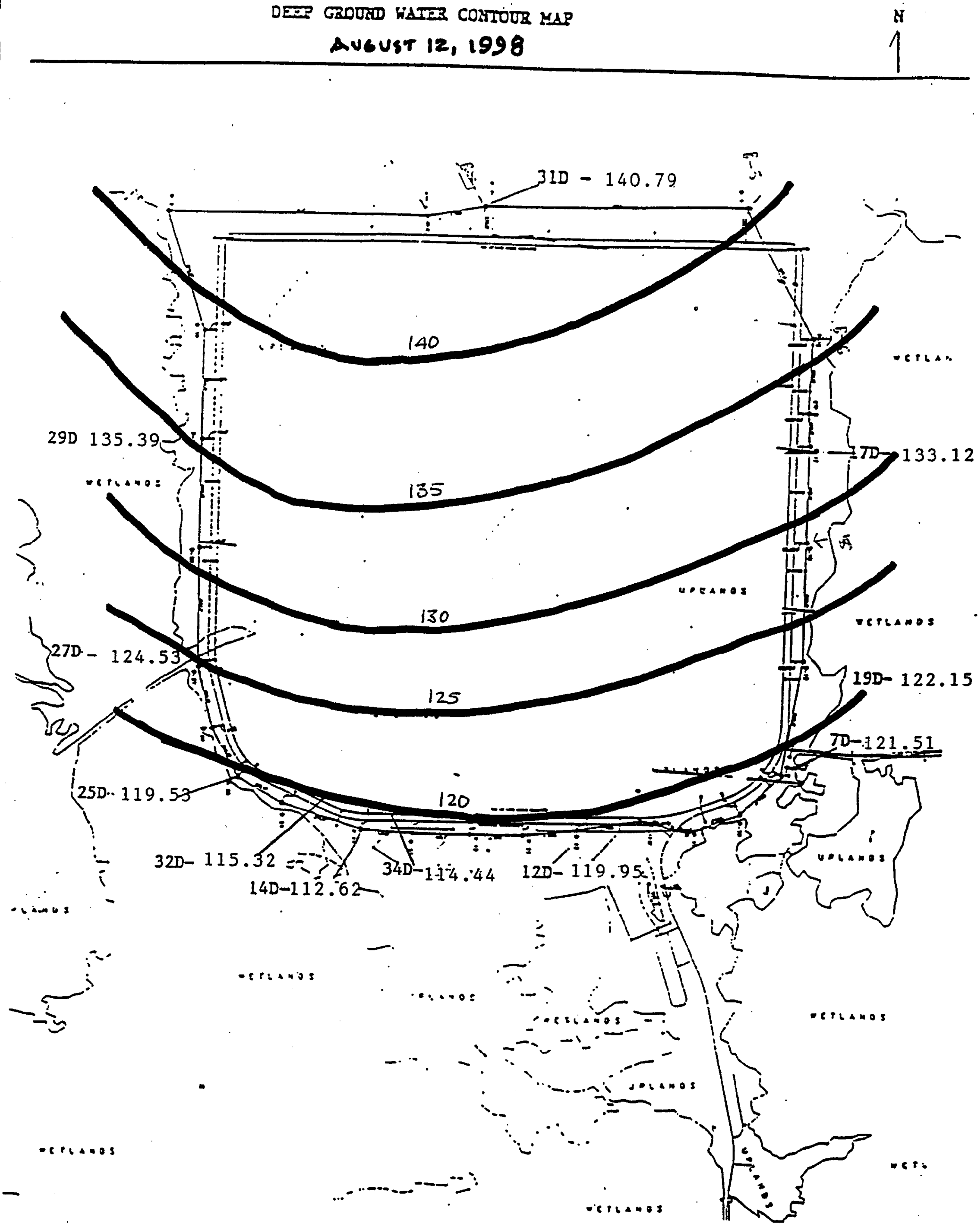
AUGUST 12, 1998



TRAIL RIDGE LANDFILL

DEEP GROUND WATER CONTOUR MAP

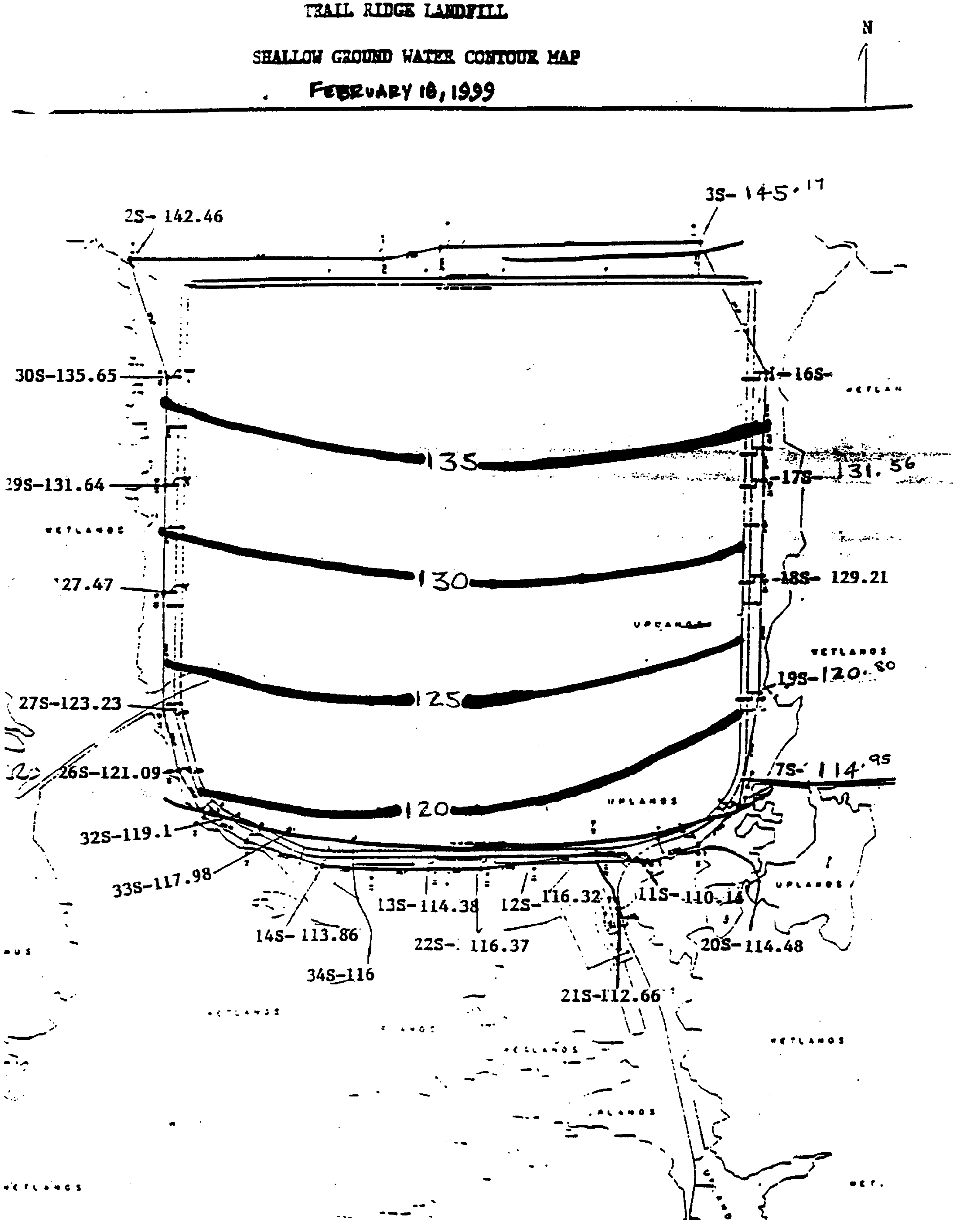
AUGUST 12, 1998



TRAIL RIDGE LANDFILL

SHALLOW GROUND WATER CONTOUR MAP

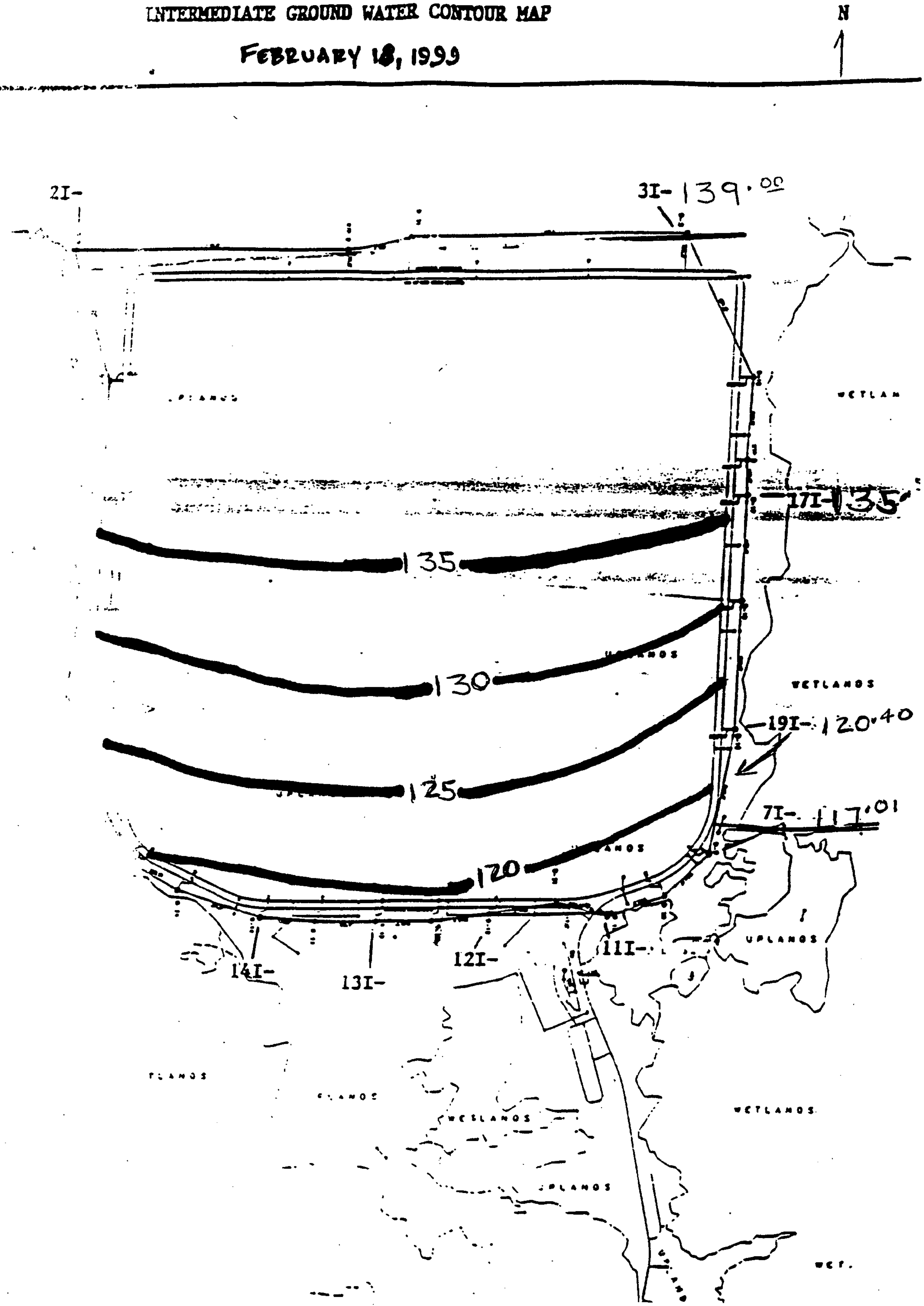
FEBRUARY 18, 1999



TRAIL RIDGE LANDFILL

INTERMEDIATE GROUND WATER CONTOUR MAP

FEBRUARY 18, 1999



TRAIL RIDGE LANDFILL

DEEP GROUND WATER CONTOUR MAP

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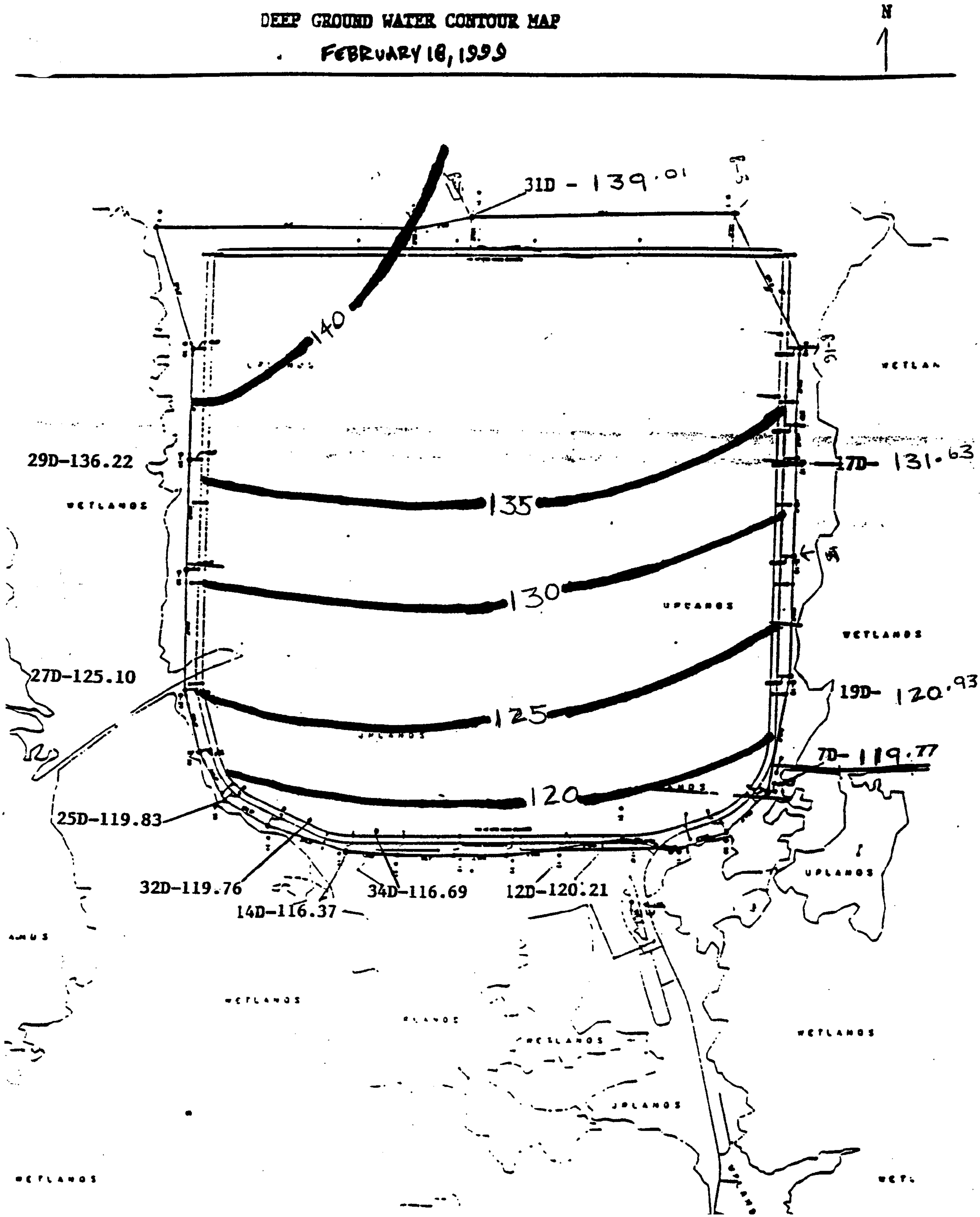
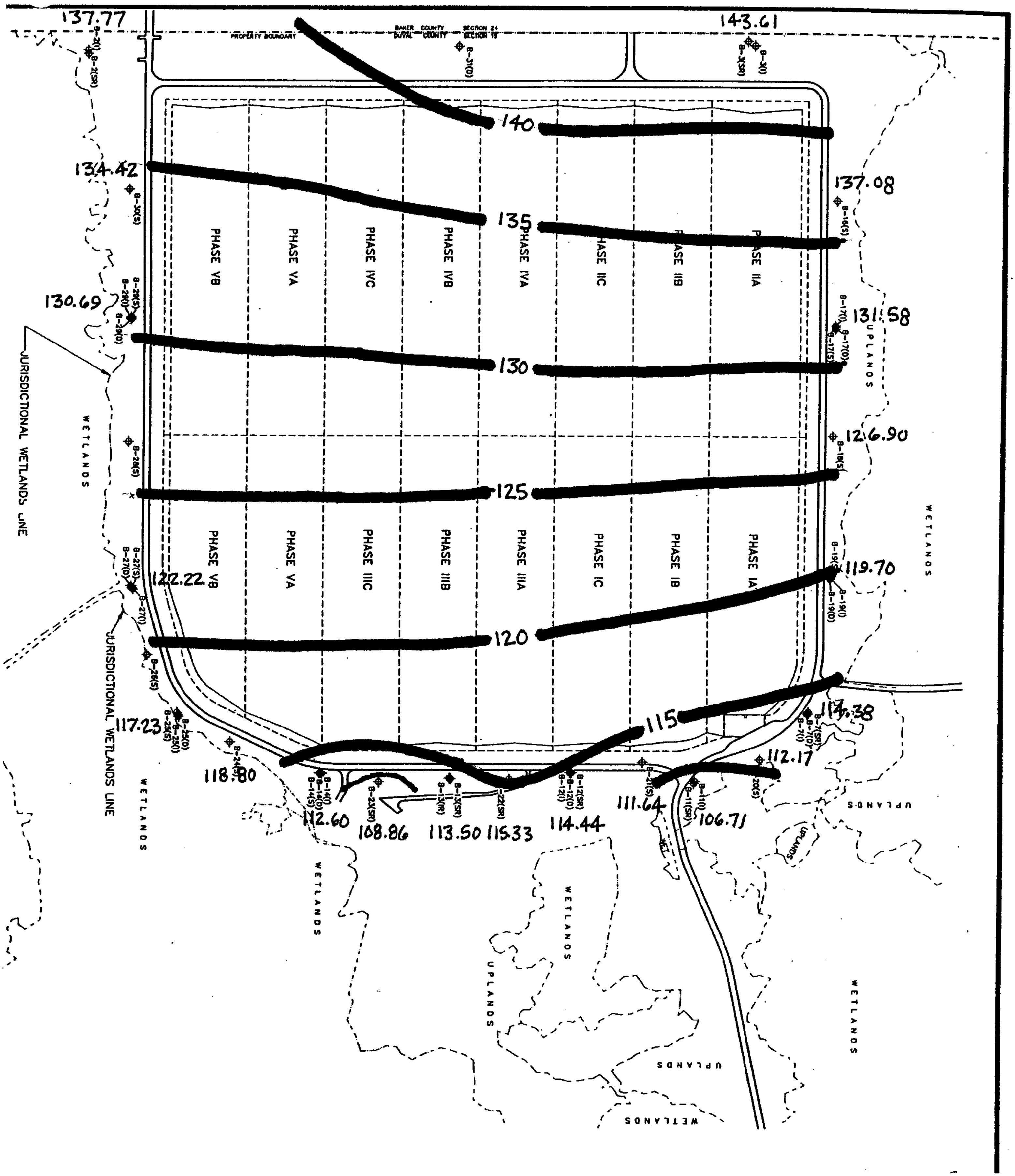


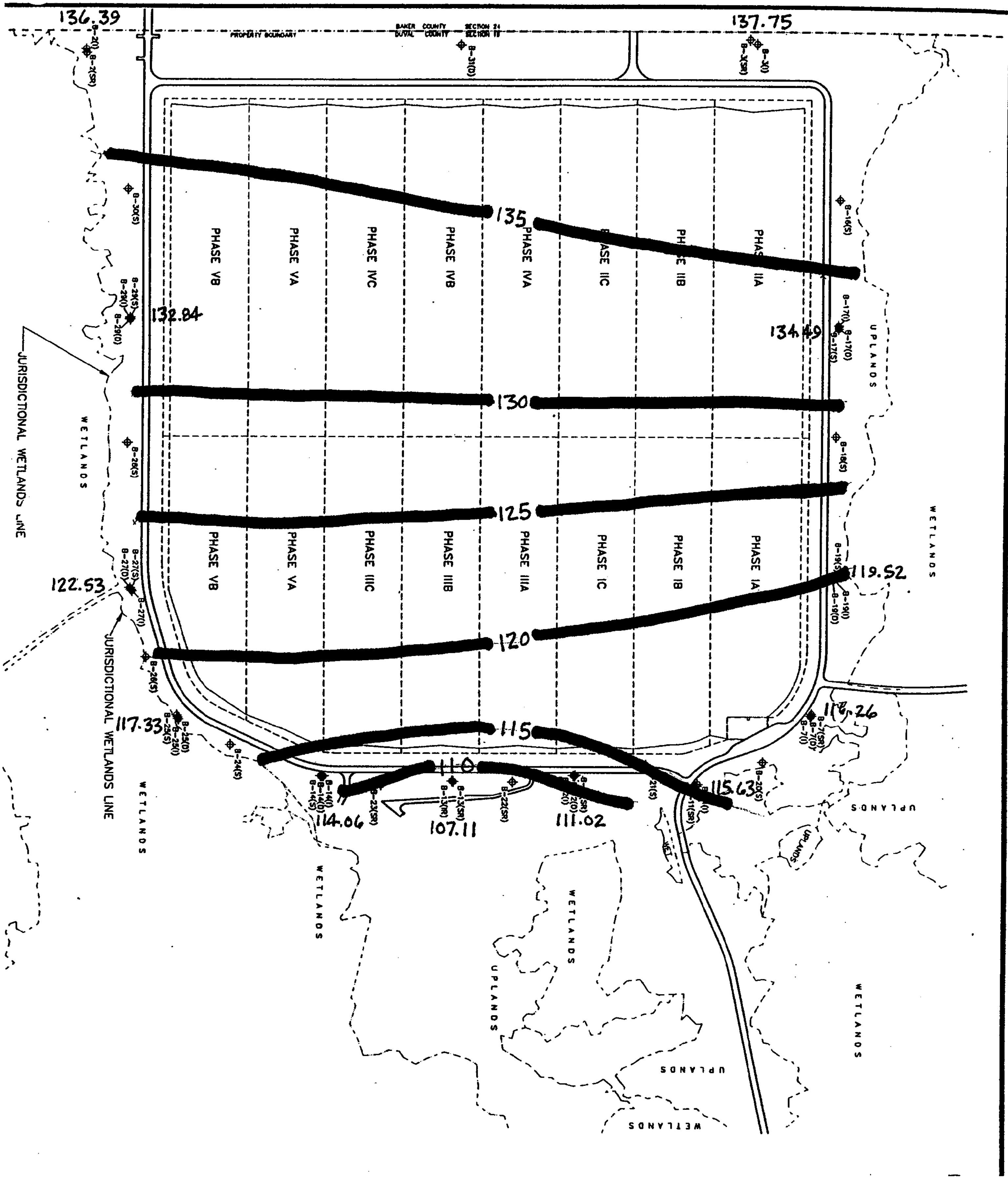
TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (SHALLOW WELLS)

JULY 20, 1999



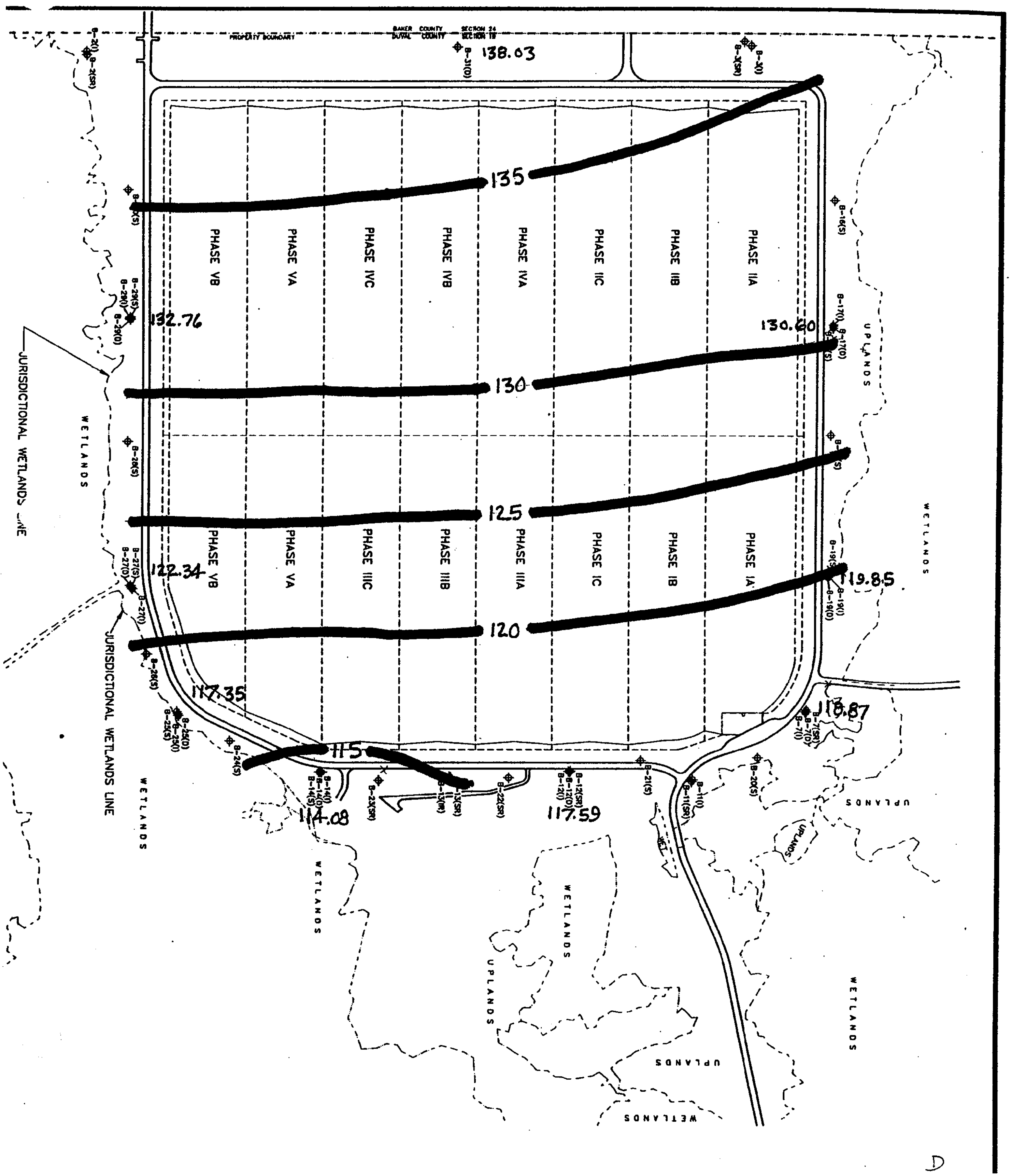
TRAIL RIDGE LANDFILL
GROUNDWATER COUNTOURS (INTERMEDIATE WELLS)

JULY 20, 1999



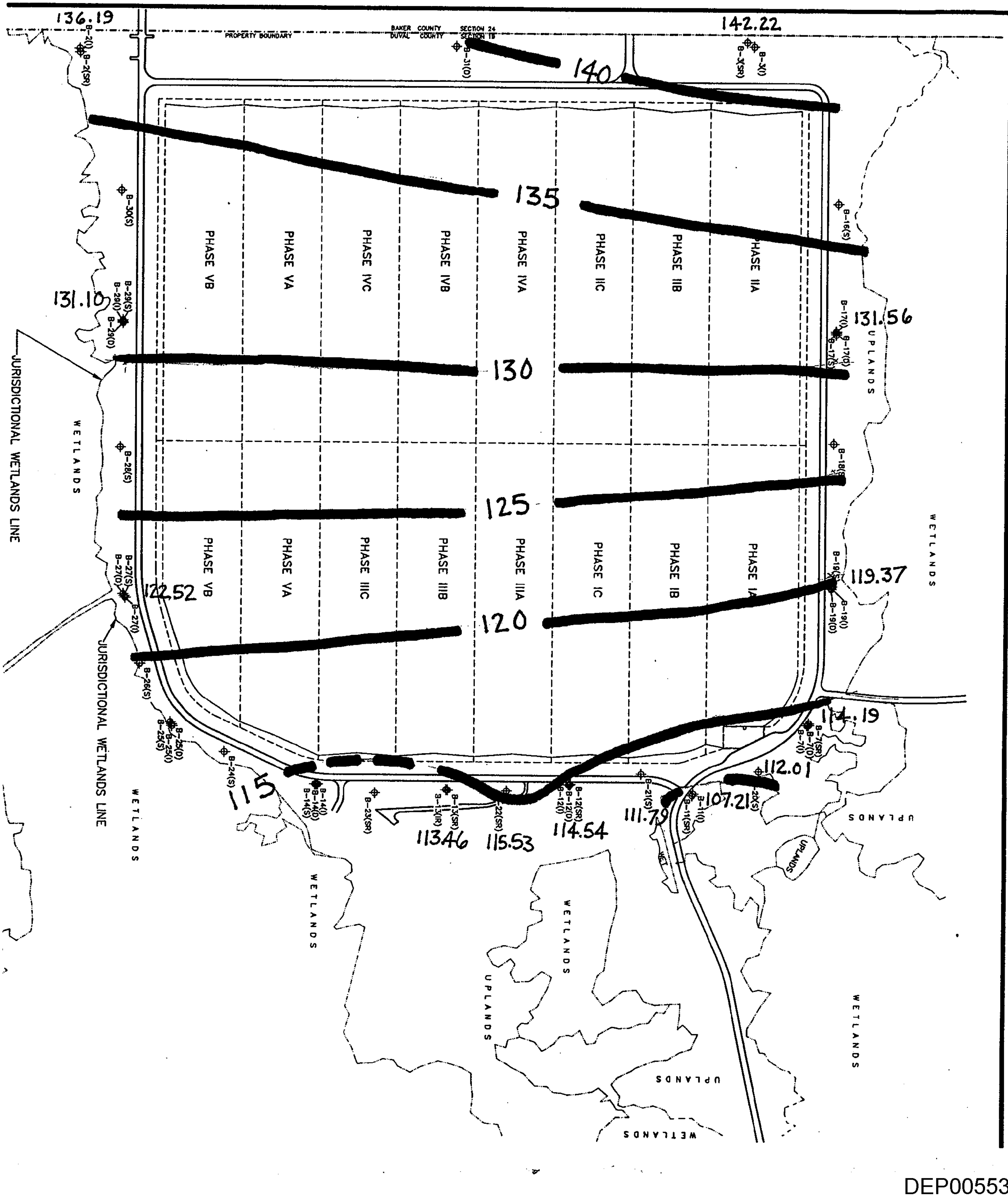
TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (DEEP WELLS)

JULY 20, 1999



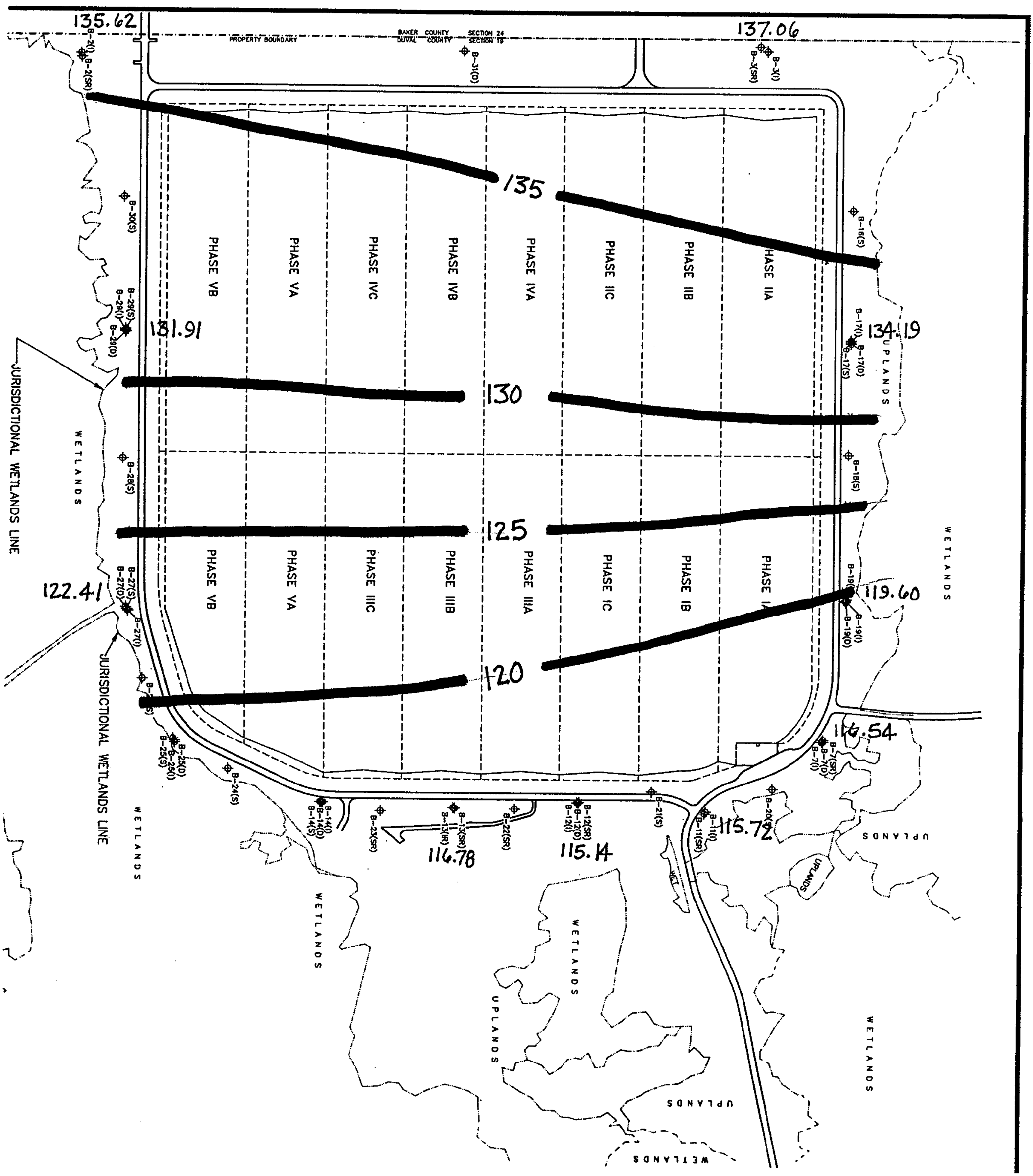
TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (SHALLOW WELLS)

JANUARY 25, 2000



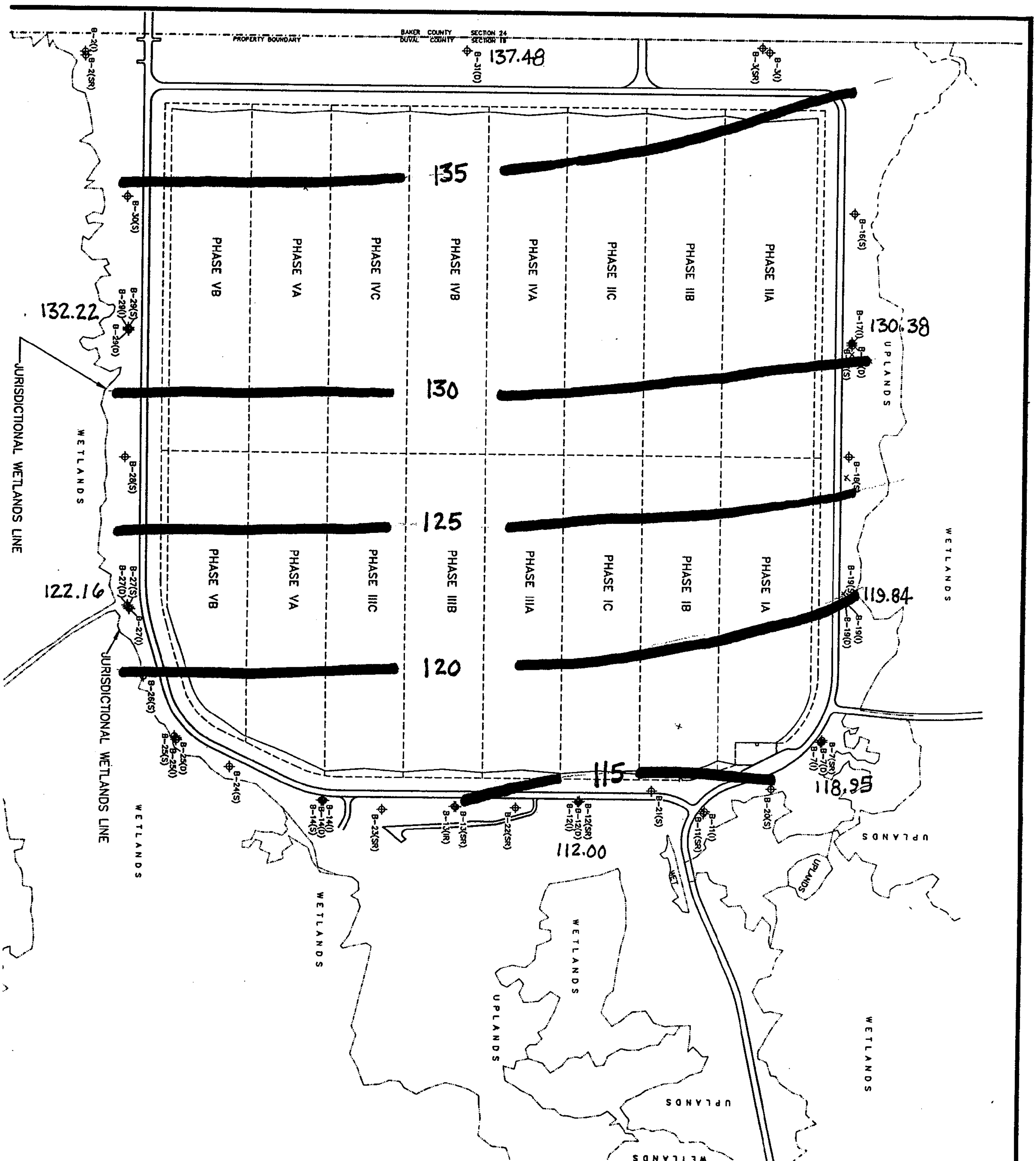
TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (INTERMEDIATE WELLS)

JANUARY 25, 2000

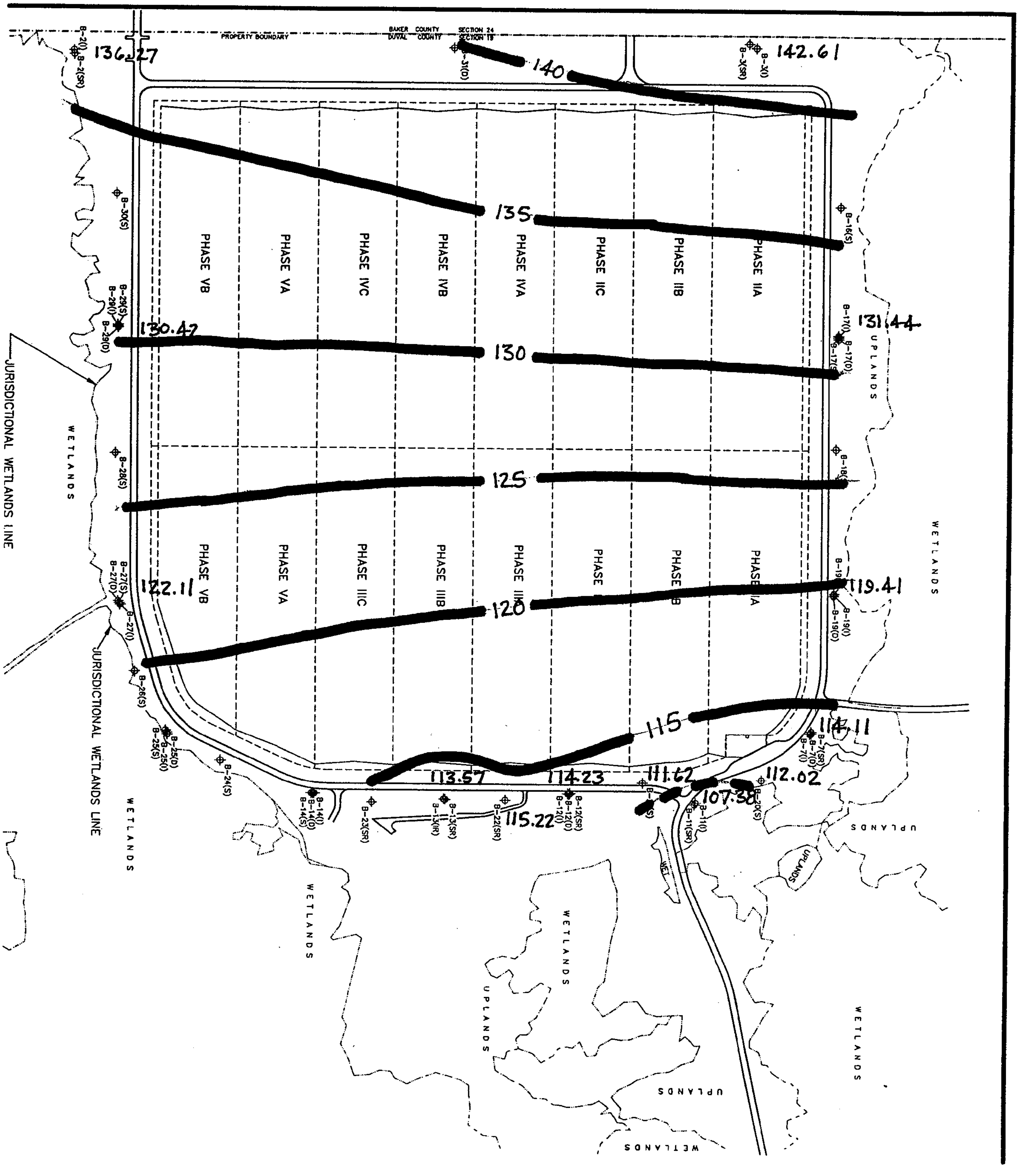


TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (DEEP WELLS)

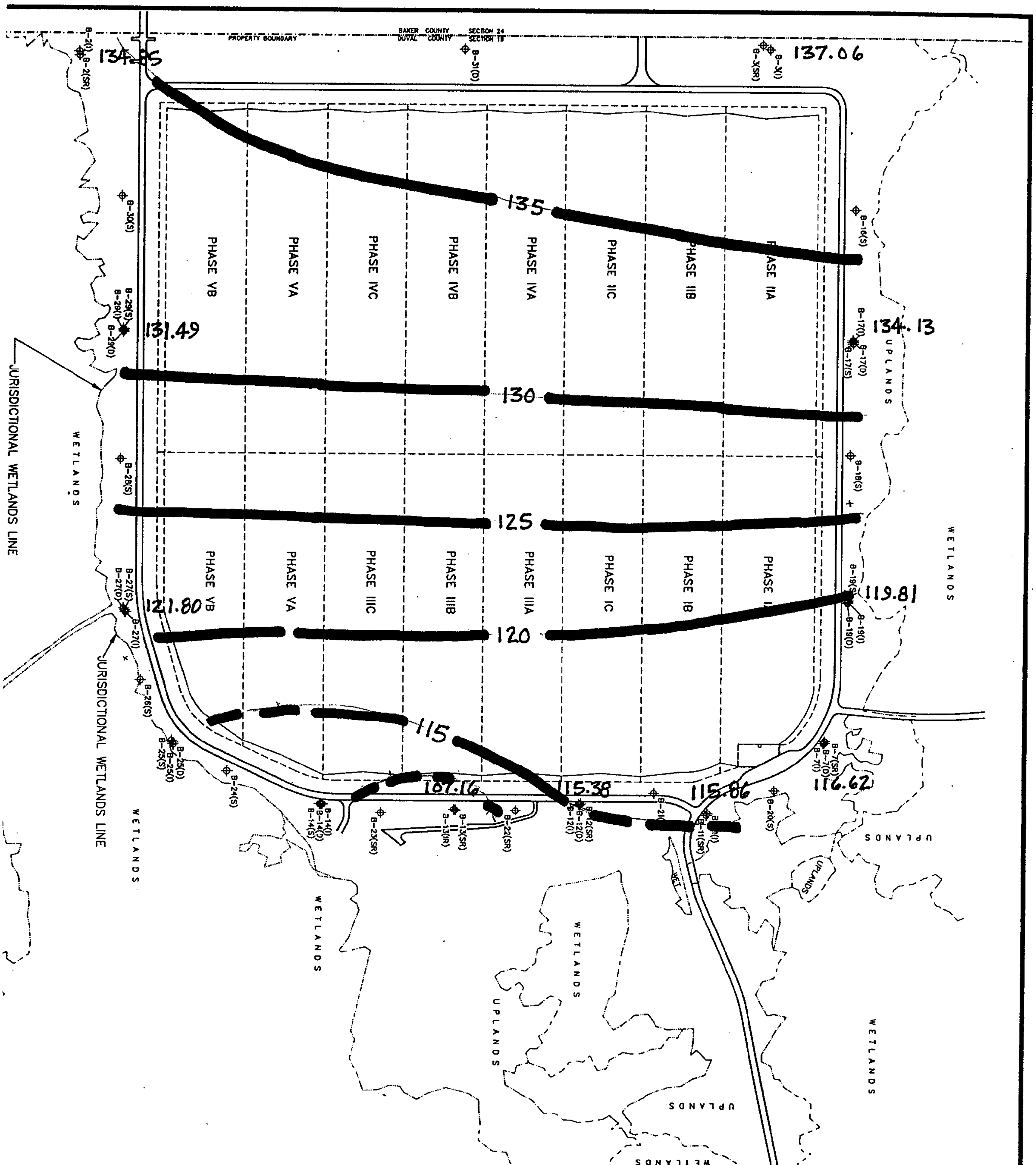
JANUARY 25, 2000



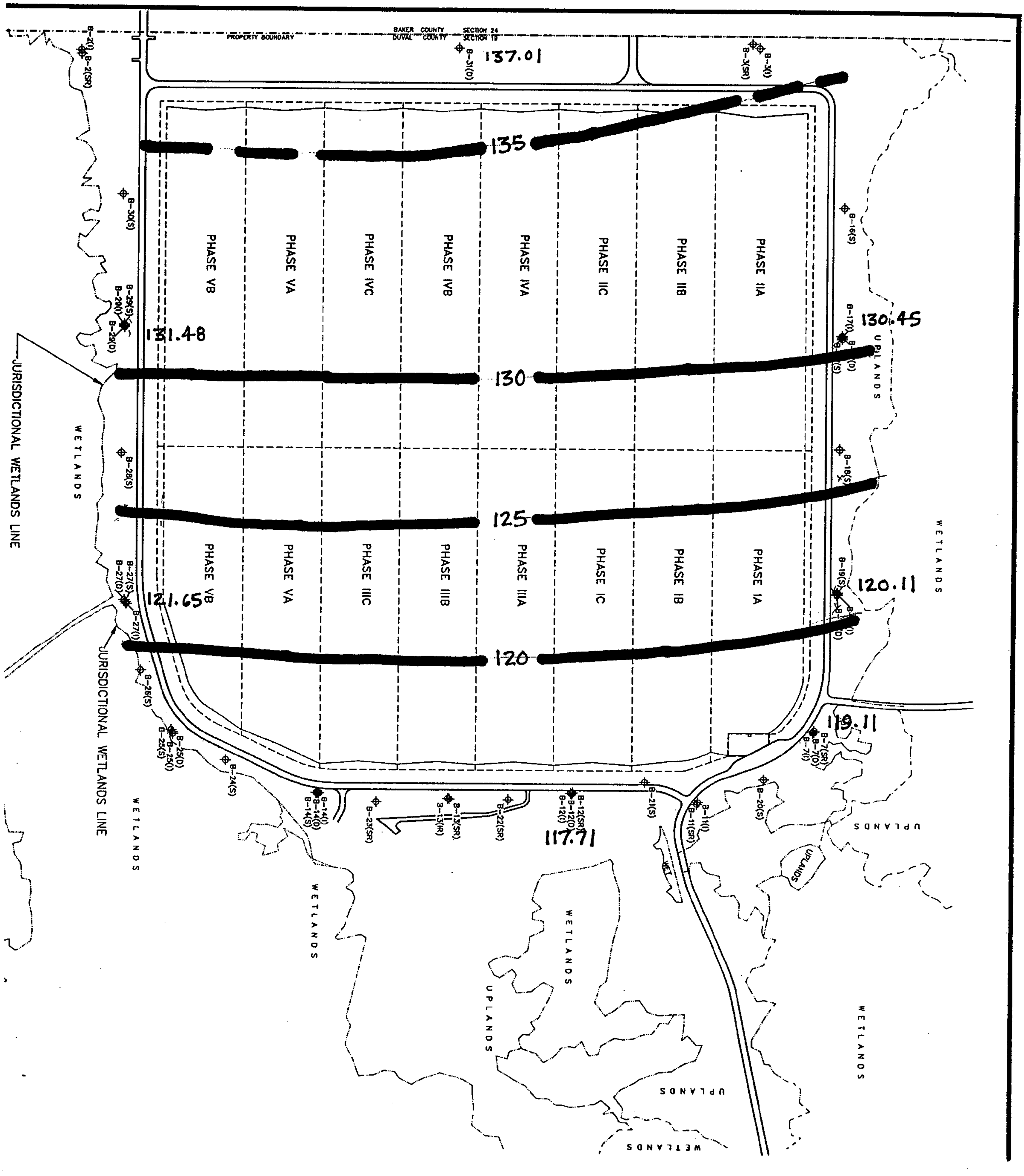
TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (SHALLOW WELLS)
(9/7/2000)



TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (INTERMEDIATE WELLS)
(9/7/2000)

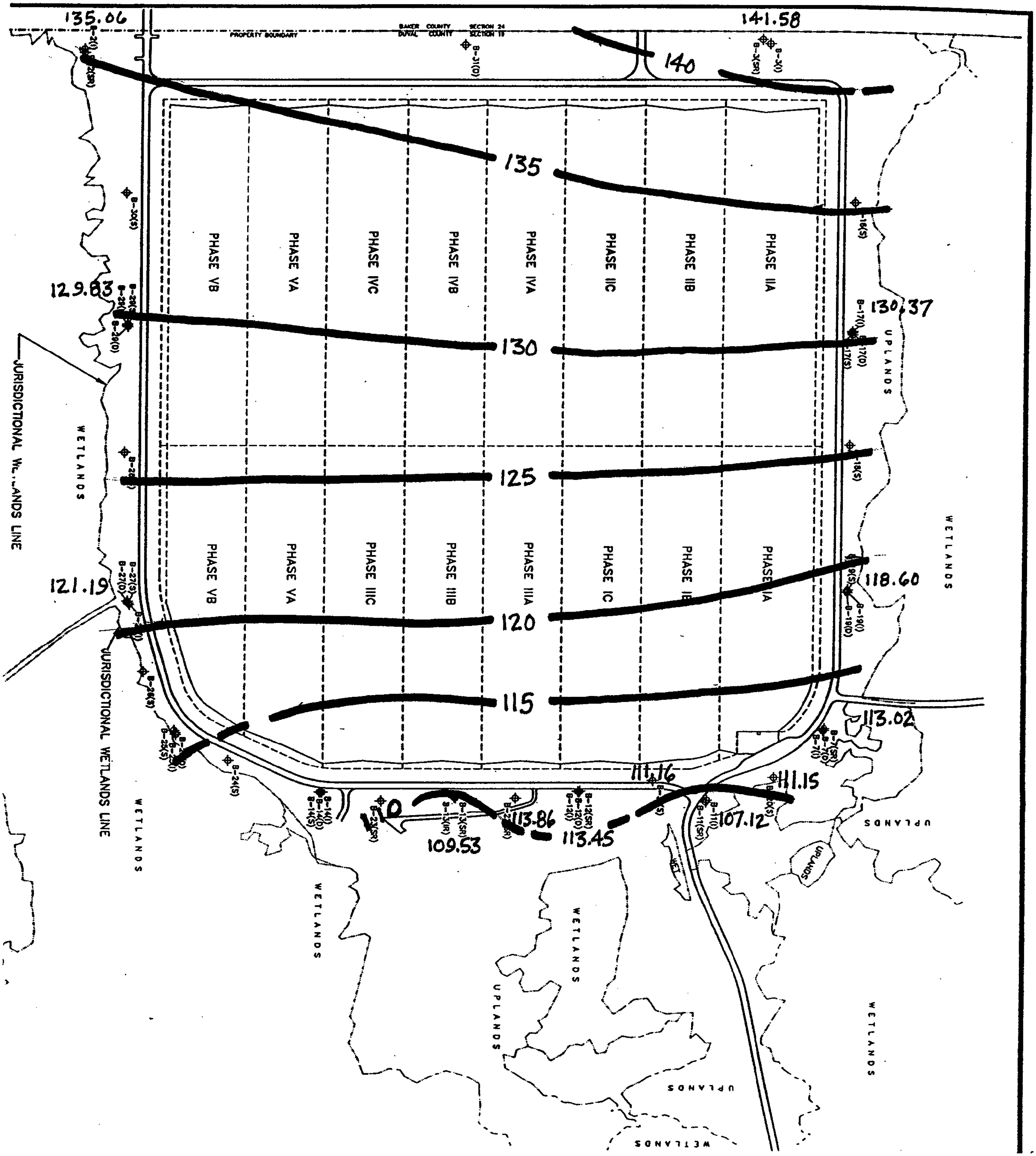


TRAIL RIDGE LANDFILL
GROUNDWATER CONTOURS (DEEP WELLS)
(9/7/2000)



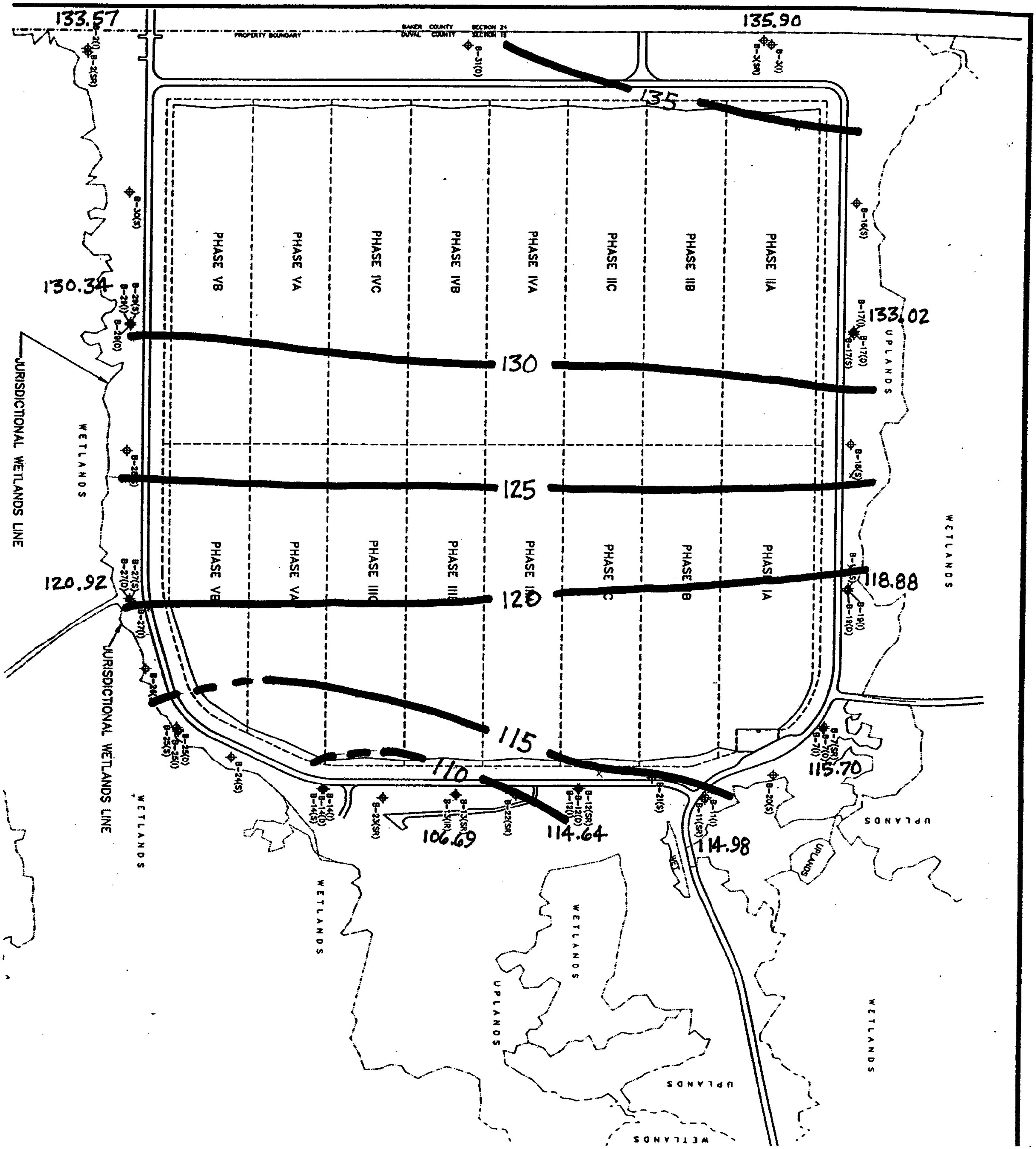
TRAIL RIDGE LANDFILL

SHALLOW WELLS
(January 31, 2001)



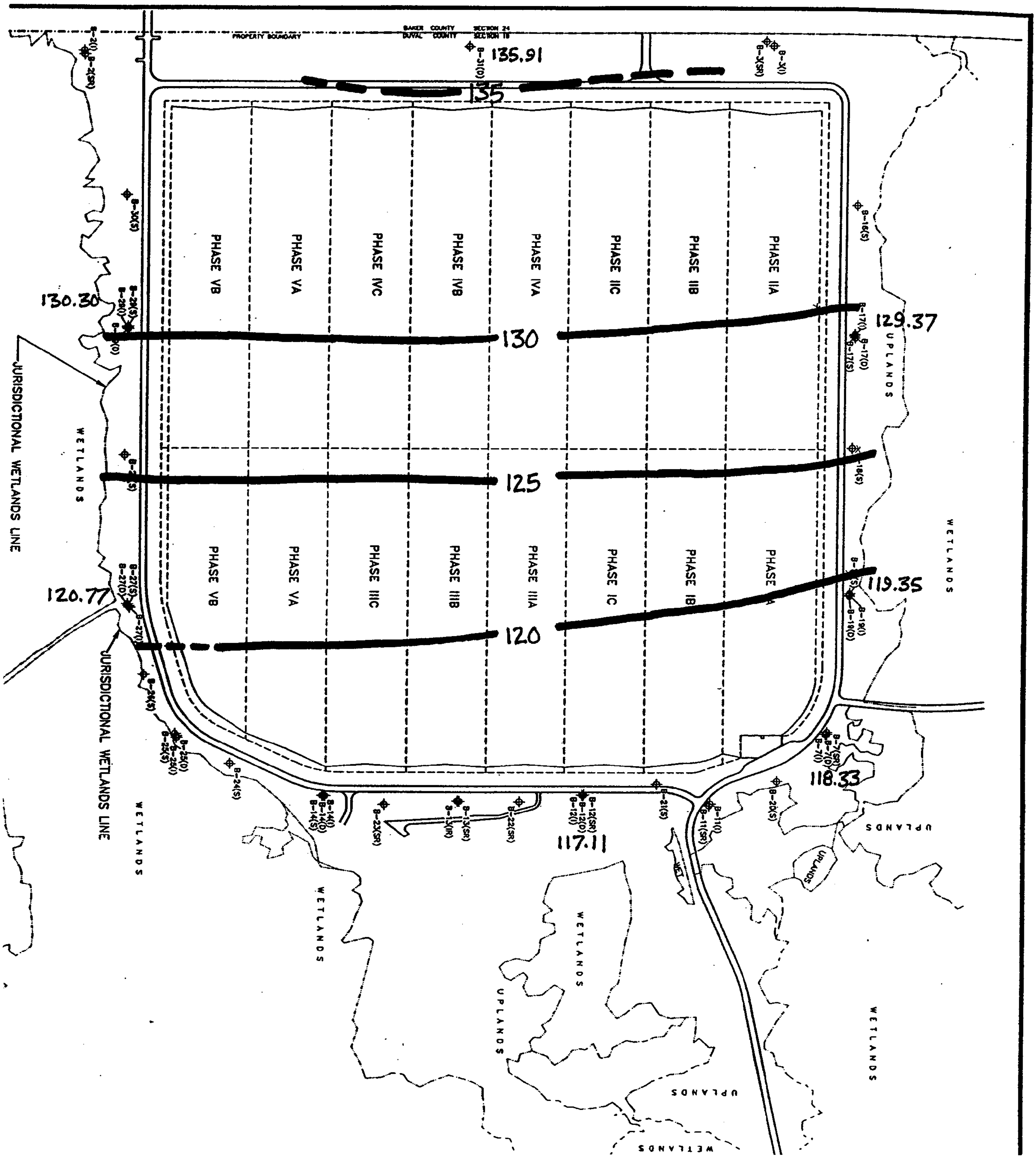
TRAIL RIDGE LANDFILL

INTERMEDIATE WELLS
(January 31, 2001)



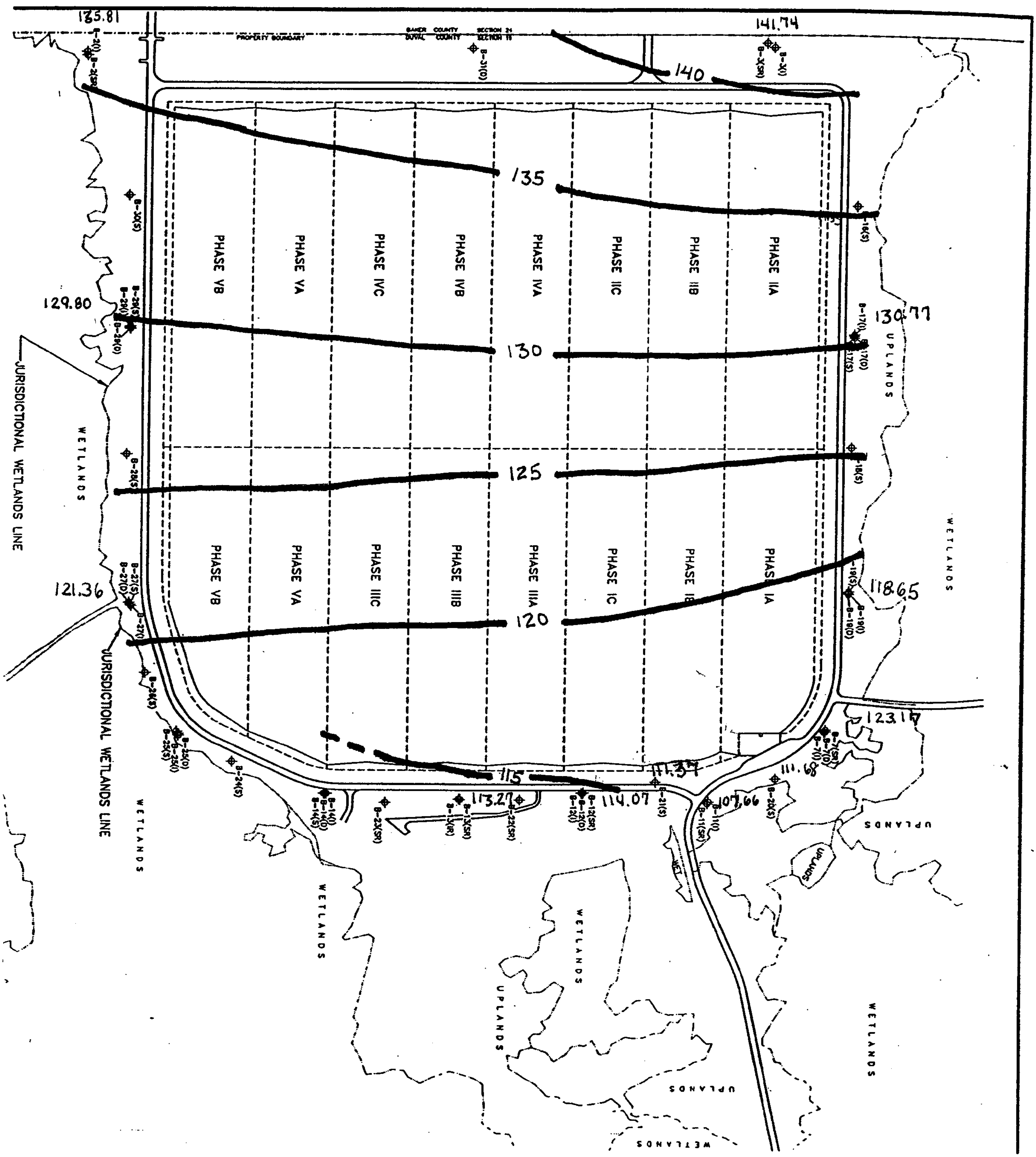
TRAIL RIDGE LANDFILL

DEEP WELLS
(January 31, 2001)



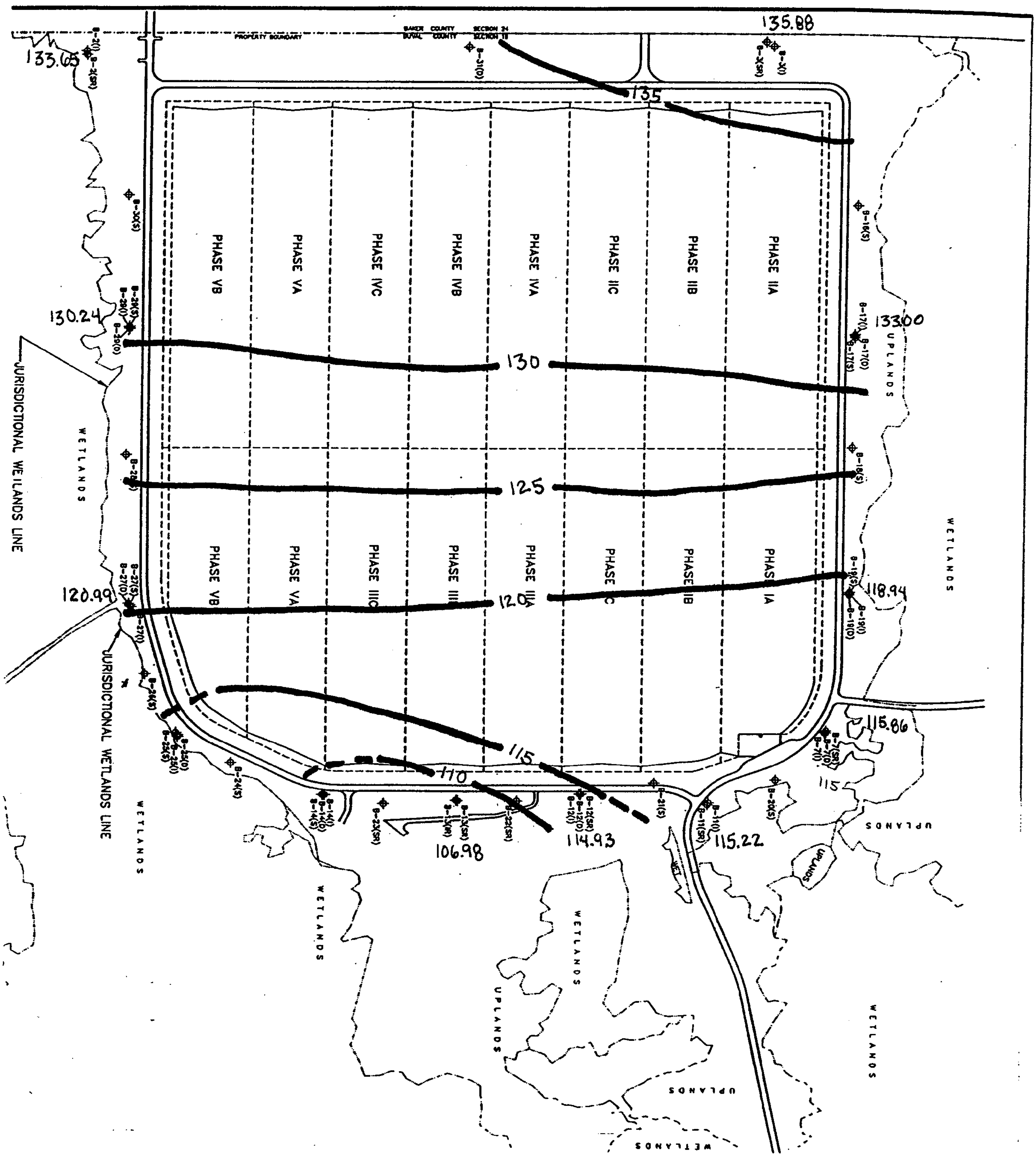
TRAIL RIDGE LANDFILL

SHALLOW WELLS
(July 17, 2001)



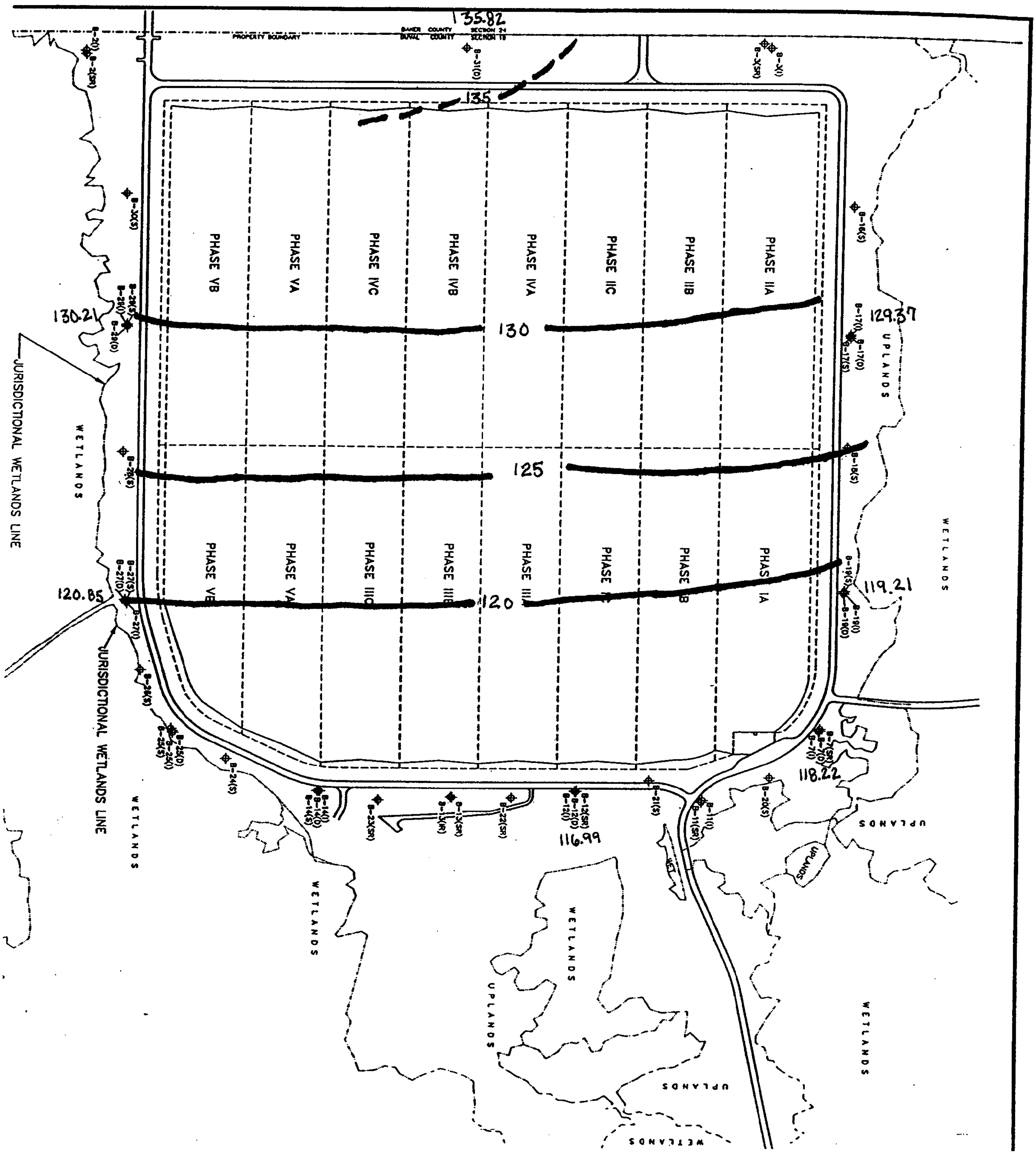
TRAIL RIDGE LANDFILL

INTERMEDIATE WELLS
(July 17, 2001)



TRAIL RIDGE LANDFILL

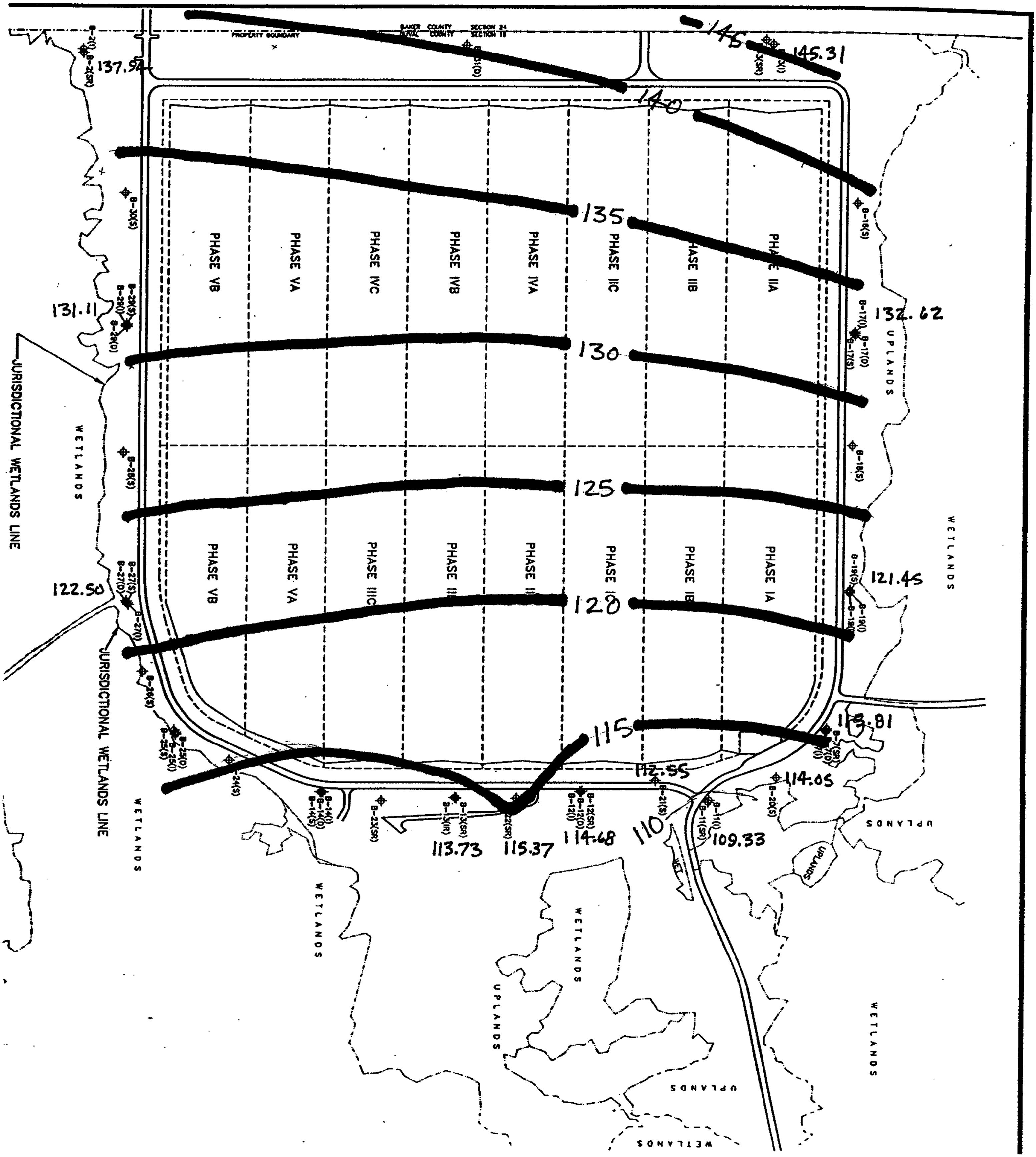
DEEP WELLS
(July 17, 2001)



TRAIL RIDGE LANDFILL

SHALLOW WELLS

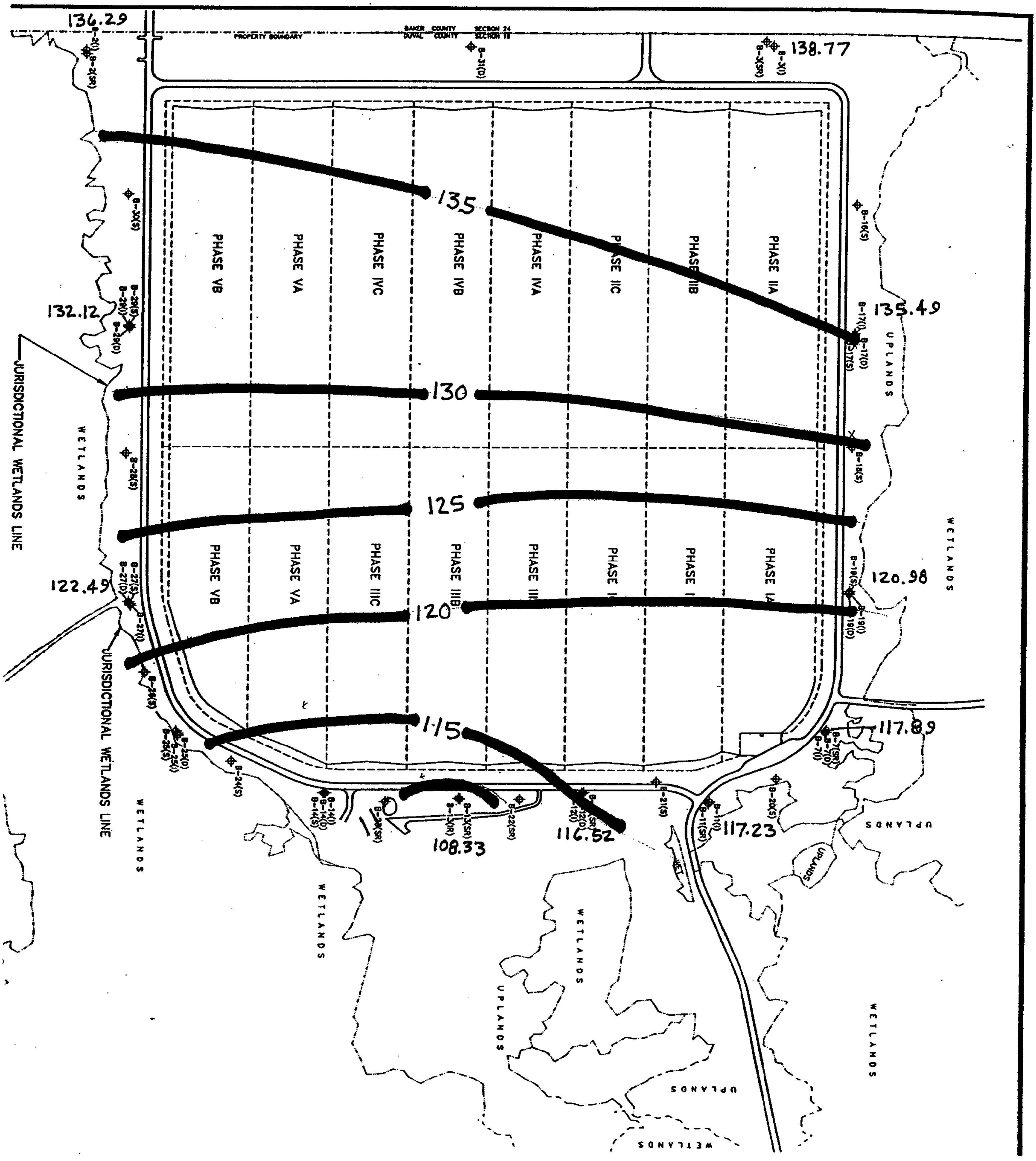
(JANUARY 15, 2002)



TRAIL RIDGE LANDFILL

INTERMEDIATE WELLS

(JANUARY 15, 2002)

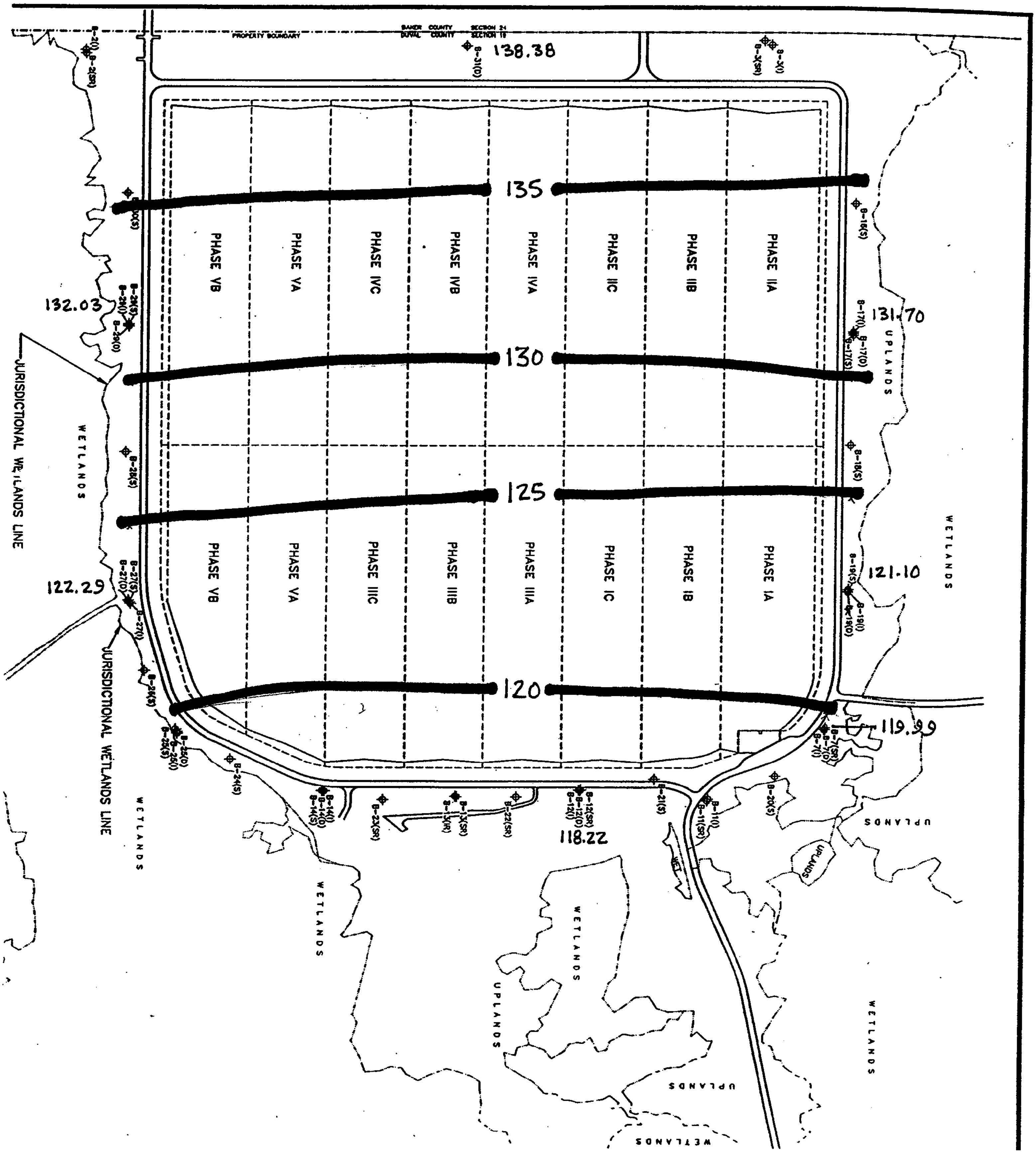


DEP005548

TRAIL RIDGE LANDFILL

DEEP WELLS

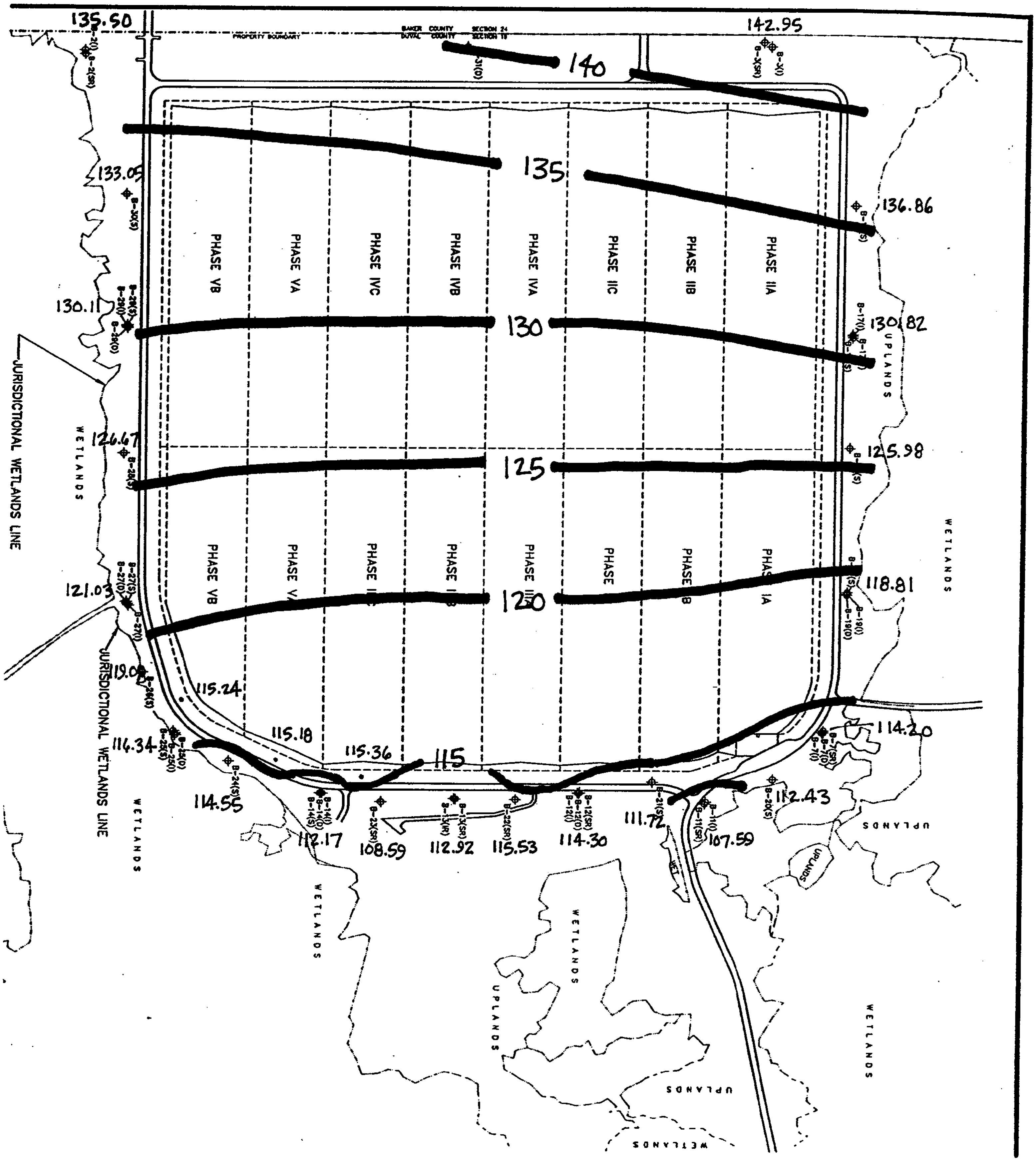
(JANUARY 15, 2002)



TRAIL RIDGE LANDFILL

SHALLOW WELLS

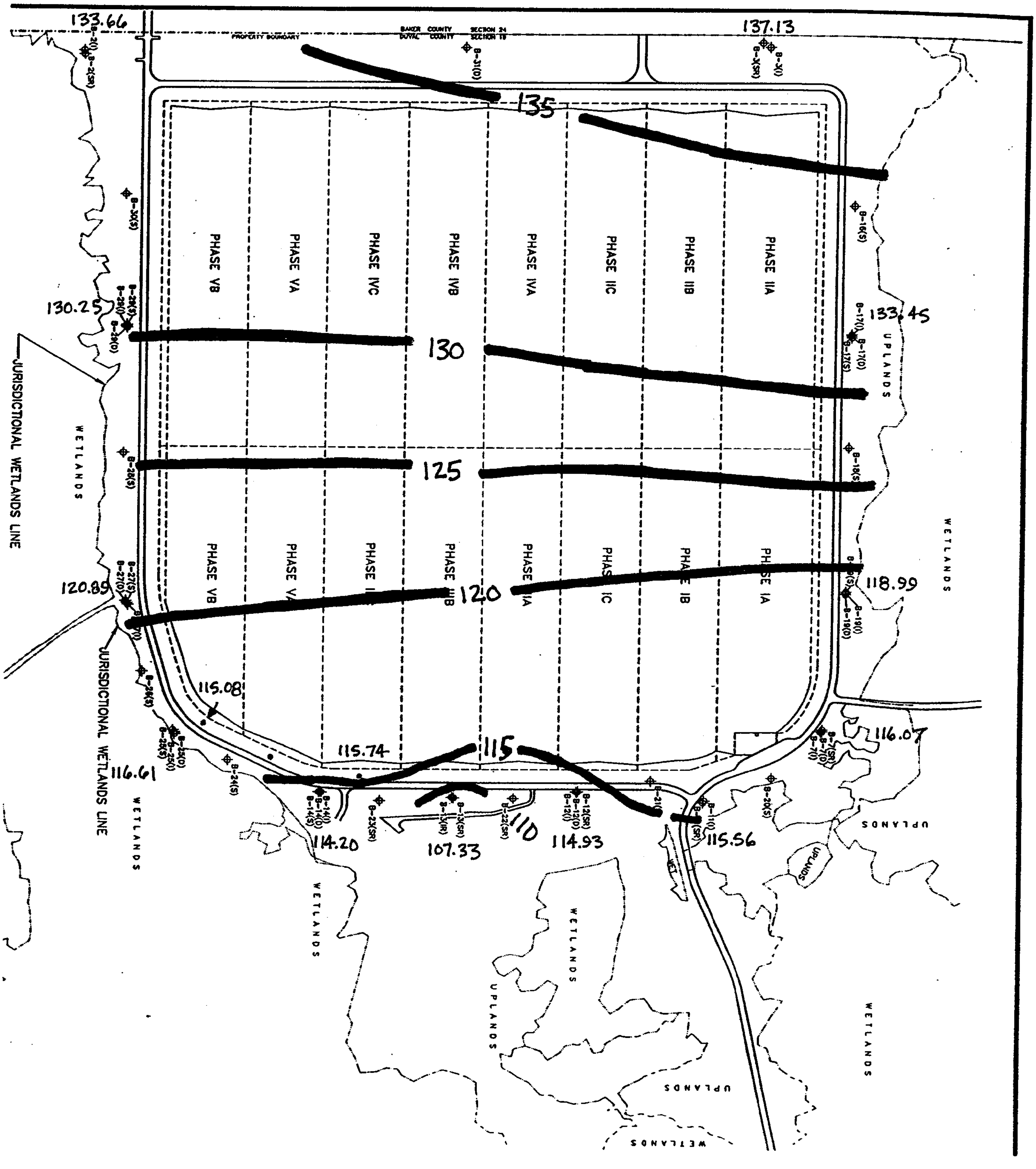
JUNE 24, 2002



TRAIL RIDGE LANDFILL

INTERMEDIATE WELLS

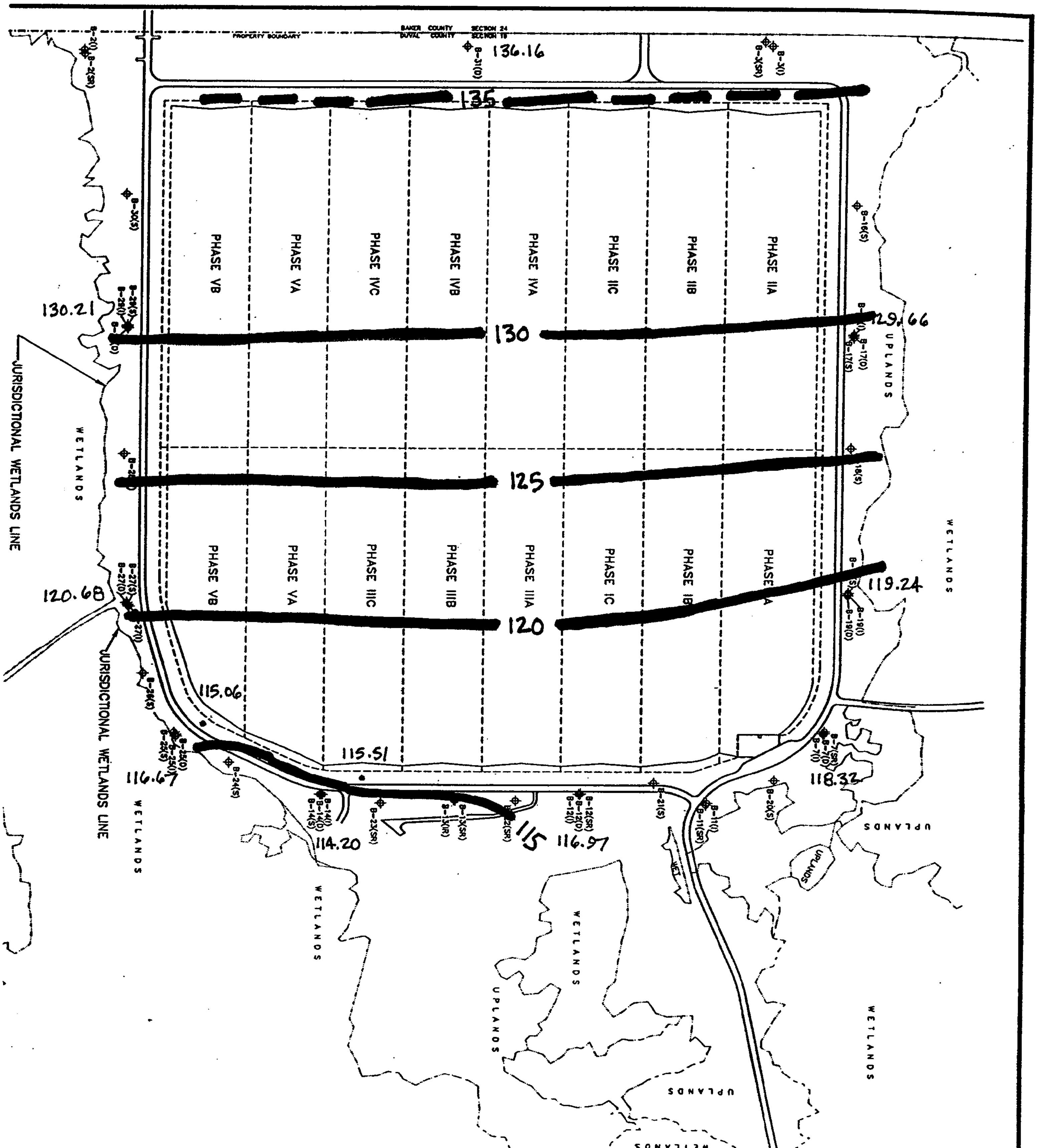
JUNE 24, 2002



TRAIL RIDGE LANDFILL

DEEP WELLS

JUNE 24, 2002



Attachment B

Groundwater Analytical Data
(Detections)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-2S	Barium - Total		7/14/97	0.018	mg/l
MWB-2S	Barium - Total	200.7	01/25/00	0.018	mg/l
MWB-2S	Barium - Total	200.8	09/07/00	0.015	mg/l
MWB-2S	Barium - Total	200.8	01/30/01	0.013	mg/L
MWB-2S	Barium - Total	200.8	07/17/01	0.016	mg/L(ppm)
MWB-2S	Barium - Total	200.7	01/15/02	0.019	mg/L(ppm)
MWB-2S	Barium - Total	200.7	06/25/02	0.019	mg/L (ppm)
MWB-2S	Cadmium - Total		7/17/96	0.003	mg/l
MWB-2S	Cadmium - Total		1/21/97	0.003	mg/l
MWB-2S	Cadmium - Total		7/14/97	0.003	mg/l
MWB-2S	Cadmium - Total	213.2	02/24/98	0.0037	mg/l
MWB-2S	Chloride		1/10/96	7.5	mg/l
MWB-2S	Chloride		7/17/96	8.83	mg/l
MWB-2S	Chloride		1/21/97	5.37	mg/l
MWB-2S	Chloride		7/14/97	18.6	mg/l
MWB-2S	Chloride	300.0	02/24/98	3.1	mg/l
MWB-2S	Chloride	300.0	8/12/98	5.1	mg/l
MWB-2S	Chloride	300.0	01/20/99	5.75	mg/l
MWB-2S	Chloride	300.0	02/18/99	4.6	mg/l
MWB-2S	Chloride	300.0	01/25/00	8.41	mg/l
MWB-2S	Chloride	300.0	09/07/00	4.83	mg/l
MWB-2S	Chloride	300.0	01/30/01	6.42	mg/L
MWB-2S	Chloride	300.0	07/17/01	6.6	mg/L (ppm)
MWB-2S	Chloride	300.0	01/15/02	8.5	mg/L (ppm)
MWB-2S	Chloride	300.0	06/25/02	11	mg/L (ppm)
MWB-2S	Color	110.2	8/12/98	10	Units
MWB-2S	Color	110.2	01/20/99	5	Units
MWB-2S	Color	110.2	09/07/00	5	Units
MWB-2S	Color	110.2	07/17/01	5	Color Units
MWB-2S	Color	110.2	01/15/02	5	Color Units
MWB-2S	Cyanide - Total	9012	06/25/02	0.0193	mg/L (ppm)
MWB-2S	Iron - Total		1/10/96	**0.428**	mg/l
MWB-2S	Iron - Total		7/17/96	**0.369**	mg/l
MWB-2S	Iron - Total		1/21/97	**0.479**	mg/l
MWB-2S	Iron - Total		7/14/97	**0.496**	mg/l
MWB-2S	Iron - Total	236.1	02/24/98	**0.450**	mg/l
MWB-2S	Iron - Total	236.1	8/12/98	**0.900**	mg/l
MWB-2S	Iron - Total	236.1	01/20/99	**0.700**	mg/l
MWB-2S	Iron - Total	236.1	02/18/99	**0.400**	mg/l
MWB-2S	Iron - Total	200.7	01/25/00	**0.480**	mg/l
MWB-2S	Iron - Total	200.7	09/07/00	**0.490**	mg/l
MWB-2S	Iron - Total	200.7	01/30/01	**0.340**	mg/L
MWB-2S	Iron - Total	200.7	07/17/01	**0.480**	mg/L(ppm)
MWB-2S	Iron - Total	200.7	01/15/02	**0.400**	mg/L(ppm)
MWB-2S	Iron - Total	200.7	06/25/02	**0.370**	mg/L (ppm)
MWB-2S	Lead - Total		1/10/96	0.005	mg/l
MWB-2S	Lead - Total		7/17/96	0.005	mg/l
MWB-2S	Nitrogen, Ammonia		1/10/96	0.407	mg/l
MWB-2S	Nitrogen, Ammonia		1/21/97	0.197	mg/l
MWB-2S	Nitrogen, Ammonia		7/14/97	0.15	mg/l
MWB-2S	Nitrogen, Ammonia	350.3	01/30/01	0.04	mg/L
MWB-2S	Oxygen, Dissolved (Field)		1/10/96	1.7	mg/l
MWB-2S	Oxygen, Dissolved (Field)		7/17/96	2.4	mg/l
MWB-2S	Oxygen, Dissolved (Field)		1/21/97	2	mg/l
MWB-2S	Oxygen, Dissolved (Field)		7/14/97	1.2	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	02/24/98	1.6	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	8/12/98	1.4	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	01/20/99	1.8	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	02/18/99	1.4	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	01/25/00	1.3	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	09/07/00	2.0	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	01/30/01	1.6	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	07/17/01	1.3	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	01/15/02	1.9	mg/l
MWB-2S	Oxygen, Dissolved (Field)	Field	06/25/02	1.8	mg/l
MWB-2S	Ph (Field)		1/10/96	**4.54**	S.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-2S	Ph (Field)		7/17/96	**4.45**	S.U.
MWB-2S	Ph (Field)		1/21/97	**4.36**	S.U.
MWB-2S	Ph (Field)		7/14/97	**4.28**	S.U.
MWB-2S	Ph (Field)	Field	02/24/98	**5.14**	n/a
MWB-2S	Ph (Field)	Field	8/12/98	**4.32**	n/a
MWB-2S	Ph (Field)	Field	01/20/99	**4.46**	n/a
MWB-2S	Ph (Field)	Field	02/18/99	**4.39**	n/a
MWB-2S	Ph (Field)	Field	09/07/00	**4.51**	n/a
MWB-2S	Ph (Field)	Field	01/30/01	**4.15**	n/a
MWB-2S	Ph (Field)	Field	07/17/01	**6.45**	n/a
MWB-2S	Ph (Field)	Field	01/15/02	**4.15**	n/a
MWB-2S	Ph (Field)	Field	06/25/02	**4.08**	n/a
MWB-2S	Sodium - Total		1/10/96	2.68	mg/l
MWB-2S	Sodium - Total		7/17/96	5.14	mg/l
MWB-2S	Sodium - Total		1/21/97	2.69	mg/l
MWB-2S	Sodium - Total		7/14/97	3.7	mg/l
MWB-2S	Sodium - Total	273.1	02/24/98	5.6	mg/l
MWB-2S	Sodium - Total	273.1	8/12/98	3.9	mg/l
MWB-2S	Sodium - Total	273.1	01/20/99	4	mg/l
MWB-2S	Sodium - Total	273.1	02/18/99	3.7	mg/l
MWB-2S	Sodium - Total	200.7	01/25/00	4.1	mg/l
MWB-2S	Sodium - Total	200.7	09/07/00	3.3	mg/l
MWB-2S	Sodium - Total	200.7	01/30/01	3.9	mg/L
MWB-2S	Sodium - Total	200.7	07/17/01	3.5	mg/L(ppm)
MWB-2S	Sodium - Total	200.7	01/15/02	5.3	mg/L(ppm)
MWB-2S	Sodium - Total	200.7	06/25/02	5.4	mg/L (ppm)
MWB-2S	Solids, Total Dissolved	160.1	1/10/96	17	mg/l
MWB-2S	Solids, Total Dissolved	160.1	7/17/96	37.5	mg/l
MWB-2S	Solids, Total Dissolved	160.1	1/21/97	36.3	mg/l
MWB-2S	Solids, Total Dissolved	160.1	7/14/97	24.5	mg/l
MWB-2S	Solids, Total Dissolved	160.1	02/24/98	71	mg/l
MWB-2S	Solids, Total Dissolved	160.1	8/12/98	38	mg/l
MWB-2S	Solids, Total Dissolved	160.1	01/20/99	24	mg/l
MWB-2S	Solids, Total Dissolved	160.1	02/18/99	14	mg/l
MWB-2S	Solids, Total Dissolved	160.1	09/07/00	29	mg/l
MWB-2S	Solids, Total Dissolved	160.1	01/30/01	28	mg/L
MWB-2S	Solids, Total Dissolved	160.1	07/17/01	40	mg/L (ppm)
MWB-2S	Solids, Total Dissolved	160.1	01/15/02	35	mg/L (ppm)
MWB-2S	Solids, Total Dissolved	160.1	06/25/02	52	mg/L (ppm)
MWB-2S	Specific Conductance(Field)		1/10/96	46	umhos/cm
MWB-2S	Specific Conductance(Field)		7/17/96	44	umhos/cm
MWB-2S	Specific Conductance(Field)		1/21/97	44	umhos/cm
MWB-2S	Specific Conductance(Field)		7/14/97	57	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	02/24/98	40.2	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	8/12/98	56	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	01/20/99	61	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	02/18/99	50	µm/cm
MWB-2S	Specific Conductance(Field)	Field	01/25/00	621	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	09/07/00	64	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	01/30/01	63	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	07/17/01	402	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	01/15/02	83	umhos/cm
MWB-2S	Specific Conductance(Field)	Field	06/25/02	91	umhos/cm
MWB-2S	Turbidity (Field)		1/10/96	3.70	NTU
MWB-2S	Turbidity (Field)		7/17/96	10.0	NTU
MWB-2S	Turbidity (Field)		1/21/97	3.5	NTU
MWB-2S	Turbidity (Field)		7/14/97	3.2	NTU
MWB-2S	Turbidity (Field)	Field	02/24/98	39.7	NTU
MWB-2S	Turbidity (Field)	Field	8/12/98	13.7	NTU
MWB-2S	Turbidity (Field)	Field	01/20/99	1.63	NTU
MWB-2S	Turbidity (Field)	Field	02/18/99	3.53	NTU
MWB-2S	Turbidity (Field)	Field	01/25/00	2.02	NTU
MWB-2S	Turbidity (Field)	Field	09/07/00	1.41	NTU
MWB-2S	Turbidity (Field)	Field	01/30/01	1.81	NTU
MWB-2S	Turbidity (Field)	Field	07/17/01	2.47	NTU
MWB-2S	Turbidity (Field)	Field	01/15/02	2.61	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-2S	Turbidity (Field)	Field	06/25/02	3.21	NTU
MWB-2S	Water Temperature in deg Celsius		1/10/96	15.7	C
MWB-2S	Water Temperature in deg Celsius		7/17/96	24.3	C
MWB-2S	Water Temperature in deg Celsius		1/21/97	18	C
MWB-2S	Water Temperature in deg Celsius		7/14/97	23	C
MWB-2S	Water Temperature in deg Celsius	Field	02/24/98	17.1	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	8/12/98	24.1	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	01/20/99	23.2	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	02/18/99	19.9	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	01/25/00	18.7	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	09/07/00	23.4	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	01/30/01	19.7	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	07/17/01	21.8	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	01/15/02	19.2	Deg C
MWB-2S	Water Temperature in deg Celsius	Field	06/25/02	22.8	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-2I	Barium - Total		7/14/97	0.024	mg/l
MWB-2I	Barium - Total	200.7	01/25/00	0.024	mg/l
MWB-2I	Barium - Total	200.8	09/07/00	0.021	mg/l
MWB-2I	Barium - Total	200.8	01/30/01	0.021	mg/L
MWB-2I	Barium - Total	200.8	07/17/01	0.02	mg/L(ppm)
MWB-2I	Barium - Total	200.7	01/15/02	0.02	mg/L(ppm)
MWB-2I	Barium - Total	200.7	06/25/02	0.021	mg/L (ppm)
MWB-2I	Chloride		1/10/96	10.9	mg/l
MWB-2I	Chloride		7/17/96	4.92	mg/l
MWB-2I	Chloride		1/21/97	6.71	mg/l
MWB-2I	Chloride		7/14/97	4.25	mg/l
MWB-2I	Chloride	300.0	02/24/98	6.7	mg/l
MWB-2I	Chloride	300.0	8/12/98	7.2	mg/l
MWB-2I	Chloride	300.0	02/18/99	6.5	mg/l
MWB-2I	Chloride	300.0	07/20/99	7.5	mg/l
MWB-2I	Chloride	300.0	01/25/00	11	mg/l
MWB-2I	Chloride	300.0	09/07/00	7.38	mg/l
MWB-2I	Chloride	300.0	01/30/01	7.4	mg/L
MWB-2I	Chloride	300.0	07/17/01	7.5	mg/L (ppm)
MWB-2I	Chloride	300.0	01/15/02	6.6	mg/L (ppm)
MWB-2I	Chloride	300.0	06/25/02	7	mg/L (ppm)
MWB-2I	Color	110.2	02/18/99	15	Units
MWB-2I	Color	110.2	07/20/99	10	Units
MWB-2I	Color	110.2	09/07/00	10	Units
MWB-2I	Color	110.2	01/30/01	5	Color Units
MWB-2I	Color	110.2	07/17/01	10	Color Units
MWB-2I	Color	110.2	01/15/02	5	Color Units
MWB-2I	Cyanide - Total	9012	06/25/02	0.0241	mg/L (ppm)
MWB-2I	Iron - Total		1/10/96	**0.34**	mg/l
MWB-2I	Iron - Total		7/17/96	**0.59**	mg/l
MWB-2I	Iron - Total		1/21/97	**0.41**	mg/l
MWB-2I	Iron - Total		7/14/97	**0.40**	mg/l
MWB-2I	Iron - Total	236.1	02/24/98	**0.31**	mg/l
MWB-2I	Iron - Total	236.1	8/12/98	**0.32**	mg/l
MWB-2I	Iron - Total	236.1	02/18/99	0.30	mg/l
MWB-2I	Iron - Total	236.1	07/20/99	0.30	mg/l
MWB-2I	Iron - Total	200.7	01/25/00	**0.35**	mg/l
MWB-2I	Iron - Total	200.7	09/07/00	**0.41**	mg/l
MWB-2I	Iron - Total	200.7	01/30/01	**0.44**	mg/L
MWB-2I	Iron - Total	200.7	07/17/01	**0.37**	mg/L(ppm)
MWB-2I	Iron - Total	200.7	01/15/02	**0.38**	mg/L(ppm)
MWB-2I	Iron - Total	200.7	06/25/02	**0.37**	mg/L (ppm)
MWB-2I	Lead - Total		1/10/96	0.009	mg/l
MWB-2I	Nitrogen, Ammonia		1/10/96	0.471	mg/l
MWB-2I	Nitrogen, Ammonia	350.3	01/30/01	0.04	mg/L
MWB-2I	Nitrogen, Nitrate		1/10/96	0.052	mg/l
MWB-2I	Oxygen, Dissolved (Field)		1/10/96	2	mg/l
MWB-2I	Oxygen, Dissolved (Field)		7/17/96	1.5	mg/l
MWB-2I	Oxygen, Dissolved (Field)		1/21/97	1.3	mg/l
MWB-2I	Oxygen, Dissolved (Field)		7/14/97	1.1	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	02/24/98	1.7	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	8/12/98	0.9	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	02/18/99	1.7	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	07/20/99	1.5	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	01/25/00	1.2	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	09/07/00	1.8	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	01/30/01	1.3	mg/l
MWB-2I	Oxygen, Dissolved (Field)		07/17/01	1.5	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	01/15/02	1.1	mg/l
MWB-2I	Oxygen, Dissolved (Field)	Field	06/25/02	1.0	mg/l
MWB-2I	Ph (Field)		1/10/96	**4.79**	S.U.
MWB-2I	Ph (Field)		7/17/96	**4.80**	S.U.
MWB-2I	Ph (Field)		1/21/97	**4.68**	S.U.
MWB-2I	Ph (Field)		7/14/97	**4.73**	S.U.
MWB-2I	Ph (Field)	Field	02/24/98	**4.71**	n/a
MWB-2I	Ph (Field)	Field	8/12/98	**4.70**	n/a
MWB-2I	Ph (Field)	Field	02/18/99	**4.66**	n/a
MWB-2I	Ph (Field)	Field	07/20/99	**4.78**	n/a
MWB-2I	Ph (Field)	Field	09/07/00	**4.86**	n/a
MWB-2I	Ph (Field)	Field	01/30/01	**4.54**	n/a
MWB-2I	Ph (Field)	Field	07/17/01	**4.07**	n/a

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-2I	Ph (Field)	Field	01/15/02	4.58	n/a
MWB-2I	Ph (Field)	Field	06/25/02	4.61	n/a
MWB-2I	Sodium - Total		1/10/96	4.85	mg/l
MWB-2I	Sodium - Total		7/17/96	2.61	mg/l
MWB-2I	Sodium - Total		1/21/97	4.86	mg/l
MWB-2I	Sodium - Total		7/14/97	4.42	mg/l
MWB-2I	Sodium - Total	273.1	02/24/98	4.5	mg/l
MWB-2I	Sodium - Total	273.1	8/12/98	4.5	mg/l
MWB-2I	Sodium - Total	273.1	02/18/99	4.6	mg/l
MWB-2I	Sodium - Total	273.1	07/20/99	4.4	mg/l
MWB-2I	Sodium - Total	200.7	01/25/00	4.3	mg/l
MWB-2I	Sodium - Total	200.7	09/07/00	4.3	mg/l
MWB-2I	Sodium - Total	200.7	01/30/01	4.5	mg/L
MWB-2I	Sodium - Total	200.7	07/17/01	4.2	mg/L(ppm)
MWB-2I	Sodium - Total	200.7	01/15/02	4.2	mg/L(ppm)
MWB-2I	Sodium - Total	200.7	06/25/02	4.2	mg/L (ppm)
MWB-2I	Solids, Total Dissolved		1/10/96	12	mg/l
MWB-2I	Solids, Total Dissolved		7/17/96	27	mg/l
MWB-2I	Solids, Total Dissolved		1/21/97	21	mg/l
MWB-2I	Solids, Total Dissolved		7/14/97	29	mg/l
MWB-2I	Solids, Total Dissolved	160.1	02/24/98	37	mg/l
MWB-2I	Solids, Total Dissolved	160.1	8/12/98	38	mg/l
MWB-2I	Solids, Total Dissolved	160.1	02/18/99	16	mg/l
MWB-2I	Solids, Total Dissolved	160.1	07/20/99	20	mg/l
MWB-2I	Solids, Total Dissolved	160.1	01/25/00	56	mg/l
MWB-2I	Solids, Total Dissolved	160.1	09/07/00	41	mg/l
MWB-2I	Solids, Total Dissolved	160.1	01/30/01	36	mg/L
MWB-2I	Solids, Total Dissolved	160.1	07/17/01	48	mg/L (ppm)
MWB-2I	Solids, Total Dissolved	160.1	01/15/02	42	mg/L (ppm)
MWB-2I	Solids, Total Dissolved	160.1	06/25/02	12	mg/L (ppm)
MWB-2I	Specific Conductance(Field)		1/10/96	41	umhos/cm
MWB-2I	Specific Conductance(Field)		7/17/96	42	umhos/cm
MWB-2I	Specific Conductance(Field)		1/21/97	40	umhos/cm
MWB-2I	Specific Conductance(Field)		7/14/97	44	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	02/24/98	43.3	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	8/12/98	40	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	02/18/99	42	µm/cm
MWB-2I	Specific Conductance(Field)	Field	07/20/99	43	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	01/25/00	47.1	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	09/07/00	49	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	01/30/01	47	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	07/17/01	66	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	01/15/02	45	umhos/cm
MWB-2I	Specific Conductance(Field)	Field	06/25/02	41	umhos/cm
MWB-2I	Turbidity (Field)		1/10/96	46	NTU
MWB-2I	Turbidity (Field)		7/17/96	1.2	NTU
MWB-2I	Turbidity (Field)		1/21/97	7.2	NTU
MWB-2I	Turbidity (Field)		7/14/97	6.6	NTU
MWB-2I	Turbidity (Field)	Field	02/24/98	11.7	NTU
MWB-2I	Turbidity (Field)	Field	8/12/98	6.61	NTU
MWB-2I	Turbidity (Field)	Field	02/18/99	4.78	NTU
MWB-2I	Turbidity (Field)	Field	07/20/99	2.76	NTU
MWB-2I	Turbidity (Field)	Field	01/25/00	2.89	NTU
MWB-2I	Turbidity (Field)	Field	09/07/00	2.62	NTU
MWB-2I	Turbidity (Field)	Field	01/30/01	2.30	NTU
MWB-2I	Turbidity (Field)	Field	07/17/01	3.00	NTU
MWB-2I	Turbidity (Field)	Field	01/15/02	1.79	NTU
MWB-2I	Turbidity (Field)	Field	06/25/02	1.13	NTU
MWB-2I	Water Temperature in deg Celsius		1/10/96	19.6	C
MWB-2I	Water Temperature in deg Celsius		7/17/96	22.3	C
MWB-2I	Water Temperature in deg Celsius		1/21/97	19.7	C
MWB-2I	Water Temperature in deg Celsius		7/14/97	21.6	C
MWB-2I	Water Temperature in deg Celsius	Field	02/24/98	20.3	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	8/12/98	22.3	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	02/18/99	21.0	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	07/20/99	22.7	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	01/25/00	19.5	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	09/07/00	22.1	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	01/30/01	20.6	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	07/17/01	22.5	Deg C
MWB-2I	Water Temperature in deg Celsius	Field	01/15/02	21.4	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-2I	Water Temperature in deg Celsius	Field	06/25/02	22.5	Deg C

DEP005559

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-3S	Barium - Total		7/14/97	0.011	mg/l
MWB-3S	Barium - Total	200.8	09/07/00	0.0071	mg/l
MWB-3S	Barium - Total	200.8	01/30/01	0.0075	mg/L
MWB-3S	Barium - Total	200.8	07/17/01	0.0073	mg/L(ppm)
MWB-3S	Barium - Total	200.7	01/16/02	0.015	mg/L(ppm)
MWB-3S	Chloride		1/8/96	11	mg/l
MWB-3S	Chloride		7/16/96	4.9	mg/l
MWB-3S	Chloride		1/21/97	5.05	mg/l
MWB-3S	Chloride		7/14/97	5.01	mg/l
MWB-3S	Chloride	300.0	02/24/98	4.3	mg/l
MWB-3S	Chloride	300.0	8/17/98	6.1	mg/l
MWB-3S	Chloride	300.0	02/18/99	4.8	mg/l
MWB-3S	Chloride	300.0	07/20/99	4.91	mg/l
MWB-3S	Chloride	300.0	01/25/00	8.93	mg/l
MWB-3S	Chloride	300.0	09/07/00	4.66	mg/l
MWB-3S	Chloride	300.0	01/30/01	4.93	mg/L
MWB-3S	Chloride	300.0	07/17/01	6.3	mg/L (ppm)
MWB-3S	Chloride	300.0	01/16/02	3..8	mg/L (ppm)
MWB-3S	Chloride	300.0	06/25/02	4.9	mg/L (ppm)
MWB-3S	Chromium - Total	200.8	07/17/01	0.011	mg/L(ppm)
MWB-3S	Color	110.2	02/18/99	5	Units
MWB-3S	Color	110.2	09/07/00	5	Units
MWB-3S	Color	110.2	01/30/01	30	Color Units
MWB-3S	Color	110.2	07/17/01	5	Color Units
MWB-3S	Color	110.2	01/16/02	5	Color Units
MWB-3S	Iron - Total		1/8/96	0.507	mg/l
MWB-3S	Iron - Total		7/16/96	0.920	Mg/l
MWB-3S	Iron - Total		1/21/97	1.390	Mg/l
MWB-3S	Iron - Total		7/14/97	0.682	Mg/l
MWB-3S	Iron - Total	236.1	02/24/98	0.220	mg/l
MWB-3S	Iron - Total	236.1	8/17/98	0.760	mg/l
MWB-3S	Iron - Total	236.1	02/18/99	0.600	mg/l
MWB-3S	Iron - Total	236.1	07/20/99	0.800	mg/l
MWB-3S	Iron - Total	200.7	01/25/00	0.620	mg/l
MWB-3S	Iron - Total	200.7	09/07/00	0.780	mg/l
MWB-3S	Iron - Total	200.7	01/30/01	0.530	mg/L
MWB-3S	Iron - Total	200.7	07/17/01	0.350	mg/L(ppm)
MWB-3S	Iron - Total	200.7	01/16/02	0.560	mg/L(ppm)
MWB-3S	Iron - Total	200.7	06/25/02	1.400	mg/L (ppm)
MWB-3S	Lead - Total		1/8/96	0.008	mg/l
MWB-3S	Nitrogen, Ammonia		7/16/96	0.159	mg/l
MWB-3S	Nitrogen, Nitrate	300.0	02/24/98	0.5	mg/l
MWB-3S	Oxygen, Dissolved (Field)		1/8/96	2	mg/l
MWB-3S	Oxygen, Dissolved (Field)		7/16/96	1.8	mg/l
MWB-3S	Oxygen, Dissolved (Field)		1/21/97	2.1	mg/l
MWB-3S	Oxygen, Dissolved (Field)		7/14/97	1	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	02/24/98	2.1	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	8/17/98	1.5	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	02/18/99	1.4	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	07/20/99	1.5	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	01/25/00	1.7	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	09/07/00	1.5	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	01/30/01	2.2	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	07/17/01	1.9	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	01/16/02	1.9	mg/l
MWB-3S	Oxygen, Dissolved (Field)	Field	06/25/02	1.8	mg/l
MWB-3S	Ph (Field)		1/8/96	4.10	S.U.
MWB-3S	Ph (Field)		7/16/96	4.74	S.U.
MWB-3S	Ph (Field)		1/21/97	4.66	S.U.
MWB-3S	Ph (Field)		7/14/97	4.60	S.U.
MWB-3S	Ph (Field)	Field	02/24/98	4.58	n/a
MWB-3S	Ph (Field)	Field	8/17/98	4.53	n/a
MWB-3S	Ph (Field)	Field	02/18/99	4.53	n/a
MWB-3S	Ph (Field)	Field	07/20/99	4.75	n/a
MWB-3S	Ph (Field)	Field	01/25/00	n/a	n/a
MWB-3S	Ph (Field)	Field	09/07/00	4.88	n/a
MWB-3S	Ph (Field)	Field	01/30/01	4.47	n/a
MWB-3S	Ph (Field)	Field	07/17/01	4.52	n/a
MWB-3S	Ph (Field)	Field	01/16/02	4.57	n/a
MWB-3S	Ph (Field)	Field	06/25/02	4.87	n/a
MWB-3S	Sodium - Total		1/8/96	4.14	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-3S	Sodium - Total		7/16/96	3.46	mg/l
MWB-3S	Sodium - Total		1/21/97	4.17	mg/l
MWB-3S	Sodium - Total		7/14/97	3.64	mg/l
MWB-3S	Sodium - Total	273.1	02/24/98	3.1	mg/l
MWB-3S	Sodium - Total	273.1	8/17/98	3.9	mg/l
MWB-3S	Sodium - Total	273.1	02/18/99	3.8	mg/l
MWB-3S	Sodium - Total	273.1	07/20/99	3.5	mg/l
MWB-3S	Sodium - Total	200.7	01/25/00	3.89	mg/l
MWB-3S	Sodium - Total	200.7	09/07/00	3.3	mg/l
MWB-3S	Sodium - Total	200.7	01/30/01	3.1	mg/L
MWB-3S	Sodium - Total	200.7	07/17/01	2.5	mg/L(ppm)
MWB-3S	Sodium - Total	200.7	01/16/02	2.5	mg/L(ppm)
MWB-3S	Sodium - Total	200.7	06/25/02	3.1	mg/L (ppm)
MWB-3S	Solids, Total Dissolved		1/8/96	47	mg/l
MWB-3S	Solids, Total Dissolved		7/16/96	24.5	mg/l
MWB-3S	Solids, Total Dissolved	160.1	02/24/98	36	mg/l
MWB-3S	Solids, Total Dissolved	160.1	07/20/99	23	mg/l
MWB-3S	Solids, Total Dissolved	160.1	01/25/00	32	mg/l
MWB-3S	Solids, Total Dissolved	160.1	09/07/00	28	mg/l
MWB-3S	Solids, Total Dissolved	160.1	01/30/01	20	mg/L
MWB-3S	Solids, Total Dissolved	160.1	07/17/01	36	mg/L (ppm)
MWB-3S	Solids, Total Dissolved	160.1	01/16/02	37	mg/L (ppm)
MWB-3S	Solids, Total Dissolved	160.1	06/25/02	36	mg/L (ppm)
MWB-3S	Specific Conductance(Field)		1/8/96	60	umhos/cm
MWB-3S	Specific Conductance(Field)		7/16/96	47	umhos/cm
MWB-3S	Specific Conductance(Field)		1/21/97	38	umhos/cm
MWB-3S	Specific Conductance(Field)		7/14/97	44	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	02/24/98	45.5	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	8/17/98	48	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	02/18/99	46	µm/cm
MWB-3S	Specific Conductance(Field)	Field	07/20/99	45	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	01/25/00	47.4	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	09/07/00	49	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	01/30/01	43	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	07/17/01	39	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	01/16/02	51	umhos/cm
MWB-3S	Specific Conductance(Field)	Field	06/25/02	39	umhos/cm
MWB-3S	Turbidity (Field)		1/8/96	4.60	NTU
MWB-3S	Turbidity (Field)		7/16/96	5.70	NTU
MWB-3S	Turbidity (Field)		1/21/97	39.00	NTU
MWB-3S	Turbidity (Field)		7/14/97	3.20	NTU
MWB-3S	Turbidity (Field)	Field	02/24/98	12.40	NTU
MWB-3S	Turbidity (Field)	Field	8/17/98	26.80	NTU
MWB-3S	Turbidity (Field)	Field	02/18/99	9.92	NTU
MWB-3S	Turbidity (Field)	Field	07/20/99	8.38	NTU
MWB-3S	Turbidity (Field)	Field	01/25/00	22.60	NTU
MWB-3S	Turbidity (Field)	Field	09/07/00	15.32	NTU
MWB-3S	Turbidity (Field)	Field	01/30/01	19.20	NTU
MWB-3S	Turbidity (Field)	Field	07/17/01	8.12	NTU
MWB-3S	Turbidity (Field)	Field	01/16/02	2.66	NTU
MWB-3S	Turbidity (Field)	Field	06/25/02	8.47	NTU
MWB-3S	Water Temperature in deg Celsius		1/8/96	18.4	C
MWB-3S	Water Temperature in deg Celsius		7/16/96	24.3	C
MWB-3S	Water Temperature in deg Celsius		1/21/97	19.7	C
MWB-3S	Water Temperature in deg Celsius		7/14/97	22.8	C
MWB-3S	Water Temperature in deg Celsius	Field	02/24/98	18.1	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	8/17/98	23.9	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	02/18/99	20.5	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	07/20/99	23.3	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	01/25/00	18.5	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	09/07/00	23.5	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	01/30/01	20.0	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	07/17/01	22.3	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	01/16/02	18.7	Deg C
MWB-3S	Water Temperature in deg Celsius	Field	06/25/02	22.8	Deg C
MWB-3S	Zinc - Total		1/21/97	0.053	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-3I	Barium - Total		7/14/97	0.022	mg/l
MWB-3I	Barium - Total	200.7	01/25/00	0.024	mg/l
MWB-3I	Barium - Total	200.8	09/07/00	0.019	mg/l
MWB-3I	Barium - Total	200.8	01/30/01	0.019	mg/L
MWB-3I	Barium - Total	200.8	07/17/01	0.019	mg/L(ppm)
MWB-3I	Barium - Total	200.7	01/16/02	0.026	mg/L(ppm)
MWB-3I	Barium - Total	200.7	06/25/02	0.019	mg/L (ppm)
MWB-3I	Chloride		1/8/96	5.61	mg/l
MWB-3I	Chloride		7/16/96	4.2	mg/l
MWB-3I	Chloride		1/21/97	4	mg/l
MWB-3I	Chloride		7/14/97	3.49	mg/l
MWB-3I	Chloride	300.0	02/24/98	3.7	mg/l
MWB-3I	Chloride	300.0	8/17/98	8	mg/l
MWB-3I	Chloride	300.0	02/18/99	4.6	mg/l
MWB-3I	Chloride	300.0	07/20/99	4.79	mg/l
MWB-3I	Chloride	300.0	01/25/00	4.29	mg/l
MWB-3I	Chloride	300.0	09/07/00	4.62	mg/l
MWB-3I	Chloride	300.0	01/30/01	4.67	mg/L
MWB-3I	Chloride	300.0	07/17/01	4.6	mg/L (ppm)
MWB-3I	Chloride	300.0	01/16/02	4	mg/L (ppm)
MWB-3I	Chloride	300.0	06/25/02	4.5	mg/L (ppm)
MWB-3I	Chromium - Total	200.8	07/17/01	0.0089	mg/L(ppm)
MWB-3I	Iron - Total		1/8/96	**0.636**	mg/l
MWB-3I	Iron - Total		7/16/96	**0.646**	mg/l
MWB-3I	Iron - Total		1/21/97	**0.649**	mg/l
MWB-3I	Iron - Total		7/14/97	**0.657**	mg/l
MWB-3I	Iron - Total	236.1	02/24/98	**0.520**	mg/l
MWB-3I	Iron - Total	236.1	8/17/98	**0.540**	mg/l
MWB-3I	Iron - Total	236.1	02/18/99	**0.600**	mg/l
MWB-3I	Iron - Total	236.1	07/20/99	**0.600**	mg/l
MWB-3I	Iron - Total	200.7	01/25/00	**0.620**	mg/l
MWB-3I	Iron - Total	200.7	09/07/00	**0.660**	mg/l
MWB-3I	Iron - Total	200.7	01/30/01	**0.550**	mg/L
MWB-3I	Iron - Total	200.7	07/17/01	**0.610**	mg/L(ppm)
MWB-3I	Iron - Total	200.7	01/16/02	**0.620**	mg/L(ppm)
MWB-3I	Iron - Total	200.7	06/25/02	**0.580**	mg/L (ppm)
MWB-3I	Lead - Total		1/8/96	0.008	mg/l
MWB-3I	Nitrogen, Ammonia		7/16/96	0.212	mg/l
MWB-3I	Nitrogen, Nitrate		1/8/96	0.091	mg/l
MWB-3I	Nitrogen, Nitrate		7/16/96	0.166	mg/l
MWB-3I	Oxygen, Dissolved (Field)		1/8/96	1.8	mg/l
MWB-3I	Oxygen, Dissolved (Field)		7/16/96	1.4	mg/l
MWB-3I	Oxygen, Dissolved (Field)		1/21/97	1.6	mg/l
MWB-3I	Oxygen, Dissolved (Field)		7/14/97	1.1	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	02/24/98	1.6	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	8/17/98	1.0	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	02/18/99	64	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	07/20/99	1.4	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	01/25/00	1.6	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	09/07/00	1.6	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	01/30/01	1.6	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	07/17/01	1.4	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	01/16/02	1.1	mg/l
MWB-3I	Oxygen, Dissolved (Field)	Field	06/25/02	1.0	mg/l
MWB-3I	Ph (Field)		1/8/96	4.82	S.U.
MWB-3I	Ph (Field)		7/16/96	5.08	S.U.
MWB-3I	Ph (Field)		1/21/97	4.83	S.U.
MWB-3I	Ph (Field)		7/14/97	4.99	S.U.
MWB-3I	Ph (Field)	Field	02/24/98	4.81	n/a
MWB-3I	Ph (Field)	Field	8/17/98	4.29	n/a
MWB-3I	Ph (Field)	Field	02/18/99	4.75	n/a
MWB-3I	Ph (Field)	Field	07/20/99	4.93	n/a
MWB-3I	Ph (Field)	Field	09/07/00	4.98	n/a
MWB-3I	Ph (Field)	Field	01/30/01	4.82	n/a
MWB-3I	Ph (Field)	Field	07/17/01	4.50	n/a
MWB-3I	Ph (Field)	Field	01/16/02	4.76	n/a
MWB-3I	Ph (Field)	Field	06/25/02	4.89	n/a
MWB-3I	Sodium - Total		1/8/96	2.89	mg/l
MWB-3I	Sodium - Total		7/16/96	2.88	mg/l
MWB-3I	Sodium - Total		1/21/97	2.95	mg/l
MWB-3I	Sodium - Total		7/14/97	3.09	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-3I	Sodium - Total	273.1	02/24/98	3.0	mg/l
MWB-3I	Sodium - Total	273.1	8/17/98	3.2	mg/l
MWB-3I	Sodium - Total	273.1	02/18/99	3.3	mg/l
MWB-3I	Sodium - Total	273.1	07/20/99	3.2	mg/l
MWB-3I	Sodium - Total	200.7	01/25/00	3.4	mg/l
MWB-31	Sodium - Total	200.7	09/07/00	3	mg/l
MWB-3I	Sodium - Total	200.7	01/30/01	2.8	mg/L
MWB-3I	Sodium - Total	200.7	07/17/01	3	mg/L(ppm)
MWB-31	Sodium - Total	200.7	01/16/02	3	mg/L(ppm)
MWB-3I	Sodium - Total	200.7	06/25/02	2.9	mg/L (ppm)
MWB-3I	Solids, Total Dissolved		1/8/96	47	mg/l
MWB-3I	Solids, Total Dissolved		7/16/96	26.5	mg/l
MWB-3I	Solids, Total Dissolved		1/21/97	7.5	mg/l
MWB-3I	Solids, Total Dissolved		7/14/97	8.5	mg/l
MWB-3I	Solids, Total Dissolved	160.1	02/24/98	20	mg/l
MWB-3I	Solids, Total Dissolved	160.1	8/17/98	17	mg/l
MWB-3I	Solids, Total Dissolved	160.1	07/20/99	19	mg/l
MWB-3I	Solids, Total Dissolved	160.1	01/25/00	38	mg/l
MWB-31	Solids, Total Dissolved	160.1	09/07/00	31	mg/l
MWB-3I	Solids, Total Dissolved	160.1	01/30/01	23	mg/L
MWB-3I	Solids, Total Dissolved	160.1	07/17/01	41	mg/L (ppm)
MWB-31	Solids, Total Dissolved	160.1	01/16/02	38	mg/L (ppm)
MWB-3I	Solids, Total Dissolved	160.1	06/25/02	42	mg/L (ppm)
MWB-3I	Specific Conductance(Field)		1/8/96	36	umhos/cm
MWB-3I	Specific Conductance(Field)		7/16/96	39	umhos/cm
MWB-3I	Specific Conductance(Field)		1/21/97	29	umhos/cm
MWB-3I	Specific Conductance(Field)		7/14/97	36	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	02/24/98	33.7	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	8/17/98	31	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	02/18/99	36	µm/cm
MWB-3I	Specific Conductance(Field)	Field	07/20/99	39	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	01/25/00	42.9	umhos/cm
MWB-31	Specific Conductance(Field)	Field	09/07/00	41	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	01/30/01	40	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	07/17/01	36	umhos/cm
MWB-31	Specific Conductance(Field)	Field	01/16/02	43	umhos/cm
MWB-3I	Specific Conductance(Field)	Field	06/25/02	34	umhos/cm
MWB-3I	Turbidity (Field)		1/8/96	0.74	NTU
MWB-3I	Turbidity (Field)		7/16/96	1.60	NTU
MWB-3I	Turbidity (Field)		1/21/97	0.87	NTU
MWB-3I	Turbidity (Field)		7/14/97	0.52	NTU
MWB-3I	Turbidity (Field)	Field	02/24/98	2.07	NTU
MWB-3I	Turbidity (Field)	Field	8/17/98	1.49	NTU
MWB-3I	Turbidity (Field)	Field	02/18/99	0.55	NTU
MWB-3I	Turbidity (Field)	Field	07/20/99	0.28	NTU
MWB-3I	Turbidity (Field)	Field	01/25/00	0.46	NTU
MWB-31	Turbidity (Field)	Field	09/07/00	0.21	NTU
MWB-3I	Turbidity (Field)	Field	01/30/01	0.67	NTU
MWB-3I	Turbidity (Field)	Field	07/17/01	0.53	NTU
MWB-31	Turbidity (Field)	Field	01/16/02	0.63	NTU
MWB-3I	Turbidity (Field)	Field	06/25/02	0.63	NTU
MWB-3I	Water Temperature in deg Celsius		1/8/96	19.2	C
MWB-3I	Water Temperature in deg Celsius		7/16/96	22.9	C
MWB-3I	Water Temperature in deg Celsius		1/21/97	20.7	C
MWB-3I	Water Temperature in deg Celsius		7/14/97	21.7	C
MWB-3I	Water Temperature in deg Celsius	Field	02/24/98	20.6	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	8/17/98	21.7	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	02/18/99	21.1	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	07/20/99	22.1	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	01/25/00	19.7	Deg C
MWB-31	Water Temperature in deg Celsius	Field	09/07/00	22.4	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	01/30/01	20.7	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	07/17/01	21.4	Deg C
MWB-31	Water Temperature in deg Celsius	Field	01/16/02	18.3	Deg C
MWB-3I	Water Temperature in deg Celsius	Field	06/25/02	22.6	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7S	Barium - Total		7/14/97	0.019	mg/l
MWB-7S	Barium - Total	200.7	01/25/00	0.011	mg/l
MWB-7S	Barium - Total	200.8	09/07/00	0.0096	mg/l
MWB-7S	Barium - Total	200.8	01/31/01	0.0091	mg/L(ppm)
MWB-7S	Barium - Total	200.8	07/18/01	0.0099	mg/L(ppm)
MWB-7S	Barium - Total	200.7	01/16/02	0.015	mg/L(ppm)
MWB-7S	Chloride		1/10/96	17.4	mg/l
MWB-7S	Chloride		7/17/96	16.7	mg/l
MWB-7S	Chloride		1/24/97	11.3	mg/l
MWB-7S	Chloride		7/14/97	7.57	mg/l
MWB-7S	Chloride	300.0	02/24/98	3.0	mg/l
MWB-7S	Chloride	300.0	8/13/98	9.7	mg/l
MWB-7S	Chloride	300.0	02/22/99	8.4	mg/l
MWB-7S	Chloride	300.0	07/20/99	10.1	mg/l
MWB-7S	Chloride	300.0	01/25/00	10.4	mg/l
MWB-7S	Chloride	300.0	09/07/00	9.89	mg/l
MWB-7S	Chloride	300.0	01/31/01	11.8	mg/L(ppm)
MWB-7S	Chloride	300.0	07/18/01	11	mg/L (ppm)
MWB-7S	Chloride	300.0	01/16/02	11	mg/L (ppm)
MWB-7S	Chloride	300.0	06/26/02	10	mg/L (ppm)
MWB-7S	Chromium - Total	218.2	02/24/98	10	mg/l
MWB-7S	Color		1/10/96	**75.0**	C.U.
MWB-7S	Color		7/17/96	**275.0**	C.U.
MWB-7S	Color		1/24/97	**500.0**	C.U.
MWB-7S	Color		7/14/97	**200.0**	C.U.
MWB-7S	Color	110.2	8/13/98	**20.0**	Units
MWB-7S	Color	110.2	02/22/99	**25.0**	Units
MWB-7S	Color	110.2	07/20/99	10.0	Units
MWB-7S	Color	110.2	01/25/00	**20.0**	Units
MWB-7S	Color	110.2	09/07/00	**25.0**	Units
MWB-7S	Color	110.2	01/31/01	**20.0**	Color Units
MWB-7S	Color	110.2	07/18/01	**20.0**	Color Units
MWB-7S	Color	110.2	01/16/02	**220.0**	Color Units
MWB-7S	Iron - Total		1/10/96	0.291	mg/l
MWB-7S	Iron - Total		7/17/96	**0.335**	mg/l
MWB-7S	Iron - Total		1/24/97	**0.375**	mg/l
MWB-7S	Iron - Total		7/14/97	**0.301**	mg/l
MWB-7S	Iron - Total	236.1	02/24/98	0.110	mg/l
MWB-7S	Iron - Total	236.1	8/13/98	0.280	mg/l
MWB-7S	Iron - Total	236.1	02/22/99	0.300	mg/l
MWB-7S	Iron - Total	236.1	07/20/99	0.300	mg/l
MWB-7S	Iron - Total	200.7	01/25/00	0.260	mg/l
MWB-7S	Iron - Total	200.7	09/07/00	0.280	mg/l
MWB-7S	Iron - Total	200.7	01/31/01	0.290	mg/L(ppm)
MWB-7S	Iron - Total	200.7	07/18/01	0.280	mg/L(ppm)
MWB-7S	Iron - Total	200.7	01/16/02	**0.320**	mg/L(ppm)
MWB-7S	Iron - Total	200.7	06/26/02	0.280	mg/L (ppm)
MWB-7S	Lead - Total		1/10/96	0.011	mg/l
MWB-7S	Lead - Total		7/17/96	0.005	mg/l
MWB-7S	Nitrogen, Ammonia		1/10/96	1.12	mg/l
MWB-7S	Nitrogen, Ammonia		7/17/96	0.798	mg/l
MWB-7S	Nitrogen, Ammonia		1/24/97	0.275	mg/l
MWB-7S	Nitrogen, Ammonia		7/14/97	0.76	mg/l
MWB-7S	Nitrogen, Ammonia	350.3	02/24/98	0.2	mg/l
MWB-7S	Nitrogen, Ammonia	350.3	8/13/98	1.3	mg/l
MWB-7S	Nitrogen, Ammonia	350.3	07/20/99	1.59	mg/l
MWB-7S	Nitrogen, Ammonia	350.3	01/25/00	1.07	mg/l
MWB-7S	Nitrogen, Ammonia	350.3	09/07/00	1.75	mg/l
MWB-7S	Nitrogen, Ammonia	350.3	01/31/01	1.2	mg/L(ppm)
MWB-7S	Nitrogen, Ammonia	350.3	07/18/01	1.6	mg/L (ppm)
MWB-7S	Nitrogen, Ammonia	350.3	01/16/02	0.66	mg/L (ppm)
MWB-7S	Nitrogen, Nitrate		1/10/96	0.168	mg/l
MWB-7S	Oxygen, Dissolved (Field)		1/10/96	1.6	mg/l
MWB-7S	Oxygen, Dissolved (Field)		7/17/96	1.6	mg/l
MWB-7S	Oxygen, Dissolved (Field)		1/24/97	2.4	mg/l
MWB-7S	Oxygen, Dissolved (Field)		7/14/97	1.4	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	02/24/98	1.8	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	8/13/98	1.2	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	02/22/99	1.5	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	07/20/99	2.5	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	01/25/00	1.0	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7S	Oxygen, Dissolved (Field)	Field	09/07/00	1.1	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	07/18/01	1.5	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	01/16/02	1.0	mg/l
MWB-7S	Oxygen, Dissolved (Field)	Field	06/26/02	1.7	mg/l
MWB-7S	Ph (Field)		1/10/96	**4.82**	S.U.
MWB-7S	Ph (Field)		7/17/96	**4.70**	S.U.
MWB-7S	Ph (Field)		1/24/97	**4.88**	S.U.
MWB-7S	Ph (Field)		7/14/97	**4.59**	S.U.
MWB-7S	Ph (Field)	Field	02/24/98	**5.41**	n/a
MWB-7S	Ph (Field)	Field	8/13/98	**4.49**	n/a
MWB-7S	Ph (Field)	Field	02/22/99	**4.62**	n/a
MWB-7S	Ph (Field)	Field	07/20/99	**4.78**	n/a
MWB-7S	Ph (Field)	Field	09/07/00	**4.76**	n/a
MWB-7S	Ph (Field)	Field	07/18/01	**4.71**	n/a
MWB-7S	Ph (Field)	Field	01/16/02	**4.69**	n/a
MWB-7S	Ph (Field)	Field	06/26/02	**5.17**	n/a
MWB-7S	Sodium - Total		1/10/96	7.51	mg/l
MWB-7S	Sodium - Total		7/17/96	8.1	mg/l
MWB-7S	Sodium - Total		1/24/97	6.68	mg/l
MWB-7S	Sodium - Total		7/14/97	6.79	mg/l
MWB-7S	Sodium - Total	273.1	02/24/98	3.9	mg/l
MWB-7S	Sodium - Total	273.1	8/13/98	6.5	mg/l
MWB-7S	Sodium - Total	273.1	02/22/99	6.2	mg/l
MWB-7S	Sodium - Total	273.1	07/20/99	6.7	mg/l
MWB-7S	Sodium - Total	200.7	01/25/00	7.06	mg/l
MWB-7S	Sodium - Total	200.7	09/07/00	6.4	mg/l
MWB-7S	Sodium - Total	200.7	01/31/01	6.7	mg/L(ppm)
MWB-7S	Sodium - Total	200.7	07/18/01	7.5	mg/L(ppm)
MWB-7S	Sodium - Total	200.7	01/16/02	6.2	mg/L(ppm)
MWB-7S	Sodium - Total	200.7	06/26/02	6.1	mg/L (ppm)
MWB-7S	Solids, Total Dissolved		1/10/96	43	mg/l
MWB-7S	Solids, Total Dissolved		7/17/96	71	mg/l
MWB-7S	Solids, Total Dissolved		1/24/97	53	mg/l
MWB-7S	Solids, Total Dissolved		7/14/97	67	mg/l
MWB-7S	Solids, Total Dissolved	160.1	02/24/98	120	mg/l
MWB-7S	Solids, Total Dissolved	160.1	8/13/98	57	mg/l
MWB-7S	Solids, Total Dissolved	160.1	02/22/99	54	mg/l
MWB-7S	Solids, Total Dissolved	160.1	07/20/99	59	mg/l
MWB-7S	Solids, Total Dissolved	160.1	01/25/00	86	mg/l
MWB-7S	Solids, Total Dissolved	160.1	09/07/00	88	mg/l
MWB-7S	Solids, Total Dissolved	160.1	01/31/01	80	mg/L(ppm)
MWB-7S	Solids, Total Dissolved	160.1	07/18/01	79	mg/L (ppm)
MWB-7S	Solids, Total Dissolved	160.1	01/16/02	77	mg/L (ppm)
MWB-7S	Solids, Total Dissolved	160.1	06/26/02	62	mg/L (ppm)
MWB-7S	Specific Conductance(Field)		1/10/96	87	umhos/cm
MWB-7S	Specific Conductance(Field)		7/17/96	86	umhos/cm
MWB-7S	Specific Conductance(Field)		1/24/97	18	umhos/cm
MWB-7S	Specific Conductance(Field)		7/14/97	89	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	02/24/98	92	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	8/13/98	89	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	02/22/99	88	um/cm
MWB-7S	Specific Conductance(Field)	Field	07/20/99	106	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	01/25/00	102	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	09/07/00	118	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	07/18/01	120	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	01/16/02	127	umhos/cm
MWB-7S	Specific Conductance(Field)	Field	06/26/02	89	umhos/cm
MWB-7S	Turbidity (Field)		1/10/96	13.00	NTU
MWB-7S	Turbidity (Field)		7/17/96	18.00	NTU
MWB-7S	Turbidity (Field)		1/24/97	34.00	NTU
MWB-7S	Turbidity (Field)		7/14/97	17.00	NTU
MWB-7S	Turbidity (Field)	Field	02/24/98	49.80	NTU
MWB-7S	Turbidity (Field)	Field	8/13/98	35.70	NTU
MWB-7S	Turbidity (Field)	Field	02/22/99	16.58	NTU
MWB-7S	Turbidity (Field)	Field	07/20/99	2.78	NTU
MWB-7S	Turbidity (Field)	Field	01/25/00	2.61	NTU
MWB-7S	Turbidity (Field)	Field	09/07/00	4.35	NTU
MWB-7S	Turbidity (Field)	Field	07/18/01	2.07	NTU
MWB-7S	Turbidity (Field)	Field	01/16/02	22.20	NTU
MWB-7S	Turbidity (Field)	Field	06/26/02	4.89	NTU
MWB-7S	Water Temperature in deg Celsius		1/10/96	21.1	C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7S	Water Temperature in deg Celsius		7/17/96	25.8	C
MWB-7S	Water Temperature in deg Celsius		1/24/97	20.8	C
MWB-7S	Water Temperature in deg Celsius		7/14/97	25.3	C
MWB-7S	Water Temperature in deg Celsius	Field	02/24/98	19.3	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	8/13/98	27.0	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	02/22/99	21.7	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	07/20/99	23.8	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	01/25/00	20.7	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	09/07/00	28.2	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	07/18/01	25.6	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	01/16/02	22.2	Deg C
MWB-7S	Water Temperature in deg Celsius	Field	06/26/02	23.1	Deg C
MWB-7S	Zinc - Total		1/24/97	0.053	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7I	Barium - Total		7/14/97	0.065	mg/l
MWB-7I	Barium - Total	200.7	01/25/00	0.064	mg/l
MWB-7I	Barium - Total	200.8	09/07/00	0.057	mg/l
MWB-7I	Barium - Total	200.8	01/31/01	0.055	mg/L(ppm)
MWB-7I	Barium - Total	200.8	07/18/01	0.053	mg/L(ppm)
MWB-7I	Barium - Total	200.7	01/16/02	0.057	mg/L(ppm)
MWB-7I	Barium - Total	200.7	06/26/02	0.051	mg/L (ppm)
MWB-7I	Chloride		1/10/96	8.13	mg/l
MWB-7I	Chloride		7/17/96	5.63	mg/l
MWB-7I	Chloride		1/24/97	5.85	mg/l
MWB-7I	Chloride		7/14/97	4.24	mg/l
MWB-7I	Chloride	300.0	02/24/98	5.2	mg/l
MWB-7I	Chloride	300.0	8/13/98	5.6	mg/l
MWB-7I	Chloride	300.0	02/22/99	5.1	mg/l
MWB-7I	Chloride	300.0	07/20/99	5.62	mg/l
MWB-7I	Chloride	300.0	01/25/00	9.68	mg/l
MWB-7I	Chloride	300.0	09/07/00	5.75	mg/l
MWB-7I	Chloride	300.0	01/31/01	5.74	mg/L(ppm)
MWB-7I	Chloride	300.0	07/18/01	5.4	mg/L (ppm)
MWB-7I	Chloride	300.0	01/16/02	5.3	mg/L (ppm)
MWB-7I	Chloride	300.0	06/26/02	5.8	mg/L (ppm)
MWB-7I	Color	110.2	02/22/99	10	Units
MWB-7I	Color	110.2	01/25/00	5	Units
MWB-7I	Color	110.2	01/16/02	5	Color Units
MWB-7I	Iron - Total		1/10/96	**0.347**	mg/l
MWB-7I	Iron - Total		7/17/96	**0.369**	mg/l
MWB-7I	Iron - Total		1/24/97	**0.369**	mg/l
MWB-7I	Iron - Total		7/14/97	**0.373**	mg/l
MWB-7I	Iron - Total	236.1	02/24/98	**0.330**	mg/l
MWB-7I	Iron - Total	236.1	8/13/98	**0.380**	mg/l
MWB-7I	Iron - Total	236.1	02/22/99	0.300	mg/l
MWB-7I	Iron - Total	236.1	07/20/99	**0.600**	mg/l
MWB-7I	Iron - Total	200.7	01/25/00	**0.380**	mg/l
MWB-7I	Iron - Total	200.7	09/07/00	**0.430**	mg/l
MWB-7I	Iron - Total	200.7	01/31/01	**0.360**	mg/L(ppm)
MWB-7I	Iron - Total	200.7	07/18/01	**0.380**	mg/L(ppm)
MWB-7I	Iron - Total	200.7	01/16/02	**0.390**	mg/L(ppm)
MWB-7I	Iron - Total	200.7	06/26/02	**0.360**	mg/L (ppm)
MWB-7I	Lead - Total		1/10/96	0.009	mg/l
MWB-7I	Nitrogen, Ammonia		1/10/96	0.441	mg/l
MWB-7I	Nitrogen, Ammonia		7/17/96	0.114	mg/l
MWB-7I	Nitrogen, Ammonia	350.3	01/31/01	0.03	mg/L(ppm)
MWB-7I	Oxygen, Dissolved (Field)		1/10/96	2.2	mg/l
MWB-7I	Oxygen, Dissolved (Field)		7/17/96	1	mg/l
MWB-7I	Oxygen, Dissolved (Field)		1/24/97	2.2	mg/l
MWB-7I	Oxygen, Dissolved (Field)		7/14/97	1.4	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	02/24/98	6.1	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	8/13/98	1.1	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	02/22/99	1.2	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	07/20/99	1.4	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	01/25/00	0.8	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	09/07/00	1.1	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	01/31/01	1.3	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	07/18/01	1.2	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	01/16/02	0.8	mg/l
MWB-7I	Oxygen, Dissolved (Field)	Field	06/26/02	0.7	mg/l
MWB-7I	Ph (Field)		1/10/96	5.4100	S.U.
MWB-7I	Ph (Field)		7/17/96	5.4700	S.U.
MWB-7I	Ph (Field)		1/24/97	5.3900	S.U.
MWB-7I	Ph (Field)		7/14/97	5.4700	S.U.
MWB-7I	Ph (Field)	Field	02/24/98	5.2100	n/a
MWB-7I	Ph (Field)	Field	8/13/98	5.2300	n/a
MWB-7I	Ph (Field)	Field	02/22/99	5.3100	n/a
MWB-7I	Ph (Field)	Field	07/20/99	5.1700	n/a
MWB-7I	Ph (Field)	Field	09/07/00	5.2400	n/a
MWB-7I	Ph (Field)	Field	01/31/01	5.1400	n/a
MWB-7I	Ph (Field)	Field	07/18/01	4.9500	n/a
MWB-7I	Ph (Field)	Field	01/16/02	5.0500	n/a
MWB-7I	Ph (Field)	Field	06/26/02	5.1100	n/a
MWB-7I	Sodium - Total		1/10/96	3.41	mg/l
MWB-7I	Sodium - Total		7/17/96	3.4	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7I	Sodium - Total		1/24/97	3.16	mg/l
MWB-7I	Sodium - Total		7/14/97	3.19	mg/l
MWB-7I	Sodium - Total	273.1	02/24/98	3.4	mg/l
MWB-7I	Sodium - Total	273.1	8/13/98	3.5	mg/l
MWB-7I	Sodium - Total	273.1	02/22/99	3.5	mg/l
MWB-7I	Sodium - Total	273.1	07/20/99	3.4	mg/l
MWB-7I	Sodium - Total	200.7	01/25/00	3.61	mg/l
MWB-7I	Sodium - Total	200.7	09/07/00	3.3	mg/l
MWB-7I	Sodium - Total	200.7	01/31/01	3.2	mg/L(ppm)
MWB-7I	Sodium - Total	200.7	07/18/01	3.2	mg/L(ppm)
MWB-7I	Sodium - Total	200.7	01/16/02	3.3	mg/L(ppm)
MWB-7I	Sodium - Total	200.7	06/26/02	3.2	mg/L (ppm)
MWB-7I	Solids, Total Dissolved		1/10/96	18	mg/l
MWB-7I	Solids, Total Dissolved		7/17/96	43	mg/l
MWB-7I	Solids, Total Dissolved		1/24/97	33	mg/l
MWB-7I	Solids, Total Dissolved	160.1	7/14/97	48	mg/l
MWB-7I	Solids, Total Dissolved	160.1	02/24/98	36	mg/l
MWB-7I	Solids, Total Dissolved	160.1	8/13/98	65	mg/l
MWB-7I	Solids, Total Dissolved	160.1	02/22/99	34	mg/l
MWB-7I	Solids, Total Dissolved	160.1	07/20/99	46	mg/l
MWB-7I	Solids, Total Dissolved	160.1	01/25/00	62	mg/l
MWB-7I	Solids, Total Dissolved	160.1	09/07/00	67	mg/l
MWB-7I	Solids, Total Dissolved	160.1	01/31/01	39	mg/L(ppm)
MWB-7I	Solids, Total Dissolved	160.1	07/18/01	51	mg/L (ppm)
MWB-7I	Solids, Total Dissolved	160.1	01/16/02	30	mg/L (ppm)
MWB-7I	Solids, Total Dissolved	160.1	06/26/02	35	mg/L (ppm)
MWB-7I	Specific Conductance(Field)		1/10/96	45	umhos/cm
MWB-7I	Specific Conductance(Field)		7/17/96	49	umhos/cm
MWB-7I	Specific Conductance(Field)		1/24/97	40	umhos/cm
MWB-7I	Specific Conductance(Field)		7/14/97	44	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	02/24/98	47.8	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	8/13/98	43	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	02/22/99	48	um/cm
MWB-7I	Specific Conductance(Field)	Field	07/20/99	51	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	01/25/00	53.6	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	09/07/00	52	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	01/31/01	51	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	07/18/01	44	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	01/16/02	49	umhos/cm
MWB-7I	Specific Conductance(Field)	Field	06/26/02	43	umhos/cm
MWB-7I	Turbidity (Field)		1/10/96	9.80	NTU
MWB-7I	Turbidity (Field)		7/17/96	5.60	NTU
MWB-7I	Turbidity (Field)		1/24/97	3.60	NTU
MWB-7I	Turbidity (Field)		7/14/97	2.60	NTU
MWB-7I	Turbidity (Field)	Field	02/24/98	9.67	NTU
MWB-7I	Turbidity (Field)	Field	8/13/98	4.34	NTU
MWB-7I	Turbidity (Field)	Field	02/22/99	2.38	NTU
MWB-7I	Turbidity (Field)	Field	07/20/99	1.63	NTU
MWB-7I	Turbidity (Field)	Field	01/25/00	2.95	NTU
MWB-7I	Turbidity (Field)	Field	09/07/00	2.83	NTU
MWB-7I	Turbidity (Field)	Field	01/31/01	3.81	NTU
MWB-7I	Turbidity (Field)	Field	07/18/01	1.31	NTU
MWB-7I	Turbidity (Field)	Field	01/16/02	2.00	NTU
MWB-7I	Turbidity (Field)	Field	06/26/02	0.78	NTU
MWB-7I	Water Temperature in deg Celsius		1/10/96	21	C
MWB-7I	Water Temperature in deg Celsius		7/17/96	23.1	C
MWB-7I	Water Temperature in deg Celsius		1/24/97	21.3	C
MWB-7I	Water Temperature in deg Celsius		7/14/97	22.4	C
MWB-7I	Water Temperature in deg Celsius	Field	02/24/98	20.4	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	8/13/98	22.6	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	02/22/99	20.8	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	07/20/99	23.3	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	01/25/00	20.5	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	09/07/00	24.4	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	01/31/01	22.2	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	07/18/01	23.0	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	01/16/02	23.2	Deg C
MWB-7I	Water Temperature in deg Celsius	Field	06/26/02	22.3	Deg C
MWB-7I	Zinc - Total		1/24/97	0.054	mg/l
MWB-7I	Zinc - Total	289.1	07/20/99	0.05	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7D	Barium - Total		1/24/97	0.1	mg/l
MWB-7D	Barium - Total		7/14/97	0.085	mg/l
MWB-7D	Barium - Total	200.7	01/25/00	0.088	mg/l
MWB-7D	Barium - Total	200.8	09/07/00	0.081	mg/l
MWB-7D	Barium - Total	200.8	01/31/01	0.076	mg/L(ppm)
MWB-7D	Barium - Total	200.8	07/18/01	0.075	mg/L(ppm)
MWB-7D	Barium - Total	200.7	01/16/02	0.079	mg/L(ppm)
MWB-7D	Barium - Total	200.7	06/26/02	0.072	mg/L (ppm)
MWB-7D	Chloride		1/10/96	5.92	mg/l
MWB-7D	Chloride		7/17/96	4.76	mg/l
MWB-7D	Chloride		1/24/97	7.25	mg/l
MWB-7D	Chloride		7/14/97	3.92	mg/l
MWB-7D	Chloride	300.0	02/24/98	3.7	mg/l
MWB-7D	Chloride	300.0	8/13/98	4.2	mg/l
MWB-7D	Chloride	300.0	02/22/99	3.8	mg/l
MWB-7D	Chloride	300.0	07/20/99	4.34	mg/l
MWB-7D	Chloride	300.0	01/25/00	7.65	mg/l
MWB-7D	Chloride	300.0	09/07/00	4.34	mg/l
MWB-7D	Chloride	300.0	01/31/01	4.78	mg/L(ppm)
MWB-7D	Chloride	300.0	07/18/01	4.3	mg/L (ppm)
MWB-7D	Chloride	300.0	01/16/02	4.6	mg/L (ppm)
MWB-7D	Chloride	300.0	06/26/02	4	mg/L (ppm)
MWB-7D	Color	110.2	02/22/99	10	Units
MWB-7D	Color	110.2	07/20/99	5	Units
MWB-7D	Color	110.2	01/25/00	10	Units
MWB-7D	Color	110.2	09/07/00	10	Units
MWB-7D	Color	110.2	01/31/01	5	Color Units
MWB-7D	Color	110.2	07/18/01	5	Color Units
MWB-7D	Color	110.2	01/16/02	10	Color Units
MWB-7D	Iron - Total		1/10/96	0.237	mg/l
MWB-7D	Iron - Total		7/17/96	0.233	mg/l
MWB-7D	Iron - Total		1/24/97	0.239	mg/l
MWB-7D	Iron - Total		7/14/97	0.239	mg/l
MWB-7D	Iron - Total	236.1	02/24/98	0.230	mg/l
MWB-7D	Iron - Total	236.1	8/13/98	0.260	mg/l
MWB-7D	Iron - Total	236.1	02/22/99	0.200	mg/l
MWB-7D	Iron - Total	236.1	07/20/99	0.300	mg/l
MWB-7D	Iron - Total	200.7	01/25/00	0.290	mg/l
MWB-7D	Iron - Total	200.7	09/07/00	**0.310**	mg/l
MWB-7D	Iron - Total	200.7	01/31/01	0.270	mg/L(ppm)
MWB-7D	Iron - Total	200.7	07/18/01	**0.330**	mg/L(ppm)
MWB-7D	Iron - Total	200.7	01/16/02	**0.310**	mg/L(ppm)
MWB-7D	Iron - Total	200.7	06/26/02	0.290	mg/L (ppm)
MWB-7D	Lead - Total		1/10/96	0.008	mg/l
MWB-7D	Lead - Total	239.2	02/24/98	0.003	mg/l
MWB-7D	Nitrogen, Ammonia		1/10/96	0.541	mg/l
MWB-7D	Nitrogen, Ammonia		7/17/96	0.104	mg/l
MWB-7D	Nitrogen, Ammonia		7/14/97	0.07	mg/l
MWB-7D	Nitrogen, Ammonia	350.3	02/24/98	0.2	mg/l
MWB-7D	Nitrogen, Ammonia	350.3	8/13/98	0.14	mg/l
MWB-7D	Nitrogen, Ammonia	350.3	07/20/99	0.17	mg/l
MWB-7D	Nitrogen, Ammonia	350.3	09/07/00	0.13	mg/l
MWB-7D	Nitrogen, Ammonia	350.3	01/31/01	0.13	mg/L(ppm)
MWB-7D	Nitrogen, Ammonia	350.3	07/18/01	0.13	mg/L (ppm)
MWB-7D	Nitrogen, Ammonia	350.3	01/16/02	0.17	mg/L (ppm)
MWB-7D	Nitrogen, Nitrate		1/10/96	0.064	mg/l
MWB-7D	Oxygen, Dissolved (Field)		1/24/97	1.7	mg/l
MWB-7D	Oxygen, Dissolved (Field)		7/14/97	1.2	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	02/24/98	1.4	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	8/13/98	0.8	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	02/22/99	1.4	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	07/20/99	0.8	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	01/25/00	0.8	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	09/07/00	1.8	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	01/31/01	1.0	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	07/18/01	0.9	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	01/16/02	0.6	mg/l
MWB-7D	Oxygen, Dissolved (Field)	Field	06/26/02	0.6	mg/l
MWB-7D	Ph (Field)		1/10/96	7.41	S.U.
MWB-7D	Ph (Field)		7/17/96	7.41	S.U.
MWB-7D	Ph (Field)		1/24/97	7.22	S.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7D	Ph (Field)		7/14/97	7.04	S.U.
MWB-7D	Ph (Field)	Field	02/24/98	6.78	n/a
MWB-7D	Ph (Field)	Field	8/13/98	7.45	n/a
MWB-7D	Ph (Field)	Field	02/22/99	7.54	n/a
MWB-7D	Ph (Field)	Field	07/20/99	7.03	n/a
MWB-7D	Ph (Field)	Field	09/07/00	6.89	n/a
MWB-7D	Ph (Field)	Field	01/31/01	7.47	n/a
MWB-7D	Ph (Field)	Field	07/18/01	6.79	n/a
MWB-7D	Ph (Field)	Field	01/16/02	6.98	n/a
MWB-7D	Ph (Field)	Field	06/26/02	6.84	n/a
MWB-7D	Sodium - Total		1/10/96	5.06	mg/l
MWB-7D	Sodium - Total		7/17/96	5.01	mg/l
MWB-7D	Sodium - Total		1/24/97	4.68	mg/l
MWB-7D	Sodium - Total		7/14/97	4.52	mg/l
MWB-7D	Sodium - Total	273.1	02/24/98	4.8	mg/l
MWB-7D	Sodium - Total	273.1	8/13/98	4.8	mg/l
MWB-7D	Sodium - Total	273.1	02/22/99	4.9	mg/l
MWB-7D	Sodium - Total	273.1	07/20/99	4.6	mg/l
MWB-7D	Sodium - Total	200.7	01/25/00	4.98	mg/l
MWB-7D	Sodium - Total	200.7	09/07/00	4.7	mg/l
MWB-7D	Sodium - Total	200.7	01/31/01	4.6	mg/L(ppm)
MWB-7D	Sodium - Total	200.7	07/18/01	4.8	mg/L(ppm)
MWB-7D	Sodium - Total	200.7	01/16/02	4.6	mg/L(ppm)
MWB-7D	Sodium - Total	200.7	06/26/02	4.4	mg/L (ppm)
MWB-7D	Solids, Total Dissolved		1/10/96	168	mg/l
MWB-7D	Solids, Total Dissolved		7/17/96	174	mg/l
MWB-7D	Solids, Total Dissolved		1/24/97	174	mg/l
MWB-7D	Solids, Total Dissolved		7/14/97	155	mg/l
MWB-7D	Solids, Total Dissolved	160.1	02/24/98	190	mg/l
MWB-7D	Solids, Total Dissolved	160.1	8/13/98	190	mg/l
MWB-7D	Solids, Total Dissolved	160.1	02/22/99	190	mg/l
MWB-7D	Solids, Total Dissolved	160.1	07/20/99	200	mg/l
MWB-7D	Solids, Total Dissolved	160.1	01/25/00	208	mg/l
MWB-7D	Solids, Total Dissolved	160.1	09/07/00	212	mg/l
MWB-7D	Solids, Total Dissolved	160.1	01/31/01	183	mg/L(ppm)
MWB-7D	Solids, Total Dissolved	160.1	07/18/01	180	mg/L (ppm)
MWB-7D	Solids, Total Dissolved	160.1	01/16/02	180	mg/L (ppm)
MWB-7D	Solids, Total Dissolved	160.1	06/26/02	190	mg/L (ppm)
MWB-7D	Specific Conductance(Field)		1/10/96	324	umhos/cm
MWB-7D	Specific Conductance(Field)		7/17/96	322	umhos/cm
MWB-7D	Specific Conductance(Field)		1/24/97	290	umhos/cm
MWB-7D	Specific Conductance(Field)		7/14/97	316	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	02/24/98	324	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	8/13/98	325	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	02/22/99	351	um/cm
MWB-7D	Specific Conductance(Field)	Field	07/20/99	361	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	01/25/00	403	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	09/07/00	339	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	01/31/01	339	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	07/18/01	365	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	01/16/02	353	umhos/cm
MWB-7D	Specific Conductance(Field)	Field	06/26/02	345	umhos/cm
MWB-7D	Turbidity (Field)		1/10/96	0.61	NTU
MWB-7D	Turbidity (Field)		7/17/96	0.64	NTU
MWB-7D	Turbidity (Field)		1/24/97	0.55	NTU
MWB-7D	Turbidity (Field)		7/14/97	0.98	NTU
MWB-7D	Turbidity (Field)	Field	02/24/98	1.17	NTU
MWB-7D	Turbidity (Field)	Field	8/13/98	1.31	NTU
MWB-7D	Turbidity (Field)	Field	02/22/99	0.90	NTU
MWB-7D	Turbidity (Field)	Field	07/20/99	0.32	NTU
MWB-7D	Turbidity (Field)	Field	01/25/00	0.98	NTU
MWB-7D	Turbidity (Field)	Field	09/07/00	0.32	NTU
MWB-7D	Turbidity (Field)	Field	01/31/01	1.01	NTU
MWB-7D	Turbidity (Field)	Field	07/18/01	0.64	NTU
MWB-7D	Turbidity (Field)	Field	01/16/02	0.75	NTU
MWB-7D	Turbidity (Field)	Field	06/26/02	0.60	NTU
MWB-7D	Water Temperature in deg Celsius		1/10/96	21	C
MWB-7D	Water Temperature in deg Celsius		7/17/96	22.7	C
MWB-7D	Water Temperature in deg Celsius		1/24/97	21.3	C
MWB-7D	Water Temperature in deg Celsius		7/14/97	22.4	C
MWB-7D	Water Temperature in deg Celsius	Field	02/24/98	20.2	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-7D	Water Temperature in deg Celsius	Field	8/13/98	22.8	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	02/22/99	20.9	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	07/20/99	23.2	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	01/25/00	20.6	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	09/07/00	23.2	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	01/31/01	24.1	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	07/18/01	22.6	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	01/16/02	22.1	Deg C
MWB-7D	Water Temperature in deg Celsius	Field	06/26/02	22.2	Deg C
MWB-7D	Zinc - Total		1/24/97	0.059	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11S	Barium - Total		8/1/97	0.039	mg/l
MWB-11S	Barium - Total	200.7	01/25/00	0.033	mg/l
MWB-11S	Barium - Total	200.8	09/07/00	0.038	mg/l
MWB-11S	Barium - Total	200.8	01/31/01	0.03	mg/L(ppm)
MWB-11S	Barium - Total	200.8	07/18/01	0.035	mg/L(ppm)
MWB-11S	Barium - Total	200.7	01/17/02	0.045	mg/L(ppm)
MWB-11S	Barium - Total	200.7	06/26/02	0.065	mg/L (ppm)
MWB-11S	Chloride		1/8/96	10.2	mg/l
MWB-11S	Chloride		7/17/96	7.51	mg/l
MWB-11S	Chloride		1/24/97	11.1	mg/l
MWB-11S	Chloride		8/1/97	4.24	mg/l
MWB-11S	Chloride	300.0	02/25/98	10.0	mg/l
MWB-11S	Chloride	300.0	8/13/98	8.6	mg/l
MWB-11S	Chloride	300.0	02/22/99	9.5	mg/l
MWB-11S	Chloride	300.0	07/21/99	9.86	mg/l
MWB-11S	Chloride	300.0	01/25/00	14	mg/l
MWB-11S	Chloride	300.0	09/07/00	8.05	mg/l
MWB-11S	Chloride	300.0	01/31/01	11.8	mg/L(ppm)
MWB-11S	Chloride	300.0	07/18/01	12	mg/L (ppm)
MWB-11S	Chloride	300.0	01/17/02	24	mg/L (ppm)
MWB-11S	Chloride	300.0	06/26/02	19	mg/L (ppm)
MWB-11S	Color	110.2	02/22/99	5	Units
MWB-11S	Color	110.2	07/21/99	5	Units
MWB-11S	Color	110.2	01/31/01	5	Color Units
MWB-11S	Color	110.2	07/18/01	5	Color Units
MWB-11S	Color	110.2	01/17/02	5	Color Units
MWB-11S	Iron - Total		1/8/96	**1.19**	mg/l
MWB-11S	Iron - Total		7/17/96	**0.558**	mg/l
MWB-11S	Iron - Total		1/24/97	**0.262**	mg/l
MWB-11S	Iron - Total		8/1/97	**0.674**	mg/l
MWB-11S	Iron - Total	236.1	02/25/98	**0.35**	mg/l
MWB-11S	Iron - Total	236.1	8/13/98	**0.61**	mg/l
MWB-11S	Iron - Total	236.1	02/22/99	**0.4**	mg/l
MWB-11S	Iron - Total	236.1	07/21/99	**0.7**	mg/l
MWB-11S	Iron - Total	200.7	01/25/00	0.24	mg/l
MWB-11S	Iron - Total	200.7	09/07/00	**1.4**	mg/l
MWB-11S	Iron - Total	200.7	01/31/01	0.2	mg/L(ppm)
MWB-11S	Iron - Total	200.7	07/18/01	**0.68**	mg/L(ppm)
MWB-11S	Iron - Total	200.7	01/17/02	**1.2**	mg/L(ppm)
MWB-11S	Iron - Total	200.7	06/26/02	**1.6**	mg/L (ppm)
MWB-11S	Lead - Total		1/8/96	0.005	mg/l
MWB-11S	Lead - Total		7/17/96	0.005	mg/l
MWB-11S	Nitrogen, Ammonia	350.3	01/31/01	0.03	mg/L(ppm)
MWB-11S	Nitrogen, Ammonia	350.3	01/17/02	0.11	mg/L (ppm)
MWB-11S	Nitrogen, Nitrate	300.0	02/22/99	0.24	mg/l
MWB-11S	Oxygen, Dissolved (Field)		1/8/96	2.4	mg/l
MWB-11S	Oxygen, Dissolved (Field)		7/17/96	1.6	mg/l
MWB-11S	Oxygen, Dissolved (Field)		1/24/97	1.7	mg/l
MWB-11S	Oxygen, Dissolved (Field)		8/1/97	1.1	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	02/25/98	1.2	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	8/13/98	1.2	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	02/22/99	0.9	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	01/25/00	1.6	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	09/07/00	1.2	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	01/31/01	1.3	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	07/18/01	1.5	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	01/17/02	1.4	mg/l
MWB-11S	Oxygen, Dissolved (Field)	Field	06/26/02	1.5	mg/l
MWB-11S	Ph (Field)		1/8/96	**4.30**	S.U.
MWB-11S	Ph (Field)		7/17/96	**4.35**	S.U.
MWB-11S	Ph (Field)		1/24/97	**4.36**	S.U.
MWB-11S	Ph (Field)		8/1/97	**4.23**	S.U.
MWB-11S	Ph (Field)	Field	02/25/98	**4.16**	n/a
MWB-11S	Ph (Field)	Field	8/13/98	**3.89**	n/a
MWB-11S	Ph (Field)	Field	02/22/99	**4.05**	n/a
MWB-11S	Ph (Field)	Field	09/07/00	**4.35**	n/a
MWB-11S	Ph (Field)	Field	01/31/01	**4.07**	n/a
MWB-11S	Ph (Field)	Field	07/18/01	**4.09**	n/a
MWB-11S	Ph (Field)	Field	01/17/02	**4.13**	n/a
MWB-11S	Ph (Field)	Field	06/26/02	**4.44**	n/a
MWB-11S	Sodium - Total		1/8/96	4.3	mg/l

DEP005572

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11S	Sodium - Total		7/17/96	4.01	mg/l
MWB-11S	Sodium - Total		1/24/97	4.38	mg/l
MWB-11S	Sodium - Total		8/1/97	4.01	mg/l
MWB-11S	Sodium - Total	273.1	8/13/98	4.9	mg/l
MWB-11S	Sodium - Total	273.1	02/22/99	5.3	mg/l
MWB-11S	Sodium - Total	273.1	07/21/99	5	mg/l
MWB-11S	Sodium - Total	200.7	01/25/00	5.54	mg/l
MWB-11S	Sodium - Total	200.7	09/07/00	5.1	mg/l
MWB-11S	Sodium - Total	200.7	01/31/01	5.4	mg/L(ppm)
MWB-11S	Sodium - Total	200.7	07/18/01	6.4	mg/L(ppm)
MWB-11S	Sodium - Total	200.7	01/17/02	12	mg/L(ppm)
MWB-11S	Sodium - Total	200.7	06/26/02	9.6	mg/L (ppm)
MWB-11S	Solids, Total Dissolved		1/8/96	28	mg/l
MWB-11S	Solids, Total Dissolved		7/17/96	59	mg/l
MWB-11S	Solids, Total Dissolved		1/24/97	42.5	mg/l
MWB-11S	Solids, Total Dissolved		8/1/97	53	mg/l
MWB-11S	Solids, Total Dissolved	160.1	02/25/98	73.0	mg/l
MWB-11S	Solids, Total Dissolved	160.1	8/13/98	51	mg/l
MWB-11S	Solids, Total Dissolved	160.1	02/22/99	62	mg/l
MWB-11S	Solids, Total Dissolved	160.1	07/21/99	68	mg/l
MWB-11S	Solids, Total Dissolved	160.1	01/25/00	67	mg/l
MWB-11S	Solids, Total Dissolved	160.1	09/07/00	96	mg/l
MWB-11S	Solids, Total Dissolved	160.1	01/31/01	44	mg/L(ppm)
MWB-11S	Solids, Total Dissolved	160.1	07/18/01	47	mg/L (ppm)
MWB-11S	Solids, Total Dissolved	160.1	01/17/02	130	mg/L (ppm)
MWB-11S	Solids, Total Dissolved	160.1	06/26/02	100	mg/L (ppm)
MWB-11S	Specific Conductance(Field)		1/8/96	75	umhos/cm
MWB-11S	Specific Conductance(Field)		7/17/96	78	umhos/cm
MWB-11S	Specific Conductance(Field)		1/24/97	75	umhos/cm
MWB-11S	Specific Conductance(Field)		8/1/97	84	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	02/25/98	110	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	8/13/98	98	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	02/22/99	139	um/cm
MWB-11S	Specific Conductance(Field)	Field	01/25/00	110	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	09/07/00	112	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	01/31/01	91	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	07/18/01	115	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	01/17/02	233	umhos/cm
MWB-11S	Specific Conductance(Field)	Field	06/26/02	189	umhos/cm
MWB-11S	Sulfide	9030B	06/26/02	1.2	mg/L (ppm)
MWB-11S	Turbidity (Field)		1/8/96	3.80	NTU
MWB-11S	Turbidity (Field)		7/17/96	0.87	NTU
MWB-11S	Turbidity (Field)		1/24/97	0.47	NTU
MWB-11S	Turbidity (Field)		8/1/97	0.45	NTU
MWB-11S	Turbidity (Field)	Field	02/25/98	2.37	NTU
MWB-11S	Turbidity (Field)	Field	8/13/98	1.61	NTU
MWB-11S	Turbidity (Field)	Field	02/22/99	0.86	NTU
MWB-11S	Turbidity (Field)	Field	01/25/00	2.24	NTU
MWB-11S	Turbidity (Field)	Field	09/07/00	3.42	NTU
MWB-11S	Turbidity (Field)	Field	01/31/01	2.04	NTU
MWB-11S	Turbidity (Field)	Field	07/18/01	3.61	NTU
MWB-11S	Turbidity (Field)	Field	01/17/02	1.43	NTU
MWB-11S	Turbidity (Field)	Field	06/26/02	2.11	NTU
MWB-11S	Water Temperature in deg Celsius		1/8/96	19.1	C
MWB-11S	Water Temperature in deg Celsius		7/17/96	22.7	C
MWB-11S	Water Temperature in deg Celsius		1/24/97	19.3	C
MWB-11S	Water Temperature in deg Celsius		8/1/97	22.5	C
MWB-11S	Water Temperature in deg Celsius	Field	02/25/98	19.6	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	8/13/98	23.0	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	02/22/99	20.8	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	01/25/00	20.8	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	09/07/00	24.6	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	01/31/01	21.3	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	07/18/01	23.1	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	01/17/02	20.4	Deg C
MWB-11S	Water Temperature in deg Celsius	Field	06/26/02	23.5	Deg C
MWB-11S	Zinc - Total		1/24/97	0.058	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11I	Barium - Dissolved		8/1/97	0.059	mg/l
MWB-11I	Barium - Dissolved	200.7	01/25/00	0.084	mg/l
MWB-11I	Barium - Dissolved	200.8	09/07/00	0.043	mg/l
MWB-11I	Barium - Dissolved	200.8	01/31/01	0.045	mg/L(ppm)
MWB-11I	Barium - Dissolved	200.8	07/18/01	0.051	mg/L(ppm)
MWB-11I	Barium - Dissolved	200.7	01/17/02	0.054	mg/L(ppm)
MWB-11I	Barium - Dissolved	200.7	06/26/02	0.19	mg/L (ppm)
MWB-11I	Barium - Total		1/8/96	0.348	mg/l
MWB-11I	Barium - Total		7/17/96	0.322	mg/l
MWB-11I	Barium - Total		1/24/97	0.295	mg/l
MWB-11I	Barium - Total		8/1/97	0.296	mg/l
MWB-11I	Barium - Total	200.7	01/25/00	0.92	mg/l
MWB-11I	Barium - Total	200.8	09/07/00	0.45	mg/l
MWB-11I	Barium - Total	200.8	01/31/01	0.3	mg/L(ppm)
MWB-11I	Barium - Total	200.8	07/18/01	0.29	mg/L(ppm)
MWB-11I	Barium - Total	200.7	01/17/02	0.27	mg/L(ppm)
MWB-11I	Barium - Total	200.7	06/26/02	0.68	mg/L (ppm)
MWB-11I	Beryllium - Total		1/8/96	0.0040	mg/l
MWB-11I	Beryllium - Total		7/17/96	0.0040	mg/l
MWB-11I	Beryllium - Total		8/1/97	0.0040	mg/l
MWB-11I	Beryllium - Total	210.2	02/25/98	[redacted]	mg/l
MWB-11I	Beryllium - Total	210.2	8/13/98	0.0035	mg/l
MWB-11I	Beryllium - Total	210.2	02/22/99	0.0027	mg/l
MWB-11I	Beryllium - Total	210.2	07/21/99	0.0029	mg/l
MWB-11I	Beryllium - Total	200.8	01/25/00	0.0040	mg/l
MWB-11I	Beryllium - Total	200.8	09/07/00	0.0019	mg/l
MWB-11I	Beryllium - Total	200.8	01/31/01	0.0021	mg/L(ppm)
MWB-11I	Beryllium - Total	200.7	07/18/01	0.0040	mg/L(ppm)
MWB-11I	Chloride		1/8/96	8.28	mg/l
MWB-11I	Chloride		7/17/96	5.02	mg/l
MWB-11I	Chloride		1/24/97	5.52	mg/l
MWB-11I	Chloride		8/1/97	5.78	mg/l
MWB-11I	Chloride	300.0	02/25/98	4.9	mg/l
MWB-11I	Chloride	300.0	8/13/98	5.3	mg/l
MWB-11I	Chloride	300.0	02/22/99	4.7	mg/l
MWB-11I	Chloride	300.0	07/21/99	5.62	mg/l
MWB-11I	Chloride	300.0	01/25/00	9.1	mg/l
MWB-11I	Chloride	300.0	09/07/00	12.3	mg/l
MWB-11I	Chloride	300.0	01/31/01	9.02	mg/L(ppm)
MWB-11I	Chloride	300.0	07/18/01	5.4	mg/L (ppm)
MWB-11I	Chloride	300.0	01/17/02	5	mg/L (ppm)
MWB-11I	Chloride	300.0	06/26/02	7.6	mg/L (ppm)
MWB-11I	Chromium - Dissolved	200.7	06/26/02	0.036	mg/L (ppm)
MWB-11I	Chromium - Total	218.2	02/25/98	0.064	mg/l
MWB-11I	Chromium - Total	218.2	8/13/98	0.043	mg/l
MWB-11I	Chromium - Total	218.2	02/22/99	0.100	mg/l
MWB-11I	Chromium - Total	200.8	07/21/99	0.086	mg/l
MWB-11I	Chromium - Total	200.7	01/25/00	[redacted]	mg/l
MWB-11I	Chromium - Total	200.8	09/07/00	0.042	mg/l
MWB-11I	Chromium - Total	200.8	01/31/01	0.039	mg/L(ppm)
MWB-11I	Chromium - Total	200.7	07/18/01	0.062	mg/L(ppm)
MWB-11I	Chromium - Total	200.7	06/26/02	[redacted]	mg/L (ppm)
MWB-11I	Cobalt - Total	200.8	09/07/00	0.0012	mg/l
MWB-11I	Color		1/8/96	60	C.U.
MWB-11I	Color		7/17/96	500	C.U.
MWB-11I	Color		1/24/97	500	C.U.
MWB-11I	Color	110.2	8/13/98	75	Units
MWB-11I	Color	110.2	02/22/99	15	Units
MWB-11I	Color	110.2	07/21/99	10	Units
MWB-11I	Color	110.2	09/07/00	500	Units
MWB-11I	Color	110.2	01/31/01	750	Color Units
MWB-11I	Color	110.2	07/18/01	500	Color Units
MWB-11I	Color	110.2	01/17/02	250	Color Units
MWB-11I	Iron - Dissolved		7/17/96	0.359	mg/l
MWB-11I	Iron - Dissolved		8/1/97	0.379	mg/l
MWB-11I	Iron - Dissolved	236.1	02/25/98	0.39	mg/l
MWB-11I	Iron - Dissolved	236.1	8/13/98	0.37	mg/l
MWB-11I	Iron - Dissolved	236.1	07/21/99	0.3	mg/l
MWB-11I	Iron - Dissolved	200.7	01/25/00	0.58	mg/l
MWB-11I	Iron - Dissolved	200.7	09/07/00	0.5	mg/l
MWB-11I	Iron - Dissolved	200.7	01/31/01	0.42	mg/L(ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11I	Iron - Dissolved	200.7	07/18/01	0.45	mg/L(ppm)
MWB-11I	Iron - Dissolved	200.7	01/17/02	0.5	mg/L(ppm)
MWB-11I	Iron - Dissolved	200.7	06/26/02	1.7	mg/L (ppm)
MWB-11I	Iron - Total		1/8/96	1.190	mg/l
MWB-11I	Iron - Total		7/17/96	1.180	mg/l
MWB-11I	Iron - Total		1/24/97	0.943	mg/l
MWB-11I	Iron - Total		8/1/97	0.935	mg/l
MWB-11I	Iron - Total	236.1	02/25/98	1.300	mg/l
MWB-11I	Iron - Total	236.1	8/13/98	0.910	mg/l
MWB-11I	Iron - Total	236.1	02/22/99	0.900	mg/l
MWB-11I	Iron - Total	236.1	07/21/99	1.700	mg/l
MWB-11I	Iron - Total	200.7	01/25/00	6.130	mg/l
MWB-11I	Iron - Total	200.7	09/07/00	6.300	mg/l
MWB-11I	Iron - Total	200.7	01/31/01	2.000	mg/L(ppm)
MWB-11I	Iron - Total	200.7	07/18/01	2.200	mg/L(ppm)
MWB-11I	Iron - Total	200.7	01/17/02	1.900	mg/L(ppm)
MWB-11I	Iron - Total	200.7	06/26/02	7.800	mg/L (ppm)
MWB-11I	Lead - Dissolved	239.2	01/25/00	0.006	mg/l
MWB-11I	Lead - Dissolved	200.8	01/17/02	0.006	mg/L(ppm)
MWB-11I	Lead - Total		1/8/96	0.012	mg/l
MWB-11I	Lead - Total		7/17/96	[redacted]	mg/l
MWB-11I	Lead - Total		8/1/97	0.011	mg/l
MWB-11I	Lead - Total	239.2	02/25/98	[redacted]	mg/l
MWB-11I	Lead - Total	239.2	8/13/98	[redacted]	mg/l
MWB-11I	Lead - Total	239.2	02/22/99	[redacted]	mg/l
MWB-11I	Lead - Total	239.2	07/21/99	[redacted]	mg/l
MWB-11I	Lead - Total	200.8	01/25/00	[redacted]	mg/l
MWB-11I	Lead - Total	200.8	09/07/00	[redacted]	mg/l
MWB-11I	Lead - Total	200.8	01/31/01	[redacted]	mg/L(ppm)
MWB-11I	Lead - Total	200.8	07/18/01	[redacted]	mg/L(ppm)
MWB-11I	Lead - Total	200.8	06/26/02	[redacted]	mg/L (ppm)
MWB-11I	Nitrogen, Ammonia		1/8/96	0.061	mg/l
MWB-11I	Nitrogen, Ammonia		7/17/96	0.071	mg/l
MWB-11I	Nitrogen, Ammonia		8/1/97	0.079	mg/l
MWB-11I	Nitrogen, Ammonia	350.3	09/07/00	0.042	mg/l
MWB-11I	Nitrogen, Ammonia	350.3	01/31/01	0.05	mg/L(ppm)
MWB-11I	Nitrogen, Nitrate		1/8/96	0.094	mg/l
MWB-11I	Oxygen, Dissolved (Field)		1/8/96	2.1	mg/l
MWB-11I	Oxygen, Dissolved (Field)		1/24/97	1.2	mg/l
MWB-11I	Oxygen, Dissolved (Field)		8/1/97	1.2	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	02/25/98	1.8	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	8/13/98	0.9	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	02/22/99	0.8	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	01/25/00	0.8	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	09/07/00	1.3	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	01/31/01	0.9	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	07/18/01	1.1	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	01/17/02	1.8	mg/l
MWB-11I	Oxygen, Dissolved (Field)	Field	06/26/02	1.9	mg/l
MWB-11I	Ph (Field)		1/8/96	5.24	S.U.
MWB-11I	Ph (Field)		7/17/96	5.39	S.U.
MWB-11I	Ph (Field)		1/24/97	5.30	S.U.
MWB-11I	Ph (Field)		8/1/97	5.26	S.U.
MWB-11I	Ph (Field)	Field	02/25/98	5.14	n/a
MWB-11I	Ph (Field)	Field	8/13/98	5.05	n/a
MWB-11I	Ph (Field)	Field	02/22/99	5.22	n/a
MWB-11I	Ph (Field)	Field	09/07/00	5.33	n/a
MWB-11I	Ph (Field)	Field	01/31/01	5.07	n/a
MWB-11I	Ph (Field)	Field	07/18/01	4.79	n/a
MWB-11I	Ph (Field)	Field	01/17/02	5.30	n/a
MWB-11I	Ph (Field)	Field	06/26/02	5.11	n/a
MWB-11I	Sodium - Dissolved		7/17/96	3.36	mg/l
MWB-11I	Sodium - Dissolved		8/1/97	3.11	mg/l
MWB-11I	Sodium - Dissolved	273.1	02/25/98	3.2	mg/l
MWB-11I	Sodium - Dissolved	273.1	8/13/98	3.1	mg/l
MWB-11I	Sodium - Dissolved	273.1	07/21/99	3	mg/l
MWB-11I	Sodium - Dissolved	200.7	01/25/00	3.22	mg/l
MWB-11I	Sodium - Dissolved	200.7	09/07/00	2.9	mg/l
MWB-11I	Sodium - Dissolved	200.7	01/31/01	3.2	mg/L(ppm)
MWB-11I	Sodium - Dissolved	200.7	07/18/01	3.7	mg/L(ppm)
MWB-11I	Sodium - Dissolved	200.7	01/17/02	3.7	mg/L(ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11I	Sodium - Dissolved	200.7	06/26/02	3.6	mg/L (ppm)
MWB-11I	Sodium - Total		1/8/96	3.24	mg/l
MWB-11I	Sodium - Total		7/17/96	3.54	mg/l
MWB-11I	Sodium - Total		1/24/97	3.24	mg/l
MWB-11I	Sodium - Total		8/1/97	3.14	mg/l
MWB-11I	Sodium - Total	273.1	02/25/98	2.7	mg/l
MWB-11I	Sodium - Total	273.1	8/13/98	3.3	mg/l
MWB-11I	Sodium - Total	273.1	02/22/99	3.3	mg/l
MWB-11I	Sodium - Total	273.1	07/21/99	3.3	mg/l
MWB-11I	Sodium - Total	200.7	01/25/00	3.56	mg/l
MWB-11I	Sodium - Total	200.7	09/07/00	3.1	mg/l
MWB-11I	Sodium - Total	200.7	01/31/01	3.2	mg/L(ppm)
MWB-11I	Sodium - Total	200.7	07/18/01	3.8	mg/L(ppm)
MWB-11I	Sodium - Total	200.7	01/17/02	3.7	mg/L(ppm)
MWB-11I	Sodium - Total	200.7	06/26/02	3.3	mg/L (ppm)
MWB-11I	Solids, Total Dissolved		1/8/96	969	mg/l
MWB-11I	Solids, Total Dissolved		7/17/96	128	mg/l
MWB-11I	Solids, Total Dissolved		1/24/97	204	mg/l
MWB-11I	Solids, Total Dissolved		8/1/97	396	mg/l
MWB-11I	Solids, Total Dissolved	160.1	02/25/98	24	mg/l
MWB-11I	Solids, Total Dissolved	160.1	8/13/98	150	mg/l
MWB-11I	Solids, Total Dissolved	160.1	02/22/99	100	mg/l
MWB-11I	Solids, Total Dissolved	160.1	07/21/99	91	mg/l
MWB-11I	Solids, Total Dissolved	160.1	01/25/00	119	mg/l
MWB-11I	Solids, Total Dissolved	160.1	09/07/00	462	mg/l
MWB-11I	Solids, Total Dissolved	160.1	01/31/01	91	mg/L(ppm)
MWB-11I	Solids, Total Dissolved	160.1	07/18/01	84	mg/L (ppm)
MWB-11I	Solids, Total Dissolved	160.1	01/17/02	73	mg/L (ppm)
MWB-11I	Solids, Total Dissolved	160.1	06/26/02	95	mg/L (ppm)
MWB-11I	Specific Conductance(Field)		1/8/96	41	umhos/cm
MWB-11I	Specific Conductance(Field)		7/17/96	40	umhos/cm
MWB-11I	Specific Conductance(Field)		1/24/97	36	umhos/cm
MWB-11I	Specific Conductance(Field)		8/1/97	120.1	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	02/25/98	42.6	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	8/13/98	39	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	02/22/99	42	um/cm
MWB-11I	Specific Conductance(Field)	Field	01/25/00	47.3	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	09/07/00	45	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	01/31/01	41	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	07/18/01	44	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	01/17/02	47	umhos/cm
MWB-11I	Specific Conductance(Field)	Field	06/26/02	39	umhos/cm
MWB-11I	Sulfide	9030B	06/26/02	1.4	mg/L (ppm)
MWB-11I	Turbidity (Field)		1/8/96	4640	NTU
MWB-11I	Turbidity (Field)		7/17/96	4600	NTU
MWB-11I	Turbidity (Field)		1/24/97	3900	NTU
MWB-11I	Turbidity (Field)		8/1/97	1400	NTU
MWB-11I	Turbidity (Field)	Field	01/31/01	1000	NTU
MWB-11I	Turbidity (Field)	Field	07/18/01	851	NTU
MWB-11I	Turbidity (Field)	Field	01/17/02	744	NTU
MWB-11I	Turbidity (Field)	Field	06/26/02	872	NTU
MWB-11I	Vanadium - Dissolved	286.2	8/13/98	0.045	mg/l
MWB-11I	Vanadium - Dissolved	200.7	06/26/02	0.042	mg/L (ppm)
MWB-11I	Vanadium - Total		1/8/96	0.04000	mg/l
MWB-11I	Vanadium - Total		7/17/96	0.03600	mg/l
MWB-11I	Vanadium - Total		8/1/97	0.06900	mg/l
MWB-11I	Vanadium - Total	286.2	02/25/98	0.07200	mg/l
MWB-11I	Vanadium - Total	286.2	8/13/98	0.04500	mg/l
MWB-11I	Vanadium - Total	286.2	02/22/99	0.11000	mg/l
MWB-11I	Vanadium - Total	200.8	07/21/99	0.11400	mg/l
MWB-11I	Vanadium - Total	200.7	01/25/00	0.24000	mg/l
MWB-11I	Vanadium - Total	200.8	09/07/00	0.04900	mg/l
MWB-11I	Vanadium - Total	200.8	01/31/01	0.05200	mg/L(ppm)
MWB-11I	Vanadium - Total	200.8	07/18/01	0.04900	mg/L(ppm)
MWB-11I	Vanadium - Total	200.7	01/17/02	0.07200	mg/L(ppm)
MWB-11I	Vanadium - Total	200.7	06/26/02	0.18000	mg/L (ppm)
MWB-11I	Vanadium - Total	200.7	08/28/02	0.14000	mg/L (ppm)
MWB-11I	Water Temperature in deg Celsius		1/8/96	19.3	C
MWB-11I	Water Temperature in deg Celsius		7/17/96	23.3	C
MWB-11I	Water Temperature in deg Celsius		1/24/97	20	C
MWB-11I	Water Temperature in deg Celsius		8/1/97	21.6	C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11I	Water Temperature in deg Celsius	Field	02/25/98	21.3	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	8/13/98	22	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	02/22/99	21.1	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	01/25/00	20.4	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	09/07/00	24.2	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	01/31/01	22.1	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	07/18/01	22.8	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	01/17/02	18.2	Deg C
MWB-11I	Water Temperature in deg Celsius	Field	06/26/02	22.8	Deg C
MWB-11I	Zinc - Total		1/24/97	0.051	mg/l
MWB-11I	Zinc - Total	289.1	07/21/99	0.06	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-11I(R)	Barium - Dissolved	200.8	07/19/01	0.022	mg/L(ppm)
MWB-11I(R)	Barium - Dissolved	200.7	01/17/02	0.028	mg/L(ppm)
MWB-11I(R)	Barium - Dissolved	200.7	06/26/02	0.024	mg/L (ppm)
MWB-11I(R)	Barium - Total	200.8	07/19/01	0.073	mg/L(ppm)
MWB-11I(R)	Barium - Total	200.7	01/17/02	0.097	mg/L(ppm)
MWB-11I(R)	Barium - Total	200.7	06/26/02	0.06	mg/L (ppm)
MWB-11I(R)	Chloride	300.0	07/19/01	5.9	mg/L (ppm)
MWB-11I(R)	Chloride	300.0	01/17/02	5.4	mg/L (ppm)
MWB-11I(R)	Chloride	300.0	06/26/02	5.3	mg/L (ppm)
MWB-11I(R)	Chromium - Total	200.8	01/17/02	0.029	mg/L(ppm)
MWB-11I(R)	Color	110.2	07/19/01	**500**	Color Units
MWB-11I(R)	Color	110.2	01/17/02	**500**	Color Units
MWB-11I(R)	Iron - Dissolved	200.7	07/19/01	**0.66**	mg/L(ppm)
MWB-11I(R)	Iron - Dissolved	200.7	01/17/02	**0.49**	mg/L(ppm)
MWB-11I(R)	Iron - Dissolved	200.7	06/26/02	**0.39**	mg/L (ppm)
MWB-11I(R)	Iron - Total	200.7	07/19/01	**1.500**	mg/L(ppm)
MWB-11I(R)	Iron - Total	200.7	01/17/02	**2.000**	mg/L(ppm)
MWB-11I(R)	Iron - Total	200.7	06/26/02	**1.200**	mg/L (ppm)
MWB-11I(R)	Lead - Total	200.8	07/19/01	0.0097	mg/L(ppm)
MWB-11I(R)	Lead - Total	200.8	01/17/02	0.014	mg/L(ppm)
MWB-11I(R)	Lead - Total	200.8	06/26/02	0.0069	mg/L(ppm)
MWB-11I(R)	Oxygen, Dissolved (Field)	Field	07/19/01	1.2	mg/l
MWB-11I(R)	Oxygen, Dissolved (Field)	Field	06/26/02	1.8	mg/l
MWB-11I(R)	Ph (Field)	Field	07/19/01	**4.72**	n/a
MWB-11I(R)	Ph (Field)	Field	06/26/02	**5.22**	n/a
MWB-11I(R)	Sodium - Dissolved	200.7	07/19/01	3.4	mg/L(ppm)
MWB-11I(R)	Sodium - Dissolved	200.7	01/17/02	3.4	mg/L(ppm)
MWB-11I(R)	Sodium - Dissolved	200.7	06/26/02	3.5	mg/L (ppm)
MWB-11I(R)	Sodium - Total	200.7	07/19/01	3.3	mg/L(ppm)
MWB-11I(R)	Sodium - Total	200.7	01/17/02	3.3	mg/L(ppm)
MWB-11I(R)	Sodium - Total	200.7	06/26/02	3	mg/L (ppm)
MWB-11I(R)	Solids, Total Dissolved	160.1	07/19/01	48	mg/L (ppm)
MWB-11I(R)	Solids, Total Dissolved	160.1	01/17/02	60	mg/L (ppm)
MWB-11I(R)	Solids, Total Dissolved	160.1	06/26/02	67	mg/L (ppm)
MWB-11I(R)	Specific Conductance(Field)	Field	07/19/01	39	umhos/cm
MWB-11I(R)	Specific Conductance(Field)	Field	06/26/02	37	umhos/cm
MWB-11I(R)	Sulfide	9030B	06/26/02	1.3	mg/L (ppm)
MWB-11I(R)	Turbidity (Field)	Field	07/19/01	130.3	NTU
MWB-11I(R)	Turbidity (Field)	Field	06/26/02	63.8	NTU
MWB-11I(R)	Vanadium - Total	200.8	07/19/01	0.037	mg/L(ppm)
MWB-11I(R)	Vanadium - Total	200.7	01/17/02	**0.052**	mg/L(ppm)
MWB-11I(R)	Vanadium - Total	200.7	06/26/02	0.027	mg/L (ppm)
MWB-11I(R)	Water Temperature in deg Celsius	Field	07/19/01	24.1	Deg C
MWB-11I(R)	Water Temperature in deg Celsius	Field	06/26/02	23.6	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12S	Barium - Total		7/15/97	0.022	mg/l
MWB-12S	Barium - Total	200.8	09/06/00	0.0055	mg/l
MWB-12S	Barium - Total	200.8	01/30/01	0.0055	mg/L
MWB-12S	Barium - Total	200.8	07/17/01	0.0067	mg/L(ppm)
MWB-12S	Chloride		1/10/96	13.8	mg/l
MWB-12S	Chloride		7/17/96	13.8	mg/l
MWB-12S	Chloride		1/23/97	9.62	mg/l
MWB-12S	Chloride		7/15/97	15.1	mg/l
MWB-12S	Chloride	300.0	02/26/98	17	mg/l
MWB-12S	Chloride	300.0	8/12/98	8.7	mg/l
MWB-12S	Chloride	300.0	02/22/99	8.6	mg/l
MWB-12S	Chloride	300.0	07/21/99	8.29	mg/l
MWB-12S	Chloride	300.0	01/26/00	12.9	mg/l
MWB-12S	Chloride	300.0	09/06/00	9.14	mg/l
MWB-12S	Chloride	300.0	01/30/01	9.6	mg/L
MWB-12S	Chloride	300.0	07/17/01	9.8	mg/L (ppm)
MWB-12S	Chloride	300.0	01/15/02	5.1	mg/L (ppm)
MWB-12S	Chloride	300.0	06/24/02	10	mg/L (ppm)
MWB-12S	Color	110.2	02/22/99	15	Units
MWB-12S	Color	110.2	07/21/99	**30**	Units
MWB-12S	Color	110.2	01/26/00	**35**	Units
MWB-12S	Color	110.2	09/06/00	**50**	Units
MWB-12S	Color	110.2	01/30/01	**100**	Color Units
MWB-12S	Color	110.2	07/17/01	**150**	Color Units
MWB-12S	Color	110.2	01/15/02	**75**	Color Units
MWB-12S	Iron - Total		1/10/96	**0.663**	mg/l
MWB-12S	Iron - Total		7/17/96	**0.665**	mg/l
MWB-12S	Iron - Total		1/23/97	**0.528**	mg/l
MWB-12S	Iron - Total		7/15/97	**0.485**	mg/l
MWB-12S	Iron - Total	236.1	02/26/98	0.280	mg/l
MWB-12S	Iron - Total	236.1	8/12/98	0.250	mg/l
MWB-12S	Iron - Total	236.1	02/22/99	0.200	mg/l
MWB-12S	Iron - Total	236.1	07/21/99	0.200	mg/l
MWB-12S	Iron - Total	200.7	01/26/00	0.140	mg/l
MWB-12S	Iron - Total	200.7	09/06/00	0.150	mg/l
MWB-12S	Iron - Total	200.7	01/30/01	0.130	mg/L
MWB-12S	Iron - Total	200.7	07/17/01	0.140	mg/L(ppm)
MWB-12S	Iron - Total	200.7	01/15/02	0.110	mg/L(ppm)
MWB-12S	Iron - Total	200.7	06/24/02	0.100	mg/L (ppm)
MWB-12S	Lead - Total		1/10/96	0.006	mg/l
MWB-12S	Nitrogen, Ammonia		1/10/96	1.23	mg/l
MWB-12S	Nitrogen, Ammonia		7/17/96	0.506	mg/l
MWB-12S	Nitrogen, Ammonia		1/23/97	0.205	mg/l
MWB-12S	Nitrogen, Ammonia		7/15/97	0.431	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	02/26/98	1.2	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	8/12/98	0.53	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	02/22/99	0.36	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	07/21/99	0.69	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	01/26/00	0.44	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	09/06/00	0.489	mg/l
MWB-12S	Nitrogen, Ammonia	350.3	01/30/01	0.39	mg/L
MWB-12S	Nitrogen, Ammonia	350.3	07/17/01	0.44	mg/L (ppm)
MWB-12S	Nitrogen, Ammonia	350.3	01/15/02	0.26	mg/L (ppm)
MWB-12S	Oxygen, Dissolved (Field)		1/10/96	2.6	mg/l
MWB-12S	Oxygen, Dissolved (Field)		7/17/96	1.8	mg/l
MWB-12S	Oxygen, Dissolved (Field)		1/23/97	2.4	mg/l
MWB-12S	Oxygen, Dissolved (Field)		7/15/97	1.9	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	02/26/98	1.7	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	8/12/98	2.4	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	02/22/99	2.6	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	07/21/99	2.4	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	01/26/00	2.0	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	09/06/00	2.1	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	01/30/01	1.9	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	07/17/01	1.7	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	01/15/02	2.3	mg/l
MWB-12S	Oxygen, Dissolved (Field)	Field	06/24/02	2.3	mg/l
MWB-12S	Ph (Field)		1/10/96	**4.43**	S.U.
MWB-12S	Ph (Field)		7/17/96	**4.50**	S.U.
MWB-12S	Ph (Field)		1/23/97	**4.54**	S.U.
MWB-12S	Ph (Field)		7/15/97	**4.49**	S.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12S	Ph (Field)	Field	02/26/98	4.48	n/a
MWB-12S	Ph (Field)	Field	8/12/98	4.52	n/a
MWB-12S	Ph (Field)	Field	02/22/99	4.86	n/a
MWB-12S	Ph (Field)	Field	07/21/99	5.00	n/a
MWB-12S	Ph (Field)	Field	09/06/00	5.07	n/a
MWB-12S	Ph (Field)	Field	01/30/01	5.71	n/a
MWB-12S	Ph (Field)	Field	07/17/01	4.73	n/a
MWB-12S	Ph (Field)	Field	01/15/02	5.16	n/a
MWB-12S	Ph (Field)	Field	06/24/02	5.45	n/a
MWB-12S	Sodium - Total		1/10/96	6.02	mg/l
MWB-12S	Sodium - Total		7/17/96	6.16	mg/l
MWB-12S	Sodium - Total		1/23/97	6.09	mg/l
MWB-12S	Sodium - Total		7/15/97	4.99	mg/l
MWB-12S	Sodium - Total	273.1	02/26/98	11	mg/l
MWB-12S	Sodium - Total	273.1	8/12/98	4.5	mg/l
MWB-12S	Sodium - Total	273.1	02/22/99	4.5	mg/l
MWB-12S	Sodium - Total	273.1	07/21/99	4.4	mg/l
MWB-12S	Sodium - Total	200.7	01/26/00	4.56	mg/l
MWB-12S	Sodium - Total	200.7	09/06/00	4.3	mg/l
MWB-12S	Sodium - Total	200.7	01/30/01	4.1	mg/L
MWB-12S	Sodium - Total	200.7	07/17/01	4.4	mg/L(ppm)
MWB-12S	Sodium - Total	200.7	01/15/02	3.1	mg/L(ppm)
MWB-12S	Sodium - Total	200.7	06/24/02	3.4	mg/L (ppm)
MWB-12S	Solids, Total Dissolved		1/10/96	47.5	mg/l
MWB-12S	Solids, Total Dissolved		7/17/96	55.5	mg/l
MWB-12S	Solids, Total Dissolved		1/23/97	42.5	mg/l
MWB-12S	Solids, Total Dissolved		7/15/97	54.5	mg/l
MWB-12S	Solids, Total Dissolved	160.1	02/26/98	87	mg/l
MWB-12S	Solids, Total Dissolved	160.1	8/12/98	68	mg/l
MWB-12S	Solids, Total Dissolved	160.1	02/22/99	60	mg/l
MWB-12S	Solids, Total Dissolved	160.1	07/21/99	57	mg/l
MWB-12S	Solids, Total Dissolved	160.1	01/26/00	42	mg/l
MWB-12S	Solids, Total Dissolved	160.1	09/06/00	51	mg/l
MWB-12S	Solids, Total Dissolved	160.1	01/30/01	62	mg/L
MWB-12S	Solids, Total Dissolved	160.1	07/17/01	70	mg/L (ppm)
MWB-12S	Solids, Total Dissolved	160.1	01/15/02	62	mg/L (ppm)
MWB-12S	Solids, Total Dissolved	160.1	06/24/02	94	mg/L (ppm)
MWB-12S	Specific Conductance(Field)		1/10/96	88	umhos/cm
MWB-12S	Specific Conductance(Field)		7/17/96	88	umhos/cm
MWB-12S	Specific Conductance(Field)		1/23/97	78	umhos/cm
MWB-12S	Specific Conductance(Field)		7/15/97	83	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	02/26/98	185	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	8/12/98	100	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	02/22/99	86	um/cm
MWB-12S	Specific Conductance(Field)	Field	07/21/99	87	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	01/26/00	98.4	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	09/06/00	116	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	01/30/01	99	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	07/17/01	90	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	01/15/02	85	umhos/cm
MWB-12S	Specific Conductance(Field)	Field	06/24/02	91	umhos/cm
MWB-12S	Sulfide	9030B	06/24/02	1.4	mg/L (ppm)
MWB-12S	Turbidity (Field)		1/10/96	1.10	NTU
MWB-12S	Turbidity (Field)		7/17/96	2.00	NTU
MWB-12S	Turbidity (Field)		1/23/97	1.50	NTU
MWB-12S	Turbidity (Field)		7/15/97	0.77	NTU
MWB-12S	Turbidity (Field)	Field	02/26/98	9.27	NTU
MWB-12S	Turbidity (Field)	Field	8/12/98	7.97	NTU
MWB-12S	Turbidity (Field)	Field	02/22/99	4.25	NTU
MWB-12S	Turbidity (Field)	Field	07/21/99	7.66	NTU
MWB-12S	Turbidity (Field)	Field	01/26/00	29.80	NTU
MWB-12S	Turbidity (Field)	Field	09/06/00	8.67	NTU
MWB-12S	Turbidity (Field)	Field	01/30/01	23.70	NTU
MWB-12S	Turbidity (Field)	Field	07/17/01	23.10	NTU
MWB-12S	Turbidity (Field)	Field	01/15/02	13.30	NTU
MWB-12S	Turbidity (Field)	Field	06/24/02	3.44	NTU
MWB-12S	Vanadium - Total	200.8	07/21/99	0.003	mg/l
MWB-12S	Water Temperature in deg Celsius		1/10/96	19.3	C
MWB-12S	Water Temperature in deg Celsius		7/17/96	24.2	C
MWB-12S	Water Temperature in deg Celsius		1/23/97	19.8	C
MWB-12S	Water Temperature in deg Celsius		7/15/97	24.3	C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12S	Water Temperature in deg Celsius	Field	02/26/98	18.6	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	8/12/98	25.1	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	02/22/99	20.0	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	07/21/99	23.2	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	01/26/00	18.5	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	09/06/00	24.5	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	01/30/01	20.3	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	07/17/01	23.1	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	01/15/02	20.1	Deg C
MWB-12S	Water Temperature in deg Celsius	Field	06/24/02	22.9	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12I	Barium - Total		7/15/97	0.058	mg/l
MWB-12I	Barium - Total	200.7	01/26/00	0.056	mg/l
MWB-12I	Barium - Total	200.8	09/06/00	0.05	mg/l
MWB-12I	Barium - Total	200.8	01/30/01	0.047	mg/L
MWB-12I	Barium - Total	200.8	07/17/01	0.049	mg/L(ppm)
MWB-12I	Barium - Total	200.7	01/15/02	0.052	mg/L(ppm)
MWB-12I	Barium - Total	200.7	06/24/02	0.053	mg/L (ppm)
MWB-12I	Chloride		1/10/96	7.32	mg/l
MWB-12I	Chloride		7/17/96	5.33	mg/l
MWB-12I	Chloride		1/23/97	5.06	mg/l
MWB-12I	Chloride		7/15/97	7	mg/l
MWB-12I	Chloride	300.0	02/26/98	4.6	mg/l
MWB-12I	Chloride	300.0	8/12/98	5.5	mg/l
MWS-12I	Chloride	300.0	02/22/99	4.9	mg/l
MWB-12I	Chloride	300.0	07/21/99	5.56	mg/l
MWB-12I	Chloride	300.0	01/26/00	6.08	mg/l
MWB-12I	Chloride	300.0	09/06/00	5.3	mg/l
MWB-12I	Chloride	300.0	01/30/01	5.41	mg/L
MWB-12I	Chloride	300.0	07/17/01	5.5	mg/L (ppm)
MWB-12I	Chloride	300.0	01/15/02	5.4	mg/L (ppm)
MWB-12I	Chloride	300.0	06/24/02	5.1	mg/L (ppm)
MWB-12I	Color	110.2	01/26/00	5	Units
MWB-12I	Color	110.2	09/06/00	5	Units
MWB-12I	Color	110.2	01/30/01	5	Color Units
MWB-12I	Color	110.2	01/15/02	5	Color Units
MWB-12I	Iron - Total		1/10/96	0.325	mg/l
MWB-12I	Iron - Total		7/17/96	0.351	mg/l
MWB-12I	Iron - Total		1/23/97	0.399	mg/l
MWB-12I	Iron - Total		7/15/97	0.372	mg/l
MWB-12I	Iron - Total	236.1	02/26/98	0.400	mg/l
MWB-12I	Iron - Total	236.1	8/12/98	0.380	mg/l
MWS-12I	Iron - Total	236.1	02/22/99	0.400	mg/l
MWB-12I	Iron - Total	236.1	07/21/99	0.400	mg/l
MWB-12I	Iron - Total	200.7	01/26/00	0.430	mg/l
MWB-12I	Iron - Total	200.7	09/06/00	0.420	mg/l
MWB-12I	Iron - Total	200.7	01/30/01	0.380	mg/L
MWB-12I	Iron - Total	200.7	07/17/01	0.440	mg/L(ppm)
MWB-12I	Iron - Total	200.7	01/15/02	0.400	mg/L(ppm)
MWB-12I	Iron - Total	200.7	06/24/02	0.420	mg/L (ppm)
MWB-12I	Lead - Total		1/10/96	0.006	mg/l
MWB-12I	Lead - Total		7/17/96	0.006	mg/l
MWB-12I	Nitrogen, Ammonia		1/10/96	0.507	mg/l
MWB-12I	Nitrogen, Ammonia	350.3	02/26/98	0.2	mg/l
MWB-12I	Nitrogen, Ammonia	350.3	01/30/01	0.06	mg/L
MWB-12I	Nitrogen, Nitrate		1/10/96	0.063	mg/l
MWB-12I	Nitrogen, Nitrate		1/23/97	0.229	mg/l
MWB-12I	Oxygen, Dissolved (Field)		1/10/96	2.1	mg/l
MWB-12I	Oxygen, Dissolved (Field)		1/23/97	1.2	mg/l
MWB-12I	Oxygen, Dissolved (Field)		7/15/97	0.8	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	02/26/98	1.4	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	8/12/98	0.8	mg/l
MWS-12I	Oxygen, Dissolved (Field)	Field	02/22/99	1.0	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	07/21/99	1.1	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	01/26/00	0.8	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	09/06/00	1.0	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	01/30/01	0.9	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	07/17/01	0.9	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	01/15/02	1.0	mg/l
MWB-12I	Oxygen, Dissolved (Field)	Field	06/24/02	1.0	mg/l
MWB-12I	Ph (Field)		1/10/96	5.42	S.U.
MWB-12I	Ph (Field)		7/17/96	5.40	S.U.
MWB-12I	Ph (Field)		1/23/97	5.27	S.U.
MWB-12I	Ph (Field)		7/15/97	5.33	S.U.
MWB-12I	Ph (Field)	Field	02/26/98	5.20	n/a
MWB-12I	Ph (Field)	Field	8/12/98	5.19	n/a
MWS-12I	Ph (Field)	Field	02/22/99	5.34	n/a
MWB-12I	Ph (Field)	Field	07/21/99	5.51	n/a
MWB-12I	Ph (Field)	Field	09/06/00	5.16	n/a
MWB-12I	Ph (Field)	Field	01/30/01	5.27	n/a
MWB-12I	Ph (Field)	Field	07/17/01	5.00	n/a
MWB-12I	Ph (Field)	Field	01/15/02	5.20	n/a

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12I	Ph (Field)	Field	06/24/02	5.26	n/a
MWB-12I	Sodium - Total		1/10/96	3.45	mg/l
MWB-12I	Sodium - Total		7/17/96	3.59	mg/l
MWB-12I	Sodium - Total		1/23/97	3.36	mg/l
MWB-12I	Sodium - Total		7/15/97	3.49	mg/l
MWB-12I	Sodium - Total	273.1	02/26/98	3.4	mg/l
MWB-12I	Sodium - Total	273.1	8/12/98	3.6	mg/l
MWS-12I	Sodium - Total	273.1	02/22/99	3.6	mg/l
MWB-12I	Sodium - Total	273.1	07/21/99	3.7	mg/l
MWB-12I	Sodium - Total	200.7	01/26/00	3.75	mg/l
MWB-12I	Sodium - Total	200.7	09/06/00	3.4	mg/l
MWB-12I	Sodium - Total	200.7	01/30/01	3.1	mg/L
MWB-12I	Sodium - Total	200.7	07/17/01	3.2	mg/L(ppm)
MWB-12I	Sodium - Total	200.7	01/15/02	3.3	mg/L(ppm)
MWB-12I	Sodium - Total	200.7	06/24/02	3.48	mg/L (ppm)
MWB-12I	Solids, Total Dissolved		1/10/96	31.5	mg/l
MWB-12I	Solids, Total Dissolved		7/17/96	45.5	mg/l
MWB-12I	Solids, Total Dissolved		1/23/97	30.5	mg/l
MWB-12I	Solids, Total Dissolved		7/15/97	47	mg/l
MWB-12I	Solids, Total Dissolved	160.1	02/26/98	33	mg/l
MWB-12I	Solids, Total Dissolved	160.1	8/12/98	38	mg/l
MWS-12I	Solids, Total Dissolved	160.1	02/22/99	42	mg/l
MWB-12I	Solids, Total Dissolved	160.1	07/21/99	50	mg/l
MWB-12I	Solids, Total Dissolved	160.1	01/26/00	36	mg/l
MWB-12I	Solids, Total Dissolved	160.1	09/06/00	37	mg/l
MWB-12I	Solids, Total Dissolved	160.1	01/30/01	40	mg/L
MWB-12I	Solids, Total Dissolved	160.1	07/17/01	49	mg/L (ppm)
MWB-12I	Solids, Total Dissolved	160.1	01/15/02	46	mg/L (ppm)
MWB-12I	Solids, Total Dissolved	160.1	06/24/02	59	mg/L (ppm)
MWB-12I	Specific Conductance(Field)		1/10/96	41	umhos/cm
MWB-12I	Specific Conductance(Field)		7/17/96	46	umhos/cm
MWB-12I	Specific Conductance(Field)		1/23/97	37	umhos/cm
MWB-12I	Specific Conductance(Field)		7/15/97	38	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	02/26/98	43.8	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	8/12/98	42	umhos/cm
MWS-12I	Specific Conductance(Field)	Field	02/22/99	47	um/cm
MWB-12I	Specific Conductance(Field)	Field	07/21/99	46	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	01/26/00	53.3	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	09/06/00	53	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	01/30/01	56	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	07/17/01	41	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	01/15/02	50	umhos/cm
MWB-12I	Specific Conductance(Field)	Field	06/24/02	40	umhos/cm
MWB-12I	Sulfide	9030B	06/24/02	1.6	mg/L (ppm)
MWB-12I	Turbidity (Field)		1/10/96	7.60	NTU
MWB-12I	Turbidity (Field)		7/17/96	5.50	NTU
MWB-12I	Turbidity (Field)		1/23/97	4.70	NTU
MWB-12I	Turbidity (Field)		7/15/97	4.60	NTU
MWB-12I	Turbidity (Field)	Field	02/26/98	5.47	NTU
MWB-12I	Turbidity (Field)	Field	8/12/98	4.87	NTU
MWS-12I	Turbidity (Field)	Field	02/22/99	4.41	NTU
MWB-12I	Turbidity (Field)	Field	07/21/99	3.11	NTU
MWB-12I	Turbidity (Field)	Field	01/26/00	3.92	NTU
MWB-12I	Turbidity (Field)	Field	09/06/00	5.11	NTU
MWB-12I	Turbidity (Field)	Field	01/30/01	3.99	NTU
MWB-12I	Turbidity (Field)	Field	07/17/01	3.09	NTU
MWB-12I	Turbidity (Field)	Field	01/15/02	3.67	NTU
MWB-12I	Turbidity (Field)	Field	06/24/02	1.09	NTU
MWB-12I	Water Temperature in deg Celsius		1/10/96	20.9	C
MWB-12I	Water Temperature in deg Celsius		7/17/96	22.1	C
MWB-12I	Water Temperature in deg Celsius		1/23/97	21.1	C
MWB-12I	Water Temperature in deg Celsius		7/15/97	22.6	C
MWB-12I	Water Temperature in deg Celsius	Field	02/26/98	21.0	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	8/12/98	22.6	Deg C
MWS-12I	Water Temperature in deg Celsius	Field	02/22/99	21.1	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	07/21/99	22.1	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	01/26/00	19.7	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	09/06/00	23.3	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	01/30/01	21.50	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	07/17/01	22.6	Deg C
MWB-12I	Water Temperature in deg Celsius	Field	01/15/02	20.6	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12I	Water Temperature in deg Celsius	Field	06/24/02	22.4	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12D	Barium - Total		1/10/96	0.11	mg/l
MWB-12D	Barium - Total		7/17/96	0.112	mg/l
MWB-12D	Barium - Total		1/23/97	0.132	mg/l
MWB-12D	Barium - Total		7/15/97	0.131	mg/l
MWB-12D	Barium - Total	200.7	01/26/00	0.12	mg/l
MWB-12D	Barium - Total	200.8	09/06/00	0.12	mg/l
MWB-12D	Barium - Total	200.8	01/30/01	0.11	mg/L
MWB-12D	Barium - Total	200.8	07/17/01	0.12	mg/L(ppm)
MWB-12D	Barium - Total	200.7	01/15/02	0.11	mg/L(ppm)
MWB-12D	Barium - Total	200.7	06/24/02	0.11	mg/L (ppm)
MWB-12D	Chloride		1/10/96	6.19	mg/l
MWB-12D	Chloride		7/17/96	4.79	mg/l
MWB-12D	Chloride		1/23/97	4.16	mg/l
MWB-12D	Chloride		7/15/97	6.42	mg/l
MWB-12D	Chloride	300.0	02/26/98	4.2	mg/l
MWB-12D	Chloride	300.0	8/12/98	4.2	mg/l
MWB-12D	Chloride	300.0	02/22/99	3.9	mg/l
MWB-12D	Chloride	300.0	07/21/99	4.35	mg/l
MWB-12D	Chloride	300.0	01/26/00	7.67	mg/l
MWB-12D	Chloride	300.0	09/06/00	4.28	mg/l
MWB-12D	Chloride	300.0	01/30/01	4.84	mg/L
MWB-12D	Chloride	300.0	07/17/01	4.6	mg/L (ppm)
MWB-12D	Chloride	300.0	01/15/02	4.1	mg/L (ppm)
MWB-12D	Chloride	300.0	06/24/02	4.2	mg/L (ppm)
MWB-12D	Chromium - Total	200.7	01/15/02	0.042	mg/L(ppm)
MWB-12D	Color		7/15/97	50	C.U.
MWB-12D	Color	110.2	02/22/99	10	Units
MWB-12D	Color	110.2	07/21/99	10	Units
MWB-12D	Color	110.2	01/26/00	5	Units
MWB-12D	Color	110.2	09/06/00	10	Units
MWB-12D	Color	110.2	01/30/01	15	Color Units
MWB-12D	Color	110.2	07/17/01	15	Color Units
MWB-12D	Color	110.2	01/15/02	15	Color Units
MWB-12D	Iron - Total		1/10/96	1.390	mg/l
MWB-12D	Iron - Total		7/17/96	1.250	mg/l
MWB-12D	Iron - Total		1/23/97	1.120	mg/l
MWB-12D	Iron - Total		7/15/97	2.820	mg/l
MWB-12D	Iron - Total	236.1	02/26/98	3.300	mg/l
MWB-12D	Iron - Total	236.1	8/12/98	2.500	mg/l
MWB-12D	Iron - Total	236.1	02/22/99	0.900	mg/l
MWB-12D	Iron - Total	236.1	07/21/99	0.800	mg/l
MWB-12D	Iron - Total	200.7	01/26/00	1.740	mg/l
MWB-12D	Iron - Total	200.7	09/06/00	0.950	mg/l
MWB-12D	Iron - Total	200.7	01/30/01	0.730	mg/L
MWB-12D	Iron - Total	200.7	07/17/01	0.660	mg/L(ppm)
MWB-12D	Iron - Total	200.7	01/15/02	0.920	mg/L(ppm)
MWB-12D	Iron - Total	200.7	06/24/02	0.670	mg/L (ppm)
MWB-12D	Lead - Total		1/10/96	0.007	mg/l
MWB-12D	Lead - Total	239.2	02/26/98	0.002	mg/l
MWB-12D	Lead - Total	239.2	02/22/99	0.003	mg/l
MWB-12D	Lead - Total	239.2	07/21/99	0.003	mg/l
MWB-12D	Nickel - Total	200.8	01/30/01	0.0095	mg/L
MWB-12D	Nitrogen, Ammonia		1/10/96	0.671	mg/l
MWB-12D	Nitrogen, Ammonia		7/17/96	0.191	mg/l
MWB-12D	Nitrogen, Ammonia		1/23/97	0.067	mg/l
MWB-12D	Nitrogen, Ammonia		7/15/97	0.1	mg/l
MWB-12D	Nitrogen, Ammonia	350.3	02/26/98	0.3	mg/l
MWB-12D	Nitrogen, Ammonia	350.3	8/12/98	0.17	mg/l
MWB-12D	Nitrogen, Ammonia	350.3	07/21/99	0.18	mg/l
MWB-12D	Nitrogen, Ammonia	350.3	01/26/00	0.25	mg/l
MWB-12D	Nitrogen, Ammonia	350.3	09/06/00	0.198	mg/l
MWB-12D	Nitrogen, Ammonia	350.3	01/30/01	0.15	mg/L
MWB-12D	Nitrogen, Ammonia	350.3	07/17/01	0.17	mg/L (ppm)
MWB-12D	Nitrogen, Ammonia	350.3	01/15/02	0.22	mg/L (ppm)
MWB-12D	Oxygen, Dissolved (Field)		1/10/96	1.1	mg/l
MWB-12D	Oxygen, Dissolved (Field)		7/17/96	1.2	mg/l
MWB-12D	Oxygen, Dissolved (Field)		1/23/97	0.7	mg/l
MWB-12D	Oxygen, Dissolved (Field)		7/15/97	0.8	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	02/26/98	0.8	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	8/12/98	0.7	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	02/22/99	1.0	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12D	Oxygen, Dissolved (Field)	Field	07/21/99	0.9	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	01/26/00	0.9	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	09/06/00	1.1	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	01/30/01	0.9	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	07/17/01	0.8	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	01/15/02	0.8	mg/l
MWB-12D	Oxygen, Dissolved (Field)	Field	06/24/02	0.8	mg/l
MWB-12D	Ph (Field)		1/10/96	7.08	S.U.
MWB-12D	Ph (Field)		7/17/96	7.27	S.U.
MWB-12D	Ph (Field)		1/23/97	6.97	S.U.
MWB-12D	Ph (Field)		7/15/97	7.05	S.U.
MWB-12D	Ph (Field)	Field	02/26/98	6.90	n/a
MWB-12D	Ph (Field)	Field	8/12/98	7.15	n/a
MWB-12D	Ph (Field)	Field	02/22/99	7.33	n/a
MWB-12D	Ph (Field)	Field	07/21/99	6.86	n/a
MWB-12D	Ph (Field)	Field	09/06/00	6.47	n/a
MWB-12D	Ph (Field)	Field	01/30/01	6.91	n/a
MWB-12D	Ph (Field)	Field	07/17/01	6.74	n/a
MWB-12D	Ph (Field)	Field	01/15/02	6.85	n/a
MWB-12D	Ph (Field)	Field	06/24/02	6.87	n/a
MWB-12D	Sodium - Total		1/10/96	6.45	mg/l
MWB-12D	Sodium - Total		7/17/96	6.75	mg/l
MWB-12D	Sodium - Total		1/23/97	7.53	mg/l
MWB-12D	Sodium - Total		7/15/97	5.65	mg/l
MWB-12D	Sodium - Total	273.1	02/26/98	6.0	mg/l
MWB-12D	Sodium - Total	273.1	8/12/98	6.2	mg/l
MWB-12D	Sodium - Total	273.1	02/22/99	6.3	mg/l
MWB-12D	Sodium - Total	273.1	07/21/99	5.8	mg/l
MWB-12D	Sodium - Total	200.7	01/26/00	6.23	mg/l
MWB-12D	Sodium - Total	200.7	09/06/00	5.9	mg/l
MWB-12D	Sodium - Total	200.7	01/30/01	5.3	mg/L
MWB-12D	Sodium - Total	200.7	07/17/01	4.9	mg/L(ppm)
MWB-12D	Sodium - Total	200.7	06/24/02	5.7	mg/L (ppm)
MWB-12D	Solids, Total Dissolved		1/10/96	219	mg/l
MWB-12D	Solids, Total Dissolved		7/17/96	221	mg/l
MWB-12D	Solids, Total Dissolved		1/23/97	199	mg/l
MWB-12D	Solids, Total Dissolved		7/15/97	214	mg/l
MWB-12D	Solids, Total Dissolved	160.1	02/26/98	200	mg/l
MWB-12D	Solids, Total Dissolved	160.1	8/12/98	220	mg/l
MWB-12D	Solids, Total Dissolved	160.1	02/22/99	210	mg/l
MWB-12D	Solids, Total Dissolved	160.1	07/21/99	250	mg/l
MWB-12D	Solids, Total Dissolved	160.1	01/26/00	215	mg/l
MWB-12D	Solids, Total Dissolved	160.1	09/06/00	213	mg/l
MWB-12D	Solids, Total Dissolved	160.1	01/30/01	191	mg/L
MWB-12D	Solids, Total Dissolved	160.1	07/17/01	220	mg/L (ppm)
MWB-12D	Solids, Total Dissolved	160.1	01/15/02	210	mg/L (ppm)
MWB-12D	Solids, Total Dissolved	160.1	06/24/02	260	mg/L (ppm)
MWB-12D	Specific Conductance(Field)		1/10/96	372	umhos/cm
MWB-12D	Specific Conductance(Field)		7/17/96	373	umhos/cm
MWB-12D	Specific Conductance(Field)		1/23/97	347	umhos/cm
MWB-12D	Specific Conductance(Field)		7/15/97	337	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	02/26/98	374	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	8/12/98	380	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	02/22/99	390	um/cm
MWB-12D	Specific Conductance(Field)	Field	07/21/99	362	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	01/26/00	477	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	09/06/00	408	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	01/30/01	432	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	07/17/01	415	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	01/15/02	399	umhos/cm
MWB-12D	Specific Conductance(Field)	Field	06/24/02	388	umhos/cm
MWB-12D	Sulfide	9030B	06/24/02	1.1	mg/L (ppm)
MWB-12D	Turbidity (Field)		1/10/96	27.00	NTU
MWB-12D	Turbidity (Field)		7/17/96	24.00	NTU
MWB-12D	Turbidity (Field)		1/23/97	30.00	NTU
MWB-12D	Turbidity (Field)		7/15/97	32.00	NTU
MWB-12D	Turbidity (Field)	Field	02/26/98	24.70	NTU
MWB-12D	Turbidity (Field)	Field	8/12/98	45.80	NTU
MWB-12D	Turbidity (Field)	Field	02/22/99	24.40	NTU
MWB-12D	Turbidity (Field)	Field	07/21/99	4.16	NTU
MWB-12D	Turbidity (Field)	Field	01/26/00	22.10	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-12D	Turbidity (Field)	Field	09/06/00	6.50	NTU
MWB-12D	Turbidity (Field)	Field	01/30/01	14.28	NTU
MWB-12D	Turbidity (Field)	Field	07/17/01	3.47	NTU
MWB-12D	Turbidity (Field)	Field	01/15/02	2.03	NTU
MWB-12D	Turbidity (Field)	Field	06/24/02	0.45	NTU
MWB-12D	Vanadium - Total		7/15/97	0.01	mg/l
MWB-12D	Water Temperature in deg Celsius		1/10/96	20.4	C
MWB-12D	Water Temperature in deg Celsius		7/17/96	22.7	C
MWB-12D	Water Temperature in deg Celsius		1/23/97	21.1	C
MWB-12D	Water Temperature in deg Celsius		7/15/97	22.6	C
MWB-12D	Water Temperature in deg Celsius	Field	02/26/98	20.7	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	8/12/98	22.6	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	02/22/99	20.5	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	07/21/99	22.0	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	01/26/00	20.0	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	09/06/00	22.8	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	01/30/01	20.3	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	07/17/01	22.6	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	01/15/02	20.2	Deg C
MWB-12D	Water Temperature in deg Celsius	Field	06/24/02	22.2	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-13S	2-Butanone	8260	02/24/98	13	ug/l
MWB-13S	Acetone	8260B	01/15/02	100	µg/L (ppb)
MWB-13S	Barium - Total		7/15/97	0.02	mg/l
MWB-13S	Barium - Total	200.7	01/26/00	0.011	mg/l
MWB-13S	Barium - Total	200.8	09/06/00	0.011	mg/l
MWB-13S	Barium - Total	200.8	01/30/01	0.02	mg/L
MWB-13S	Barium - Total	200.8	07/17/01	0.0086	mg/L(ppm)
MWB-13S	Chloride		11/22/95	7.27	mg/l
MWB-13S	Chloride		1/10/96	9.31	mg/l
MWB-13S	Chloride		7/16/96	8.43	mg/l
MWB-13S	Chloride		1/22/97	8.14	mg/l
MWB-13S	Chloride		7/15/97	8.43	mg/l
MWB-13S	Chloride	300.0	02/24/98	14	mg/l
MWB-13S	Chloride	300.0	8/17/98	12	mg/l
MWB-13S	Chloride	300.0	02/22/99	7.4	mg/l
MWB-13S	Chloride	300.0	07/21/99	9.53	mg/l
MWB-13S	Chloride	300.0	01/26/00	11.9	mg/l
MWB-13S	Chloride	300.0	09/06/00	8.1	mg/l
MWB-13S	Chloride	300.0	01/30/01	12.3	mg/L
MWB-13S	Chloride	300.0	07/17/01	8.9	mg/L (ppm)
MWB-13S	Chloride	300.0	01/15/02	11	mg/L (ppm)
MWB-13S	Chloride	300.0	06/25/02	23	mg/L (ppm)
MWB-13S	Chromium - Total	200.8	07/17/01	0.011	mg/L(ppm)
MWB-13S	Color		11/22/95	**100**	C.U.
MWB-13S	Color	110.2	02/22/99	**20**	Units
MWB-13S	Color	110.2	07/21/99	5	Units
MWB-13S	Color	110.2	01/26/00	15	Units
MWB-13S	Color	110.2	09/06/00	15	Units
MWB-13S	Color	110.2	01/30/01	**75**	Color Units
MWB-13S	Color	110.2	07/17/01	5	Color Units
MWB-13S	Color	110.2	01/15/02	**25**	Color Units
MWB-13S	Copper - Total	200.7	09/06/00	0.0057	mg/l
MWB-13S	Copper - Total	200.8	01/30/01	0.0087	mg/L
MWB-13S	Iron - Total		11/22/95	0.265	mg/l
MWB-13S	Iron - Total		1/10/96	0.299	mg/l
MWB-13S	Iron - Total		7/16/96	**0.372**	mg/l
MWB-13S	Iron - Total		1/22/97	**0.349**	mg/l
MWB-13S	Iron - Total		7/15/97	0.205	mg/l
MWB-13S	Iron - Total	236.1	02/24/98	0.160	mg/l
MWB-13S	Iron - Total	236.1	8/17/98	0.150	mg/l
MWB-13S	Iron - Total	236.1	02/22/99	0.300	mg/l
MWB-13S	Iron - Total	236.1	07/21/99	0.200	mg/l
MWB-13S	Iron - Total	200.7	01/26/00	**0.620**	mg/l
MWB-13S	Iron - Total	200.7	09/06/00	**0.930**	mg/l
MWB-13S	Iron - Total	200.7	01/30/01	10.000	mg/L
MWB-13S	Iron - Total	200.7	07/17/01	0.150	mg/L(ppm)
MWB-13S	Iron - Total	200.7	01/15/02	**0.960**	mg/L(ppm)
MWB-13S	Iron - Total	200.7	06/25/02	**0.570**	mg/L (ppm)
MWB-13S	Lead - Total		1/10/96	0.007	mg/l
MWB-13S	Lead - Total		7/16/96	0.005	mg/l
MWB-13S	Nitrogen, Ammonia		11/22/95	0.414	mg/l
MWB-13S	Nitrogen, Ammonia		1/10/96	1.29	mg/l
MWB-13S	Nitrogen, Ammonia		7/16/96	0.703	mg/l
MWB-13S	Nitrogen, Ammonia		1/22/97	0.568	mg/l
MWB-13S	Nitrogen, Ammonia		7/15/97	0.866	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	02/24/98	0.9	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	8/17/98	0.9	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	02/22/99	0.86	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	07/21/99	0.53	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	01/26/00	0.68	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	09/06/00	0.571	mg/l
MWB-13S	Nitrogen, Ammonia	350.3	01/30/01	0.43	mg/L
MWB-13S	Nitrogen, Ammonia	350.3	07/17/01	0.28	mg/L (ppm)
MWB-13S	Nitrogen, Ammonia	350.3	01/15/02	0.37	mg/L (ppm)
MWB-13S	Nitrogen, Ammonia	350.1	06/25/02	0.4	mg/L (ppm)
MWB-13S	Nitrogen, Nitrate		1/10/96	7.8	mg/l
MWB-13S	Nitrogen, Nitrate		7/16/96	0.118	mg/l
MWB-13S	Oxygen, Dissolved (Field)		11/22/95	3.4	mg/l
MWB-13S	Oxygen, Dissolved (Field)		1/10/96	3.6	mg/l
MWB-13S	Oxygen, Dissolved (Field)		7/16/96	4.6	mg/l
MWB-13S	Oxygen, Dissolved (Field)		1/22/97	4.1	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-13S	Oxygen, Dissolved (Field)		7/15/97	4	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	02/24/98	2.4	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	8/17/98	3.8	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	02/22/99	3.4	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	07/21/99	0.9	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	01/26/00	1.7	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	09/06/00	2.3	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	01/30/01	3.1	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	07/17/01	2.8	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	01/15/02	1.3	mg/l
MWB-13S	Oxygen, Dissolved (Field)	Field	06/25/02	1.4	mg/l
MWB-13S	Ph (Field)		11/22/95	**4.800**	S.U.
MWB-13S	Ph (Field)		1/10/96	**5.120**	S.U.
MWB-13S	Ph (Field)		7/16/96	**4.910**	S.U.
MWB-13S	Ph (Field)		1/22/97	**4.940**	S.U.
MWB-13S	Ph (Field)		7/15/97	**5.090**	S.U.
MWB-13S	Ph (Field)	Field	02/24/98	**5.030**	n/a
MWB-13S	Ph (Field)	Field	8/17/98	**5.210**	n/a
MWB-13S	Ph (Field)	Field	02/22/99	**5.080**	n/a
MWB-13S	Ph (Field)	Field	07/21/99	**5.010**	n/a
MWB-13S	Ph (Field)	Field	09/06/00	**5.090**	n/a
MWB-13S	Ph (Field)	Field	01/30/01	**4.970**	n/a
MWB-13S	Ph (Field)	Field	07/17/01	**4.830**	n/a
MWB-13S	Ph (Field)	Field	01/15/02	**4.810**	n/a
MWB-13S	Ph (Field)	Field	06/25/02	**5.430**	n/a
MWB-13S	Selenium - Total	200.8	06/25/02	0.0076	mg/L (ppm)
MWB-13S	Sodium - Total		11/22/95	2.8	mg/l
MWB-13S	Sodium - Total		1/10/96	3.51	mg/l
MWB-13S	Sodium - Total		7/16/96	5.61	mg/l
MWB-13S	Sodium - Total		1/22/97	5.5	mg/l
MWB-13S	Sodium - Total		7/15/97	6.33	mg/l
MWB-13S	Sodium - Total	273.1	02/24/98	8.7	mg/l
MWB-13S	Sodium - Total	273.1	8/17/98	7	mg/l
MWB-13S	Sodium - Total	273.1	02/22/99	6.0	mg/l
MWB-13S	Sodium - Total	273.1	07/21/99	6.1	mg/l
MWB-13S	Sodium - Total	200.7	01/26/00	5.67	mg/l
MWB-13S	Sodium - Total	200.7	09/06/00	5.4	mg/l
MWB-13S	Sodium - Total	200.7	01/30/01	5.6	mg/L
MWB-13S	Sodium - Total	200.7	07/17/01	5.4	mg/L(ppm)
MWB-13S	Sodium - Total	200.7	01/15/02	6.7	mg/L(ppm)
MWB-13S	Sodium - Total	200.7	06/25/02	13	mg/L (ppm)
MWB-13S	Solids, Total Dissolved		11/22/95	9	mg/l
MWB-13S	Solids, Total Dissolved		1/10/96	32.5	mg/l
MWB-13S	Solids, Total Dissolved		7/16/96	64	mg/l
MWB-13S	Solids, Total Dissolved		1/22/97	71.5	mg/l
MWB-13S	Solids, Total Dissolved		7/15/97	66	mg/l
MWB-13S	Solids, Total Dissolved	160.1	02/24/98	95	mg/l
MWB-13S	Solids, Total Dissolved	160.1	8/17/98	56	mg/l
MWB-13S	Solids, Total Dissolved	160.1	07/21/99	26	mg/l
MWB-13S	Solids, Total Dissolved	160.1	01/26/00	53	mg/l
MWB-13S	Solids, Total Dissolved	160.1	09/06/00	40	mg/l
MWB-13S	Solids, Total Dissolved	160.1	01/30/01	66	mg/L
MWB-13S	Solids, Total Dissolved	160.1	07/17/01	56	mg/L (ppm)
MWB-13S	Solids, Total Dissolved	160.1	01/15/02	74	mg/L (ppm)
MWB-13S	Solids, Total Dissolved	160.1	06/25/02	110	mg/L (ppm)
MWB-13S	Specific Conductance(Field)		11/22/95	55	umhos/cm
MWB-13S	Specific Conductance(Field)		1/10/96	60	umhos/cm
MWB-13S	Specific Conductance(Field)		7/16/96	97	umhos/cm
MWB-13S	Specific Conductance(Field)		1/22/97	75	umhos/cm
MWB-13S	Specific Conductance(Field)		7/15/97	89	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	02/24/98	116	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	8/17/98	112	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	02/22/99	94	um/cm
MWB-13S	Specific Conductance(Field)	Field	07/21/99	122	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	01/26/00	113	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	09/06/00	119	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	01/30/01	113	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	07/17/01	103	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	01/15/02	126	umhos/cm
MWB-13S	Specific Conductance(Field)	Field	06/25/02	160	umhos/cm
MWB-13S	Sulfide	9030B	06/25/02	1.2	mg/L (ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-13S	Turbidity (Field)		11/22/95	32.00	NTU
MWB-13S	Turbidity (Field)		1/10/96	18.00	NTU
MWB-13S	Turbidity (Field)		7/16/96	0.82	NTU
MWB-13S	Turbidity (Field)		1/22/97	0.98	NTU
MWB-13S	Turbidity (Field)		7/15/97	2.60	NTU
MWB-13S	Turbidity (Field)	Field	02/24/98	7.87	NTU
MWB-13S	Turbidity (Field)	Field	8/17/98	9.84	NTU
MWB-13S	Turbidity (Field)	Field	02/22/99	5.69	NTU
MWB-13S	Turbidity (Field)	Field	07/21/99	1.27	NTU
MWB-13S	Turbidity (Field)	Field	01/26/00	2.85	NTU
MWB-13S	Turbidity (Field)	Field	09/06/00	1.41	NTU
MWB-13S	Turbidity (Field)	Field	01/30/01	17.24	NTU
MWB-13S	Turbidity (Field)	Field	07/17/01	2.60	NTU
MWB-13S	Turbidity (Field)	Field	01/15/02	4.95	NTU
MWB-13S	Turbidity (Field)	Field	06/25/02	3.41	NTU
MWB-13S	Vanadium - Total		11/22/95	0.0700	mg/l
MWB-13S	Vanadium - Total	200.8	07/21/99	0.0040	mg/l
MWB-13S	Vanadium - Total	200.8	09/06/00	0.0072	mg/l
MWB-13S	Vanadium - Total	200.7	01/15/02	0.0220	mg/L(ppm)
MWB-13S	Vanadium - Total	200.7	06/25/02	0.0340	mg/L (ppm)
MWB-13S	Water Temperature in deg Celsius		11/22/95	22.7	C
MWB-13S	Water Temperature in deg Celsius		1/10/96	19	C
MWB-13S	Water Temperature in deg Celsius		7/16/96	24.1	C
MWB-13S	Water Temperature in deg Celsius		1/22/97	19.5	C
MWB-13S	Water Temperature in deg Celsius		7/15/97	25.5	C
MWB-13S	Water Temperature in deg Celsius	Field	02/24/98	17.5	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	8/17/98	26.5	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	02/22/99	19.6	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	07/21/99	24.0	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	01/26/00	17.8	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	09/06/00	24.6	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	01/30/01	19.8	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	07/17/01	23.5	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	01/15/02	20.7	Deg C
MWB-13S	Water Temperature in deg Celsius	Field	06/25/02	22.7	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-13I	Barium - Dissolved	200.8	01/30/01	0.029	mg/L
MWB-13I	Barium - Dissolved	200.8	07/17/01	0.03	mg/L(ppm)
MWB-13I	Barium - Dissolved	200.7	1/15/02	0.027	mg/L(ppm)
MWB-13I	Barium - Total		1/11/96	0.118	mg/l
MWB-13I	Barium - Total		7/15/97	0.046	mg/l
MWB-13I	Barium - Total	200.7	01/26/00	0.034	mg/l
MWB-13I	Barium - Total	200.8	09/06/00	0.034	mg/l
MWB-13I	Barium - Total	200.8	01/30/01	0.034	mg/L
MWB-13I	Barium - Total	200.8	07/17/01	0.03	mg/L(ppm)
MWB-13I	Barium - Total	200.7	1/15/02	0.034	mg/L(ppm)
MWB-13I	Barium - Total	200.7	06/25/02	0.034	mg/L (ppm)
MWB-13I	Chloride		11/22/95	7.57	mg/l
MWB-13I	Chloride		1/11/96	8.75	mg/l
MWB-13I	Chloride		7/16/96	4.77	mg/l
MWB-13I	Chloride		1/22/97	5.43	mg/l
MWB-13I	Chloride		7/15/97	6.99	mg/l
MWB-13I	Chloride	300.0	02/24/98	4.9	mg/l
MWB-13I	Chloride	300.0	8/17/98	5.8	mg/l
MWB-13I	Chloride	300.0	02/22/99	4.9	mg/l
MWB-13I	Chloride	300.0	07/21/99	5.43	mg/l
MWB-13I	Chloride	300.0	01/26/00	10.4	mg/l
MWB-13I	Chloride	300.0	09/06/00	5.08	mg/l
MWB-13I	Chloride	300.0	01/30/01	5.89	mg/L
MWB-13I	Chloride	300.0	07/17/01	5.9	mg/L (ppm)
MWB-13I	Chloride	300.0	1/15/02	5.2	mg/L (ppm)
MWB-13I	Chloride	300.0	06/25/02	5.2	mg/L (ppm)
MWB-13I	Chromium - Total	200.8	07/21/99	0.004	mg/l
MWB-13I	Color		11/22/95	**500L**	C.U.
MWB-13I	Color		1/11/96	**500L**	C.U.
MWB-13I	Color		7/16/96	**175**	C.U.
MWB-13I	Color		1/22/97	**75**	C.U.
MWB-13I	Color		7/15/97	**275**	C.U.
MWB-13I	Color	110.2	8/17/98	15	Units
MWB-13I	Color	110.2	02/22/99	15	Units
MWB-13I	Color	110.2	07/21/99	10	Units
MWB-13I	Color	110.2	01/26/00	5	Units
MWB-13I	Color	110.2	09/06/00	**75**	Units
MWB-13I	Color	110.2	01/30/01	**75**	Color Units
MWB-13I	Color	110.2	07/17/01	**50**	Color Units
MWB-13I	Color	110.2	1/15/02	**30**	Color Units
MWB-13I	Iron - Dissolved	200.7	01/30/01	0.3	mg/L
MWB-13I	Iron - Dissolved	200.7	07/17/01	**0.33**	mg/L(ppm)
MWB-13I	Iron - Dissolved	200.7	1/15/02	0.29	mg/L(ppm)
MWB-13I	Iron - Total		11/22/95	**5.290**	mg/l
MWB-13I	Iron - Total		1/11/96	**3.080**	mg/l
MWB-13I	Iron - Total		7/16/96	**0.521**	mg/l
MWB-13I	Iron - Total		1/22/97	**0.366**	mg/l
MWB-13I	Iron - Total		7/15/97	**0.468**	mg/l
MWB-13I	Iron - Total	236.1	02/24/98	**0.460**	mg/l
MWB-13I	Iron - Total	236.1	8/17/98	**0.550**	mg/l
MWB-13I	Iron - Total	236.1	02/22/99	0.300	mg/l
MWB-13I	Iron - Total	236.1	07/21/99	**0.500**	mg/l
MWB-13I	Iron - Total	200.7	01/26/00	**0.420**	mg/l
MWB-13I	Iron - Total	200.7	09/06/00	0.150	mg/l
MWB-13I	Iron - Total	200.7	01/30/01	**0.480**	mg/L
MWB-13I	Iron - Total	200.7	07/17/01	**0.420**	mg/L(ppm)
MWB-13I	Iron - Total	200.7	1/15/02	**0.450**	mg/L(ppm)
MWB-13I	Iron - Total	200.7	06/25/02	**0.380**	mg/L (ppm)
MWB-13I	Lead - Total		11/22/95	0.01K	mg/l
MWB-13I	Lead - Total		1/11/96	[redacted]	mg/l
MWB-13I	Lead - Total		2/5/96	[redacted]	mg/l
MWB-13I	Lead - Total		7/16/96	0.014	mg/l
MWB-13I	Nitrogen, Ammonia	350.3	01/30/01	0.05	mg/L
MWB-13I	Nitrogen, Nitrate		1/11/96	0.142	mg/l
MWB-13I	Oxygen, Dissolved (Field)		11/22/95	1.4	mg/l
MWB-13I	Oxygen, Dissolved (Field)		1/11/96	360.1	mg/l
MWB-13I	Oxygen, Dissolved (Field)		7/16/96	2.1	mg/l
MWB-13I	Oxygen, Dissolved (Field)		1/22/97	1.7	mg/l
MWB-13I	Oxygen, Dissolved (Field)		7/15/97	1.6	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	02/24/98	1.6	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	8/17/98	1.3	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-13I	Oxygen, Dissolved (Field)	Field	02/22/99	1.1	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	07/21/99	1.4	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	01/26/00	1.7	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	09/06/00	1.9	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	01/30/01	1.6	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	07/17/01	1.7	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	1/15/02	1.8	mg/l
MWB-13I	Oxygen, Dissolved (Field)	Field	06/25/02	1.6	mg/l
MWB-13I	Ph (Field)		11/22/95	**5.10**	S.U.
MWB-13I	Ph (Field)		1/11/96	**5.21**	S.U.
MWB-13I	Ph (Field)		7/16/96	**5.13**	S.U.
MWB-13I	Ph (Field)		1/22/97	**5.10**	S.U.
MWB-13I	Ph (Field)		7/15/97	**5.28**	S.U.
MWB-13I	Ph (Field)	Field	02/24/98	**5.05**	n/a
MWB-13I	Ph (Field)	Field	8/17/98	**4.96**	n/a
MWB-13I	Ph (Field)	Field	02/22/99	**5.07**	n/a
MWB-13I	Ph (Field)	Field	07/21/99	**5.24**	n/a
MWB-13I	Ph (Field)	Field	09/06/00	**5.30**	n/a
MWB-13I	Ph (Field)	Field	01/30/01	**5.00**	n/a
MWB-13I	Ph (Field)	Field	07/17/01	**4.91**	n/a
MWB-13I	Ph (Field)	Field	1/15/02	**5.08**	n/a
MWB-13I	Ph (Field)	Field	06/25/02	**5.11**	n/a
MWB-13I	Sodium - Dissolved	200.7	01/30/01	3.8	mg/L
MWB-13I	Sodium - Dissolved	200.7	07/17/01	3.6	mg/L(ppm)
MWB-13I	Sodium - Dissolved	200.7	1/15/02	3.5	mg/L(ppm)
MWB-13I	Sodium - Total		11/22/95	5.23	mg/l
MWB-13I	Sodium - Total		1/11/96	4.85	mg/l
MWB-13I	Sodium - Total		7/16/96	3.49	mg/l
MWB-13I	Sodium - Total		1/22/97	4.43	mg/l
MWB-13I	Sodium - Total		7/15/97	3.4	mg/l
MWB-13I	Sodium - Total	273.1	02/24/98	3.6	mg/l
MWB-13I	Sodium - Total	273.1	8/17/98	3.6	mg/l
MWB-13I	Sodium - Total	273.1	02/22/99	3.7	mg/l
MWB-13I	Sodium - Total	273.1	07/21/99	3.4	mg/l
MWB-13I	Sodium - Total	200.7	01/26/00	3.21	mg/l
MWB-13I	Sodium - Total	200.7	09/06/00	0.44	mg/l
MWB-13I	Sodium - Total	200.7	01/30/01	3.2	mg/L
MWB-13I	Sodium - Total	200.7	07/17/01	3	mg/L(ppm)
MWB-13I	Sodium - Total	200.7	1/15/02	3.4	mg/L(ppm)
MWB-13I	Sodium - Total	200.7	06/25/02	3.4	mg/L(ppm)
MWB-13I	Solids, Total Dissolved		1/11/96	n/a	mg/l
MWB-13I	Solids, Total Dissolved		7/16/96	45.5	mg/l
MWB-13I	Solids, Total Dissolved		1/22/97	46.5	mg/l
MWB-13I	Solids, Total Dissolved		7/15/97	45	mg/l
MWB-13I	Solids, Total Dissolved	160.1	02/24/98	35	mg/l
MWB-13I	Solids, Total Dissolved	160.1	8/17/98	26	mg/l
MWB-13I	Solids, Total Dissolved	160.1	02/22/99	47	mg/l
MWB-13I	Solids, Total Dissolved	160.1	07/21/99	43	mg/l
MWB-13I	Solids, Total Dissolved	160.1	01/26/00	46	mg/l
MWB-13I	Solids, Total Dissolved	160.1	09/06/00	35	mg/l
MWB-13I	Solids, Total Dissolved	160.1	01/30/01	43	mg/L
MWB-13I	Solids, Total Dissolved	160.1	07/17/01	51	mg/L (ppm)
MWB-13I	Solids, Total Dissolved	160.1	1/15/02	51	mg/L (ppm)
MWB-13I	Solids, Total Dissolved	160.1	06/25/02	42	mg/L (ppm)
MWB-13I	Specific Conductance(Field)		11/22/95	40	umhos/cm
MWB-13I	Specific Conductance(Field)		1/11/96	38	umhos/cm
MWB-13I	Specific Conductance(Field)		7/16/96	41	umhos/cm
MWB-13I	Specific Conductance(Field)		1/22/97	33	umhos/cm
MWB-13I	Specific Conductance(Field)		7/15/97	35	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	02/24/98	39.8	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	8/17/98	42	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	02/22/99	43	um/cm
MWB-13I	Specific Conductance(Field)	Field	07/21/99	40	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	01/26/00	46.4	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	09/06/00	47	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	01/30/01	46	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	07/17/01	38	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	1/15/02	45	umhos/cm
MWB-13I	Specific Conductance(Field)	Field	06/25/02	36	umhos/cm
MWB-13I	Sulfide	9030B	06/25/02	1.6	mg/L (ppm)
MWB-13I	Thallium - Total	279.2	02/24/98	0.002	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-13I	Turbidity (Field)		11/22/95	185.00	NTU
MWB-13I	Turbidity (Field)		1/11/96	36.00	NTU
MWB-13I	Turbidity (Field)		7/16/96	40.00	NTU
MWB-13I	Turbidity (Field)		1/22/97	24.00	NTU
MWB-13I	Turbidity (Field)		7/15/97	37.00	NTU
MWB-13I	Turbidity (Field)	Field	02/24/98	87.90	NTU
MWB-13I	Turbidity (Field)	Field	8/17/98	59.60	NTU
MWB-13I	Turbidity (Field)	Field	02/22/99	38.50	NTU
MWB-13I	Turbidity (Field)	Field	07/21/99	26.80	NTU
MWB-13I	Turbidity (Field)	Field	01/26/00	33.00	NTU
MWB-13I	Turbidity (Field)	Field	09/06/00	23.10	NTU
MWB-13I	Turbidity (Field)	Field	01/30/01	42.40	NTU
MWB-13I	Turbidity (Field)	Field	07/17/01	27.70	NTU
MWB-13I	Turbidity (Field)	Field	1/15/02	22.20	NTU
MWB-13I	Turbidity (Field)	Field	06/25/02	7.72	NTU
MWB-13I	Vanadium - Total		11/22/95	0.070	mg/l
MWB-13I	Vanadium - Total		1/11/96	0.048	mg/l
MWB-13I	Vanadium - Total		1/22/97	0.011	mg/l
MWB-13I	Vanadium - Total		7/15/97	0.011	mg/l
MWB-13I	Vanadium - Total	200.8	07/21/99	0.005	mg/l
MWB-13I	Water Temperature in deg Celsius		11/22/95	21	C
MWB-13I	Water Temperature in deg Celsius		1/11/96	19.9	C
MWB-13I	Water Temperature in deg Celsius		7/16/96	21.8	C
MWB-13I	Water Temperature in deg Celsius		1/22/97	20.8	C
MWB-13I	Water Temperature in deg Celsius		7/15/97	22.3	C
MWB-13I	Water Temperature in deg Celsius	Field	02/24/98	20.5	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	8/17/98	22.6	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	02/22/99	20.9	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	07/21/99	22.3	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	01/26/00	19.8	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	09/06/00	22.5	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	01/30/01	21.6	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	07/17/01	22.3	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	1/15/02	21	Deg C
MWB-13I	Water Temperature in deg Celsius	Field	06/25/02	22.5	Deg C
MWB-13I	Zinc - Total	289.1	07/21/99	0.06	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17S	Barium - Total	200.8	09/07/00	0.0066	mg/l
MWB-17S	Barium - Total	200.8	01/31/01	0.0059	mg/L(ppm)
MWB-17S	Barium - Total	200.8	07/18/01	0.0054	mg/L(ppm)
MWB-17S	Barium - Total	200.7	01/16/02	0.012	mg/L(ppm)
MWB-17S	Chloride		1/9/96	7.76	mg/l
MWB-17S	Chloride		7/16/96	4.92	mg/l
MWB-17S	Chloride		1/21/97	4.95	mg/l
MWB-17S	Chloride		7/14/97	19.6	mg/l
MWB-17S	Chloride	300.0	02/24/98	4.1	mg/l
MWB-17S	Chloride	300.0	8/12/98	6.5	mg/l
MWB-17S	Chloride	300.0	02/18/99	9.2	mg/l
MWB-17S	Chloride	300.0	07/20/99	9.05	mg/l
MWB-17S	Chloride	300.0	01/24/00	13.9	mg/l
MWB-17S	Chloride	300.0	09/07/00	11.9	mg/l
MWB-17S	Chloride	300.0	01/31/01	11.4	mg/L(ppm)
MWB-17S	Chloride	300.0	07/18/01	13	mg/L (ppm)
MWB-17S	Chloride	300.0	01/16/02	6.4	mg/L (ppm)
MWB-17S	Chloride	300.0	06/26/02	10	mg/L (ppm)
MWB-17S	Color		1/9/96	150	C.U.
MWB-17S	Color		7/16/96	150	C.U.
MWB-17S	Color		1/21/97	225	C.U.
MWB-17S	Color		7/14/97	325	C.U.
MWB-17S	Color	110.2	8/12/98	10	Units
MWB-17S	Color	110.2	02/18/99	20	Units
MWB-17S	Color	110.2	07/20/99	30	Units
MWB-17S	Color	110.2	01/24/00	60	Units
MWB-17S	Color	110.2	09/07/00	50	Units
MWB-17S	Color	110.2	01/31/01	20	Color Units
MWB-17S	Color	110.2	07/18/01	50	Color Units
MWB-17S	Color	110.2	01/16/02	150	Color Units
MWB-17S	Iron - Total		1/9/96	0.315	mg/l
MWB-17S	Iron - Total		7/16/96	0.474	mg/l
MWB-17S	Iron - Total		1/21/97	0.415	mg/l
MWB-17S	Iron - Total		7/14/97	0.309	mg/l
MWB-17S	Iron - Total	236.1	02/24/98	1.000	mg/l
MWB-17S	Iron - Total	236.1	8/12/98	0.390	mg/l
MWB-17S	Iron - Total	236.1	02/18/99	0.500	mg/l
MWB-17S	Iron - Total	236.1	07/20/99	0.200	mg/l
MWB-17S	Iron - Total	200.7	09/07/00	0.210	mg/l
MWB-17S	Iron - Total	200.7	01/31/01	0.200	mg/L(ppm)
MWB-17S	Iron - Total	200.7	07/18/01	0.180	mg/L(ppm)
MWB-17S	Iron - Total	200.7	01/16/02	0.350	mg/L(ppm)
MWB-17S	Iron - Total	200.7	06/26/02	0.280	mg/L (ppm)
MWB-17S	Lead - Total		1/9/96	0.007	mg/l
MWB-17S	Lead - Total		7/16/96	0.005	mg/l
MWB-17S	Lead - Total	239.2	02/24/98	0.003	mg/l
MWB-17S	Nitrogen, Ammonia		1/9/96	0.069	mg/l
MWB-17S	Nitrogen, Ammonia	350.3	8/12/98	0.11	mg/l
MWB-17S	Nitrogen, Ammonia	350.3	02/18/99	0.48	mg/l
MWB-17S	Nitrogen, Ammonia	350.3	07/20/99	0.89	mg/l
MWB-17S	Nitrogen, Ammonia	350.3	01/24/00	0.313	mg/l
MWB-17S	Nitrogen, Ammonia	350.3	09/07/00	0.72	mg/l
MWB-17S	Nitrogen, Ammonia	350.3	01/31/01	0.54	mg/L(ppm)
MWB-17S	Nitrogen, Ammonia	350.3	07/18/01	1.3	mg/L (ppm)
MWB-17S	Nitrogen, Ammonia	350.3	01/16/02	0.32	mg/L (ppm)
MWB-17S	Nitrogen, Nitrate		1/9/96	0.054	mg/l
MWB-17S	Nitrogen, Nitrate		7/14/97	0.538	mg/l
MWB-17S	Oxygen, Dissolved (Field)		1/9/96	2.2	mg/l
MWB-17S	Oxygen, Dissolved (Field)		7/16/96	2.2	mg/l
MWB-17S	Oxygen, Dissolved (Field)		1/21/97	2.3	mg/l
MWB-17S	Oxygen, Dissolved (Field)		7/14/97	2.4	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	02/24/98	2.7	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	8/12/98	1.3	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	02/18/99	1.4	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	07/20/99	1.4	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	01/24/00	1.5	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	09/07/00	1.8	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	01/31/01	1.8	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	07/18/01	1.9	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	01/16/02	1.8	mg/l
MWB-17S	Oxygen, Dissolved (Field)	Field	06/26/02	1.7	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17S	Ph (Field)		1/9/96	**4.9100**	S.U.
MWB-17S	Ph (Field)		7/16/96	**4.8700**	S.U.
MWB-17S	Ph (Field)		1/21/97	**4.7100**	S.U.
MWB-17S	Ph (Field)		7/14/97	**4.8100**	S.U.
MWB-17S	Ph (Field)	Field	02/24/98	**5.0800**	n/a
MWB-17S	Ph (Field)	Field	8/12/98	**4.5900**	n/a
MWB-17S	Ph (Field)	Field	02/18/99	**4.6900**	n/a
MWB-17S	Ph (Field)	Field	07/20/99	**4.9100**	n/a
MWB-17S	Ph (Field)	Field	09/07/00	**5.2700**	n/a
MWB-17S	Ph (Field)	Field	01/31/01	**5.0100**	n/a
MWB-17S	Ph (Field)	Field	07/18/01	**5.0900**	n/a
MWB-17S	Ph (Field)	Field	01/16/02	**4.8700**	n/a
MWB-17S	Ph (Field)	Field	06/26/02	**5.1700**	n/a
MWB-17S	Sodium - Total		1/9/96	3.06	mg/l
MWB-17S	Sodium - Total		7/16/96	4.06	mg/l
MWB-17S	Sodium - Total		1/21/97	4.82	mg/l
MWB-17S	Sodium - Total		7/14/97	3.29	mg/l
MWB-17S	Sodium - Total	273.1	02/24/98	4.8	mg/l
MWB-17S	Sodium - Total	273.1	8/12/98	4	mg/l
MWB-17S	Sodium - Total	273.1	02/18/99	6.8	mg/l
MWB-17S	Sodium - Total	273.1	07/20/99	5.6	mg/l
MWB-17S	Sodium - Total	200.7	01/24/00	5.83	mg/l
MWB-17S	Sodium - Total	200.7	09/07/00	7.2	mg/l
MWB-17S	Sodium - Total	200.7	01/31/01	7	mg/L(ppm)
MWB-17S	Sodium - Total	200.7	07/18/01	10	mg/L(ppm)
MWB-17S	Sodium - Total	200.7	01/16/02	4.8	mg/L(ppm)
MWB-17S	Sodium - Total	200.7	06/26/02	6.1	mg/L (ppm)
MWB-17S	Solids, Total Dissolved		1/9/96	56.5	mg/l
MWB-17S	Solids, Total Dissolved		7/16/96	42.5	mg/l
MWB-17S	Solids, Total Dissolved		1/21/97	37.5	mg/l
MWB-17S	Solids, Total Dissolved		7/14/97	24.5	mg/l
MWB-17S	Solids, Total Dissolved	160.1	02/24/98	82	mg/l
MWB-17S	Solids, Total Dissolved	160.1	8/12/98	39	mg/l
MWB-17S	Solids, Total Dissolved	160.1	02/18/99	24	mg/l
MWB-17S	Solids, Total Dissolved	160.1	07/20/99	42	mg/l
MWB-17S	Solids, Total Dissolved	160.1	01/24/00	61	mg/l
MWB-17S	Solids, Total Dissolved	160.1	09/07/00	67	mg/l
MWB-17S	Solids, Total Dissolved	160.1	01/31/01	63	mg/L(ppm)
MWB-17S	Solids, Total Dissolved	160.1	07/18/01	90	mg/L (ppm)
MWB-17S	Solids, Total Dissolved	160.1	01/16/02	53	mg/L (ppm)
MWB-17S	Solids, Total Dissolved	160.1	06/26/02	62	mg/L (ppm)
MWB-17S	Specific Conductance(Field)		1/9/96	35	umhos/cm
MWB-17S	Specific Conductance(Field)		7/16/96	40	umhos/cm
MWB-17S	Specific Conductance(Field)		1/21/97	33	umhos/cm
MWB-17S	Specific Conductance(Field)		7/14/97	35	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	02/24/98	46.1	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	8/12/98	49	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	02/18/99	85	µm/cm
MWB-17S	Specific Conductance(Field)	Field	07/20/99	74	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	01/24/00	99.3	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	09/07/00	102	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	01/31/01	105	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	07/18/01	136	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	01/16/02	70	umhos/cm
MWB-17S	Specific Conductance(Field)	Field	06/26/02	89	umhos/cm
MWB-17S	Turbidity (Field)		1/9/96	25	NTU
MWB-17S	Turbidity (Field)		7/16/96	19	NTU
MWB-17S	Turbidity (Field)		1/21/97	19	NTU
MWB-17S	Turbidity (Field)		7/14/97	24	NTU
MWB-17S	Turbidity (Field)	Field	02/24/98	135.70	NTU
MWB-17S	Turbidity (Field)	Field	8/12/98	27.50	NTU
MWB-17S	Turbidity (Field)	Field	02/18/99	5.43	NTU
MWB-17S	Turbidity (Field)	Field	07/20/99	8.13	NTU
MWB-17S	Turbidity (Field)	Field	01/24/00	10.91	NTU
MWB-17S	Turbidity (Field)	Field	09/07/00	6.09	NTU
MWB-17S	Turbidity (Field)	Field	01/31/01	9.17	NTU
MWB-17S	Turbidity (Field)	Field	07/18/01	5.61	NTU
MWB-17S	Turbidity (Field)	Field	01/16/02	14.11	NTU
MWB-17S	Turbidity (Field)	Field	06/26/02	4.89	NTU
MWB-17S	Vanadium - Total	286.2	02/24/98	0.015	mg/l
MWB-17S	Water Temperature in deg Celsius		1/9/96	19.2	C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17S	Water Temperature in deg Celsius		7/16/96	24.9	C
MWB-17S	Water Temperature in deg Celsius		1/21/97	19.9	C
MWB-17S	Water Temperature in deg Celsius		7/14/97	24.5	C
MWB-17S	Water Temperature in deg Celsius	Field	02/24/98	19.3	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	8/12/98	26.2	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	02/18/99	20.7	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	07/20/99	23.5	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	01/24/00	20.9	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	09/07/00	26.7	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	01/31/01	21.1	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	07/18/01	24.5	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	01/16/02	21.4	Deg C
MWB-17S	Water Temperature in deg Celsius	Field	06/26/02	23.1	Deg C
MWB-17S	Zinc - Total	289.1	02/18/99	0.11	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17I	Barium - Total		7/14/97	0.047	mg/l
MWB-17I	Barium - Total	200.7	01/24/00	0.042	mg/l
MWB-17I	Barium - Total	200.8	09/07/00	0.038	mg/l
MWB-17I	Barium - Total	200.8	01/31/01	0.039	mg/L(ppm)
MWB-17I	Barium - Total	200.8	07/18/01	0.036	mg/L(ppm)
MWB-17I	Barium - Total	200.7	01/16/02	0.041	mg/L(ppm)
MWB-17I	Barium - Total	200.7	06/25/02	0.036	mg/L (ppm)
MWB-17I	Chloride		1/9/96	6.94	mg/l
MWB-17I	Chloride		7/16/96	5.16	mg/l
MWB-17I	Chloride		1/21/97	5.74	mg/l
MWB-17I	Chloride		7/14/97	4.72	mg/l
MWB-17I	Chloride	300.0	02/24/98	4.7	mg/l
MWB-17I	Chloride	300.0	8/12/98	5.2	mg/l
MWB-17I	Chloride	300.0	02/18/99	7.9	mg/l
MWB-17I	Chloride	300.0	07/20/99	5.64	mg/l
MWB-17I	Chloride	300.0	01/24/00	5.26	mg/l
MWB-17I	Chloride	300.0	09/07/00	5.33	mg/l
MWB-17I	Chloride	300.0	01/31/01	6.05	mg/L(ppm)
MWB-17I	Chloride	300.0	07/18/01	5.4	mg/L (ppm)
MWB-17I	Chloride	300.0	01/16/02	5.2	mg/L (ppm)
MWB-17I	Chloride	300.0	06/25/02	5.3	mg/L (ppm)
MWB-17I	Color	110.2	02/18/99	5	Units
MWB-17I	Color	110.2	07/20/99	5	Units
MWB-17I	Color	110.2	07/18/01	5	Color Units
MWB-17I	Color	110.2	01/16/02	5	Color Units
MWB-17I	Copper - Total	200.7	01/24/00	0.079	mg/l
MWB-17I	Iron - Total		1/9/96	0.265	mg/l
MWB-17I	Iron - Total		7/16/96	**0.349**	mg/l
MWB-17I	Iron - Total		1/21/97	**0.350**	mg/l
MWB-17I	Iron - Total		7/14/97	**0.317**	mg/l
MWB-17I	Iron - Total	236.1	02/24/98	0.290	mg/l
MWB-17I	Iron - Total	236.1	8/12/98	0.290	mg/l
MWB-17I	Iron - Total	236.1	02/18/99	0.300	mg/l
MWB-17I	Iron - Total	236.1	07/20/99	0.300	mg/l
MWB-17I	Iron - Total	200.7	09/07/00	**0.370**	mg/l
MWB-17I	Iron - Total	200.7	01/31/01	**0.320**	mg/L(ppm)
MWB-17I	Iron - Total	200.7	07/18/01	**0.350**	mg/L(ppm)
MWB-17I	Iron - Total	200.7	01/16/02	**0.340**	mg/L(ppm)
MWB-17I	Iron - Total	200.7	06/25/02	**0.340**	mg/L (ppm)
MWB-17I	Lead - Total		1/9/96	0.01	mg/l
MWB-17I	Nitrogen, Ammonia	350.3	01/31/01	0.03	mg/L(ppm)
MWB-17I	Nitrogen, Nitrate		1/9/96	0.2	mg/l
MWB-17I	Oxygen, Dissolved (Field)		1/9/96	2.2	mg/l
MWB-17I	Oxygen, Dissolved (Field)		7/16/96	1.8	mg/l
MWB-17I	Oxygen, Dissolved (Field)		1/21/97	1.2	mg/l
MWB-17I	Oxygen, Dissolved (Field)		7/14/97	1.4	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	02/24/98	1.6	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	8/12/98	1.3	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	02/18/99	1.4	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	07/20/99	1.6	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	01/24/00	0.8	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	09/07/00	2.0	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	01/31/01	1.3	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	07/18/01	1.1	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	01/16/02	1.1	mg/l
MWB-17I	Oxygen, Dissolved (Field)	Field	06/25/02	1.0	mg/l
MWB-17I	Ph (Field)		1/9/96	5.07	S.U.
MWB-17I	Ph (Field)		7/16/96	4.97	S.U.
MWB-17I	Ph (Field)		1/21/97	4.89	S.U.
MWB-17I	Ph (Field)		7/14/97	4.84	S.U.
MWB-17I	Ph (Field)	Field	02/24/98	4.96	n/a
MWB-17I	Ph (Field)	Field	8/12/98	4.78	n/a
MWB-17I	Ph (Field)	Field		4.78	n/a
MWB-17I	Ph (Field)	Field	07/20/99	4.93	n/a
MWB-17I	Ph (Field)	Field	09/07/00	4.98	n/a
MWB-17I	Ph (Field)	Field	01/31/01	4.58	n/a
MWB-17I	Ph (Field)	Field	07/18/01	4.52	n/a
MWB-17I	Ph (Field)	Field	01/16/02	4.88	n/a
MWB-17I	Sodium - Total		1/9/96	3.2	mg/l
MWB-17I	Sodium - Total		7/16/96	3.57	mg/l
MWB-17I	Sodium - Total		1/21/97	3.57	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17I	Sodium - Total		7/14/97	3.58	mg/l
MWB-17I	Sodium - Total	273.1	02/24/98	3.7	mg/l
MWB-17I	Sodium - Total	273.1	8/12/98	3.6	mg/l
MWB-17I	Sodium - Total	273.1	02/18/99	3.8	mg/l
MWB-17I	Sodium - Total	273.1	07/20/99	3.4	mg/l
MWB-17I	Sodium - Total	200.7	01/24/00	4.04	mg/l
MWB-17I	Sodium - Total	200.7	09/07/00	3.3	mg/l
MWB-17I	Sodium - Total	200.7	01/31/01	3.3	mg/L(ppm)
MWB-17I	Sodium - Total	200.7	07/18/01	3.3	mg/L(ppm)
MWB-17I	Sodium - Total	200.7	01/16/02	3.3	mg/L(ppm)
MWB-17I	Sodium - Total	200.7	06/25/02	3.2	mg/L (ppm)
MWB-17I	Solids, Total Dissolved		1/9/96	56	mg/l
MWB-17I	Solids, Total Dissolved		7/16/96	29.5	mg/l
MWB-17I	Solids, Total Dissolved		1/21/97	13.5	mg/l
MWB-17I	Solids, Total Dissolved		7/14/97	21.5	mg/l
MWB-17I	Solids, Total Dissolved	160.1	02/24/98	32	mg/l
MWB-17I	Solids, Total Dissolved	160.1	8/12/98	32	mg/l
MWB-17I	Solids, Total Dissolved	160.1	02/18/99	11	mg/l
MWB-17I	Solids, Total Dissolved	160.1	07/20/99	27	mg/l
MWB-17I	Solids, Total Dissolved	160.1	01/24/00	22	mg/l
MWB-17I	Solids, Total Dissolved	160.1	09/07/00	42	mg/l
MWB-17I	Solids, Total Dissolved	160.1	01/31/01	46	mg/L(ppm)
MWB-17I	Solids, Total Dissolved	160.1	07/18/01	42	mg/L (ppm)
MWB-17I	Solids, Total Dissolved	160.1	01/16/02	37	mg/L (ppm)
MWB-17I	Solids, Total Dissolved	160.1	06/25/02	53	mg/L (ppm)
MWB-17I	Specific Conductance(Field)		1/9/96	37	umhos/cm
MWB-17I	Specific Conductance(Field)		7/16/96	33	umhos/cm
MWB-17I	Specific Conductance(Field)		1/21/97	32	umhos/cm
MWB-17I	Specific Conductance(Field)		7/14/97	36	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	02/24/98	42.5	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	8/12/98	35	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	02/18/99	39	µm/cm
MWB-17I	Specific Conductance(Field)	Field	07/20/99	38	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	01/24/00	46.8	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	09/07/00	42	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	01/31/01	41	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	07/18/01	35	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	01/16/02	39	umhos/cm
MWB-17I	Specific Conductance(Field)	Field	06/25/02	32	umhos/cm
MWB-17I	Sulfide	9030B	06/25/02	1.3	mg/L (ppm)
MWB-17I	Thallium - Total	279.2	02/24/98	0.002	mg/l
MWB-17I	Turbidity (Field)		1/9/96	3.00	NTU
MWB-17I	Turbidity (Field)		7/16/96	1.40	NTU
MWB-17I	Turbidity (Field)		1/21/97	1.70	NTU
MWB-17I	Turbidity (Field)		7/14/97	3.80	NTU
MWB-17I	Turbidity (Field)	Field	02/24/98	8.71	NTU
MWB-17I	Turbidity (Field)	Field	8/12/98	2.20	NTU
MWB-17I	Turbidity (Field)	Field	02/18/99	0.90	NTU
MWB-17I	Turbidity (Field)	Field	07/20/99	1.20	NTU
MWB-17I	Turbidity (Field)	Field	01/24/00	0.72	NTU
MWB-17I	Turbidity (Field)	Field	09/07/00	1.13	NTU
MWB-17I	Turbidity (Field)	Field	01/31/01	0.83	NTU
MWB-17I	Turbidity (Field)	Field	07/18/01	0.71	NTU
MWB-17I	Turbidity (Field)	Field	01/16/02	0.97	NTU
MWB-17I	Turbidity (Field)	Field	06/25/02	0.71	NTU
MWB-17I	Water Temperature in deg Celsius		1/9/96	19.6	C
MWB-17I	Water Temperature in deg Celsius		7/16/96	23.5	C
MWB-17I	Water Temperature in deg Celsius		1/21/97	20.4	C
MWB-17I	Water Temperature in deg Celsius		7/14/97	22.2	C
MWB-17I	Water Temperature in deg Celsius	Field	02/24/98	20.8	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	8/12/98	22.8	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	02/18/99	21.2	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	07/20/99	21.8	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	01/24/00	21.1	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	09/07/00	23.3	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	01/31/01	22.0	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	07/18/01	22.4	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	01/16/02	21.1	Deg C
MWB-17I	Water Temperature in deg Celsius	Field	06/25/02	22.3	Deg C
MWB-17I	Zinc - Total	200.7	01/24/00	0.26	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17D	Barium - Total		7/14/97	0.046	mg/l
MWB-17D	Barium - Total	200.7	01/24/00	0.042	mg/l
MWB-17D	Barium - Total	200.8	09/07/00	0.034	mg/l
MWB-17D	Barium - Total	200.8	01/31/01	0.037	mg/L(ppm)
MWB-17D	Barium - Total	200.8	07/18/01	0.035	mg/L(ppm)
MWB-17D	Barium - Total	200.7	01/16/02	0.039	mg/L(ppm)
MWB-17D	Barium - Total	200.7	06/25/02	0.037	mg/L (ppm)
MWB-17D	Chloride		1/9/96	9.7	mg/l
MWB-17D	Chloride		7/16/96	5.1	mg/l
MWB-17D	Chloride		1/21/97	5.58	mg/l
MWB-17D	Chloride		7/14/97	5.7	mg/l
MWB-17D	Chloride	300.0	02/24/98	5.6	mg/l
MWB-17D	Chloride	300.0	8/12/98	6.0	mg/l
MWB-17D	Chloride	300.0	02/18/99	5.5	mg/l
MWB-17D	Chloride	300.0	07/20/99	6.41	mg/l
MWB-17D	Chloride	300.0	01/24/00	5.76	mg/l
MWB-17D	Chloride	300.0	09/07/00	5.97	mg/l
MWB-17D	Chloride	300.0	01/31/01	6.51	mg/L(ppm)
MWB-17D	Chloride	300.0	07/18/01	6.2	mg/L (ppm)
MWB-17D	Chloride	300.0	01/16/02	5.8	mg/L (ppm)
MWB-17D	Chloride	300.0	06/25/02	5.8	mg/L (ppm)
MWB-17D	Color	110.2	02/18/99	10	Units
MWB-17D	Color	110.2	07/20/99	5	Units
MWB-17D	Color	110.2	07/18/01	5	Color Units
MWB-17D	Color	110.2	01/16/02	5	Color Units
MWB-17D	Iron - Total		1/9/96	**0.576**	mg/l
MWB-17D	Iron - Total		7/16/96	**0.720**	mg/l
MWB-17D	Iron - Total		1/21/97	**0.587**	mg/l
MWB-17D	Iron - Total		7/14/97	**0.643**	mg/l
MWB-17D	Iron - Total	236.1	02/24/98	**0.600**	mg/l
MWB-17D	Iron - Total	236.1	8/12/98	**0.620**	mg/l
MWB-17D	Iron - Total	236.1	02/18/99	**0.600**	mg/l
MWB-17D	Iron - Total	236.1	07/20/99	**0.700**	mg/l
MWB-17D	Iron - Total	200.7	01/24/00	**0.750**	mg/l
MWB-17D	Iron - Total	200.7	09/07/00	**0.740**	mg/l
MWB-17D	Iron - Total	200.7	01/31/01	**0.660**	mg/L(ppm)
MWB-17D	Iron - Total	200.7	07/18/01	**0.710**	mg/L(ppm)
MWB-17D	Iron - Total	200.7	01/16/02	**0.660**	mg/L(ppm)
MWB-17D	Iron - Total	200.7	06/25/02	**0.630**	mg/L (ppm)
MWB-17D	Lead - Total		1/9/96	0.010	mg/l
MWB-17D	Lead - Total		7/16/96	0.011	mg/l
MWB-17D	Nitrogen, Ammonia		7/16/96	0.461	mg/l
MWB-17D	Nitrogen, Ammonia		7/14/97	0.12	mg/l
MWB-17D	Nitrogen, Ammonia	350.3	02/24/98	0.1	mg/l
MWB-17D	Nitrogen, Ammonia	350.3	07/20/99	0.12	mg/l
MWB-17D	Nitrogen, Ammonia	350.3	01/31/01	0.06	mg/L(ppm)
MWB-17D	Nitrogen, Nitrate		1/9/96	0.147	mg/l
MWB-17D	Oxygen, Dissolved (Field)		1/9/96	1.7	mg/l
MWB-17D	Oxygen, Dissolved (Field)		7/16/96	1.2	mg/l
MWB-17D	Oxygen, Dissolved (Field)		1/21/97	1.1	mg/l
MWB-17D	Oxygen, Dissolved (Field)		7/14/97	0.8	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	02/24/98	1.8	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	8/12/98	1.2	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	02/18/99	1.8	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	07/20/99	0.8	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	01/24/00	1.3	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	09/07/00	2.0	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	01/31/01	1.3	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	07/18/01	1.0	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	01/16/02	1.0	mg/l
MWB-17D	Oxygen, Dissolved (Field)	Field	06/25/02	0.9	mg/l
MWB-17D	Ph (Field)		1/9/96	5.94	S.U.
MWB-17D	Ph (Field)		7/16/96	5.79	S.U.
MWB-17D	Ph (Field)		1/21/97	5.69	S.U.
MWB-17D	Ph (Field)		7/14/97	5.68	S.U.
MWB-17D	Ph (Field)	Field	02/24/98	5.60	n/a
MWB-17D	Ph (Field)	Field	8/12/98	5.61	n/a
MWB-17D	Ph (Field)	Field	02/18/99	5.68	n/a
MWB-17D	Ph (Field)	Field	07/20/99	5.82	n/a
MWB-17D	Ph (Field)	Field	09/07/00	5.77	n/a
MWB-17D	Ph (Field)	Field	01/31/01	5.52	n/a

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17D	Ph (Field)	Field	07/18/01	**5.31**	n/a
MWB-17D	Ph (Field)	Field	01/16/02	**5.61**	n/a
MWB-17D	Ph (Field)	Field	06/25/02	**6.24**	n/a
MWB-17D	Sodium - Total		1/9/96	4.45	mg/l
MWB-17D	Sodium - Total		7/16/96	4.36	mg/l
MWB-17D	Sodium - Total		1/21/97	3.92	mg/l
MWB-17D	Sodium - Total		7/14/97	3.83	mg/l
MWB-17D	Sodium - Total	273.1	02/24/98	3.6	mg/l
MWB-17D	Sodium - Total	273.1	8/12/98	3.8	mg/l
MWB-17D	Sodium - Total	273.1	02/18/99	3.8	mg/l
MWB-17D	Sodium - Total	273.1	07/20/99	3.8	mg/l
MWB-17D	Sodium - Total	200.7	01/24/00	3.98	mg/l
MWB-17D	Sodium - Total	200.7	09/07/00	3.4	mg/l
MWB-17D	Sodium - Total	200.7	01/31/01	3.4	mg/L(ppm)
MWB-17D	Sodium - Total	200.7	07/18/01	3.3	mg/L(ppm)
MWB-17D	Sodium - Total	200.7	01/16/02	3.5	mg/L(ppm)
MWB-17D	Sodium - Total	200.7	06/25/02	3.4	mg/L (ppm)
MWB-17D	Solids, Total Dissolved		1/9/96	85.5	mg/l
MWB-17D	Solids, Total Dissolved		7/16/96	66	mg/l
MWB-17D	Solids, Total Dissolved		1/21/97	44	mg/l
MWB-17D	Solids, Total Dissolved		7/14/97	50	mg/l
MWB-17D	Solids, Total Dissolved	160.1	02/24/98	66	mg/l
MWB-17D	Solids, Total Dissolved	160.1	8/12/98	50	mg/l
MWB-17D	Solids, Total Dissolved	160.1	02/18/99	30	mg/l
MWB-17D	Solids, Total Dissolved	160.1	07/20/99	53	mg/l
MWB-17D	Solids, Total Dissolved	160.1	01/24/00	52	mg/l
MWB-17D	Solids, Total Dissolved	160.1	09/07/00	60	mg/l
MWB-17D	Solids, Total Dissolved	160.1	01/31/01	51	mg/L(ppm)
MWB-17D	Solids, Total Dissolved	160.1	07/18/01	55	mg/L (ppm)
MWB-17D	Solids, Total Dissolved	160.1	01/16/02	67	mg/L (ppm)
MWB-17D	Solids, Total Dissolved	160.1	06/25/02	73	mg/L (ppm)
MWB-17D	Specific Conductance(Field)		1/9/96	81	umhos/cm
MWB-17D	Specific Conductance(Field)		7/16/96	83	umhos/cm
MWB-17D	Specific Conductance(Field)		1/21/97	73	umhos/cm
MWB-17D	Specific Conductance(Field)		7/14/97	79	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	02/24/98	78.4	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	8/12/98	74	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	02/18/99	108	µm/cm
MWB-17D	Specific Conductance(Field)	Field	07/20/99	80	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	01/24/00	87.8	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	09/07/00	71	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	01/31/01	79	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	07/18/01	69	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	01/16/02	87	umhos/cm
MWB-17D	Specific Conductance(Field)	Field	06/25/02	66	umhos/cm
MWB-17D	Sulfide	9030B	06/25/02	1	mg/L (ppm)
MWB-17D	Turbidity (Field)		1/9/96	27.00	NTU
MWB-17D	Turbidity (Field)		7/16/96	14.00	NTU
MWB-17D	Turbidity (Field)		1/21/97	7.70	NTU
MWB-17D	Turbidity (Field)		7/14/97	4.10	NTU
MWB-17D	Turbidity (Field)	Field	02/24/98	6.99	NTU
MWB-17D	Turbidity (Field)	Field	8/12/98	2.98	NTU
MWB-17D	Turbidity (Field)	Field	02/18/99	2.23	NTU
MWB-17D	Turbidity (Field)	Field	07/20/99	1.06	NTU
MWB-17D	Turbidity (Field)	Field	01/24/00	1.33	NTU
MWB-17D	Turbidity (Field)	Field	09/07/00	1.35	NTU
MWB-17D	Turbidity (Field)	Field	01/31/01	1.43	NTU
MWB-17D	Turbidity (Field)	Field	07/18/01	0.73	NTU
MWB-17D	Turbidity (Field)	Field	01/16/02	0.67	NTU
MWB-17D	Turbidity (Field)	Field	06/25/02	0.53	NTU
MWB-17D	Water Temperature in deg Celsius		1/9/96	19.8	C
MWB-17D	Water Temperature in deg Celsius		7/16/96	22	C
MWB-17D	Water Temperature in deg Celsius		1/21/97	20.3	C
MWB-17D	Water Temperature in deg Celsius		7/14/97	22.1	C
MWB-17D	Water Temperature in deg Celsius	Field	02/24/98	20.7	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	8/12/98	22.2	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	02/18/99	20.8	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	07/20/99	22.9	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	01/24/00	20.6	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	09/07/00	22.7	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	01/31/01	21.3	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-17D	Water Temperature in deg Celsius	Field	07/18/01	22.1	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	01/16/02	20.0	Deg C
MWB-17D	Water Temperature in deg Celsius	Field	06/25/02	22.0	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19S	Barium - Total		7/14/97	0.023	mg/l
MWB-19S	Barium - Total	200.7	01/24/00	0.022	mg/l
MWB-19S	Barium - Total	200.8	09/07/00	0.035	mg/l
MWB-19S	Barium - Total	200.8	01/31/01	0.034	mg/L(ppm)
MWB-19S	Barium - Total	200.8	07/18/01	0.027	mg/L(ppm)
MWB-19S	Barium - Total	200.7	01/16/02	0.012	mg/L(ppm)
MWB-19S	Chloride		1/10/96	8.74	mg/l
MWB-19S	Chloride		7/16/96	8.92	mg/l
MWB-19S	Chloride		1/22/97	6.54	mg/l
MWB-19S	Chloride		7/14/97	7.25	mg/l
MWB-19S	Chloride	300.0	02/25/98	3.2	mg/l
MWB-19S	Chloride	300.0	8/13/98	9.4	mg/l
MWB-19S	Chloride	300.0	02/18/99	8.5	mg/l
MWB-19S	Chloride	300.0	07/20/99	10.2	mg/l
MWB-19S	Chloride	300.0	01/24/00	14.1	mg/l
MWB-19S	Chloride	300.0	09/07/00	9.83	mg/l
MWB-19S	Chloride	300.0	01/31/01	11.8	mg/L(ppm)
MWB-19S	Chloride	300.0	07/18/01	11	mg/L (ppm)
MWB-19S	Chloride	300.0	01/16/02	11	mg/L (ppm)
MWB-19S	Chloride	300.0	06/26/02	13	mg/L (ppm)
MWB-19S	Chromium - Total	218.2	02/25/98	0.005	mg/l
MWB-19S	Color	110.2	02/18/99	35	Units
MWB-19S	Color	110.2	07/20/99	15	Units
MWB-19S	Color	110.2	01/24/00	45	Units
MWB-19S	Color	110.2	09/07/00	30	Units
MWB-19S	Color	110.2	01/31/01	20	Color Units
MWB-19S	Color	110.2	07/18/01	30	Color Units
MWB-19S	Color	110.2	01/16/02	150	Color Units
MWB-19S	Iron - Total		1/10/96	0.326	mg/l
MWB-19S	Iron - Total		7/16/96	0.477	mg/l
MWB-19S	Iron - Total		1/22/97	0.553	mg/l
MWB-19S	Iron - Total		7/14/97	0.631	mg/l
MWB-19S	Iron - Total	236.1	02/25/98	0.500	mg/l
MWB-19S	Iron - Total	236.1	8/13/98	0.250	mg/l
MWB-19S	Iron - Total	236.1	02/18/99	0.100	mg/l
MWB-19S	Iron - Total	236.1	07/20/99	0.700	mg/l
MWB-19S	Iron - Total	200.7	09/07/00	1.200	mg/l
MWB-19S	Iron - Total	200.7	01/31/01	1.100	mg/L(ppm)
MWB-19S	Iron - Total	200.7	07/18/01	1.100	mg/L(ppm)
MWB-19S	Iron - Total	200.7	01/16/02	0.260	mg/L(ppm)
MWB-19S	Iron - Total	200.7	06/26/02	0.210	mg/L (ppm)
MWB-19S	Lead - Total		1/10/96	0.006	mg/l
MWB-19S	Lead - Total	200.8	07/18/01	0.0026	mg/L(ppm)
MWB-19S	Nickel - Total	200.8	07/18/01	0.014	mg/L(ppm)
MWB-19S	Nitrogen, Ammonia		1/10/96	0.222	mg/l
MWB-19S	Nitrogen, Ammonia		7/16/96	0.133	mg/l
MWB-19S	Nitrogen, Ammonia	350.3	8/13/98	0.28	mg/l
MWB-19S	Nitrogen, Ammonia	350.3	02/18/99	1.1	mg/l
MWB-19S	Nitrogen, Ammonia	350.3	07/20/99	0.2	mg/l
MWB-19S	Nitrogen, Ammonia	350.3	01/24/00	0.205	mg/l
MWB-19S	Nitrogen, Ammonia	350.3	09/07/00	0.31	mg/l
MWB-19S	Nitrogen, Ammonia	350.3	01/31/01	0.26	mg/L(ppm)
MWB-19S	Nitrogen, Ammonia	350.3	07/18/01	0.26	mg/L (ppm)
MWB-19S	Nitrogen, Ammonia	350.3	01/16/02	0.26	mg/L (ppm)
MWB-19S	Nitrogen, Ammonia	350.1	06/26/02	0.22	mg/L (ppm)
MWB-19S	Oxygen, Dissolved (Field)		1/10/96	1.8	mg/l
MWB-19S	Oxygen, Dissolved (Field)		7/16/96	1.8	mg/l
MWB-19S	Oxygen, Dissolved (Field)		1/22/97	1.9	mg/l
MWB-19S	Oxygen, Dissolved (Field)		7/14/97	1.3	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	02/25/98	2.4	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	8/13/98	0.9	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	02/18/99	0.8	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	07/20/99	1.2	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	01/24/00	1.2	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	09/07/00	1.6	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	01/31/01	1.6	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	07/18/01	1.8	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	01/16/02	0.8	mg/l
MWB-19S	Oxygen, Dissolved (Field)	Field	06/26/02	0.9	mg/l
MWB-19S	Ph (Field)		1/10/96	4.67	S.U.
MWB-19S	Ph (Field)		7/16/96	4.51	S.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19S	Ph (Field)		1/22/97	4.65	S.U.
MWB-19S	Ph (Field)		7/14/97	4.75	S.U.
MWB-19S	Ph (Field)	Field	02/25/98	5.41	n/a
MWB-19S	Ph (Field)	Field	8/13/98	4.35	n/a
MWB-19S	Ph (Field)	Field	02/18/99	4.87	n/a
MWB-19S	Ph (Field)	Field	07/20/99	4.93	n/a
MWB-19S	Ph (Field)	Field	09/07/00	4.79	n/a
MWB-19S	Ph (Field)	Field	01/31/01	4.64	n/a
MWB-19S	Ph (Field)	Field	07/18/01	4.46	n/a
MWB-19S	Ph (Field)	Field	01/16/02	5.09	n/a
MWB-19S	Ph (Field)	Field	06/26/02	5.17	n/a
MWB-19S	Sodium - Total		1/10/96	3.65	mg/l
MWB-19S	Sodium - Total		7/16/96	5.05	mg/l
MWB-19S	Sodium - Total		1/22/97	4.72	mg/l
MWB-19S	Sodium - Total		7/14/97	4.23	mg/l
MWB-19S	Sodium - Total	273.1	02/25/98	4.4	mg/l
MWB-19S	Sodium - Total	273.1	8/13/98	5.4	mg/l
MWB-19S	Sodium - Total	273.1	02/18/99	4.8	mg/l
MWB-19S	Sodium - Total	273.1	07/20/99	5.6	mg/l
MWB-19S	Sodium - Total	200.7	01/24/00	6.16	mg/l
MWB-19S	Sodium - Total	200.7	09/07/00	5.7	mg/l
MWB-19S	Sodium - Total	200.7	01/31/01	5.6	mg/L(ppm)
MWB-19S	Sodium - Total	200.7	07/18/01	6.6	mg/L(ppm)
MWB-19S	Sodium - Total	200.7	01/16/02	5.9	mg/L(ppm)
MWB-19S	Sodium - Total	200.7	06/26/02	6.3	mg/L (ppm)
MWB-19S	Solids, Total Dissolved		1/10/96	52.5	mg/l
MWB-19S	Solids, Total Dissolved		7/16/96	52	mg/l
MWB-19S	Solids, Total Dissolved		1/22/97	42.5	mg/l
MWB-19S	Solids, Total Dissolved		7/14/97	27.5	mg/l
MWB-19S	Solids, Total Dissolved	160.1	02/25/98	15	mg/l
MWB-19S	Solids, Total Dissolved	160.1	8/13/98	57	mg/l
MWB-19S	Solids, Total Dissolved	160.1	02/18/99	47	mg/l
MWB-19S	Solids, Total Dissolved	160.1	07/20/99	74	mg/l
MWB-19S	Solids, Total Dissolved	160.1	01/24/00	64	mg/l
MWB-19S	Solids, Total Dissolved	160.1	09/07/00	55	mg/l
MWB-19S	Solids, Total Dissolved	160.1	01/31/01	62	mg/L(ppm)
MWB-19S	Solids, Total Dissolved	160.1	07/18/01	69	mg/L (ppm)
MWB-19S	Solids, Total Dissolved	160.1	01/16/02	62	mg/L (ppm)
MWB-19S	Solids, Total Dissolved	160.1	06/26/02	98	mg/L (ppm)
MWB-19S	Specific Conductance(Field)		1/10/96	48	umhos/cm
MWB-19S	Specific Conductance(Field)		7/16/96	60	umhos/cm
MWB-19S	Specific Conductance(Field)		1/22/97	52	umhos/cm
MWB-19S	Specific Conductance(Field)		7/14/97	60	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	02/25/98	46	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	8/13/98	88	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	02/18/99	94	µm/cm
MWB-19S	Specific Conductance(Field)	Field	07/20/99	94	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	01/24/00	97.4	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	09/07/00	83	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	01/31/01	92	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	07/18/01	86	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	01/16/02	124	umhos/cm
MWB-19S	Specific Conductance(Field)	Field	06/26/02	130	umhos/cm
MWB-19S	Sulfide	9030B	06/26/02	1.1	mg/L (ppm)
MWB-19S	Turbidity (Field)		1/10/96	5.70	NTU
MWB-19S	Turbidity (Field)		7/16/96	2.80	NTU
MWB-19S	Turbidity (Field)		1/22/97	8.00	NTU
MWB-19S	Turbidity (Field)		7/14/97	2.90	NTU
MWB-19S	Turbidity (Field)	Field	02/25/98	26.70	NTU
MWB-19S	Turbidity (Field)	Field	8/13/98	13.29	NTU
MWB-19S	Turbidity (Field)	Field	02/18/99	10.96	NTU
MWB-19S	Turbidity (Field)	Field	07/20/99	2.91	NTU
MWB-19S	Turbidity (Field)	Field	01/24/00	5.01	NTU
MWB-19S	Turbidity (Field)	Field	09/07/00	4.47	NTU
MWB-19S	Turbidity (Field)	Field	01/31/01	7.07	NTU
MWB-19S	Turbidity (Field)	Field	07/18/01	6.01	NTU
MWB-19S	Turbidity (Field)	Field	01/16/02	18.60	NTU
MWB-19S	Turbidity (Field)	Field	06/26/02	3.16	NTU
MWB-19S	Water Temperature in deg Celsius		1/10/96	19.8	C
MWB-19S	Water Temperature in deg Celsius		7/16/96	25	C
MWB-19S	Water Temperature in deg Celsius		1/22/97	20.3	C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19S	Water Temperature in deg Celsius		7/14/97	24.1	C
MWB-19S	Water Temperature in deg Celsius	Field	02/25/98	19.8	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	8/13/98	25.9	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	02/18/99	22.2	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	07/20/99	23.3	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	01/24/00	21.4	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	09/07/00	25.6	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	01/31/01	21.4	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	07/18/01	24.5	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	01/16/02	22.8	Deg C
MWB-19S	Water Temperature in deg Celsius	Field	06/26/02	22.9	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19I	Barium - Dissolved		7/14/97	0.176	mg/l
MWB-19I	Barium - Dissolved	200.8	09/07/00	0.041	mg/l
MWB-19I	Barium - Dissolved	200.8	01/31/01	0.046	mg/L(ppm)
MWB-19I	Barium - Dissolved	200.8	07/18/01	0.047	mg/L(ppm)
MWB-19I	Barium - Dissolved	200.7	01/16/02	0.054	mg/L(ppm)
MWB-19I	Barium - Dissolved	200.7	06/25/02	0.072	mg/L (ppm)
MWB-19I	Barium - Total		1/9/96	0.157	mg/l
MWB-19I	Barium - Total		7/16/96	0.136	mg/l
MWB-19I	Barium - Total		7/14/97	0.179	mg/l
MWB-19I	Barium - Total	200.7	01/24/00	0.12	mg/l
MWB-19I	Barium - Total	200.8	09/07/00	0.041	mg/l
MWB-19I	Barium - Total	200.8	01/31/01	0.098	mg/L(ppm)
MWB-19I	Barium - Total	200.8	07/18/01	0.09	mg/L(ppm)
MWB-19I	Barium - Total	200.7	01/16/02	0.098	mg/L(ppm)
MWB-19I	Barium - Total	200.7	06/25/02	0.092	mg/L (ppm)
MWB-19I	Cadmium - Total	213.2	02/25/98	0.0021	mg/l
MWB-19I	Cadmium - Total	213.2	8/13/98	0.0016	mg/l
MWB-19I	Cadmium - Total	213.2	02/18/99	0.0016	mg/l
MWB-19I	Cadmium - Total	213.2	07/20/99	0.0015	mg/l
MWB-19I	Cadmium - Total	200.8	01/31/01	0.0012	mg/L(ppm)
MWB-19I	Cadmium - Total	200.8	07/18/01	0.0013	mg/L(ppm)
MWB-19I	Cadmium - Total	200.8	01/16/02	0.0012	mg/L(ppm)
MWB-19I	Cadmium - Total	200.8	06/25/02	0.0011	mg/L (ppm)
MWB-19I	Chloride		1/9/96	8.79	mg/l
MWB-19I	Chloride		7/16/96	8.26	mg/l
MWB-19I	Chloride		1/22/97	5.49	mg/l
MWB-19I	Chloride		7/14/97	8.18	mg/l
MWB-19I	Chloride	300.0	02/25/98	4.6	mg/l
MWB-19I	Chloride	300.0	8/13/98	5.6	mg/l
MWB-19I	Chloride	300.0	02/18/99	5.0	mg/l
MWB-19I	Chloride	300.0	07/20/99	6.04	mg/l
MWB-19I	Chloride	300.0	01/24/00	10.1	mg/l
MWB-19I	Chloride	300.0	09/07/00	5.8	mg/l
MWB-19I	Chloride	300.0	01/31/01	6.42	mg/L(ppm)
MWB-19I	Chloride	300.0	07/18/01	5.8	mg/L (ppm)
MWB-19I	Chloride	300.0	01/16/02	5.7	mg/L (ppm)
MWB-19I	Chloride	300.0	06/25/02	5.4	mg/L (ppm)
MWB-19I	Chromium - Total	218.2	02/25/98	0.014	mg/l
MWB-19I	Chromium - Total	218.2	8/13/98	0.005	mg/l
MWB-19I	Chromium - Total	218.2	02/18/99	0.006	mg/l
MWB-19I	Chromium - Total	200.8	07/20/99	0.008	mg/l
MWB-19I	Cobalt - Total	200.8	01/31/01	0.0043	mg/L(ppm)
MWB-19I	Cobalt - Total	200.8	07/18/01	0.0036	mg/L(ppm)
MWB-19I	Color		1/9/96	275	C.U.
MWB-19I	Color		7/16/96	200	C.U.
MWB-19I	Color		1/22/97	300	C.U.
MWB-19I	Color		7/14/97	300	C.U.
MWB-19I	Color	110.2	8/13/98	20	Units
MWB-19I	Color	110.2	02/18/99	90	Units
MWB-19I	Color	110.2	07/20/99	40	Units
MWB-19I	Color	110.2	01/24/00	5	Units
MWB-19I	Color	110.2	09/07/00	150	Units
MWB-19I	Color	110.2	01/31/01	30	Color Units
MWB-19I	Color	110.2	07/18/01	150	Color Units
MWB-19I	Color	110.2	01/16/02	50	Color Units
MWB-19I	Copper - Dissolved	200.7	09/07/00	0.0056	mg/l
MWB-19I	Copper - Total	200.7	09/07/00	0.0056	mg/l
MWB-19I	Iron - Dissolved		7/16/96	0.345	mg/l
MWB-19I	Iron - Dissolved		7/14/97	0.736	mg/l
MWB-19I	Iron - Dissolved	236.1	02/25/98	0.420	mg/l
MWB-19I	Iron - Dissolved	236.1	8/13/98	0.310	mg/l
MWB-19I	Iron - Dissolved	236.1	07/20/99	0.300	mg/l
MWB-19I	Iron - Dissolved	200.7	09/07/00	0.340	mg/l
MWB-19I	Iron - Dissolved	200.7	01/31/01	0.450	mg/L(ppm)
MWB-19I	Iron - Dissolved	200.7	07/18/01	0.400	mg/L(ppm)
MWB-19I	Iron - Dissolved	200.7	01/16/02	0.470	mg/L(ppm)
MWB-19I	Iron - Dissolved	200.7	06/25/02	0.620	mg/L (ppm)
MWB-19I	Iron - Total		1/9/96	0.499	mg/l
MWB-19I	Iron - Total		7/16/96	0.987	mg/l
MWB-19I	Iron - Total		1/22/97	0.784	mg/l
MWB-19I	Iron - Total		7/14/97	0.776	mg/l

DEP005605

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19I	Iron - Total	236.1	02/25/98	1.600	mg/l
MWB-19I	Iron - Total	236.1	8/13/98	0.930	mg/l
MWB-19I	Iron - Total	236.1	02/18/99	0.900	mg/l
MWB-19I	Iron - Total	236.1	07/20/99	0.900	mg/l
MWB-19I	Iron - Total	200.7	09/07/00	0.340	mg/l
MWB-19I	Iron - Total	200.7	01/31/01	0.940	mg/L(ppm)
MWB-19I	Iron - Total	200.7	07/18/01	1.100	mg/L(ppm)
MWB-19I	Iron - Total	200.7	01/16/02	0.890	mg/L(ppm)
MWB-19I	Iron - Total	200.7	06/25/02	0.96	mg/L (ppm)
MWB-19I	Lead - Total		7/16/96	0.0070	mg/l
MWB-19I	Lead - Total	239.2	02/25/98	0.0040	mg/l
MWB-19I	Lead - Total	239.2	07/20/99	0.0020	mg/l
MWB-19I	Lead - Total	200.8	01/24/00	0.0035	mg/l
MWB-19I	Lead - Total	200.8	01/31/01	0.0022	mg/L(ppm)
MWB-19I	Lead - Total	200.8	07/18/01	0.0025	mg/L(ppm)
MWB-19I	Lead - Total	200.8	06/25/02	0.0024	mg/L (ppm)
MWB-19I	Nickel - Total	200.8	01/31/01	0.006	mg/L(ppm)
MWB-19I	Nickel - Total	200.8	07/18/01	0.0056	mg/L(ppm)
MWB-19I	Nickel - Total	200.8	06/25/02	0.0072	mg/L (ppm)
MWB-19I	Nitrogen, Ammonia		1/9/96	0.091	mg/l
MWB-19I	Nitrogen, Ammonia	350.3	01/31/01	0.03	mg/L(ppm)
MWB-19I	Nitrogen, Nitrate		1/9/96	0.14	mg/l
MWB-19I	Oxygen, Dissolved (Field)		1/9/96	2.3	mg/l
MWB-19I	Oxygen, Dissolved (Field)		7/16/96	1.6	mg/l
MWB-19I	Oxygen, Dissolved (Field)		1/22/97	1.1	mg/l
MWB-19I	Oxygen, Dissolved (Field)		7/14/97	1.2	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	02/25/98	1.4	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	8/13/98	0.6	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	02/18/99	1.1	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	07/20/99	1.4	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	01/24/00	0.9	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	09/07/00	1.7	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	01/31/01	1.6	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	07/18/01	1.5	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	01/16/02	0.9	mg/l
MWB-19I	Oxygen, Dissolved (Field)	Field	06/25/02	0.9	mg/l
MWB-19I	Ph (Field)		1/9/96	5.18	S.U.
MWB-19I	Ph (Field)		7/16/96	5.10	S.U.
MWB-19I	Ph (Field)		1/22/97	5.05	S.U.
MWB-19I	Ph (Field)		7/14/97	4.96	S.U.
MWB-19I	Ph (Field)	Field	02/25/98	5.07	n/a
MWB-19I	Ph (Field)	Field	8/13/98	4.99	n/a
MWB-19I	Ph (Field)	Field	02/18/99	5.06	n/a
MWB-19I	Ph (Field)	Field	07/20/99	5.17	n/a
MWB-19I	Ph (Field)	Field	09/07/00	5.13	n/a
MWB-19I	Ph (Field)	Field	01/31/01	4.92	n/a
MWB-19I	Ph (Field)	Field	07/18/01	4.56	n/a
MWB-19I	Ph (Field)	Field	01/16/02	4.97	n/a
MWB-19I	Ph (Field)	Field	06/25/02	5.21	n/a
MWB-19I	Sodium - Dissolved		7/16/96	3.51	mg/l
MWB-19I	Sodium - Dissolved		7/14/97	4.18	mg/l
MWB-19I	Sodium - Dissolved	273.1	02/25/98	3.7	mg/l
MWB-19I	Sodium - Dissolved	273.1	8/13/98	4.4	mg/l
MWB-19I	Sodium - Dissolved	273.1	07/20/99	3.4	mg/l
MWB-19I	Sodium - Dissolved	200.7	09/07/00	3.2	mg/l
MWB-19I	Sodium - Dissolved	200.7	01/31/01	3.6	mg/L(ppm)
MWB-19I	Sodium - Dissolved	200.7	07/18/01	3.5	mg/L(ppm)
MWB-19I	Sodium - Dissolved	200.7	01/16/02	4	mg/L(ppm)
MWB-19I	Sodium - Dissolved	200.7	06/25/02	4.7	mg/L (ppm)
MWB-19I	Sodium - Total		1/9/96	3.21	mg/l
MWB-19I	Sodium - Total		7/16/96	3.7	mg/l
MWB-19I	Sodium - Total		1/22/97	5.6	mg/l
MWB-19I	Sodium - Total		7/14/97	4.35	mg/l
MWB-19I	Sodium - Total	273.1	02/25/98	4.0	mg/l
MWB-19I	Sodium - Total	273.1	8/13/98	4	mg/l
MWB-19I	Sodium - Total	273.1	02/18/99	4.1	mg/l
MWB-19I	Sodium - Total	273.1	07/20/99	3.6	mg/l
MWB-19I	Sodium - Total	200.7	01/24/00	4.11	mg/l
MWB-19I	Sodium - Total	200.7	09/07/00	3.2	mg/l
MWB-19I	Sodium - Total	200.7	01/31/01	3.4	mg/L(ppm)
MWB-19I	Sodium - Total	200.7	07/18/01	3.5	mg/L(ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19I	Sodium - Total	200.7	01/16/02	3.5	mg/L(ppm)
MWB-19I	Sodium - Total	200.7	06/25/02	3.3	mg/L (ppm)
MWB-19I	Solids, Total Dissolved		1/9/96	82	mg/l
MWB-19I	Solids, Total Dissolved		7/16/96	46	mg/l
MWB-19I	Solids, Total Dissolved		1/22/97	79.5	mg/l
MWB-19I	Solids, Total Dissolved		7/14/97	65	mg/l
MWB-19I	Solids, Total Dissolved	160.1	02/25/98	66.0	mg/l
MWB-19I	Solids, Total Dissolved	160.1	8/13/98	54	mg/l
MWB-19I	Solids, Total Dissolved	160.1	02/18/99	20	mg/l
MWB-19I	Solids, Total Dissolved	160.1	07/20/99	50	mg/l
MWB-19I	Solids, Total Dissolved	160.1	01/24/00	46.2	mg/l
MWB-19I	Solids, Total Dissolved	160.1	09/07/00	54	mg/l
MWB-19I	Solids, Total Dissolved	160.1	01/31/01	47	mg/L(ppm)
MWB-19I	Solids, Total Dissolved	160.1	07/18/01	55	mg/L (ppm)
MWB-19I	Solids, Total Dissolved	160.1	01/16/02	48	mg/L (ppm)
MWB-19I	Solids, Total Dissolved	160.1	06/25/02	44	mg/L (ppm)
MWB-19I	Specific Conductance(Field)		1/9/96	37	umhos/cm
MWB-19I	Specific Conductance(Field)		7/16/96	36	umhos/cm
MWB-19I	Specific Conductance(Field)		1/22/97	36	umhos/cm
MWB-19I	Specific Conductance(Field)		7/14/97	38	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	02/25/98	45.1	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	8/13/98	37	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	02/18/99	43	µm/cm
MWB-19I	Specific Conductance(Field)	Field	07/20/99	44	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	01/24/00	49.8	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	09/07/00	40	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	01/31/01	44	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	07/18/01	38	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	01/16/02	44	umhos/cm
MWB-19I	Specific Conductance(Field)	Field	06/25/02	39	umhos/cm
MWB-19I	Turbidity (Field)		1/9/96	300.0	NTU
MWB-19I	Turbidity (Field)		7/16/96	92.0	NTU
MWB-19I	Turbidity (Field)		1/22/97	140.0	NTU
MWB-19I	Turbidity (Field)		7/14/97	198.0	NTU
MWB-19I	Turbidity (Field)	Field	02/18/99	195.6	NTU
MWB-19I	Turbidity (Field)	Field	01/24/00	141.0	NTU
MWB-19I	Turbidity (Field)	Field	09/07/00	116.5	NTU
MWB-19I	Turbidity (Field)	Field	01/31/01	158.8	NTU
MWB-19I	Turbidity (Field)	Field	07/18/01	123.6	NTU
MWB-19I	Turbidity (Field)	Field	01/16/02	113.8	NTU
MWB-19I	Turbidity (Field)	Field	06/25/02	53.5	NTU
MWB-19I	Vanadium - Dissolved		7/14/97	0.012	mg/l
MWB-19I	Vanadium - Total		7/14/97	0.013	mg/l
MWB-19I	Vanadium - Total	200.8	02/18/99	0.012	mg/l
MWB-19I	Vanadium - Total	200.8	07/20/99	0.012	mg/l
MWB-19I	Vanadium - Total	200.8	01/31/01	0.0067	mg/L(ppm)
MWB-19I	Vanadium - Total	200.8	07/18/01	0.0062	mg/L(ppm)
MWB-19I	Water Temperature in deg Celsius		1/9/96	19.4	C
MWB-19I	Water Temperature in deg Celsius		7/16/96	23.2	C
MWB-19I	Water Temperature in deg Celsius		1/22/97	20.5	C
MWB-19I	Water Temperature in deg Celsius		7/14/97	22	C
MWB-19I	Water Temperature in deg Celsius	Field	02/25/98	21	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	8/13/98	22.4	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	02/18/99	21.0	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	07/20/99	22.6	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	01/24/00	21.1	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	09/07/00	23.3	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	01/31/01	21.5	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	07/18/01	22.4	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	01/16/02	22.4	Deg C
MWB-19I	Water Temperature in deg Celsius	Field	06/25/02	22.4	Deg C
MWB-19I	Zinc - Dissolved		7/14/97	0.063	mg/l
MWB-19I	Zinc - Total		1/9/96	0.082	mg/l
MWB-19I	Zinc - Total		7/16/96	0.170	mg/l
MWB-19I	Zinc - Total		1/22/97	0.074	mg/l
MWB-19I	Zinc - Total		7/14/97	0.064	mg/l
MWB-19I	Zinc - Total	289.1	07/20/99	0.070	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19D	Arsenic - Total	200.8	06/25/02	0.003	mg/L (ppm)
MWB-19D	Barium - Total		1/9/96	0.104	mg/l
MWB-19D	Barium - Total		7/14/97	0.116	mg/l
MWB-19D	Barium - Total	200.7	01/24/00	0.11	mg/l
MWB-19D	Barium - Total	200.8	09/07/00	0.099	mg/l
MWB-19D	Barium - Total	200.8	01/31/01	0.11	mg/L(ppm)
MWB-19D	Barium - Total	200.8	07/18/01	0.11	mg/L(ppm)
MWB-19D	Barium - Total	200.7	01/16/02	0.11	mg/L(ppm)
MWB-19D	Barium - Total	200.7	06/25/02	0.1	mg/L (ppm)
MWB-19D	Chloride		1/9/96	5.88	mg/l
MWB-19D	Chloride		7/16/96	4.99	mg/l
MWB-19D	Chloride		1/22/97	5	mg/l
MWB-19D	Chloride		7/14/97	6.24	mg/l
MWB-19D	Chloride	300.0	02/25/98	4.4	mg/l
MWB-19D	Chloride	300.0	8/12/98	4.2	mg/l
MWB-19D	Chloride	300.0	02/18/99	34	mg/l
MWB-19D	Chloride	300.0	07/20/99	4.61	mg/l
MWB-19D	Chloride	300.0	01/24/00	4.18	mg/l
MWB-19D	Chloride	300.0	09/07/00	4.54	mg/l
MWB-19D	Chloride	300.0	01/31/01	4.85	mg/L(ppm)
MWB-19D	Chloride	300.0	07/18/01	4.7	mg/L (ppm)
MWB-19D	Chloride	300.0	01/16/02	4.3	mg/L (ppm)
MWB-19D	Chloride	300.0	06/25/02	4.4	mg/L (ppm)
MWB-19D	Chromium - Total	218.2	02/25/98	0.006	mg/l
MWB-19D	Chromium - Total	200.8	07/20/99	0.005	mg/l
MWB-19D	Color	110.2	07/20/99	5	Units
MWB-19D	Color	110.2	01/24/00	5	Units
MWB-19D	Color	110.2	09/07/00	10	Units
MWB-19D	Color	110.2	01/31/01	**20**	Color Units
MWB-19D	Color	110.2	07/18/01	10	Color Units
MWB-19D	Color	110.2	01/16/02	**25**	Color Units
MWB-19D	Iron - Total		1/9/96	**0.392**	mg/l
MWB-19D	Iron - Total		7/16/96	**0.700**	mg/l
MWB-19D	Iron - Total		1/22/97	**0.428**	mg/l
MWB-19D	Iron - Total		7/14/97	**0.712**	mg/l
MWB-19D	Iron - Total	236.1	02/25/98	**1.200**	mg/l
MWB-19D	Iron - Total	236.1	8/12/98	**0.780**	mg/l
MWB-19D	Iron - Total	236.1	02/18/99	**0.900**	mg/l
MWB-19D	Iron - Total	236.1	07/20/99	**1.600**	mg/l
MWB-19D	Iron - Total	200.7	09/07/00	**1.400**	mg/l
MWB-19D	Iron - Total	200.7	01/31/01	**3.300**	mg/L(ppm)
MWB-19D	Iron - Total	200.7	07/18/01	**3.700**	mg/L(ppm)
MWB-19D	Iron - Total	200.7	01/16/02	**2.400**	mg/L(ppm)
MWB-19D	Iron - Total	200.7	06/25/02	**2.400**	mg/L (ppm)
MWB-19D	Lead - Total		1/9/96	0.009	mg/l
MWB-19D	Lead - Total	200.8	06/25/02	0.0012	mg/L (ppm)
MWB-19D	Nickel - Total	200.8	07/18/01	0.0059	mg/L(ppm)
MWB-19D	Nickel - Total	200.8	06/25/02	0.0037	mg/L (ppm)
MWB-19D	Nitrogen, Ammonia		1/9/96	0.113	mg/l
MWB-19D	Nitrogen, Ammonia		7/16/96	0.168	mg/l
MWB-19D	Nitrogen, Ammonia		1/22/97	0.2	mg/l
MWB-19D	Nitrogen, Ammonia	350.3	02/25/98	0.2	mg/l
MWB-19D	Nitrogen, Ammonia	350.3	02/18/99	0.12	mg/l
MWB-19D	Nitrogen, Ammonia	350.3	07/20/99	0.14	mg/l
MWB-19D	Nitrogen, Ammonia	350.3	01/31/01	0.11	mg/L(ppm)
MWB-19D	Nitrogen, Ammonia	350.3	07/18/01	0.11	mg/L (ppm)
MWB-19D	Nitrogen, Ammonia	350.3	01/16/02	0.16	mg/L (ppm)
MWB-19D	Oxygen, Dissolved (Field)		1/9/96	1.5	mg/l
MWB-19D	Oxygen, Dissolved (Field)		1/22/97	1.1	mg/l
MWB-19D	Oxygen, Dissolved (Field)		7/14/97	1.2	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	02/25/98	1.3	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	8/12/98	1.2	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	02/18/99	1.1	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	07/20/99	1.2	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	01/24/00	0.3	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	09/07/00	1.2	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	01/31/01	1.3	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	07/18/01	2.2	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	01/16/02	0.7	mg/l
MWB-19D	Oxygen, Dissolved (Field)	Field	06/25/02	0.6	mg/l
MWB-19D	Ph (Field)		1/9/96	7.29	S.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19D	Ph (Field)		7/16/96	7.31	S.U.
MWB-19D	Ph (Field)		1/22/97	7.05	S.U.
MWB-19D	Ph (Field)		7/14/97	6.88	S.U.
MWB-19D	Ph (Field)	Field	02/25/98	6.62	n/a
MWB-19D	Ph (Field)	Field	8/12/98	7.20	n/a
MWB-19D	Ph (Field)	Field	02/18/99	7.36	n/a
MWB-19D	Ph (Field)	Field	07/20/99	7.10	n/a
MWB-19D	Ph (Field)	Field	09/07/00	6.72	n/a
MWB-19D	Ph (Field)	Field	01/31/01	7.11	n/a
MWB-19D	Ph (Field)	Field	07/18/01	6.85	n/a
MWB-19D	Ph (Field)	Field	01/16/02	6.84	n/a
MWB-19D	Ph (Field)	Field	06/25/02	6.91	n/a
MWB-19D	Sodium - Total		1/9/96	6.32	mg/l
MWB-19D	Sodium - Total		7/16/96	7.02	mg/l
MWB-19D	Sodium - Total		1/22/97	5.24	mg/l
MWB-19D	Sodium - Total		7/14/97	4.97	mg/l
MWB-19D	Sodium - Total	273.1	02/25/98	5.1	mg/l
MWB-19D	Sodium - Total	273.1	8/12/98	4.9	mg/l
MWB-19D	Sodium - Total	273.1	02/18/99	5.2	mg/l
MWB-19D	Sodium - Total	273.1	07/20/99	4.7	mg/l
MWB-19D	Sodium - Total	200.7	01/24/00	5.27	mg/l
MWB-19D	Sodium - Total	200.7	09/07/00	4.9	mg/l
MWB-19D	Sodium - Total	200.7	01/31/01	4.3	mg/L(ppm)
MWB-19D	Sodium - Total	200.7	07/18/01	4.6	mg/L(ppm)
MWB-19D	Sodium - Total	200.7	01/16/02	4.7	mg/L(ppm)
MWB-19D	Sodium - Total	200.7	06/25/02	4.4	mg/L (ppm)
MWB-19D	Solids, Total Dissolved		1/9/96	217	mg/l
MWB-19D	Solids, Total Dissolved		7/16/96	209	mg/l
MWB-19D	Solids, Total Dissolved		1/22/97	207	mg/l
MWB-19D	Solids, Total Dissolved		7/14/97	193	mg/l
MWB-19D	Solids, Total Dissolved	160.1	02/25/98	200.0	mg/l
MWB-19D	Solids, Total Dissolved	160.1	8/12/98	200	mg/l
MWB-19D	Solids, Total Dissolved	160.1	02/18/99	190	mg/l
MWB-19D	Solids, Total Dissolved	160.1	07/20/99	220	mg/l
MWB-19D	Solids, Total Dissolved	160.1	01/24/00	192	mg/l
MWB-19D	Solids, Total Dissolved	160.1	09/07/00	212	mg/l
MWB-19D	Solids, Total Dissolved	160.1	01/31/01	202	mg/L(ppm)
MWB-19D	Solids, Total Dissolved	160.1	07/18/01	194	mg/L (ppm)
MWB-19D	Solids, Total Dissolved	160.1	01/16/02	210	mg/L (ppm)
MWB-19D	Solids, Total Dissolved	160.1	06/25/02	200	mg/L (ppm)
MWB-19D	Specific Conductance(Field)		1/9/96	356	umhos/cm
MWB-19D	Specific Conductance(Field)		7/16/96	358	umhos/cm
MWB-19D	Specific Conductance(Field)		1/22/97	325	umhos/cm
MWB-19D	Specific Conductance(Field)		7/14/97	336	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	02/25/98	352	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	8/12/98	352	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	02/18/99	343	µm/cm
MWB-19D	Specific Conductance(Field)	Field	07/20/99	348	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	01/24/00	43.6	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	09/07/00	325	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	01/31/01	362	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	07/18/01	68	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	01/16/02	378	umhos/cm
MWB-19D	Specific Conductance(Field)	Field	06/25/02	351	umhos/cm
MWB-19D	Sulfide	9030B	06/25/02	1	mg/L (ppm)
MWB-19D	Turbidity (Field)		1/9/96	9.40	NTU
MWB-19D	Turbidity (Field)		7/16/96	5.50	NTU
MWB-19D	Turbidity (Field)		1/22/97	6.60	NTU
MWB-19D	Turbidity (Field)		7/14/97	10.00	NTU
MWB-19D	Turbidity (Field)	Field	02/25/98	29.70	NTU
MWB-19D	Turbidity (Field)	Field	8/12/98	9.94	NTU
MWB-19D	Turbidity (Field)	Field	02/18/99	7.69	NTU
MWB-19D	Turbidity (Field)	Field	07/20/99	8.43	NTU
MWB-19D	Turbidity (Field)	Field	01/24/00	12.60	NTU
MWB-19D	Turbidity (Field)	Field	09/07/00	10.89	NTU
MWB-19D	Turbidity (Field)	Field	01/31/01	17.23	NTU
MWB-19D	Turbidity (Field)	Field	07/18/01	2.01	NTU
MWB-19D	Turbidity (Field)	Field	01/16/02	28.10	NTU
MWB-19D	Turbidity (Field)	Field	06/25/02	17.80	NTU
MWB-19D	Vanadium - Total	200.8	07/20/99	0.0060	mg/l
MWB-19D	Vanadium - Total	200.8	01/31/01	0.0089	mg/L(ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-19D	Vanadium - Total	200.8	07/18/01	0.0100	mg/L(ppm)
MWB-19D	Vanadium - Total	200.7	06/25/02	0.0100	mg/L (ppm)
MWB-19D	Water Temperature in deg Celsius		1/9/96	19.3	C
MWB-19D	Water Temperature in deg Celsius		7/16/96	24.1	C
MWB-19D	Water Temperature in deg Celsius		1/22/97	20.2	C
MWB-19D	Water Temperature in deg Celsius		7/14/97	21.8	C
MWB-19D	Water Temperature in deg Celsius	Field	02/25/98	20.9	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	8/12/98	22.7	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	02/18/99	21.2	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	07/20/99	21.6	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	01/24/00	20.5	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	09/07/00	23.2	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	01/31/01	21.3	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	07/18/01	23.7	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	01/16/02	22.1	Deg C
MWB-19D	Water Temperature in deg Celsius	Field	06/25/02	22.1	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-20S	Barium - Total		8/1/97	0.019	mg/l
MWB-20S	Barium - Total	200.7	01/25/00	0.059	mg/l
MWB-20S	Barium - Total	200.8	09/07/00	0.05	mg/l
MWB-20S	Barium - Total	200.8	01/31/01	0.046	mg/L(ppm)
MWB-20S	Barium - Total	200.8	07/18/01	0.041	mg/L(ppm)
MWB-20S	Barium - Total	200.7	01/16/02	0.047	mg/L(ppm)
MWB-20S	Barium - Total	200.7	06/26/02	0.053	mg/L (ppm)
MWB-20S	Chloride		1/10/96	10.6	mg/l
MWB-20S	Chloride		7/17/96	10.3	mg/l
MWB-20S	Chloride		1/24/97	10	mg/l
MWB-20S	Chloride		8/1/97	25.5	mg/l
MWB-20S	Chloride	300.0	02/24/98	7.1	mg/l
MWB-20S	Chloride	300.0	8/13/98	8.2	mg/l
MWB-20S	Chloride	300.0	02/22/99	8.3	mg/l
MWB-20S	Chloride	300.0	07/20/99	9.83	mg/l
MWB-20S	Chloride	300.0	01/25/00	16.8	mg/l
MWB-20S	Chloride	300.0	09/07/00	17.7	mg/l
MWB-20S	Chloride	300.0	01/31/01	16.7	mg/L(ppm)
MWB-20S	Chloride	300.0	07/18/01	7.3	mg/L (ppm)
MWB-20S	Chloride	300.0	01/16/02	14	mg/L (ppm)
MWB-20S	Chloride	300.0	06/26/02	17	mg/L (ppm)
MWB-20S	Color	110.2	02/22/99	15	Units
MWB-20S	Color	110.2	07/20/99	20	Units
MWB-20S	Color	110.2	01/25/00	5	Units
MWB-20S	Color	110.2	09/07/00	10	Units
MWB-20S	Color	110.2	07/18/01	5	Color Units
MWB-20S	Color	110.2	01/16/02	20	Color Units
MWB-20S	Copper - Total	200.8	01/31/01	0.0091	mg/L(ppm)
MWB-20S	Iron - Total		1/10/96	1.000	mg/l
MWB-20S	Iron - Total		7/17/96	0.679	mg/l
MWB-20S	Iron - Total		1/24/97	0.890	mg/l
MWB-20S	Iron - Total		8/1/97	0.607	mg/l
MWB-20S	Iron - Total	236.1	02/24/98	0.250	mg/l
MWB-20S	Iron - Total	236.1	8/13/98	0.660	mg/l
MWB-20S	Iron - Total	236.1	02/22/99	0.600	mg/l
MWB-20S	Iron - Total	236.1	07/20/99	0.800	mg/l
MWB-20S	Iron - Total	200.7	01/25/00	0.770	mg/l
MWB-20S	Iron - Total	200.7	09/07/00	0.870	mg/l
MWB-20S	Iron - Total	200.7	01/31/01	0.720	mg/L(ppm)
MWB-20S	Iron - Total	200.7	07/18/01	0.740	mg/L(ppm)
MWB-20S	Iron - Total	200.7	01/16/02	0.510	mg/L(ppm)
MWB-20S	Iron - Total	200.7	06/26/02	0.490	mg/L (ppm)
MWB-20S	Lead - Total		1/10/96	0.006	mg/l
MWB-20S	Lead - Total		7/17/96	0.005	mg/l
MWB-20S	Nitrogen, Ammonia		1/10/96	0.615	mg/l
MWB-20S	Nitrogen, Ammonia		7/17/96	0.245	mg/l
MWB-20S	Nitrogen, Ammonia		1/24/97	0.056	mg/l
MWB-20S	Nitrogen, Ammonia		8/1/97	0.226	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	02/24/98	0.3	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	8/13/98	0.31	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	02/22/99	0.20	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	07/20/99	0.52	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	01/25/00	0.51	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	09/07/00	0.4	mg/l
MWB-20S	Nitrogen, Ammonia	350.3	01/31/01	0.46	mg/L(ppm)
MWB-20S	Nitrogen, Ammonia	350.3	07/18/01	0.66	mg/L (ppm)
MWB-20S	Nitrogen, Ammonia	350.3	01/16/02	0.68	mg/L (ppm)
MWB-20S	Nitrogen, Ammonia	350.1	06/26/02	1.1	mg/L (ppm)
MWB-20S	Nitrogen, Nitrate		1/10/96	0.09	mg/l
MWB-20S	Oxygen, Dissolved (Field)		1/10/96	2.2	mg/l
MWB-20S	Oxygen, Dissolved (Field)		7/17/96	1.7	mg/l
MWB-20S	Oxygen, Dissolved (Field)		1/24/97	3.2	mg/l
MWB-20S	Oxygen, Dissolved (Field)		8/1/97	1	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	02/24/98	2.8	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	8/13/98	1.1	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	02/22/99	2.0	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	07/20/99	1.9	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	01/25/00	1.4	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	09/07/00	1.8	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	01/31/01	1.2	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	07/18/01	1.1	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-20S	Oxygen, Dissolved (Field)	Field	01/16/02	0.9	mg/l
MWB-20S	Oxygen, Dissolved (Field)	Field	06/26/02	0.9	mg/l
MWB-20S	Ph (Field)		1/10/96	4.36	S.U.
MWB-20S	Ph (Field)		7/17/96	4.50	S.U.
MWB-20S	Ph (Field)		1/24/97	4.38	S.U.
MWB-20S	Ph (Field)		8/1/97	4.44	S.U.
MWB-20S	Ph (Field)	Field	02/24/98	4.49	n/a
MWB-20S	Ph (Field)	Field	8/13/98	4.18	n/a
MWB-20S	Ph (Field)	Field	02/22/99	4.11	n/a
MWB-20S	Ph (Field)	Field	07/20/99	4.02	n/a
MWB-20S	Ph (Field)	Field	09/07/00	4.00	n/a
MWB-20S	Ph (Field)	Field	01/31/01	4.00	n/a
MWB-20S	Ph (Field)	Field	07/18/01	4.26	n/a
MWB-20S	Ph (Field)	Field	01/16/02	3.95	n/a
MWB-20S	Ph (Field)	Field	06/26/02	4.19	n/a
MWB-20S	Sodium - Total		1/10/96	5.33	mg/l
MWB-20S	Sodium - Total		7/17/96	4.9	mg/l
MWB-20S	Sodium - Total		1/24/97	4.44	mg/l
MWB-20S	Sodium - Total		8/1/97	4.38	mg/l
MWB-20S	Sodium - Total	273.1	02/24/98	5.0	mg/l
MWB-20S	Sodium - Total	273.1	8/13/98	4.7	mg/l
MWB-20S	Sodium - Total	273.1	02/22/99	5.0	mg/l
MWB-20S	Sodium - Total	273.1	07/20/99	5	mg/l
MWB-20S	Sodium - Total	200.7	01/25/00	8.23	mg/l
MWB-20S	Sodium - Total	200.7	09/07/00	8.6	mg/l
MWB-20S	Sodium - Total	200.7	01/31/01	8.1	mg/L(ppm)
MWB-20S	Sodium - Total	200.7	07/18/01	8.5	mg/L(ppm)
MWB-20S	Sodium - Total	200.7	01/16/02	8.4	mg/L(ppm)
MWB-20S	Sodium - Total	200.7	06/26/02	9.41	mg/L (ppm)
MWB-20S	Solids, Total Dissolved		1/10/96	44	mg/l
MWB-20S	Solids, Total Dissolved		7/17/96	47	mg/l
MWB-20S	Solids, Total Dissolved		1/24/97	42	mg/l
MWB-20S	Solids, Total Dissolved		8/1/97	42	mg/l
MWB-20S	Solids, Total Dissolved	160.1	02/24/98	73	mg/l
MWB-20S	Solids, Total Dissolved	160.1	8/13/98	49	mg/l
MWB-20S	Solids, Total Dissolved	160.1	02/22/99	46	mg/l
MWB-20S	Solids, Total Dissolved	160.1	07/20/99	90	mg/l
MWB-20S	Solids, Total Dissolved	160.1	01/25/00	109	mg/l
MWB-20S	Solids, Total Dissolved	160.1	09/07/00	97	mg/l
MWB-20S	Solids, Total Dissolved	160.1	01/31/01	59	mg/L(ppm)
MWB-20S	Solids, Total Dissolved	160.1	07/18/01	82	mg/L (ppm)
MWB-20S	Solids, Total Dissolved	160.1	01/16/02	68	mg/L (ppm)
MWB-20S	Solids, Total Dissolved	160.1	06/26/02	130	mg/L (ppm)
MWB-20S	Specific Conductance(Field)		1/10/96	86	umhos/cm
MWB-20S	Specific Conductance(Field)		7/17/96	74	umhos/cm
MWB-20S	Specific Conductance(Field)		1/24/97	81	umhos/cm
MWB-20S	Specific Conductance(Field)		8/1/97	67	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	02/24/98	74	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	8/13/98	75	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	02/22/99	136	um/cm
MWB-20S	Specific Conductance(Field)	Field	07/20/99	151	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	01/25/00	197	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	09/07/00	186	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	01/31/01	152	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	07/18/01	140	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	01/16/02	190	umhos/cm
MWB-20S	Specific Conductance(Field)	Field	06/26/02	191	umhos/cm
MWB-20S	Turbidity (Field)		1/10/96	0.67	NTU
MWB-20S	Turbidity (Field)		7/17/96	1.40	NTU
MWB-20S	Turbidity (Field)		1/24/97	0.98	NTU
MWB-20S	Turbidity (Field)		8/1/97	0.75	NTU
MWB-20S	Turbidity (Field)	Field	02/24/98	3.77	NTU
MWB-20S	Turbidity (Field)	Field	8/13/98	24.40	NTU
MWB-20S	Turbidity (Field)	Field	02/22/99	3.94	NTU
MWB-20S	Turbidity (Field)	Field	07/20/99	2.41	NTU
MWB-20S	Turbidity (Field)	Field	01/25/00	1.90	NTU
MWB-20S	Turbidity (Field)	Field	09/07/00	1.93	NTU
MWB-20S	Turbidity (Field)	Field	01/31/01	1.69	NTU
MWB-20S	Turbidity (Field)	Field	07/18/01	0.79	NTU
MWB-20S	Turbidity (Field)	Field	01/16/02	8.14	NTU
MWB-20S	Turbidity (Field)	Field	06/26/02	2.11	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-20S	Water Temperature in deg Celsius		1/10/96	20.9	C
MWB-20S	Water Temperature in deg Celsius		7/17/96	23.8	C
MWB-20S	Water Temperature in deg Celsius		1/24/97	19.9	C
MWB-20S	Water Temperature in deg Celsius		8/1/97	23.4	C
MWB-20S	Water Temperature in deg Celsius	Field	02/24/98	19.3	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	8/13/98	24.4	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	02/22/99	21.3	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	01/25/00	23.5	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	09/07/00	24.1	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	01/31/01	23.8	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	07/18/01	26.9	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	01/16/02	23.9	Deg C
MWB-20S	Water Temperature in deg Celsius	Field	06/26/02	26.4	Deg C
MWB-20S	Zinc - Total		7/17/96	0.097	mg/l
MWB-20S	Zinc - Total		1/24/97	0.074	mg/l
MWB-20S	Zinc - Total	289.1	07/20/99	0.050	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-21S	Barium - Total		8/1/97	0.031	mg/l
MWB-21S	Barium - Total	200.7	01/26/00	0.038	mg/l
MWB-21S	Barium - Total	200.8	09/07/00	0.026	mg/l
MWB-21S	Barium - Total	200.8	01/31/01	0.025	mg/L(ppm)
MWB-21S	Barium - Total	200.8	07/18/01	0.025	mg/L(ppm)
MWB-21S	Barium - Total	200.7	01/16/02	0.074	mg/L(ppm)
MWB-21S	Barium - Total	200.7	06/26/02	0.028	mg/L (ppm)
MWB-21S	Chloride		1/9/96	7.8	mg/l
MWB-21S	Chloride		7/18/96	5.49	mg/l
MWB-21S	Chloride		1/24/97	5.66	mg/l
MWB-21S	Chloride		8/1/97	4.68	mg/l
MWB-21S	Chloride	300.0	02/26/98	6.8	mg/l
MWB-21S	Chloride	300.0	8/17/98	4.6	mg/l
MWB-21S	Chloride	300.0	02/24/99	5.4	mg/l
MWB-21S	Chloride	300.0	07/21/99	6.3	mg/l
MWB-21S	Chloride	300.0	01/26/00	12.4	mg/l
MWB-21S	Chloride	300.0	09/07/00	6.11	mg/l
MWB-21S	Chloride	300.0	01/31/01	7.53	mg/L(ppm)
MWB-21S	Chloride	300.0	07/18/01	6.7	mg/L (ppm)
MWB-21S	Chloride	300.0	01/16/02	9.2	mg/L (ppm)
MWB-21S	Chloride	300.0	06/26/02	6.7	mg/L (ppm)
MWB-21S	Color		1/9/96	125	C.U.
MWB-21S	Color		7/18/96	60	C.U.
MWB-21S	Color		1/24/97	75	C.U.
MWB-21S	Color	110.2	8/17/98	10	Units
MWB-21S	Color	110.2	07/21/99	15	Units
MWB-21S	Color	110.2	01/26/00	60	Units
MWB-21S	Color	110.2	09/07/00	100	Units
MWB-21S	Color	110.2	01/31/01	200	Units
MWB-21S	Color	110.2	07/18/01	50	Units
MWB-21S	Color	110.2	01/16/02	75	Color Units
MWB-21S	Iron - Total		1/9/96	0.568	mg/l
MWB-21S	Iron - Total		7/18/96	0.764	mg/l
MWB-21S	Iron - Total		1/24/97	0.676	mg/l
MWB-21S	Iron - Total		8/1/97	0.677	mg/l
MWB-21S	Iron - Total	236.1	02/26/98	0.86	mg/l
MWB-21S	Iron - Total	236.1	8/17/98	0.7	mg/l
MWB-21S	Iron - Total	236.1	02/24/99	0.7	mg/l
MWB-21S	Iron - Total	236.1	07/21/99	0.6	mg/l
MWB-21S	Iron - Total	200.7	01/26/00	0.99	mg/l
MWB-21S	Iron - Total	200.7	09/07/00	0.66	mg/l
MWB-21S	Iron - Total	200.7	01/31/01	0.63	mg/L(ppm)
MWB-21S	Iron - Total	200.7	07/18/01	0.74	mg/L(ppm)
MWB-21S	Iron - Total	200.7	01/16/02	1.1	mg/L(ppm)
MWB-21S	Iron - Total	200.7	06/26/02	0.74	mg/L (ppm)
MWB-21S	Lead - Total		1/9/96	0.006	mg/l
MWB-21S	Lead - Total		7/18/96	0.007	mg/l
MWB-21S	Nitrogen, Ammonia		1/9/96	0.108	mg/l
MWB-21S	Nitrogen, Ammonia	350.3	02/26/98	0.9	mg/l
MWB-21S	Nitrogen, Ammonia	350.3	09/07/00	0.05	mg/l
MWB-21S	Nitrogen, Ammonia	350.3	01/31/01	0.05	mg/L(ppm)
MWB-21S	Nitrogen, Ammonia	350.3	01/16/02	0.15	mg/L (ppm)
MWB-21S	Nitrogen, Nitrate	353.2	01/16/02	4.6	mg/L (ppm)
MWB-21S	Oxygen, Dissolved (Field)		1/9/96	2	mg/l
MWB-21S	Oxygen, Dissolved (Field)		7/18/96	1	mg/l
MWB-21S	Oxygen, Dissolved (Field)		1/24/97	1.4	mg/l
MWB-21S	Oxygen, Dissolved (Field)		8/1/97	1.1	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	02/26/98	1.9	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	8/17/98	0.8	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	02/24/99	1.5	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	07/21/99	1.6	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	01/26/00	1.4	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	09/07/00	1.3	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	01/31/01	1.3	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	07/18/01	1.2	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	01/16/02	1.0	mg/l
MWB-21S	Oxygen, Dissolved (Field)	Field	06/26/02	1.0	mg/l
MWB-21S	Ph (Field)		1/9/96	4.93	S.U.
MWB-21S	Ph (Field)		7/18/96	4.80	S.U.
MWB-21S	Ph (Field)		1/24/97	4.78	S.U.
MWB-21S	Ph (Field)		8/1/97	4.75	S.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-21S	Ph (Field)	Field	02/26/98	**4.83**	n/a
MWB-21S	Ph (Field)	Field	8/17/98	**4.51**	n/a
MWB-21S	Ph (Field)	Field	02/24/99	**4.66**	n/a
MWB-21S	Ph (Field)	Field	07/21/99	**4.17**	n/a
MWB-21S	Ph (Field)	Field	09/07/00	**4.76**	n/a
MWB-21S	Ph (Field)	Field	01/31/01	**4.51**	n/a
MWB-21S	Ph (Field)	Field	07/18/01	**4.38**	n/a
MWB-21S	Ph (Field)	Field	01/16/02	**4.88**	n/a
MWB-21S	Ph (Field)	Field	06/26/02	**5.01**	n/a
MWB-21S	Sodium - Total		1/9/96	3.76	mg/l
MWB-21S	Sodium - Total		7/18/96	2.54	mg/l
MWB-21S	Sodium - Total		1/24/97	3.61	mg/l
MWB-21S	Sodium - Total		8/1/97	3.52	mg/l
MWB-21S	Sodium - Total	273.1	02/26/98	4.5	mg/l
MWB-21S	Sodium - Total	273.1	8/17/98	3.8	mg/l
MWB-21S	Sodium - Total	273.1	02/24/99	3.8	mg/l
MWB-21S	Sodium - Total	273.1	07/21/99	3.5	mg/l
MWB-21S	Sodium - Total	200.7	01/26/00	4.54	mg/l
MWB-21S	Sodium - Total	200.7	09/07/00	3.5	mg/l
MWB-21S	Sodium - Total	200.7	01/31/01	3.4	mg/L(ppm)
MWB-21S	Sodium - Total	200.7	07/18/01	3.5	mg/L(ppm)
MWB-21S	Sodium - Total	200.7	01/16/02	4.9	mg/L(ppm)
MWB-21S	Sodium - Total	200.7	06/26/02	3.3	mg/L (ppm)
MWB-21S	Solids, Total Dissolved		1/9/96	56.5	mg/l
MWB-21S	Solids, Total Dissolved		7/18/96	16	mg/l
MWB-21S	Solids, Total Dissolved		1/24/97	15.5	mg/l
MWB-21S	Solids, Total Dissolved		8/1/97	33	mg/l
MWB-21S	Solids, Total Dissolved	160.1	02/26/98	32	mg/l
MWB-21S	Solids, Total Dissolved	160.1	8/17/98	26	mg/l
MWB-21S	Solids, Total Dissolved	160.1	02/24/99	22	mg/l
MWB-21S	Solids, Total Dissolved	160.1	07/21/99	41	mg/l
MWB-21S	Solids, Total Dissolved	160.1	01/26/00	18	mg/l
MWB-21S	Solids, Total Dissolved	160.1	09/07/00	67	mg/l
MWB-21S	Solids, Total Dissolved	160.1	01/31/01	26	mg/L(ppm)
MWB-21S	Solids, Total Dissolved	160.1	07/18/01	32	mg/L (ppm)
MWB-21S	Solids, Total Dissolved	160.1	01/16/02	110	mg/L (ppm)
MWB-21S	Solids, Total Dissolved	160.1	06/26/02	54	mg/L (ppm)
MWB-21S	Specific Conductance(Field)		1/9/96	51	umhos/cm
MWB-21S	Specific Conductance(Field)		7/18/96	46	umhos/cm
MWB-21S	Specific Conductance(Field)		1/24/97	44	umhos/cm
MWB-21S	Specific Conductance(Field)		8/1/97	44	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	02/26/98	74.9	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	8/17/98	55	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	02/24/99	60	um/cm
MWB-21S	Specific Conductance(Field)	Field	07/21/99	53	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	01/26/00	76.4	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	09/07/00	52	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	01/31/01	46	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	07/18/01	49	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	01/16/02	159	umhos/cm
MWB-21S	Specific Conductance(Field)	Field	06/26/02	49	umhos/cm
MWB-21S	Sulfide	9030B	06/26/02	1	mg/L (ppm)
MWB-21S	Turbidity (Field)		1/9/96	18.0	NTU
MWB-21S	Turbidity (Field)		7/18/96	15.0	NTU
MWB-21S	Turbidity (Field)		1/24/97	8.0	NTU
MWB-21S	Turbidity (Field)		8/1/97	15.0	NTU
MWB-21S	Turbidity (Field)	Field	02/26/98	18.7	NTU
MWB-21S	Turbidity (Field)	Field	8/17/98	43.6	NTU
MWB-21S	Turbidity (Field)	Field	02/24/99	46.7	NTU
MWB-21S	Turbidity (Field)	Field	07/21/99	33.8	NTU
MWB-21S	Turbidity (Field)	Field	01/26/00	17.3	NTU
MWB-21S	Turbidity (Field)	Field	09/07/00	18.23	NTU
MWB-21S	Turbidity (Field)	Field	01/31/01	18.43	NTU
MWB-21S	Turbidity (Field)	Field	07/18/01	10.41	NTU
MWB-21S	Turbidity (Field)	Field	01/16/02	11.05	NTU
MWB-21S	Turbidity (Field)	Field	06/26/02	6.34	NTU
MWB-21S	Water Temperature in deg Celsius		1/9/96	20.4	C
MWB-21S	Water Temperature in deg Celsius		7/18/96	24.1	C
MWB-21S	Water Temperature in deg Celsius		1/24/97	21.2	C
MWB-21S	Water Temperature in deg Celsius		8/1/97	24	C
MWB-21S	Water Temperature in deg Celsius	Field	02/26/98	21	Deg C

DEP005615

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-21S	Water Temperature in deg Celsius	Field	8/17/98	25	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	02/24/99	22.0	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	07/21/99	23.0	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	01/26/00	20.3	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	09/07/00	25.1	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	01/31/01	21.8	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	07/18/01	23.9	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	01/16/02	22.9	Deg C
MWB-21S	Water Temperature in deg Celsius	Field	06/26/02	23.3	Deg C
MWB-21S	Zinc - Total		1/24/97	0.05	mg/l
MWB-21S	Zinc - Total	289.1	02/26/98	0.05	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-22S	Barium - Total		7/15/97	0.012	mg/l
MWB-22S	Barium - Total	200.8	09/07/00	0.0062	mg/l
MWB-22S	Barium - Total	200.8	01/30/01	0.0078	mg/L
MWB-22S	Barium - Total	200.8	07/17/01	0.0055	mg/L(ppm)
MWB-22S	Chloride		1/10/96	15.2	mg/l
MWB-22S	Chloride		7/18/96	8.86	mg/l
MWB-22S	Chloride		1/22/97	6.55	mg/l
MWB-22S	Chloride		7/15/97	6.95	mg/l
MWB-22S	Chloride	300.0	02/26/98	7.9	mg/l
MWB-22S	Chloride	300.0	8/17/98	11	mg/l
MWB-22S	Chloride	300.0	02/22/99	9.0	mg/l
MWB-22S	Chloride	300.0	07/21/99	6.25	mg/l
MWB-22S	Chloride	300.0	01/26/00	13.3	mg/l
MWB-22S	Chloride	300.0	09/07/00	4.96	mg/l
MWB-22S	Chloride	300.0	01/30/01	9.17	mg/L
MWB-22S	Chloride	300.0	07/17/01	3.9	mg/L (ppm)
MWB-22S	Chloride	300.0	01/15/02	8.2	mg/L (ppm)
MWB-22S	Color		7/15/97	25	C.U.
MWB-22S	Color	110.2	02/22/99	15	Units
MWB-22S	Color	110.2	07/21/99	25	Units
MWB-22S	Color	110.2	01/26/00	20	Units
MWB-22S	Color	110.2	09/07/00	40	Units
MWB-22S	Color	110.2	01/30/01	50	Color Units
MWB-22S	Color	110.2	07/17/01	100	Color Units
MWB-22S	Color	110.2	01/15/02	25	Color Units
MWB-22S	Iron - Total		1/10/96	0.42	mg/l
MWB-22S	Iron - Total		7/18/96	0.60	mg/l
MWB-22S	Iron - Total		1/22/97	0.52	mg/l
MWB-22S	Iron - Total		7/15/97	0.33	mg/l
MWB-22S	Iron - Total	236.1	02/26/98	0.18	mg/l
MWB-22S	Iron - Total	236.1	8/17/98	0.41	mg/l
MWB-22S	Iron - Total	236.1	02/22/99	0.40	mg/l
MWB-22S	Iron - Total	236.1	07/21/99	0.30	mg/l
MWB-22S	Iron - Total	200.7	01/26/00	0.27	mg/l
MWB-22S	Iron - Total	200.7	09/07/00	0.21	mg/l
MWB-22S	Iron - Total	200.7	01/30/01	0.24	mg/L
MWB-22S	Iron - Total	200.7	07/17/01	0.12	mg/L(ppm)
MWB-22S	Iron - Total	200.7	01/15/02	0.23	mg/L(ppm)
MWB-22S	Lead - Total		1/10/96	0.006	mg/l
MWB-22S	Lead - Total		7/18/96	0.005	mg/l
MWB-22S	Nitrogen, Ammonia		1/10/96	1.3	mg/l
MWB-22S	Nitrogen, Ammonia		7/18/96	0.99	mg/l
MWB-22S	Nitrogen, Ammonia		1/22/97	0.632	mg/l
MWB-22S	Nitrogen, Ammonia		7/15/97	0.925	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	02/26/98	1.0	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	8/17/98	1	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	02/22/99	0.85	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	07/21/99	0.71	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	01/26/00	0.65	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	09/07/00	0.334	mg/l
MWB-22S	Nitrogen, Ammonia	350.3	01/30/01	0.39	mg/L
MWB-22S	Nitrogen, Ammonia	350.3	07/17/01	0.24	mg/L (ppm)
MWB-22S	Nitrogen, Ammonia	350.3	01/15/02	0.36	mg/L (ppm)
MWB-22S	Oxygen, Dissolved (Field)		1/10/96	2.4	mg/l
MWB-22S	Oxygen, Dissolved (Field)		7/18/96	1.7	mg/l
MWB-22S	Oxygen, Dissolved (Field)		1/22/97	2.3	mg/l
MWB-22S	Oxygen, Dissolved (Field)		7/15/97	1.7	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	02/26/98	2.6	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	8/17/98	1.4	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	02/22/99	1.8	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	07/21/99	1.6	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	01/26/00	1.5	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	09/07/00	1.7	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	01/30/01	1.4	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	07/17/01	1.3	mg/l
MWB-22S	Oxygen, Dissolved (Field)	Field	01/15/02	1.8	mg/l
MWB-22S	Ph (Field)		1/10/96	4.70	S.U.
MWB-22S	Ph (Field)		7/18/96	4.63	S.U.
MWB-22S	Ph (Field)		1/22/97	4.70	S.U.
MWB-22S	Ph (Field)		7/15/97	4.69	S.U.
MWB-22S	Ph (Field)	Field	02/26/98	5.22	n/a

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-22S	Ph (Field)	Field	8/17/98	4.49	n/a
MWB-22S	Ph (Field)	Field	02/22/99	4.64	n/a
MWB-22S	Ph (Field)	Field	07/21/99	4.83	n/a
MWB-22S	Ph (Field)	Field	09/07/00	4.91	n/a
MWB-22S	Ph (Field)	Field	01/30/01	5.16	n/a
MWB-22S	Ph (Field)	Field	07/17/01	5.04	n/a
MWB-22S	Ph (Field)	Field	01/15/02	5.08	n/a
MWB-22S	Sodium - Total		1/10/96	4.8	mg/l
MWB-22S	Sodium - Total		7/18/96	5.36	mg/l
MWB-22S	Sodium - Total		1/22/97	5.43	mg/l
MWB-22S	Sodium - Total		7/15/97	4.71	mg/l
MWB-22S	Sodium - Total	273.1	02/26/98	5.3	mg/l
MWB-22S	Sodium - Total	273.1	8/17/98	8.8	mg/l
MWB-22S	Sodium - Total	273.1	02/22/99	6.2	mg/l
MWB-22S	Sodium - Total	273.1	07/21/99	5.9	mg/l
MWB-22S	Sodium - Total	200.7	01/26/00	5.46	mg/l
MWB-22S	Sodium - Total	200.7	09/07/00	4.4	mg/l
MWB-22S	Sodium - Total	200.7	01/30/01	5.1	mg/L
MWB-22S	Sodium - Total	200.7	07/17/01	3.6	mg/L(ppm)
MWB-22S	Sodium - Total	200.7	01/15/02	5.4	mg/L(ppm)
MWB-22S	Solids, Total Dissolved		1/10/96	77	mg/l
MWB-22S	Solids, Total Dissolved		7/18/96	51	mg/l
MWB-22S	Solids, Total Dissolved		1/22/97	63.5	mg/l
MWB-22S	Solids, Total Dissolved		7/15/97	59.5	mg/l
MWB-22S	Solids, Total Dissolved	160.1	02/26/98	39	mg/l
MWB-22S	Solids, Total Dissolved	160.1	8/17/98	57	mg/l
MWB-22S	Solids, Total Dissolved	160.1	02/22/99	59	mg/l
MWB-22S	Solids, Total Dissolved	160.1	07/21/99	70	mg/l
MWB-22S	Solids, Total Dissolved	160.1	01/26/00	62	mg/l
MWB-22S	Solids, Total Dissolved	160.1	09/07/00	59	mg/l
MWB-22S	Solids, Total Dissolved	160.1	01/30/01	47	mg/L
MWB-22S	Solids, Total Dissolved	160.1	07/17/01	72	mg/L (ppm)
MWB-22S	Solids, Total Dissolved	160.1	01/15/02	83	mg/L (ppm)
MWB-22S	Specific Conductance(Field)		1/10/96	85	umhos/cm
MWB-22S	Specific Conductance(Field)		7/18/96	911	umhos/cm
MWB-22S	Specific Conductance(Field)		1/22/97	74	umhos/cm
MWB-22S	Specific Conductance(Field)		7/15/97	72	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	02/26/98	104	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	8/17/98	125	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	02/22/99	98	um/cm
MWB-22S	Specific Conductance(Field)	Field	07/21/99	95	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	01/26/00	95.6	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	09/07/00	88	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	01/30/01	101	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	07/17/01	71	umhos/cm
MWB-22S	Specific Conductance(Field)	Field	01/15/02	122	umhos/cm
MWB-22S	Turbidity (Field)		1/10/96	1.60	NTU
MWB-22S	Turbidity (Field)		7/18/96	1.80	NTU
MWB-22S	Turbidity (Field)		1/22/97	2.90	NTU
MWB-22S	Turbidity (Field)		7/15/97	3.10	NTU
MWB-22S	Turbidity (Field)	Field	02/26/98	4.78	NTU
MWB-22S	Turbidity (Field)	Field	8/17/98	4.79	NTU
MWB-22S	Turbidity (Field)	Field	02/22/99	10.64	NTU
MWB-22S	Turbidity (Field)	Field	07/21/99	3.21	NTU
MWB-22S	Turbidity (Field)	Field	01/26/00	5.24	NTU
MWB-22S	Turbidity (Field)	Field	09/07/00	7.61	NTU
MWB-22S	Turbidity (Field)	Field	01/30/01	9.23	NTU
MWB-22S	Turbidity (Field)	Field	07/17/01	19.30	NTU
MWB-22S	Turbidity (Field)	Field	01/15/02	6.78	NTU
MWB-22S	Vanadium - Total		7/15/97	0.01	mg/l
MWB-22S	Water Temperature in deg Celsius		1/10/96	18.8	C
MWB-22S	Water Temperature in deg Celsius		7/18/96	24.8	C
MWB-22S	Water Temperature in deg Celsius		1/22/97	19.8	C
MWB-22S	Water Temperature in deg Celsius		7/15/97	24.5	C
MWB-22S	Water Temperature in deg Celsius	Field	02/26/98	17.8	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	8/17/98	26.3	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	02/22/99	20.4	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	07/21/99	23.4	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	01/26/00	18.4	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	09/07/00	24.8	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	01/30/01	20.10	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-22S	Water Temperature in deg Celsius	Field	07/17/01	24.5	Deg C
MWB-22S	Water Temperature in deg Celsius	Field	01/15/02	19.4	Deg C
MWB-22S	Zinc - Total	289.1	07/21/99	0.06	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MSB-27S	Barium - Dissolved	200.7	1/15/02	0.028	mg/L(ppm)
MSB-27S	Barium - Total	200.7	01/26/00	0.015	mg/l
MSB-27S	Barium - Total	200.8	09/06/00	0.024	mg/l
MSB-27S	Barium - Total	200.8	01/30/01	0.027	mg/L
MSB-27S	Barium - Total	200.8	07/17/01	0.035	mg/L(ppm)
MSB-27S	Barium - Total	200.7	1/15/02	0.036	mg/L(ppm)
MSB-27S	Barium - Total	200.7	06/25/02	0.023	mg/L (ppm)
MSB-27S	Chloride	300.0	02/25/98	1.0	mg/l
MSB-27S	Chloride	300.0	07/21/99	5.64	mg/l
MSB-27S	Chloride	300.0	01/26/00	8.58	mg/l
MSB-27S	Chloride	300.0	09/06/00	5.65	mg/l
MSB-27S	Chloride	300.0	01/30/01	5.66	mg/l
MSB-27S	Chloride	300.0	07/17/01	5.7	mg/L (ppm)
MSB-27S	Chloride	300.0	1/15/02	5.6	mg/L (ppm)
MSB-27S	Chloride	300.0	06/25/02	5.7	mg/L (ppm)
MSB-27S	Chromium - Total	200.8	07/21/99	0.003	mg/l
MSB-27S	Color	110.2	07/21/99	**30**	Units
MSB-27S	Color	110.2	01/26/00	**100**	Units
MSB-27S	Color	110.2	09/06/00	**75**	Units
MSB-27S	Color	110.2	01/30/01	**75**	Color Units
MSB-27S	Color	110.2	07/17/01	**25**	Color Units
MSB-27S	Color	110.2	1/15/02	**150**	Color Units
MSB-27S	Iron - Dissolved	200.7	1/15/02	0.081	mg/L(ppm)
MSB-27S	Iron - Total	236.1	02/25/98	0.23	mg/l
MSB-27S	Iron - Total	236.1	07/21/99	0.30	mg/l
MSB-27S	Iron - Total	200.7	01/26/00	0.22	mg/l
MSB-27S	Iron - Total	200.7	09/06/00	**0.44**	mg/l
MSB-27S	Iron - Total	200.7	01/30/01	0.29	mg/L
MSB-27S	Iron - Total	200.7	07/17/01	**0.44**	mg/L(ppm)
MSB-27S	Iron - Total	200.7	1/15/02	**0.90**	mg/L(ppm)
MSB-27S	Iron - Total	200.7	06/25/02	**1.20**	mg/L (ppm)
MSB-27S	Methylene Chloride	8260B	07/17/01	7	µg/L (ppb)
MSB-27S	Nitrogen, Ammonia	350.3	07/21/99	0.1	mg/l
MSB-27S	Nitrogen, Ammonia	350.3	09/06/00	0.105	mg/l
MSB-27S	Nitrogen, Ammonia	350.3	01/30/01	0.08	mg/L
MSB-27S	Nitrogen, Ammonia	350.3	07/17/01	0.12	mg/L (ppm)
MSB-27S	Oxygen, Dissolved (Field)	Field	02/25/98	1.5	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	07/21/99	1.7	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	01/26/00	1.3	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	09/06/00	2.2	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	01/30/01	1.3	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	07/17/01	1.5	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	1/15/02	1.7	mg/l
MSB-27S	Oxygen, Dissolved (Field)	Field	06/25/02	1.8	mg/l
MSB-27S	Ph (Field)	Field	02/25/98	**5.67**	n/a
MSB-27S	Ph (Field)	Field	07/21/99	**5.33**	n/a
MSB-27S	Ph (Field)	Field	09/06/00	**5.23**	n/a
MSB-27S	Ph (Field)	Field	01/30/01	**5.09**	n/a
MSB-27S	Ph (Field)	Field	07/17/01	**4.58**	n/a
MSB-27S	Ph (Field)	Field	1/15/02	**4.46**	n/a
MSB-27S	Ph (Field)	Field	06/25/02	**5.03**	n/a
MSB-27S	Sodium - Dissolved	200.7	1/15/02	3.3	mg/L(ppm)
MSB-27S	Sodium - Total	273.1	02/25/98	3.6	mg/l
MSB-27S	Sodium - Total	273.1	07/21/99	3.4	mg/l
MSB-27S	Sodium - Total	200.7	01/26/00	4.39	mg/l
MSB-27S	Sodium - Total	200.7	09/06/00	4.1	mg/l
MSB-27S	Sodium - Total	200.7	01/30/01	4	mg/L
MSB-27S	Sodium - Total	200.7	07/17/01	3.7	mg/L(ppm)
MSB-27S	Sodium - Total	200.7	1/15/02	3.2	mg/L(ppm)
MSB-27S	Sodium - Total	200.7	06/25/02	3.7	mg/L (ppm)
MSB-27S	Solids, Total Dissolved	160.1	02/25/98	110.0	mg/l
MSB-27S	Solids, Total Dissolved	160.1	07/21/99	60	mg/l
MSB-27S	Solids, Total Dissolved	160.1	01/26/00	56	mg/l
MSB-27S	Solids, Total Dissolved	160.1	09/06/00	65	mg/l
MSB-27S	Solids, Total Dissolved	160.1	01/30/01	52	mg/L
MSB-27S	Solids, Total Dissolved	160.1	07/17/01	42	mg/L (ppm)
MSB-27S	Solids, Total Dissolved	160.1	1/15/02	46	mg/L (ppm)
MSB-27S	Solids, Total Dissolved	160.1	06/25/02	39	mg/L (ppm)
MSB-27S	Specific Conductance(Field)	Field	02/25/98	50.5	umhos/cm
MSB-27S	Specific Conductance(Field)	Field	07/21/99	62	umhos/cm
MSB-27S	Specific Conductance(Field)	Field	01/26/00	72.1	umhos/cm

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MSB-27S	Specific Conductance(Field)	Field	09/06/00	77	umhos/cm
MSB-27S	Specific Conductance(Field)	Field	01/30/01	74	umhos/cm
MSB-27S	Specific Conductance(Field)	Field	07/17/01	67	umhos/cm
MSB-27S	Specific Conductance(Field)	Field	1/15/02	70	umhos/cm
MSB-27S	Specific Conductance(Field)	Field	06/25/02	56	umhos/cm
MSB-27S	Sulfide	9030B	06/25/02	1.3	mg/L (ppm)
MSB-27S	Turbidity (Field)	Field	02/25/98	37.80	NTU
MSB-27S	Turbidity (Field)	Field	07/21/99	33.50	NTU
MSB-27S	Turbidity (Field)	Field	01/26/00	49.50	NTU
MSB-27S	Turbidity (Field)	Field	09/06/00	24.30	NTU
MSB-27S	Turbidity (Field)	Field	01/30/01	28.60	NTU
MSB-27S	Turbidity (Field)	Field	07/17/01	7.65	NTU
MSB-27S	Turbidity (Field)	Field	1/15/02	32.60	NTU
MSB-27S	Turbidity (Field)	Field	06/25/02	6.04	NTU
MSB-27S	Vanadium - Total	200.8	07/21/99	0.005	mg/l
MSB-27S	Water Temperature in deg Celsius	Field	02/25/98	18.1	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	07/21/99	23.4	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	01/26/00	17.8	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	09/06/00	24.4	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	01/30/01	19.1	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	07/17/01	22.9	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	1/15/02	19.2	Deg C
MSB-27S	Water Temperature in deg Celsius	Field	06/25/02	22.4	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-27I	Barium - Dissolved	200.8	09/06/00	0.045	mg/l
MWB-27I	Barium - Dissolved	200.8	01/30/01	0.048	mg/L
MWB-27I	Barium - Dissolved	200.8	07/17/01	0.048	mg/L(ppm)
MWB-27I	Barium - Dissolved	200.7	1/15/02	0.043	mg/L(ppm)
MWB-27I	Barium - Total	200.7	01/26/00	0.061	mg/l
MWB-27I	Barium - Total	200.8	09/06/00	0.045	mg/l
MWB-27I	Barium - Total	200.8	01/30/01	0.05	mg/L
MWB-27I	Barium - Total	200.8	07/17/01	0.052	mg/L(ppm)
MWB-27I	Barium - Total	200.7	1/15/02	0.056	mg/L(ppm)
MWB-27I	Barium - Total	200.7	06/25/02	0.054	mg/L (ppm)
MWB-27I	Chloride	300.0	02/25/98	4.7	mg/l
MWB-27I	Chloride	300.0	07/21/99	5.42	mg/l
MWB-27I	Chloride	300.0	01/26/00	8.78	mg/l
MWB-27I	Chloride	300.0	09/06/00	5.11	mg/l
MWB-27I	Chloride	300.0	01/30/01	5.8	mg/L
MWB-27I	Chloride	300.0	07/17/01	5.4	mg/L (ppm)
MWB-27I	Chloride	300.0	1/15/02	5.7	mg/L (ppm)
MWB-27I	Chloride	300.0	06/25/02	5.3	mg/L (ppm)
MWB-27I	Chromium - Total	218.2	02/25/98	0.013	mg/l
MWB-27I	Chromium - Total	200.8	07/21/99	0.003	mg/l
MWB-27I	Color	110.2	07/21/99	5	Units
MWB-27I	Color	110.2	01/30/01	**20**	Color Units
MWB-27I	Color	110.2	07/17/01	15	Color Units
MWB-27I	Color	110.2	1/15/02	10	Color Units
MWB-27I	Iron - Dissolved	236.1	02/25/98	**0.40**	mg/l
MWB-27I	Iron - Dissolved	200.7	09/06/00	**0.39**	mg/l
MWB-27I	Iron - Dissolved	200.7	01/30/01	**0.45**	mg/L
MWB-27I	Iron - Dissolved	200.7	07/17/01	**0.46**	mg/L(ppm)
MWB-27I	Iron - Dissolved	200.7	1/15/02	**0.41**	mg/L(ppm)
MWB-27I	Iron - Total	236.1	02/25/98	**0.56**	mg/l
MWB-27I	Iron - Total	236.1	07/21/99	**0.50**	mg/l
MWB-27I	Iron - Total	200.7	01/26/00	**0.67**	mg/l
MWB-27I	Iron - Total	200.7	09/06/00	**0.39**	mg/l
MWB-27I	Iron - Total	200.7	01/30/01	**0.55**	mg/L
MWB-27I	Iron - Total	200.7	07/17/01	**0.43**	mg/L(ppm)
MWB-27I	Iron - Total	200.7	1/15/02	**0.61**	mg/L(ppm)
MWB-27I	Iron - Total	200.7	06/25/02	**0.45**	mg/L (ppm)
MWB-27I	Lead - Total	239.2	02/25/98	0.003	mg/l
MWB-27I	Nitrogen, Ammonia	350.3	07/21/99	0.1	mg/l
MWB-27I	Nitrogen, Ammonia	350.3	01/30/01	0.06	mg/L
MWB-27I	Oxygen, Dissolved (Field)	Field	02/25/98	1.4	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	07/21/99	0.8	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	01/26/00	7.2	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	09/06/00	1.3	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	01/30/01	1.1	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	07/17/01	1.0	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	1/15/02	1	mg/l
MWB-27I	Oxygen, Dissolved (Field)	Field	06/25/02	0.9	mg/l
MWB-27I	Ph (Field)	Field	02/25/98	**5.46**	n/a
MWB-27I	Ph (Field)	Field	07/21/99	**5.56**	n/a
MWB-27I	Ph (Field)	Field	09/06/00	**5.71**	n/a
MWB-27I	Ph (Field)	Field	01/30/01	**5.27**	n/a
MWB-27I	Ph (Field)	Field	07/17/01	**5.02**	n/a
MWB-27I	Ph (Field)	Field	1/15/02	**5.38**	n/a
MWB-27I	Ph (Field)	Field	06/25/02	**5.36**	n/a
MWB-27I	Sodium - Dissolved	273.1	02/25/98	3.4	mg/l
MWB-27I	Sodium - Dissolved	200.7	09/06/00	3.2	mg/l
MWB-27I	Sodium - Dissolved	200.7	01/30/01	3.8	mg/L
MWB-27I	Sodium - Dissolved	200.7	07/17/01	3.5	mg/L(ppm)
MWB-27I	Sodium - Dissolved	200.7	1/15/02	3.5	mg/L(ppm)
MWB-27I	Sodium - Total	273.1	02/25/98	3.2	mg/l
MWB-27I	Sodium - Total	273.1	07/21/99	3.5	mg/l
MWB-27I	Sodium - Total	200.7	01/26/00	3.9	mg/l
MWB-27I	Sodium - Total	200.7	09/06/00	3.2	mg/l
MWB-27I	Sodium - Total	200.7	01/30/01	3.4	mg/L
MWB-27I	Sodium - Total	200.7	07/17/01	2.9	mg/L(ppm)
MWB-27I	Sodium - Total	200.7	1/15/02	3.7	mg/L(ppm)
MWB-27I	Sodium - Total	200.7	06/25/02	3.7	mg/L (ppm)
MWB-27I	Solids, Total Dissolved	160.1	02/25/98	79	mg/l
MWB-27I	Solids, Total Dissolved	160.1	07/21/99	66	mg/l
MWB-27I	Solids, Total Dissolved	160.1	01/26/00	61	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-27I	Solids, Total Dissolved	160.1	09/06/00	58	mg/l
MWB-27I	Solids, Total Dissolved	160.1	01/30/01	66	mg/L
MWB-27I	Solids, Total Dissolved	160.1	07/17/01	56	mg/L (ppm)
MWB-27I	Solids, Total Dissolved	160.1	1/15/02	67	mg/L (ppm)
MWB-27I	Solids, Total Dissolved	160.1	06/25/02	71	mg/L (ppm)
MWB-27I	Specific Conductance(Field)	Field	02/25/98	56.1	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	07/21/99	58	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	01/26/00	63.7	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	09/06/00	65	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	01/30/01	64	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	07/17/01	57	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	1/15/02	64	umhos/cm
MWB-27I	Specific Conductance(Field)	Field	06/25/02	54	umhos/cm
MWB-27I	Sulfide	9030B	06/25/02	1	mg/L (ppm)
MWB-27I	Turbidity (Field)	Field	02/25/98	>200	NTU
MWB-27I	Turbidity (Field)	Field	07/21/99	125.1	NTU
MWB-27I	Turbidity (Field)	Field	01/26/00	120.3	NTU
MWB-27I	Turbidity (Field)	Field	09/06/00	107.3	NTU
MWB-27I	Turbidity (Field)	Field	01/30/01	114.3	NTU
MWB-27I	Turbidity (Field)	Field	07/17/01	52.1	NTU
MWB-27I	Turbidity (Field)	Field	1/15/02	54.6	NTU
MWB-27I	Turbidity (Field)	Field	06/25/02	13.21	NTU
MWB-27I	Vanadium - Total	200.8	07/21/99	0.002	mg/l
MWB-27I	Water Temperature in deg Celsius	Field	02/25/98	20	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	07/21/99	22.8	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	01/26/00	19.0	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	09/06/00	21.9	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	01/30/01	20.50	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	07/17/01	21.3	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	1/15/02	19.7	Deg C
MWB-27I	Water Temperature in deg Celsius	Field	06/25/02	22.2	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-27D	Barium - Total	200.7	01/26/00	0.066	mg/l
MWB-27D	Barium - Total	200.8	09/06/00	0.06	mg/l
MWB-27D	Barium - Total	200.8	01/30/01	0.052	mg/L
MWB-27D	Barium - Total	200.8	07/17/01	0.051	mg/L(ppm)
MWB-27D	Barium - Total	200.7	01/15/02	0.058	mg/L(ppm)
MWB-27D	Barium - Total	200.7	06/25/02	0.058	mg/L (ppm)
MWB-27D	Chloride	300.0	02/25/98	5.5	mg/l
MWB-27D	Chloride	300.0	07/21/99	5.89	mg/l
MWB-27D	Chloride	300.0	01/26/00	9.1	mg/l
MWB-27D	Chloride	300.0	09/06/00	5.71	mg/l
MWB-27D	Chloride	300.0	01/30/01	5.69	mg/L
MWB-27D	Chloride	300.0	07/17/01	5.7	mg/L (ppm)
MWB-27D	Chloride	300.0	01/15/02	5.4	mg/L (ppm)
MWB-27D	Chloride	300.0	06/25/02	5.4	mg/L (ppm)
MWB-27D	Color	110.2	07/21/99	5	Units
MWB-27D	Color	110.2	01/26/00	10	Units
MWB-27D	Color	110.2	09/06/00	5	Units
MWB-27D	Color	110.2	01/30/01	5	Color Units
MWB-27D	Color	110.2	07/17/01	5	Color Units
MWB-27D	Color	110.2	01/15/02	10	Color Units
MWB-27D	Iron - Total	236.1	02/25/98	**0.950**	mg/l
MWB-27D	Iron - Total	236.1	07/21/99	**0.900**	mg/l
MWB-27D	Iron - Total	200.7	01/26/00	**1.400**	mg/l
MWB-27D	Iron - Total	200.7	09/06/00	**1.300**	mg/l
MWB-27D	Iron - Total	200.7	01/30/01	**1.300**	mg/L
MWB-27D	Iron - Total	200.7	07/17/01	**1.000**	mg/L(ppm)
MWB-27D	Iron - Total	200.7	01/15/02	**1.400**	mg/L(ppm)
MWB-27D	Iron - Total	200.7	06/25/02	**1.300**	mg/L (ppm)
MWB-27D	Nitrogen, Ammonia	350.3	02/25/98	0.1	mg/l
MWB-27D	Nitrogen, Ammonia	350.3	01/30/01	0.08	mg/L
MWB-27D	Oxygen, Dissolved (Field)	Field	02/25/98	1.2	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	07/21/99	0.8	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	01/26/00	6.0	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	09/06/00	2.4	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	01/30/01	1.0	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	07/17/01	1.0	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	01/15/02	1.7	mg/l
MWB-27D	Oxygen, Dissolved (Field)	Field	06/25/02	1.6	mg/l
MWB-27D	Ph (Field)	Field	02/25/98	**5.92**	n/a
MWB-27D	Ph (Field)	Field	07/21/99	**5.95**	n/a
MWB-27D	Ph (Field)	Field	09/06/00	**6.01**	n/a
MWB-27D	Ph (Field)	Field	01/30/01	**5.65**	n/a
MWB-27D	Ph (Field)	Field	07/17/01	**5.47**	n/a
MWB-27D	Ph (Field)	Field	01/15/02	**5.98**	n/a
MWB-27D	Ph (Field)	Field	06/25/02	**5.97**	n/a
MWB-27D	Sodium - Total	273.1	02/25/98	4.6	mg/l
MWB-27D	Sodium - Total	273.1	07/21/99	4.2	mg/l
MWB-27D	Sodium - Total	200.7	01/26/00	4.23	mg/l
MWB-27D	Sodium - Total	200.7	09/06/00	3.9	mg/l
MWB-27D	Sodium - Total	200.7	01/30/01	3.8	mg/L
MWB-27D	Sodium - Total	200.7	07/17/01	3.1	mg/L(ppm)
MWB-27D	Sodium - Total	200.7	01/15/02	3.9	mg/L(ppm)
MWB-27D	Sodium - Total	200.7	06/25/02	4.1	mg/L (ppm)
MWB-27D	Solids, Total Dissolved	160.1	02/25/98	100	mg/l
MWB-27D	Solids, Total Dissolved	160.1	07/21/99	92	mg/l
MWB-27D	Solids, Total Dissolved	160.1	01/26/00	76	mg/l
MWB-27D	Solids, Total Dissolved	160.1	09/06/00	88	mg/l
MWB-27D	Solids, Total Dissolved	160.1	01/30/01	63	mg/L
MWB-27D	Solids, Total Dissolved	160.1	07/17/01	80	mg/L (ppm)
MWB-27D	Solids, Total Dissolved	160.1	01/15/02	38	mg/L (ppm)
MWB-27D	Solids, Total Dissolved	160.1	06/25/02	66	mg/L (ppm)
MWB-27D	Specific Conductance(Field)	Field	02/25/98	113	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	07/21/99	109	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	01/26/00	129	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	09/06/00	119	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	01/30/01	100	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	07/17/01	103	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	01/15/02	106	umhos/cm
MWB-27D	Specific Conductance(Field)	Field	06/25/02	103	umhos/cm
MWB-27D	Sulfide	9030B	06/25/02	1.5	mg/L (ppm)
MWB-27D	Turbidity (Field)	Field	02/25/98	18.50	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-27D	Turbidity (Field)	Field	07/21/99	2.41	NTU
MWB-27D	Turbidity (Field)	Field	01/26/00	29.40	NTU
MWB-27D	Turbidity (Field)	Field	09/06/00	2.38	NTU
MWB-27D	Turbidity (Field)	Field	01/30/01	8.91	NTU
MWB-27D	Turbidity (Field)	Field	07/17/01	12.33	NTU
MWB-27D	Turbidity (Field)	Field	01/15/02	3.22	NTU
MWB-27D	Turbidity (Field)	Field	06/25/02	1.18	NTU
MWB-27D	Water Temperature in deg Celsius	Field	02/25/98	19.7	Deg C
MWB-27D	Water Temperature in deg Celsius	Field	01/26/00	18.9	Deg C
MWB-27D	Water Temperature in deg Celsius	Field	09/06/00	21.9	Deg C
MWB-27D	Water Temperature in deg Celsius	Field	01/30/01	20.1	Deg C
MWB-27D	Water Temperature in deg Celsius	Field	07/17/01	21.3	Deg C
MWB-27D	Water Temperature in deg Celsius	Field	01/15/02	20.1	Deg C
MWB-27D	Water Temperature in deg Celsius	Field	06/25/02	22.0	Deg C
MWB-27D	Zinc - Total	289.1	07/21/99	0.05	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-29S	Barium - Total	200.8	09/07/00	0.0071	mg/l
MWB-29S	Barium - Total	200.8	01/30/01	0.0071	mg/L
MWB-29S	Barium - Total	200.8	07/17/01	0.0083	mg/L(ppm)
MWB-29S	Barium - Total	200.7	01/15/02	0.01	mg/L(ppm)
MWB-29S	Chloride	300.0	02/26/98	5.8	mg/l
MWB-29S	Chloride	300.0	07/21/99	5.46	mg/l
MWB-29S	Chloride	300.0	01/25/00	9.08	mg/l
MWB-29S	Chloride	300.0	09/07/00	5.15	mg/l
MWB-29S	Chloride	300.0	01/30/01	5.23	mg/L
MWB-29S	Chloride	300.0	07/17/01	5.9	mg/L (ppm)
MWB-29S	Chloride	300.0	01/15/02	5.6	mg/L (ppm)
MWB-29S	Chloride	300.0	06/25/02	5.3	mg/L (ppm)
MWB-29S	Chromium - Total	218.2	02/26/98	0.006	mg/l
MWB-29S	Color	110.2	07/21/99	15	Units
MWB-29S	Color	110.2	09/07/00	15	Units
MWB-29S	Color	110.2	01/30/01	15	Color Units
MWB-29S	Color	110.2	07/17/01	5	Color Units
MWB-29S	Color	110.2	01/15/02	10	Color Units
MWB-29S	Iron - Total	236.1	02/26/98	**0.640**	mg/l
MWB-29S	Iron - Total	236.1	07/21/99	0.300	mg/l
MWB-29S	Iron - Total	200.7	01/25/00	0.260	mg/l
MWB-29S	Iron - Total	200.7	09/07/00	**0.320**	mg/l
MWB-29S	Iron - Total	200.7	01/30/01	0.290	mg/L
MWB-29S	Iron - Total	200.7	07/17/01	**0.340**	mg/L(ppm)
MWB-29S	Iron - Total	200.7	01/15/02	0.280	mg/L(ppm)
MWB-29S	Iron - Total	200.7	06/25/02	0.200	mg/L (ppm)
MWB-29S	Nitrogen, Ammonia	350.3	02/26/98	0.2	mg/l
MWB-29S	Nitrogen, Ammonia	350.3	01/30/01	0.06	mg/L
MWB-29S	Oxygen, Dissolved (Field)	Field	02/26/98	1.4	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	07/21/99	1.3	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	01/25/00	1.6	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	09/07/00	1.9	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	01/30/01	1.5	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	07/17/01	0.7	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	01/15/02	1.1	mg/l
MWB-29S	Oxygen, Dissolved (Field)	Field	06/25/02	1.1	mg/l
MWB-29S	Ph (Field)	Field	02/26/98	**4.31**	n/a
MWB-29S	Ph (Field)	Field	07/21/99	**4.61**	n/a
MWB-29S	Ph (Field)	Field	09/07/00	**4.70**	n/a
MWB-29S	Ph (Field)	Field	01/30/01	**4.29**	n/a
MWB-29S	Ph (Field)	Field	07/17/01	**5.24**	n/a
MWB-29S	Ph (Field)	Field	01/15/02	**4.33**	n/a
MWB-29S	Ph (Field)	Field	06/25/02	**5.13**	n/a
MWB-29S	Sodium - Total	273.1	02/26/98	3.7	mg/l
MWB-29S	Sodium - Total	273.1	07/21/99	3.1	mg/l
MWB-29S	Sodium - Total	200.7	01/25/00	3.26	mg/l
MWB-29S	Sodium - Total	200.7	09/07/00	3.1	mg/l
MWB-29S	Sodium - Total	200.7	01/30/01	2.9	mg/L
MWB-29S	Sodium - Total	200.7	07/17/01	2.9	mg/L(ppm)
MWB-29S	Sodium - Total	200.7	01/15/02	3.2	mg/L(ppm)
MWB-29S	Sodium - Total	200.7	06/25/02	3	mg/L (ppm)
MWB-29S	Solids, Total Dissolved	160.1	02/26/98	21	mg/l
MWB-29S	Solids, Total Dissolved	160.1	07/21/99	33	mg/l
MWB-29S	Solids, Total Dissolved	160.1	01/25/00	36	mg/l
MWB-29S	Solids, Total Dissolved	160.1	09/07/00	35	mg/l
MWB-29S	Solids, Total Dissolved	160.1	01/30/01	37	mg/L
MWB-29S	Solids, Total Dissolved	160.1	07/17/01	33	mg/L (ppm)
MWB-29S	Solids, Total Dissolved	160.1	01/15/02	27	mg/L (ppm)
MWB-29S	Solids, Total Dissolved	160.1	06/25/02	23	mg/L (ppm)
MWB-29S	Specific Conductance(Field)	Field	02/26/98	50.9	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	07/21/99	43	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	01/25/00	39.6	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	09/07/00	47	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	01/30/01	40	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	07/17/01	76	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	01/15/02	39	umhos/cm
MWB-29S	Specific Conductance(Field)	Field	06/25/02	34	umhos/cm
MWB-29S	Sulfide	9030B	06/25/02	**1.1**	mg/L (ppm)
MWB-29S	Turbidity (Field)	Field	02/26/98	**98.70**	NTU
MWB-29S	Turbidity (Field)	Field	07/21/99	**2.33**	NTU
MWB-29S	Turbidity (Field)	Field	01/25/00	**6.90**	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-29S	Turbidity (Field)	Field	09/07/00	6.93	NTU
MWB-29S	Turbidity (Field)	Field	01/30/01	3.74	NTU
MWB-29S	Turbidity (Field)	Field	07/17/01	2.06	NTU
MWB-29S	Turbidity (Field)	Field	01/15/02	3.48	NTU
MWB-29S	Turbidity (Field)	Field	06/25/02	2.04	NTU
MWB-29S	Water Temperature in deg Celsius	Field	02/26/98	15.4	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	07/21/99	23.4	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	01/25/00	16.9	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	09/07/00	24.9	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	01/30/01	17.74	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	07/17/01	22.3	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	01/15/02	17.2	Deg C
MWB-29S	Water Temperature in deg Celsius	Field	06/25/02	22.7	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-29I	Barium - Dissolved	200.7	01/25/00	0.042	mg/l
MWB-29I	Barium - Dissolved	200.8	09/07/00	0.040	mg/l
MWB-29I	Barium - Dissolved	200.8	01/30/01	0.042	mg/L
MWB-29I	Barium - Dissolved	200.8	07/17/01	0.03	mg/L(ppm)
MWB-29I	Barium - Dissolved	200.7	1/15/02	0.041	mg/L(ppm)
MWB-29I	Barium - Dissolved	200.7	06/25/02	0.042	mg/L (ppm)
MWB-29I	Barium - Total	200.7	01/25/00	0.061	mg/l
MWB-29I	Barium - Total	200.8	09/07/00	0.04	mg/l
MWB-29I	Barium - Total	200.8	01/30/01	0.044	mg/L
MWB-29I	Barium - Total	200.8	07/17/01	0.044	mg/L(ppm)
MWB-29I	Barium - Total	200.7	1/15/02	0.046	mg/L(ppm)
MWB-29I	Barium - Total	200.7	06/25/02	0.044	mg/L (ppm)
MWB-29I	Chloride	300.0	02/26/98	4.3	mg/l
MWB-29I	Chloride	300.0	07/21/99	4.94	mg/l
MWB-29I	Chloride	300.0	01/25/00	9.59	mg/l
MWB-29I	Chloride	300.0	09/07/00	4.82	mg/l
MWB-29I	Chloride	300.0	01/30/01	4.98	mg/L
MWB-29I	Chloride	300.0	07/17/01	4.8	mg/L (ppm)
MWB-29I	Chloride	300.0	1/15/02	5	mg/L (ppm)
MWB-29I	Chloride	300.0	06/25/02	5	mg/L (ppm)
MWB-29I	Chromium - Total	218.2	02/26/98	0.010	mg/l
MWB-29I	Color	110.2	01/25/00	5	Units
MWB-29I	Color	110.2	01/30/01	30	Color Units
MWB-29I	Color	110.2	07/17/01	10	Color Units
MWB-29I	Color	110.2	1/15/02	10	Color Units
MWB-29I	Iron - Dissolved	236.1	02/26/98	0.360	mg/l
MWB-29I	Iron - Dissolved	236.1	07/21/99	0.300	mg/l
MWB-29I	Iron - Dissolved	200.7	01/25/00	0.420	mg/l
MWB-29I	Iron - Dissolved	200.7	09/07/00	0.380	mg/l
MWB-29I	Iron - Dissolved	200.7	01/30/01	0.430	mg/L
MWB-29I	Iron - Dissolved	200.7	07/17/01	0.460	mg/L(ppm)
MWB-29I	Iron - Dissolved	200.7	1/15/02	0.400	mg/L(ppm)
MWB-29I	Iron - Dissolved	200.7	06/25/02	0.370	mg/L (ppm)
MWB-29I	Iron - Total	236.1	02/26/98	0.360	mg/l
MWB-29I	Iron - Total	236.1	07/21/99	0.400	mg/l
MWB-29I	Iron - Total	200.7	01/25/00	0.650	mg/l
MWB-29I	Iron - Total	200.7	09/07/00	0.380	mg/l
MWB-29I	Iron - Total	200.7	01/30/01	0.510	mg/L
MWB-29I	Iron - Total	200.7	07/17/01	0.420	mg/L(ppm)
MWB-29I	Iron - Total	200.7	1/15/02	0.500	mg/L(ppm)
MWB-29I	Iron - Total	200.7	06/25/02	0.410	mg/L (ppm)
MWB-29I	Lead - Dissolved	200.8	09/07/00	0.0041	mg/l
MWB-29I	Lead - Total	239.2	02/26/98	0.0150	mg/l
MWB-29I	Lead - Total	239.2	07/21/99	0.0030	mg/l
MWB-29I	Lead - Total	200.8	01/25/00	0.0040	mg/l
MWB-29I	Lead - Total	200.8	01/30/01	0.0030	mg/L
MWB-29I	Lead - Total	200.8	07/17/01	0.0021	mg/L(ppm)
MWB-29I	Nitrogen, Ammonia	350.3	02/26/98	0.3	mg/l
MWB-29I	Nitrogen, Ammonia	350.3	01/30/01	0.04	mg/L
MWB-29I	Oxygen, Dissolved (Field)	Field	02/26/98	1.3	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	07/21/99	1.3	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	01/25/00	1.1	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	09/07/00	1.5	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	01/30/01	1.0	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	07/17/01	1.5	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	1/15/02	1.3	mg/l
MWB-29I	Oxygen, Dissolved (Field)	Field	06/25/02	1.4	mg/l
MWB-29I	Ph (Field)	Field	02/26/98	5.08	n/a
MWB-29I	Ph (Field)	Field	07/21/99	5.08	n/a
MWB-29I	Ph (Field)	Field	09/07/00	5.20	n/a
MWB-29I	Ph (Field)	Field	01/30/01	4.95	n/a
MWB-29I	Ph (Field)	Field	07/17/01	4.29	n/a
MWB-29I	Ph (Field)	Field	1/15/02	4.64	n/a
MWB-29I	Ph (Field)	Field	06/25/02	5.36	n/a
MWB-29I	Sodium - Dissolved	273.1	02/26/98	3.1	mg/l
MWB-29I	Sodium - Dissolved	273.1	07/21/99	2.9	mg/l
MWB-29I	Sodium - Dissolved	200.7	01/25/00	3.29	mg/l
MWB-29I	Sodium - Dissolved	200.7	09/07/00	2.9	mg/l
MWB-29I	Sodium - Dissolved	200.7	01/30/01	3.3	mg/L
MWB-29I	Sodium - Dissolved	200.7	07/17/01	3.3	mg/L(ppm)
MWB-29I	Sodium - Dissolved	200.7	1/15/02	3.5	mg/L(ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-29I	Sodium - Dissolved	200.7	06/25/02	3.3	mg/L (ppm)
MWB-29I	Sodium - Total	273.1	02/26/98	2.9	mg/l
MWB-29I	Sodium - Total	273.1	07/21/99	3.5	mg/l
MWB-29I	Sodium - Total	200.7	01/25/00	3.46	mg/l
MWB-29I	Sodium - Total	200.7	09/07/00	2.9	mg/l
MWB-29I	Sodium - Total	200.7	01/30/01	3.2	mg/L
MWB-29I	Sodium - Total	200.7	07/17/01	2.7	mg/L(ppm)
MWB-29I	Sodium - Total	200.7	1/15/02	3.2	mg/L(ppm)
MWB-29I	Sodium - Total	200.7	06/25/02	3.1	mg/L (ppm)
MWB-29I	Solids, Total Dissolved	160.1	02/26/98	25	mg/l
MWB-29I	Solids, Total Dissolved	160.1	07/21/99	48	mg/l
MWB-29I	Solids, Total Dissolved	160.1	01/25/00	65	mg/l
MWB-29I	Solids, Total Dissolved	160.1	09/07/00	41	mg/l
MWB-29I	Solids, Total Dissolved	160.1	01/30/01	32	mg/L
MWB-29I	Solids, Total Dissolved	160.1	07/17/01	45	mg/L (ppm)
MWB-29I	Solids, Total Dissolved	160.1	1/15/02	22	mg/L (ppm)
MWB-29I	Solids, Total Dissolved	160.1	06/25/02	33	mg/L (ppm)
MWB-29I	Specific Conductance(Field)	Field	02/26/98	38	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	07/21/99	42	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	01/25/00	45.8	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	09/07/00	47	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	01/30/01	48	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	07/17/01	37	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	1/15/02	46	umhos/cm
MWB-29I	Specific Conductance(Field)	Field	06/25/02	37	umhos/cm
MWB-29I	Sulfide	9030B	06/25/02	1.2	mg/L (ppm)
MWB-29I	Turbidity (Field)	Field	02/26/98	>200	NTU
MWB-29I	Turbidity (Field)	Field	07/21/99	>200	NTU
MWB-29I	Turbidity (Field)	Field	01/25/00	351.0	NTU
MWB-29I	Turbidity (Field)	Field	09/07/00	170.4	NTU
MWB-29I	Turbidity (Field)	Field	01/30/01	167.3	NTU
MWB-29I	Turbidity (Field)	Field	07/17/01	3.0	NTU
MWB-29I	Turbidity (Field)	Field	1/15/02	79.5	NTU
MWB-29I	Turbidity (Field)	Field	06/25/02	31.9	NTU
MWB-29I	Vanadium - Total	200.8	07/21/99	0.004	mg/l
MWB-29I	Water Temperature in deg Celsius	Field	02/26/98	18.7	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	07/21/99	22.3	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	01/25/00	19.5	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	09/07/00	21.9	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	01/30/01	20.3	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	07/17/01	24.8	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	1/15/02	20.4	Deg C
MWB-29I	Water Temperature in deg Celsius	Field	06/25/02	22.4	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-29D	Barium - Total	200.7	01/25/00	0.067	mg/l
MWB-29D	Barium - Total	200.8	09/07/00	0.053	mg/l
MWB-29D	Barium - Total	200.8	01/30/01	0.053	mg/L
MWB-29D	Barium - Total	200.8	07/17/01	0.051	mg/L(ppm)
MWB-29D	Barium - Total	200.7	01/15/02	0.054	mg/L(ppm)
MWB-29D	Barium - Total	200.7	06/25/02	0.048	mg/L (ppm)
MWB-29D	Chloride	300.0	02/26/98	4.9	mg/l
MWB-29D	Chloride	300.0	07/21/99	6.43	mg/l
MWB-29D	Chloride	300.0	01/25/00	8.67	mg/l
MWB-29D	Chloride	300.0	09/07/00	6.16	mg/l
MWB-29D	Chloride	300.0	01/30/01	6.37	mg/L
MWB-29D	Chloride	300.0	07/17/01	6.1	mg/L (ppm)
MWB-29D	Chloride	300.0	01/15/02	6.1	mg/L (ppm)
MWB-29D	Chloride	300.0	06/25/02	6.1	mg/L (ppm)
MWB-29D	Color	110.2	07/21/99	5	Units
MWB-29D	Color	110.2	09/07/00	5	Units
MWB-29D	Color	110.2	01/30/01	5	Color Units
MWB-29D	Color	110.2	07/17/01	5	Color Units
MWB-29D	Color	110.2	01/15/02	10	Color Units
MWB-29D	Iron - Total	236.1	02/26/98	**1.30**	mg/l
MWB-29D	Iron - Total	236.1	07/21/99	**1.50**	mg/l
MWB-29D	Iron - Total	200.7	01/25/00	**1.59**	mg/l
MWB-29D	Iron - Total	200.7	09/07/00	**1.50**	mg/l
MWB-29D	Iron - Total	200.7	01/30/01	**1.20**	mg/L
MWB-29D	Iron - Total	200.7	07/17/01	**1.20**	mg/L(ppm)
MWB-29D	Iron - Total	200.7	01/15/02	**1.10**	mg/L(ppm)
MWB-29D	Iron - Total	200.7	06/25/02	**1.00**	mg/L (ppm)
MWB-29D	Nitrogen, Ammonia	350.3	02/26/98	0.3	mg/l
MWB-29D	Nitrogen, Ammonia	350.3	01/30/01	0.1	mg/L
MWB-29D	Nitrogen, Ammonia	350.3	01/15/02	0.1	mg/L (ppm)
MWB-29D	Oxygen, Dissolved (Field)	Field	02/26/98	1.2	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	07/21/99	1.0	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	01/25/00	1.2	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	09/07/00	1.2	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	01/30/01	0.8	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	07/17/01	1.1	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	01/15/02	0.8	mg/l
MWB-29D	Oxygen, Dissolved (Field)	Field	06/25/02	0.7	mg/l
MWB-29D	Ph (Field)	Field	02/26/98	**5.76**	n/a
MWB-29D	Ph (Field)	Field	07/21/99	**5.69**	n/a
MWB-29D	Ph (Field)	Field	09/07/00	**5.70**	n/a
MWB-29D	Ph (Field)	Field	01/30/01	**5.47**	n/a
MWB-29D	Ph (Field)	Field	07/17/01	**4.31**	n/a
MWB-29D	Ph (Field)	Field	01/15/02	**5.54**	n/a
MWB-29D	Ph (Field)	Field	06/25/02	**5.43**	n/a
MWB-29D	Sodium - Total	273.1	02/26/98	4.3	mg/l
MWB-29D	Sodium - Total	273.1	07/21/99	4	mg/l
MWB-29D	Sodium - Total	200.7	01/25/00	4.25	mg/l
MWB-29D	Sodium - Total	200.7	09/07/00	3.8	mg/l
MWB-29D	Sodium - Total	200.7	01/30/01	3.6	mg/L
MWB-29D	Sodium - Total	200.7	07/17/01	3.6	mg/L(ppm)
MWB-29D	Sodium - Total	200.7	01/15/02	3.9	mg/L(ppm)
MWB-29D	Sodium - Total	200.7	06/25/02	3.7	mg/L (ppm)
MWB-29D	Solids, Total Dissolved	160.1	02/26/98	67	mg/l
MWB-29D	Solids, Total Dissolved	160.1	07/21/99	50	mg/l
MWB-29D	Solids, Total Dissolved	160.1	01/25/00	87	mg/l
MWB-29D	Solids, Total Dissolved	160.1	09/07/00	59	mg/l
MWB-29D	Solids, Total Dissolved	160.1	01/30/01	65	mg/L
MWB-29D	Solids, Total Dissolved	160.1	07/17/01	68	mg/L (ppm)
MWB-29D	Solids, Total Dissolved	160.1	01/15/02	58	mg/L (ppm)
MWB-29D	Solids, Total Dissolved	160.1	06/25/02	50	mg/L (ppm)
MWB-29D	Specific Conductance(Field)	Field	02/26/98	101	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	07/21/99	81	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	01/25/00	107	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	09/07/00	91	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	01/30/01	90	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	07/17/01	42	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	01/15/02	81	umhos/cm
MWB-29D	Specific Conductance(Field)	Field	06/25/02	70	umhos/cm
MWB-29D	Turbidity (Field)	Field	02/26/98	9.78	NTU
MWB-29D	Turbidity (Field)	Field	07/21/99	1.11	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-29D	Turbidity (Field)	Field	01/25/00	6.20	NTU
MWB-29D	Turbidity (Field)	Field	09/07/00	3.13	NTU
MWB-29D	Turbidity (Field)	Field	01/30/01	3.58	NTU
MWB-29D	Turbidity (Field)	Field	07/17/01	1.31	NTU
MWB-29D	Turbidity (Field)	Field	01/15/02	1.47	NTU
MWB-29D	Turbidity (Field)	Field	06/25/02	0.70	NTU
MWB-29D	Water Temperature in deg Celsius	Field	02/26/98	19.5	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	07/21/99	22.5	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	01/25/00	19.4	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	09/07/00	21.8	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	01/30/01	20.10	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	07/17/01	21.7	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	01/15/02	20.8	Deg C
MWB-29D	Water Temperature in deg Celsius	Field	06/25/02	21.9	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-31D	Barium - Total		7/14/97	0.106	mg/l
MWB-31D	Barium - Total	200.7	01/25/00	0.11	mg/l
MWB-31D	Barium - Total	200.8	09/07/00	0.091	mg/l
MWB-31D	Barium - Total	200.8	01/30/01	0.086	mg/L
MWB-31D	Barium - Total	200.8	07/17/01	0.092	mg/L(ppm)
MWB-31D	Barium - Total	200.7	01/16/02	0.093	mg/L(ppm)
MWB-31D	Barium - Total	200.7	06/25/02	0.08	mg/L (ppm)
MWB-31D	Chloride		1/10/96	8.48	mg/l
MWB-31D	Chloride		7/17/96	4.86	mg/l
MWB-31D	Chloride		1/21/97	5.21	mg/l
MWB-31D	Chloride		7/14/97	4.45	mg/l
MWB-31D	Chloride	300.0	02/25/98	4.4	mg/l
MWB-31D	Chloride	300.0	8/12/98	5.4	mg/l
MWB-31D	Chloride	300.0	02/18/99	4.8	mg/l
MWB-31D	Chloride	300.0	07/20/99	5.52	mg/l
MWB-31D	Chloride	300.0	01/25/00	9.37	mg/l
MWB-31D	Chloride	300.0	09/07/00	5.3	mg/l
MWB-31D	Chloride	300.0	01/30/01	5.56	mg/L
MWB-31D	Chloride	300.0	07/17/01	5.5	mg/L (ppm)
MWB-31D	Chloride	300.0	01/16/02	4.6	mg/L (ppm)
MWB-31D	Chloride	300.0	06/25/02	5.2	mg/L (ppm)
MWB-31D	Color	110.2	07/20/99	10	Units
MWB-31D	Color	110.2	01/25/00	5	Units
MWB-31D	Color	110.2	09/07/00	10	Units
MWB-31D	Color	110.2	01/30/01	10	Color Units
MWB-31D	Color	110.2	07/17/01	10	Color Units
MWB-31D	Color	110.2	01/16/02	10	Color Units
MWB-31D	Iron - Total		1/10/96	0.196	mg/l
MWB-31D	Iron - Total		7/17/96	0.766	mg/l
MWB-31D	Iron - Total		1/21/97	0.183	mg/l
MWB-31D	Iron - Total		7/14/97	0.168	mg/l
MWB-31D	Iron - Total	236.1	02/25/98	0.380	mg/l
MWB-31D	Iron - Total	236.1	8/12/98	0.400	mg/l
MWB-31D	Iron - Total	236.1	02/18/99	0.400	mg/l
MWB-31D	Iron - Total	236.1	07/20/99	0.300	mg/l
MWB-31D	Iron - Total	200.7	01/25/00	0.530	mg/l
MWB-31D	Iron - Total	200.7	09/07/00	0.490	mg/l
MWB-31D	Iron - Total	200.7	01/30/01	0.190	mg/L
MWB-31D	Iron - Total	200.7	07/17/01	0.380	mg/L(ppm)
MWB-31D	Iron - Total	200.7	01/16/02	0.670	mg/L(ppm)
MWB-31D	Iron - Total	200.7	06/25/02	0.630	mg/L (ppm)
MWB-31D	Lead - Total		1/10/96	0.0090	mg/l
MWB-31D	Lead - Total	200.8	09/07/00	0.0034	mg/l
MWB-31D	Mercury - Total	245.1	02/25/98	0.0005	mg/l
MWB-31D	Nickel - Total	200.8	01/30/01	0.0072	mg/L
MWB-31D	Nickel - Total	200.8	07/17/01	0.0052	mg/L(ppm)
MWB-31D	Nitrogen, Ammonia		1/10/96	0.438	mg/l
MWB-31D	Nitrogen, Ammonia		7/17/96	0.123	mg/l
MWB-31D	Nitrogen, Ammonia		1/21/97	0.062	mg/l
MWB-31D	Nitrogen, Ammonia		7/14/97	0.078	mg/l
MWB-31D	Nitrogen, Ammonia	350.3	02/25/98	0.2	mg/l
MWB-31D	Nitrogen, Ammonia	350.3	8/12/98	0.13	mg/l
MWB-31D	Nitrogen, Ammonia	350.3	02/18/99	0.11	mg/l
MWB-31D	Nitrogen, Ammonia	350.3	07/20/99	0.14	mg/l
MWB-31D	Nitrogen, Ammonia	350.3	09/07/00	0.135	mg/l
MWB-31D	Nitrogen, Ammonia	350.3	01/30/01	0.06	mg/L
MWB-31D	Nitrogen, Ammonia	350.3	07/17/01	0.13	mg/L (ppm)
MWB-31D	Nitrogen, Ammonia	350.3	01/16/02	0.2	mg/L (ppm)
MWB-31D	Nitrogen, Nitrate		1/10/96	0.073	mg/l
MWB-31D	Oxygen, Dissolved (Field)		1/10/96	2	mg/l
MWB-31D	Oxygen, Dissolved (Field)		1/21/97	1.3	mg/l
MWB-31D	Oxygen, Dissolved (Field)		7/14/97	1.4	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	02/25/98	1.1	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	8/12/98	1.1	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	02/18/99	1.2	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	07/20/99	0.8	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	01/25/00	1.7	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	09/07/00	1.8	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	01/30/01	1.6	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	01/16/02	1.6	mg/l
MWB-31D	Oxygen, Dissolved (Field)	Field	06/25/02	1.5	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-31D	Ph (Field)		1/10/96	7.04	S.U.
MWB-31D	Ph (Field)		7/17/96	7.02	S.U.
MWB-31D	Ph (Field)		1/21/97	6.83	S.U.
MWB-31D	Ph (Field)		7/14/97	6.77	S.U.
MWB-31D	Ph (Field)	Field	02/25/98	6.72	n/a
MWB-31D	Ph (Field)	Field	8/12/98	6.83	n/a
MWB-31D	Ph (Field)	Field	02/18/99	6.95	n/a
MWB-31D	Ph (Field)	Field	07/20/99	6.93	n/a
MWB-31D	Ph (Field)	Field	09/07/00	6.61	n/a
MWB-31D	Ph (Field)	Field	01/30/01	6.91	n/a
MWB-31D	Ph (Field)	Field	01/16/02	6.64	n/a
MWB-31D	Ph (Field)	Field	06/25/02	6.69	n/a
MWB-31D	Sodium - Total		1/10/96	7.02	mg/l
MWB-31D	Sodium - Total		7/17/96	7.45	mg/l
MWB-31D	Sodium - Total		1/21/97	6.65	mg/l
MWB-31D	Sodium - Total		7/14/97	6.61	mg/l
MWB-31D	Sodium - Total	273.1	02/25/98	6.4	mg/l
MWB-31D	Sodium - Total	273.1	8/12/98	6.7	mg/l
MWB-31D	Sodium - Total	273.1	02/18/99	6.9	mg/l
MWB-31D	Sodium - Total	273.1	07/20/99	6.9	mg/l
MWB-31D	Sodium - Total	200.7	01/25/00	6.76	mg/l
MWB-31D	Sodium - Total	200.7	09/07/00	6.5	mg/l
MWB-31D	Sodium - Total	200.7	01/30/01	6.9	mg/L
MWB-31D	Sodium - Total	200.7	07/17/01	4	mg/L(ppm)
MWB-31D	Sodium - Total	200.7	01/16/02	6.6	mg/L(ppm)
MWB-31D	Sodium - Total	200.7	06/25/02	5.9	mg/L (ppm)
MWB-31D	Solids, Total Dissolved		1/10/96	185	mg/l
MWB-31D	Solids, Total Dissolved		7/17/96	213	mg/l
MWB-31D	Solids, Total Dissolved		1/21/97	208	mg/l
MWB-31D	Solids, Total Dissolved		7/14/97	184	mg/l
MWB-31D	Solids, Total Dissolved	160.1	02/25/98	230	mg/l
MWB-31D	Solids, Total Dissolved	160.1	8/12/98	210	mg/l
MWB-31D	Solids, Total Dissolved	160.1	02/18/99	200	mg/l
MWB-31D	Solids, Total Dissolved	160.1	07/20/99	220	mg/l
MWB-31D	Solids, Total Dissolved	160.1	01/25/00	283	mg/l
MWB-31D	Solids, Total Dissolved	160.1	09/07/00	230	mg/l
MWB-31D	Solids, Total Dissolved	160.1	01/30/01	214	mg/L
MWB-31D	Solids, Total Dissolved	160.1	07/17/01	220	mg/L (ppm)
MWB-31D	Solids, Total Dissolved	160.1	01/16/02	230	mg/L (ppm)
MWB-31D	Solids, Total Dissolved	160.1	06/25/02	220	mg/L (ppm)
MWB-31D	Specific Conductance(Field)		1/10/96	356	umhos/cm
MWB-31D	Specific Conductance(Field)		7/17/96	346	umhos/cm
MWB-31D	Specific Conductance(Field)		1/21/97	333	umhos/cm
MWB-31D	Specific Conductance(Field)		7/14/97	352	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	02/25/98	362	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	8/12/98	358	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	02/18/99	386	µm/cm
MWB-31D	Specific Conductance(Field)	Field	07/20/99	343	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	01/25/00	438	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	09/07/00	394	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	01/30/01	365	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	01/16/02	415	umhos/cm
MWB-31D	Specific Conductance(Field)	Field	06/25/02	373	umhos/cm
MWB-31D	Turbidity (Field)		1/10/96	6.20	NTU
MWB-31D	Turbidity (Field)		7/17/96	8.20	NTU
MWB-31D	Turbidity (Field)		1/21/97	5.70	NTU
MWB-31D	Turbidity (Field)		7/14/97	5.70	NTU
MWB-31D	Turbidity (Field)	Field	02/25/98	1.75	NTU
MWB-31D	Turbidity (Field)	Field	8/12/98	7.02	NTU
MWB-31D	Turbidity (Field)	Field	02/18/99	455.00	NTU
MWB-31D	Turbidity (Field)	Field	07/20/99	1.02	NTU
MWB-31D	Turbidity (Field)	Field	01/25/00	4.75	NTU
MWB-31D	Turbidity (Field)	Field	09/07/00	2.52	NTU
MWB-31D	Turbidity (Field)	Field	01/30/01	4.68	NTU
MWB-31D	Turbidity (Field)	Field	01/16/02	2.02	NTU
MWB-31D	Turbidity (Field)	Field	06/25/02	2.63	NTU
MWB-31D	Water Temperature in deg Celsius		1/10/96	19.8	C
MWB-31D	Water Temperature in deg Celsius		7/17/96	24.5	C
MWB-31D	Water Temperature in deg Celsius		1/21/97	20.5	C
MWB-31D	Water Temperature in deg Celsius		7/14/97	22.4	C
MWB-31D	Water Temperature in deg Celsius	Field	02/25/98	21.7	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-31D	Water Temperature in deg Celsius	Field	8/12/98	22.3	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	02/18/99	21.5	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	07/20/99	23.5	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	01/25/00	20.7	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	09/07/00	22.3	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	01/30/01	20.8	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	01/16/02	17.9	Deg C
MWB-31D	Water Temperature in deg Celsius	Field	06/25/02	22.2	Deg C
MWB-31D	Zinc - Total		1/21/97	0.05	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-32S	1,2-Dibromo-3-Choloropropane	504.1	10/06/00	0.076	µg/L (ppb)
MWB-32S	Barium - Dissolved	200.7	06/26/02	0.024	mg/L (ppm)
MWB-32S	Barium - Total	200.7	10/06/00	0.057	mg/L(ppm)
MWB-32S	Barium - Total	200.7	06/26/02	0.036	mg/L (ppm)
MWB-32S	Chloride	300.0	03/03/98	5.1	mg/l
MWB-32S	Chloride	300.0	10/06/00	4.68	mg/L (ppm)
MWB-32S	Chloride	300.0	06/26/02	5.6	mg/L (ppm)
MWB-32S	Chromium - Total	200.8	10/06/00	0.0067	mg/L(ppm)
MWB-32S	Color	110.2	10/06/00	**1500**	Color Units
MWB-32S	Iron - Dissolved	200.7	06/26/02	0.23	mg/L (ppm)
MWB-32S	Iron - Total	236.1	03/03/98	**0.570**	mg/L (ppm)
MWB-32S	Iron - Total	200.7	10/06/00	**0.540**	mg/L (ppm)
MWB-32S	Iron - Total	200.7	06/26/02	**0.520**	mg/L (ppm)
MWB-32S	Lead - Total	200.8	10/06/00	0.0022	mg/L(ppm)
MWB-32S	Nitrogen, Ammonia	350.3	03/03/98	0.6	mg/l
MWB-32S	Oxygen, Dissolved (Field)	Field	03/03/98	1.2	mg/l
MWB-32S	Oxygen, Dissolved (Field)	Field	06/26/02	1.4	mg/l
MWB-32S	Ph (Field)	Field	03/03/98	**5.78**	n/a
MWB-32S	Ph (Field)	Field	06/26/02	**5.30**	n/a
MWB-32S	Sodium - Dissolved	200.7	06/26/02	3.7	mg/L (ppm)
MWB-32S	Sodium - Total	273.1	03/03/98	10	mg/l
MWB-32S	Sodium - Total	200.7	10/06/00	4.9	mg/L(ppm)
MWB-32S	Sodium - Total	200.7	06/26/02	3.4	mg/L (ppm)
MWB-32S	Solids, Total Dissolved	160.1	03/03/98	63	mg/l
MWB-32S	Solids, Total Dissolved	160.1	10/06/00	89	mg/L (ppm)
MWB-32S	Solids, Total Dissolved	160.1	06/26/02	69	mg/L (ppm)
MWB-32S	Specific Conductance(Field)	Field	03/03/98	97.6	umhos/cm
MWB-32S	Specific Conductance(Field)	Field	06/26/02	76	umhos/cm
MWB-32S	Sulfide	9030B	06/26/02	1.2	mg/L (ppm)
MWB-32S	Turbidity (Field)	Field	03/03/98	126.7	NTU
MWB-32S	Turbidity (Field)	Field	06/26/02	106.0	NTU
MWB-32S	Vanadium - Total	200.8	10/06/00	0.0074	mg/L(ppm)
MWB-32S	Vanadium - Total	200.7	06/26/02	0.011	mg/L (ppm)
MWB-32S	Water Temperature in deg Celsius	Field	03/03/98	17	Deg C
MWB-32S	Water Temperature in deg Celsius	Field	06/26/02	21.7	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-32I	1,2-Dibromoethane	504.1	10/10/00	0.084	µg/L (ppb)
MWB-32I	Arsenic - Total	206.2	03/03/98	0.006	mg/l
MWB-32I	Barium - Dissolved	200.7	06/26/02	0.033	mg/L (ppm)
MWB-32I	Barium - Total	208.1	03/03/98	0.3	mg/l
MWB-32I	Barium - Total	200.8	10/10/00	0.13	mg/L(ppm)
MWB-32I	Barium - Total	200.7	06/26/02	0.1	mg/L (ppm)
MWB-32I	Beryllium - Total	210.2	03/03/98	0.0034	mg/l
MWB-32I	Chloride	300.0	03/03/98	4.4	mg/l
MWB-32I	Chloride	300.0	10/10/00	11.4	mg/L (ppm)
MWB-32I	Chloride	300.0	06/26/02	4.9	mg/L (ppm)
MWB-32I	Chromium - Total	218.2	03/03/98	0.074	mg/l
MWB-32I	Cobalt - Total	219.1	03/03/98	0.028	mg/l
MWB-32I	Color	110.2	10/10/00	10	Color Units
MWB-32I	Copper - Total	220.1	03/03/98	0.056	mg/l
MWB-32I	Iron - Dissolved	236.1	03/03/98	0.22	mg/l
MWB-32I	Iron - Dissolved	200.7	06/26/02	0.25	mg/L (ppm)
MWB-32I	Iron - Total	236.1	03/03/98	2.5	mg/l
MWB-32I	Iron - Total	236.1	10/10/00	2.4	mg/L(ppm)
MWB-32I	Iron - Total	200.7	06/26/02	1.3	mg/L (ppm)
MWB-32I	Lead - Total	239.2	03/03/98	[redacted]	mg/l
MWB-32I	Lead - Total	200.8	10/10/00	0.0028	mg/L(ppm)
MWB-32I	Lead - Total	200.8	06/26/02	0.0140	mg/L (ppm)
MWB-32I	Nickel - Total	249.1	03/03/98	0.03	mg/l
MWB-32I	Nitrogen, Ammonia	350.3	03/03/98	0.4	mg/l
MWB-32I	Nitrogen, Ammonia	350.3	10/10/00	0.15	mg/L (ppm)
MWB-32I	Oxygen, Dissolved (Field)	Field	03/03/98	1.2	mg/l
MWB-32I	Oxygen, Dissolved (Field)	Field	06/26/02	1.2	mg/l
MWB-32I	Ph (Field)	Field	03/03/98	5.50	n/a
MWB-32I	Ph (Field)	Field	06/26/02	5.39	n/a
MWB-32I	Sodium - Dissolved	273.1	03/03/98	3.1	mg/l
MWB-32I	Sodium - Dissolved	200.7	06/26/02	3.2	mg/L (ppm)
MWB-32I	Sodium - Total	273.1	03/03/98	3.5	mg/l
MWB-32I	Sodium - Total	273.1	10/10/00	3.3	mg/L(ppm)
MWB-32I	Sodium - Total	200.7	06/26/02	2.7	mg/L (ppm)
MWB-32I	Solids, Total Dissolved	160.1	03/03/98	52	mg/l
MWB-32I	Solids, Total Dissolved	160.1	10/10/00	36	mg/L (ppm)
MWB-32I	Solids, Total Dissolved	160.1	06/26/02	71	mg/L (ppm)
MWB-32I	Specific Conductance(Field)	Field	03/03/98	50.1	umhos/cm
MWB-32I	Specific Conductance(Field)	Field	06/26/02	40	umhos/cm
MWB-32I	Sulfide	376.1	03/03/98	0.8	mg/l
MWB-32I	Sulfide	9030B	06/26/02	1.2	mg/L (ppm)
MWB-32I	Turbidity (Field)	Field	03/03/98	>200	NTU
MWB-32I	Turbidity (Field)	Field	06/26/02	308	NTU
MWB-32I	Vanadium - Total	286.2	03/03/98	0.066	mg/l
MWB-32I	Vanadium - Total	200.8	10/10/00	0.012	mg/L(ppm)
MWB-32I	Vanadium - Total	200.7	06/26/02	0.017	mg/L (ppm)
MWB-32I	Water Temperature in deg Celsius	Field	03/03/98	19.1	Deg C
MWB-32I	Water Temperature in deg Celsius	Field	06/26/02	21.4	Deg C
MWB-32I	Zinc - Dissolved	289.1	03/03/98	0.02	mg/l
MWB-32I	Zinc - Total	289.1	03/03/98	0.19	mg/l
MWB-32I	Zinc - Total	200.8	10/10/00	0.053	mg/L(ppm)
MWB-32I	Zinc - Total	200.7	06/26/02	0.038	mg/L (ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-32D	1,2-Dibromoethane	504.1	10/10/00	0.092	µg/L (ppb)
MWB-32D	Arsenic - Total	206.2	03/03/98	0.008	mg/l
MWB-32D	Barium - Total	200.8	10/10/00	0.077	mg/L(ppm)
MWB-32D	Barium - Total	200.7	06/26/02	0.063	mg/L (ppm)
MWB-32D	Chloride	300.0	03/03/98	5	mg/l
MWB-32D	Chloride	300.0	10/10/00	5.2	mg/L (ppm)
MWB-32D	Chloride	300.0	06/26/02	5.2	mg/L (ppm)
MWB-32D	Chromium - Total	218.2	03/03/98	0.039	mg/l
MWB-32D	Color	110.2	10/10/00	50	Color Units
MWB-32D	Copper - Total	220.1	03/03/98	0.028	mg/l
MWB-32D	Cyanide - Total	9012	06/26/02	0.0462	mg/L (ppm)
MWB-32D	Iron - Total	236.1	03/03/98	3.70	mg/l
MWB-32D	Iron - Total	236.1	10/10/00	0.69	mg/L(ppm)
MWB-32D	Iron - Total	200.7	06/26/02	0.97	mg/L (ppm)
MWB-32D	Lead - Total	239.2	03/03/98	0.009	mg/l
MWB-32D	Nitrogen, Ammonia	350.3	03/03/98	0.5	mg/l
MWB-32D	Oxygen, Dissolved (Field)	Field	03/03/98	1.4	mg/l
MWB-32D	Oxygen, Dissolved (Field)	Field	06/26/02	0.9	mg/l
MWB-32D	Ph (Field)	Field	03/03/98	6.73	n/a
MWB-32D	Ph (Field)	Field	06/26/02	6.92	n/a
MWB-32D	Sodium - Total	273.1	03/03/98	33	mg/l
MWB-32D	Sodium - Total	273.1	10/10/00	6.8	mg/L(ppm)
MWB-32D	Sodium - Total	200.7	06/26/02	4.6	mg/L (ppm)
MWB-32D	Solids, Total Dissolved	160.1	03/03/98	270	mg/l
MWB-32D	Solids, Total Dissolved	160.1	10/10/00	132	mg/L (ppm)
MWB-32D	Solids, Total Dissolved	160.1	06/26/02	120	mg/L (ppm)
MWB-32D	Specific Conductance(Field)	Field	03/03/98	377	umhos/cm
MWB-32D	Specific Conductance(Field)	Field	06/26/02	183	umhos/cm
MWB-32D	Sulfide	9030B	06/26/02	1.1	mg/L (ppm)
MWB-32D	Turbidity (Field)	Field	03/03/98	130.8	NTU
MWB-32D	Turbidity (Field)	Field	06/26/02	11.2	NTU
MWB-32D	Vanadium - Total	286.2	03/03/98	0.018	mg/l
MWB-32D	Water Temperature in deg Celsius	Field	03/03/98	19.2	Deg C
MWB-32D	Water Temperature in deg Celsius	Field	06/26/02	21.2	Deg C
MWB-32D	Zinc - Total	289.1	03/03/98	0.03	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-33S	Barium - Total	200.7	10/06/00	0.028	mg/L(ppm)
MWB-33S	Barium - Total	200.8	02/01/01	0.018	mg/L(ppm)
MWB-33S	Barium - Total	200.8	07/19/01	0.028	mg/L(ppm)
MWB-33S	Barium - Total	200.7	01/16/02	0.039	mg/L(ppm)
MWB-33S	Barium - Total	200.7	06/26/02	0.047	mg/L (ppm)
MWB-33S	Chloride	300.0	03/03/98	6	mg/l
MWB-33S	Chloride	300.0	10/06/00	5.57	mg/L (ppm)
MWB-33S	Chloride	300.0	02/01/01	10.6	mg/L (ppm)
MWB-33S	Chloride	300.0	07/19/01	6.1	mg/L (ppm)
MWB-33S	Chloride	300.0	01/16/02	6.6	mg/L (ppm)
MWB-33S	Chloride	300.0	06/26/02	6.8	mg/L (ppm)
MWB-33S	Color	110.2	02/01/01	15	Color Units
MWB-33S	Color	110.2	07/19/01	10	Color Units
MWB-33S	Color	110.2	01/16/02	75	Color Units
MWB-33S	Iron - Total	200.7	10/06/00	0.061	mg/L(ppm)
MWB-33S	Iron - Total	200.7	02/01/01	0.1	mg/L(ppm)
MWB-33S	Iron - Total	200.7	07/19/01	0.16	mg/L(ppm)
MWB-33S	Iron - Total	200.7	01/16/02	0.16	mg/L(ppm)
MWB-33S	Iron - Total	200.7	06/26/02	0.28	mg/L (ppm)
MWB-33S	Nitrogen, Ammonia	350.3	03/03/98	1.4	mg/l
MWB-33S	Nitrogen, Ammonia	350.3	10/06/00	0.21	mg/L (ppm)
MWB-33S	Nitrogen, Ammonia	350.3	02/01/01	0.19	mg/L (ppm)
MWB-33S	Nitrogen, Ammonia	350.3	01/16/02	0.15	mg/L (ppm)
MWB-33S	Nitrogen, Nitrate	300.0	10/06/00	1.36	mg/L (ppm)
MWB-33S	Nitrogen, Nitrate	300.0	07/19/01	0.31	mg/L (ppm)
MWB-33S	Oxygen, Dissolved (Field)	Field	03/03/98	1.6	mg/l
MWB-33S	Oxygen, Dissolved (Field)	Field	02/01/01	2.4	mg/l
MWB-33S	Oxygen, Dissolved (Field)	Field	07/19/01	2.2	mg/l
MWB-33S	Oxygen, Dissolved (Field)	Field	01/16/02	1.9	mg/l
MWB-33S	Oxygen, Dissolved (Field)	Field	06/26/02	1.7	mg/l
MWB-33S	Ph (Field)	Field	03/03/98	4.87	n/a
MWB-33S	Ph (Field)	Field	02/01/01	4.74	n/a
MWB-33S	Ph (Field)	Field	07/19/01	4.85	n/a
MWB-33S	Ph (Field)	Field	01/16/02	4.75	n/a
MWB-33S	Ph (Field)	Field	06/26/02	4.69	n/a
MWB-33S	Sodium - Total	273.1	03/03/98	4.6	mg/l
MWB-33S	Sodium - Total	200.7	10/06/00	3.8	mg/L(ppm)
MWB-33S	Sodium - Total	200.7	02/01/01	5.3	mg/L(ppm)
MWB-33S	Sodium - Total	200.7	07/19/01	3.7	mg/L(ppm)
MWB-33S	Sodium - Total	200.7	01/16/02	4	mg/L(ppm)
MWB-33S	Sodium - Total	200.7	06/26/02	3.9	mg/L (ppm)
MWB-33S	Solids, Total Dissolved	160.1	03/03/98	130	mg/l
MWB-33S	Solids, Total Dissolved	160.1	10/06/00	65	mg/L (ppm)
MWB-33S	Solids, Total Dissolved	160.1	02/01/01	69	mg/L (ppm)
MWB-33S	Solids, Total Dissolved	160.1	07/19/01	34	mg/L (ppm)
MWB-33S	Solids, Total Dissolved	160.1	01/16/02	60	mg/L (ppm)
MWB-33S	Solids, Total Dissolved	160.1	06/26/02	30	mg/L (ppm)
MWB-33S	Specific Conductance(Field)	Field	03/03/98	72.6	umhos/cm
MWB-33S	Specific Conductance(Field)	Field	02/01/01	107	umhos/cm
MWB-33S	Specific Conductance(Field)	Field	07/19/01	68	umhos/cm
MWB-33S	Specific Conductance(Field)	Field	01/16/02	83	umhos/cm
MWB-33S	Specific Conductance(Field)	Field	06/26/02	71	umhos/cm
MWB-33S	Turbidity (Field)	Field	03/03/98	69.40	NTU
MWB-33S	Turbidity (Field)	Field	02/01/01	1.68	NTU
MWB-33S	Turbidity (Field)	Field	07/19/01	2.01	NTU
MWB-33S	Turbidity (Field)	Field	01/16/02	8.07	NTU
MWB-33S	Turbidity (Field)	Field	06/26/02	2.10	NTU
MWB-33S	Vanadium - Total	286.2	03/03/98	0.006	mg/l
MWB-33S	Vanadium - Total	200.8	10/06/00	0.013	mg/L(ppm)
MWB-33S	Vanadium - Total	200.8	02/01/01	0.009	mg/L(ppm)
MWB-33S	Vanadium - Total	200.8	07/19/01	0.011	mg/L(ppm)
MWB-33S	Vanadium - Total	200.7	01/16/02	0.029	mg/L(ppm)
MWB-33S	Water Temperature in deg Celsius	Field	03/03/98	17.4	Deg C
MWB-33S	Water Temperature in deg Celsius	Field	02/01/01	20.8	Deg C
MWB-33S	Water Temperature in deg Celsius	Field	07/19/01	23.7	Deg C
MWB-33S	Water Temperature in deg Celsius	Field	01/16/02	19.9	Deg C
MWB-33S	Water Temperature in deg Celsius	Field	06/26/02	22.8	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-34S	Barium - Total	200.7	10/06/00	0.043	mg/L(ppm)
MWB-34S	Barium - Total	200.8	02/01/01	0.027	mg/L(ppm)
MWB-34S	Barium - Total	200.8	07/18/01	0.047	mg/L(ppm)
MWB-34S	Barium - Total	200.7	01/16/02	0.015	mg/L(ppm)
MWB-34S	Barium - Total	200.7	06/24/02	0.023	mg/L (ppm)
MWB-34S	Chloride	300.0	03/03/98	4.3	mg/l
MWB-34S	Chloride	300.0	10/06/00	8.72	mg/l
MWB-34S	Chloride	300.0	02/01/01	11.6	mg/l
MWB-34S	Chloride	300.0	07/18/01	18	mg/L (ppm)
MWB-34S	Chloride	300.0	01/16/02	13	mg/L (ppm)
MWB-34S	Chloride	300.0	06/24/02	15	mg/L (ppm)
MWB-34S	Chromium - Total	218.2	03/03/98	0.007	mg/l
MWB-34S	Color	110.2	10/06/00	**500**	Color Units
MWB-34S	Color	110.2	02/01/01	**50**	Color Units
MWB-34S	Color	110.2	07/18/01	10	Color Units
MWB-34S	Color	110.2	01/16/02	**150**	Color Units
MWB-34S	Iron - Total	236.1	03/03/98	**1.200**	mg/l
MWB-34S	Iron - Total	200.7	10/06/00	**0.740**	mg/L(ppm)
MWB-34S	Iron - Total	200.7	02/01/01	**0.340**	mg/L(ppm)
MWB-34S	Iron - Total	200.7	07/18/01	**0.490**	mg/L(ppm)
MWB-34S	Iron - Total	200.7	01/16/02	**0.330**	mg/L(ppm)
MWB-34S	Iron - Total	200.7	06/24/02	**0.570**	mg/L (ppm)
MWB-34S	Lead - Total	239.2	03/03/98	0.002	mg/l
MWB-34S	Nitrogen, Ammonia	350.3	03/03/98	0.5	mg/l
MWB-34S	Nitrogen, Ammonia	350.3	10/06/00	0.14	mg/L (ppm)
MWB-34S	Nitrogen, Ammonia	350.3	02/01/01	0.28	mg/L (ppm)
MWB-34S	Nitrogen, Ammonia	350.3	07/18/01	0.32	mg/L (ppm)
MWB-34S	Nitrogen, Ammonia	350.3	01/16/02	0.46	mg/L (ppm)
MWB-34S	Nitrogen, Ammonia	350.1	06/24/02	0.24	mg/L (ppm)
MWB-34S	Nitrogen, Nitrate	300.0	07/18/01	2.9	mg/L (ppm)
MWB-34S	Oxygen, Dissolved (Field)	Field	03/03/98	2.6	mg/l
MWB-34S	Oxygen, Dissolved (Field)	Field	02/01/01	2.4	mg/l
MWB-34S	Oxygen, Dissolved (Field)	Field	07/18/01	2.2	mg/l
MWB-34S	Oxygen, Dissolved (Field)	Field	01/16/02	1.2	mg/l
MWB-34S	Oxygen, Dissolved (Field)	Field	06/24/02	1.3	mg/l
MWB-34S	Ph (Field)	Field	03/03/98	**5.73**	n/a
MWB-34S	Ph (Field)	Field	02/01/01	**4.69**	n/a
MWB-34S	Ph (Field)	Field	07/18/01	**4.52**	n/a
MWB-34S	Ph (Field)	Field	01/16/02	**5.40**	n/a
MWB-34S	Ph (Field)	Field	06/24/02	**5.18**	n/a
MWB-34S	Sodium - Total	273.1	03/03/98	4.8	mg/l
MWB-34S	Sodium - Total	200.7	10/06/00	6.4	mg/L(ppm)
MWB-34S	Sodium - Total	200.7	02/01/01	6	mg/L(ppm)
MWB-34S	Sodium - Total	200.7	07/18/01	12	mg/L(ppm)
MWB-34S	Sodium - Total	200.7	01/16/02	10	mg/L(ppm)
MWB-34S	Sodium - Total	200.7	06/24/02	9.4	mg/L (ppm)
MWB-34S	Solids, Total Dissolved	160.1	03/03/98	140	mg/l
MWB-34S	Solids, Total Dissolved	160.1	10/06/00	99	mg/L (ppm)
MWB-34S	Solids, Total Dissolved	160.1	02/01/01	94	mg/L (ppm)
MWB-34S	Solids, Total Dissolved	160.1	07/18/01	130	mg/L (ppm)
MWB-34S	Solids, Total Dissolved	160.1	01/16/02	140	mg/L (ppm)
MWB-34S	Solids, Total Dissolved	160.1	06/24/02	100	mg/L (ppm)
MWB-34S	Specific Conductance(Field)	Field	03/03/98	199	umhos/cm
MWB-34S	Specific Conductance(Field)	Field	02/01/01	129	umhos/cm
MWB-34S	Specific Conductance(Field)	Field	07/18/01	243	umhos/cm
MWB-34S	Specific Conductance(Field)	Field	01/16/02	210	umhos/cm
MWB-34S	Specific Conductance(Field)	Field	06/24/02	181	umhos/cm
MWB-34S	Turbidity (Field)	Field	03/03/98	131.70	NTU
MWB-34S	Turbidity (Field)	Field	02/01/01	3.03	NTU
MWB-34S	Turbidity (Field)	Field	07/18/01	2.26	NTU
MWB-34S	Turbidity (Field)	Field	01/16/02	23.60	NTU
MWB-34S	Turbidity (Field)	Field	06/24/02	16.20	NTU
MWB-34S	Vanadium - Total	286.2	03/03/98	0.031	mg/l
MWB-34S	Vanadium - Total	200.8	10/06/00	0.018	mg/L(ppm)
MWB-34S	Vanadium - Total	200.8	02/01/01	0.018	mg/L(ppm)
MWB-34S	Vanadium - Total	200.8	07/18/01	0.014	mg/L(ppm)
MWB-34S	Vanadium - Total	200.7	01/16/02	0.016	mg/L(ppm)
MWB-34S	Vanadium - Total	200.7	06/24/02	0.018	mg/L (ppm)
MWB-34S	Water Temperature in deg Celsius	Field	03/03/98	16.7	Deg C
MWB-34S	Water Temperature in deg Celsius	Field	02/01/01	20.6	Deg C
MWB-34S	Water Temperature in deg Celsius	Field	07/18/01	24.3	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-34S	Water Temperature in deg Celsius	Field	01/16/02	20.9	Deg C
MWB-34S	Water Temperature in deg Celsius	Field	06/24/02	22.4	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-34I	Barium - Dissolved	200.8	02/01/01	0.043	mg/l
MWB-34I	Barium - Dissolved	200.8	07/18/01	0.042	mg/L(ppm)
MWB-34I	Barium - Dissolved	200.7	01/16/02	0.048	mg/L(ppm)
MWB-34I	Barium - Dissolved	200.7	06/24/02	0.051	mg/L (ppm)
MWB-34I	Barium - Total	200.7	10/06/00	0.11	mg/L(ppm)
MWB-34I	Barium - Total	208.1	02/01/01	0.066	mg/l
MWB-34I	Barium - Total	200.8	07/18/01	0.056	mg/L(ppm)
MWB-34I	Barium - Total	200.7	01/16/02	0.058	mg/L(ppm)
MWB-34I	Barium - Total	200.7	06/24/02	0.055	mg/L (ppm)
MWB-34I	Chloride	300.0	03/03/98	5	mg/l
MWB-34I	Chloride	300.0	10/06/00	5.41	mg/L (ppm)
MWB-34I	Chloride	300.0	02/01/01	6.14	mg/l
MWB-34I	Chloride	300.0	07/18/01	5.4	mg/L (ppm)
MWB-34I	Chloride	300.0	01/16/02	4.7	mg/L (ppm)
MWB-34I	Chloride	300.0	06/24/02	5.1	mg/L (ppm)
MWB-34I	Chromium - Dissolved	218.2	03/03/98	0.059	mg/l
MWB-34I	Chromium - Total	218.2	03/03/98	0.0450	mg/l
MWB-34I	Chromium - Total	200.8	10/06/00	0.0095	mg/L(ppm)
MWB-34I	Chromium - Total	218.2	02/01/01	0.0058	mg/l
MWB-34I	Cobalt - Total	200.8	10/06/00	0.0021	mg/L(ppm)
MWB-34I	Color	110.2	10/06/00	**100**	Color Units
MWB-34I	Color	110.2	02/01/01	**50**	Units
MWB-34I	Color	110.2	07/18/01	10	Color Units
MWB-34I	Color	110.2	01/16/02	10	Color Units
MWB-34I	Iron - Dissolved	236.1	03/03/98	**0.58**	mg/l
MWB-34I	Iron - Dissolved	200.7	02/01/01	**0.39**	mg/l
MWB-34I	Iron - Dissolved	200.7	07/18/01	**0.41**	mg/L(ppm)
MWB-34I	Iron - Dissolved	200.7	01/16/02	**0.41**	mg/L(ppm)
MWB-34I	Iron - Dissolved	200.7	06/24/02	**0.40**	mg/L (ppm)
MWB-34I	Iron - Total	236.1	03/03/98	**16.000**	mg/l
MWB-34I	Iron - Total	200.7	10/06/00	**2.400**	mg/L(ppm)
MWB-34I	Iron - Total	236.1	02/01/01	**1.100**	mg/l
MWB-34I	Iron - Total	200.7	07/18/01	**0.760**	mg/L(ppm)
MWB-34I	Iron - Total	200.7	01/16/02	**0.830**	mg/L(ppm)
MWB-34I	Iron - Total	200.7	06/24/02	**0.680**	mg/L (ppm)
MWB-34I	Lead - Total	200.8	10/06/00	[redacted]	mg/L(ppm)
MWB-34I	Lead - Total	239.2	02/01/01	0.0059	mg/l
MWB-34I	Lead - Total	200.8	07/18/01	0.0038	mg/L(ppm)
MWB-34I	Lead - Total	200.8	01/16/02	0.0028	mg/L(ppm)
MWB-34I	Lead - Total	200.8	06/24/02	0.0018	mg/L (ppm)
MWB-34I	Nitrogen, Ammonia	350.3	03/03/98	0.2	mg/l
MWB-34I	Nitrogen, Ammonia	350.3	02/01/01	0.055	mg/l
MWB-34I	Oxygen, Dissolved (Field)	Field	03/03/98	1.8	mg/l
MWB-34I	Oxygen, Dissolved (Field)	Field	02/01/01	0.8	mg/l
MWB-34I	Oxygen, Dissolved (Field)	Field	07/18/01	1.1	mg/l
MWB-34I	Oxygen, Dissolved (Field)	Field	01/16/02	1.1	mg/l
MWB-34I	Oxygen, Dissolved (Field)	Field	06/24/02	1.2	mg/l
MWB-34I	Ph (Field)	Field	03/03/98	**5.45**	n/a
MWB-34I	Ph (Field)	Field	02/01/01	**5.23**	n/a
MWB-34I	Ph (Field)	Field	07/18/01	**5.32**	n/a
MWB-34I	Ph (Field)	Field	01/16/02	**5.33**	n/a
MWB-34I	Ph (Field)	Field	06/24/02	**5.31**	n/a
MWB-34I	Sodium - Dissolved	273.1	03/03/98	4.0	mg/l
MWB-34I	Sodium - Dissolved	200.7	02/01/01	3.4	mg/l
MWB-34I	Sodium - Dissolved	200.7	07/18/01	3.2	mg/L(ppm)
MWB-34I	Sodium - Dissolved	200.7	01/16/02	3.5	mg/L(ppm)
MWB-34I	Sodium - Dissolved	200.7	06/24/02	3.5	mg/L(ppm)
MWB-34I	Sodium - Total	273.1	03/03/98	4.3	mg/l
MWB-34I	Sodium - Total	200.7	10/06/00	3.3	mg/L(ppm)
MWB-34I	Sodium - Total	273.1	02/01/01	3.3	mg/l
MWB-34I	Sodium - Total	200.7	07/18/01	3.3	mg/L(ppm)
MWB-34I	Sodium - Total	200.7	01/16/02	3.3	mg/L(ppm)
MWB-34I	Sodium - Total	200.7	06/24/02	3.4	mg/L (ppm)
MWB-34I	Solids, Total Dissolved	160.1	03/03/98	180	mg/l
MWB-34I	Solids, Total Dissolved	160.1	10/06/00	43	mg/L (ppm)
MWB-34I	Solids, Total Dissolved	160.1	02/01/01	46	mg/l
MWB-34I	Solids, Total Dissolved	160.1	07/18/01	45	mg/L (ppm)
MWB-34I	Solids, Total Dissolved	160.1	01/16/02	53	mg/L (ppm)
MWB-34I	Solids, Total Dissolved	160.1	06/24/02	56	mg/L (ppm)
MWB-34I	Specific Conductance(Field)	Field	03/03/98	56	umhos/cm
MWB-34I	Specific Conductance(Field)	Field	02/01/01	51	umhos/cm

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-34I	Specific Conductance(Field)	Field	07/18/01	43	umhos/cm
MWB-34I	Specific Conductance(Field)	Field	01/16/02	49	umhos/cm
MWB-34I	Specific Conductance(Field)	Field	06/24/02	53	umhos/cm
MWB-34I	Turbidity (Field)	Field	03/03/98	7200.0	NTU
MWB-34I	Turbidity (Field)	Field	02/01/01	172.4	NTU
MWB-34I	Turbidity (Field)	Field	07/18/01	126.9	NTU
MWB-34I	Turbidity (Field)	Field	01/16/02	111.6	NTU
MWB-34I	Turbidity (Field)	Field	06/24/02	37.8	NTU
MWB-34I	Vanadium - Total	286.2	03/03/98	0.0470	mg/l
MWB-34I	Vanadium - Total	200.8	10/06/00	0.0078	mg/L(ppm)
MWB-34I	Vanadium - Total	286.2	02/01/01	0.0042	mg/l
MWB-34I	Water Temperature in deg Celsius	Field	03/03/98	19.4	Deg C
MWB-34I	Water Temperature in deg Celsius	Field	02/01/01	20.4	Deg C
MWB-34I	Water Temperature in deg Celsius	Field	07/18/01	21.8	Deg C
MWB-34I	Water Temperature in deg Celsius	Field	01/16/02	21.8	Deg C
MWB-34I	Water Temperature in deg Celsius	Field	06/24/02	22.3	Deg C

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
MWB-34D	Barium - Total	200.7	10/06/00	0.1	mg/L(ppm)
MWB-34D	Barium - Total	200.8	02/01/01	0.1	mg/L(ppm)
MWB-34D	Barium - Total	200.8	07/18/01	0.1	mg/L(ppm)
MWB-34D	Barium - Total	200.7	01/16/02	0.11	mg/L(ppm)
MWB-34D	Barium - Total	200.7	06/24/02	0.099	mg/L (ppm)
MWB-34D	Chloride	300.0	03/03/98	4.5	mg/l
MWB-34D	Chloride	300.0	10/06/00	4.72	mg/L (ppm)
MWB-34D	Chloride	300.0	02/01/01	5.68	mg/L (ppm)
MWB-34D	Chloride	300.0	07/18/01	5.2	mg/L (ppm)
MWB-34D	Chloride	300.0	01/16/02	4.9	mg/L (ppm)
MWB-34D	Chloride	300.0	06/24/02	4.6	mg/L (ppm)
MWB-34D	Color	110.2	10/06/00	15	Color Units
MWB-34D	Color	110.2	02/01/01	15	Color Units
MWB-34D	Color	110.2	07/18/01	15	Color Units
MWB-34D	Color	110.2	01/16/02	10	Color Units
MWB-34D	Copper - Total	200.8	07/18/01	0.0067	mg/L(ppm)
MWB-34D	Iron - Total	236.1	03/03/98	**0.730**	mg/l
MWB-34D	Iron - Total	200.7	10/06/00	**0.480**	mg/L(ppm)
MWB-34D	Iron - Total	200.7	02/01/01	**0.460**	mg/L(ppm)
MWB-34D	Iron - Total	200.7	07/18/01	**0.500**	mg/L(ppm)
MWB-34D	Iron - Total	200.7	01/16/02	**0.500**	mg/L(ppm)
MWB-34D	Iron - Total	200.7	06/24/02	**0.450**	mg/L (ppm)
MWB-34D	Methylene Chloride	8260B	07/18/01	5	µg/L (ppb)
MWB-34D	Nickel - Total	249.1	03/03/98	0.02	mg/l
MWB-34D	Nitrogen, Ammonia	350.3	03/03/98	0.4	mg/l
MWB-34D	Nitrogen, Ammonia	350.3	10/06/00	0.2	mg/L (ppm)
MWB-34D	Nitrogen, Ammonia	350.3	02/01/01	0.2	mg/L (ppm)
MWB-34D	Nitrogen, Ammonia	350.3	07/18/01	0.18	mg/L (ppm)
MWB-34D	Nitrogen, Ammonia	350.3	01/16/02	0.2	mg/L (ppm)
MWB-34D	Oxygen, Dissolved (Field)	Field	03/03/98	1.2	mg/l
MWB-34D	Oxygen, Dissolved (Field)	Field	02/01/01	2.1	mg/l
MWB-34D	Oxygen, Dissolved (Field)	Field	07/18/01	1.7	mg/l
MWB-34D	Oxygen, Dissolved (Field)	Field	01/16/02	1.4	mg/l
MWB-34D	Oxygen, Dissolved (Field)	Field	06/24/02	1.3	mg/l
MWB-34D	Ph (Field)	Field	03/03/98	7.02	n/a
MWB-34D	Ph (Field)	Field	02/01/01	7.71	n/a
MWB-34D	Ph (Field)	Field	07/18/01	6.84	n/a
MWB-34D	Ph (Field)	Field	01/16/02	7.33	n/a
MWB-34D	Ph (Field)	Field	06/24/02	7.37	n/a
MWB-34D	Sodium - Total	273.1	03/03/98	6.5	mg/l
MWB-34D	Sodium - Total	200.7	10/06/00	6.4	mg/L(ppm)
MWB-34D	Sodium - Total	200.7	02/01/01	6.1	mg/L(ppm)
MWB-34D	Sodium - Total	200.7	07/18/01	6.2	mg/L(ppm)
MWB-34D	Sodium - Total	200.7	01/16/02	6.4	mg/L(ppm)
MWB-34D	Sodium - Total	200.7	06/24/02	6.3	mg/L (ppm)
MWB-34D	Solids, Total Dissolved	160.1	03/03/98	240	mg/l
MWB-34D	Solids, Total Dissolved	160.1	10/06/00	234	mg/L (ppm)
MWB-34D	Solids, Total Dissolved	160.1	02/01/01	250	mg/L (ppm)
MWB-34D	Solids, Total Dissolved	160.1	07/18/01	230	mg/L (ppm)
MWB-34D	Solids, Total Dissolved	160.1	01/16/02	220	mg/L (ppm)
MWB-34D	Solids, Total Dissolved	160.1	06/24/02	230	mg/L (ppm)
MWB-34D	Specific Conductance(Field)	Field	03/03/98	451	umhos/cm
MWB-34D	Specific Conductance(Field)	Field	02/01/01	434	umhos/cm
MWB-34D	Specific Conductance(Field)	Field	07/18/01	470	umhos/cm
MWB-34D	Specific Conductance(Field)	Field	01/16/02	451	umhos/cm
MWB-34D	Specific Conductance(Field)	Field	06/24/02	414	umhos/cm
MWB-34D	Turbidity (Field)	Field	03/03/98	12.64	NTU
MWB-34D	Turbidity (Field)	Field	02/01/01	1.04	NTU
MWB-34D	Turbidity (Field)	Field	07/18/01	1.07	NTU
MWB-34D	Turbidity (Field)	Field	01/16/02	1.48	NTU
MWB-34D	Turbidity (Field)	Field	06/24/02	2.47	NTU
MWB-34D	Water Temperature in deg Celsius	Field	03/03/98	19.4	Deg C
MWB-34D	Water Temperature in deg Celsius	Field	02/01/01	20.3	Deg C
MWB-34D	Water Temperature in deg Celsius	Field	07/18/01	21.9	Deg C
MWB-34D	Water Temperature in deg Celsius	Field	01/16/02	21.0	Deg C
MWB-34D	Water Temperature in deg Celsius	Field	06/24/02	22.1	Deg C

DEP005643

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB19S	pH		6.5-8.5	4.67	4.51	4.65	4.75	5.41	4.35	4.87	4.93	NA	4.79	4.64	4.46	5.09	5.17
	Dissolved Oxygen	--	--	1.8	1.8	1.9	1.3	2.4	0.9	0.8	1.2	1.2	1.6	1.6	1.8	0.8	0.9
	Specific Conductance	--	--	48	60	52	60	45.6	88	94	94	NA	83	92	86	124	130
	Color		15	<5	<5	<5	<5		<5	35	15	45	30	20	30	150	
	Total Dissolved Solids		500	52.5	52	42.5	27.5	15	57	47	74	64	55	62	69	62	98
	Chloride		250	8.74	8.92	6.54	7.25	3.2	9.4	8.5	10.2	14.1	1.2	11.8	11	11	13
	Iron - Total		0.3	0.326	0.477	0.553	0.631	0.5	0.25	0.1	0.7	ND	ND	1.1	1.1	0.26	0.21
	Lead - Total	0.015		0.006	<0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	0.0026	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	0.005	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.222	0.133	<0.05	<0.05	<0.1000	0.28	1.1	0.2	0.205	0.31	0.26	0.26	0.26	0.22
	Sodium - Total	160		3.65	5.05	4.72	4.23	4.4	5.4	4.8	5.6	6.16	5.7	5.6	6.6	5.9	6.3
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.023	<0.05000	<0.5	ND	ND	0.022	0.035	0.034	0.027	0.012	<0.01
	Disolved Iron		0.3							NS	NS	NS	NS		NS		
	Dissolved Barium	2								NS	NS	NS	NS		NS		
	Dissolved Lead	0.015								NS	NS	NS	NS		NS		
MWB11S	pH		6.5-8.5	4.3	4.35	4.36	4.23	4.16	3.89	4.05	NA	NA	4.35	4.07	4.09	4.13	4.44
	Dissolved Oxygen	--	--	2.4	1.6	1.7	1.1	1.2	1.2	0.9	NA	1.2	NA	1.3	1.5	1.4	1.5
	Specific Conductance	--	--	75	78	75	84	110	98	139	NA	112	NA	91	115	233	189
	Color		15	<5	<5	<5	<5		<5	5	5	ND	ND	5	5	5	
	Total Dissolved Solids		500	28	59	42.5	53	73	51	62	68	67	96	44	47	130	100
	Chloride		250	10.2	7.51	11.1	4.24	10.1	8.6	9.5	9.86	14	8.05	11.8	12	24	19
	Iron - Total		0.3	1.19	0.558	0.262	0.674	0.35	0.61	0.4	0.7	0.24	1.4	0.2	0.68	1.2	1.6
	Lead - Total	0.015		0.005	0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.005
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.005	<0.03
	Nitrogen as Ammonia	--	--	<0.05	<0.05	<0.05	<0.05	<0.1000	<0.1	ND	ND	ND	ND	0.03	<0.1	0.11	<0.1
	Sodium - Total	160		4.3	4.01	4.38	4.01	<0.5000	4.9	5.3	5	5.1	5	5.4	6.4	12	9.6
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.058	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.0025
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0025
	Barium - Total	2		<0.1	<0.1	<0.1	0.039	<0.5000	<0.5	ND	ND	0.33	0.038	0.03	0.035	0.045	0.065
	Dissolved Iron		0.3							NS	NS	NS	NS		NS		
	Dissolved Barium	2								NS	NS	NS	NS		NS		
	Dissolved Lead	0.015								NS	NS	NS	NS		NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB12S	pH		6.5-8.5	4.43	4.5	4.54	4.49	4.48	4.52	4.86	5.00	NA	5.07	5.71	4.73	5.16	5.45
	Dissolved Oxygen	--	--	2.6	1.8	2.4	1.9	1.7	2.4	2.6	2.4	NA	2.1	1.9	1.7	2.3	2.3
	Specific Conductance	--	--	88	88	78	83	185	100	86	87	NA	116	99	90	85	91
	Color		15	<5	<5	<5	<5		<5	15	30	35	50	100	150	75	
	Total Dissolved Solids		500	47.5	55.5	42.5	54.5	87	68	60	57	42	51	62	70	62	94
	Chloride		250	13.8	13.8	9.62	15.1	17	8.7	8.6	8.29	12.9	9.14	9.6	9.8	5.1	10
	Iron - Total		0.3	0.663	0.665	0.528	0.485	0.28	0.25	0.2	0.2	0.14	0.15	0.13	0.14	0.11	0.1
	Lead - Total	0.015		0.006	<0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	1.23	0.506	0.205	0.431	1.2	0.53	0.36	0.69	0.44	0.489	0.39	0.44	0.26	<0.1
	Sodium - Total	160		6.02	6.16	6.09	4.99	11	4.5	4.5	4.4	4.56	4.3	4.1	4.4	3.1	3.4
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	0.003	ND	ND	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.0020	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.022	<0.5000	<0.5	ND	ND	ND	0.0055	0.0055	0.0067	<0.01	<0.01
	Dissolved Iron		0.3							ND	NS	NS	NS	NS	NS		
	Dissolved Barium	2								ND	NS	NS	NS	NS	NS		
	Dissolved Lead	0.015								ND	NS	NS	NS	NS	NS		
MWB20S	pH		6.5-8.5	4.36	4.5	4.38	4.44	4.49	4.18	4.11	4.02	NA	4.00	4.00	4.26	3.95	4.19
	Dissolved Oxygen	--	--	2.2	1.7	3.2	1	2.8	1.1	2	1.9	NA	1.8	1.2	1.1	0.9	0.9
	Specific Conductance	--	--	86	74	81	67	74	75	136	151	NA	186	152	140	190	191
	Color		15	<5	<5	<5	<5		<5	15	20	5	10	<5	5	20	
	Total Dissolved Solids		500	44	47	42	41.5	73	49	46	90	109	97	59	82	68	130
	Chloride		250	10.6	10.3	10	25.5	7.1	8.2	8.3	9.83	16.8	17.7	16.7	7.3	14	17
	Iron - Total		0.3	1	0.679	0.89	0.607	0.25	0.66	0.6	0.8	0.77	0.87	0.72	0.74	0.51	0.49
	Lead - Total	0.015		0.006	0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.615	0.245	0.056	0.226	0.3	0.31	0.2	0.52	0.51	0.4	0.46	0.66	0.68	1.1
	Sodium - Total	160		5.33	4.9	4.44	4.38	5	4.7	5	5	8.23	8.6	8.1	8.5	8.4	9.41
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.10	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	0.097	0.074	<0.05	<0.0500	<0.05	ND	0.05	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.019	<.5000	<0.5	ND	ND	0.059	0.05	0.046	0.041	0.047	0.053
	Dissolved Iron		0.3							NS	NS	NS	NS		NS		
	Dissolved Barium	2								NS	NS	NS	NS		NS		
	Dissolved Lead	0.015								NS	NS	NS	NS		NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005645

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB22S	pH		6.5-8.5	4.70	4.63	4.70	4.69	5.22	4.49	4.64	4.83	NA	4.91	5.16	5.04	5.08	
	Dissolved Oxygen	--	--	2.4	1.7	2.3	1.7	2.6	1.4	1.8	1.6	NA	1.7	1.4	1.3	1.8	
	Specific Conductance	--	--	85	911	74	104	125	98	98	95	NA	88	101	71	122	
	Color		15	<5	<5	<5	25		<5	15	25	20	40	50	100	25	
	Total Dissolved Solids		500	77	51	63.5	59.5	39	57	59	70	62	59	47	72	83	
	Chloride		250	15.2	8.86	6.55	6.95	7.9	11	9	6.25	13.3	4.96	9.17	3.9	8.2	
	Iron - Total		0.3	0.42	0.599	0.516	0.329	0.18	0.41	0.4	0.3	0.27	0.21	0.24	0.12	0.23	
	Lead - Total	0.015		0.006	0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.005	<0.03	
	Nitrogen as Ammonia	--	--	1.3	0.99	0.632	0.925	1	1	0.85	0.71	0.65	0.334	0.39	0.24	0.36	
	Sodium - Total	160		4.8	5.36	5.43	4.71	5.3	8.8	6.2	5.9	5.46	4.4	5.1	3.6	5.4	
	Vanadium - Total	--	--	<0.025	<0.025	<0.025	0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.045	<0.01	
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	0.06	ND	ND	<0.02	<0.1	<0.03	
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.002	<0.002	
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	
	Barium - Total	2		<0.1	<0.1	<0.1	0.012	<0.5000	<0.5	ND	ND	ND	0.0062	0.0078	0.0055	<0.01	
	Dissolved Iron		0.3							NS	NS	ND	NS	NS	NS		
	Dissolved Barium	2								NS	NS	ND	NS	NS	NS		
	Dissolved Lead	0.015								NS	NS	ND	NS	NS	NS		
MWB7S	pH		6.5-8.5	4.82	4.70	4.88	4.59	5.41	4.49	4.62	4.78	NA	4.76	NA	4.71	4.69	4.17
	Dissolved Oxygen	--	--	1.6	1.6	2.4	1.4	1.8	1.2	1.5	2.5	NA	1.1	NA	1.5	1	1.7
	Specific Conductance	--	--	87	86	18	89	91.7	89	88	106	NA	118	NA	120	127	89
	Color		15	75	275	500L	200		20	25	10	20	25	20	20	220	
	Total Disolved Solids		500	43	70.7	52.7	66.5	120	57	54	59	86	88	80	79	77	62
	Chloride		250	17.4	16.7	11.3	7.57	3	9.7	8.4	10.1	10.4	9.89	11.8	11	11	10
	Iron - Total		0.3		0.291	0.335	0.375	0.301	0.11	0.3	0.3	0.26	0.28	0.28	0.28	0.32	0.28
	Lead - Total	0.015		0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	10	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	1.12	0.798	0.275	0.76	0.2	1.3	ND	1.59	1.07	1.75	1.2	1.6	0.66	<0.1
	Sodium - Total	160		7.51	8.1	6.68	6.79	3.9	6.5	6.2	6.7	7.06	6.4	6.7	7.5	6.2	6.1
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.053	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.019	<.5000	<0.5	ND	ND	0.011	0.0096	0.0091	0.0099	0.015	<0.01
	Disolved Iron		0.3							NS	NS	NS	NS		NS		
	Disolved Barium	2								NS	NS	NS	NS		NS		
	Disolved Lead	0.015								NS	NS	NS	NS		NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005646

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Aug-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB21S	pH		6.5-8.5	4.93	4.80	4.78	4.75	4.83	4.51	4.66	4.17	NA	4.76	4.51	4.38	4.88	5.01
	Dissolved Oxygen	--	--	2	1	1.4	1.1	1.9	0.8	1.5	1.6	NA	1.3	1.3	1.2	1	1
	Specific Conductance	--	--	51	46	44	44	74.9	55	60	53	NA	52	46	49	159	49
	Color		15	125	60	75	<5		10	NS	15	60	100	20	50	75	
	Total Disolved Solids		500	56.5	16	15.5	33	32	26	22	41	18	67	26	32	110	54
	Chloride		250	7.8	5.49	5.66	4.68	6.8	4.6	5.4	6.3	12.4	6.11	7.53	6.7	9.2	6.7
	Iron - Total		0.3	0.568	0.764	0.676	0.677	0.86	0.7	0.7	0.6	0.99	0.66	0.63	0.74	1.1	0.74
	Lead - Total	0.015		0.006	0.007	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.005
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.03	<0.02	<0.03	
	Nitrogen as Ammonia	--	--	0.108	<0.005	<0.005	<0.05	0.9	<0.1	ND	ND	ND	0.05	0.05	<0.1	0.15	<0.1
	Sodium - Total	160		3.76	2.54	3.61	3.52	4.5	3.8	3.8	3.5	4.54	3.5	3.4	3.5	4.9	3.3
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.05	<0.05	0.05	<0.05	ND	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.0025
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.010	<0.001	<0.001	<0.0025
	Barium - Total	2		<0.01	<0.1	<0.1	0.031	<0.5000	<0.5	ND	ND	0.033	0.026	0.025	0.025	0.074	0.028
MWB19I	pH		6.5-8.5	5.18	5.10	5.05	4.96	5.07	4.99	5.06	5.17	n/a	5.13	4.92	4.56	4.97	5.21
	Dissolved Oxygen	--	--	2.3	1.6	1.1	1.2	1.4	0.6	1.1	1.4	0.9	1.7	1.6	1.5	0.9	0.9
	Specific Conductance	--	--	37	36	36	38	45.1	37	43	44	49.8	40	44	38	44	39
	Color		15	275	200	300	300		20	90	40	5	150	30	150	50	
	Total Disolved Solids		500	82	46	79.5	65	66	54	20	50	46.2	54	47	55	48	44
	Chloride		250	8.79	8.26	5.49	8.18	4.6	5.6	5	6.04	10.1	5.8	6.42	5.8	5.7	5.4
	Iron - Total		0.3	0.499	0.987	0.784	0.776	1.6	0.93	0.9	0.9	<0.1	0.34	0.94	1.1	0.89	0.96
	Lead - Total	0.015		<0.005	0.007	<0.005	<0.005	0.004	<0.002	ND	0.002	0.00345	ND	0.0022	0.0025	<0.002	0.0024
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	0.014	0.005	0.006	0.008	<0.03	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.091	<0.05	<0.05	<0.05	<0.1000	<0.1	ND	ND	<0.1	ND	0.03	<0.1	<0.1	<0.1
	Sodium - Total	160		3.21	3.7	5.6	4.35	4	4	4.1	3.6	4.11	3.2	3.4	3.5	3.5	3.3
	Vanadium - Total	--	--	<0.025	<0.025	<0.025	0.013	<0.0100	<0.010	0.012	0.012	<0.01	ND	0.0067	0.0062	<0.01	<0.01
	Zinc - Total		5							ND	0.07	<0.03	ND				
	Beryllium - Total	0.004								ND	ND	<0.0020	ND				
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	0.0021	0.0016	0.0016	0.0015	<0.0010	ND	0.0012	0.0013	0.0012	0.0011
	Barium - Total	2		0.157	0.136	<0.1	0.179	<0.5000	<0.5	ND	ND	0.12	0.041	0.098	0.09	0.098	0.092
	Disolved Sodium	160			3.51		4.18	3.7	4.4	NS	3.4		3.2	3.6	3.5	4	4.7
	Disolved Iron		0.3		0.345		0.736		0.31	NS	0.3		0.34	0.45	0.4	0.47	0.62
	Disolved Copper		1		<0.05		<0.01	<0.0500	<0.05	NS	ND		0.0056	<0.005	<0.005	<0.025	<0.025
	Disolved Barium	2			<0.1		0.176	<0.5000	<0.5	NS	ND		0.041	0.046	0.047	0.054	0.072
	Disolved Lead	0.015			<0.005		<0.005	<0.0020	<0.002	NS	ND		ND	<0.002	<0.002	<0.002	<0.001

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005647

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Aug-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB11I	pH		6.5-8.5	5.24	5.39	5.30	5.26	5.14	5.05	5.22	NA	NA	5.33	5.07	4.79	5.30	5.11
	Dissolved Oxygen	--	--	2.1	<1	1.2	1.2	1.8	0.9	0.8	NA	NA	1.3	0.9	1.1	1.8	1.9
	Specific Conductance	--	--	41	40	36	120.1	4.26	39	42	NA	NA	45	41	44	47	39
	Color		15	60K	500L	500L	<5		75	15	10	ND	500	75	500	250	
	Total Dissolved Solids		500	969	128	204	396	24	150	100	91	119	462	91	84	73	95
	Chloride		250	8.28	5.02	5.52	5.78	4.9	5.3	4.7	5.62	9.1	12.3	9.02	5.4	5	7.6
	Iron - Total		0.3	1.19	1.18	0.943	0.935	1.3	0.91	0.9	1.7	6.13	6.3	2	2.2	1.9	7.8
	Lead - Total	0.015		0.017	<0.005	0.011	0.011	0.021	0.03	0.03	0.023	0.106	0.076	0.04	0.04	0.05U(a)	0.14
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	0.064	0.043	0.1	0.086	0.21	0.042	0.039	0.0062	0.1U(a)	0.16
	Nitrogen as Ammonia	--	--	0.061	0.071	<0.05	0.079	<0.1000	<0.1	ND	ND	ND	0.042	0.05	<0.1	<0.1	<0.1
	Sodium - Total	160		3.24	3.54	3.24	3.14	2.7	3.3	3.3	3.3	3.56	3.1	3.2	3.8	3.7	3.3
	Vanadium - Total	--	--	0.040	0.036	<0.025	<0.01	0.072	0.045	0.11	0.114	0.24	0.049	0.052	0.049	0.072	0.18
	Zinc - Total		5	<0.05	<0.05	0.051	<0.05	<0.0500	<0.05	ND	0.06	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		0.004	0.004	<0.004	0.004	0.0042	0.0035	0.0027	0.0029	0.004	0.0019	0.0021	0.004	0.04U(a)	<0.0025
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.0010	0.2U(a)	<0.0025
	Barium - Total	2		0.348	0.322	0.295	0.296	<0.500	<0.5	ND	ND	0.92	0.45	0.3	0.29	0.27	0.68
	Dissolved Sodium	160			3.36		3.11	3.2	3.1	NS	3	NS	2.9	3.2	3.7	3.7	3.6
	Dissolved Iron		0.3		0.359		0.379	0.39	0.37	NS	0.3	NS	0.5	0.42	0.45	0.5	1.7
	Dissolved Barium	2		<0.1	<0.1		0.059	<0.500	<0.5	NS	ND	NS	0.043	0.045	0.0051	0.054	0.19
	Dissolved Lead	0.015			<0.005		<0.005	<0.0020	<0.002	NS	ND	NS	ND	<0.002	<0.002	0.006	<0.002
MWB12I	pH		6.5-8.5	5.42	5.4	5.27	5.33	5.2	5.19	5.34	5.51	NA	5.16	5.27	5.00	5.20	5.26
	Dissolved Oxygen	--	--	2.1	<1	1.2	0.8	1.4	0.8	1	1.1	NA	1	0.9	0.9	1	1
	Specific Conductance	--	--	41	46	37	38	43.8	42	47	46	NA	53	56	41	50	40
	Color		15	<5	<5	<5	<5	<5	<5	ND	ND	5	5	5	<5	5	
	Total Dissolved Solids		500	31.5	45.5	30.5	47	33	38	42	50	36	37	40	49	46	59
	Chloride		250	7.32	5.33	5.06	7	4.6	5.5	4.9	5.56	6.08	5.3	5.41	5.5	5.4	5.1
	Iron - Total		0.3	0.325	0.351	0.399	0.372	0.4	0.38	0.4	0.4	0.43	0.42	0.38	0.44	0.4	0.42
	Lead - Total	0.015		0.006	0.006	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.507	<0.05	<0.05	<0.05	0.2	<0.1	ND	ND	ND	ND	0.06	<0.1	<0.1	<0.1
	Sodium - Total	160		3.45	3.59	3.36	3.49	3.4	3.6	3.6	3.7	7.75	3.4	3.1	3.2	3.3	3.48
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.01	<0.1	<0.1	0.058	<0.500	<0.5	ND	ND	0.056	0.05	0.047	0.049	0.052	0.053
	Dissolved Iron		0.3							NS	NS	NS	NS	NS	NS		
	Dissolved Lead	0.015								NS	NS	NS	NS	NS	NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005648

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	1/10/96	7/17/96	1/24/97	7/14/97	02/24/98	8/13/98	02/22/99	07/20/99	01/25/00	09/07/00	01/31/01	07/18/01	01/16/02	06/26/02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB7I	pH		6.5-8.5	5.41	5.47	5.39	5.47	5.21	5.23	5.31	5.17	NA	5.24	5.14	4.95	5.05	5.11
	Dissolved Oxygen	--	--	2.2	1	2.2	1.4	6.1	1.1	1.2	1.4	NA	1.1	1.3	1.2	0.8	0.7
	Specific Conductance	--	--	45	49	40	44	47.8	43	48	51	NA	52	51	44	49	43
	Color		15	<5	<5	<5	<5		<5	10	ND	5	ND	<5	<5	5	
	Total Dissolved Solids		500	18	43	32.5	48	36	65	34	46	62	67	39	51	30	35
	Chloride		250	8.13	5.63	5.85	4.24	5.2	5.6	5.1	5.62	9.68	5.75	5.74	5.4	5.3	5.8
	Iron - Total		0.3	0.347	0.369	0.369	0.373	0.33	0.38	0.3	0.6	0.38	0.43	0.36	0.38	0.39	0.36
	Lead - Total	0.015		0.009	<0.005	<0.005	<0.005	<0.00020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.441	0.114	<0.05	<0.05	<0.1000	<0.1	ND	ND	ND	ND	0.03	<0.1	<0.1	<0.1
	Sodium - Total	160		3.41	3.4	3.16	3.19	3.4	3.5	3.5	3.4	3.61	3.3	3.2	3.2	3.3	3.2
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.054	<0.05	<0.0500	<0.05	ND	0.05	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.0020	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.065	<0.5000	<0.5	ND	ND	0.064	0.057	0.055	0.053	0.057	0.051
	Dissolved Iron		0.3							NS	NS	NS	NS		NS		
	Dissolved Barium	2								NS	NS	NS	NS		NS		
	Dissolved Lead	0.015								NS	NS	NS	NS		NS		
MWB19D	pH		6.5-8.5	7.29	7.31	7.05	6.88	6.62	7.20	7.36	7.1	NA	6.72	7.11	4.85	6.84	6.91
	Dissolved Oxygen	--	--	1.5	<1	1.1	1.2	1.3	1.2	1.1	1.2	NA	1.2	1.3	2.2	0.7	0.6
	Specific Conductance	--	--	356	358	325	336	352	352	343	348	NA	325	362	68	378	351
	Color		15	<5	<5	<5	<5	<5	<5	ND	5	5	10	20	10	25	
	Total Disolved Solids		500	217	209	207	193	200	200	190	220	192	212	202	194	210	200
	Chloride		250	5.88	4.99	5	6.24	4.4	4.2	3.4	4.61	4.18	4.54	4.85	4.7	4.3	4.4
	Iron - Total		0.3	0.392	0.7	0.428	0.712	1.2	0.78	0.9	1.6	ND	1.4	3.3	3.7	2.4	2.4
	Lead - Total	0.015		0.009	<0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	0.0012
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	0.006	<0.005	ND	0.005	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.113	0.168	0.2	<0.05	0.2	<0.1	0.12	0.14	ND	ND	0.11	0.11	0.16	<0.1
	Sodium - Total	160		6.32	7.02	5.24	4.97	5.1	4.9	5.2	4.7	5.27	4.9	4.3	4.6	4.7	4.4
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	0.006	ND	ND	0.0089	0.01	<0.01	0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		0.104	<0.1	<0.1	0.116	<0.5000	<0.5	ND	ND	0.11	0.099	0.11	0.11	0.11	0.1
	Disolved Iron		0.3							NS	NS	NS	NS		NS		
	Disolved Barium	2								NS	NS	NS	NS		NS		
	Disolved Lead	0.015								NS	NS	NS	NS		NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005649

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 1		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB12D	pH		6.5-8.5	7.08	7.27	6.97	7.05	6.90	7.15	7.33	6.86	NA	6.47	6.91	6.74	6.85	6.87
	Dissolved Oxygen	--	--	1.1	1.2	0.7	0.8	0.8	0.7	1	0.9	NA	1.1	0.9	0.8	0.8	0.8
	Specific Conductance	--	--	372	373	347	337	374	380	390	362	NA	408	432	415	399	388
	Color		15	<5	<5	<5	50		<5	10	10	5	10	15	15	15	
	Total Dissolved Solids		500	219	221	199	214	200	220	210	250	215	213	191	220	210	260
	Chloride		250	6.19	4.79	4.16	6.42	4.2	4.2	3.9	4.35	7.67	4.28	4.84	4.6	4.1	4.2
	Iron - Total		0.3	1.39	1.25	1.12	2.82	3.3	2.5	0.9	0.8	1.74	0.95	0.73	0.66	0.92	0.67
	Lead - Total	0.015		0.007	<0.005	<0.005	<0.005	0.002	<0.002	0.003	0.003	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.005	0.042	<0.03
	Nitrogen as Ammonia	--	--	0.671	0.191	0.067	0.1	0.3	0.17	ND	0.18	0.25	0.198	0.15	0.17	0.22	<0.1
	Sodium - Total	160		6.45	6.75	7.53	5.65	6.0	6.2	6.3	5.8	6.23	5.9	5.3	4.9	<0.1	5.7
	Vanadium	--	--	<0.025	<0.025	<0.025	0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		0.11	0.112	0.132	0.131	<0.5000	<0.5	ND	ND	0.12	0.12	0.11	0.12	0.11	0.11
	Dissolved Iron		0.3							NS	NS	NS	NS	NS	NS		
	Dissolved Barium	2								NS	NS	NS	NS	NS	NS		
	Dissolved Lead	0.015								NS	NS	NS	NS	NS	NS		
MWB7D	pH		6.5-8.5	7.41	7.41	7.22	7.04	6.78	7.45	7.54	7.03	NA	6.89	7.47	6.79	6.98	6.84
	Dissolved Oxygen	--	--	<1	<1	1.7	1.2	1.4	0.8	1.4	0.8	NA	1.8	1.0	0.9	0.6	0.6
	Specific Conductance	--	--	324	322	290	316	324	325	351	361	NA	339	339	365	353	345
	Color		15	<5	<5	<5	<5		<5	10	5	10	10	5	5	10	
	Total Dissolved Solids		500	168	174	174	155	190	190	190	200	208	212	183	180	180	190
	Chloride		250	5.92	4.76	7.25	3.92	3.7	4.2	3.8	4.34	7.65	4.34	4.78	4.3	4.6	4
	Iron - Total		0.3	0.237	0.233	0.239	0.239	0.23	0.26	0.2	0.3	0.29	0.31	0.27	0.33	0.31	0.29
	Lead - Total	0.015		0.008	<0.005	<0.005	<0.005	0.003	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.541	0.104	<0.05	0.07	0.2	0.14	ND	0.17	ND	0.13	0.13	0.13	0.17	<0.1
	Sodium - Total	160		5.06	5.01	4.68	4.52	4.8	4.8	4.6	4.6	4.98	4.7	4.6	4.8	4.6	4.4
	Vanadium	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.059	<0.05	<0.0500	<0.05	ND	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	0.1	0.085	<0.5000	<0.5	ND	ND	0.88	0.081	0.076	0.075	0.079	0.072
	Dissolved Iron		0.3							NS	NS	ND	NS		NS		
	Dissolved Barium	2								NS	NS	ND	NS		NS		
	Dissolved Lead	0.015								NS	NS	ND	NS		NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
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Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 2		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB17S	pH		6.5-8.5	4.91	4.87	4.71	4.81	5.08	4.59	4.69	4.91	NA	5.27	5.01	5.09	4.87	5.17
	Dissolved Oxygen	--	--	2.2	2.2	2.3	2.4	2.7	1.3	1.4	1.4	NA	1.8	1.8	1.9	1.8	1.7
	Specific Conductance	--	--	35	40	33	35	46.1	49	85	74	NA	102	105	136	70	89
	Color		15	150	150	225	325		10	20	30	60	50	20	50	150	
	Total Dissolved Solids		500	56.5	42.5	37.5	24.5	82	39	24	42	61	67	63	90	53	62
	Chloride		250	7.76	4.92	4.95	19.6	4.1	6.5	9.2	9.05	13.9	11.9	11.4	13	6.4	10
	Iron - Total		0.3	0.315	0.474	0.415	0.309	1.00	0.39	0.5	0.2	ND	0.21	0.2	0.18	0.35	0.28
	Lead - Total	0.015		0.007	0.005	<0.005	<0.005	0.003	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.069	<0.05	<0.05	<0.05	<0.1000	0.11	0.48	0.89	0.313	0.72	0.54	1.3	0.32	<0.1
	Sodium - Total	160		3.06	4.06	4.82	3.29	4.8	4	6.8	5.6	5.83	7.2	7	10	4.8	6.1
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	0.015	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	0.11	ND	ND	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	<0.010	<0.5000	<0.5	ND	ND	ND	0.0066	0.0059	0.0054	0.012	<0.01
	Dissolved Iron		0.3							NS	NS	NS	NS		NS		
	Dissolved Barium	2								NS	NS	NS	NS		NS		
	Dissolved Lead	0.015								NS	NS	NS	NS		NS		
MWB17I	pH		6.5-8.5	5.07	4.97	4.89	4.84	4.96	4.78	4.78	4.93	NA	4.98	4.58	4.52	4.88	5.13
	Dissolved Oxygen	--	--	2.2	1.8	1.2	1.4	1.6	1.3	1.4	1.6	NA	2	1.3	1.1	1.1	1.0
	Specific Conductance	--	--	37	33	32	36	42.5	35	39	38	NA	42	41	35	39	32
	Color		15	<5	<5	<5	<5		<5	5	5	ND	ND	<5	5	5	
	Total Dissolved Solids		500	56	29.5	13.5	21.5	32	32	11	27	22	42	46	42	37	53
	Chloride		250	6.94	5.16	5.74	4.72	4.7	5.2	7.9	5.64	5.26	5.33	6.05	5.4	5.2	5.3
	Iron - Total		0.3	0.265	0.349	0.35	0.317	0.29	0.29	0.3	0.3	ND	0.37	0.32	0.35	0.34	0.34
	Lead - Total	0.015		0.01	<0.005	<0.005	<0.005	<0.0020	<0.002	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Copper - Total	1		<0.05	<0.05	<0.01	<0.01	<0.0500	<0.05	ND	ND	0.079	ND	<0.005	<0.005	<0.025	<0.025
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	ND	ND	ND	ND	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	<0.05	<0.05	<0.05	<0.05	<0.1000	<0.1	ND	ND	ND	ND	0.03	<0.1	<0.1	<0.2
	Sodium - Total	160		3.2	3.57	3.57	3.58	3.7	3.6	3.8	3.4	4.04	3.3	3.3	3.3	3.3	3.2
	Vanadium	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	ND	ND	ND	ND	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	ND	ND	0.26	ND	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	ND	ND	ND	ND	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	ND	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.047	<0.5000	<0.5	ND	ND	0.042	0.038	0.039	0.036	0.041	0.036
	Dissolved Iron		0.3							NS	NS	NS	NS		NS		
	Dissolved Lead	0.015								NS	NS	NS	NS		NS		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 2		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB17D	pH		6.5-8.5	5.94	5.79	5.69	5.68	5.60	5.61	5.68	5.82	n/a	5.77	5.52	5.31	5.61	6.24
	Dissolved Oxygen	--	--	1.7	1.2	1.1	0.8	1.8	1.2	1.8	0.8	1.3	2.0	1.3	1.0	1.0	0.9
	Specific Conductance	--	--	81	83	73	79	78.4	74	108	80	87.8	71	79	69	87	66
	Color		15	<5	<5	<5	<5	NS	<5	10	5	<5	<5	<5	5	5	NS
	Total Disolved Solids		500	85.5	66	44	49.5	66	50	30	53	52	60	51	55	67	73
	Chloride		250	9.7	5.1	5.58	5.7	5.6	6.0	5.5	6.41	5.76	5.97	6.51	6.2	5.8	5.8
	Iron - Total		0.3	0.576	0.72	0.587	0.643	0.6	0.62	0.6	0.7	0.75	0.74	0.66	0.71	0.66	0.63
	Lead - Total	0.015		0.01	0.011	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.005	<0.002	<0.03	<0.005	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	<0.05	0.461	<0.05	0.12	0.1	<0.1	<0.1	0.12	<0.1	<0.1	0.06	<0.1	<0.1	<0.1
	Sodium - Total	160		4.45	4.36	3.92	3.83	3.6	3.8	3.8	3.8	3.98	3.4	3.4	3.3	3.5	3.4
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.010	<0.002	<0.01	<0.005	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	<0.05	<0.05	<0.03	<0.03	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.046	<0.5000	<0.5	<0.5	<0.5	0.042	0.034	0.037	0.035	0.039	0.037

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005652

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 3		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB13S	pH		6.5-8.5	5.12	4.91	4.94	5.09	5.03	5.21	5.08	5.01	n/a	5.09	4.97	4.83	4.81	5.43
	Dissolved Oxygen	--	--	3.6	4.6	4.1	4	2.4	3.8	3.4	0.9	1.7	2.3	3.1	2.8	1.3	1.4
	Specific Conductance	--	--	60	97	75	89	116	112	94	122	113	119	113	103	126	160
	Color		15	<5	<5	<5	<5	n/a	<5	20	5	15	15	75	5	25	n/a
	Total Dissolved Solids		500	32.5	64	71.5	66	95	56	<10	26	53	40	66	56	74	110
	Chloride		250	9.31	8.43	8.14	8.43	14	12	7.4	9.53	11.9	8.1	12.3	8.9	11	23
	Iron - Total		0.3	0.299	0.372	0.349	0.205	0.16	0.15	0.3	0.2	0.62	0.93	10	0.15	0.96	0.57
	Lead - Total	0.015		0.007	0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.03	<0.002	<0.03	<0.005	<0.005	0.011	<0.03	<0.03
	Nitrogen as Ammonia	--	--	1.29	0.703	0.568	0.866	0.9	0.9	0.86	0.53	0.68	0.571	0.43	0.28	0.37	0.4
	Sodium - Total	160		3.51	5.61	5.5	6.33	8.7	7	6.0	6.1	5.67	5.4	5.6	5.4	6.7	13
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.010	0.004	<0.01	0.0072	<0.004	<0.045	0.022	0.034
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	<0.03	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.02	<0.5000	<0.5	<0.5	<0.5	0.011	0.011	0.02	0.0086	<0.01	<0.01
	Dissolved Iron		0.3						NS	NS	NS	NS					
	Dissolved Barium	2							NS	NS	NS	NS					
	Dissolved Lead	0.015							NS	NS	NS	NS					
MWB13I	pH		6.5-8.5	5.21	5.13	5.10	5.28	5.05	5.07	5.24	NA	5.30	5.30	5.00	4.91	5.08	5.11
	Dissolved Oxygen	--	--	360.1	2.1	1.7	1.6	1.6	1.1	1.4	NA	1.9	1.9	1.6	1.7	1.8	1.6
	Specific Conductance	--	--	38	41	33	35	39.8	43	40	NA	47	47	46	38	45	36
	Color		15	500L	175	75	275		15	10	5	75	75	75	50	30	
	Total Dissolved Solids		500	44	45.5	46.5	45	35	47	43	46	35	35	43	51	51	42
	Chloride		250	8.75	4.77	5.43	6.99	4.9	5.8	4.9	5.43	10.4	5.08	5.89	5.9	5.2	5.2
	Iron - Total		0.3	3.08	0.521	0.366	0.468	0.46	0.3	0.5	0.42	0.15	0.15	0.48	0.42	0.45	0.38
	Lead - Total	0.015		0.019	0.014	<0.005	<0.005	<0.0020	ND	ND	ND	ND	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	ND	0.004	ND	ND	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	<0.05	<0.05	<0.05	<0.05	<0.1000	ND	ND	ND	ND	<0.1	0.05	<0.1	<0.1	<0.1
	Sodium - Total	160		4.85	3.49	4.43	3.4	3.6	3.7	3.4	3.21	0.44	0.44	3.2	3	3.4	3.4
	Vanadium - Total	--	--	0.048	<0.025	0.011	0.011	<0.0100	ND	0.005	ND	ND	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	ND	0.06	ND	ND	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	ND	ND	ND	ND	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	ND	ND	ND	ND	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		0.118	<0.1	<0.1	0.046	<0.5000	ND	ND	0.034	0.034	0.034	0.034	0.03	0.034	0.034
	Dissolved Iron		0.3						NS	NS	NS	NS		0.3	0.33	0.29	
	Dissolved Barium	2							NS	NS	NS	NS		0.029	0.03	0.027	
	Dissolved Lead	0.015							NS	NS	NS	NS		<0.002	<0.002	<0.002	

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005653

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Feb-98	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 5		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB27S	pH		6.5-8.5	5.67	5.33	NA	5.23	5.09	4.58	4.46	5.03
	Dissolved Oxygen	--	--	1.5	1.7	NA	2.2	1.3	1.5	1.7	1.8
	Specific Conductance	--	--	50.5	62	NA	77	74	67	70	56
	Color		15		30	100	75	75	25	150	
	Total Dissolved Solids		500	110.0	60	56	65	52	42	46	39
	Chloride		250	1.0	5.64	8.58	5.65	5.66	5.7	5.6	5.7
	Iron - Total		0.3	0.23	0.3	0.22	0.44	0.29	0.44	0.9	1.2
	Lead - Total	0.015		<0.0020	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.0050	0.003	ND	ND	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	<0.1000	0.1	ND	0.105	0.08	0.12	<0.1	<0.1
	Sodium - Total	160		3.6	3.4	3.49	4.1	4	3.7	3.2	3.7
	Vanadium - Total	--	--	<0.0100	0.005	ND	ND	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.0500	ND	ND	ND	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	ND	ND	ND	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	ND	0.015	ND	0.027	0.035	0.036	0.023
	Dissolved Iron		0.3		NS	NS	NS	NS	NS	0.081	
	Dissolved Barium	2			NS	NS	NS	NS	NS	0.028	
MWB27I	pH		6.5-8.5	5.46	5.56	NA	5.71	5.27	5.02	5.38	5.36
	Dissolved Oxygen	--	--	1.4	0.8	NA	1.3	1.1	1.0	1	0.9
	Specific Conductance	--	--	56.1	58	NA	65	64	57	64	54
	Color		15		5	ND	ND	20	15	10	
	Total Dissolved Solids		500	79	66	61	58	66	56	67	71
	Chloride		250	4.7	5.42	8.78	5.11	5.8	5.4	5.7	5.3
	Iron - Total		0.3	0.56	0.5	1.42	0.39	0.55	0.43	0.61	0.45
	Lead - Total	0.015		0.003	ND	ND	ND	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		0.013	0.003	ND	ND	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	<0.1000	0.1	ND	ND	0.06	<0.1	<0.1	<0.1
	Sodium - Total	160		3.2	3.5	3.9	3.2	3.4	2.9	3.7	3.7
	Vanadium - Total	--	--	<0.0100	0.002	ND	ND	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.0500	ND	ND	ND	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	ND	ND	ND	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	ND	ND	ND	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	ND	0.066	0.045	0.05	0.052	0.056	0.054
	Dissolved Sodium	160		3.4	NS	NS	3.2	3.8	3.5	3.5	
	Dissolved Iron		0.3	0.40	NS	NS	0.39	0.45	0.46	0.41	
	Dissolved Barium	2		<0.5000	NS	NS	0.045	0.048	0.048	0.043	
	Dissolved Lead	0.015		<0.0020	NS	NS	ND	<0.002	<0.002	<0.002	

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Feb-98	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 5		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB27D	pH		6.5-8.5	5.92	5.95	NA	6.01	5.65	5.47	5.98	5.97
	Dissolved Oxygen	--	--	1.2	0.8	6.0	2.4	1.0	1.0	1.7	1.6
	Specific Conductance	--	--	113	109	129	119	100	103	106	103
	Color		15		5	10	5	5	5	10	
	Total Disolved Solids		500	100	92	76	88	63	80	38	66
	Chloride		250	5.5	5.89	9.1	5.71	5.69	5.7	5.4	5.4
	Iron - Total		0.3	0.95	0.9	1.4	1.3	1.3	1	1.4	1.3
	Lead - Total	0.015		<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.0050	<0.002	<0.03	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.1	<0.1	<0.1	<0.1	0.08	<0.1	<0.1	<0.1
	Sodium - Total	160		4.6	4.2	4.23	3.9	3.8	3.1	3.9	4.1
	Vanadium - Total	--	--	<0.0100	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.0500	0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	<0.5	0.066	0.06	0.052	0.051	0.058	0.058
	Disolved Iron		0.3		NS	NS	NS	NS	NS		
	Disolved Barium	2			NS	NS	NS	NS	NS		
	Disolved Lead	0.015			NS	NS	NS	NS	NS		
MWB29S	pH		6.5-8.5	4.31	4.61	NA	4.70	4.29	5.24	4.33	5.13
	Dissolved Oxygen	--	--	1.4	1.3	1.6	1.9	1.5	0.7	1.1	1.1
	Specific Conductance	--	--	50.9	43	39.6	47	40	76	39	34
	Color		15		15	<5	15	15	5	10	
	Total Disolved Solids		500	21	33	36	35	37	33	27	23
	Chloride		250	5.8	5.46	9.08	5.15	5.23	5.9	5.6	5.3
	Iron - Total		0.3	0.64	0.3	0.26	ND	0.29	0.34	0.28	0.2
	Lead - Total	0.015		<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		0.006	<0.002	<0.03	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.2	<0.1	<0.1	<0.1	0.06	<0.1	<0.1	<0.1
	Sodium - Total	160		0.2	<0.1	<0.1	<0.1	0.06	<0.1	<0.1	<0.1
	Vanadium - Total	--	--	<0.0100	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.0500	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	<0.5	<0.01	0.0071	0.0071	0.0083	0.01	<0.01
	Disolved Iron		0.3		NS	NS	NS	--	--		
	Disolved Barium	2			NS	NS	NS	--	--		
	Disolved Lead	0.015			NS	NS	NS	--	--		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005655

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Feb-98	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Phase 5		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB29I	pH		6.5-8.5	5.08	5.08	n/a	5.20	4.95	4.29	4.64	5.36
	Dissolved Oxygen	--	--	1.3	1.3	1.1	1.5	1.0	1.5	1.3	1.4
	Specific Conductance	--	--	38	42	45.8	47	48	37	46	37
	Color		15		<5	5	<5	30	10	10	
	Total Disolved Solids		500	25	48	65	41	32	45	22	33
	Chloride		250	4.3	4.94	9.59	4.82	4.98	4.8	5	5
	Iron - Total		0.3	0.36	0.4	0.65	0.38	0.51	0.42	0.5	0.41
	Lead - Total	0.015		0.015	0.003	0.004	<0.002	0.003	0.0021	<0.002	<0.001
	Chromium - Total	0.1		0.010	<0.002	<0.03	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.3	<0.1	<0.1	<0.1	0.04	<0.1	<0.1	<0.1
	Sodium - Total	160		2.9	3.5	3.46	2.9	3.2	2.7	3.2	3.1
	Vanadium - Total	--	--	<0.0100	0.004	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.0500	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	<0.5	0.061	0.04	0.044	0.044	0.046	0.044
	Dissolved Sodium	160		3.1	2.9	3.29	2.9	3.3	3.3	3.5	3.3
	Disolved Iron		0.3	0.36	0.3	0.42	0.38	0.43	0.46	0.4	0.37
	Disolved Barium	2		<0.5000	<0.5	0.042	0.040	0.042	0.03	0.041	0.042
	Disolved Lead	0.015		<0.0020	<0.002	<0.002	0.0041	<0.002	<0.002	<0.002	<0.001
MWB29D	pH		6.5-8.5	5.76	5.69	n/a	5.70	5.47	4.31	5.54	5.43
	Dissolved Oxygen	--	--	1.2	1.0	1.2	1.2	0.8	1.1	0.8	0.7
	Specific Conductance	--	--	101	81	107	91	90	42	81	70
	Color		15		5	<5	5	5	5	10	
	Total Disolved Solids		500	67	50	87	59	65	68	58	50
	Chloride		250	4.9	6.43	8.67	6.16	6.37	6.1	6.1	6.1
	Iron - Total		0.3	1.3	1.5	1.59	1.5	1.2	1.2	1.1	1
	Lead - Total	0.015		<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.0050	<0.002	<0.03	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.3	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1
	Sodium - Total	160		4.3	4	4.25	3.8	3.6	3.6	3.9	3.7
	Vanadium - Total	--	--	<0.0100	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.0500	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	<0.5	0.067	0.053	0.053	0.051	0.054	0.048
	Disolved Iron		0.3					--	--		
	Disolved Lead	0.015						--	--		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005656

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Jan-99	Feb-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Background		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB2S	pH		6.5-8.5	4.54	4.45	4.36	4.28	5.14	4.32	4.46	4.39	n/a	4.51	4.15	6.45	4.15	4.08
	Dissolved Oxygen	--	--	1.7	2.4	2	1.2	1.6	1.4	1.8	1.4	1.3	2.0	1.6	1.3	1.9	1.8
	Specific Conductance	--	--	46	44	44	57	40.2	56	61	50	621	64	63	402	83	91
	Color		15	<5	<5	<5	<5		10	5	<5	<5	5	<5	5	5	
	Total Disolved Solids		500	17	37.5	36.3	24.5	71	38	24	14	<10	29	28	40	35	52
	Chloride		250	7.5	8.83	5.37	18.6	3.1	5.1	5.75	4.6	8.41	4.83	6.42	6.6	8.5	11
	Iron - Total		0.3	0.428	0.369	0.479	0.496	0.45	0.9	0.7	0.4	0.48	0.49	0.34	0.48	0.4	0.37
	Lead - Total	0.015		0.005	0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.002	<0.005	<0.03	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.407	<0.05	0.197	0.15	<0.1000	<0.1	<0.1	<0.1	<0.1	<0.1	0.04	<0.1	<0.1	<0.1
	Sodium - Total	160		2.68	5.14	2.69	3.7	5.6	3.9	4	3.7	4.1	3.3	3.9	3.5	5.3	5.4
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.002	<0.010	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0010	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	0.003	0.003	0.003	0.0037	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.018	<0.5000	<0.5	<0.5	<0.5	0.018	0.015	0.013	0.016	0.019	0.019
	Disolved Iron		0.3											--	--		
	Disolved Barium	2												--	--		
	Disolved Lead	0.015												--	--		
MWB2I	pH		6.5-8.5	4.79	4.80	4.68	4.73	4.71	4.70	4.66	4.78	n/a	4.86	4.54	4.07	4.58	4.61
	Dissolved Oxygen	--	--	2	1.5	1.3	1.1	1.7	0.9	1.7	1.5	1.2	1.8	1.3	1.5	1.1	1.0
	Specific Conductance	--	--	41	42	40	44	43.3	40	42	43	47.1	49	47	66	45	41
	Color		15	<5	<5	<5	<5		<5	15	10	<5	10	5	10	5	
	Total Disolved Solids		500	12	27	21	28.5	37	38	16	20	56	41	36	48	42	12
	Chloride		250	10.9	4.92	6.71	4.25	6.7	7.2	6.5	7.5	11	7.38	7.4	7.5	6.6	7
	Iron - Total		0.3	0.34	0.593	0.414	0.398	0.31	0.32	0.3	0.3	0.35	0.41	0.44	0.37	0.38	0.37
	Lead - Total	0.015		0.009	<0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.005	<0.002	<0.03	<0.005	<0.005	<0.005	<0.03	<0.03
	Nitrogen as Ammonia	--	--	0.471	<0.05	<0.05	<0.05	<0.1000	<0.1	<0.1	<0.1	<0.1	<0.1	0.04	<0.1	<0.1	<0.1
	Sodium - Total	160		4.85	2.61	4.86	4.42	4.5	4.5	4.6	4.4	4.3	4.3	4.5	4.2	4.2	4.2
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.010	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.024	<0.5000	<0.5	<0.5	<0.5	0.024	0.021	0.021	0.02	0.02	0.021
	Disolved Iron		0.3											--	--		
	Disolved Barium	2												--	--		
	Disolved Lead	0.015												--	--		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Background		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB3S	pH		6.5-8.5	4.10	4.74	4.66	4.60	4.58	4.53	4.53	4.75	n/a	4.88	4.47	4.52	4.57	4.87
	Dissolved Oxygen	--	--	2	1.8	2.1	1	2.1	1.5	1.4	1.5	1.7	1.5	2.2	1.9	1.9	1.8
	Specific Conductance	--	--	60	47	38	44	45.5	48	46	45	47.4	49	43	39	51	39
	Color		15	<5	<5	<5	<5		<5	5	<5	<5	5	30	5	5	
	Total Disolved Solids		500	60	47	38	44	45.5	48	46	45	47.4	49	43	39	51	39
	Chloride		250	11	4.9	5.05	5.01	4.3	6.1	4.8	4.91	8.93	4.66	4.93	6.3	3..8	4.9
	Iron - Total		0.3	0.507	0.92	1.39	0.682	0.22	0.76	0.6	0.8	0.62	0.78	0.53	0.35	0.56	1.4
	Lead - Total	0.015		0.008	<0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.005	<0.002	<0.03	<0.005	<0.005	0.011	<0.02	<0.03
	Nitrogen as Ammonia	--	--	<0.05	0.159	<0.05	<0.05	<0.1000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sodium - Total	160		4.14	3.46	4.17	3.64	3.1	3.9	3.8	3.5	3.89	3.3	3.1	2.5	2.5	3.1
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.010	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.053	<0.05	<0.0500	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.011	<0.5000	<0.5	<0.5	<0.5	<0.01	0.0071	0.0075	0.0073	0.015	<0.01
	Disolved Iron		0.3											--	--		
	Disolved Barium	2												--	--		
	Disolved Lead	0.015												--	--		
MWB3I	pH		6.5-8.5	4.82	5.08	4.83	4.99	4.81	4.29	4.75	4.93	n/a	4.98	4.82	4.50	4.76	4.89
	Dissolved Oxygen	--	--	1.8	1.4	1.6	1.1	1.6	1.0	64	1.4	1.6	1.6	1.6	1.4	1.1	1.0
	Specific Conductance	--	--	36	39	29	36	33.7	31	36	39	42.9	41	40	36	43	34
	Color		15	<5	<5	<5	<5		<5	<5	<5	<5	<5	<5	<5	<5	
	Total Disolved Solids		500	47	26.5	7.5	8.5	20	17	<10	19	38	31	23	41	38	42
	Chloride		250	5.61	4.2	4	3.49	3.7	8	4.6	4.79	4.29	4.62	4.67	4.6	4	4.5
	Iron - Total		0.3	0.636	0.646	0.649	0.657	0.52	0.54	0.6	0.6	0.62	0.66	0.55	0.61	0.62	0.58
	Lead - Total	0.015		0.008	<0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.005	<0.002	<0.03	<0.005	<0.005	0.0089	<0.02	<0.03
	Nitrogen as Ammonia	--	--	<0.05	0.212	<0.05	<0.05	<0.1000	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
	Sodium - Total	160		2.89	2.88	2.95	3.09	3.0	3.2	3.3	3.2	3.4	3	2.8	3	3	2.9
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.010	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	<0.05	<0.05	<0.0500	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.022	<0.5000	<0.5	<0.5	<0.5	0.024	0.019	0.019	0.019	0.026	0.019
	Disolved Iron		0.3											--	--		
	Disolved Barium	2												--	--		
	Disolved Lead	0.015												--	--		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

Table A-1

**SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT**

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Jan-96	Jul-96	Jan-97	Jul-97	Feb-98	Aug-98	Feb-99	Jul-99	Jan-00	Sep-00	Jan-01	Jul-01	Jan-02	Jun-02
Background		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB31D	pH		6.5-8.5	7.04	7.02	6.83	6.77	6.72	6.83	6.95	6.93	n/a	6.61	6.91	n/a	6.64	6.69
	Dissolved Oxygen	--	--	2	<1	1.3	1.4	1.1	1.1	1.2	0.8	1.7	1.8	1.6	n/a	1.6	1.5
	Specific Conductance	--	--	356	346	333	352	362	358	386	343	438	394	365	n/a	415	373
	Color		15	<5	<5	<5	<5		<5	<5	10	5	10	10	10	10	
	Total Disolved Solids		500	185	213	208	184	230	210	200	220	283	230	214	220	230	220
	Chloride		250	8.48	4.86	5.21	4.45	4.4	5.4	4.8	5.52	9.37	5.3	5.56	5.5	4.6	5.2
	Iron - Total		0.3	0.196	0.766	0.183	0.168	0.38	0.4	0.4	0.3	0.53	0.49	0.19	0.38	0.67	0.63
	Lead - Total	0.015		0.009	<0.005	<0.005	<0.005	<0.0020	<0.002	<0.002	<0.002	<0.002	0.0034	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.05	<0.05	<0.01	<0.01	<0.0050	<0.005	<0.005	<0.002	<0.03	<0.005	<0.005	<0.005	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.438	0.123	0.062	0.078	0.2	0.13	0.11	0.14	<0.1	0.135	0.06	0.13	0.2	<0.1
	Sodium - Total	160		7.02	7.45	6.65	6.61	6.4	6.7	6.9	6.9	6.76	6.5	6.9	4	6.6	5.9
	Vanadium - Total	--	--	<0.025	<0.025	<0.01	<0.01	<0.0100	<0.010	<0.010	<0.002	<0.01	<0.005	<0.004	<0.045	<0.01	<0.01
	Zinc - Total		5	<0.05	<0.05	0.05	<0.05	<0.0500	<0.05	<0.05	<0.05	<0.05	<0.03	<0.02	<0.1	<0.03	<0.03
	Beryllium - Total	0.004		<0.004	<0.004	<0.002	<0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.001	<0.0020	<0.002	<0.002	<0.001
	Cadmium - Total	0.005		<0.003	<0.003	<0.003	<0.003	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.1	<0.1	<0.1	0.106	<0.5000	<0.5	<0.5	<0.5	0.11	0.091	0.086	0.092	0.093	0.08
	Disolved Iron		0.3											--	--		
	Disolved Barium	2												--	--		
	Disolved Lead	0.015												--	--		

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005659

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Mar-98	Oct-00	Feb-01	Jul-01	Jan-02	Jun-02
Phase 3		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB33S	pH		6.5-8.5	4.87	4.42	4.74	4.85	4.75	4.69
	Dissolved Oxygen	--	--	1.6	1.75	2.4	2.2	1.9	1.7
	Specific Conductance	--	--	72.6	74.1	107	68	83	71
	Color		15	None	<5	15	10	75	
	Total Disolved Solids		500	130	65	69	34	60	30
	Chloride		250	6	5.57	10.6	6.1	6.6	6.8
	Iron - Total		0.3	<0.0020	0.061	0.1	0.16	0.16	0.28
	Lead - Total	0.015		<0.0500	<0.002	<0.002	<0.002	<0.002	<0.005
	Chromium - Total	0.1		<0.0050	<0.005	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	1.4	0.21	0.19	<0.1	0.15	<0.1
	Sodium - Total	160		4.6	3.8	5.3	3.7	4	3.9
	Vanadium - Total	--	--	0.006	0.013	0.0089	0.011	0.029	<0.01
	Zinc - Total		5	<0.0500	<0.025	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.003	<0.002	<0.0025
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0025
	Barium - Total	2		<0.5000	0.028	0.018	0.028	0.039	0.047
	Disolved Iron		0.3						
	Disolved Barium	2							
	Disolved Lead	0.015							
MWB34S	pH		6.5-8.5	5.73	4.72	4.69	4.52	5.40	5.18
	Dissolved Oxygen	--	--	2.6	1.94	2.4	2.2	1.2	1.3
	Specific Conductance	--	--	199	106	129	243	210	181
	Color		15	Brown	500	50	10	150	
	Total Disolved Solids		500	140	99	94	130	140	100
	Chloride		250	4.3	8.72	11.6	18	13	15
	Iron - Total		0.3	1.2	0.74	0.34	0.49	0.33	0.57
	Lead - Total	0.015		0.002	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		0.007	<0.005	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.5	0.14	0.28	0.32	0.46	0.24
	Sodium - Total	160		4.8	6.4	6	12	10	9.4
	Vanadium - Total	--	--	0.031	0.018	0.018	0.014	0.016	0.018
	Zinc - Total		5	<0.0200	<0.025	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.2000	0.043	0.027	0.047	0.015	0.023
	Disolved Iron		0.3						
	Disolved Barium	2							
	Disolved Lead	0.015							

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005660

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Mar-98	Oct-00	Feb-01	Jul-01	Jan-02	Jun-02
Phase 3		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
MWB34I	pH		6.5-8.5	5.45	5.26	5.23	5.32	5.33	5.31
	Dissolved Oxygen	--	--	1.8	1.1	0.8	1.1	1.1	1.2
	Specific Conductance	--	--	56	38	51	43	49	53
	Color		15	Grey	100	50	10	10	
	Total Disolved Solids		500	180	43	46	45	53	56
	Chloride		250	5	5.41	6.14	5.4	4.7	5.1
	Iron - Total		0.3	16	2.4	1.1	0.76	0.83	0.68
	Lead - Total	0.015		<0.0020	0.016	0.0059	0.0038	0.0028	0.0018
	Chromium - Total	0.1		0.045	0.0095	0.0058	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.2	<0.1	0.055	<0.1	<0.1	<0.1
	Sodium - Total	160		4.3	3.3	3.3	3.3	3.3	3.4
	Vanadium - Total	--	--	0.047	0.0078	0.0042	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.025	<0.02	<0.03	<0.03	<0.03	<0.0200
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.2000	0.11	0.066	0.056	0.058	0.055
	Disolved Iron		0.3						
	Disolved Barium	2							
	Disolved Lead	0.015							
MWB34D	pH		6.5-8.5	7.02	7.16	7.71	6.84	7.33	7.37
	Dissolved Oxygen	--	--	1.2	0.9	2.1	1.7	1.4	1.3
	Specific Conductance	--	--	451	369	434	470	451	414
	Color		15	None	15	15	15	10	
	Total Disolved Solids		500	240	234	250	230	220	230
	Chloride		250	4.5	4.72	5.68	5.2	4.9	4.6
	Iron - Total		0.3	0.73	0.48	0.46	0.5	0.5	0.45
	Lead - Total	0.015		<0.0500	<0.002	<0.002	<0.002	<0.002	<0.001
	Chromium - Total	0.1		<0.0050	<0.005	<0.005	<0.03	<0.02	<0.03
	Nitrogen as Ammonia	--	--	0.4	0.2	0.2	0.18	0.2	<0.1
	Sodium - Total	160		6.5	6.4	6.1	6.2	6.4	6.3
	Vanadium - Total	--	--	<0.0005	<0.002	<0.004	<0.004	<0.01	<0.01
	Zinc - Total		5	<0.0500	<0.025	<0.02	<0.03	<0.03	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0020	<0.003	<0.002	<0.001
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.0005
	Barium - Total	2		<0.5000	0.1	0.1	0.1	0.11	0.099
	Disolved Iron		0.3						
	Disolved Barium	2							
	Disolved Lead	0.015							

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

DEP005661

Table A-1

SUMMARY OF DETECTED PARAMETERS IN GROUNDWATER
PERMIT RENEWAL WATER QUALITY DATA REPORT

TRAIL RIDGE LANDFILL
BALDWIN, FLORIDA

Well	Component	PMCL	SMCL	Mar-98	Oct-00	Jun-02
Phase 5		(mg/L)	(mg/L)*	(mg/L)	(mg/L)	(mg/L)
MWB32S	pH		6.5-8.5	5.78	4.75	5.30
	Dissolved Oxygen	--	--	1.2	1.9	1.4
	Specific Conductance	--	--	97.6	53	76
	Color		15	Brown	1500	
	Total Disolved Solids		500	63	89	69
	Chloride		250	5.1	4.68	5.6
	Iron - Total		0.3	0.57	0.54	0.52
	Lead - Total	0.015		<0.0020	0.0022	<0.005
	Chromium - Total	0.1		<0.0050	0.0067	<0.03
	Nitrogen as Ammonia	--	--	0.6	<0.1	<0.1
	Sodium - Total	160		10	4.9	3.4
	Vanadium - Total	--	--	<0.0100	0.0074	0.011
	Zinc - Total		5	<0.0200	<0.025	<0.03
	Beryllium - Total	0.004		<0.0020	<0.0020	<0.0025
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0025
	Barium - Total	2		<0.2000	0.057	0.036
	Disolved Iron		0.3			0.23
	Disolved Barium	2				0.024
	Disolved Lead	0.015				<0.002
MWB32I	pH		6.5-8.5	5.50	5.15	5.39
	Dissolved Oxygen	--	--	1.2	1.5	1.2
	Specific Conductance	--	--	50.1	39	40
	Color		15	Tan	10	
	Total Disolved Solids		500	52	36	71
	Chloride		250	4.4	11.4	4.9
	Iron - Total		0.3	2.5	2.4	1.3
	Lead - Total	0.015		0.032	0.0028	0.014
	Chromium - Total	0.1		0.074	<0.005	<0.03
	Nitrogen as Ammonia	--	--	0.4	0.15	<0.1
	Sodium - Total	160		3.5	3.3	2.7
	Vanadium - Total	--	--	0.066	0.012	0.017
	Zinc - Total		5	0.19	0.053	0.038
	Beryllium - Total	0.004		0.0034	<0.0020	<0.0025
	Cadmium - Total	0.005		<0.0010	<0.0010	<0.0025
	Barium - Total	2		0.3	0.13	0.1
	Disolved Iron		0.3	0.22		0.25
	Disolved Barium	2		<0.2000		0.033
	Disolved Lead	0.015		<0.0020		<0.002

Notes:
* Except pH and color
ND - Parameter not detected at concentrations above the laboratory detection limit
NS - Not sampled
NA - Not available
Bold - Above laboratory detection limits
Shaded - Above Florida regulated limits for drinking water standards (Primary or Secondary) as under Chapter 62-550 F.A.C.
PMCL - Primary Drinking Water Standards
SMCL - Secondary Drinking Water Standards

Attachment C

Surface Water Analytical Data
(Detections)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-1	Ammonia		7/18/96	0.149	mg/l
SW-1	Ammonia, Unionized	FDEP	03/03/98	0.0015	mg/l
SW-1	Ammonium		7/18/96	0.149	mg/l
SW-1	Arsenic - Total	200.8	06/25/02	0.00095	mg/L (ppm)
SW-1	Barium - Total	208.1	08/04/97	0.025	mg/l
SW-1	Barium - Total	200.8	09/07/00	0.021	mg/l
SW-1	Barium - Total	200.8	01/31/01	0.042	mg/L(ppm)
SW-1	Barium - Total	200.8	07/19/01	0.061	mg/L(ppm)
SW-1	Barium - Total	200.7	01/16/02	0.041	mg/L(ppm)
SW-1	Barium - Total	200.7	06/25/02	0.041	mg/L (ppm)
SW-1	Biochemical Oxygen Demand		11/16/95	4.8	mg/l
SW-1	Biochemical Oxygen Demand		2/2/96	2.3	mg/l
SW-1	Biochemical Oxygen Demand	405.1	02/11/97	2.3	mg/l
SW-1	Biochemical Oxygen Demand	405.1	08/04/97	3.8	mg/l
SW-1	Biochemical Oxygen Demand	405.1	07/19/01	7.7	mg/L (ppm)
SW-1	Calcium - Total	215.1	8/13/98	24	mg/l
SW-1	Carbon, Total Organic	415.1	02/11/97	7.0	mg/l
SW-1	Carbon, Total Organic	415.1	08/04/97	6.0	mg/l
SW-1	Carbon, Total Organic	415.1	03/03/98	7.0	mg/l
SW-1	Carbon, Total Organic	415.1	8/13/98	10	mg/L
SW-1	Carbon, Total Organic	415.1	02/24/99	10	mg/l
SW-1	Carbon, Total Organic	415.1	07/21/99	6.73	mg/L
SW-1	Carbon, Total Organic	415.1	01/26/00	10.9	mg/L
SW-1	Carbon, Total Organic	415.1	09/07/00	9.44	mg/L
SW-1	Carbon, Total Organic	415.1	01/31/01	26.2	mg/L (ppm)
SW-1	Carbon, Total Organic	415.1	07/19/01	18	mg/L (ppm)
SW-1	Carbon, Total Organic	415.1	01/16/02	39	mg/L (ppm)
SW-1	Carbon, Total Organic	415.1	06/25/02	25	mg/L (ppm)
SW-1	Chemical Oxygen Demand		11/16/95	41.4	mg/l
SW-1	Chemical Oxygen Demand		2/2/96	28.9	mg/l
SW-1	Chemical Oxygen Demand		7/18/96	63.8	mg/l
SW-1	Chemical Oxygen Demand	410.2	02/11/97	35.3	mg/l
SW-1	Chemical Oxygen Demand	410.2	08/04/97	7.5	mg/l
SW-1	Chemical Oxygen Demand	410.2	03/03/98	22	mg/l
SW-1	Chemical Oxygen Demand	410.2	8/13/98	34	mg/L
SW-1	Chemical Oxygen Demand	410.2	02/24/99	32	mg/l
SW-1	Chemical Oxygen Demand	410.2	01/26/00	36.8	mg/l
SW-1	Chemical Oxygen Demand	410.1	09/07/00	29.8	mg/l
SW-1	Chemical Oxygen Demand	410.2	01/31/01	72.2	mg/L (ppm)
SW-1	Chemical Oxygen Demand	410.2	07/19/01	55	mg/L (ppm)
SW-1	Chemical Oxygen Demand	410.2	01/16/02	110	mg/L (ppm)
SW-1	Chemical Oxygen Demand	410.2	06/25/02	120	mg/L (ppm)
SW-1	Chloride		7/18/96	9.36	mg/l
SW-1	Chloride		02/11/97	12.9	mg/l
SW-1	Chlorophyll A		11/16/95	3.2	ug/l
SW-1	Chlorophyll A		2/2/96	2.1	ug/l
SW-1	Chlorophyll A	SM1020H	8/13/98	1.6	mg/m3
SW-1	Chlorophyll A	SM10200H	02/24/99	1.3	mg/m3
SW-1	Chlorophyll A	SM10200H	01/26/00	2.3	mg/m3
SW-1	Chlorophyll A	SM 1020H	09/07/00	4.2	mg/m3
SW-1	Chlorophyll A	SM10200H	01/31/01	46	mg/m3
SW-1	Chlorophyll A	SM10200H	07/19/01	50	mg/m3
SW-1	Chlorophyll A	SM 10200H	06/25/02	31	mg/m3
SW-1	Chromium - Total	218.2	02/24/99	0.052	mg/l
SW-1	Chromium - Total	200.8	06/25/02	0.0024	mg/L (ppm)
SW-1	Cobalt - Total	219.1	07/21/99	22.0	mg/l
SW-1	Coliform, Fecal		11/16/95	316	/100ml
SW-1	Coliform, Fecal		2/2/96	110	/100ml
SW-1	Coliform, Fecal	SM9222D	08/04/97	156	col/100ml
SW-1	Coliform, Fecal	SM9222D	07/21/99	560	COLF/100 mL
SW-1	Coliform, Fecal	SM 9222D	09/07/00	62	COLF/100 mL
SW-1	Coliform, Fecal	SM9222D	01/31/01	96	COLF/100 mL
SW-1	Coliform, Fecal	SM 9222D	07/19/01	500	Col/100mL
SW-1	Coliform, Fecal	SM 9222D	01/16/02	86	COLF/100 mL
SW-1	Color		11/16/95	150	C.U.

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-1	Color		2/2/96	125	C.U.
SW-1	Color		7/18/96	150	C.U.
SW-1	Color	Field	02/11/97	500L	C.U.
SW-1	Conductance		7/18/96	70	umhos/cm
SW-1	Conductance		02/11/97	40	umhos/cm
SW-1	Copper - Total	200.8	06/25/02	0.0055	mg/L (ppm)
SW-1	Field Conductivity		11/16/95	517	umhos/cm
SW-1	Field Conductivity		2/2/96	53	umhos/cm
SW-1	Field Conductivity		7/18/96	67	umhos/cm
SW-1	Field Conductivity	Field	02/11/97	51	umhos/cm
SW-1	Fluoride		7/18/96	0.272	mg/l
SW-1	Fluoride		02/11/97	0.154	mg/l
SW-1	Hardness, Total		11/16/95	9.26	mg/l
SW-1	Hardness, Total		2/2/96	12K	mg/l
SW-1	Hardness, Total		7/18/96	15.9	mg/l
SW-1	Hardness, Total as CaCo3	SM2340B	08/04/97	42	mg/l
SW-1	Hardness, Total as CaCo3	SM2340B	03/03/98	38	mg/l
SW-1	Hardness, Total as CaCO3	SM2340B	8/13/98	67	mg/l
SW-1	Hardness, Total as CaCO3	SM2340B	02/24/99	46	mg/l
SW-1	Hardness, Total as CaCO3	SM2340B	07/21/99	94	mg/L
SW-1	Hardness, Total as CaCO3	SM2340B	01/26/00	69	mg/L
SW-1	Hardness, Total as CaCO3	SM2340B	09/07/00	100	mg/L
SW-1	Hardness, Total as CaCO3	SM2340B	01/31/01	120	mg/L(ppm)
SW-1	Hardness, Total as CaCO3	SM2340B	07/19/01	130	mg/L(ppm)
SW-1	Hardness, Total as CaCO3	SM2340B	01/16/02	18	mg/L(ppm)
SW-1	Hardness, Total as CaCO3	SM 2340B	06/25/02	64	mg/L (ppm)
SW-1	Iron - Total		11/16/95	0.546	mg/l
SW-1	Iron - Total		2/2/96	0.189	mg/l
SW-1	Iron - Total		7/18/96	0.375	mg/l
SW-1	Iron - Total	236.1	02/11/97	0.184	mg/l
SW-1	Iron - Total	236.1	08/04/97	0.115	mg/l
SW-1	Iron - Total	236.1	03/03/98	0.56	mg/l
SW-1	Iron - Total	236.1	8/13/98	0.27	mg/l
SW-1	Iron - Total	236.1	02/24/99	0.2	mg/l
SW-1	Iron - Total	236.1	07/21/99	0.1	mg/l
SW-1	Iron - Total	200.7	01/26/00	0.45	mg/l
SW-1	Iron - Total	200.7	09/07/00	0.18	mg/l
SW-1	Iron - Total	200.7	01/31/01	0.37	mg/L(ppm)
SW-1	Iron - Total	200.7	07/19/01	0.73	mg/L(ppm)
SW-1	Iron - Total	200.7	01/16/02	0.92	mg/L(ppm)
SW-1	Iron - Total	200.7	06/25/02	1.5	mg/L (ppm)
SW-1	Lead - Total		7/18/96	0.007	mg/l
SW-1	Lead - Total	200.8	06/25/02	0.0023	mg/L (ppm)
SW-1	Magnesium - Total	242.1	8/13/98	1.8	mg/l
SW-1	Nickel - Total	200.8	07/19/01	0.005	mg/L(ppm)
SW-1	Nitrate & Nitrite		7/18/96	0.098	mg/l
SW-1	Nitrogen, Total		11/16/95	0.782	mg/l
SW-1	Nitrogen, Total	300,351	03/03/98	0.5	mg/l
SW-1	Nitrogen, Total	300.0 + 351	02/24/99	0.70	mg/l
SW-1	Nitrogen, Total		7/18/96	0.912	mg/l
SW-1	Nitrogen, Total as N	300.0 + 351.1	01/26/00	0.62	mg/l
SW-1	Nitrogen, Total as N	300.0+351.4	09/07/00	0.6	mg/l
SW-1	Nitrogen, Total as N	300.0+351.4	01/31/01	0.98	mg/L (ppm)
SW-1	Nitrogen, Total as N	300.0+351.4	07/19/01	0.69	mg/L (ppm)
SW-1	Nitrogen, Total as N	300.0+351.4	01/16/02	0.84	mg/L (ppm)
SW-1	Nitrogen, Total as N	300.0+351.4	06/25/02	1.9	mg/L (ppm)
SW-1	Oxygen, Dissolved (Field)		11/16/95	3.8	mg/l
SW-1	Oxygen, Dissolved (Field)		2/2/96	5	mg/l
SW-1	Oxygen, Dissolved (Field)		7/18/96	3.2	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	02/11/97	5.6	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	08/04/97	3.5	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	03/03/98	5.4	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	8/13/98	3.5	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	02/24/99	5.6	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	07/21/99	4.2	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-1	Oxygen, Dissolved (Field)	Field	01/26/00	6.5	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	09/07/00	6.7	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	01/31/01	5.5	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	07/19/01	3.7	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	01/16/02	4.2	mg/l
SW-1	Oxygen, Dissolved (Field)	Field	06/25/02	4.2	mg/l
SW-1	Ph		7/18/96	5.71	S.U.
SW-1	Ph (Field)		11/16/95	5.01	S.U.
SW-1	Ph (Field)		2/2/96	7.39	S.U.
SW-1	Ph (Field)		7/18/96	5	S.U.
SW-1		Field	02/11/97	5.67	n/a
SW-1	Ph (Field)	Field	08/04/97	7.36	n/a
SW-1	Ph (Field)	Field	03/03/98	7.65	n/a
SW-1	Ph (Field)	Field	8/13/98	6.62	n/a
SW-1	Ph (Field)	Field	02/24/99	6.55	n/a
SW-1	Ph (Field)	Field	07/21/99	6.78	n/a
SW-1	Ph (Field)	Field	01/26/00	6.35	n/a
SW-1	Ph (Field)	Field	09/07/00	6.22	n/a
SW-1	Ph (Field)	Field	01/31/01	6.86	n/a
SW-1	Ph (Field)	Field	07/19/01	6.93	n/a
SW-1	Ph (Field)	Field	01/16/02	4.97	n/a
SW-1	Ph (Field)	Field	06/25/02	6.48	n/a
SW-1	Phosphorus, Total		11/16/95	0.398	mg/l
SW-1	Phosphorus, Total	365.3	02/11/97	0.07	mg/l
SW-1	Phosphorus, Total	365.3	08/04/97	0.076	mg/l
SW-1	Phosphorus, Total	365.3	03/03/98	0.12	mg/l
SW-1	Phosphorus, Total	365.3	01/26/00	0.112	mg/l
SW-1	Phosphorus, Total	365.3	01/31/01	0.02	mg/L (ppm)
SW-1	Phosphorus, Total	365.3	07/19/01	0.019	mg/L (ppm)
SW-1	Phosphorus, Total	365.1	06/25/02	0.13	mg/L (ppm)
SW-1	Sodium - Total		7/18/96	5.67	mg/l
SW-1	Sodium - Total		02/11/97	4.25	mg/l
SW-1	Sodium - Total	273.1	8/13/98	5.4	mg/l
SW-1	Solids, Total Dissolved		11/16/95	79.3	mg/l
SW-1	Solids, Total Dissolved		2/2/96	69.5	mg/l
SW-1	Solids, Total Dissolved		7/18/96	68	mg/l
SW-1	Solids, Total Dissolved	160.1	08/04/97	109	mg/l
SW-1	Solids, Total Dissolved	160.1	03/03/98	110	mg/l
SW-1	Solids, Total Dissolved	160.1	8/13/98	120	mg/l
SW-1	Solids, Total Dissolved	160.1	02/24/99	72	mg/l
SW-1	Solids, Total Dissolved	160.1	07/21/99	110	mg/l
SW-1	Solids, Total Dissolved	160.1	01/26/00	152	mg/l
SW-1	Solids, Total Dissolved	160.1	09/07/00	168	mg/l
SW-1	Solids, Total Dissolved	160.1	01/31/01	259	mg/L (ppm)
SW-1	Solids, Total Dissolved	160.1	07/19/01	200	mg/L (ppm)
SW-1	Solids, Total Dissolved	160.1	01/16/02	140	mg/L (ppm)
SW-1	Solids, Total Dissolved	160.1	06/25/02	200	mg/L (ppm)
SW-1	Solids, Total Suspended	160.2	08/04/97	5.5	mg/l
SW-1	Solids, Total Suspended	160.2	03/03/98	15	mg/l
SW-1	Solids, Total Suspended	160.2	8/13/98	9	mg/l
SW-1	Solids, Total Suspended	160.2	01/26/00	15.2	mg/l
SW-1	Solids, Total Suspended	160.2	09/07/00	10.5	mg/l
SW-1	Solids, Total Suspended	160.2	01/31/01	31	mg/L (ppm)
SW-1	Solids, Total Suspended	160.2	07/19/01	72	mg/L (ppm)
SW-1	Solids, Total Suspended	160.2	06/25/02	20	mg/L (ppm)
SW-1	Specific Conductance(Field)	Field	08/04/97	189	umhos/cm
SW-1	Specific Conductance(Field)	Field	03/03/98	108	umhos/cm
SW-1	Specific Conductance(Field)	Field	8/13/98	192	umhos/cm
SW-1	Specific Conductance(Field)	Field	02/24/99	158	um/cm
SW-1	Specific Conductance(Field)	Field	07/21/99	245	umhos/cm
SW-1	Specific Conductance(Field)	Field	01/26/00	145	umhos/cm
SW-1	Specific Conductance(Field)	Field	09/07/00	238	umhos/cm
SW-1	Specific Conductance(Field)	Field	01/31/01	294	umhos/cm
SW-1	Specific Conductance(Field)	Field	07/19/01	339	umhos/cm
SW-1	Specific Conductance(Field)	Field	01/16/02	187	umhos/cm

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-1	Specific Conductance(Field)	Field	06/25/02	180	umhos/cm
SW-1	Sulfate		02/11/97	1.74	mg/l
SW-1	Total Dissolved Volatile Solids		7/18/96	5.88	%
SW-1	Total Fixed Solids		7/18/96	7.32	%
SW-1	Total Kjeldahl Nitrogen		7/18/96	0.814	mg/l
SW-1	Total Organic Carbon		11/16/95	27	mg/l
SW-1	Total Organic Carbon		2/2/96	9	mg/l
SW-1	Total Organic Carbon		7/18/96	9	mg/l
SW-1	Total Volatile Solids		7/18/96	92.7	%
SW-1	Total Volatile Solids		02/11/97	100	%
SW-1	Turbidity (Field)		11/16/95	2.6	NTU
SW-1	Turbidity (Field)		2/2/96	3.5	NTU
SW-1	Turbidity (Field)		7/18/96	1.5	NTU
SW-1	Turbidity (Field)	Field	02/11/97	2.9	NTU
SW-1	Turbidity (Field)	Field	08/04/97	6.3	NTU
SW-1	Turbidity (Field)	Field	03/03/98	33.7	NTU
SW-1	Turbidity (Field)	Field	8/13/98	10.78	NTU
SW-1	Turbidity (Field)	Field	02/24/99	11.97	NTU
SW-1	Turbidity (Field)	Field	07/21/99	2.61	NTU
SW-1	Turbidity (Field)	Field	01/26/00	45.2	NTU
SW-1	Turbidity (Field)	Field	09/07/00	1.58	NTU
SW-1	Turbidity (Field)	Field	01/31/01	24.3	NTU
SW-1	Turbidity (Field)	Field	07/19/01	27.8	NTU
SW-1	Turbidity (Field)	Field	01/16/02	2.24	NTU
SW-1	Turbidity (Field)	Field	06/25/02	7.43	NTU
SW-1	Vanadium - Total	286.2	02/24/99	0.036	mg/l
SW-1	Water Temperature in deg Celsius		11/16/95	22.9	C
SW-1	Water Temperature in deg Celsius		2/2/96	9.7	C
SW-1	Water Temperature in deg Celsius		7/18/96	27.1	C
SW-1	Water Temperature in deg Celsius	Field	02/11/97	14.1	Deg C
SW-1	Water Temperature in deg Celsius	Field	08/04/97	26.8	Deg C
SW-1	Water Temperature in deg Celsius	Field	03/03/98	16.3	Deg C
SW-1	Water Temperature in deg Celsius	Field	8/13/98	28.8	Deg C
SW-1	Water Temperature in deg Celsius	Field	02/24/99	15.3	Deg C
SW-1	Water Temperature in deg Celsius	Field	07/21/99	25.1	Deg C
SW-1	Water Temperature in deg Celsius	Field	01/26/00	11.3	Deg C
SW-1	Water Temperature in deg Celsius	Field	09/07/00	27.7	Deg C
SW-1	Water Temperature in deg Celsius	Field	01/31/01	15.6	Deg C
SW-1	Water Temperature in deg Celsius	Field	07/19/01	25.0	Deg C
SW-1	Water Temperature in deg Celsius	Field	01/16/02	11.2	Deg C
SW-1	Water Temperature in deg Celsius	Field	06/25/02	23.2	Deg C
SW-1	Zinc - Total	289.1	07/21/99	0.06	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-2	Ammonia		02/11/97	0.08	mg/l
SW-2	Ammonia, Unionized	FDEP	03/03/98	0.0161	mg/l
SW-2	Ammonium	FDEP	02/11/97	0.08	mg/l
SW-2	Barium - Total	208.1	08/04/97	0.054	mg/l
SW-2	Barium - Total	200.8	09/07/00	0.31	mg/l
SW-2	Barium - Total	200.8	01/31/01	0.085	mg/L(ppm)
SW-2	Barium - Total	200.8	07/19/01	0.34	mg/L(ppm)
SW-2	Barium - Total	200.7	01/16/02	0.11	mg/L(ppm)
SW-2	Barium - Total	200.7	06/25/02	0.06	mg/L (ppm)
SW-2	Beryllium - Total	200.7	07/19/01	0.003	mg/L(ppm)
SW-2	Biochemical Oxygen Demand		11/16/95	2.2	mg/l
SW-2	Biochemical Oxygen Demand	405.1	02/11/97	2.8	mg/l
SW-2	Biochemical Oxygen Demand	405.1	08/04/97	3.0	mg/l
SW-2	Calcium - Total	215.1	8/13/98	1.7	mg/l
SW-2	Carbon, Total Organic	415.1	02/11/97	5.0	mg/l
SW-2	Carbon, Total Organic	415.1	08/04/97	3.0	mg/l
SW-2	Carbon, Total Organic	415.1	03/03/98	12.0	mg/l
SW-2	Carbon, Total Organic	415.1	8/13/98	8.9	mg/L
SW-2	Carbon, Total Organic	415.1	02/24/99	5.2	mg/l
SW-2	Carbon, Total Organic	415.1	07/21/99	4.00	mg/L
SW-2	Carbon, Total Organic	415.1	09/07/00	19	mg/L
SW-2	Carbon, Total Organic	415.1	01/31/01	7.06	mg/L (ppm)
SW-2	Carbon, Total Organic	415.1	07/19/01	2.8	mg/L (ppm)
SW-2	Carbon, Total Organic	415.1	01/16/02	21	mg/L (ppm)
SW-2	Carbon, Total Organic	415.1	06/25/02	5.4	mg/L (ppm)
SW-2	Chemical Oxygen Demand		11/16/95	47.3	mg/l
SW-2	Chemical Oxygen Demand		2/2/96	32.1	mg/l
SW-2	Chemical Oxygen Demand		7/18/96	41.4	mg/l
SW-2	Chemical Oxygen Demand	410.2	02/11/97	32.1	mg/l
SW-2	Chemical Oxygen Demand	410.2	03/03/98	41	mg/l
SW-2	Chemical Oxygen Demand	410.2	8/13/98	29	mg/L
SW-2	Chemical Oxygen Demand	410.2	02/24/99	17	mg/l
SW-2	Chemical Oxygen Demand	410.1	09/07/00	100	mg/l
SW-2	Chemical Oxygen Demand	410.2	01/31/01	98.8	mg/L (ppm)
SW-2	Chemical Oxygen Demand	410.2	07/19/01	1200 (a)	mg/L (ppm)
SW-2	Chemical Oxygen Demand	410.2	01/16/02	60	mg/L (ppm)
SW-2	Chemical Oxygen Demand	410.2	06/25/02	16	mg/L (ppm)
SW-2	Chloride		7/18/96	7.82	mg/l
SW-2	Chloride		02/11/97	8.69	mg/l
SW-2	Chlorophyll A		11/16/95	3.2	ug/l
SW-2	Chlorophyll A		2/2/96	1.1	ug/l
SW-2	Chlorophyll A	SM1020H	8/13/98	1.0	mg/m3
SW-2	Chlorophyll A	SM10200H	02/24/99	3.8	mg/m3
SW-2	Chlorophyll A	SM 1020H	09/07/00	5.2	mg/m3
SW-2	Chlorophyll A	SM10200H	01/31/01	6.8	mg/m3
SW-2	Chlorophyll A	SM10200H	07/19/01	61	mg/m3
SW-2	Chlorophyll A	SM 10200H	06/25/02	1.4	mg/m3
SW-2	Chromium - Total	200.8	07/19/01	0.0058	mg/L(ppm)
SW-2	Cobalt - Total	219.1	07/21/99	15.0	mg/l
SW-2	Coliform, Fecal		11/16/95	284	/100ml
SW-2	Coliform, Fecal		2/2/96	300	/100ml
SW-2	Coliform, Fecal	SM9222D	08/04/97	258	col/100ml
SW-2	Coliform, Fecal	SM9222D	03/03/98	106	col/100ml
SW-2	Coliform, Fecal	SM9222D	07/21/99	140	COLF/100 mL
SW-2	Coliform, Fecal	SM 9222D	07/19/01	600	Col/100mL
SW-2	Coliform, Fecal	SM 9222D	01/16/02	22	COLF/100 mL
SW-2	Color		11/16/95	125	C.U.
SW-2	Color		2/2/96	125	C.U.
SW-2	Color		7/18/96	150	C.U.
SW-2	Color	Field	02/11/97	500L	C.U.
SW-2	Color	Field	08/04/97	25	C.U.
SW-2	Conductance		7/18/96	50	umhos/cm
SW-2	Conductance		02/11/97	30	umhos/cm
SW-2	Copper - Total	200.8	06/25/02	0.0066	mg/L (ppm)
SW-2	Field Conductivity		11/16/95	620	umhos/cm

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-2	Field Conductivity		2/2/96	47	umhos/cm
SW-2	Field Conductivity		7/18/96	47	umhos/cm
SW-2	Field Conductivity	Field	02/11/97	45	umhos/cm
SW-2	Fluoride		7/18/96	0.272	mg/l
SW-2	Fluoride		02/11/97	0.154	mg/l
SW-2	Hardness, Total		7/18/96	4.52	mg/l
SW-2	Hardness, Total as CaCO3	SM2340B	8/13/98	9	mg/l
SW-2	Hardness, Total as CaCO3	SM2340B	02/24/99	7.0	mg/l
SW-2	Hardness, Total as CaCO3	SM2340B	07/21/99	5.54	mg/L
SW-2	Hardness, Total as CaCO3	SM2340B	09/07/00	24	mg/L
SW-2	Hardness, Total as CaCO3	SM2340B	01/31/01	8.2	mg/L(ppm)
SW-2	Hardness, Total as CaCO3	SM2340B	07/19/01	11	mg/L(ppm)
SW-2	Hardness, Total as CaCO3	SM2340B	01/16/02	12	mg/L(ppm)
SW-2	Hardness, Total as CaCO3	SM 2340B	06/25/02	9	mg/L (ppm)
SW-2	Iron - Total		11/16/95	0.461	mg/l
SW-2	Iron - Total		2/2/96	0.342	mg/l
SW-2	Iron - Total		7/18/96	0.3	mg/l
SW-2	Iron - Total	236.1	02/11/97	0.333	mg/l
SW-2	Iron - Total	236.1	08/04/97	0.2	mg/l
SW-2	Iron - Total	236.1	03/03/98	0.23	mg/l
SW-2	Iron - Total	236.1	8/13/98	0.29	mg/l
SW-2	Iron - Total	236.1	02/24/99	0.3	mg/l
SW-2	Iron - Total	236.1	07/21/99	0.2	mg/l
SW-2	Iron - Total	200.7	09/07/00	1.6	mg/l
SW-2	Iron - Total	200.7	01/31/01	0.87	mg/L(ppm)
SW-2	Iron - Total	200.7	07/19/01	5.9	mg/L(ppm)
SW-2	Iron - Total	200.7	01/16/02	0.45	mg/L(ppm)
SW-2	Iron - Total	200.7	06/25/02	0.29	mg/L (ppm)
SW-2	Lead - Total		2/2/96	0.005	mg/l
SW-2	Lead - Total		7/18/96	0.006	mg/l
SW-2	Lead - Total	239.2	07/21/99	0.003	mg/l
SW-2	Lead - Total	200.8	07/19/01	0.0033	mg/L(ppm)
SW-2	Magnesium - Total	242.1	8/13/98	1.2	mg/l
SW-2	Nitrate		7/18/96	0.064	mg/l
SW-2	Nitrate & Nitrite		7/18/96	0.114	mg/l
SW-2	Nitrogen, Nitrate	300.0	09/07/00	0.65	mg/l
SW-2	Nitrogen, Total		11/16/95	0.929	mg/l
SW-2	Nitrogen, Total	300,351	02/11/97	0.185	mg/l
SW-2	Nitrogen, Total	300,351	03/03/98	0.5	mg/l
SW-2	Nitrogen, Total	300.0 + 351	02/24/99	0.62	mg/l
SW-2	Nitrogen, Total		7/18/96	0.783	mg/l
SW-2	Nitrogen, Total as N	300.0+351.4	09/07/00	1.86	mg/l
SW-2	Nitrogen, Total as N	300.0+351.4	01/31/01	1.37	mg/L (ppm)
SW-2	Nitrogen, Total as N	300.0+351.4	07/19/01	4.2	mg/L (ppm)
SW-2	Nitrogen, Total as N	300.0+351.4	01/16/02	1.2	mg/L (ppm)
SW-2	Oxygen, Dissolved (Field)		11/16/95	5	mg/l
SW-2	Oxygen, Dissolved (Field)		2/2/96	5.2	mg/l
SW-2	Oxygen, Dissolved (Field)		7/18/96	5.6	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	02/11/97	5.4	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	08/04/97	5.3	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	03/03/98	5.3	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	8/13/98	4.2	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	02/24/99	5.7	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	07/21/99	5.3	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	09/07/00	5.8	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	01/31/01	6.7	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	07/19/01	5.7	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	01/16/02	4.0	mg/l
SW-2	Oxygen, Dissolved (Field)	Field	06/25/02	4.3	mg/l
SW-2	Ph		7/18/96	5.65	S.U.
SW-2	Ph (Field)		11/16/95	4.5	S.U.
SW-2	Ph (Field)		2/2/96	5.61	S.U.
SW-2	Ph (Field)		7/18/96	4.93	S.U.
SW-2	Ph (Field)	Field	02/11/97	5.07	n/a
SW-2	Ph (Field)	Field	08/04/97	5.76	n/a

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-2	Ph (Field)	Field	03/03/98	6.90	n/a
SW-2	Ph (Field)	Field	8/13/98	4.59	n/a
SW-2	Ph (Field)	Field	02/24/99	5.57	n/a
SW-2	Ph (Field)	Field	07/21/99	5.41	n/a
SW-2	Ph (Field)	Field	09/07/00	4.19	n/a
SW-2	Ph (Field)	Field	01/31/01	5.76	n/a
SW-2	Ph (Field)	Field	07/19/01	7.56	n/a
SW-2	Ph (Field)	Field	01/16/02	3.86	n/a
SW-2	Ph (Field)	Field	06/25/02	5.89	n/a
SW-2	Phosphorus, Total		11/16/95	0.331	mg/l
SW-2	Phosphorus, Total		7/18/96	0.057	mg/l
SW-2	Phosphorus, Total	365.3	03/03/98	0.02	mg/l
SW-2	Phosphorus, Total	365.3	09/07/00	0.081	mg/l
SW-2	Phosphorus, Total	365.3	01/31/01	0.14	mg/L (ppm)
SW-2	Phosphorus, Total	365.3	07/19/01	0.61	mg/L (ppm)
SW-2	Phosphorus, Total	365.1	06/25/02	0.01	mg/L (ppm)
SW-2	Sodium - Total		7/18/96	5.17	mg/l
SW-2	Sodium - Total		02/11/97	4.2	mg/l
SW-2	Sodium - Total	273.1	8/13/98	4.8	mg/l
SW-2	Solids, Total Dissolved		11/16/95	67	mg/l
SW-2	Solids, Total Dissolved		2/2/96	57	mg/l
SW-2	Solids, Total Dissolved		7/18/96	52	mg/l
SW-2	Solids, Total Dissolved	160.1	08/04/97	47	mg/l
SW-2	Solids, Total Dissolved	160.1	03/03/98	49	mg/l
SW-2	Solids, Total Dissolved	160.1	8/13/98	61	mg/l
SW-2	Solids, Total Dissolved	160.1	02/24/99	44	mg/l
SW-2	Solids, Total Dissolved	160.1	07/21/99	11.0	mg/l
SW-2	Solids, Total Dissolved	160.1	09/07/00	153	mg/l
SW-2	Solids, Total Dissolved	160.1	01/31/01	41	mg/L (ppm)
SW-2	Solids, Total Dissolved	160.1	07/19/01	40	mg/L (ppm)
SW-2	Solids, Total Dissolved	160.1	01/16/02	88	mg/L (ppm)
SW-2	Solids, Total Dissolved	160.1	06/25/02	53	mg/L (ppm)
SW-2	Solids, Total Suspended	160.2	08/04/97	2.5	mg/l
SW-2	Solids, Total Suspended	160.2	03/03/98	6	mg/l
SW-2	Solids, Total Suspended	160.2	09/07/00	19	mg/l
SW-2	Solids, Total Suspended	160.2	01/31/01	8	mg/L (ppm)
SW-2	Solids, Total Suspended	160.2	07/19/01	22	mg/L (ppm)
SW-2	Solids, Total Suspended		11/16/95	10	mg/l
SW-2	Specific Conductance(Field)	Field	08/04/97	41	umhos/cm
SW-2	Specific Conductance(Field)	Field	03/03/98	50	umhos/cm
SW-2	Specific Conductance(Field)	Field	8/13/98	63	umhos/cm
SW-2	Specific Conductance(Field)	Field	02/24/99	73	um/cm
SW-2	Specific Conductance(Field)	Field	07/21/99	45	umhos/cm
SW-2	Specific Conductance(Field)	Field	09/07/00	127	umhos/cm
SW-2	Specific Conductance(Field)	Field	01/31/01	50	umhos/cm
SW-2	Specific Conductance(Field)	Field	07/19/01	41	umhos/cm
SW-2	Specific Conductance(Field)	Field	01/16/02	123	umhos/cm
SW-2	Specific Conductance(Field)	Field	06/25/02	44	umhos/cm
SW-2	Sulfate		02/11/97	2.33	mg/l
SW-2	Total Dissolved Volatile Solids		7/18/96	51.9	%
SW-2	Total Kjeldahl Nitrogen		7/18/96	0.669	mg/l
SW-2	Total Kjeldahl Nitrogen		02/11/97	0.085	mg/l
SW-2	Total Organic Carbon		11/16/95	12	mg/l
SW-2	Total Organic Carbon		2/2/96	10	mg/l
SW-2	Total Organic Carbon		7/18/96	6	mg/l
SW-2	Total Volatile Solids		7/18/96	100	%
SW-2	Total Volatile Solids		02/11/97	100	%
SW-2	Turbidity (Field)		11/16/95	6.2	NTU
SW-2	Turbidity (Field)		2/2/96	2.8	NTU
SW-2	Turbidity (Field)		7/18/96	3	NTU
SW-2	Turbidity (Field)	Field	02/11/97	3.4	NTU
SW-2	Turbidity (Field)	Field	08/04/97	4.1	NTU
SW-2	Turbidity (Field)	Field	03/03/98	4.79	NTU
SW-2	Turbidity (Field)	Field	8/13/98	0.38	NTU
SW-2	Turbidity (Field)	Field	02/24/99	5.64	NTU

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
SW-2	Turbidity (Field)	Field	07/21/99	2.52	NTU
SW-2	Turbidity (Field)	Field	09/07/00	6.86	NTU
SW-2	Turbidity (Field)	Field	01/31/01	11.30	NTU
SW-2	Turbidity (Field)	Field	07/19/01	2.63	NTU
SW-2	Turbidity (Field)	Field	01/16/02	2.88	NTU
SW-2	Turbidity (Field)	Field	06/25/02	1.09	NTU
SW-2	Vanadium - Total	200.8	07/19/01	0.017	mg/L(ppm)
SW-2	Water Temperature in deg Celsius		11/16/95	21.4	C
SW-2	Water Temperature in deg Celsius		2/2/96	11.9	C
SW-2	Water Temperature in deg Celsius		7/18/96	24.2	C
SW-2	Water Temperature in deg Celsius	Field	02/11/97	17.3	Deg C
SW-2	Water Temperature in deg Celsius	Field	08/04/97	20.9	Deg C
SW-2	Water Temperature in deg Celsius	Field	03/03/98	16.9	Deg C
SW-2	Water Temperature in deg Celsius	Field	8/13/98	25.3	Deg C
SW-2	Water Temperature in deg Celsius	Field	02/24/99	18.2	Deg C
SW-2	Water Temperature in deg Celsius	Field	07/21/99	25.1	Deg C
SW-2	Water Temperature in deg Celsius	Field	09/07/00	24.9	Deg C
SW-2	Water Temperature in deg Celsius	Field	01/31/01	18.1	Deg C
SW-2	Water Temperature in deg Celsius	Field	07/19/01	21.1	Deg C
SW-2	Water Temperature in deg Celsius	Field	01/16/02	11.0	Deg C
SW-2	Water Temperature in deg Celsius	Field	06/25/02	20.6	Deg C

Attachment D

Leachate Analytical Data
(Detections)

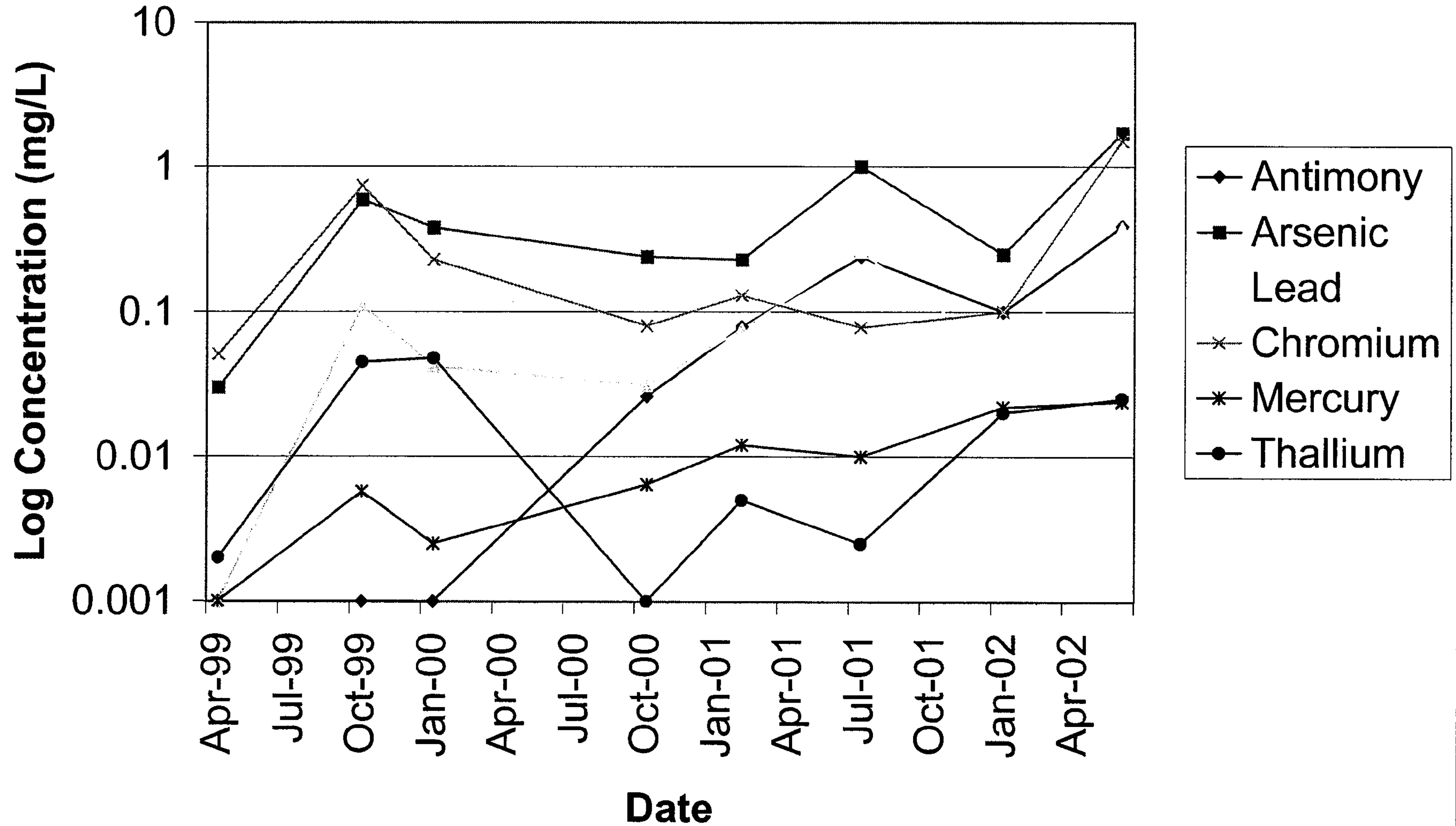
Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LCS	*Barium	6010B	2/2/01	0.12	ug/l
LCS	1,2,4-Trichlorobenzene	8260B	06/26/02	100	ug/L
LCS	1,2-Dibromo-3-Choloropropane	8260B	06/26/02	100	ug/L
LCS	1,4-Dichlorobenzene	8260	01/26/00	12	µg/L
LCS	1,4-Dichlorobenzene	8260	09/08/00	11	ug/l
LCS	1,4-Dichlorobenzene	8260	2/2/01	16	ug/l
LCS	1,4-Dichlorobenzene	8260B	7/18/01	10	µg/L
LCS	2-Butanone	8260	02/24/99	5800	ug/l
LCS	2-Butanone	8260	07/21/99	190000	ug/l
LCS	2-Butanone	8260	01/26/00	12000(b)	µg/L
LCS	2-Butanone	8260	09/08/00	1400	ug/l
LCS	2-Butanone	8260B	7/18/01	3000	µg/L
LCS	2-Butanone (MEK)	8200B	2/2/01	7.9	ug/l
LCS	4-Methyl-2-Pentanone	8260	02/24/99	180	ug/l
LCS	4-Methyl-2-Pentanone (MIBK)	8260	8/18/98	320	ug/l
LCS	Acetone	8260	8/18/98	1500	ug/l
LCS	Acetone	8260	02/24/99	5400	ug/l
LCS	Acetone	8260	01/26/00	9200(b)	µg/L
LCS	Acetone	8260	09/08/00	1300	ug/l
LCS	Acetone	8260	2/2/01	6500	ug/l
LCS	Acetone	8260B	7/18/01	1900	µg/L
LCS	Alkalinity, Total	310.1	06/26/02	32	mg/L
LCS	Ammonia as Nitrogen	350.3	01/17/02	530	mg/L (ppm)
LCS	Ammonia as Nitrogen	350.1	06/26/02	610	mg/L
LCS	Antimony - Total	200.8	09/08/00	[redacted]	mg/l
LCS	Antimony - Total	204.2	2/2/01	[redacted]	mg/l
LCS	Antimony - Total	6020	7/18/01	[redacted]	mg/L(ppm)
LCS	Antimony - Total	200.8	06/26/02	[redacted]	mg/L
LCS	Arsenic - Total	206.2	8/18/98	0.017	mg/l
LCS	Arsenic - Total	206.2	02/24/99	0.03	mg/l
LCS	Arsenic - Total	206.2	07/21/99	[redacted]	mg/l
LCS	Arsenic - Total	206.2	01/26/00	[redacted]	mg/L(ppm)
LCS	Arsenic - Total	200.8	09/08/00	[redacted]	mg/l
LCS	Arsenic - Total	206.2	2/2/01	[redacted]	mg/l
LCS	Arsenic - Total	6020	7/18/01	[redacted]	mg/L(ppm)
LCS	Arsenic - Total	200.8	06/26/02	[redacted]	mg/L
LCS	Barium	1311/6010B	01/17/02	0.15	mg/L (ppm)
LCS	Barium - Total	208.1	07/21/99	[redacted]	mg/l
LCS	Barium - Total	200.7	01/26/00	1.32	mg/L(ppm)
LCS	Barium - Total	200.8	09/08/00	0.47	mg/l
LCS	Barium - Total	208.1	2/2/01	0.48	mg/l
LCS	Barium - Total	6020	7/18/01	[redacted]	mg/L(ppm)
LCS	Barium - Total	200.7	06/26/02	[redacted]	mg/L
LCS	Barium, Total	200.7	01/17/02	0.62	mg/L (ppm)
LCS	Bicarbonate	310.1	02/24/99	1800	mg/L
LCS	Bicarbonate	310.1	07/21/99	4500	mg/L
LCS	Bicarbonate	310.1	01/26/00	4580	mg/L (ppm)
LCS	Bicarbonate	310.1	7/18/01	4600	mg/L (ppm)
LCS	Bicarbonate	310.1	01/17/02	4500	mg/L (ppm)
LCS	Bicarbonate as CaCO3	310.1	8/18/98	1230	mg/l
LCS	Bicarbonate as CaCO3	310.1	09/08/00	6550	mg/l
LCS	Bicarbonate as CaCO3	310.1	2/2/01	4500	mg/l
LCS	Cadmium - Total	200.8	06/26/02	0.042	mg/L
LCS	Chloride	300.0	8/18/98	5.4	mg/l
LCS	Chloride	300.0	02/24/99	570	mg/l
LCS	Chloride	300.0	07/21/99	1250	mg/l
LCS	Chloride	300.0	01/26/00	815	mg/L (ppm)
LCS	Chloride	300.0	09/08/00	1368	mg/l
LCS	Chloride	300.0	2/2/01	1600	mg/l
LCS	Chloride	300.0	7/18/01	500	mg/L (ppm)
LCS	Chloride	300.0	01/17/02	1040	mg/L (ppm)
LCS	Chloride	300.0	06/26/02	880	mg/L
LCS	Chromium - Total	218.2	8/18/98	0.034	mg/l
LCS	Chromium - Total	218.2	02/24/99	0.051	mg/l
LCS	Chromium - Total	218.2	07/21/99	[redacted]	mg/l

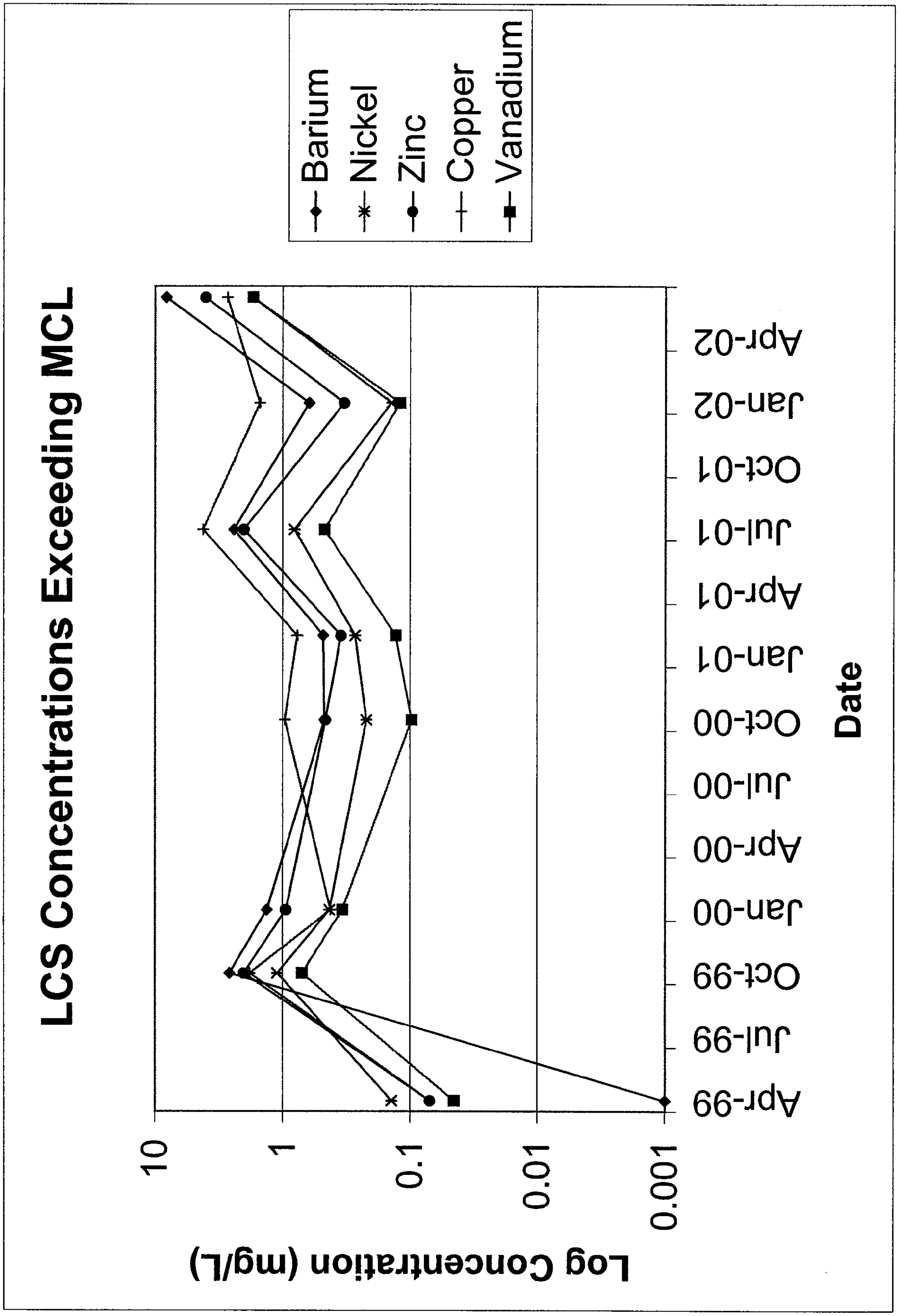
Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LCS	Chromium - Total	200.7	01/26/00	0.23	mg/L(ppm)
LCS	Chromium - Total	200.8	09/08/00	0.08	mg/l
LCS	Chromium - Total	218.2	2/2/01	[redacted]	mg/l
LCS	Chromium - Total	6010B	7/18/01	0.078	mg/L(ppm)
LCS	Chromium - Total	200.7	06/26/02	[redacted]	mg/L
LCS	Cobalt - Total	219.1	8/18/98	0.05	mg/l
LCS	Cobalt - Total	219.1	02/24/99	0.07	mg/l
LCS	Cobalt - Total	219.1	07/21/99	0.76	mg/l
LCS	Cobalt - Total	200.8	09/08/00	0.055	mg/l
LCS	Cobalt - Total	219.1	2/2/01	0.063	mg/l
LCS	Cobalt - Total	6020	7/18/01	0.43	mg/L(ppm)
LCS	Cobalt - Total	200.7	06/26/02	0.98	mg/L
LCS	Cobalt, Total	200.7	01/17/02	0.11	mg/L (ppm)
LCS	Color	110.2	8/18/98	**250**	Units
LCS	Copper - Total	220.1	02/24/99	0.07	mg/l
LCS	Copper - Total	220.1	07/21/99	**1.8**	mg/l
LCS	Copper - Total	200.7	01/26/00	0.49	mg/L(ppm)
LCS	Copper - Total	200.8	09/08/00	0.96	mg/l
LCS	Copper - Total	220.1	2/2/01	0.77	mg/l
LCS	Copper - Total	6020	7/18/01	**4.2**	mg/L(ppm)
LCS	Copper - Total	200.7	06/26/02	**2.7**	mg/L
LCS	Copper, Total	200.7	01/17/02	**1.5**	mg/L (ppm)
LCS	Ethylbenzene	8260	8/18/98	34	ug/l
LCS	Ethylbenzene	8260	02/24/99	27	ug/l
LCS	Ethylbenzene	8260	01/26/00	50	µg/L
LCS	Ethylbenzene	8260	09/08/00	34	ug/l
LCS	Ethylbenzene	8260	2/2/01	38	ug/l
LCS	Ethylbenzene	8260B	7/18/01	39	µg/L
LCS	Ethylbenzene	8260B	01/17/02	21	ug/L (ppb)
LCS	Iron - Total	236.1	8/18/98	**59**	mg/l
LCS	Iron - Total	236.1	02/24/99	**140**	mg/l
LCS	Iron - Total	236.1	07/21/99	**2900**	mg/l
LCS	Iron - Total	200.7	01/26/00	**1660**	mg/L(ppm)
LCS	Iron - Total	200.7	09/08/00	**2300**	mg/l
LCS	Iron - Total	236.1	2/2/01	**300**	mg/l
LCS	Iron - Total	6010B	7/18/01	**3800**	mg/L(ppm)
LCS	Iron - Total	200.7	06/26/02	**5900**	mg/L
LCS	Iron, Total	200.7	01/17/02	**500**	mg/L (ppm)
LCS	Lead - Total	239.2	07/21/99	[redacted]	mg/l
LCS	Lead - Total	239.2	01/26/00	[redacted]	mg/L(ppm)
LCS	Lead - Total	200.8	09/08/00	[redacted]	mg/l
LCS	Lead - Total	239.2	2/2/01	[redacted]	mg/l
LCS	Lead - Total	6020	7/18/01	[redacted]	mg/L(ppm)
LCS	Lead - Total	200.8	06/26/02	[redacted]	mg/L
LCS	m,p-Xylenes	8260B	01/17/02	24	ug/L (ppb)
LCS	Mercury - Total	245.1	07/21/99	[redacted]	mg/l
LCS	Mercury - Total	245.1	09/08/00	[redacted]	mg/l
LCS	Mercury - Total	245.1	2/2/01	[redacted]	mg/l
LCS	Mercury - Total	7470A	7/18/01	[redacted]	mg/L(ppm)
LCS	Mercury - Total	245.1	06/26/02	[redacted]	mg/L
LCS	Mercury, Total	245.1	01/17/02	[redacted]	mg/L (ppm)
LCS	Methyl Ethyl Ketone (MEK)	8260	8/18/98	2600	ug/l
LCS	Methyl Ethyl Ketone (MEK)	8260	2/2/01	7900	ug/l
LCS	Naphthalene	8270	8/18/98	42	ug/l
LCS	Nickel - Total	249.1	8/18/98	0.09	mg/l
LCS	Nickel - Total	249.1	02/24/99	[redacted]	mg/l
LCS	Nickel - Total	249.1	07/21/99	[redacted]	mg/l
LCS	Nickel - Total	200.7	01/26/00	[redacted]	mg/L(ppm)
LCS	Nickel - Total	200.8	09/08/00	[redacted]	mg/l
LCS	Nickel - Total	249.1	2/2/01	[redacted]	mg/l
LCS	Nickel - Total	6020	7/18/01	[redacted]	mg/L(ppm)
LCS	Nickel - Total	200.8	06/26/02	[redacted]	mg/L
LCS	Nickel, Total	200.7	01/17/02	[redacted]	mg/L (ppm)
LCS	Nitrogen, Ammonia	350.3	8/18/98	92	mg/l
LCS	Nitrogen, Ammonia	350.3	02/24/99	300	mg/l

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LCS	Nitrogen, Ammonia	350.3	07/21/99	702	mg/l
LCS	Nitrogen, Ammonia	350.3	01/26/00	471	mg/L (ppm)
LCS	Nitrogen, Ammonia	350.3	09/08/00	542	mg/l
LCS	Nitrogen, Ammonia	350.3	2/2/01	960	mg/l
LCS	Nitrogen, Ammonia	350.3	7/18/01	670	mg/L (ppm)
LCS	Oxygen, Dissolved (Field)	Field	8/18/98	0.8	mg/l
LCS	Oxygen, Dissolved (Field)	Field	02/24/99	0.3	mg/l
LCS	Oxygen, Dissolved (Field)	Field	07/21/99	0.2	mg/l
LCS	Oxygen, Dissolved (Field)	Field	09/08/00	0.2	mg/l
LCS	Oxygen, Dissolved (Field)	Field	2/2/01	0.4	mg/l
LCS	Oxygen, Dissolved (Field)	Field	7/18/01	0.5	mg/l
LCS	o-Xylene	8260B	01/17/02	8	ug/L (ppb)
LCS	Ph (Field)	Field	8/18/98	7.01	n/a
LCS	Ph (Field)	Field	2/2/01	7.73	n/a
LCS	Phenol	8270	8/18/98	28	ug/l
LCS	Phenol	8270	2/2/01	16	ug/l
LCS	Selenium - Total	200.8	09/08/00	0.01	mg/l
LCS	Silver - Total	272.1	07/21/99	0.074	mg/l
LCS	Sodium - Total	273.1	8/18/98	[redacted]	mg/l
LCS	Sodium - Total	273.1	02/24/99	[redacted]	mg/l
LCS	Sodium - Total	273.1	07/21/99	[redacted]	mg/l
LCS	Sodium - Total	200.7	01/26/00	[redacted]	mg/L(ppm)
LCS	Sodium - Total	200.7	09/08/00	[redacted]	mg/l
LCS	Sodium - Total	273.1	2/2/01	[redacted]	mg/l
LCS	Sodium - Total	6010B	7/18/01	[redacted]	mg/L(ppm)
LCS	Sodium - Total	200.7	06/26/02	[redacted]	mg/L
LCS	Solids, Total Dissolved	160.1	8/18/98	2000	mg/l
LCS	Solids, Total Dissolved	160.1	02/24/99	2200	mg/l
LCS	Solids, Total Dissolved	160.1	07/21/99	6200	mg/l
LCS	Solids, Total Dissolved	160.1	01/26/00	3450	mg/L (ppm)
LCS	Solids, Total Dissolved	160.1	09/08/00	11000	mg/l
LCS	Solids, Total Dissolved	160.1	2/2/01	4400	mg/l
LCS	Solids, Total Dissolved	160.1	7/18/01	3700	mg/L (ppm)
LCS	Solids, Total Dissolved	160.1	06/26/02	8700	mg/L
LCS	Solids, Total Dissolved (TDS)	160.1	01/17/02	2500	mg/L (ppm)
LCS	Specific Conductance(Field)	Field	8/18/98	3540	umhos/cm
LCS	Specific Conductance(Field)	Field	02/24/99	5740	um/cm
LCS	Specific Conductance(Field)	Field	07/21/99	10350	umhos/cm
LCS	Specific Conductance(Field)	Field	09/08/00	9680	umhos/cm
LCS	Specific Conductance(Field)	Field	2/2/01	9300	umhos/cm
LCS	Specific Conductance(Field)	Field	7/18/01	7850	umhos/cm
LCS	Sulfide	376.1	8/18/98	7.5	mg/l
LCS	Sulfide	376.1	2/2/01	160	mg/l
LCS	Sulfide	9030/9034	01/17/02	370	mg/Kg (ppm)
LCS	Sulfide	9030B	07/17/02	650	mg/L
LCS	Thallium - Total	279.2	02/24/99	0.002	mg/l
LCS	Thallium - Total	279.2	07/21/99	[redacted]	mg/l
LCS	Thallium - Total	279.2	01/26/00	[redacted]	mg/L(ppm)
LCS	Tin	282.2	2/2/01	0.027	mg/l
LCS	Toluene	8260	8/18/98	30	ug/l
LCS	Toluene	8260	02/24/99	43	ug/l
LCS	Toluene	8260	01/26/00	38	µg/L
LCS	Toluene	8260	2/2/01	24	ug/l
LCS	Toluene	8260B	7/18/01	35	µg/L
LCS	Turbidity (Field)	Field	2/2/01	1000	NTU
LCS	Turbidity (Field)	Field	7/18/01	1000	NTU
LCS	Vanadium - Total	286.2	8/18/98	0.019	mg/l
LCS	Vanadium - Total	286.2	02/24/99	0.045	mg/l
LCS	Vanadium - Total	286.2	07/21/99	0.706	mg/l
LCS	Vanadium - Total	200.7	01/26/00	0.34	mg/L(ppm)
LCS	Vanadium - Total	200.8	09/08/00	0.097	mg/l
LCS	Vanadium - Total	286.2	2/2/01	0.13	mg/l
LCS	Vanadium - Total	6020	7/18/01	0.47	mg/L(ppm)
LCS	Vanadium - Total	200.7	06/26/02	1.7	mg/L
LCS	Vanadium, Total	200.7	01/17/02	0.12	mg/L (ppm)

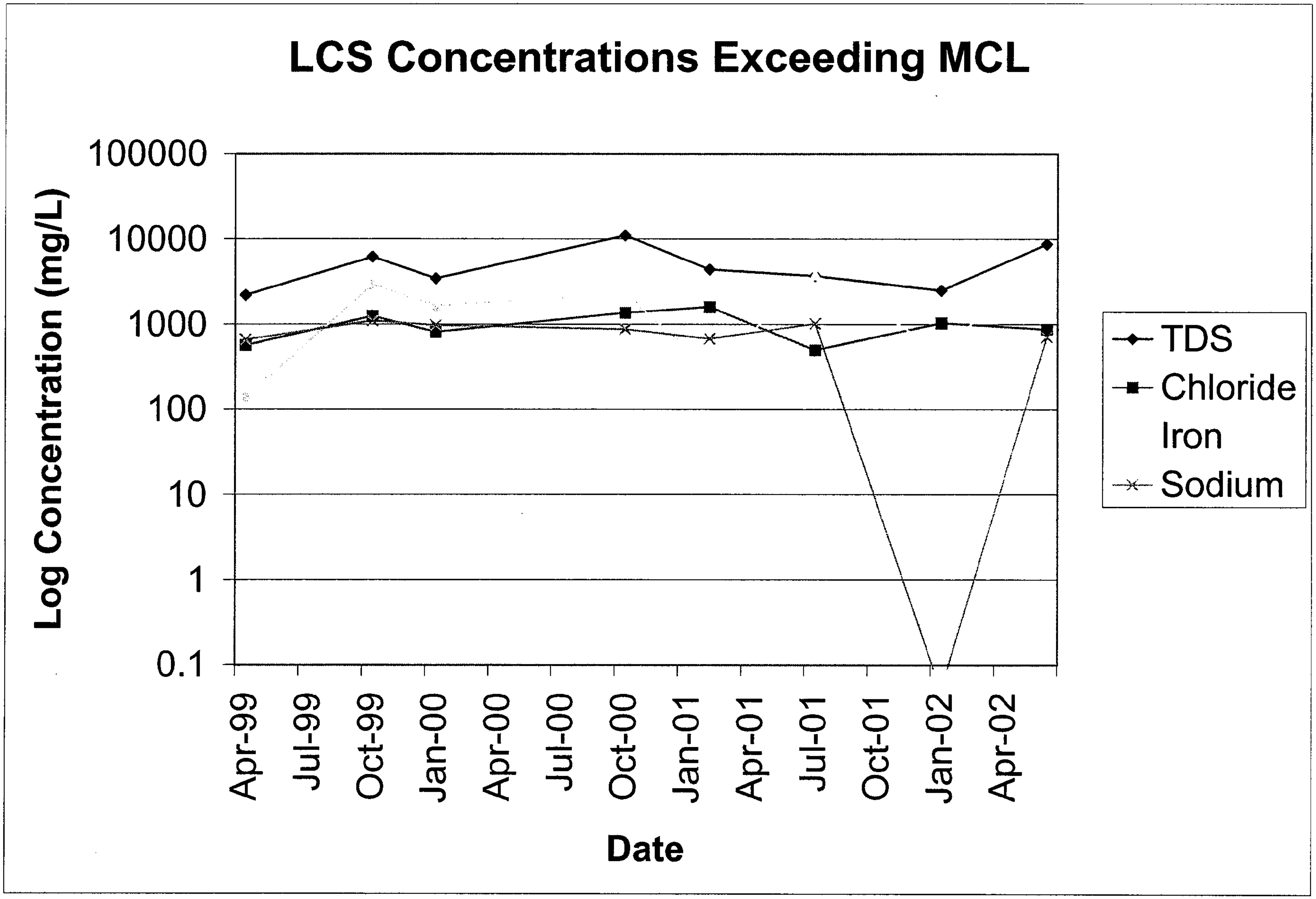
Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LCS	Water Temperature in deg Celsius	Field	8/18/98	27.3	Deg C
LCS	Water Temperature in deg Celsius	Field	02/24/99	17.2	Deg C
LCS	Water Temperature in deg Celsius	Field	07/21/99	32.1	Deg C
LCS	Water Temperature in deg Celsius	Field	09/08/00	25.2	Deg C
LCS	Water Temperature in deg Celsius	Field	2/2/01	18.1	Deg C
LCS	Water Temperature in deg Celsius	Field	7/18/01	33.3	Deg C
LCS	Xylene (Total)	8260	8/18/98	75	ug/l
LCS	Xylene (Total)	8260	02/24/99	68	ug/l
LCS	Xylene (Total)	8260	01/26/00	120	µg/L
LCS	Xylene (Total)	8260	09/08/00	56	ug/l
LCS	Xylene (Total)	8260	2/2/01	110	ug/l
LCS	Xylene (Total)	8260B	7/18/01	64	µg/L
LCS	Zinc - Total	289.1	02/24/99	0.07	mg/l
LCS	Zinc - Total	289.1	07/21/99	2.0	mg/l
LCS	Zinc - Total	200.7	01/26/00	0.94	mg/L(ppm)
LCS	Zinc - Total	200.8	09/08/00	0.46	mg/l
LCS	Zinc - Total	289.1	2/2/01	0.35	mg/l
LCS	Zinc - Total	6010B	7/18/01	2	mg/L(ppm)
LCS	Zinc - Total	200.7	06/26/02	4	mg/L
LCS	Zinc, Total	200.7	01/17/02	0.33	mg/L (ppm)

LCS Concentrations Exceeding MCL





LCS Concentrations Exceeding MCL
Barium
Nickel
Zinc
Copper
Vanadium
Log Concentration (mg/L)
10
1
0.1
0.01
0.001
Apr-99
Jul-99
Oct-99
Jan-00
Apr-00
Jul-00
Oct-00
Jan-01
Apr-01
Jul-01
Oct-01
Jan-02
Apr-02
Date



LCS Concentrations Exceeding MCL
Log Concentration (mg/L)
100000
10000
1000
100
10
1
0.1
Apr-99
Jul-99
Oct-99
Jan-00
Apr-00
Jul-00
Oct-00
Jan-01
Apr-01
Jul-01
Oct-01
Jan-02
Apr-02
Date
TDS
Chloride
Iron
Sodium

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LDSS	*Barium	6010B	2/2/01	0.12	ug/l
LDSS	1,2,4-Trichlorobenzene	8260B	06/26/02	[illegible]	ug/L
LDSS	1,2-Dibromo-3-Choloropropane	8260B	06/26/02	100	ug/L
LDSS	1,4-Dichlorobenzene	8260	2/2/01	12	ug/l
LDSS	2-Butanone	8260	07/21/99	4600	ug/l
LDSS	2-Butanone	8260	01/26/00	740	µg/L
LDSS	2-Butanone	8260B	07/18/01	5400	µg/L
LDSS	2-Butanone	8260B	06/26/02	4600	ug/L
LDSS	2-Butanone (MEK)	8200B	2/2/01	14	ug/l
LDSS	3- and 4-Methylphenol	8270	2/2/01	22	ug/l
LDSS	4-Methyl-2-Pentanone (MIBK)	8260	8/18/98	220	ug/l
LDSS	4-Methylphenol	8270C	06/26/02	110	ug/L
LDSS	Acetone	8260	8/18/98	1700	ug/l
LDSS	Acetone	8260	07/21/99	1200	ug/l
LDSS	Acetone	8260	2/2/01	15000	ug/l
LDSS	Acetone	8260B	07/18/01	3400	µg/L
LDSS	Acetone	8260B	06/26/02	2600	ug/L
LDSS	Acetophenone	8270	2/2/01	37	ug/l
LDSS	Alkalinity, Total	310.1	06/26/02	1100	mg/L
LDSS	Ammonia as Nitrogen	350.3	01/17/02	370	mg/L (ppm)
LDSS	Ammonia as Nitrogen	350.1	06/26/02	150	mg/L
LDSS	Antimony - Total	200.7	01/26/00	[illegible]	mg/L(ppm)
LDSS	Antimony - Total	200.8	09/08/00	0.0058	mg/l
LDSS	Antimony - Total	200.8	06/26/02	[illegible]	mg/L
LDSS	Arsenic - Total	206.2	8/18/98	0.013	mg/l
LDSS	Arsenic - Total	206.2	02/24/99	0.037	mg/l
LDSS	Arsenic - Total	206.2	07/21/99	0.033	mg/l
LDSS	Arsenic - Total	200.8	09/08/00	0.047	mg/l
LDSS	Arsenic - Total	206.2	2/2/01	0.049	mg/l
LDSS	Arsenic - Total	6020	07/18/01	0.035	mg/L(ppm)
LDSS	Arsenic - Total	200.8	06/26/02	0.041	mg/L
LDSS	Arsenic, Total	200.8	01/17/02	0.035	mg/L (ppm)
LDSS	Barium - Total	310.1	01/26/00	4640	mg/L (ppm)
LDSS	Barium - Total	200.8	09/08/00	0.28	mg/l
LDSS	Barium - Total	208.1	2/2/01	0.12	mg/l
LDSS	Barium - Total	6020	07/18/01	0.4	mg/L (ppm)
LDSS	Barium - Total	200.7	06/26/02	0.48	mg/L
LDSS	Barium, Total	200.7	01/17/02	0.15	mg/L (ppm)
LDSS	Bicarbonate	310.1	02/24/99	3400	mg/L
LDSS	Bicarbonate	310.1	07/21/99	2920	mg/L
LDSS	Bicarbonate	300.0	01/26/00	1515	mg/L (ppm)
LDSS	Bicarbonate	310.1	07/18/01	1700	mg/L (ppm)
LDSS	Bicarbonate	310.1	01/17/02	2800	mg/L (ppm)
LDSS	Bicarbonate as CaCO3	310.1	8/18/98	840	mg/l
LDSS	Bicarbonate as CaCO3	310.1	09/08/00	2390	mg/l
LDSS	Bicarbonate as CaCO3	310.1	2/2/01	3300	mg/l
LDSS	Cadmium - Total	200.7	01/26/00	[illegible]	mg/L(ppm)
LDSS	Chloride	300.0	8/18/98	5.4	mg/l
LDSS	Chloride	300.0	02/24/99	1200	mg/l
LDSS	Chloride		07/21/99	1000	mg/l
LDSS	Chloride	300.0	09/08/00	927	mg/l
LDSS	Chloride	300.0	2/2/01	1300	mg/l
LDSS	Chloride	300	07/18/01	500	mg/L(ppm)
LDSS	Chloride	300.0	01/17/02	1000	mg/L (ppm)
LDSS	Chloride	300.0	06/26/02	380	mg/L
LDSS	Chromium - Total	218.2	8/18/98	0.006	mg/l
LDSS	Chromium - Total	218.2	02/24/99	0.052	mg/l
LDSS	Chromium - Total	218.2	07/21/99	0.069	mg/l
LDSS	Chromium - Total	200.8	09/08/00	0.027	mg/l
LDSS	Chromium - Total	218.2	2/2/01	0.049	mg/l
LDSS	Chromium - Total	200.7	06/26/02	0.052	mg/L
LDSS	Chromium, Total	200.8	01/17/02	0.037	mg/L (ppm)
LDSS	Cobalt - Total	219.1	02/24/99	0.08	mg/l
LDSS	Cobalt - Total	219.1	07/21/99	0.09	mg/l
LDSS	Cobalt - Total	200.7	01/26/00	11.95	mg/L(ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LDSS	Cobalt - Total	200.8	09/08/00	0.022	mg/l
LDSS	Cobalt - Total	219.1	2/2/01	0.019	mg/l
LDSS	Color	110.2	8/18/98	175	Units
LDSS	Copper - Total	220.1	02/24/99	0.06	mg/l
LDSS	Copper - Total	200.8	09/08/00	0.01	mg/l
LDSS	Copper - Total	200.7	06/26/02	0.031	mg/L
LDSS	Dimethyl Phthalate	8270	2/2/01	26	ug/l
LDSS	Ethylbenzene	8260	8/18/98	43	ug/l
LDSS	Ethylbenzene	8260	01/26/00	18	µg/L
LDSS	Ethylbenzene	8260	2/2/01	21	ug/l
LDSS	Ethylbenzene	8260B	07/18/01	31	µg/L
LDSS	Ethylbenzene	8260B	06/26/02	10	ug/L
LDSS	Iron - Total	236.1	8/18/98	**61**	mg/l
LDSS	Iron - Total	236.1	02/24/99	**12**	mg/l
LDSS	Iron - Total	236.1	07/21/99	**24**	mg/l
LDSS	Iron - Total	200.7	09/08/00	**40.8**	mg/l
LDSS	Iron - Total	236.1	2/2/01	**19**	mg/l
LDSS	Iron - Total	6010B	07/18/01	**120**	mg/L(ppm)
LDSS	Iron - Total	200.7	06/26/02	**150**	mg/L
LDSS	Iron, Total	200.7	01/17/02	**31**	mg/L (ppm)
LDSS	Lead - Total	200.7	01/26/00	[redacted]	mg/L(ppm)
LDSS	Lead - Total	200.8	09/08/00	0.003	mg/l
LDSS	Lead - Total	200.8	06/26/02	0.0074	mg/L
LDSS	Methyl Ethyl Ketone (MEK)	8260	8/18/98	3500	ug/l
LDSS	Methyl Ethyl Ketone (MEK)	8260	2/2/01	14000	ug/l
LDSS	Naphthalene	8270	8/18/98	65	ug/l
LDSS	Nickel - Total	249.1	8/18/98	0.06	mg/l
LDSS	Nickel - Total	249.1	02/24/99	[redacted]	mg/l
LDSS	Nickel - Total	249.1	07/21/99	[redacted]	mg/l
LDSS	Nickel - Total	200.8	09/08/00	0.088	mg/l
LDSS	Nickel - Total	249.1	2/2/01	0.091	mg/l
LDSS	Nickel - Total	200.8	06/26/02	0.067	mg/L
LDSS	Nickel, Total	200.7	01/17/02	0.091	mg/L (ppm)
LDSS	Nitrogen, Ammonia	350.3	8/18/98	100	mg/l
LDSS	Nitrogen, Ammonia	350.3	02/24/99	780	mg/l
LDSS	Nitrogen, Ammonia	350.3	07/21/99	455	mg/l
LDSS	Nitrogen, Ammonia	350.3	01/26/00	699	mg/L (ppm)
LDSS	Nitrogen, Ammonia	350.3	09/08/00	368	mg/l
LDSS	Nitrogen, Ammonia	350.3	2/2/01	600	mg/l
LDSS	Nitrogen, Ammonia	350.3	07/18/01	270	mg/L (ppm)
LDSS	Nitrogen, Nitrate	300.0	02/24/99	0.21	mg/l
LDSS	Oxygen, Dissolved (Field)	Field	8/18/98	0.3	mg/l
LDSS	Oxygen, Dissolved (Field)	Field	02/24/99	2.8	mg/l
LDSS	Oxygen, Dissolved (Field)	Field	07/21/99	0.1	mg/l
LDSS	Oxygen, Dissolved (Field)	Field	09/08/00	0.7	mg/l
LDSS	Oxygen, Dissolved (Field)	Field	2/2/01	0.2	mg/l
LDSS	Oxygen, Dissolved (Field)	Field	07/18/01	0.2	mg/l
LDSS	Ph (Field)	Field	8/18/98	6.53	n/a
LDSS	Ph (Field)	Field	02/24/99	8.76	n/a
LDSS	Ph (Field)	Field	07/21/99	7.63	n/a
LDSS	Ph (Field)	Field	09/08/00	7.55	n/a
LDSS	Ph (Field)	Field	2/2/01	7.77	n/a
LDSS	Ph (Field)	Field	07/18/01	7.07	n/a
LDSS	Phenol	8270	8/18/98	37	ug/l
LDSS	Phenol	8270	2/2/01	27	ug/l
LDSS	Phenol	8270C	06/26/02	100	ug/L
LDSS	Selenium - Total	200.8	09/08/00	0.023	mg/l
LDSS	Silver - Total	200.7	01/26/00	1430	mg/L(ppm)
LDSS	Sodium - Total	273.1	8/18/98	[redacted]	mg/l
LDSS	Sodium - Total	273.1	02/24/99	[redacted]	mg/l
LDSS	Sodium - Total	273.1	07/21/99	[redacted]	mg/l
LDSS	Sodium - Total	160.1	01/26/00	[redacted]	mg/L (ppm)
LDSS	Sodium - Total	200.7	09/08/00	[redacted]	mg/l
LDSS	Sodium - Total	273.1	2/2/01	[redacted]	mg/l
LDSS	Sodium - Total	6010B	07/18/01	[redacted]	mg/L (ppm)

Well ID	Parameter Monitoring	Analysis Method	Analysis Date/Time	Analysis Result	Unit
LDSS	Sodium - Total	200.7	06/26/02	[redacted]	mg/L
LDSS	Sodium, Total	200.7	01/17/02	[redacted]	mg/L (ppm)
LDSS	Solids, Total Dissolved	160.1	8/18/98	**1600**	mg/l
LDSS	Solids, Total Dissolved	160.1	02/24/99	**4100**	mg/l
LDSS	Solids, Total Dissolved	160.1	07/21/99	**5200**	mg/l
LDSS	Solids, Total Dissolved	206.2	01/26/00	0.029	mg/L(ppm)
LDSS	Solids, Total Dissolved	160.1	09/08/00	**5000**	mg/l
LDSS	Solids, Total Dissolved	160.1	2/2/01	**4800**	mg/l
LDSS	Solids, Total Dissolved	160.1	07/18/01	**2700**	mg/L(ppm)
LDSS	Solids, Total Dissolved	160.1	06/26/02	**2800**	mg/L
LDSS	Solids, Total Dissolved (TDS)	160.1	01/17/02	**3400**	mg/L (ppm)
LDSS	Specific Conductance(Field)	Field	8/18/98	2550	umhos/cm
LDSS	Specific Conductance(Field)	Field	02/24/99	9750	um/cm
LDSS	Specific Conductance(Field)	Field	07/21/99	8800	umhos/cm
LDSS	Specific Conductance(Field)	Field	09/08/00	7090	umhos/cm
LDSS	Specific Conductance(Field)	Field	2/2/01	7770	umhos/cm
LDSS	Specific Conductance(Field)	Field	07/18/01	5900	umhos/cm
LDSS	Sulfide	376.1	8/18/98	4.6	mg/l
LDSS	Sulfide	376.1	2/2/01	370	mg/l
LDSS	Sulfide	9030/9034	01/17/02	47	mg/Kg (ppm)
LDSS	Sulfide	9030B	07/17/02	5.1	mg/L
LDSS	Toluene	8260	8/18/98	27	ug/l
LDSS	Toluene	8260	2/2/01	27	ug/l
LDSS	Toluene	8260B	07/18/01	91	µg/L
LDSS	Toluene	8260B	06/26/02	61	ug/L
LDSS	Turbidity (Field)	Field	8/18/98	43.5	NTU
LDSS	Turbidity (Field)	Field	02/24/99	32.5	NTU
LDSS	Turbidity (Field)	Field	09/08/00	94.8	NTU
LDSS	Turbidity (Field)	Field	2/2/01	3.82	NTU
LDSS	Turbidity (Field)	Field	07/18/01	7.82	NTU
LDSS	Vanadium - Total	286.2	8/18/98	0.011	mg/l
LDSS	Vanadium - Total	286.2	02/24/99	0.036	mg/l
LDSS	Vanadium - Total	286.2	07/21/99	0.045	mg/l
LDSS	Vanadium - Total	200.7	01/26/00	0.063	mg/L(ppm)
LDSS	Vanadium - Total	200.8	09/08/00	0.033	mg/l
LDSS	Vanadium - Total	286.2	2/2/01	0.048	mg/l
LDSS	Vanadium - Total	200.7	06/26/02	0.042	mg/L
LDSS	Vanadium, Total	200.7	01/17/02	0.032	mg/L (ppm)
LDSS	Water Temperature in deg Celsius	Field	8/18/98	27.7	Deg C
LDSS	Water Temperature in deg Celsius	Field	02/24/99	15.8	Deg C
LDSS	Water Temperature in deg Celsius	Field	07/21/99	31.4	Deg C
LDSS	Water Temperature in deg Celsius	Field	09/08/00	25.6	Deg C
LDSS	Water Temperature in deg Celsius	Field	2/2/01	17.6	Deg C
LDSS	Water Temperature in deg Celsius	Field	07/18/01	29.7	Deg C
LDSS	Xylene (Total)	8260	8/18/98	94	ug/l
LDSS	Xylene (Total)	8260	01/26/00	110	µg/L
LDSS	Xylene (Total)	8260	09/08/00	20	ug/l
LDSS	Xylene (Total)	8260	2/2/01	68	ug/l
LDSS	Xylene (Total)	8260B	07/18/01	73	µg/L
LDSS	Zinc - Total	289.1	07/21/99	0.06	mg/l
LDSS	Zinc - Total	200.7	06/26/02	0.088	mg/L

J

APPENDIX J

QUALITY ASSURANCE/QUALITY CONTROL PLAN

FOR SIDE SLOPE CLOSURE

TRAIL RIDGE LANDFILL
INCREMENTAL SIDE SLOPE CLOSURE
QUALITY ASSURANCE/QUALITY CONTROL PLAN

This plan addresses the quality assurance and quality control (QA/QC) for the incremental closure (close-as-you-go) of Trail Ridge Landfill. This program delineates the quality procedures and standards for the construction. This plan includes the closure of the side slopes only (including the reconstruction of final cover on side slopes). The top area closure has a separate QA/QC Plan.

In the context of this plan, quality assurance and quality control are defined as follows:

Quality Assurance - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

Quality Control - Those actions which provide a means to measure and regulate the characteristics of an item or service to contract and regulatory requirements.

The City of Jacksonville, Florida is the owner of Trail Ridge Landfill. Trail Ridge Landfill, Inc. is the permittee and operates the landfill. England, Thims & Miller, Inc. is the design engineer. The name of the Contractor for each incremental closure shall be provided to the Department of Environmental Protection (DEP), prior to construction.

All QA/QC activities (including monitoring, sampling and testing) shall be directed and conducted by third parties, whom are independent of the Contractor.

The QA/QC Plan for this project includes General QA/QC and Soils QA/QC. The General QA/QC includes full-time services to periodically observe the contractor's work to verify substantial compliance with permits, plans, specifications and design concepts. These services will include the following:

General Quality Control Monitor - shall monitor the construction for compliance with the permits, plans, specifications and design including construction to proper lines and grades, maintain daily logs and weekly progress reports of the construction (including observation data sheets, problem identification and correction logs), make note of any construction deviations, coordinate qualifying and testing of materials, monitor any waste excavation, and monitor filling. This individual shall be experienced in civil site construction and solid waste regulations.

General Quality Assurance Engineer - shall supervise the construction monitoring and waste removal to verify compliance with permits, plans, specification and design concepts. This individual shall be experienced in civil site construction and solid waste regulations and shall be a registered Professional Engineer.

The General QA/QC Program includes monitoring the following activities:

1. General Earthwork
2. Storm Drainage Installation
3. General Construction Quality Control

The Soils QA/QC for this project includes soil material qualifying, sampling and testing to verify substantial compliance with the material standards. This work will include the following:

Soils Quality Control Monitor - shall pre-qualify soil materials, monitor the installation of soil materials, determine where in-place soil materials shall be tested, and test the in-place soil materials. This individual shall be responsible for assuring that all soil materials have been pre-qualified and have a chain-of-custody from the pre-qualified source to the project site, prior to installation. This individual shall be experienced in civil site construction and soil testing standards and procedures.

Soils Quality Assurance Engineer - shall supervise the soil material pre-qualifying and testing of in-place soil materials to assure compliance with the test standards and testing frequency requirements, and verify compliance with the plans, specification and design. This individual shall be experienced in civil site construction and soil testing procedures and shall be a registered Professional Engineer.

The QA/QC Plan including monitoring construction of the following:

A. Final Cover (Intermediate Cover, Compacted Clay Layer and Vegetative Cover (Top Soil))

   Incremental side slope closure of Trail Ridge Landfill includes a final cover consisting of 12" of intermediate cover, 12" of clay, and 24" of vegetative cover. The clay layer of the final cover must be placed in two 6" (minimum) lifts. The Soils Quality Control Monitor shall observe the clay layer construction on a full-time (on-site) basis. The QA/QC for the final cover is as follows:

   1. Intermediate Cover

      a. Location - The fill material shall come from an off-site source. The Soils Quality Control Monitor shall visually inspect the fill material.

      b. Standard - Soil shall be free of brush, weeds, and other litter; and free of roots, stumps, stones and any other extraneous or toxic matter.

         The intermediate cover shall be a minimum of 12" thick.

         Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698).

c. Frequency - Depth measurements and density tests shall be conducted at the frequency of four per acre.

2. Clay Layer (referred to as Barrier Layer in Chapter 62-701, F.A.C.)

a. Borrow Source - Prior to clay layer installation, an appropriate borrow source shall be located. Suitability of the clay layer construction materials from that source shall be determined in accordance with the following:

(1) If demonstrated field experience is available from at least three prior successful projects of five or more acres each to document that a given borrow source can meet the requirements of the project specifications, then extensive laboratory testing of the borrow source will not be required. However, the source of material shall be geologically similar to and the methods of excavating and stockpiling the material shall be consistent with those used on the prior projects. Furthermore, a minimum of three representative samples from the appropriate thickness of the in-situ stratum or from stockpiles of the borrow material proposed for clay layer construction shall be submitted to the Owner's independent soil testing laboratory to document through index testing that the proposed material is consistent with the material used on prior successful projects. At a minimum, index testing shall consist of percent fines, Atterberg limits and moisture content determinations.

(2) If demonstrated field experience as defined above is not available or cannot be documented, then the following requirements shall be met.

(a) A field exploration and laboratory testing program shall be conducted by the Owner's independent soil testing laboratory to document the horizontal and vertical extent and the homogeneity of the soil strata proposed for use as clay layer material. A sufficient number of index tests from each potential borrow stratum shall be performed to quantify the variability of the borrow materials and to document that the proposed borrow material complies with specifications. At a minimum, the index tests shall consist of percent fines, Atterberg limits and moisture content determinations.

(b) Sufficient laboratory hydraulic conductivity tests shall be conducted on samples representative of the range invariability of the proposed borrow source (ASTM D-5084). For each such sample, test specimens shall be prepared and tested to cover the range of molding conditions (moisture content and dry density) required by project specifications. The hydraulic conductivity tests shall be conducted in triaxial type permeameters. The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084). The borrow source will only be considered suitable if the hydraulic conductivity of the material, as documented on laboratory test specimens, can be shown to meet the requirements of the project specifications at the 98 percent confidence level.

(3) The Soils Quality Assurance Engineer shall review the pre-qualification data and shall approve or reject the clay layer material for use.

b. Test Strip - Prior to full-scale clay layer installation, a field test section or test strip shall be constructed at the site above a prepared subbase. The test strip shall be considered acceptable if the measured hydraulic conductivities of undisturbed samples from the test strip meet the requirements of the project specifications at the 98 percent confidence level. If the test section fails to achieve the desired results, additional test sections shall be constructed in accordance with the following requirements:

(1) The test section shall be of sufficient size (40' wide x 60' long, at a minimum) such that full-scale clay layer installation procedures can be duplicated within the test section;

(2) The test section shall be constructed using the same equipment for spreading, kneading and compaction and the same construction procedures (e.g., number of passes, moisture addition and homogenization, if needed) that are anticipated for use during full-scale clay layer installation;

(3) At a minimum, the clay layer test section shall be subject to the following field and laboratory testing requirements by Soils Quality Control Monitor:

(a) A minimum of five random samples of the clay layer construction material delivered to the site during test section installation shall be tested for moisture content (ASTM D-2216), percent fines (ASTM D-1140) and Atterberg limits (ASTM D-4318);

(b) At least five field density and moisture determinations shall be performed on each lift of the compacted clay layer test section;

(c) Upon completion of the test section lift, the thickness of the lift shall be measured at a minimum of five random locations to check for thickness adequacy; and

(d) A minimum of five Shelby tube or drive cylinder (ASTM D-2937) samples shall be obtained from each lift of the test section for laboratory hydraulic conductivity testing. Laboratory hydraulic conductivity testing shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured (ASTM D-5084).

(e) The test strip shall meet or exceed the standards established below except the field density which shall be established by the QA Engineer, based upon the test strip results. If the test strip fails to meet these standards, the construction methods and/or material will be rejected and the test strip shall be performed again.

c. Final Cover Installation - Full scale final cover installation may begin only after completion of a successful test section. During clay layer construction, quality control testing shall be provided to document that the installed clay layer conforms to project specifications. The testing frequency for quality control testing is specified below; however, during construction of the first five acres, the frequencies shall be doubled. The clay layer shall be installed in two 6" lifts for a total minimum thickness of 12".

(1) Location - The clay layer shall be tested in place. The locations of testing shall be random locations as determined by the Soils Quality Control Monitor. If there are indications of a change in product quality or construction procedures during final cover construction, additional tests shall be performed to determine compliance.

(2) Standard

(a) Clay Layer Subgrade - Compacted to 90% of Modified Proctor maximum dry density (ASTM D-1557)D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698). (See Intermediate Cover above).

(b) Field Density - The field density shall be established by the QA Engineer based upon the test strip results and shall be determined by Standard Proctor Density (ASTM D-698). In no case shall the field density be less than 80% of Standard Proctor Density (ASTM D-698).

(c) Thickness - Each lift (two total) shall be a minimum of 6" thick.

(d) Hydraulic Conductivity - The compacted clay layer shall have an in-place hydraulic conductivity no greater than 6.67×10^{-8} cm/sec (ASTM D-5084).

(3) Field Testing Frequency

(a) Prior to the laying of the clay layer materials, the clay layer subgrade shall be compacted to the specified density. Density tests shall be conducted at a minimum rate of two tests per acre;

(b) A minimum of two moisture content and field density determinations shall be conducted per acre per lift of the compacted clay layer. The degree of compaction shall be checked using the one-point field Proctor test or other appropriate test procedures; and

(c) A minimum of four thickness measures shall be conducted per acre per lift of the compacted clay layer.

(4) Laboratory Testing Frequency

(a) Percent fines (ASTM D-1140) of the clay layer material shall be determined at a minimum frequency of two tests per acre per lift of installed clay layer;

(b) Atterberg limits determinations shall be performed on one sample per acre per lift of installed clay layer; and

(c) Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D-2937) samples of the compacted clay layer shall be performed at a minimum frequency of one test per acre per lift. Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D-5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

(5) Deficiency - If the test data from a clay layer section does not meet the requirements of the project specifications, additional random samples shall be tested from that clay layer section. If such additional testing demonstrates that

the thickness and hydraulic conductivity meet the requirements of the project specifications at the 95 percent confidence level, that clay layer section will be considered acceptable. If not, that clay layer section shall be reworked or reconstructed so that it does meet these requirements.

3. Clay Layer Tie-In (To Existing Clay Layer, Where Applicable)

   a. Location - The edge of any existing final cover adjacent to the proposed final cover area.

   b. Standard - The compacted clay layer of any existing final cover and the proposed final cover must be tied together to form one continuous seamless layer. At the interface, the existing and new clay layers shall be compacted to form a seamless connection.

   c. Frequency - The Soils Quality Control Monitor shall monitor the tie-in by visual inspection on a continuous basis.

4. Vegetative Cover (Top Soil)

   a. Location - The vegetative cover shall be tested in place. The location of testing shall be determined by the Soils Quality Control Monitor.

   b. Standard - Top soil which is reasonably free of brush, weeds, and other litter; and relatively free of roots, stumps, stones and any other extraneous or toxic matter harmful to plant growth. Roots with a diameter greater than ⅜" shall be hand picked and removed.

      The vegetative cover shall be at least 24" thick.

   c. Frequency - Depth measurements shall be taken at the frequency of four per acre. The soil shall be monitored on a continuous basis for extraneous matter.

5. Final Cover Repairs (When Applicable)

   If, during construction of the final cover system, damage is sustained on the final cover system (including the intermediate cover, clay layer and vegetative cover), the areas of damage shall be reconstructed and retested in accordance with corresponding section described above. All repair areas shall be tested at the frequencies prescribed above, unless more frequent testing is required at the discretion of the Soils Quality Assurance Engineer.

B. Downcomer Pipes

Downcomer pipes shall be installed in the final cover at the low point of the terraces, to intercept the stormwater between terraces. The downcomer pipes shall include the terrace side drains and terrace underdrain piping.

The downcomer pipes shall be constructed as shown on the Construction Drawings. The clay around the pipes shall be compacted into a uniform homogeneous material. Prior to placement of vegetative cover over the downcomer pipes, the pipe shall be inspected by the General Quality Control Monitor.

1. Location - The compacted clay layer shall be tested in place. The locations of testing shall be determined by the Soils Quality Control Monitor. If there are indications of a change in product quality or construction procedures during construction, additional tests shall be performed to determine compliance.

2. Standard -

   a. Clay Layer Subgrade - Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557)D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698) (12" thick minimum).

   b. Field Density - The field density of the clay layer shall be as established in Section A.2.c.(2)(b) above and shall be determined by Standard Proctor Density (ASTM D 698).

   c. Thickness - Twelve inches minimum below pipe.

   d. Hydraulic Conductivity - The compacted clay layer shall have an in-place hydraulic conductivity no greater than 6.67×10^{-8} cm/sec (ASTM D 5084).

3. Field Testing Frequency -

   a. Prior to the laying of the compacted clay materials, the subbase shall be compacted to the specified density. Density tests and thickness shall be conducted at a minimum rate of one per 75 linear feet of pipe. (Minimum of one test between terraces).

   b. A minimum of one moisture content and field density determination of the compacted clay layer shall be conducted per 75 linear feet of pipe.

   c. A minimum of two thickness measures of the compacted clay layer shall be conducted per 75 linear feet of pipe.

4. Laboratory Testing Frequency -

   a. Hydraulic conductivity testing of Shelby tube or drive cylinder (ASTM D 2937) samples of the compacted clay layer shall be performed at a minimum frequency of one test per 75 linear feet of pipe (at least once between terraces). Laboratory hydraulic conductivity tests shall be conducted in triaxial type permeameters (ASTM D 5084). The test specimens shall be consolidated under an isotropic consolidation stress no greater than 10 pounds per square inch and permeated with water under an adequate backpressure to achieve saturation of the test specimens. The inflow to and outflow from the specimens shall be monitored with time and the hydraulic conductivity calculated for each recorded flow increment. The test shall continue until steady state flow is achieved and relatively constant values of hydraulic conductivity are measured.

5. Deficiency - If the test data from a compacted clay layer section does not meet the requirements of the project specifications, that section shall be reworked or reconstructed so that it does meet these requirements.

C. Underdrain Filter Sand

The underdrains in the terraces shall be surrounded by filter sand as shown on the Contract Drawings. The QA/QC for the filter sand is as follows:

1. Filter Sand

   a. Location - The material shall be pre-qualified prior to installation.

      If the testing is done at the borrow source, a chain of custody shall be provided.

   b. Standard - Clean, uniformly graded sand with a uniformity coefficient of 1.5 or greater and an effective grain size of 0.2 mm to 0.5 mm. Grain size distribution shall be conducted as part of pre-qualification.

      The sand shall have a hydraulic conductivity no less than 1.0 x 10^{-3} cm/sec at a density of 100 percent Modified Proctor. The hydraulic conductivity testing shall be by Constant Head method (ASTM D2434).

   c. Frequency - The hydraulic conductivity of the sand shall be tested once per 500 cubic yards of sand material.

K

APPENDIX K

QUALITY ASSURANCE/QUALITY CONTROL PLAN

FOR TOP AREA

TRAIL RIDGE LANDFILL
PROJECT-SPECIFIC ADDENDA
TO QUALITY ASSURANCE MANUAL

This plan specifically addresses the quality assurance and quality control (QA/QC) for Trail Ridge Landfill, Top Area Closure. This program delineates the quality procedures and standards for the construction.

In the context of this plan, quality assurance, quality control and the plan participants are defined as follows:

Quality Assurance - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

Quality Control - Those actions which provide a means to measure and regulate the characteristics of an item or service to contract and regulatory requirements.

Permittee - Trail Ridge Landfill, Inc.

Owner - The City of Jacksonville

Design Engineer - England, Thims & Miller, Inc.

The QA/QC Program for this project includes General QA/QC, Soils QA/QC, and Synthetic Liner System QA/QC. These QA/QC activities (including monitoring, sampling and testing) shall be directed and conducted by the third parties who are independent of the Contractor.

The General QA/QC includes full-time services to periodically observe the contractor's work to verify substantial compliance with permits, plans, specifications and design concepts.

General Quality Control Monitor - shall monitor the construction for compliance with the permits, plans, specifications and design including construction to proper lines and grades, maintain daily logs and weekly progress reports of the construction (including observation data sheets, problem identification and correction logs), make note of construction deviations, coordinate qualifying and testing of materials, and monitor filling. This individual shall be experienced in civil site construction and solid waste regulations.

General Quality Assurance Engineer - shall supervise the construction monitoring to verify compliance with permits, plans, specification and design concepts. This individual shall be experienced in civil site construction and solid waste regulations and shall be a registered Professional Engineer.

The General QA/QC Program includes monitoring the following activities:

1. General Earthwork
2. Drainage Installation
3. Overall Liner System Installation
4. General Construction Quality Control

The Soils QA/QC for this project includes soil material qualifying, sampling and testing to verify substantial compliance with the material standards.

Soils Quality Control Monitor - shall pre-qualify soil materials, monitor the installation of soil materials, determine where in-place soil materials shall be tested, and test the in-place soil materials. This individual shall be responsible for assuring that all soil materials have been pre-qualified and have a chain-of-custody from the pre-qualified source to the project site, prior to installation. This individual shall be experienced in civil site construction and soil testing standards and procedures.

Soils Quality Assurance Engineer - shall supervise the soil material pre-qualifying and testing of in-place soil materials to assure compliance with the test standards and testing frequency requirements, and verify compliance with the plans, specification and design. This individual shall be experienced in civil site construction and soil testing procedures and shall be a registered Professional Engineer.

The Top Area closure of Trail Ridge Landfill includes a final cover consisting of 12" of intermediate cover, a 40-mil geomembrane liner, 12" of sand, and 12" of top soil (from bottom to top). The QA/QC for the final cover is as follows:

A. INTERMEDIATE COVER

1. Location - The fill material shall come from an off-site source. The Soils Quality Control Monitor shall visually inspect the fill material.

2. Standard - Soil shall be free of brush, weeds, and other litter; and free of roots, stumps, stones and any other extraneous or toxic matter.

   The intermediate cover shall be a minimum of 12" thick.

   Compacted to 90% of Modified Proctor maximum dry density (ASTM D 1557), unless the soil material contains 30.0% or greater passing the No. 200 sieve, then compacted to 90% of Standard Proctor maximum dry density (ASTM D-698).

3. Frequency - Depth measurements and density tests shall be conducted at the frequency of four per acre.

B. GEOMEMBRANE LINER

The final cover shall include a textured 40-mil (average) geomembrane liner. The geomembrane liner shall be monitored and tested in accordance with the requirements of the *Quality Assurance Guidance Document for the Installation of Lining Systems* (WMI, August 1997) and the following revisions shall be made to Section 9.0B of the *Quality Assurance Guidance Document for the Installation of Lining Systems* with regard to the geomembrane liner.

9.2B-3.f. Add Puncture Resistance (ASTM D4833)

9.2B-3. Replace "30,000 lb except Multi-Axial Tensile Elongation which will be tested every 75,000 lbs." with "100,000 ft^2 of geomembrane sheet except Multi-Axial Tensile Elongation which will be tested every 250,000 ft^2. Further, thickness (ASTM D5199/ASTM D5944) will be performed for every roll."

9.2B-3 Add the following: "Written certification from the manufacturer that the geomembrane product to be delivered has been extruded from an approved resin will be required. The certification shall include the origin (resin supplier's name and resin production plant), identification (brand name and number), resin production date, and quality control certificates issued by the resin supplier."

9.2B-4 Add the following: "6. Batch number" and "7. Date of manufacture" to the manufacturer's roll identification information.

9.2B Add the following: "Conformance testing of geomembrane will be conducted by an independent laboratory selected by the CQA Engineer. The laboratory will be accredited by the Geosynthetics Accreditation Institute (GAI) for the specific tests to be performed. The results of the conformance testing shall be reviewed by the Geosynthetic QAE and compared to the Project Specifications. Any nonconformance will be the basis of rejection of the material by the Geosynthetic QAE."

9.6.2B-2.e. Replace "the maximum permissible pressure differential as outlined in the project specifications" with "3 psi."

C. SAND LAYER

After the geomembrane liner has been installed, it shall be covered with a sand layer. The sand layer shall be a minimum of 12" in thickness.

1. Location - Material shall be pre-qualified by hydraulic conductivity and particle size testing at the borrow location.

   Truck tickets shall be utilized for chain of custody to site.

2. Standard - Sand shall be reasonably free of brush, weeds, and other litter; and relatively free of roots, stumps, stones and any other extraneous or toxic matter. The Soils Quality Control Monitor shall visually inspect the sand during placement.

Hydraulic Conductivity shall be greater than or equal to 1×10^{-3} cm/sec at a density of 96 percent Modified Proctor maximum dry density (ASTM D1557). Hydraulic Conductivity testing by Constant Head Method (ASTM D2434).

Thickness shall be no less than 12 inches at each location.

3. Frequency - Hydraulic Conductivity testing shall be on-going as necessary to support fill borrow operations with minimum of one test per 500 cubic yards.

Prior to placement, the sand shall be tested for particle size. The test shall be taken at least once per 5,000 cubic yards and for each change in material source.

Depth measurements and density tests shall be conducted at the frequency of four per acre.

D. TOP SOIL LAYER

After the sand layer has been installed, it shall be covered with top soil. The top soil layer shall be a minimum of 12" in thickness.

1. Location - The top soil layer shall be tested in place. The location of testing shall be determined by the Soils Quality Control Monitor.

2. Standard - Top soil shall be reasonably free of brush, weeds, and other litter; and relatively free of roots, stumps, stones and any other extraneous or toxic matter harmful to plant growth. Roots with a diameter greater than ⅜" shall be hand picked and removed.

The top soil layer shall be at least 24" thick.

3. Frequency - Depth measurements shall be taken at the frequency of four per acre. The soil shall be monitored on a continuous basis for extraneous matter.

E. UNDERDRAIN FILTER SAND

The underdrains shall be surrounded by filter sand.

1 Location - The material shall be pre-qualified prior to installation.

If the testing is done at the borrow source, a chain of custody shall be provided.

2. Standard - Clean, uniformly graded sand with a uniformity coefficient of 1.5 or greater and an effective grain size of 0.2 mm to 0.5 mm. Grain size distribution shall be conducted as part of pre-qualification.

The sand shall have a hydraulic conductivity no less than 1.0×10^{-3} cm/sec at a density of 100 percent Modified Proctor. The hydraulic conductivity testing shall be by Constant Head method (ASTM D2434).

3. Frequency - The hydraulic conductivity of the sand shall be tested once per 500 cubic yard of sand material.

QUALITY ASSURANCE GUIDANCE DOCUMENT
FOR THE INSTALLATION OF
LINING SYSTEMS

THIS DOCUMENT IS INTENDED TO PROVIDE THE BASIS FOR AND COMPONENTS OF A SITE SPECIFIC QUALITY ASSURANCE PLAN TAILORED TO SITE SPECIFIC ENGINEERING, GEOLOGIC, AND REGULATORY REQUIREMENTS.

QUALITY ASSURANCE MANUAL
FOR THE INSTALLATION OF
LINING SYSTEMS

TABLE OF CONTENTS

APPENDIX - SPECIFICATIONS FOR HDPE GEOSYNTHETICS

1.0 GENERAL

1.1 SCOPE

This Quality Assurance Resource Document (QAGD) addresses the quality assurance of the installation of soil and geosynthetic materials used in lining systems by Waste Management companies (Owner) for their land disposal, surface impoundment and other waste containment facilities. This QAGD is applicable for lining systems which include base liner and final cover systems. Extreme care and detailed documentation are required in the selection and installation of all materials used in lining systems for waste containment applications.

This QAGD primarily addresses quality assurance and is directed toward the Quality Assurance Consultant. In the context of this manual, **quality assurance** refers to means and actions employed by the Owner to assure conformity of the lining system production and installation with the project-specific Quality Assurance Plan (QAP), contractual and regulatory requirements. **Quality control** refers only to those actions taken to ensure that materials and workmanship meet the requirements of the project plans and specifications. Quality control is provided by the manufacturers, suppliers, contractors and installers of the various components of the lining system.

The QAGD is one component of the overall QAP. **A PROJECT-SPECIFIC QAP IS REQUIRED FOR EACH PROJECT.** At a minimum, the QAP shall consist of the following:

1. Pertinent Sections of this QAGD or other applicable QAGDs.

2. Project-Specific Addenda to the QAGD Sections. Project-Specific Addenda shall be used to provide for additions, deletions, and changes necessary to the QAGD Sections used for a particular project.

3. Project-Specific Plans and Specifications.

The QAP should contain all of the elements necessary to ensure that the project is constructed in accordance with project plans and specifications as well as regulatory requirements. This QAGD serves as a foundation for a QAP, and is not a QAP in itself.

1.2 PARTIES

The parties discussed in this section are associated with the ownership, design, supply, manufacture, transportation, installation, and quality assurance of a lining system. The definitions, responsibilities, qualifications, and submittals of these parties are outlined in the following subsections.

1.2.1 Project Manager

1.2.1.1 *Definitions*

The Project Manager is the official representative of the Owner. In this manual, the term Project Manager shall apply equally to "Construction Coordinator" or "Construction Manager", defined as the individual who coordinates construction and quality assurance activities for the project.

1.2.1.2 *Responsibilities*

The Project Manager is responsible for coordination of all construction quality assurance activities. The Project Manager is responsible for the organization and implementation of the QAP for the project as outlined in Section 1.1 of this manual. Other responsibilities include selection or approval of Earthwork Contractor, Geosynthetic Installer, Quality Assurance Consultant and the Quality Assurance Laboratory.

The Project Manager shall serve as communications coordinator for the project, initiating the resolution, pre-construction and construction meetings outlined in Section 1.3. As communications coordinator, the Project Manager shall serve as a liaison between all parties involved in the project to ensure that communications are maintained. The Project Manager shall also be responsible for proper resolution of all quality assurance issues that arise during construction.

1.2.1.3 *Qualifications*

The selection of the Project Manager is the direct responsibility of the Owner. Qualifications for this position include familiarity with the following:

1. Sections of this QAGD or other applicable QAGDs.

2. General earthwork construction techniques.

3. General geosynthetic installation techniques.

4. All applicable regulatory requirements.

5. Company policies and procedures for project management.

1.2.2 Designer

1.2.2.1 *Definitions*

The Designer is the individual and/or firm who prepares the design, including project plans and specifications for the lining system.

1.2.2.2 *Responsibilities*

The Designer is responsible for performing the engineering design and preparing the associated project plans and specifications for the lining system. The Designer is responsible for approving all design and specification changes and making design clarifications necessitated during construction of the lining system. Upon the request of the Project Manager, the Designer shall attend the resolution and pre-construction meetings outlined in Section 1.3 of this manual.

1.2.2.3 *Qualifications*

The Designer shall be a qualified engineer, certified or licensed as required by regulation. The Designer shall be familiar with the use of soils and/or geosynthetics including detailed design methods and procedures. In addition, the Designer should be familiar with applicable regulatory requirements.

1.2.2.4 *Submittals*

The Designer shall submit the project plans, specifications and associated engineering reports to the Project Manager. The Designer shall also submit completed design clarification forms to the Project Manager in a timely manner upon request. Other information may also be required by the Owner.

1.2.3 Manufacturer

1.2.3.1 *Definitions*

The Manufacturer is the firm which produces any of the various geosynthetic lining system components outlined in this QAGD. In the case of a geocomposite, the Manufacturer is the firm which combines the components into the final product.

1.2.3.2 *Responsibilities*

Each Manufacturer is responsible for the production of its geosynthetic product. In addition, each Manufacturer is responsible for the condition of the geosynthetic product until the material is accepted by the Project Manager upon delivery. Each Manufacturer shall produce a consistent product that meets the project specifications. Each Manufacturer shall provide quality control documentation for its product as specified in this QAGD.

1.2.3.3 *Qualifications*

Each Manufacturer shall:

1. Be pre-qualified and approved by the Owner.

2. Provide sufficient production capacity and qualified personnel to meet the demands of the project.

3. Have an internal quality control program for its product that meets the requirements presented in this QAGD.

1.2.3.4 *Submittals*

Pre-qualification: At a minimum, the Manufacturer shall meet the following requirements and submit the following information to the Project Manager to be considered for pre-qualification:

1. Corporate background and information.

2. Manufacturing capabilities:
   a. Information on plant size, equipment, personnel, number of shifts per day, and capacity per shift.
   b. Daily production quantity of the specified product available for the Owner's facilities.
   c. A list of material properties including certified test results with attached geosynthetic samples.
   d. A list of at least 15 completed landfill or surface impoundment facilities totalling a minimum of 15,000,000 ft^2 (1,500,000 m^2), for which the Manufacturer has manufactured a geosynthetic. For each facility, the following information shall be provided:
      (1) Name and purpose of facility, its location and date of installation.
      (2) Name of Owner, Project Manager, Designer, Installer and Fabricator (if any).
      (3) Type of geosynthetic and surface area of geosynthetic manufactured.
      (4) Available information on the performance of the lining system.

3. The Manufacturer's quality control manual, including a description of the quality control laboratory facilities.

4. The origin (supplier's name and production plant) and identification (brand name and number) of resin used to manufacture the product.

Additional information may need to be submitted if requested by the Project Manager.

Pre-installation: Prior to the installation of any geosynthetic material, the Manufacturer shall submit to the Project Manager all quality control documentation required by the appropriate section of this QAGD. This documentation shall be reviewed by the Geosynthetic Quality Assurance Consultant as outlined in Section 1.2.7 of this QAGD before installation can begin.

1.2.4 Earthwork Contractor

1.2.4.1 *Definitions*

The Earthwork Contractor is the firm which performs the site earthwork preparation and construction of the soil components of the lining system. The Earthwork Superintendent is the individual responsible for the Earthwork Contractor's field crew. The Earthwork Superintendent may represent the Earthwork Contractor at all site meetings and acts as the Earthwork Contractor's spokesman on the project.

1.2.4.2 *Responsibilities*

The Earthwork Contractor is responsible for constructing soil components of the lining systems in conformance to the project plan and specifications. The Earthwork Contractor may also be responsible for supplying and transporting the required earth and granular materials, concrete, piping, and other work, as outlined in the project specifications.

1.2.4.3 *Qualifications*

The Earthwork Contractor shall be:

1. Pre-qualified and approved by the Owner.

2. Able to provide qualified personnel to meet the demands of the project.

At a minimum, the Earthwork Contractor shall provide a Superintendent as described below.

The Superintendent must be qualified based on previously demonstrated experience, management ability, and authority. The Superintendent shall be approved by the Project Manager.

1.2.4.4 *Submittals*

Pre-qualification: At a minimum, the Earthwork Contractor shall meet the following requirements and submit the following information to the Project Manager to be considered for prequalification:

1. Company background and information

2. Demonstration of bonding capability

3. List of outstanding contracts

4. List of readily available equipment required to perform the work (i.e., scrapers, graders, scarifiers, compactors, disking equipment, water trucks, and admixing equipment, if required)

5. List of at least five comparable projects with the following information for each project:
   a. Name of the facility, its location, date of installation.
   b. Name of project manager or contact person for the installation.
   c. Description and purpose of installation and definition of contractor's scope of work.

   Additional information may need to be submitted if requested by the Project Manager.

Pre-installation: Prior to commencement of the earthwork activities, the Earthwork Contractor shall submit to the Project Manager:

1. Resume of the Earthwork Superintendent to be assigned to this project, including the dates and duration of employment.

2. Schedule of construction activities.

3. List of specific equipment and personnel to be used on the project.

4. List of proposed subcontractors and suppliers.

Completion: Upon completion of the installation, the Earthwork Contractor shall submit a Certificate of Completion.

1.2.5 Geosynthetic Installer

1.2.5.1 *Definitions*

The Geosynthetic Installer (Installer) is the firm which installs the geosynthetic components of the lining system. The Geosynthetic Superintendent is the individual responsible for the Installer's field crew. The Geosynthetic Superintendent shall represent the Installer at all site meetings and act as the Installer's spokesman on the project.

1.2.5.2 *Responsibilities*

The Installer is responsible for field handling, storing, deploying, seaming, temporary restraining and all other aspects of the geosynthetics installation. The Installer may also be responsible for transportation of these materials to the site and for anchor systems, if required by the project specifications. The Installer shall be responsible for submittal of the documentation listed in Section 1.2.5.4.

1.2.5.3 *Qualifications*

The Installer shall be pre-qualified and approved by the Owner. The Installer shall be able to provide qualified personnel to meet the demands of the project. At a minimum, the Installer shall provide a Geosynthetic Superintendent.

The Geosynthetic Superintendent shall be qualified based on previously demonstrated experience, management ability and authority. The Geosynthetic Superintendent shall be approved by the Project Manager.

For geomembrane installation, all personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests.

1.2.5.4 *Submittals*

Pre-qualification: At a minimum, the Installer shall submit the following information to the Project Manager to be considered for pre-qualification:

1. Corporate background and information

2. Description of installation capabilities:
   a. Information on equipment (numbers and types), and personnel (number of Superintendents, number of crews).
   b. Average daily production anticipated.
   c. Samples of field geomembrane seams and a list of minimum values for geomembrane seam properties.

3. A list of at least ten completed facilities, totalling a minimum of 2,000,000 ft^2 (200,000 m^2) for which the Installer has installed geosynthetics. For each installation, the following information shall be provided:
   a. Name and purpose of facility, its location, and date of installation.
   b. Name of owner, project manager, designer, manufacturer, fabricator (if any), and name of contact at the facility who can discuss the project.
   c. Name and qualifications of the Superintendent(s) of the Installer's crew(s).
   d. Type of geosynthetic, and surface area installed.
   e. Type of seaming and type of seaming apparatus used.
   f. Duration of installation.
   g. Available information on the performance of the lining system.

4. The Installer's quality control manual.

5. A copy of a letter of recommendation supplied by the geomembrane manufacturer.

Pre-installation: Prior to commencement of the installation, the Installer must submit to the Project Manager:

1. Resume of the Geosynthetic Superintendent to be assigned to this project, including dates and duration of employment.

2. A panel layout drawing showing the installation layout identifying field seams as well as any variance or additional details which deviate from the project plans or specifications. The layout shall be adequate for use as a construction plan and shall include dimensions and details as appropriate.

3. Installation schedule.

4. A list of personnel performing field seaming operations along with pertinent experience information.

5. All geosynthetic quality control certificates as required by this QAGD, unless submitted directly to the Project Manager by the Manufacturer.

6. Certification that extrudate to be used is comprised of the same resin as the geomembrane to be used.

This documentation shall be reviewed by the Geosynthetic Quality Assurance Consultant before installation of the geosynthetic can begin.

Installation: During installation, the Installer shall be responsible for the submission of:

1. Quality control documentation recorded during installation.

2. Subgrade surface acceptance certificates signed by the Installer for each area to be covered by the lining system.

Completion: Upon completion of the installation, the Installer shall submit:

1. The warranty obtained from the Manufacturer.

2. The installation warranty.

1.2.6 Soil Quality Assurance Consultant

1.2.6.1 *Definitions*

The Soil Quality Assurance Consultant (Soil QAC) is the firm which observes and documents activities related to the quality assurance of the installation of the soil components of the lining system on behalf of the Owner. The Soil QAC and Geosynthetic QAC may be the same party.

In this QAGD, the term Soil Quality Assurance Engineer (Soil QAE) refers to the engineer employed by the QAC who is personally in charge of the quality assurance work. In some cases, the duties of the Soil QAE may be shared by two individuals: a Soil Quality Assurance Certifying Engineer and a Soil Quality Assurance Resident Engineer. Although not located at the site, the Soil Quality Assurance Certifying Engineer shall visit the site often enough to be familiar with the details of the project. The Soil Quality Assurance Certifying Engineer may also be known as the Soil Quality Assurance Officer.

The personnel of the Soil QAC also include Soil Quality Assurance Monitors (Soil QA Monitors) who are located at the site for construction observation and documentation.

1.2.6.2 *Responsibilities*

The Soil QAC is responsible for observing and documenting activities related to the quality assurance of the construction of the soil components of the lining systems. The Soil QAC is responsible for the implementation of the project QAP prepared by the Project Manager. The Soil QAC is also responsible for issuing a final Quality Assurance Report, sealed by a licensed Professional Engineer, as outlined in Section 2.0 of this QAGD. Other duties of the Soil QAC shall include overseeing the soil laboratory testing.

The specific duties of the Soil QAC personnel are as follows:

1. The Soil QAE:
    a. Reviews all project plans and specifications.
    b. Reviews other site-specific documentation.
    c. Develops site-specific addenda for quality assurance of soil components with the assistance of the Project Manager as necessary.
    d. Administers the soil portions of the QAP, including assigning and managing all soil quality assurance personnel, reviews all field reports, and provides engineering review of all quality assurance related issues.
    e. Familiarizes himself with all applicable changes to project plans and specifications as issued by the Designer.
    f. Acts as on-site (resident) representative of the Soil QAC.
    g. Familiarizes all Soil QA Monitors with the site and the project QAP.
    h. Assigns Soil QA Monitors to observe and document all activities requiring monitoring.
    i. Attends all quality assurance related meetings, including resolution, pre-construction, daily, weekly meetings.
    j. Reviews the calibration certification of the on-site soil testing equipment.
    k. Manages the preparation of the record drawings.
    l. Reviews the Soil QA Monitors' daily reports, logs, and photographs.
    m. Notes any on-site activities that could result in damage to the installed soil components.
    n. Reports to the Project Manager, and logs in the daily report, any relevant observations reported by the Soil QA Monitors.
    o. Prepares his own daily report.
    p. Prepares a daily summary of the soil component quantities estimates installed each day of construction activity.
    q. Prepares a weekly summary of soil quality assurance activities at the end of each week of the construction activity.
    r. Oversees marking, packaging and shipping of all laboratory test samples.
    s. Reviews the results of laboratory testing and makes appropriate recommendations.
    t. Recommends the approval of the final soils acceptance to the Project Manager.
    u. Designates a Soil QA Monitor to represent the QAE whenever he is absent from the site while operations are ongoing.
    v. Reports any unapproved deviations from the QAP to the Project Manager.
    w. Maintains field files of all logs and reports.
    x. Maintains qualifications of all personnel and calibration of equipment.
    y. Prepares the final Quality Assurance Report.

2. The Soil QA Monitor:
    a. Monitors, logs, photographs and/or documents all soil component installation operations. Photographs shall be taken routinely and in critical areas of the installation sequence. These duties shall be assigned by the Soil QAE.
    b. Monitors and documents the following operations for all soil components:
        (1) Material delivery
        (2) Unloading and on-site transport and storage
        (3) Sampling and conformance testing

(4) Deployment operations
(5) Condition of the soil components as placed
(6) Visual observation, by walkover, of the finished soil components
(7) Sampling and field testing of the finished soil components
(8) Repair operations, if and when necessary

c. Conducts soil sampling and testing.
d. Documents any on-site activities that could result in damage to the constructed soil components. Any problems noted shall be reported as soon as possible to the Soil QAE.

Any differences of the Soil QAC's interpretation of the project plans and specifications from the Earthwork Contractor's interpretation shall be properly and adequately assessed by the Soil QAC through discussion with the Earthwork Contractor. If such assessment indicates any actual or suspected work deficiencies, the Soil QAC shall inform the Earthwork Contractor of these deficiency issues.

1.2.6.3 *Qualifications*

The Soil QAC shall be pre-qualified and approved by the Owner. The Soil QAC shall be experienced in the preparation of quality assurance documentation including quality assurance forms, reports, certifications and manuals.

The Soil QAE shall hold a B.S., M.S., or Ph.D degree in civil engineering or related fields and be licensed as a Professional Engineer. If the duties of the Soil QAE are shared by two parties, only the Soil Quality Assurance Certifying Engineer shall be required to be a licensed Professional Engineer. The Soil QAE shall be specifically experienced in the installation of soil liners and shall have the necessary training and certification by the Soil QAC in the duties of a Soil QAE. The Soil QAE shall be approved by the Project Manager.

Soil QA Monitors shall have specific training in construction quality assurance of engineered soil structures and be so designated by the Soil QAE. The Monitors shall be approved by the Project Manager.

1.2.6.4 *Submittals*

Pre-qualification: At a minimum, the Soil QAC shall submit the following information in writing to the Project Manager to be considered for pre-qualification:

1. Corporate background and information:
   a. General company information
   b. Proof of insurance
      (1) Professional liability
      (2) "Umbrella" coverage
      (3) Other coverages as required by statute and/or proposed contractual agreement

2. Quality assurance capabilities:
   a. A summary of the firm's experience in quality assurance, specifically quality assurance of soil components of lining systems.
   b. A summary of quality assurance documentation and methods used by the firm, including sample quality assurance forms, reports, certifications, and manuals prepared by the firm.
   c. Resumes of key personnel.

Additional information may need to be submitted if required by the Project Manager.

<u>Pre-construction:</u> Prior to beginning work on a project, the Soil QAC shall, in writing, provide the Project Manager with the following:

1. Resumes of personnel to be involved in the project including Soil QAE and Soil Quality Assurance Monitors.

2. Proof of professional engineering registration in the appropriate state of the engineer to be designated as the Soil Quality Assurance Certifying Engineer, as well as proof of B.S., M.S. or Ph.D in civil engineering or related field degree.

3. Proof of the required soil components quality assurance experience of all of the quality assurance personnel.

4. Examples of forms to be used in documentation of the project.

1.2.7 Geosynthetic Quality Assurance Consultant

1.2.7.1 *Definitions*

The Geosynthetic Quality Assurance Consultant (Geosynthetic QAC) is the firm which observes and documents activities related to the quality assurance of the production and installation of the geosynthetic components of the lining systems on behalf of the Owner. The Geosynthetic QAC and Soil QAC may be the same party.

In this QAGD, the term Geosynthetic Quality Assurance Engineer (Geosynthetic QAE) shall be used to designate the engineer working for the Geosynthetic QAC in charge of the quality assurance work. In some cases the duties of the Geosynthetic QAE may be shared by two individuals: a Geosynthetic Quality Assurance Certifying Engineer and a Geosynthetic Quality Assurance Resident Engineer. Although not located at the site, the Geosynthetic Quality Assurance Certifying Engineer shall visit the site often enough to be familiar with the details of the project. The Geosynthetic Quality Assurance Certifying Engineer may also be known as the Geosynthetic Quality Assurance Officer.
The personnel of the Geosynthetic QAC also include Geosynthetic Quality Assurance Monitors who are located at the site for construction observation and documentation.

1.2.7.2 *Responsibilities*

The Geosynthetic QAC is responsible for observing and documenting activities related to the quality assurance of the production and installation of the geosynthetic components of the lining systems. The Geosynthetic QAC is responsible for implementation of the project QAP prepared by the Project Manager as well as reviewing work products of the Geosynthetic Quality Assurance Laboratory. The Geosynthetic QAC is also responsible for issuing a final Quality Assurance Report, sealed by a licensed Professional Engineer, as outlined in Section 2.0 of this QAGD.

The specific duties of the Geosynthetic QAC personnel are as follows:

1. The Geosynthetic QAE:
    a. Familiarizes himself with all project plans and specifications.
    b. Reviews other site-specific documentation, including proposed layouts, and manufacturer's and installer's literature.
    c. Develops site-specific addenda for quality assurance of geosynthetics with the assistance of the Project Manager, as necessary.
    d. Administers the geosynthetic portions of the QAP, including assigning and managing all geosynthetic quality assurance personnel, reviewing all field reports, and providing engineering review of all quality assurance related issues.
    e. Reviews for familiarity all appropriate changes to design drawings and project specifications as issued by the Designer.
    f. Acts as the on-site (resident) representative of the Geosynthetic QAC.
    g. Familiarizes all Geosynthetic Quality Assurance Monitors with the site and the project QAP.
    h. Assigns Geosynthetic Quality Assurance personnel to observe and document geosynthetic installation activities requiring certification.
    i. Attends all quality assurance related meetings, including resolution, pre-construction, daily, weekly.
    j. Reviews all Manufacturer and Installer certifications and documentation and makes appropriate recommendations.
    k. Reviews the Installer's personnel qualifications for conformance with those qualifications preapproved for work on site.
    l. Manages the preparation of the record drawings.
    m. Reviews the calibration certification of the on-site testing equipment, as required.
    n. Reviews all Geosynthetic Quality Assurance Monitor's daily reports, logs and photographs.
    o. Notes any on-site activities that could result in damage to the geosynthetics.
    p. Reports to the Project Manager, and logs in the daily report, any relevant observations reported by the Geosynthetic Quality Assurance Monitors.
    q. Prepares his own daily report.
    r. Prepares a daily summary of the quantities estimates of geosynthetics installed that day.
    s. Prepares the weekly summary of geosynthetic quality assurance activities.
    t. Oversees the marking, packaging and shipping of all laboratory test samples.
    u. Reviews the results of laboratory testing and makes appropriate recommendations.
    v. Recommends the approval of the final liner acceptance to the Project Manager.

w. Designates a Geosynthetic Quality Assurance Monitor to represent the QAE whenever he is absent from the site while operations are ongoing.
x. Reports any unapproved deviations from the QAP immediately to the Project Manager.
y. Prepares the final Quality Assurance Report.

2. The Geosynthetic Quality Assurance Monitor:
   a. Monitors, logs, photographs and/or documents all geosynthetic installation operations. Photographs shall be taken routinely and in critical areas of the installation. These duties shall be assigned by the Geosynthetic QAE.
   b. Monitors the following operations for all geosynthetics:
      (1) Material delivery*
      (2) Unloading and on-site transport and storage*
      (3) Sampling for conformance testing*
      (4) Deployment operations
      (5) Joining and/or seaming operations
      (6) Condition of panels as placed
      (7) Visual inspection by walkover
      (8) Repair operations
   c. Monitors and documents the geomembrane seaming operations, including:
      (1) Trial seams
      (2) Seam preparation
      (3) Seaming
      (4) Nondestructive seam testing
      (5) Destructive seam testing
      (6) Field tensiometer testing
      (7) Laboratory sample marking
      (8) Repair operations
      (9) Measurements of uninstalled quantities
   d. Documents any on-site activities that could result in damage to the geosynthetics. Any problems noted shall be reported as soon as possible to the Geosynthetic QAE.

Any differences between the Geosynthetic QAC's and Installer's interpretation of the project plans and specifications shall be properly and adequately assessed by the Geosynthetic QAC. If such assessment indicates any actual or suspected work deficiencies, the Geosynthetic QAC shall inform the Installer, or the Installer's representative, of these deficiencies.

1.2.7.3 *Qualifications*

The Geosynthetic QAC shall be pre-qualified by the Owner. The Geosynthetic QAC shall be experienced in quality assurance of geosynthetics with emphasis on polyethylene geomembranes. The Geosynthetic QAC shall be experienced in the preparation of quality assurance documentation including quality assurance forms, reports, certifications, and manuals.

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*when appropriate

The Geosynthetic Quality Assurance Certifying Engineer shall hold a B.S., M.S. or Ph.D degree in civil engineering or related fields and be licensed as a Professional Engineer. If the duties of the Geosynthetic QAE are shared by two parties, only the Certifying Engineer shall be required to be licensed as a Professional Engineer. The Geosynthetic Quality Assurance Resident Engineer shall be specifically experienced in the installation of geosynthetics and shall be trained and certified by the Geosynthetic QAC in the duties of a Geosynthetic QAE. The Geosynthetic QAC shall be approved by the Project Manager.

Geosynthetic Quality Assurance Monitors shall be quality assurance personnel who have been specifically trained in the quality assurance of geosynthetics. The Monitors shall be approved by the Project Manager.

1.2.7.4 *Submittals*

Pre-qualification: At a minimum, the Geosynthetic QAC shall provide the following information in writing to the Project Manager to be considered for pre-qualification:

1. Corporate background and information.
   a. General company information
   b. Proof of insurance
      (1) Professional liability
      (2) "Umbrella" coverage
      (3) Other coverages as required by statute and/or proposed contractual agreement

2. Quality assurance capabilities:
   a. A summary of the firm's experience with geosynthetics.
   b. A summary of the firm's experience in quality assurance, including installation quality assurance of geosynthetics.
   c. A summary of quality assurance documentation and methods used by the firm, including sample quality assurance forms, reports, certifications, and manuals prepared by the firm.
   d. Resumes of key personnel.

Additional information may need to be submitted if required by the Project Manager.

Pre-installation: Prior to beginning work on a project, the Geosynthetic QAC must provide the Project Manager with the following information:

1. Resumes of personnel to be involved in the project including Geosynthetic QAE and Geosynthetic Quality Assurance Monitors.

2. Proof of professional engineering registration in the appropriate state for the engineer to be designated as the Geosynthetic QAE, as well as proof of B.S., M.S., or Ph.D in civil engineering or related field degree.

3. Proof of the required quality assurance experience of all of the quality assurance personnel with emphasis on polyethylene geomembranes.

4. Examples of forms to be used in documentation of the project.

1.2.8 Soil Quality Assurance Laboratory

1.2.8.1 *Definitions*

The Soil Quality Assurance Laboratory (Soil QAL) is the firm which conducts tests on soil samples taken from the site. The Soil QAL and Geosynthetic QAL may be the same party.

1.2.8.2 *Responsibilities*

The Soil QAL is responsible for conducting the appropriate laboratory tests as directed by the Soil QAE. The test procedures shall be done in accordance with the test methods outlined in this QAGD and/or the project QAP. The Soil QAL shall be responsible for providing tests results as outlined in Section 1.2.8.4.

1.2.8.3 *Qualifications*

The Soil QAL shall be pre-qualified by the Owner and approved by the Project Manager. The Soil QAL shall have properly maintained and periodically calibrated appropriate testing equipment. The Soil QAL shall also ensure that laboratory soil testing is performed by personnel with experience and/or training in soil testing fundamentals. The laboratory personnel shall be familiar with American Society for Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), Federal Test Method Standard (FTMS) and other applicable test standards. The Soil QAL shall be capable of providing test results within project deadlines throughout the soil prequalification and installation phase of the soil components.

The Soil QAL shall submit sample data and analysis to be used during the lab tests to the Project Manager.

1.2.8.4 *Submittals*

The Soil QAL shall submit all written test results within project deadlines to the Soil QAE. Soil test results shall be provided to the Soil QAE as soon as possible after test completion. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.2.9 Geosynthetic Quality Assurance Laboratory

1.2.9.1 *Definitions*

The Geosynthetic Quality Assurance Laboratory (Geosynthetic QAL) is the firm which conducts tests on samples of geosynthetics taken from the site. The Geosynthetic QAL and the Soil QAL may be the same party.

1.2.9.2 *Responsibilities*

The Geosynthetic QAL is responsible for conducting the appropriate laboratory tests as directed by the Geosynthetic QAE. The test procedures shall be done in accordance with the test methods outlined in this QAGD and/or the project QAP. The Geosynthetic QAL shall be responsible for providing test results as outlined in Section 1.2.9.4.

1.2.9.3 *Qualifications*

The Geosynthetic QAL shall be pre-qualified by the Owner and approved by the Project Manager. The Geosynthetic QAL shall have properly maintained and periodically calibrated appropriate testing equipment. The Geosynthetic QAL shall also ensure the laboratory testing is performed by personnel with experience and/or training in geosynthetic testing fundamentals.

The Geosynthetic QAL shall be familiar with ASTM, FTMS, National Sanitation Foundation (NSF), Geosynthetic Research Institute (GRI), and other applicable test standards. The Geosynthetic QAL shall be capable of providing results of destructive seam tests within 24 hours of receipt of test samples and shall maintain that standard throughout the installation. On-site laboratory facilities may be used by the Geosynthetic QAL, provided they are appropriately equipped and approved by the Geosynthetic QAC and Project Manager.

1.2.9.4 *Submittals*

The Geosynthetic QAL shall submit all destructive seam test results to the Geosynthetic QAE in written form within 48 hours of receipt of test samples unless otherwise specified by the Project Manager. Geomembrane destructive test results shall typically be provided to the Geosynthetic QAE within 24 hours of receipt of test samples. Written test results shall be in an easily readable format and include references to the standard test methods used.

1.3 COMMUNICATION

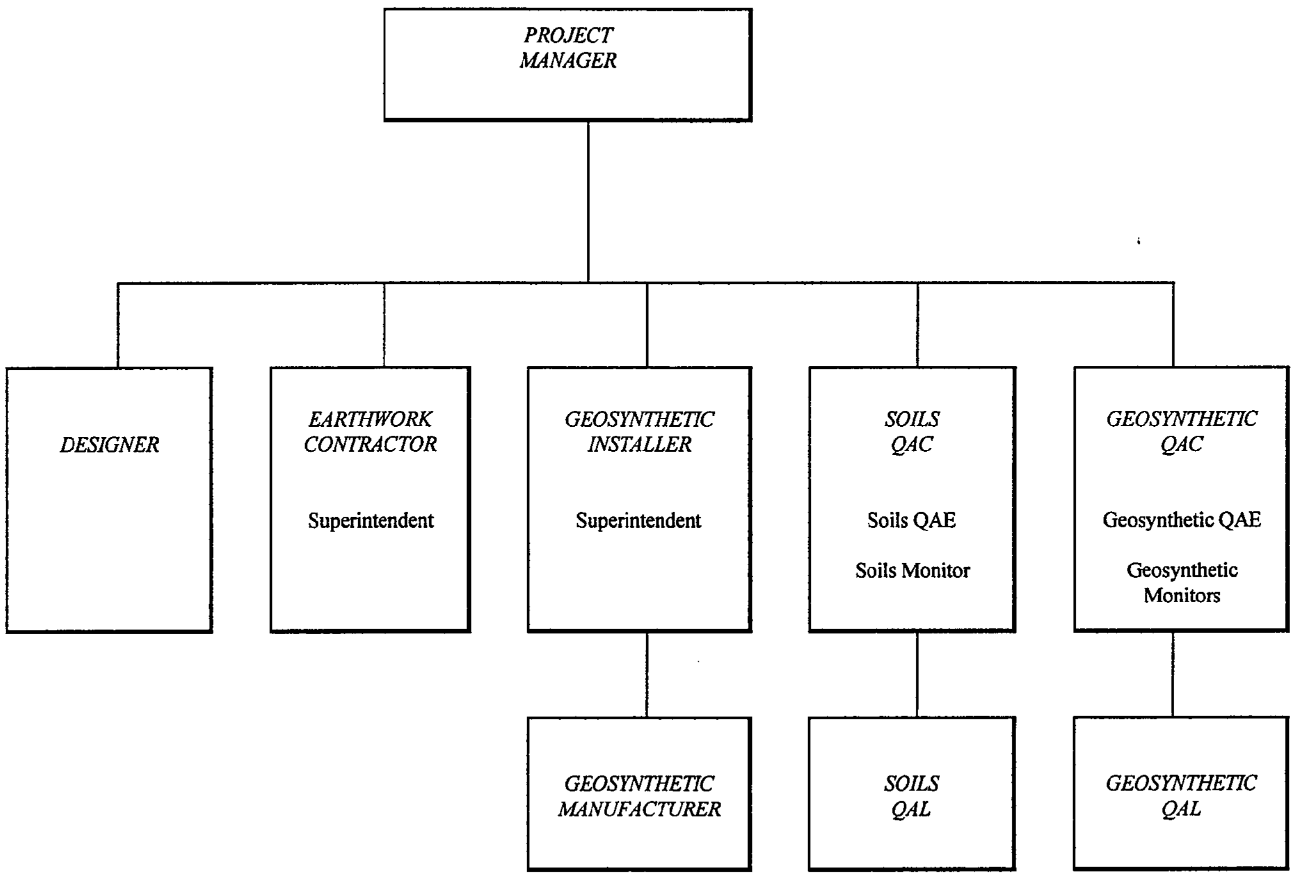
To help ensure a high degree of quality during installation and assure a final product that meets all project specifications, clear, open channels of communication are essential between all parties. This section discusses appropriate lines of communication and describes all meetings that will be necessary to achieve project goals.

1.3.1 Lines of Communication

The typical lines of communication necessary during a project are illustrated in Exhibit 1-1. The Soil QAE and Geosynthetic QAE shall be capable of direct communication with the Project Manager at all times.

Exhibit 1-1

LINES OF COMMUNICATION



1.3.2 Resolution Meeting

Following permit approval and the completion of the project plans and specifications, a resolution meeting may be held. If a Project Manager determines a resolution meeting is necessary, it shall be held prior to bidding the construction work and include all parties involved, typically including the Project Manager, Designer, Soil/Geosynthetic QAE and the Owner's technical representative. If appropriate, this meeting may be held in conjunction with the pre-bid meeting.

The purpose of the resolution meeting is to establish lines of communication, review project plans and specifications for completeness and clarity, begin planning for coordination of tasks, anticipate any problems which might cause difficulties and delays in construction, and complete the QAP. The design shall be discussed during this meeting so that clarification and/or design changes may be made before the construction work is bid. In addition, the guidelines regarding quality assurance testing and problem resolution must be known and accepted by all.

A recommended agenda for the resolution meeting is presented in Exhibit 1-2. The meeting shall be documented by a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties.

1.3.3 Pre-Construction Meeting

A pre-construction meeting shall be held at the site prior to beginning of lining system installation. Typically, the meeting shall be attended by the Project Manager, Designer, Earthwork Contractor, Geosynthetic Installer, Soil/Geosynthetic QAE, surveyor, and the Owner's technical representative.

Specific topics considered for this pre-construction meeting include review of the project QAP for any problems or additions. The responsibilities of each party should also be reviewed and understood clearly. A recommended agenda with specific topics for the pre-construction meeting is presented in Exhibit 1-3. The meeting shall be documented by a person designated at the beginning of the meeting, and minutes shall be transmitted to all parties.

1.3.4 Progress Meetings

A weekly progress meeting shall be held between the Soil/Geosynthetic QAE, Earthwork Contractor's/Installer's Superintendent, Project Manager and any other concerned parties. This meeting shall discuss current progress, planned activities for the next week, issues requiring resolution, and any new business or revisions to the work. The Soil/Geosynthetic QAE shall log any problems, decisions, or questions arising at this meeting in his weekly report. If any matter remains unresolved at the end of this meeting, the Project Manager shall be responsible for the resolution of the matter and the communication of the decision to the appropriate parties. The Project Manager may require daily progress meetings at his discretion.

Exhibit 1-2
RESOLUTION MEETING AGENDA
EXAMPLE

1. Introductions
   A. Assign Minute Taker
   B. Identify Parties
      1. Project Manager
      2. Designer
      3. Soil/Geosynthetic Quality Assurance Consultant
      4. Owner technical representative
      5. Others
2. Tour Project Site
3. Review Documents
   A. Project Plans
   B. Project Specifications
   C. Construction Quality Assurance Manuals
   D. Permit Documents
4. Complete Quality Assurance Plan
   A. Project-specific Addendum to Quality Assurance Manual(s)
   B. Project-specific Addendum to project specifications
5. Discuss Contract Administration and Construction Issues
6. Define Lines of Communication
7. Define Project Deliverables
8. Determine Schedule

Exhibit 1-3
PRE-CONSTRUCTION MEETING AGENDA
EXAMPLE

1. Introductions
   A. Assign Minute Taker
   B. Identify Parties
      1. Project Manager
      2. Designer
      3. Surveyor
      4. Earthwork Contractor
      5. Geosynthetic Installer
      6. Soil/Geosynthetic Quality Assurance Consultant
      7. Soil/Geosynthetic Quality Assurance Laboratory
      8. Owner technical representative
      9. Others
2. Tour Project Site
3. Review Documents
   A. Project Plans
   B. Project Specifications
   C. Geosynthetic Panel Layout
   D. Project Quality Assurance Plan
   E. Health and Safety Plan
4. Define Lines of Communication
   A. Lines of Communication
   B. Reporting Methods
   C. Distribution Methods
   D. Progress Meetings
   E. Procedures for Approving Design Clarifications and Changes During Installation
5. Review Site Requirements
   A. Safety Rules
   B. Site Rules
   C. Work Schedule
   D. Storage of Materials
   E. Available Facilities

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Exhibit 1-3 (Continued)
PRE-CONSTRUCTION MEETING AGENDA

F. Contractor Submittals

6. Discuss Construction Issues
    A. Scope of Work
    B. Review Design
        1. Construction Drawings
        2. Specifications
        3. Geosynthetic Panel Layout
    C. Construction Procedures
        1. Proposed Construction Sequencing
        2. Location of Soil Stockpile Areas
        3. Location of Geosynthetic Storage Area
        4. Equipment
        5. Construction Water Management
    D. Construction Schedule
    E. Procedures for Preparing and Approving Change Orders
7. Complete Construction Quality Assurance Plan
    A. Soils
    B. Geosynthetics
    C. Structural Systems (e.g., risers, piping, etc.)
8. Establish Project Deliverables
    A. Responsibilities
        1. Designer
        2. Installer
        3. Earthwork Contractor
        4. Soil/Geosynthetic Quality Assurance Consultant
        5. Soil/Geosynthetic Quality Assurance Laboratory
        6. Project Manager
    B. Distribution of Deliverables
    C. Approval Procedures

2.0 DOCUMENTATION

An effective QAP depends largely on identification of those construction activities that require monitoring, and on assigning responsibilities for the monitoring of each activity. This is most effectively verified by the thorough documentation of quality assurance activities. The Soil/Geosynthetic QAC shall document that all requirements in the lining portions of the project QAP have been addressed and satisfied.

The Soil/Geosynthetic QAC shall provide the Project Manager with signed descriptive remarks, data sheets, and checklists to verify that required monitoring activities have been carried out. The Soil/Geosynthetic QAC shall also maintain at the job site a complete file of all documents which comprise the QAP, including plans and specifications, this QAGD, checklists, test procedures, daily logs, and other pertinent documents.

2.1 DAILY REPORTS

2.1.1 Soils Reports

Each Soil Quality Assurance Monitor shall complete a daily report and/or logs on prescribed forms outlining all monitoring activities for that day. The report at a minimum shall consist of field notes, observations, test data sheets, construction problems and solution data sheets. A summary of all supporting data sheets along with final testing results and Soils QAE's approval of the work shall be required upon completion of construction.

The Project Manager shall immediately be made aware of any nonconformance with the project specifications. In particular, the Project Manager shall be informed before the work in question is covered by overlying system layers. The Project Manager shall then determine its cause and recommend direct appropriate changes or recommend the appropriate changes. When this type of evaluation is made, the results shall be documented, and any revision to procedures or project specifications shall be approved in writing by the Owner and Designer.

2.1.2 Geosynthetic Reports

Each Geosynthetic Quality Assurance Monitor shall complete a daily report and/or logs on prescribed forms outlining all monitoring activities for that day. The precise areas worked on, panel numbers, seams completed and approved, measures taken to protect unfinished areas overnight and other appropriate data and information shall be identified. Failed seams, other panel areas, or other geosynthetics requiring remedial action shall be identified with regard to nature of action, required repair, and precise location. Repairs completed must also be identified. Any problems or concerns with regard to operations on site should be noted. The report should also include information regarding the weather conditions. This report must be completed at the end of each monitor's shift, prior to leaving the site, and submitted to the Geosynthetic QAC.

The Geosynthetic QAE shall review the daily reports submitted by the Quality Assurance Monitors, and incorporate a summary of their reports into the QAE's daily report. Any matters requiring action by the Project Manager shall be identified. The report shall include a summary of the quantities of all material installed that day. This report must be completed daily, summarizing the previous day's activities, and a copy submitted to the Project Manager at the beginning of the work day following the report date.

2.2 TEST REPORTS

2.2.1 Soils Testing Reports

Records of field and laboratory testing performed on the soil components of the liner shall be collated by the Soil QAC. A summary list of test results shall be prepared by the Soil QAC on an ongoing basis, and submitted with the weekly progress reports.

2.2.2 Geosynthetic Testing Reports

The destructive test reports from all sources shall be collated by the Geosynthetic QAC. This includes field tests, Installer's laboratory tests (if performed), and Geosynthetic QAL tests. A summary list of test samples pass/fail results shall be prepared by the Geosynthetic QAC on an ongoing basis, and submitted with the weekly progress reports. The report shall also contain resolution on failed tests clearly documenting complete quality assurance conformance with established procedures.

2.3 PROGRESS REPORTS

Progress reports shall be prepared by the Soil and Geosynthetic QAEs and submitted to the Project Manager. These reports shall be submitted every week, starting the first Friday of soil placement or geosynthetics deployment on site or other day as approved by the Project Manager. This report shall include an overview of progress to date and an outline of any deviation from the project plans or specifications. The report shall also include any problems or deficiencies in installation at the site, an outline of any action taken to remedy the situation, a summary of weather conditions and a brief description of activities anticipated for the next reporting period. All daily reports for the period should be appended to each progress report.

2.4 RECORD DRAWINGS

2.4.1 Soils Drawings

Record drawings shall be prepared by the Soil QAC or surveyor. The record drawings shall include, at a minimum, the following information for soil components:

1. Surveyed grade of the prepared subgrade.

2. Surveyed grade of the clay layer and other soil components.

3. Measured dimensions of any excavation within the subgrade and also within the soil layers.

4. Locations of all field tests and samples obtained for laboratory testing.

5. Locations of all repairs performed on soil components.

6. Locations of grade changes relative to site survey grid.

If necessary, for the purpose of clarity in the drawings, separate sheets shall be used to illustrate the locations of test sampling points. The drawings shall be shown in both plan and in cross section views as applicable. All surveying shall be performed by a licensed land surveyor or approved by the Project Manager.

2.4.2 Geosynthetic Drawings

Record drawings shall be prepared by the Geosynthetic QAC or surveyor. The record drawings shall include, at a minimum, the following information for geomembranes:

1. Dimensions of all geomembrane field panels.

2. Location, as accurately as possible, of each panel relative to the site survey grid furnished by the Project Manager.

3. Identification of all seams and panels with appropriate numbers or identification codes.

4. Location of all patches and repairs.

5. Location of all destructive testing samples.

The record drawings shall illustrate each layer of geomembrane, and if necessary, other drawings shall identify problems or unusual conditions of the geotextile or geonet layers. In addition, applicable cross sections shall show layouts of geonets, geotextiles or geogrids in sump areas or any other areas which are unusual or differ from the design drawings. All surveying for as-built information shall be performed by a licensed land surveyor or approved by the Project Manager.

2.5 FINAL QUALITY ASSURANCE REPORT

Upon completion of the work, the Soil/Geosynthetic QAC shall submit a final Quality Assurance Report to the Project Manager. This report shall summarize the activities of the project, and document all aspects of the quality assurance program performed.

The final Quality Assurance Report shall include, at a minimum, the following information:

1. Parties and personnel involved with the project.

2. Scope of work.

3. Outline of project.

4. Quality assurance methods.

5. Test results (conformance, destructive and non-destructive, including laboratory tests).

6. Signature page, sealed and signed by a licensed Professional Engineer or licensed Surveyor.

7. Record drawings, sealed and signed by a licensed Professional Engineer.

The Soils/Geosynthetic QAC shall state in the report that the installation has proceeded in accordance with the project QAP except as noted to the Project Manager. A recommended outline for the final Quality Assurance Report is given in Exhibit 2-1. The items shown in Exhibit 2-1 shall be considered the minimum content. The Soils/Geosynthetic QAC may expand the content as required.

Exhibit 2-1
FINAL CONSTRUCTION QUALITY ASSURANCE REPORT
(CERTIFICATION REPORT)
GENERAL OUTLINE

1. Cover Sheet stamped by P.E. as required.
2. Introduction
   A. Purpose
   B. Scope
   C. Unit Description
   D. Project Parties
3. Project QAP
   A. Scope
   B. Design Changes
   C. Project-Specific Addenda
   D. Permit Conditions
   E. Regulations
4. Work Performed
   A. Weather Constraints
   B. Pre-construction Testing
   C. Conformance Testing (as required)
   D. Visual Monitoring
   E. Photo Documentation
   F. Construction Testing
   G. Repairs
5. Summary and Conclusions
6. Project Certification
7. Appendices
   A. Geosynthetic and/or Soils QAC Personnel
   B. Contractor Personnel
   C. Quality Assurance Plan (QAP) with Project-Specific Addenda
   D. Design Change Forms
   E. Earthwork Testing Records (if required)

Exhibit 2-1 (Continued)
FINAL CONSTRUCTION QUALITY ASSURANCE REPORT
GENERAL OUTLINE

F. Conformance Testing Records (as required)
G. Manufacturer Quality Control Records
H. Quality Assurance Reports
I. Subgrade Acceptance Certificates
J. Panel Placement and Seaming Records
K. Trial Weld Records
L. Non-Destructive Seam Testing Records
M. Destructive Seam Testing Records
N. Repairs
O. Record Drawings stamped by licensed surveyor or P.E. as required.

3.0 LINING SYSTEM ACCEPTANCE

3.1 SOIL COMPONENTS ACCEPTANCE

Upon written recommendation by the Soil QAC, the Project Manager shall consider accepting the soil components of the lining system. The Earthwork Contractor will retain all ownership and responsibility for the soil lining components until acceptance by the Project Manager. At the Project Manager's discretion, the lining system may be accepted in sections or at points of substantial completion.

The soil components of the lining system will be accepted by the Project Manager when:

1. The installation of the soil components is finished.

2. Verification of the adequacy of the constructed components, including repairs, if any, is completed in accordance with the project-specific QAP.

3. All documentation of installation is completed.

4. The Soil QAC is able to recommend acceptance.

The Soil QAC shall certify that installation of the soil components has proceeded in accordance with the soil portions of the project-specific QAP except as noted to the Project Manager. This certification shall be provided in the final Quality Assurance Report as outlined in Section 2.5.

3.2 GEOSYNTHETIC COMPONENTS ACCEPTANCE

Upon written recommendation by the Geosynthetic QAC, the Project Manager shall consider accepting the geosynthetic components of the lining system. The Installer will retain all ownership and responsibility for the geosynthetics in the lining system until acceptance by the Project Manager. At the Project Manager's discretion, the lining system may be accepted in sections or at points of substantial completion.

The geosynthetic components of the lining system will be accepted by the Project Manager when:

1. The installation of the geosynthetic components is finished.

2. Verification of the adequacy of all seams including associated testing and repairs, if any, is completed in accordance with the project-specific QAP.

3. All documentation of installation is completed.

4. The Geosynthetic QAC is able to recommend acceptance.

The Geosynthetic QAC shall certify that installation has proceeded in accordance with the geosynthetic portions of the project-specific QAP except as noted to the Project Manager. This certification shall be provided in the final Quality Assurance Report as outlined in Section 2.5.

4.0 SOIL LINER MATERIAL

4.1 DESCRIPTION AND APPLICABILITY

Soil liner material generally consists of native cohesive soils with low hydraulic conductivity used as a barrier element in lining systems. Soils used in soil liners shall consist of clean, select material free of debris, excessive coarse particles or other deleterious matter. Soils with a visibly identifiable organic content, or soils classified according to the Unified Soil Classification System as organic silt or organic clay (OL, OH) shall not be used. This Section does not address quality assurance procedures for bentonite admixtures or geosynthetic clay liners (GCL).

4.2 QUALITY CONTROL DOCUMENTATION

Prior to the construction of a soil liner, soil evaluation tests shall be performed to confirm the adequacy of soil liner materials procured from each on-site or off-site source area. All tests shall be performed in a geotechnical laboratory or in the field as required, which may be the Soil QAL or another laboratory approved by the Project Manager. The Earthwork Contractor shall submit the results of source evaluation tests to the Project Manager. Previous testing and evaluations of the soil sources may also be used to evaluate the soil material. The material shall be accepted or rejected by the Project Manager according to these results.

At a minimum, the following tests shall be conducted:

1. Moisture content (ASTM D2216)

2. Particle size (ASTM D1140, D422)

3. Atterberg limits (ASTM D4318)

4. Laboratory compaction (ASTM D1557 for Modified or ASTM D698 for Standard)

5. Laboratory hydraulic conductivity at a specified compaction (ASTM D5084)

Unless otherwise specified in the project specifications, these tests shall be performed at a frequency of one per 20,000 yd^3 (15,000 m^3) of liner soil, or upon visual observation of changes in the material type. Previous soil testing and evaluations may be used in determining testing frequencies.

If identification of additional soil liner material sources becomes necessary during construction, the same material qualification and testing procedures shall be applied to each new source. Additional testing may be required by the project specifications. Project specifications may modify testing frequencies if the soil liner material has been previously evaluated or used.

4.3 CONFORMANCE TESTING

Conformance testing of the soil liner materials shall be performed to ensure the consistency of the properties of the soil obtained from on or off-site borrow sources. These tests shall be performed on or off-site prior to placement, compaction and any necessary conditioning of the soil liner.

At a minimum, the following tests shall be conducted:

1. Moisture content (ASTM D2216)

2. Particle size (ASTM D1140, D422)

3. Atterberg limits (ASTM D4318)

4. Laboratory compaction (ASTM D1557 for Modified or ASTM D698 for Standard)

5. Laboratory hydraulic conductivity at a specified compaction (ASTM D5084)

Unless otherwise specified in the project specifications, particle size tests shall be performed at a frequency of one per 1,000 yd^3 (750 m^3) of liner soil, or upon visually observable changes in the material type. The other tests shall be performed at a frequency of one per 5,000 yd^3 (3,500 m^3) of liner soil, or upon visually observable changes in the material type.

The Soil QAE shall examine all test results and report any nonconformance to the Project Manager. The Project Manager shall accept or reject the soil based on this review and the requirements of the project specifications prior to construction.

4.4 SUBGRADE PREPARATION

The Earthwork Contractor shall be responsible for preparing the subgrade soil for placement of overlying materials including all fill and recompacted separation layers and underdrains. Upon completion of the subgrade preparation work, the Soil QAC shall examine the subgrade and prepare a certificate of acceptance to be submitted to the Project Manager. In this certificate of acceptance, the Soil QAC shall verify, at a minimum, that:

1. The surveyor has verified all lines and grades.

2. A qualified engineer has verified that the subgrade soil meets the criteria in the project specifications.

At any time during construction of the soil liner, the Soil QAC shall indicate to the Project Manager any locations which are not adequate for placement of the soil liner. Such defects in the subgrade soil shall be repaired by the Earthwork Contractor, at the direction of the Project Manager, such that the properties of the repaired areas meet the project specifications.

4.5 CONSTRUCTION OBSERVATION

Observation of the soil liner construction shall be coordinated with construction testing. Acceptance criteria for construction work shall be as identified in the project specifications.
At a minimum, the Soil QAC shall observe and record the following during the construction of soil liners:

1. Moisture content and consistency of the soil during processing, placement, and compaction.

2. Type and level of compactive effort
   a. Roller type
   b. Roller weight
   c. Number of coverages (if required)

3. Action of compaction equipment on the soil surface (sheepsfoot penetration, pumping, cracking, etc.)

4. Maximum clod size (if required)

5. Loose and compacted lift thickness

6. Method of bonding lifts together

7. Dimensions of the compacted embankment

8. Stones which may damage overlying geosynthetic components

9. Areas where damage due to excess moisture, insufficient moisture, freezing, or excessive dessication may have occurred.

4.6 CONSTRUCTION TESTING

All construction quality assurance testing shall be conducted in accordance with the project specifications, or as directed by the Project Manager, and as documented in the site-specific addenda to this QAGD. All field and laboratory tests shall be conducted on samples taken from the soil liner materials during the course of the construction work. Testing and sampling procedures shall be observed and documented by the Soil QAC. Documentation and reporting of test results shall be in accordance with the requirements identified in this QAGD.

4.6.1 Field Testing

The Soil QAC shall perform the following field tests on each lift of the compacted soil:

1. Field moisture content (ASTM D2216 or D3017)

2. Field density (ASTM D2922, D1556, D2167, or D2937)

Unless otherwise specified in the project specifications, these tests shall be performed at a frequency of one per 10,000 ft^2 (1,000 m^2) area or less of each compacted lift. Sampling locations shall be selected by the Soil QAC.

Nuclear density tests (ASTM D2922) shall be preferred for density (dry unit weight) testing for most projects. The location of routine in-place density tests can be determined using a non-biased sampling plan based on random selection of testing locations. Questions concerning the accuracy of any single test shall be addressed by retesting in the same general location. Periodic checks using the Drive Cylinder Method (ASTM D2937), Sand-Cone Method (ASTM D1556), Rubber Balloon Method (ASTM D2167) or other standard techniques required in the project specifications may be performed to verify the nuclear density test results.

Unless otherwise noted in the project specifications, or as directed by the Project Manager, all perforations of the soil liner shall be backfilled. Perforations that must be backfilled shall include, but not limited to, the following:

Nuclear density test probe locations

Sand-cone test locations

Rubber balloon test locations

Hydraulic conductivity sampling locations

Drive cylinder test locations

All perforations shall be backfilled with bentonite, a mixture of bentonite and soil or compacted soil liner material as specified in the project specifications. Compaction shall be performed with a tamping rod, Modified or Standard Proctor hammer, or a hand tamper as specified in the project specifications. At a minimum, the Soil QAC shall perform observations and routine tests on the backfilled areas to ensure a proper seal.

Based on recommendations from the Soil QAC and at the discretion of the Project Manager, an increased frequency of testing may be required if one or more of the following conditions develop during construction:

1. Rollers slip during operation
2. Lift thickness is greater than specified
3. Soil is at improper and/or variable moisture content
4. Fewer than the specified number of roller coverages are made
5. Clogged rollers are used to compact the material
6. Soils fail to meet the project specifications

7. Soil liner materials differ substantially from those specified

8. Degree of compaction and remolding of the material is suspect

Additional testing may also be considered when:

1. Weather conditions are adverse

2. Rollers have not used optimum ballast

3. Equipment breaks down frequently

4. Grading is being started or finished

4.6.2 Laboratory Testing

Hydraulic conductivity tests (ASTM D5084) may be performed to confirm the soil in the compacted lining system meets the project specifications. Unless specified in the project specifications, hydraulic conductivity of the compacted soil shall be determined on undisturbed samples obtained from the constructed soil liner at the frequency of one test per lift per acre. Acceptability criteria shall be as identified in the project specifications.

Laboratory hydraulic conductivity samples shall be taken such that the sample tube is inserted into the liner perpendicular to the plane of the constructed surface. The tube shall be inserted into the lift being tested by applying a gradually increasing pressure.

4.7 DEFECTS AND REPAIRS

4.7.1 Identification

Acceptability criteria for testing shall be as identified in the project specifications. Recommended maximum percentage of failing material tests and maximum allowable variations may be specified in the project specifications. At locations where the testing indicates the requirements of the project specifications are not met, the Soil QAC shall determine the extent and the nature of the defect and recommend corrective actions to the Project Manager.

The Soil QAC shall confirm that no stones or roots are present which may damage overlying geosynthetic components. If the compacted soil liner has been subject to adverse weather conditions, the Soil QAC shall reexamine the soil for possible damage.

4.7.2 Notification

After determining the extent and nature of any defect, the Soil QAC shall promptly notify the Earthwork Contractor and the Project Manager. A work deficiency meeting shall be held as needed between the Earthwork Contractor, Soil QAC, Designer, Project Manager and other appropriate parties to assess the problem, review alternative solutions, and implement an action plan.

4.7.3 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to meet the project specifications. If a project specification criteria cannot be met, or unusual weather conditions hinder work, the Soil QAC and Designer shall develop and present to the Project Manager suggested solutions for his approval.

The Soil QAC shall schedule appropriate retests when the work defect has been corrected. All retests by the Soil QAC shall verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

The Soil QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

5.0 GRANULAR DRAINAGE MEDIA

5.1 DESCRIPTION AND APPLICABILITY

Granular drainage materials consist of highly permeable materials used in leachate collection, final cover drainage and gas venting systems. The materials may consist of clean sands and/or gravels or other permeable material generally classified according to the Unified Soil Classification System as SW, SP, GW or GP. Variation to these material classifications may be required by project specifications.

5.2 QUALITY CONTROL DOCUMENTATION

Prior to the construction of a granular drainage layer, source evaluation tests shall be performed to confirm the adequacy of the granular drainage materials procured from each on or off-site source area. All material evaluation tests are to be performed in a geotechnical laboratory, which may be the Soil QAL or another laboratory approved by the Project Manager. The Earthwork Contractor shall submit the results of source evaluation tests to the Project Manager. The material shall be accepted or rejected by the Project Manager according to these results.

At a minimum, the following tests shall be conducted:

1. Particle Size (ASTM D1140, D422, C136, or C117)

2. Laboratory Hydraulic Conductivity at a specified density (ASTM D2434)

Unless otherwise specified in the project specifications, one series of these tests shall be performed per source, or upon visually observable changes in the material type. If identification of additional drainage material sources becomes necessary during construction, the same material qualification and consistency checking procedures shall be applied to each such source.

For granular drainage materials used in the leachate collection systems, the amount of soluble carbonates shall be determined as required by the project specifications. For granular drainage materials used in leachate collection trenches and sumps, laboratory hydraulic conductivity tests may not be required. Additional testing may be specified by the project specifications.

5.3 CONFORMANCE TESTING

Conformance testing of the granular drainage materials shall be performed to ensure the consistency of the drainage layer material properties obtained from the borrow source.

At a minimum, the following tests shall be conducted:

1. Particle size (ASTM D1140, D422, C136, C117)

2. Laboratory hydraulic conductivity at a specified density (ASTM D2434)

Unless otherwise specified in the project specifications, particle size tests shall be performed at a frequency of one per 3,000 yd^3 (2,500 m^2) of drainage layer material, or upon visually observable changes in the material type. The laboratory hydraulic conductivity tests shall be performed upon visually observable changes in the material type or, as required in the project specifications.

The Soil QAE shall examine all test results and report any nonconformance to the Project Manager. The Project Manager shall accept or reject the material based on this review and the requirements of the project specifications prior to construction.

5.4 CONSTRUCTION OBSERVATION

The Soil QAC shall observe the procedures used by the Earthwork Contractor during placement of the drainage material to ensure that the materials meet the project specifications. The thickness of the drainage layer shall be verified by a licensed land surveyor following completion of the drainage layer placement. The Soil QAC shall prepare a certificate of acceptance for the drainage layer to be submitted to the Project Manager.

If placement on a geomembrane, the Soil QAC or Geosynthetic QAC, as determined by Project Manager, shall verify:

1. Placement of materials on the geomembrane shall not proceed at an ambient temperature below 32□F (0□C) nor above 104□F (40□C) unless otherwise approved.

2. Placement of materials on the geomembrane should be done during the coolest part of the day to minimize the development of wrinkles in the geomembrane.

3. Equipment used for placing materials shall not be driven directly on the geomembrane.

4. A minimum thickness of 1 ft (0.3 m) of materials is specified between a light dozer, ground pressure of 5 psi (35 kPa) or lighter, and the geomembrane. (or as required by project specification)

5. In any areas traversed by any vehicles other than low ground pressure vehicles approved by the Project Manager, the soil layer shall have a minimum thickness of 3 ft (0.9 m). This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. Small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic QAC to ensure that wrinkle formation is minimized and that, in all cases, the geomembrane is not folded over on itself.

5.5 DEFECTS AND REPAIRS

5.5.1 Identification

If a defect is identified in the drainage layer, the Soil QAC shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the Soil QAC shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Soil QAC deems appropriate.

5.5.2 Notification

After determining the extent and nature of the defect, the Soil QAC shall promptly notify the Earthwork Contractor and the Project Manager. A work deficiency meeting shall be held as required between the Earthwork Contractor, Soil QAC, Designer, Project Manager and other appropriate parties to assess the problem, review alternative solutions, and implement an action plan.

5.5.3 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to meet the project specifications. If project specification criteria cannot be met, or unusual weather conditions hinder work, the Soil QAC and Designer shall develop and suggest solutions to the Project Manager for his approval.

The Soil QAC shall schedule appropriate retests when the work defect has been corrected. All retests by the Soil QAC shall verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

The Soil QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

6.0 PROTECTIVE SOIL COVER

6.1 DESCRIPTION AND APPLICABILITY

Protective soil covers consist of soils used to protect the components of the lining systems. Other materials (tire chips, glass cullet, foundry sand, etc.) are suitable for this use if performance requirements are met. This material prevents direct contact between the lining system and the refuse or between the leachate collection system and the refuse. Particles of the protective soil cover shall not be of a size or shape which may damage an underlying geosynthetic component.

6.2 QUALITY CONTROL DOCUMENTATION

Prior to construction of the protective soil cover, source evaluation tests shall be performed to confirm the adequacy of protective soil cover materials procured from each on or off-site source area. The Soil QAC shall verify that the grain-size distribution of the protective layer material is as specified in the project specifications. All required testing shall be performed by the Soil QAL or another laboratory approved by the Project Manager. The Earthwork Contractor shall submit the results of source evaluation tests to the Project Manager. The material shall be accepted or rejected by the Project Manager according to these results.

The particle size distribution tests (ASTM D1140, D422, C136, C117) as appropriate shall be performed at a frequency of one per 20,000 yd^3 (15,000 m^3) or upon visual observation of changes in the protective layer soil. If identification of additional soil sources becomes necessary during construction, the same material qualification and testing procedures shall be applied to each new source.

If the project specifications require the use of cohesive protective layer materials, the Soil QAC shall obtain the moisture content of the material at the source as specified in the project specifications to evaluate its workability. Additional testing may be performed if required by the project specifications.

6.3 CONFORMANCE TESTING

Conformance testing of the protective soil cover shall be performed to ensure the consistency of the properties of the soil obtained. The Soil QAC shall conduct particle size tests at the frequency of one per 5,000 yd^3 (3,500 m^3) of protective layer soil before placement. If cohesive soil is used to construct the protective layer on the sideslopes, the Soil QAC shall obtain the moisture content of the protective layer soil at the time of placement at a frequency specified in the project specifications.

The Soil QAC shall examine all test results and report any nonconformance to the Project Manager. The Project Manager shall accept or reject the material based on this review and the requirements of the project specifications prior to construction.

6.4 CONSTRUCTION OBSERVATION

The Soil QAC shall verify the protective layer thickness by spot checks and direct measurements after placement. The Soil QAC shall also observe the placement of any geosynthetic placed in direct contact with the protective soil.

If placing on a geomembrane or geocomposite (i.e. texnet), the Soil QAC or Geosynthetic QAC as determined by Project Manager shall verify:

1. Placement of soils on the geomembrane shall not proceed at an ambient temperature below 32°F (0°C) nor above 104°F (40°C) unless otherwise approved.

2. Placement of soil on the geomembrane should be done during the coolest part of the day to minimize the development of wrinkles in the geomembrane.

3. Equipment used for placing soil shall not be driven directly on the geomembrane.

4. A minimum thickness of 1 ft (0.3 m) of soil is specified between a light dozer, ground pressure of 5 psi (35 kPa) or lighter, and the geomembrane. (or as required by project specification)

5. In any areas traversed by any vehicles other than low ground pressure vehicles approved by the Project Manager, the soil layer shall have a minimum thickness of 3 ft (0.9 m). This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. Small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic QAC to ensure that wrinkle formation is minimized and, in all cases, that the geomembrane is not folded over on itself. The minimum thickness shall be certified by the surveyor in accordance with the project specifications.

6.5 DEFECTS AND REPAIRS

6.5.1 Identification

If a defect is identified in the protective soil cover layer, the Soil QAC shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the Soil QAC shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Soil QAC deems appropriate.

6.5.2 Notification

After determining the extent and nature of the defect, the Soil QAC shall promptly notify the Earthwork Contractor and the Project Manager. A work deficiency meeting shall be held as needed between the Earthwork Contractor, the Soil QAC, Designer, Project Manager and other appropriate parties to assess the problem, review alternative solutions, and implement an action plan.

6.5.3 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to meet the project specifications. If a project specification criteria cannot be met, or unusual weather conditions hinder work, the Soil QAC and Designer shall develop and present to the Project Manager suggested solutions for his approval.

The Soil QAC shall schedule appropriate retests when the work defect has been corrected. All retests by the Soil QAC must verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

The Soil QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

7.0 VEGETATIVE SOIL COVER

7.1 DESCRIPTION AND APPLICABILITY

Vegetative soil cover material generally consists of medium-textured soils capable of supporting vegetative growth. Establishment of vegetation reduces cover erosion due to water and wind, and protects the soil and/or geosynthetic cover against damage. The vegetation also enhances the aesthetic appearance of the landfill.

Site-specific criteria for the vegetative layer shall be specified in the project specifications. Alternative cover designs in certain climatic regions may not require a vegetative soil cover. In such cases, the site-specific project specifications are to be used instead of this Section as a guide for construction quality assurance purposes.

7.2 QUALITY CONTROL DOCUMENTATION

Prior to the construction of a vegetative layer, any required tests shall be conducted to verify that proposed sources meet the project specifications. Testing shall be performed by the Soil QAL or other laboratory approved by the Project Manager.

The Earthwork Contractor shall submit the results of these tests to the Project Manager. The Project Manager shall accept or reject the material based on these test results.

7.3 CONSTRUCTION OBSERVATION

The vegetative cover layer shall be compacted to the specified thickness. The firmness of the compacted vegetative cover varies with the type of vegetation specified for the cover, and should be indicated in the project specifications.

The Soil QAC shall:

1. Verify the actual thickness of the vegetative soil cover after compaction by direct measurements. The thickness of the soil layer shall not be less than the thickness required by the project specifications. Thickness measurements shall be taken at spaced points as required by project specifications. The vegetative soil cover layer final grades shall be verified by the surveyor as required.

2. Ensure that care is taken in the vicinity of riser pipe and other protrusions to prevent physical damage by the construction equipment.

3. Observe the quantity and the uniformity of any soil amendment incorporated within the tilled depth before seeding.

4. Ensure that the seeding application equipment is appropriate for the job. The rate of seed and mulch application, amount and uniformity of coverage, and watering instructions as provided in the project specifications shall be closely observed.

5. Examine the perimeter areas to ensure that no unseeded area remain.

The Soil QAC shall report any nonconformance to the Project Manager.

7.4 DEFECTS AND REPAIRS

7.4.1 Identification

If a defect is identified in the vegetative soil layer, the Soil QAC shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the Soil QAC shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Soil QAC deems appropriate. If the vegetative layer has been subject to adverse weather conditions during construction, the Soil QAC shall reexamine the vegetative layer for possible damage in overly wet, desiccated or windblown areas.

7.4.2 Notification

After determining the extent and nature of the defect, the Soil QAC shall promptly notify the Earthwork Contractor and the Project Manager. If necessary, a work deficiency meeting may be held as needed between the Earthwork Contractor, Soil QAC, Designer, Project Manager and other necessary parties to assess the problem, review alternative solutions, and implement an action plan.

7.4.3 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to meet the project specifications. If project specification criteria cannot be met, or unusual weather conditions hinder work, the Soil QAC and Designer shall develop and present to the Project Manager suggested solutions for his approval.

The Soil QAC shall schedule appropriate retests when the work defect has been corrected. All retests by the Soil QAC must verify that the defect has been corrected before additional work is performed by the Earthwork Contractor in the area of the deficiency.

The Soil QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

8.0 GENERAL EARTHFILL

8.1 DESCRIPTION AND APPLICABILITY

General earthfill consists of random, granular or cohesive material taken from on-site, approved off-site excavations or stockpiles and used for non-critical applications. General earthfill material consists of a broad range of soils relatively free of organics, debris, or other deleterious matter which can be used for the purpose of earthfill construction. Specific tests to determine the suitability of earth materials for use in general earthfill shall be specified in the project specifications.

8.2 QUALITY CONTROL DOCUMENTATION

Prior to construction of the general earthfill, any required tests shall be performed to determine conformance with the project specifications. Testing shall be performed by the Soil QAL or other laboratory approved by the Project Manager.

If required, the general fill material shall be processed such that it does not contain particles exceeding the maximum size established in the project specifications. The Earthwork Contractor shall submit the results of these tests to the Project Manager. The Project Manager shall accept or reject the material based on these tests.

8.3 CONSTRUCTION OBSERVATION

The Soil QAC shall verify that the requirements of the project specifications are met. The Soil QAC shall report any nonconformance to the Project Manager.

8.4 DEFECTS AND REPAIRS

8.4.1 Identification

If a defect is identified in the finished general earthwork, the Soil QAC shall determine the extent and the nature of the defect. If the defect is indicated by an unsatisfactory test result, the Soil QAC shall determine the extent of the deficient area by additional tests, observations, a review of records, or other means that the Soil QAC deems appropriate.

8.4.2 Notification

After determining the extent and nature of the defect, the Soil QAC shall promptly notify the Earthwork Contractor and the Project Manager. A work deficiency meeting shall be held as needed between the Earthwork Contractor, Soil QAC, Designer, Project Manager and other necessary parties to assess the problem, review alternative solutions, and implement an action plan.

8.4.3 Repairs and Retesting

The Earthwork Contractor shall correct all deficiencies to meet the project specifications. If a project specification criteria cannot be met, or unusual weather conditions hinder work, the Soil QAC shall develop and present to the Project Manager suggested solutions for his approval.

The Soil QAC shall schedule appropriate retests, if any required, when the work defect has been corrected. All retests by the Soil QAC must verify that the defect has been corrected before any additional work is performed by the Earthwork Contractor in the area of the deficiency.

The Soil QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

9.0A BASE LINER GEOMEMBRANES

9.1A DESCRIPTION AND APPLICABILITY

Geomembranes are low permeability geosynthetic barriers used in lining systems. This Section is applicable to smooth and textured high density polyethylene (HDPE) geomembranes for base lining systems. The base lining system is defined as the liner on the bottom and inside sideslope surfaces of a landfill cell. This Section may need to be modified when using other geomembranes.

9.2A MANUFACTURING PLANT INSPECTION [OPTIONAL]

The Owner or other appropriate representative may conduct an annual inspection of the Manufacturer's plant. The Manufacturer will document annual inspections of manufacturing plants for products which they distribute. ISO 9000 certification may be accepted as a substitute. In addition, the Project Manager, or his designated representative, may visit the manufacturing plant for a project-specific inspection if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the product for that particular project. The purpose of the plant inspection is to review the manufacturing process and quality control procedures.

The manufacturing plant inspection may include:

1. Verification that properties guaranteed by the Manufacturer are met and meet all the project specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and test methods used are acceptable. (including calibrations)

3. Spot inspection of the rolls and verification that they are free of imperfections or any sign of contamination by foreign matter.

4. Review of handling, storage, and transportation procedures, and verification that these procedures will not damage the geomembrane.

5. Verification that roll packages have a label indicating the name of the manufacturer, type of geomembrane, thickness, roll number, and roll dimensions.

6. Verification that extrusion rods and/or beads are produced from the same base resin type as the geomembrane.

A report describing the inspection shall be retained by the Owner for annual inspections and by the Project Manager for project-specific inspections.

9.3A QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geomembrane, the Manufacturer or Installer shall provide the Project Manager with the following information:

1. Copies of dated quality control certificates issued by the resin supplier.

2. Written certification that minimum values given in the specification are guaranteed by the Manufacturer.

3. Quality control certificates, signed by a responsible party employed by the Manufacturer. Each quality control certificate shall include roll identification numbers, testing procedures, and results of quality control tests. At a minimum, results shall be given for:
   a. Density (ASTM D1505)
   b. Carbon black content (ASTM D4218)
   c. Carbon black dispersion (ASTM D5596)
   d. Thickness (ASTM D5199-smooth/ASTM D5944-textured)
   e. Tensile properties (ASTM D638)

   These quality control tests shall be performed in accordance with the test methods for every 15,000 lbs. of resin.

4. Results of environmental stress crack resistance tests (ASTM D5397 - single point). At a minimum, tests shall be performed once every resin lot (180,000 lbs.).

The following shall be maintained by the Manufacturer and will be available upon request:

1. The origin (supplier's name and production plant) and identification (brand name and number) of the resin used to manufacture the geomembrane.

2. Results of tests conducted by the Manufacturer to verify that the resin used to manufacture the geomembrane meets the project specifications.

3. A list of the materials which comprise the geomembrane, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives.

The Manufacturer shall identify all rolls of geomembranes with the following:

1. Manufacturer's name
2. Product identification
3. Thickness
4. Roll number
5. Roll dimensions

The Geosynthetic QAE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QAE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

4. Rolls are appropriately labeled.

5. Certified minimum properties meet the project specifications.

6. Project specifications and a copy of the QAP are provided by the Project Manager to the Installer.

9.4A CONFORMANCE TESTING

In general, conformance testing is not required except under the following conditions:

1. A specific regulatory or permit condition requiring independent material conformance testing to be performed.

2. The Geosynthetic QAC is required by contract to provide a professional engineer's certification that the material meets certain specifications (as opposed to certifying that the material supplied is marked and identified as that which is specified for the project).

3. Conformance testing may be required by the Project Manager at any time.

9.4.1A Sampling Procedures

Upon delivery of the rolls of the geomembrane, the Geosynthetic QAC shall ensure that conformance test samples are obtained for the geomembrane. The geomembrane rolls to be sampled shall be selected by the Geosynthetic QAC. Samples shall be taken across the entire width of the roll judged by the Geosynthetic QAC not to be damaged. Unless otherwise specified by the Project Manager, samples shall be 3 ft (1 m) long by the roll width. The Geosynthetic QAC shall mark the machine direction on the samples with an arrow.

If the Project Manager desires, the Geosynthetic QAC can perform the conformance test sampling at the manufacturing plant. This may be advantageous in expediting the installation process for very large projects.

Unless otherwise specified in the project specifications, samples shall be taken at a rate of not less than one per 100,000 ft^2 (10,000 m^2) of geomembrane. These samples shall be forwarded to the Geosynthetic QAL for testing.

9.4.2A Conformance Tests

The following conformance tests shall be conducted:

1. Density (ASTM D1505)
2. Carbon black content (ASTM D4218)
3. Carbon black dispersion (ASTM D5596)
4. Thickness (ASTM D5199)
5. Tensile properties (ASTM D638)

Other conformance tests may be required by the project specifications.

9.4.3A Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QAE prior to the deployment of the geomembrane. The Geosynthetic QAE shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The Geosynthetic QAE shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that non-conforming tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. Alternatively, the Manufacturer may have the sample retested at two different Owner-approved Geosynthetic QALs. If both laboratories produce conforming results, the material shall be accepted. If both laboratories do not produce conforming results, then the original Geosynthetic QAL's test results shall be accepted. The use of these procedures for dealing with non-conforming test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out-of-specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting the project specification. This procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line. To isolate the out-of- specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

9.5A SUBGRADE PREPARATION

9.5.1A Surface Preparation

The Earthwork Contractor shall be responsible for preparing the underlying soil prior to geomembrane placement. The Project Manager shall coordinate the work of the Earthwork Contractor and the Installer so that the requirements of the project-specific QAP are met.

Before the geomembrane installation begins, the Geosynthetic QAC shall verify that:

1. A land surveyor qualified according to project requirements has verified all lines and grades.

2. A Professional Engineer qualified according to project requirements has verified that the underlying soil meets the criteria specified in the project specifications.

3. The underlying soil surface to be lined has been rolled, compacted, or hand-worked so as to be free of irregularities, protrusions, loose soil, and abrupt changes in grade.

4. The surface of the underlying soil does not contain stones which may be damaging to the geomembrane.

5. There is no area excessively softened by high water content.

6. There is no area where the underlying soil surface contains desiccation cracks which may damage the geomembrane.

The Installer shall certify in writing that the surface on which the geomembrane will be installed is acceptable. A certificate of acceptance shall be given by the Installer to the Geosynthetic QAC prior to commencement of geomembrane deployment in the area under consideration. The Project Manager shall be given a copy of this certificate by the Geosynthetic QAC.

After the underlying soil has been accepted by the Installer, it is the Installer's responsibility to indicate to the Project Manager any change in the underlying soil condition that may require repair work. The Project Manager may consult with the Geosynthetic QAC regarding the need for repairs. If the Geosynthetic QAC concurs with the Installer, the Project Manager shall ensure that the underlying soil is repaired.

At any time before or during the geomembrane installation, the Geosynthetic QAC shall indicate to the Project Manager any locations which may not be adequately prepared for the geomembrane.

9.5.2A Anchor Trench

The Geosynthetic QAC shall verify:

1. The anchor trench has been constructed according to the project plans and specifications.

2. Rounded corners are provided in the trench so as to avoid sharp bends in the geomembrane.

3. Excessive amounts of loose soil are not allowed to underlie the geomembrane in the anchor trench.

4. The anchor trench is adequately drained to prevent ponding or softening of the adjacent soils while the trench is open.

5. The anchor trench is backfilled and compacted promptly after geomembrane deployment as outlined in the project specifications.

Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetic components. The Geosynthetic QAC shall observe the backfilling operation and advise the Project Manager of any problems. Any problems shall be documented by the Geosynthetic QAC in his daily report.

9.6A GEOMEMBRANE DEPLOYMENT

9.6.1A Panel Nomenclature

A field panel is defined as a unit of geomembrane which is to be seamed in the field. A field panel is a roll or a portion of a roll cut in the field. The Geosynthetic QAC shall be responsible to ensure that each field panel is given an identification code (number or letter-number) consistent with the layout plan. This identification code shall be as simple and logical as possible and shall be agreed upon by the Project Manager, Installer and Geosynthetic QAC.

In general, it is not appropriate to identify panels using roll numbers since roll numbers established in the manufacturing plant are usually cumbersome and are not related to location in the field. The Geosynthetic QAC shall establish a table or chart showing correspondence between roll numbers and field panel identification codes. The field panel identification code shall be used for all quality assurance records.

9.6.2A Panel Deployment Procedure

The Geosynthetic QAC shall review the panel deployment progress of the Installer and advise the Project Manager on changes in panel deployment. The Geosynthetic QAC shall also review the panel deployment for suitability to actual field condition such as issues relating to wind, rain, soil liner desiccation and other site-specific conditions. The Geosynthetic QAC shall verify that the condition of the underlying soil does not change detrimentally during installation. The Geosynthetic QAC shall record the identification code, location, and date of installation of each field panel.

9.6.3A Deployment Weather Conditions

Geomembrane deployment shall not be undertaken if weather conditions will preclude material seaming following deployment.

The normal acceptable weather conditions for seaming are as follows:

1. Ambient temperature between 32°F (0°C) and 104°F (40°C).

2. Dry conditions (no precipitation or other excessive moisture)

3. No excessive winds.

Ambient temperature shall be measured and ambient conditions appraised by the Geosynthetic QAC in the area in which the panels are to be placed.

The Geosynthetic QAC shall inform the Project Manager of any weather-related problems which may not allow geomembrane placement to proceed. The Project Manager will determine if the installation is to be stopped or special procedures are to be used.

9.6.4A Method of Deployment

Before the geomembrane is handled on site, the Geosynthetic QAC shall verify that deployment equipment and method of deployment proposed by the Installer to be used on the site is adequate and does not pose risk of damage to the geomembrane or underlying subgrade. If vehicles are used which must operate on the geomembrane, drivers shall proceed with caution during deployment of the geomembrane to prevent spinning of tires, sharp turns and quick stops. During handling, the Geosynthetic QAC shall observe and verify that the Installer's personnel handle the geomembrane with care.

The Geosynthetic QAC shall verify the following:

1. Equipment used does not damage the geomembrane or underlying subgrade by handling.

2. The prepared surface underlying the geomembrane is acceptable immediately prior to geomembrane placement.

3. Geosynthetic elements immediately underlying the geomembrane are clean and free of debris.

4. Personnel do not smoke or wear damaging shoes while working on the geomembrane, or engage in other activities which could damage the geomembrane.

5. The method used to unroll the panels does not cause excessive scratches or crimps in the geomembrane and does not damage the supporting soil.

6. The method used to place the panels minimizes wrinkles especially differential wrinkles between adjacent panels.

7. Adequate temporary loading and/or anchoring (such as sand bags or tires), not likely to damage the geomembrane, are placed to prevent uplift by wind. In case of high winds,

continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels.

8. Direct contact with the geomembrane is minimized, and the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where repeated traffic use may be expected. See Section 9.11 for geomembrane protection.

9. Liner has promptly been anchored in trench where applicable.

The Geosynthetic QAC shall inform the Project Manager if the above conditions are not fulfilled.

9.6.5A Damage and Defects

Upon delivery to the site, the Geosynthetic QAC shall conduct a surface observation of all rolls for defects and for damage. This examination shall be conducted without unrolling rolls unless defects or damages are found or suspected. The Geosynthetic QAC shall advise the Project Manager, in writing, of any rolls or portions of rolls which should be rejected and removed from the site because they have severe flaws, and/or minor repairable flaws.

The Geosynthetic QAC shall examine each panel, after placement and prior to seaming, for damage and/or defects. The Geosynthetic QAC shall advise the Project Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels, or portions of damaged panels, which have been rejected shall be marked and their removal from the work area recorded by the Geosynthetic QAC. Repairs shall be made using procedures described in Section 9.10.

9.6.6A Writing on the Liner

To avoid confusion, the Installer and the Geosynthetic QAC shall each use different colored markers or other materials approved by the Project Manager that are readily visible for writing on the geomembrane. The markers used must be semi-permanent and compatible with the geomembrane. The Installer shall use a white marker to write on the geomembrane while the Geosynthetic QAC shall use a yellow marker.

9.7A FIELD SEAMING

9.7.1A Seam Layout

Before installation begins, the Installer shall provide the Project Manager and the Geosynthetic QAC with a panel layout drawing. This drawing shall present all the proposed seams of the lining system at the facility. The Geosynthetic QAE shall review the panel layout drawing and verify that it is consistent with accepted state-of-practice.

In general, seams should be oriented parallel to the line of maximum slope. In corners and odd-shaped geometric locations, the number of seams should be minimized. No horizontal seam should be less than 5 ft (1.5 m) from the toe or crest of the slope, or from areas of potential stress concentrations, unless otherwise authorized by the Project Manager.

Horizontal seams shall be allowed under the following conditions:

1. Seams are offset in adjacent panels by one panel width.

2. Seams are "shingled" downhill.

A seam numbering system compatible with the panel numbering system shall be used by the Geosynthetic QAC.

9.7.2A Accepted Seaming Methods

Approved processes for field seaming are fusion welding and extrusion welding. Proposed alternate processes shall be documented and submitted by the Installer to the Project Manager for approval. The Project Manager shall submit all documentation regarding seaming methods to be used to the Geosynthetic QAC for review.

9.7.2.1A *Fusion Process*

The Geosynthetic QAC shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Project Manager.

The Geosynthetic QAC shall also verify that:

1. The Installer maintains on-site the number of spare operable seaming apparatus agreed upon at the pre-construction meeting.

2. Equipment used for seaming is not likely to damage the geomembrane.

3. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane and any fuel spills promptly cleaned up. Fuel shall not be stored on liner surface.

4. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs to the geomembrane.

5. A movable protective layer is used as required by the Installer directly below each overlap of geomembrane that is to be seamed to prevent buildup of moisture between the sheets and to prevent debris from collecting around the pressure rollers.

6. In general, the geomembrane panels are aligned to have an overlap of 4 to 6 in (100 mm to 150 mm) for fusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam.

7. No solvent or adhesive is used.

8. The geomembrane is protected from damage in heavy traffic areas.

9.7.2.2A *Extrusion Process*

The Geosynthetic QAC shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Project Manager.

The Geosynthetic QAC shall verify that:

1. The Installer maintains on-site the number of spare operable seaming apparatus agreed upon at the pre-construction meeting.

2. Equipment used for seaming is not likely to damage the geomembrane.

3. Prior to beginning a seam, the extruder is purged until all heat-degraded extrudate has been removed from the barrel.

4. Clean and dry welding rods or extrudate pellets are used.

5. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane.

6. Grinding is completed no more than one hour prior to seaming.

7. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs.

8. The geomembrane is protected from damage in heavy traffic areas.

9. Exposed grinding marks adjacent to an extrusion weld shall be minimized. In no instance shall exposed grinding marks extend more than ¼ in (6 mm) from the finished seamed area.

10. In general, the geomembrane panels are aligned to have a nominal overlap of 3 in (75 mm) for extrusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam.

11. No solvent or adhesive is used.

12. The procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any temporary welding apparatus is controlled such that the geomembrane is not damaged.

9.7.3A Seam Preparation

The Geosynthetic QAC shall verify that prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris or foreign material of any kind. If seam overlap grinding is required, the Geosynthetic QAC must ensure that the process is completed according to the Manufacturer's instructions within one hour of the seaming operation, and in a way that does not damage the geomembrane. The Geosynthetic QAC shall also verify that seams are aligned with the fewest number of wrinkles and "fishmouths".

9.7.4A Trial Seams

Trial seams shall be made on fragment pieces of geomembrane liner to verify that conditions are adequate for production seaming. Such trial seams shall be made at the beginning of each seaming period, and at least once each five hours, for each production seaming apparatus used that day. Trial seams shall be made under the same conditions as production seams.

The trial seam sample shall be at least 5 ft (1.6 m) long by 1 ft (0.3 m) wide (after seaming) with the seam centered lengthwise. Seam overlap shall be as indicated in Section 9.7.2. Two specimens shall be cut from the sample with a 1 in (25 mm) wide die. The specimens shall be cut by the Installer at locations selected randomly along the trial seam sample by the Geosynthetic QAC.

The specimens shall be tested in peel using a field tensiometer. The tensiometer shall be capable of maintaining a constant jaw separation rate of two inches per minute. They should not fail in the seam as described in Section 9.9.5. If a specimen fails, the entire trial seam operation shall be repeated. If the additional specimen fails, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are achieved. The Geosynthetic QAC shall observe all trial seam procedures.

The remainder of the successful trial seam sample shall be retained until project completion in the QAC's archives for possible laboratory testing. Each sample shall be assigned a number and marked accordingly by the Geosynthetic QAC, who shall also log the date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description.

If agreed upon between the Project Manager and the Geosynthetic QAE, and documented by the Geosynthetic QAE in his daily report, the remaining portion of the trial seam sample can be subjected to destructive testing as indicated in Section 9.9.6. If a trial seam sample fails a test conducted by the Geosynthetic QAL, then a destructive seam test sample shall be taken from each of the seams completed by the seamer during the shift related to the subject trial seam. These samples shall be forwarded to the Geosynthetic QAL and, if they fail the tests, the procedure indicated in Section 9.9.7 shall apply. The conditions of this paragraph shall be considered satisfied for a given seam if a destructive seam test sample has already been taken.

9.7.5A General Seaming Procedures

During general seaming, the Geosynthetic QAC shall ensure the following:

1. Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 in (150 mm) beyond the cut in all directions.

2. If seaming operations are carried out at night, adequate illumination shall be provided.

3. Seaming shall extend to the outside edge of panels placed in the anchor trench.

4. All cross seam tees should be extrusion welded to a minimum distance of 4 in (100 mm) on each side of the tee.

5. A firm substrate may be required to be provided by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve proper support.

The Geosynthetic QAC shall verify that the above seaming procedures or any other procedures agreed upon and indicated in the project QAP are followed, and shall inform the Project Manager of any nonconformance.

9.7.6A Seaming Weather Conditions

9.7.6.1A *Cold Weather Conditions*

To ensure a quality installation, if seaming is conducted when the ambient temperature is below 32°F (0°C), the following conditions shall be met:

1. Geomembrane surface temperatures shall be determined by the Geosynthetic QAC at intervals of at least once per 100 feet (30 m) of seam length to determine if preheating is required. For extrusion welding, preheating is required if the surface temperature of the geomembrane is below 32°F (0°C).

2. For fusion welding, preheating may be waived by the Project Manager based on a recommendation from the Geosynthetic QAE, if the Installer demonstrates to the Geosynthetic QAE's satisfaction that welds of equivalent quality may be obtained without preheating at the expected temperature of installation.

3. If preheating is required, the Geosynthetic QAC shall observe all areas of geomembrane that have been preheated by a hot air device prior to seaming, to ensure that they have not been overheated.

4. Care shall be taken to confirm that wind chill does not adversely affect the pre-heat requirements specified for welding. It may be necessary to provide wind protection for the seam area.

5. All preheating devices shall be approved prior to use by the Project Manager.

6. Sheet grinding may be performed before preheating, if applicable.

7. Trial seaming, as described in Section 9.7.4, shall be conducted under the same ambient temperature and preheating conditions as the production seams. Under cold weather conditions, new trial seams shall be conducted if the ambient temperature drops by more than 100F from the initial trial seam test conditions. Such new seams shall be conducted upon completion of seams in progress during temperature drop.

9.7.6.2A *Warm Weather Conditions*

At ambient temperatures above 104°F, no seaming of the geomembrane shall be permitted unless the Installer can demonstrate to the satisfaction of the Project Manager that geomembrane seam quality is not compromised. Trial seaming, as described in Section 9.7.4, shall be conducted under the same ambient temperature conditions as the production seams. At the option of the Geosynthetic QAC, additional destructive tests may be required for any suspect areas.

9.8A NONDESTRUCTIVE SEAM TESTING

9.8.1A Concept

The Installer shall nondestructively test all field seams over their full length using an air pressure test (for double fusion seams only), a vacuum test or other approved method. Air pressure testing and vacuum testing are described in Sections 9.8.2 and 9.8.3 respectively. The purpose of nondestructive tests is to check the continuity of seams. It does not provide quantitative information on seam strength. Nondestructive testing shall be carried out as the seaming work progresses, not at the completion of all field seaming.

For all seams, the Geosynthetic QAC shall:

1. Observe nondestructive testing procedures.

2. Record location, data, test unit number, name of tester, and outcome of all testing.

3. Inform the Installer and Project Manager of any required repairs.

9.8.2A Air Pressure Testing

Air pressure testing is applicable to double fusion welding which produces a double seam with an enclosed space.

1. The equipment for air pressure testing shall consist of the following:
   a. An air pump (manual or motor driven), equipped with pressure gauge and capable of generating and sustaining a pressure between 25 and 30 psi (160 and 200 kPa) and mounted on a cushion to protect the geomembrane.
   b. A rubber hose with fittings and connections.
   c. A sharp hollow needle, or other pressure feed device, approved by Project Manager.

2. The following procedures shall be followed:
   a. Seal both ends of the seam to be tested.
   b. Insert needle or other approved pressure feed device into the air channel created by the fusion weld.
   c. Insert a protective cushion between the air pump and the geomembrane.
   d. Pressurize the air channel to a pressure of approximately 30 psi (200K Pa). Close valve, allow 2 minutes for pressure to stabilize, and sustain pressure for at least 5 minutes.
   e. If loss of pressure exceeds the maximum permissible pressure differential as outlined in the project specifications or does not stabilize, locate faulty area and repair in accordance with Section 9.10.3.
   f. Cut opposite end of tested seam area once testing is completed to verify continuity of the air channel. If air does not escape, locate blockage and retest unpressurized area. Seam the cut end of the air channel.
   g. Remove needle or other approved pressure feed device and seal the hole in the geomembrane.

9.8.3A Vacuum Testing

Vacuum testing is applicable to extrusion welding and to non-seam areas of the liner.

1. The equipment shall consist of the following:
   a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, a porthole or valve assembly, and a vacuum gauge.
   b. A pump assembly equipped with a pressure controller and pipe connections.
   c. A rubber pressure/vacuum hose with fittings and connections.
   d. A soapy solution. (Geosynthetic QAC shall ensure solution makes bubbles when air is passed through. Windshield washer fluid shall be used as anti-freeze in cold weather.)
   e. A bucket and wide paint brush, or other means of applying the soapy solution.

2. The following procedures shall be followed:
   a. Wet a strip of geomembrane approximately 12 in x 48 in (0.3 m x 1.2 m) with the soapy solution.
   b. Place the box over the wetted area.

c. Close the bleed valve and open the vacuum valve.
d. Ensure that a leak-tight seal is created.
e. Energize the vacuum/venturi pump and reduce the applied pressure to approximately 5 psi (10 in of Hg/35 kPa) gauge.
f. For a minimum of 10 seconds, apply vacuum with the box placed and maintaining a seal, examine the geomembrane through the viewing window for the presence of soap bubbles.
g. If no bubble appears after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 in (75 mm) overlap, and repeat the process.
h. All areas where soap bubbles appear shall be marked and repaired in accordance with Section 9.10.3.

9.8.4A Test Failure Procedures

The Installer shall complete any required repairs in accordance with Section 9.10. For repairs, the Geosynthetic QAC shall:

1. Observe the repair and testing of the repair.

2. Mark on the geomembrane that the repair has been made.

3. Document the repair procedures and test results.

9.9A DESTRUCTIVE SEAM TESTING

9.9.1A Concept

The purpose of destructive tests is to evaluate seam strength. Destructive seam tests shall be performed at selected locations. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming.

9.9.2A Location and Frequency

The Geosynthetic QAC shall select where seam samples will be cut out for laboratory testing. The frequency and locations shall be established as follows:

1. A minimum frequency of one test location per 1000 ft (305 m) of production seam length performed by each welding machine. This frequency is to be determined as an average taken throughout the entire facility.

2. Test locations shall be determined during seaming at the Geosynthetic QAC's discretion. Special consideration shall be given to locations where the potential for imperfect welding, such as overheating, contamination, offset welds exists.

The Installer shall not be informed in advance of the locations where the seam samples will be taken.

9.9.3A Sampling Procedures

Samples shall be cut by the Installer at locations chosen by the Geosynthetic QAC as the seaming progresses so that laboratory test results are available before the geomembrane is covered by another material. The Geosynthetic QAC shall:

1. Observe sample cutting.

2. Assign a number to each sample, and mark it accordingly.

3. Record sample location on layout drawing.

4. Record reason for taking the sample at this location (e.g., statistical routine, suspicious feature of the geomembrane).

All holes in the geomembrane resulting from destructive seam sampling shall be repaired in accordance with repair procedures described in Section 9.10.3 immediately following receipt of successful test results. The continuity of the new seams in the repaired area shall be tested according to Section 9.8.3.

9.9.4A Sample Dimensions

At each sampling location, two types of samples shall be taken by the Installer. First, two specimens for field testing should be taken. Each of these samples shall be cut with a 1 in (25 mm) wide die, with the seam centered parallel to the width. The distance between these two samples shall be 30 in (0.8 m). If both samples pass the field test described in Section 9.9.5, a sample for laboratory testing shall be taken.

The sample for laboratory testing shall be located between the samples for field testing. The sample for laboratory testing shall be 12 in (0.3 m) wide by 30 in (0.8 m) long with the seam centered lengthwise. The sample shall be cut into two parts and distributed as follows:

1. One 12 in wide x 18 in long (0.3 m x 0.5 m) portion for Geosynthetic QAL testing.

2. One 12 in wide x 12 in long (0.3 m x 0.3 m) portion to the QAC.

Final determination of the sample sizes shall be made at the pre-construction meeting.

9.9.5A Field Testing

The two 1 in (25 mm) wide specimens mentioned in Section 9.7.4 and Section 9.9.4 shall be tested in the field using a tensiometer for peel adhesion and shall not fail according to the criteria in the project specifications. The tensiometer shall be capable of maintaining a constant jaw separation rate of two inches per minute. If the test passes in accordance with this section, the sample qualifies for testing in the laboratory. If it is non-conforming, the seam should be repaired in accordance with Section 9.9.7. Final judgement regarding seam acceptability, based on the conformance criteria provided in the project specifications, rests with the Geosynthetic QAE.

The Geosynthetic QAC shall witness all field tests and mark all samples and portions with their number. The Geosynthetic QAC shall also log the date and time, ambient temperature, number of seaming unit, name of seamer, welding apparatus temperatures and pressures, and pass or fail description, and attach a copy to each sample portion.

9.9.6A Laboratory Testing (on or off-site)

Destructive test samples shall be packaged and shipped, if necessary, under the responsibility of the Geosynthetic QAC in a manner which will not damage the test sample. The sample shall be shipped as soon as possible to expedite laboratory testing. The QAC will be responsible for storing the archive samples. Test samples shall be tested by the Geosynthetic QAL.

Testing shall include seam strength and peel adhesion (ASTM D4437). The minimum acceptable values to be obtained in these tests shall be provided in the project specifications. At least 4 specimens shall be tested successfully, each in both shear and peel. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear). A passing test shall meet the minimum acceptable values in at least 4 of the 5 specimens tested for each method.

The Geosynthetic QAL shall provide test results within 24 hours of receiving the samples. The Geosynthetic QAE shall review laboratory test results as soon as they become available, and make appropriate recommendations to the Project Manager.

9.9.7A Destructive Test Failure

When a sample fails a destructive test, whether that test is conducted by the Geosynthetic QAL or by field tensiometer, the Installer has two options:

1. The Installer can repair the seam between any two passing destructive test locations.

2. The Installer can trace the welding path to an intermediate location 10 ft (3 m) minimum from the point of the failed test in each direction and take a sample with a 1 in (25 mm) wide die for an additional field test at each location. If these additional samples pass the test, then full laboratory samples are taken. If these laboratory samples pass the tests, then the seam is repaired between these locations. If either sample fails, then the process is repeated to establish the zone in which the seam should be repaired.

All acceptable repaired seams shall be bound by two locations from which samples passing laboratory destructive tests have been taken. Passing laboratory destructive tests of trial seam samples taken as indicated in Section 9.7.4 may be used as a boundary for the failing seam. In cases exceeding 150 ft (50 m) of repaired seam, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Section 9.10.

The Geosynthetic QAC shall document all actions taken in conjunction with destructive test failures.

9.10A DEFECTS AND REPAIRS

9.10.1A Identification

All seams and non-seam areas of the geomembrane shall be examined by the Geosynthetic QAC for identification of defects, holes, blisters, undispersed raw materials, large wrinkles and any sign of contamination by foreign matter. The geomembrane surface shall be cleaned by the Installer prior to examination if the Geosynthetic QAC determines that the amount of dust or mud inhibits examination.

9.10.2A Evaluation

Each suspect location both in seam and non-seam areas shall be nondestructively tested using the methods described in Section 9.8. Each location which fails the nondestructive testing shall be marked by the Geosynthetic QAC and repaired by the Installer. Work shall not proceed with any materials which will cover locations which have been repaired until successful nondestructive and/or laboratory tests are obtained.

When seaming of the geomembrane is completed, and prior to placing overlying materials, the Geosynthetic QAC shall indicate to the Project Manager any large wrinkles which should be cut and reseamed by the Installer. The number of wrinkles to be repaired should be kept to an absolute minimum. Therefore, wrinkles should be located during the coldest part of the installation period, while keeping in mind the forecasted weather to which the uncovered geomembrane may be exposed. Wrinkles are considered to be large when the geomembrane can be folded over on to itself which is generally a wrinkle that extends 12 in (0.3 m) from the subgrade. Seams produced while repairing wrinkles shall be nondestructively tested.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. If possible, cover should be placed during the coolest weather. In addition, small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic QAC to ensure that wrinkle formation is minimized and that, in all cases, the geomembrane is not folded over on itself.

9.10.3A Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be agreed upon between the Project Manager, Installer, Designer, and Geosynthetic QAC.

1. The repair procedures available include:
   a. Patching, used to repair holes, tears, undispersed raw materials, and contamination by foreign matter.
   b. Spot welding used to repair pinholes, or other minor, localized flaws.
   c. Capping, used to repair large lengths of failed seams.
   d. Extrusion welding the flap, used to repair areas of inadequate fusion seams which have an exposed edge.
   e. Removing bad seam and replacing with a strip of new material welded into place.

2. For any repair method, the following provisions shall be satisfied:
   a. Surfaces of the geomembrane which are to be repaired using extrusion methods shall be ground no more than one hour prior to the repair.
   b. All surfaces shall be clean and dry at the time of the repair.
   c. All seaming equipment used in repairing procedures shall meet the requirements of the project QAP.
   d. Patches or caps shall extend at least 6 in (150 mm) beyond the edge of the defect, and all corners of patches shall be rounded with a radius of approximately 3 in (75 mm).

9.10.4A Repair Verification

The Geosynthetic QAC shall observe all nondestructive testing of repairs and shall record the number of each repair, date and test outcome. Each repair shall be nondestructively tested using the methods described in Section 9.8 as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150 consecutive feet (50 m) long require destructive test sampling. Failed tests require that the repair shall be redone and retested until a passing test results.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. If possible, cover should be placed during the coolest weather available. In addition, small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic QAC to ensure that wrinkle formation is minimized and that, in all cases, the geomembrane is not folded over on itself.

9.11A GEOMEMBRANE PROTECTION

The quality assurance procedures indicated in this Section are intended only to assure that the installation of adjacent materials does not damage the geomembrane. The quality assurance of the adjacent materials themselves are covered in separate Sections of this manual.

9.11.1A Soils

A copy of the project specifications prepared by the Designer for placement of soils shall be given to the Geosynthetic QAE by the Project Manager. The Geosynthetic QAE shall verify that these project specifications are consistent with geosynthetic state-of-practice such as:

1. Placement of soils on the geomembrane shall not proceed at an ambient temperature below 320F (0°C) nor above 104°F (40°C) unless otherwise specified.

2. Placement of soil on the geomembrane should be done during the coolest part of the day to minimize the development of wrinkles in the geomembrane.

3. Equipment used for placing soil shall not be driven directly on the geomembrane.

4. A minimum thickness of 1 ft (0.3 m) of soil is specified between a light dozer, ground pressure of 5 psi (35 kPa) or lighter, and the geomembrane.

5. In any areas traversed by construction traffic (any vehicles other than deployment equipment approved by the Project Manager) the soil layer shall have a minimum thickness of 3 ft (0.9 m). This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns.

The Geosynthetic QAC shall measure soil thickness and verify that the required thickness is present. The Geosynthetic QAC must also verify that final thickness is consistent with the design and verify that placement of the soil is done in such a manner that geomembrane damage is unlikely. The Geosynthetic QAE shall inform the Project Manager if the above conditions are not fulfilled.

9.11.2A Sumps and Appurtenances

A copy of the plans and project specifications prepared by the Designer for sumps and appurtenances shall be given by the Project Manager to the Geosynthetic QAC. The Geosynthetic QAC shall review these plans and verify that:

1. Installation of the geomembrane in sump and appurtenant areas, and connection of geomembrane to sumps and appurtenances have been made according to project specifications.

2. Extreme care is taken while welding around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas.

3. The geomembrane has not been visibly damaged while making connections to sumps and appurtenances.

4. A representative of the Geosynthetic QAC shall be present at all times when the Installer is welding geomembrane to appurtenant structures.

The Geosynthetic QAC shall inform the Project Manager in writing if the above conditions are not fulfilled.

9.11.3A Concrete

A copy of the project specifications prepared by the Designer for placement of concrete shall be given by the Project Manager to the Geosynthetic QAC. The Geosynthetic QAC shall verify that these specifications are consistent with the state-of-practice, including the use of geosynthetic layers between concrete and geomembrane. The Geosynthetic QAC shall verify that geosynthetic layers are placed between the concrete and the geomembrane according to design specifications. The Geosynthetic QAC will also verify that construction methods used are not likely to damage the geomembrane.

9.0B FINAL COVER GEOMEMBRANES

9.1B DESCRIPTION AND APPLICABILITY

Geomembranes are low permeability geosynthetic barriers used in lining systems. This Section is applicable to smooth and textured polyethylene (all types) geomembranes used in final cover systems. This Section may need to be modified when using other geomembranes.

9.2B QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geomembrane, the Manufacturer or Installer shall provide the Project Manager with the following information:

1. A specification for the geomembrane which includes all properties contained in the project specifications measured using the appropriate test methods.

2. Written certification that minimum values given in the specification are guaranteed by the Manufacturer.

3. Quality control certificates, signed by a responsible party employed by the Manufacturer. Each quality control certificate shall include roll identification numbers, testing procedures, and results of quality control tests. At a minimum, results shall be given for:
   a. Density (ASTM D1505)
   b. Carbon black content (ASTM D4218)
   c. Thickness (ASTM D5199-smooth/ASTM D5994-textured)
   d. Tensile properties (ASTM D638)
   e. Multi-Axial Tensile Elongation (ASTM D5617)

   These quality control tests shall be performed in accordance with the test methods for every 30,000 lbs except Multi-Axial Tensile Elongation which will be tested every 75,000 lbs.

The Manufacturer shall identify all rolls of geomembranes with the following:

1. Manufacturer's name
2. Product identification
3. Thickness
4. Roll number
5. Roll dimensions

The Geosynthetic QAE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QAE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

4. Rolls are appropriately labeled.

5. Certified minimum properties meet the project specifications.

6. Project specifications and a copy of the QAP are provided by the Project Manager to the Installer.

9.3B SUBGRADE PREPARATION

9.3.1B Surface Preparation

The Earthwork Contractor shall be responsible for preparing the underlying soil prior to geomembrane placement. The Project Manager shall coordinate the work of the Earthwork Contractor and the Installer so that the requirements of the project-specific QAP are met.

Before the geomembrane installation begins, the Geosynthetic QAC shall verify that the underlying surface has been prepared to meet the project requirements.

The Installer shall certify in writing that the surface on which the geomembrane will be installed is acceptable. A certificate of acceptance shall be given by the Installer to the Geosynthetic QAC prior to commencement of geomembrane deployment in the area under consideration. The Project Manager shall be given a copy of this certificate by the Geosynthetic QAC.

After the underlying soil has been accepted by the Installer, it is the Installer's responsibility to indicate to the Project Manager any change in the underlying soil condition that may require repair work. The Project Manager may consult with the Geosynthetic QAC regarding the need for repairs. If the Geosynthetic QAC concurs with the Installer, the Project Manager shall ensure that the underlying soil is repaired.

At any time before or during the geomembrane installation, the Geosynthetic QAC shall indicate to the Project Manager any locations which may not be adequately prepared for the geomembrane.

9.3.2B Anchor Trench

The Geosynthetic QAC shall verify:

1. The anchor trench has been constructed according to the project plans and specifications.

2. Rounded corners are provided in the trench so as to avoid sharp bends in the geomembrane.

3. Excessive amounts of loose soil are not allowed to underlie the geomembrane in the anchor trench.

4. The anchor trench is adequately drained to prevent ponding or softening of the adjacent soils while the trench is open promptly after geomembrane deployment.

5. The anchor trench is backfilled and compacted promptly after deployment as outlined in the project specifications.

Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetic components. The Geosynthetic QAC shall observe the backfilling operation and advise the Project Manager of any problems. Any problems shall be documented by the Geosynthetic QAC in his daily report.

9.4B GEOMEMBRANE DEPLOYMENT

9.4.1B Panel Nomenclature

A field panel is defined as a unit of geomembrane which is to be seamed in the field. A field panel is a roll or a portion of a roll cut in the field. The Geosynthetic QAC shall be responsible to ensure that each field panel is given an identification code (number or letter-number) consistent with the layout plan. This identification code shall be as simple and logical as possible and shall be agreed upon by the Project Manager, Installer and Geosynthetic QAC.

In general, it is not appropriate to identify panels using roll numbers since roll numbers established in the manufacturing plant are usually cumbersome and are not related to location in the field. The Geosynthetic QAC shall establish a table or chart showing correspondence between roll numbers and field panel identification codes. The field panel identification code shall be used for all quality assurance records.

9.4.2B Panel Deployment Procedure

The Geosynthetic QAC shall review the panel deployment progress of the Installer and advise the Project Manager on changes in panel deployment. The Geosynthetic QAC shall also review the panel deployment for suitability to actual field condition such as issues relating to wind, rain, soil liner desiccation and other site-specific conditions. The Geosynthetic QAC shall verify that the condition of the underlying soil does not change detrimentally during installation. The Geosynthetic QAC shall record the identification code, location, and date of installation of each field panel.

9.4.3B Deployment Weather Conditions

Geomembrane deployment shall not be undertaken if weather conditions will preclude material seaming following deployment.

The normal acceptable weather conditions for seaming are as follows:

1. Ambient temperature between 32°F (0°C) and 104°F (40°C).

2. Dry conditions (no precipitation or other excessive moisture)

3. No excessive winds.

Ambient temperature shall be measured and ambient conditions appraised by the Geosynthetic QAC in the area in which the panels are to be placed.

The Geosynthetic QAC shall inform the Project Manager of any weather-related problems which may not allow geomembrane placement to proceed. The Project Manager will determine if the installation is to be stopped or special procedures are to be used.

9.4.4B Method of Deployment

Before the geomembrane is handled on site, the Geosynthetic QAC shall verify that deployment equipment and method of deployment proposed by the Installer to be used on the site is adequate and does not pose risk of damage to the geomembrane or underlying subgrade. Drivers shall proceed with caution during deployment of the geomembrane to prevent spinning of tires, sharp turns and quick stops. During handling, the Geosynthetic QAC shall observe and verify that the Installer's personnel handle the geomembrane with care.

The Geosynthetic QAC shall verify the following:

1. Equipment used does not damage the geomembrane by handling.

2. The prepared surface underlying the geomembrane is acceptable immediately prior to geomembrane placement.

3. Geosynthetic elements immediately underlying the geomembrane are clean and free of debris.

4. Personnel do not smoke or wear damaging shoes while working on the geomembrane, or engage in other activities which could damage the geomembrane.

5. The method used to unroll the panels does not cause excessive scratches or crimps in the geomembrane and does not damage the supporting soil.

6. The method used to place the panels minimizes wrinkles especially differential wrinkles between adjacent panels.

7. Adequate temporary loading and/or anchoring (such as sand bags or tires), not likely to damage the geomembrane, are placed to prevent uplift by wind. In case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels.

8. Direct contact with the geomembrane is minimized, and the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials, in areas where excessive traffic may be expected. See Section 8.0 for geomembrane protection.

The Geosynthetic QAC shall inform the Project Manager if the above conditions are not fulfilled.

9.4.5B Damage and Defects

Upon delivery to the site, the Geosynthetic QAC shall conduct a surface observation of all rolls for defects and for damage. This examination shall be conducted without unrolling rolls unless defects or damages are found or suspected. The Geosynthetic QAC shall advise the Project Manager, in writing, of any rolls or portions of rolls which should be rejected and removed from the site because they have severe flaws.

The Geosynthetic QAC shall examine each panel, after placement and prior to seaming, for damage and/or defects. The Geosynthetic QAC shall advise the Project Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels, or portions of damaged panels, which have been rejected shall be marked and their removal from the work area recorded by the geosynthetic QAC. Repairs shall be made using procedures described in Section 7.0.

9.4.6B Writing on the Geomembrane

To avoid confusion, the Installer and the Geosynthetic QAC shall each use different colored markers or other materials approved by the Project Manager that are readily visible for writing on the geomembrane. The markers used must be semi-permanent and compatible with the geomembrane.

9.5B FIELD SEAMING

9.5.1B Seam Layout

Before installation begins, the Installer shall provide the Project Manager and the Geosynthetic QAC with a panel layout drawing. This drawing shall present all the proposed seams of the lining system at the facility. The Geosynthetic QAE shall review the panel layout drawing and verify that it is consistent with accepted state-of-practice.

In general, seams should be oriented parallel to the line of maximum slope. In corners and odd-shaped geometric locations, the number of seams should be minimized. No horizontal seam should be less than 5 ft (1.5 m) from the toe or crest of the slope, or from areas of potential stress concentrations, unless otherwise authorized by the Project Manager.

Horizontal seams shall be allowed under the following conditions:

1. Seams are offset in adjacent panels by one panel width.

2. Seams are "shingled" downhill.

A seam numbering system compatible with the panel numbering system shall be used by the Geosynthetic QAC.

9.5.2B Accepted Seaming Methods

Approved processes for field seaming are fusion welding and extrusion welding. Proposed alternate processes shall be documented and submitted by the Installer to the Project Manager for approval. The Project Manager shall submit all documentation regarding seaming methods to be used to the Geosynthetic QAC for review.

9.5.2.1B *Fusion Process*

The Geosynthetic QAC shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Project Manager.

The Geosynthetic QAC shall also verify that:

1. The Installer maintains on-site the number of spare operable seaming apparatus agreed upon at the pre-construction meeting.

2. Equipment used for seaming is not likely to damage the geomembrane.

3. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane and any fuel spills promptly cleaned up. Fuel shall not be stored on liner surface.

4. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs to the geomembrane.

5. In general, the geomembrane panels are aligned to have an overlap of 4 to 6 in (100 mm to 150 mm) for fusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam.

6. The geomembrane is protected from damage in heavy traffic areas.

9.5.2.2B *Extrusion Process*

The Geosynthetic QAC shall log ambient, seaming apparatus, and geomembrane surface temperatures at appropriate intervals and report any noncompliances to the Project Manager.

The Geosynthetic QAC shall verify that:

1. The Installer maintains on-site the number of spare operable seaming apparatus agreed upon at the pre-construction meeting.

2. Equipment used for seaming is not likely to damage the geomembrane.

3. Prior to beginning a seam, the extruder is purged until all heat-degraded extrudate has been removed from the barrel.

4. Clean and dry welding rods or extrudate pellets are used.

5. The electric generator is placed on a smooth base such that no damage occurs to the geomembrane and any fuel spills promptly cleaned up. Fuel shall not be stored on liner surface.

6. Grinding is completed prior to seaming.

7. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage such that no damage occurs.

8. The geomembrane is protected from damage in heavy traffic areas.

9. Exposed grinding marks adjacent to an extrusion weld shall be minimized. In no instance shall exposed grinding marks extend more than ¼ in (6 mm) from the finished seamed area.

10. In general, the geomembrane panels are aligned to have a nominal overlap of 3 in (75 mm) for extrusion welding. In any event, the final overlap shall be sufficient to allow peel tests to be performed on the seam.

11. The procedure used to temporarily bond adjacent panels together does not damage the geomembrane; in particular, the temperature of hot air at the nozzle of any temporary welding apparatus is controlled such that the geomembrane is not damaged.

9.5.3B Seam Preparation

The Geosynthetic QAC shall verify that prior to seaming, the seam area is clean and free of moisture, dust, dirt, debris or foreign material of any kind. If seam overlap grinding is required, the Geosynthetic QAC must ensure that the process is completed according to the Manufacturer's instructions seaming operation, and in a way that does not damage the geomembrane. The Geosynthetic QAC shall also verify that seams are aligned with the fewest number of wrinkles and "fishmouths".

9.5.4B Trial Seams

Trial seams shall be made on fragment pieces of geomembrane liner to verify that conditions are adequate for production seaming. Such trial seams shall be made at the beginning of each seaming period, and at least once each five hours, for each production seaming apparatus used that day. Trial seams shall be made under the same conditions as production seams.

The trial seam sample shall be at least 5 ft (1.6 m) long by 1 ft (0.3 m) wide (after seaming) with the seam centered lengthwise. Seam overlap shall be as indicated in Section 5.2. The specimens shall be cut by the Installer at locations selected randomly along the trial seam sample by the Geosynthetic QAC.

The specimens shall be tested for peel adhesion and seam strength using a tensiometer. The minimum acceptable values to be obtained in these tests shall be provided in the project specifications. At least 4 specimens shall be tested, each in both shear and peel. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel, shear). A passing test shall meet the minimum acceptable values in at least 4 of the 5 specimens tested for each method. If a specimen fails, the entire trial seam operation shall be repeated. If the additional specimen fails, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial seams are achieved. The Geosynthetic QAC shall observe all trial seam procedures.

The remainder of the successful trial seam sample shall be retained by the QAC for possible additional testing. Each sample shall be assigned a number and marked accordingly by the Geosynthetic QAC, who shall also log the date, hour, ambient temperature, number of seaming unit, name of seamer, and pass or fail description.

9.5.5B General Seaming Procedures

During general seaming, the Geosynthetic QAC shall ensure the following:

1. Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 in (150 mm) beyond the cut in all directions.

2. If seaming operations are carried out at night, adequate illumination shall be provided.

3. Seaming shall extend to the outside edge of panels placed in the anchor trench.

The Geosynthetic QAC shall verify that the above seaming procedures or any other procedures agreed upon and indicated in the project QAP are followed, and shall inform the Project Manager of any nonconformance.

9.5.6B Seaming Weather Conditions

9.5.6.1B *Cold Weather Conditions*

To ensure a quality installation, if seaming is conducted when the ambient temperature is below 32°F (0°C), the following condition shall be met:

Trial seaming, as described in Section 5.4, shall be conducted under the same ambient temperature and preheating conditions as the production seams. Under cold weather conditions, new trial seams shall be conducted if the ambient temperature drops by more than 10°F from the initial trial seam test conditions. Such new seams shall be conducted upon completion of seams in progress during temperature drop.

9.5.6.2B *Warm Weather Conditions*

At ambient temperatures above 104°F, no seaming of the geomembrane shall be permitted unless the Installer can demonstrate to the satisfaction of the Project Manager that geomembrane seam quality is not compromised. Trial seaming, as described in Section 5.4, shall be conducted under the same ambient temperature conditions as the production seams.

9.6B NONDESTRUCTIVE SEAM TESTING

As described in Section 5.2, seams can be made using fusion or extrusion welding procedures. Fusion welding can be done by either a solid heated wedge which will produce a single seam or by a double wedge which will produce two parallel but narrower seams. Of the three testing procedures which follow, air lance and vacuum tests may be used for all seam types, while air pressure testing can only be used on double fusion welds.

One of, or in some cases, a combination of these three procedures shall be designated by the Owner and shall be applied in accordance with the following procedures:

9.6.1B Concept

The Installer shall nondestructively test all field seams over their full length using an air lance, air pressure test (for double fusion seams only), a vacuum test or other approved method. Air lance testing, air pressure testing and vacuum testing are described in following Sections 9.6.2, 6.3 and 6.4, respectively. The purpose of nondestructive tests is to check the continuity of seams. It does not provide quantitative information on seam strength. Nondestructive testing shall be carried out as the seaming work progresses, not at the completion of all field seaming.

For all seams, the Geosynthetic QAC shall:

1. Observe nondestructive testing procedures.

2. Record location, data, test unit number, name of tester, and outcome of all testing.

3. Inform the Installer and Project Manager of any required repairs.

9.6.2B Air Pressure Testing

Air pressure testing is applicable to double fusion welding which produces a double seam with an enclosed space.

1. The equipment for air pressure testing shall consist of the following:
   a. An air pump (manual or motor driven), equipped with pressure gauge and capable of generating and sustaining a pressure required by the project specifications and mounted on a cushion to protect the geomembrane.
   b. A rubber hose with fittings and connections.
   c. A sharp hollow needle, or other pressure feed device, approved by Project Manager.

2. The following procedures shall be followed:
   a. Seal both ends of the seam to be tested.
   b. Insert needle or other approved pressure feed device into the air channel created by the fusion weld.
   c. Insert a protective cushion between the air pump and the geomembrane.
   d. Pressurize the air channel, close valve, allow for pressure to stabilize, and sustain pressure according to project specifications.
   e. If loss of pressure exceeds the maximum permissible pressure differential as outlined in the project specifications or does not stabilize, locate faulty area and vacuum test in accordance with Section 6.4. If the vacuum test fails, repair in accordance with Section 7.3
   f. Cut opposite end of tested seam area once testing is completed to verify continuity of the air channel. If air does not escape, locate blockage and retest unpressurized area. Seam the cut end of the air channel.
   g. Remove needle or other approved pressure feed device and seal the hole in the geomembrane.

9.6.3B Vacuum Testing

Vacuum testing is applicable to any type of seam.

1. The equipment shall consist of the following:
   a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, a porthole or valve assembly, and a vacuum gauge.
   b. A pump assembly equipped with a pressure controller and pipe connections.

c. A rubber pressure/vacuum hose with fittings and connections.
d. A soapy solution. (Geosynthetic QAC shall ensure solution makes bubbles when air is passed through.)
e. A bucket and wide paint brush, or other means of applying the soapy solution.

2. The following procedures shall be followed:
    a. Wet a strip of geomembrane approximately 12 in x 48 in (0.3 m x 1.2 m) with the soapy solution.
    b. Place the box over the wetted area.
    c. Close the bleed valve and open the vacuum valve.
    d. Ensure that a leak-tight seal is created.
    e. Energize the vacuum/venturi pump and reduce the applied pressure to approximately 5 psi (10 in of Hg/35 kPa) gauge.
    f. For a minimum of 10 seconds, apply vacuum with the box placed and maintaining a seal, examine the geomembrane through the viewing window for the presence of soap bubbles.
    g. If no bubble appears after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 in (75 mm) overlap, and repeat the process.
    h. All areas where soap bubbles appear shall be marked and repaired in accordance with Section 7.3.

9.6.4B Test Failure Procedures

The Installer shall complete any required repairs in accordance with Section 7.0. For repairs, the Geosynthetic QAC shall:

1. Observe the repair and testing of the repair.

2. Mark on the geomembrane that the repair has been made.

3. Document the repair procedures and test results.

9.7B DEFECTS AND REPAIRS

9.7.1B Identification

All seams and non-seam areas of the geomembrane shall be examined by the Geosynthetic QAC for identification of defects, holes, blisters, undispersed raw materials, large wrinkles and any sign of contamination by foreign matter. The geomembrane surface shall be cleaned by the Installer prior to examination if the Geosynthetic QAC determines that the amount of dust or mud inhibits examination.

9.7.2B Evaluation

Each suspect location both in seam and non-seam areas shall be nondestructively tested using the methods described in Section 9.6B. Each location which fails the nondestructive testing shall be marked by the Geosynthetic QAC and repaired by the Installer. Work shall not proceed with any materials which will cover locations which have been repaired until successful verification by, nondestructive tests are obtained.

When seaming of the geomembrane is completed, and prior to placing overlying materials, the Geosynthetic QAC shall indicate to the Project Manager any large wrinkles which should be cut and reseamed by the Installer. The number of wrinkles to be repaired should be kept to an absolute minimum. Therefore, wrinkles should be located during the coldest part of the installation period, while keeping in mind the forecasted weather to which the uncovered geomembrane may be exposed. Wrinkles are considered to be large when the geomembrane can be folded over on to itself which is generally a wrinkle that extends 12 in (0.3 m) from the subgrade. Seams produced while repairing wrinkles shall be nondestructively tested.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. If possible, cover should be placed during the coolest weather. In addition, small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic QAC to ensure that wrinkle formation is minimized and that, in all cases, the geomembrane is not folded over on itself.

9.7.3B Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be agreed upon between the Project Manager, Installer, Designer, and Geosynthetic QAC.

1. The repair procedures available include:
   a. Patching, used to repair holes, tears, undispersed raw materials, and contamination by foreign matter.
   b. Spot welding used to repair pinholes, or other minor, localized flaws.
   c. Capping, used to repair large lengths of failed seams.
   d. Extrusion welding the flap, used to repair areas of inadequate fusion seams which have an exposed edge.
   e. Removing bad seam and replacing with a strip of new material welded into place.

2. For any repair method, the following provisions shall be satisfied:
   a. Surfaces of the geomembrane which are to be repaired using extrusion methods shall be ground prior to the repair.
   b. All surfaces shall be clean and dry at the time of the repair.
   c. All seaming equipment used in repairing procedures shall meet the requirements of the project QAP.

d. Patches or caps shall extend at least 6 in (150 mm) beyond the edge of the defect, and all corners of patches shall be rounded with a radius of approximately 3 in (75 mm).

9.7.4B Repair Verification

The Geosynthetic QAC shall observe all nondestructive testing of repairs and shall record the number of each repair, date and test outcome. Each repair shall be nondestructively tested using the methods described in Section 6.0 as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair.

When placing overlying material on the geomembrane, every effort must be made to minimize wrinkle development. If possible, cover should be placed during the coolest weather available. In addition, small wrinkles should be isolated and covered as quickly as possible to prevent their growth. The placement of cover materials shall be observed by the Geosynthetic QAC to ensure that wrinkle formation is minimized and that, in all cases, the geomembrane is not folded over on itself.

9.8B GEOMEMBRANE PROTECTION

The quality assurance procedures indicated in this Section are intended only to assure that the installation of adjacent materials does not damage the geomembrane. The quality assurance of the adjacent materials themselves are covered in separate Sections of this manual.

9.8.1B Soils

A copy of the project specifications prepared by the Designer for placement of soils shall be given to the Geosynthetic QAE by the Project Manager. The Geosynthetic QAE shall verify that these project specifications are consistent with geosynthetic state-of-practice such as:

1. Placement of soils on the geomembrane shall not proceed at an ambient temperature below 32°F (0°C) nor above 104°F (40°C) unless otherwise specified.

2. Placement of soil on the geomembrane should be done during the coolest part of the day to minimize the development of wrinkles in the geomembrane.

3. Equipment used for placing soil shall not be driven directly on the geomembrane.

4. A minimum thickness of 1 ft (0.3 m) of soil is specified between a light dozer, ground pressure of 5 psi (35 kPa) or lighter, and the geomembrane.

5. In any areas traversed by heavy construction equipment or any vehicles other than deployment equipment approved by the Project Manager, the soil layer shall have a minimum thickness of 3 ft (0.9 m). This requirement may be waived if provisions are made to protect the geomembrane through an engineered design. Drivers shall proceed with caution when on the overlying soil and prevent spinning of tires or sharp turns.

The Geosynthetic QAC or surveyor shall measure soil thickness and verify that the required thickness is present. The Geosynthetic QAC must also verify that final thickness is consistent with the design and verify that placement of the soil is done in such a manner that geomembrane damage is unlikely. The Geosynthetic QAE shall inform the Project Manager if the above conditions are not fulfilled.

9.8.2B Appurtenances

A copy of the plans and project specifications prepared by the Designer for appurtenances such as the pipe risers for gas or leachate collection systems shall be given by the Project Manager to the Geosynthetic QAC. The Geosynthetic QAC shall review these plans and verify that:

1. Installation of the geomembrane appurtenant areas, and connection of geomembrane to risers and appurtenances have been made according to project specifications.

2. Extreme care is taken while welding around appurtenances since neither non-destructive nor destructive testing may be feasible in these areas.

3. The geomembrane has not been visibly damaged while making connections to appurtenances.

4. A representative of the Geosynthetic QAC shall be present at all times when the Installer is welding geomembrane to appurtenant structures.

The Geosynthetic QAC shall inform the Project Manager in writing if the above conditions are not fulfilled.

9.8.3B Concrete

A copy of the project specifications prepared by the Designer for placement of concrete shall be given by the Project Manager to the Geosynthetic QAC. The Geosynthetic QAC shall verify that these specifications are consistent with the state-of-practice, including the use of geosynthetic layers between concrete and geomembrane. The Geosynthetic QAC shall verify that geosynthetic layers are placed between the concrete and the geomembrane according to design specifications. The Geosynthetic QAC will also verify that construction methods used are not likely to damage the geomembrane.

10.0 GEOTEXTILES

10.1 DEFINITION AND APPLICABILITY

Geotextiles are used in protection and filtering applications in lining systems. This Section does not describe procedures for other applications such as erosion control or reinforcement. This Section is applicable to nonwoven geotextiles made of polyester or polypropylene and not applicable to nonwoven geotextiles made of other materials or woven geotextiles.

10.2 MANUFACTURING PLANT INSPECTION

The Owner or other appropriate representative may conduct an annual inspection of the Manufacturer's plant. Manufacturer will document annual inspections of manufacturing plants for products which they distribute. ISO 9000 certification may be accepted as a substitute. In addition, the Project Manager, or his designated representative, may visit the manufacturing plant for a project-specific inspection if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the product for that particular project. The purpose of the plant inspection is to review the manufacturing process and quality control procedures.

The manufacturing plant inspection shall include:

1. Verification that properties of the geotextile guaranteed by the Manufacturer are met and meet the project specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and test methods used are acceptable.

3. Spot inspection of the rolls and verification that they are free of imperfections or any sign of contamination by foreign matter.

4. Review of packaging, handling, storage, and transportation procedures and verification that these procedures will not damage the geotextile.

5. Verification that roll packages have a label indicating the name of the manufacturer, type of geotextile, roll number and roll dimensions.

6. Verification that the geotextiles are inspected continuously for the presence of needles using a metal detector.

A report describing the inspection will be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

10.3 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geotextile, the Manufacturer or Installer shall provide the Project Manager with the following information:

1. Reports on quality control tests conducted by the Manufacturer to verify that the geotextile manufactured for the project meets the project specifications.

2. A specification for the geotextile which includes all properties published by the Manufacturer, measured using the appropriate test methods.

3. Written certification that the Manufacturer has continuously inspected the geotextile for the presence of needles and found the geotextile to be needle-free.

4. Written quality control certificates, signed by a responsible party employed by the Manufacturer and stating that the product will meet the minimum average roll values (MARV) given in the specification are guaranteed by the Manufacturer. The quality control certificates shall include roll identification numbers, testing procedures and results of quality control tests. At a minimum, results shall be given for:
   a. Mass per unit area (ASTM D5261)
   b. Grab strength (ASTM D4632)
   c. Trapezoidal tear strength (ASTM D4533)
   d. Puncture strength (ASTM D4833)

   These quality control tests shall be performed in accordance with the test methods for at least every 10,000 lbs of geotextile produced.

The following shall be maintained by the Manufacturer and will be available upon request:

1. The origin (resin supplier's name and resin production plant) and identification (brand name and number) of the resin used to manufacture the geotextile.

2. Reports on tests conducted by the Manufacturer to verify that resin used to manufacture the geotextile meets the Manufacturer's resin specifications.

3. A list of the materials which comprise the geotextile, expressed in the following categories as percent by weight: base polymer, carbon black, other additives.

The Manufacturer shall identify all rolls of geotextiles with the following:

1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

The Geosynthetic QAE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QAE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

4. Roll packages are appropriately labeled.

5. Certified minimum average roll values meet the project specifications.

6. Project specifications and a copy of the QAP were submitted by the Project Manager to the Installer.

10.4 CONFORMANCE TESTING

In general, conformance testing is not required except under the following conditions:

1. A specific regulatory or permit condition requiring independent material conformance testing to be performed.

2. The Geosynthetic QAC is required by contract to provide a professional engineer's certification that the material meets certain specifications (as opposed to certifying that the material supplied is marked and identified as that which is specified for the project).

3. Conformance testing may be required by the Project Manager at any time.

If required, conformance tests should be tailored to the intended application of the geosynthetic (i.e. filtration, cushioning, or reinforcement)

10.4.1 Sampling Procedures

Upon delivery of the rolls of geotextiles, the Geosynthetic QAC shall ensure that conformance test samples are obtained for the geotextile. The rolls to be sampled shall be selected by the Geosynthetic QAC. Samples shall be taken from any portion of a roll which has not been damaged. Unless otherwise specified, samples shall be 3 ft (1 m) long by the roll width. The Geosynthetic QAC shall mark the machine direction on the samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Alternatively, a lot may be designated by the Geosynthetic QAC based on a review of all roll information including quality control documentation and manufacturing records.

Unless otherwise specified in the project specifications, samples shall be taken at a rate of not less than one per 100,000 ft^2 (10,000 m^2) of geotextile. These samples shall then be forwarded to the Geosynthetic QAL for testing to ensure conformance with the project specifications.

10.4.2 Conformance Tests

At a minimum, the following conformance tests shall be performed on geotextiles:

	cushion	*filter*	*reinforcement*
1. Mass per unit area (ASTM D5261)	√	√	√
2. Grab strength (ASTM D4632)			√
3. Trapezoidal tear strength (ASTM D4533)			√
4. Puncture strength (ASTM D4833)	√		
5. A.O.S. (ASTM D4751)		√	

Other conformance tests may be required by the project specifications.

10.4.3 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QAC prior to the deployment of the geotextile. The Geosynthetic QAC shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The Geosynthetic QAC shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. Alternatively, the Manufacturer may have the sample retested at two different Owner-approved Geosynthetic QALs at the expense of the Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out-of-specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting project specifications (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out-of-specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

10.5 GEOTEXTILE DEPLOYMENT

During shipment and storage, the geotextile shall be protected from ultraviolet light exposure, moisture, mud, dirt, dust, puncture, cutting, or any other damaging or deleterious conditions. Geotextile rolls shall be shipped and stored in relatively opaque and watertight wrappings. Wrappings shall not be removed until shortly before deployment.

The Geosynthetic QAC shall observe rolls upon delivery at the site. Any apparently damaged or improperly wrapped rolls shall be reported to the Project Manager.

The Installer shall ensure that geotextiles are not damaged during handling. The geotextile shall be deployed as described below:

1. On slopes, the geotextiles shall be securely anchored and then rolled down the slope in such a manner as to continually keep the geotextile sheet in tension.

2. In the presence of wind, all geotextiles shall be weighted with sandbags or the equivalent. Such sand bags shall be installed during deployment and shall remain until replaced with cover material.

3. Geotextiles shall be cut using a geotextile cutter (hook blade) only. If in place, special care shall be taken to protect other materials from damage which could be caused by the cutting of the geotextiles.

4. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geotextile.

5. During placement of geotextiles, care shall be taken not to entrap, in or beneath the geotextile, stones, excessive dust, or moisture that could damage the geomembrane, cause clogging of drains or filters, or hamper subsequent seaming.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

10.6 SEAMING PROCEDURES

Geotextiles shall be overlapped a minimum of 3 in (75 mm) prior to seaming. In general, no horizontal seams shall be allowed on sideslopes (seams along, not across, the slope) except as part of a patch. When horizontal seams are necessary, adjacent seams shall be offset in adjacent panels and shall be "shingled" downhill.

On slopes steeper than 10:1 (horizontal:vertical), all geotextiles shall be continuously sewn. Dry clean material may also be fusion heat bonded. Spot sewing is not allowed. On bottoms and slopes shallower than 10:1, geotextiles shall be continually sewn or thermally bonded with the written approval of the Project Manager.

Any sewing shall be done using polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. The color of the sewing thread shall contrast the background color of the geotextile. Sewing shall be done using machinery and stitch types specified in the project specifications or as approved in writing by the Project Manager and the Geosynthetic QAE.

10.7 DEFECTS AND REPAIRS

10.7.1 Identification

If a defect is identified in the geotextile, the Geosynthetic QAC shall determine the extent and nature of the defect. If the defect is indicated by unsatisfactory test result, the Geosynthetic QAC shall determine the extent of the deficient area by additional tests, observations, a review of records and other means that the Geosynthetic QAC deems appropriate.

10.7.2 Notification

After determining the extent and nature of the defect, the Geosynthetic QAC shall promptly notify the Installer and Project Manager. A work deficiency meeting shall be held as required between the Installer, Geosynthetic QAC, Designer, Project Manager and any other necessary parties to assess the problem, review alternative solutions, and implement an action plan.

10.7.3 Repair Procedures

The final decision as to the appropriate repair shall be agreed upon between the Project Manager, Installer, Designer, and Geosynthetic QAE.

Any holes or tears in the geotextile shall be repaired using the following two procedures.

On sideslopes, a patch made from the same geotextile shall be thermally bonded or sewn into place in accordance with the project specifications.

On non-sideslope areas, a patch made from the same geotextile shall be thermally bonded or sewn into place with a minimum of 12-inch overlap in all directions. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

The Geosynthetic QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

10.8 GEOTEXTILE PROTECTION

All soil materials located on top of a geotextile shall be deployed in such a manner as to ensure:

1. The geotextile and underlying lining materials are not damaged.

2. Minimal slippage of the geotextile on underlying layers occurs.

3. No excess tensile stresses occur in the geotextile.

Any noncompliance with these guidelines or the project specifications shall be noted by the Geosynthetic QAC and reported to the Project Manager.

11.0 GEONETS

11.1 DEFINITION AND APPLICABILITY

Geonets are geosynthetic nets used as a drainage medium in lining systems. This Section is applicable to geonets made of high density polyethylene (HDPE) but is not applicable to geonets made of other polymers.

11.2 MANUFACTURING PLANT INSPECTION

The Owner or other appropriate representative may conduct an annual inspection of the Manufacturer's plant. Manufacturer shall document annual inspections of manufacturing plants for products which they distribute. ISO 9000 certification may be accepted as a substitute. In addition, the Project Manager, or his designated representative, may visit the manufacturing plant for a project-specific inspection if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the product for that particular project. The purpose of the plant inspection is to review the manufacturing process and quality control procedures.

The manufacturing plant inspection shall include:

1. Verification that properties guaranteed by the Manufacturer are met and meet all project specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and test methods used are acceptable.

3. Spot inspection of the rolls and verification that they are free of imperfections or any sign of contamination by foreign matter.

4. Review of packaging, handling, storage, and transportation procedures and verification that these procedures will not damage the geonet.

5. Verification that roll packages have a label indicating the name of the manufacturer, type of geonet, roll number and roll dimensions.

A report describing the inspection will be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

11.3 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geonet, the Manufacturer or Installer shall provide the Project Manager with the following information:

1. Written certification that minimum values given in the specification are guaranteed by the Manufacturer.

2. Quality control certificates, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, sampling procedures and results of quality control tests. At a minimum, results shall be given for:
   a. Density (ASTM D1505)
   b. Mass per unit area (ASTM D5261)
   c. Thickness (ASTM D5199)
   d. Carbon black content (ASTM D4218)
   e. Transmissivity (ASTM D4716)

   Quality control tests shall be performed in accordance with the test methods for every 10,000 lbs of geonet produced. Transmissivity tests shall be performed every 25,000 lbs of geonet produced.

The following shall be maintained by the Manufacturer and will be available upon request:

1. The origin (supplier's name and production plant) and identification (brand name and number) of the resin.

2. Results of tests conducted by the Manufacturer to verify that the resin used to manufacture the geonet meets the project specifications.

3. A list of the materials which comprise the geonet, expressed in the following categories as percent by weight: polyethylene, carbon black, other additives.

The Manufacturer shall identify all rolls of geonets with the following:

1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

The Geosynthetic QAE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QAE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

4. Roll packages are appropriately labeled.

5. Certified minimum properties meet the project specifications.

6. Project specifications and a copy of the QAP were submitted by Project Manager to the Installer.

11.4 CONFORMANCE TESTING

In general, conformance testing is not required except under the following conditions:

1. A specific regulatory or permit condition requiring independent material conformance testing to be performed.

2. The Geosynthetic QAC is required by contract to provide a professional engineer's certification that the material meets certain specifications (as opposed to certifying that the material supplied is marked and identified as that which is specified for the project).

3. Conformance testing may be required by the Project Manager at any time.

11.4.1 Sampling Procedures

Upon delivery of the rolls of geonet, the Geosynthetic QAC shall ensure that conformance test samples are obtained for the geonet. The rolls to be sampled shall be selected by the Geosynthetic QAC. Samples shall be taken from any portion of a roll which has not been damaged. Unless otherwise specified by the Project Manager, samples shall be 3 ft (1 m) long by the roll width. The Geosynthetic QAC shall mark the machine direction on the samples with an arrow.

Unless otherwise specified in the project specifications, samples shall be taken at a rate of not less than one per 100,000 ft^2 (10,000 m^2) of geonet. These samples shall then be forwarded to the Geosynthetic QAL for testing to ensure conformance to the project specifications.

11.4.2 Conformance Tests

At a minimum, the following tests shall be performed:

1. Density (ASTM D1505)
2. Mass per unit area (ASTM D5261)
3. Thickness (ASTM D5199)

Other conformance tests may be required by the project specifications.

11.4.3 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QAE prior to the deployment of the geonet. The Geosynthetic QAE shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The Geosynthetic QAE shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. Alternatively, the Manufacturer may have the sample retested at two different Owner-approved Geosynthetic QALs at the expense of the Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out of specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out-of- specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

11.5 GEONET DEPLOYMENT

The Geosynthetic QAC shall examine rolls upon delivery and any deviation from the above requirements shall be reported to the Project Manager.

The geonet rolls should be protected against dust and dirt during shipment and storage since geonet cleanliness is essential to its performance. The Geosynthetic QAC shall verify that the geonet is free of dirt and dust prior to installation. The Geosynthetic QAC shall report any rolls judged dirty to the Project Manager. If the geonet is judged dirty, the Installer shall clean geonet prior to installation. Cleaning operations shall be observed by the Geosynthetic QAC and improper cleaning operations shall be reported to the Project Manager.

The Installer shall handle all geonet in such a manner as to ensure that it is not damaged in any way, and the following shall be complied with:

1. On slopes, the geonet shall be secured and rolled down the slope in such a manner as to continually keep the geonet sheet in tension. If necessary, the geonet shall be positioned by hand after being unrolled to minimize wrinkles.

2. In the presence of wind, all geonet shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during deployment and shall remain until replaced with cover material.

3. Unless otherwise specified, geonet shall not be welded to geomembrane.

4. Geonet shall only be cut using scissors or other cutting tools approved by the Project Manager that will not damage the underlying geosynthetics. Care shall be taken not to leave tools in the geonet.

5. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geonet.

6. During placement of geonet, care shall be taken not to entrap dirt, excessive dust, or fugitive bentonite clay in the geonet that could cause clogging of the drainage system, and/or stones that could damage the adjacent geomembrane. If dirt or excessive dust is entrapped in the geonet, it should be cleaned prior to placement of the next material on top of it. In this regard, care shall be taken with the handling of sandbags, to prevent puncturing the sand bag.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

11.6 SEAMS AND OVERLAPS

At a minimum, the following requirements for joining the adjacent geonet shall be met:

1. Adjacent rolls shall be overlapped by at least 4 in (100 mm).

2. The geonet overlaps shall be tied with plastic fasteners. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed.

3. Tying shall be every 5 ft (1.5 m) along the length at the adjacent rolls, every 6 in (0.15 m) in the anchor trench and every 6 in (0.15 m) along end-to-end seams.

4. In general, no horizontal seams shall be allowed on sideslopes, except as part of a patch. When horizontal seams are necessary, they shall be offset in adjacent panels and shall be "shingled" downhill.

5. When more than one layer of geonet is installed, joints shall be staggered.

6. When several layers of geonet are stacked, rolls shall be deployed in the same direction to minimize strands of one layer from penetrating the channels of the adjacent layer.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

11.7 DEFECTS AND REPAIRS

11.7.1 Identification

If a defect is identified in the geonet, the Geosynthetic QAC shall determine the extent and nature of the defect. If the defect is indicated by unsatisfactory test result, the Geosynthetic QAC shall determine the extent of the deficient area by additional tests, observations, a review of records and other means that the Geosynthetic QAC deems appropriate.

11.7.2 Notification

After determining the extent and nature of the defect, the Geosynthetic QAC shall promptly notify the Installer and Project Manager. A work deficiency meeting shall be held as required between the Installer, Geosynthetic QAC, Designer, Project Manager and any other necessary parties to assess the problem, review alternative solutions, and implement an action plan.

11.7.3 Repair Procedures

The final decision as to the appropriate repair shall be agreed upon between the Project Manager, Installer, Designer, and Geosynthetic QAE.

If the hole or tear width is less than 50% of the width of the roll, the damaged area shall be repaired as follows:

1. A patch shall be placed extending 1 ft (0.3 m) beyond the edges of the hole or tear.

2. The patch shall be secured to the original geonet by tying every 6 in (0.15 m). Tying devices shall be as indicated in Section 11.6.

If the hole or tear width across the roll is equal to or more than 50% of the width of the roll, the damaged area shall be cut out and the two portions of the geonet shall be joined as indicated in Section 11.6.

The Geosynthetic QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

11.8 GEONET PROTECTION

Soil should never be placed in direct contact with geonet. Soil materials near the geonet shall be placed in such a manner as to ensure:

1. The geonet and underlying lining materials are not damaged.

2. Minimal slippage of the geonet on underlying layers occurs.

3. No excess tensile stresses occur in the geonet.

Any noncompliance with these guidelines or the project specifications shall be noted by the Geosynthetic QAC and reported in writing to the Project Manager.

12.0 GEOTEXTILE/GEONET COMPOSITE

12.1 DEFINITION AND APPLICABILITY

Geotextile/geonet composites are geocomposites used as a filter and drainage media in lining systems. This Section is applicable to drainage geocomposites made of polyester or polypropylene nonwoven geotextiles and high density polyethylene (HDPE) geonet. The geotextiles may be bonded to one side or both sides of the geonet. This Section is not applicable to geocomposites made with other material or components. The specific type of geocomposite shall be specified in the project specifications.

12.2 MANUFACTURING PLANT INSPECTION

The Owner or other appropriate representative may conduct an annual inspection of the Manufacturer's plant. Manufacturer shall document annual inspections of manufacturing plants for products which they distribute. ISO 9000 certification may be accepted as a substitute. In addition, the Project Manager, or his designated representative, may visit the manufacturing plant for a project-specific inspection if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the product for that particular project. The purpose of the plant inspection is to review the manufacturing process and quality control procedures.

The manufacturing plant inspection shall include:

1. Verification that the proper quality control documentation has been received by the Manufacturer from the component manufacturers.

2. Verification that properties guaranteed by the Manufacturer are met and meet all project specifications.

3. Verification that the measurement of properties by the Manufacturer is properly documented and test methods used are acceptable.

4. Spot inspection of the rolls and verification that they are free of imperfections or contamination by foreign matter.

5. Review of packaging, handling, storage, and transportation procedures and verification that these procedures will not damage the geocomposite.

6. Verification that roll packages have a label indicating the name of the manufacturer, type of geocomposite, roll number, and roll dimensions.

A report describing the inspection will be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

12.3 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any geocomposite, the geocomposite Manufacturer or Installer shall provide the Project Manager with the following information:

1. The origin (supplier's name and production plant) and identification (brand name and number) of the geotextile and geonet used to fabricate the geocomposite.

2. Copies of dated quality control certificates issued by the geotextile and geonet supplier. These certificates shall contain the results of the quality control tests performed on the geocomposite components outlined in Section 10 and 11 of this QAGD.

3. A specification for the geocomposite which includes all properties published by the Manufacturer measured using the appropriate test methods.

4. Written certification that minimum values given in the specification are guaranteed by the Manufacturer.

5. Quality control certificates for the geocomposite, signed by a responsible party employed by the Manufacturer. The quality control certificates shall include roll identification numbers, testing procedures and results of quality control tests. At a minimum, results shall be given for:
   a. Mass per unit area (ASTM D5261)
   b. Thickness (ASTM D5199)
   c. Geotextile-geonet adhesion (ASTM D413)
   d. Transmissivity (ASTM 4716)

   Quality control tests shall be performed in accordance with the test methods for at least every 40,000 ft^2 (4,000 m^2) of geocomposite produced, except for transmissivity which shall be at a rate of one test per 120,000 ft^2 (11,200 m^2).

The Manufacturer shall identify all rolls of geocomposite with the following:

1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

The Geosynthetic QAE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QAE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

4. Roll packages are appropriately labeled.

5. Certified minimum roll properties meet the project specifications.

6. Project specifications and the QAP were submitted by the Project Manager to the Installer.

12.4 CONFORMANCE TESTING

In general, conformance testing is not required except under the following conditions:

1. A specific regulatory or permit condition requiring independent material conformance testing to be performed.

2. The Geosynthetic QAC is required by contract to provide a professional engineer's certification that the material meets certain specifications (as opposed to certifying that the material supplied is marked and identified as that which is specified for the project).

3. Conformance testing may be required by the Project Manager at any time.

12.4.1 Sampling Procedures

Upon delivery of the rolls of geocomposite, the Geosynthetic QAC shall ensure that conformance test samples are obtained for the geocomposite.

The rolls to be sampled shall be selected by the Geosynthetic QAC. Samples shall not be taken from any portion of a roll which has been damaged. Unless otherwise specified, samples shall be 3 ft (1 m) long by the roll width. The Geosynthetic QAC shall mark the machine direction on the samples with an arrow. All lots of material and the particular test sample that represents each lot should be defined before the samples are taken.

A lot shall be defined as a group of consecutively numbered rolls from the same manufacturing line. Alternatively, a lot may be designated by the Geosynthetic QAC based on a review of all roll information including quality control documentation and manufacturing records.

Unless otherwise specified, samples shall be taken at a rate of one per lot, not to be less than one per 100,000 ft^2 (10,000 m^2) of geocomposite. These samples shall then be forwarded to the Geosynthetic QAL for testing to ensure conformance with the project specifications.

12.4.2 Conformance Tests

At a minimum, the following conformance tests shall be performed on the geocomposite as a unit:

1. Mass per unit area (ASTM D5261)

2. Geotextile-geonet adhesion (ASTM D413)

Other conformance tests may be required by the project specifications.

12.4.3 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QAE prior to the deployment of the geocomposite. The Geosynthetic QAE shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The Geosynthetic QAE shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the Manufacturer present during the testing. Alternatively, the Manufacturer may have the sample retested at two different Owner-approved Geosynthetic QALs at the expense of the Manufacturer. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out-of-specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out-of-specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

12.5 GEOCOMPOSITE DEPLOYMENT

During shipment and storage, the geocomposite shall be protected from ultraviolet light exposure, moisture, mud, dirt, dust, puncture, cutting, or any other damaging conditions. Geocomposite rolls shall be shipped and stored in relatively opaque and watertight wrappings. The roll wrappings shall be removed shortly before deployment.

For one-sided geocomposite, the Geosynthetic QAC shall verify that the geonet is free of dirt and dust prior to installation. The Geosynthetic QAC shall identify any dirty rolls and report them to the Project Manager. If the geonet is judged to be dirty or dusty by the Geosynthetic QAE, it shall be cleaned by the Installer prior to installation. Washing operation shall be observed by the Geosynthetic QAC and improper washing operations shall be reported to the Project Manager.

The Geosynthetic QAC shall observe rolls upon delivery at the site and any deviation from the above requirements shall be reported to the Project Manager.

The Installer shall handle all geocomposite in such a manner as to ensure they are not damaged, and the following shall be complied with:

1. On slopes, the geocomposite shall be securely anchored and then rolled down the slope in such a manner as to continually keep the geocomposite sheet in tension. If necessary, the geocomposite shall be positioned by hand after being unrolled to minimize wrinkles.

2. In the presence of wind, all geocomposites shall be weighted with sandbags or the equivalent. Sandbags shall be installed during deployment and shall remain until replaced with cover material.

3. Unless otherwise specified, single-sided geocomposite shall not be welded to the geomembrane.

4. Geocomposites shall be cut using a hook blade or other tool approved by the Project Manager. If in place, special care shall be taken to protect underlying geosynthetics from damage which could be caused by the cutting of the geocomposite. Care shall be taken not to leave the tools in the geocomposite.

5. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the geocomposite.

6. During placement of geocomposite, care shall be taken not to entrap in or beneath the geocomposite, stones, or dirt that could damage the geomembrane, cause clogging of drains or filters, or hamper subsequent seaming. If dirt or excess dust is entrapped in the geonet of single-sided geocomposite, it should be washed clean prior to placement of the next material on top of it. In this regard, care shall be taken with the handling of sandbags, to prevent puncturing the sandbag.

7. A visual examination of the geotextile component of the geocomposite shall be carried out over the entire surface, after installation, to ensure that no potentially harmful foreign objects are present.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

12.6 SEAMING PROCEDURES

In general, no horizontal seams shall be allowed on sideslopes thus seams shall be along, not across, the slope, except as part of a patch. If horizontal seams are required, offset adjacent horizontal seams.

Horizontal seams shall be allowed under the following conditions:

1. Seams are offset in adjacent panels by one panel width.

2. Seams are "shingled" downhill.

At a minimum, the following requirements shall be met:

1. Adjacent geocomposite shall be overlapped so that the geonet overlaps by at least 4 in (100 mm) and geotextile overlap by at least 3 in (75 mm).

2. If two sided geocomposite or the geotextile is on bottom, overlap geotextile.

3. The geonet overlaps shall be tied with plastic fasteners. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed.

4. Tying shall be every 5 ft (1.5 m) along the slope, every 6 in (150 mm) in the anchor trench, and every 6 in (150 mm) along end-to-end seams on the base of the landfill.

5. In the corners of the sideslopes where overlaps between perpendicular strips are required, an extra layer shall be unrolled along the slope, on top of the previously installed geocomposite, from top to bottom of the slope.

6. When more than one layer of geocomposite is installed, joints shall be staggered.

7. Once geonet is tied, the top layer of geotextile of the geocomposite shall be seamed. On slopes steeper than 10:1 (horizontal:vertical), all geotextiles shall be continuously sewn. Spot sewing is not allowed. On bottoms and slopes shallower than 10:1, geotextiles shall be sewn (preferred), or thermally bonded with the written approval of the Project Manager. The Installer shall pay particular attention to seams to ensure that no earth cover material could be inadvertently inserted beneath the geotextile if applicable.

8. Any sewing shall be done using polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the geotextile. Sewing shall be done using machinery and stitch types specified in the project specifications or as approved in writing by the Project Manager and the Geosynthetic QAE.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

12.7 DEFECTS AND REPAIRS

12.7.1 Identification

If a defect is identified in the geotextile/geonet composite, the Geosynthetic QAC shall determine the extent and nature of the defect. If the defect is indicated by unsatisfactory test result, the Geosynthetic QAC shall determine the extent of the deficient area by additional tests, observations, a review of records and other means that the Geosynthetic QAC deems appropriate.

12.7.2 Notification

After determining the extent and nature of the defect, the Geosynthetic QAC shall promptly notify the Installer and Project Manager. A work deficiency meeting shall be held as required between the Installer, Geosynthetic QAC, Designer, Project Manager and any other necessary parties to assess the problem, review alternative solutions, and implement an action plan.

12.7.3 Repair Procedures

The final decision as to the appropriate repair shall be agreed upon between the Project Manager, Installer, Designer, and Geosynthetic QAE. Prior to acceptance of the geocomposite, the Installer shall locate and repair all damaged areas as directed by the Geosynthetic QAC. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile. The Geosynthetic QAC shall observe any repair and report any noncompliance with the following requirements in writing to the Project Manager.

If in the Geosynthetic QAC's judgement, the defect is determined to be small, typically smaller than 3 by 3 feet (1 m by 1 m), the geocomposite shall be repaired as follows:

1. If the geonet is judged to be undamaged but the geotextile is damaged, a patch of geotextile shall be placed. The geotextile patch shall be thermally bonded in place with a minimum of 12 inch (0.3 m) overlap in all directions.

2. If the geonet is judged to be damaged, the damaged geonet shall be removed. A section of geonet shall be cut to replace the removed section. The geonet shall be tied to the existing geonet using white plastic fasteners placed at least every 6 inches (150 mm) on overlap. A geotextile patch shall be placed over the repaired geonet section. The geotextile patch shall be thermally bonded in place with a minimum of 12 inch (0.3 m) overlap in all directions.

If in the Geosynthetic QAC's judgement, the defect is determined to be large, typically larger than 3 by 3 feet (1 m by 1 m), the geocomposite shall be replaced.

The Geosynthetic QAC shall observe any repair and report any noncompliance with the above requirements in writing to the Project Manager.

12.8 GEOCOMPOSITE PROTECTION

For single-sided geocomposites, soils should never be placed in direct contact with geonet. All soil materials located on top of the geocomposite shall be deployed in such a manner as to ensure:

1. The geocomposite and underlying lining materials are not damaged.

2. Minimal slippage of the geocomposite on underlying layers occurs.

3. No excess tensile stresses occur in the geocomposite.

Any noncompliance with these guidelines or the project specifications shall be noted by the Geosynthetic QAC and reported to the Project Manager.

13.0 GEOSYNTHETIC CLAY LINERS

13.1 DEFINITIONS AND APPLICABILITY

Geosynthetic Clay Liners (GCLs) are geocomposite materials that consist of a uniform layer of low hydraulic conductivity, sodium bentonite clay which is encapsulated between two geotextile layers. GCLs are used as the clay component of barriers in lining systems.

13.2 MANUFACTURING PLANT INSPECTION

The Owner or other appropriate representative may conduct an annual inspection of the Manufacturer's plant. Manufacturer will document annual inspections of manufacturing plants for products which they distribute. ISO 9000 certification may be accepted as a substitute. In addition, the Project Manager, or his designated representative, may visit the manufacturing plant for a project-specific inspection if deemed necessary. If possible, the project-specific inspection shall be prior to or during the manufacturing of the product for that particular project. The purpose of the plant inspection is to review the manufacturing process and quality control procedures.

The manufacturing plant inspection shall include:

1. Verification that properties guaranteed by the Manufacturer are met and meet all project specifications.

2. Verification that the measurement of properties by the Manufacturer is properly documented and test methods used are acceptable.

3. Spot inspection of the rolls and verification that they are free of imperfections or contamination by foreign matter.

4. Review of handling, storage, and transportation procedures, and verification that these procedures will not damage the GCL.

5. Verification that rolls are labeled with the name of the manufacturer, roll number, and roll dimensions.

6. Verification that overlap lines are printed on the rolls.

A report describing the inspection shall be retained by the Owner for periodic inspections and by the Project Manager for project-specific inspections.

13.3 QUALITY CONTROL DOCUMENTATION

Prior to the installation of any GCL, the Manufacturer or Installer shall provide the Project Manager with the following information:

1. Copies of dated quality control information issued by the bentonite supplier.

2. Results of quality control tests conducted by the GCL Manufacturer to verify that the bentonite supplied met the GCL Manufacturer's specifications. The following quality control tests shall be performed on the bentonite:
    a. Swell Index (ASTM D5890)
    b. Fluid loss (ASTM D5891)
    c. Moisture Content (ASTM D4643)

    Tests will be performed at a frequency of one per 100,000 lbs. of sodium bentonite clay.

3. Written certification that the minimum values given in the project specifications are guaranteed by the Manufacturer.

4. Quality control certificates, signed by a responsible party employed by the Manufacturer. Each quality control certificate shall include roll identification numbers, testing procedures, and results of quality control tests. At a minimum, results for the GCL as a unit shall be given for:
    a. Moisture content (ASTM D4643)
    b. Index Flux (ASTM D5887)
    c. Mass per unit area (ASTM D5261)
    d. Peel strength (ASTM D4632) - modified as per Table 10, Note #4.
    e. Grab strength (ASTM D4632)

    Moisture content, mass per unit area, and peel adhesion quality control tests shall be performed in accordance with the test methods for at least every 40,000 ft^2 (4,000 m^2). Hydraulic conductivity and fluid loss tests shall be performed in accordance with the test methods for at least every 100,000 ft^2 (10,000 m^2) of GCL produced.

The following shall be maintained by the Manufacturer and be available upon request:

1. The origin (supplier's name and location of material source) and identification of the bentonite used for production of the GCL.

2. Copies of dated quality control information provided by the geotextile Manufacturer.

The Manufacturer shall identify all rolls of GCL with the following:

1. Manufacturer's name
2. Product identification
3. Roll number
4. Roll dimensions

The Geosynthetic QAE shall review these documents and shall report any discrepancies with the above requirements to the Project Manager. The Geosynthetic QAE shall verify that:

1. Property values certified by the Manufacturer meet all of its guaranteed specifications.

2. Measurements of properties by the Manufacturer are properly documented and that the test methods used are acceptable.

3. Quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it.

4. Rolls are appropriately labeled.

5. Project specifications and the QAP were submitted by Project Manager to the Installer.

13.4 CONFORMANCE TESTING

In general, conformance testing is not required except under the following conditions:

1. A specific regulatory or permit condition requiring independent material conformance testing to be performed.

2. The Geosynthetic QAC is required by contract to provide a professional engineer's certification that the material meets certain specifications (as opposed to certifying that the material supplied is marked and identified as that which is specified for the project)

3. Conformance testing may be required by the Project Manager at any time.

13.4.1 Sampling Procedures

Upon delivery of the rolls of GCL, the Geosynthetic QAC shall ensure that conformance test samples are obtained in accordance with industry accepted standards such as ASTM D6072. The rolls to be sampled shall be selected by the Geosynthetic QAC. Samples shall not be taken from any portion of a roll which has been damaged. Unless otherwise specified, samples shall be 2 ft (0.6 m) long by the roll width. The Geosynthetic QAC shall mark the machine direction on the samples with an arrow.

If the Project Manager desires, the Geosynthetic QAC can perform the conformance test sampling at the manufacturing plant. This may expedite the installation process for certain projects. Unless otherwise specified in the project specifications, samples shall be taken at a rate of one per 100,000 ft^2 (10,000 m^2) of GCL. Samples for index flux conformance tests shall be taken at least every 250,000 ft^2 (25,000 m^2). These samples shall then be forwarded to the Geosynthetic QAL for testing to ensure conformance to the project specifications.

13.4.2 Conformance Tests

At a minimum, the following conformance tests shall be conducted on the GCL as a unit:

1. Moisture content (ASTM D4643)
2. Index Flux (ASTM D5887) or Hydraulic Conductivity (ASTM D5084)
3. Mass per unit area (ASTM D5261)

Additional conformance tests may be required by the project specifications.

13.4.3 Test Results

All conformance test results shall be reviewed and accepted or rejected by the Geosynthetic QAE prior to the deployment of the GCL. The Geosynthetic QAE shall examine all results from laboratory conformance testing and shall report any nonconformance to the Project Manager. The Geosynthetic QAE shall be responsible for checking that all test results meet or exceed the property values listed in the project specifications.

If the Manufacturer has reason to believe that failing tests may be the result of the Geosynthetic QAL incorrectly conducting the tests, the Manufacturer may request that the sample in question be retested by the Geosynthetic QAL with a technical representative of the manufacturer present during the testing. Alternatively, the Manufacturer may have the sample retested at two different Owner-approved Geosynthetic QALs. If both laboratories produce passing results, the material shall be accepted. If both laboratories do not produce passing results, then the original Geosynthetic QAL's test results shall be accepted. The use of these procedures for dealing with failed test results is subject to the approval of the Project Manager.

If a test result is in nonconformance, all material from the lot represented by the failing test should be considered out-of-specification and rejected. Alternatively, at the option of the Project Manager, additional conformance test samples may be taken to "bracket" the portion of the lot not meeting specification (note that this procedure is valid only when all rolls in the lot are consecutively produced and numbered from one manufacturing line). To isolate the out-of- specification material, additional samples must be taken from rolls that have roll numbers immediately adjacent to the roll that was sampled and failed. If both additional tests pass, the roll that represents the initial failed test and the roll manufactured immediately after that roll (next larger roll number) shall be rejected. If one or both of the additional tests fail, then the entire lot shall be rejected or the procedure repeated with two additional tests that bracket a greater number of rolls within the lot.

13.5 GCL DEPLOYMENT

During shipment and storage, the GCL shall be protected from ultraviolet light exposure, moisture, excessive humidity, puncture, cutting, or any other damaging conditions. GCL rolls shall be shipped and stored in relatively opaque and water resistant wrappings. GCL rolls shall be stored on a flat dry surface and covered with a tarp or under a roof. The roll wrappings shall only be removed shortly before deployment.

The Geosynthetic QAC shall observe rolls and track log numbers upon delivery and prior to deployment at the site and report any deviations from the above requirements to the Project Manager.

The Geosynthetic QAC shall review the GCL panel deployment progress and advise the Project Manager on its conformance with the actual field conditions. The Geosynthetic QAC shall verify that the Installer handles the GCL material in such a manner as to ensure that it is not damaged, and the following are complied with:

1. On slopes, the GCL rolls shall be deployed down the slope in such a manner as to keep slack out of the GCL panel.

2. The GCL should be installed with the proper side of the material facing upward. The proper orientation of the material should be as specified by the project specifications.

3. If the GCL is cut in place, special care shall be taken to protect underlying geosynthetic materials from damage which could be caused by cutting of the GCL.

4. The Installer shall take any necessary precautions to prevent damage to underlying layers during placement of the GCL.

5. During placement of the GCL, care shall be taken not to entrap beneath the GCL any stones, excessive dust or moisture that could damage the GCL or any underlying geosynthetics.

6. After installation, a visual examination of the GCL shall be carried out over the entire surface to ensure that no potentially harmful foreign objects, contaminated soil or damaged areas are present.

7. Excess loss of bentonite on edges during deployment should be minimized.

The Geosynthetic QAC shall verify that no more GCL material is deployed during one working day than can be covered by the end of that day. Exceptions to this requirement may be given by the Project Manager if dry weather is forecast for several consecutive days. GCL deployment shall not be undertaken during precipitation or when there is an immediate threat of precipitation.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

13.6 SEAMING PROCEDURES

13.6.1 Seam Overlap

Adjacent GCL panels shall be joined according to project plans and specifications. At a minimum, the Geosynthetic QAC shall verify the Installer complies with the following requirements:

1. Edge seam overlaps shall be a minimum of 6 in (150 mm).

2. Roll end seam overlaps shall be a minimum 12 in (.3 m).

3. The addition of bentonite to seam locations shall be in accordance with the project specifications.

4. End to end seams on slopes shall be minimized. If they are required, the Geosynthetic QAC shall contact Designer to verify the method used to attach the GCLs has adequate tensile strength.

Prior to approval of the GCL by the Geosynthetic QAC, the following requirements should be visually verified by the QAC:

1. The required overlaps are provided. For GCL materials with a moisture content $\geq 20\%$, the overlap shall be doubled and monitored to assure the appropriate overlap is maintained since the panels may be subjected to shrinkage.

2. The amount of the bentonite is placed on the seam required by the project specifications.

The Geosynthetic QAC shall note any noncompliance and report it to the Project Manager.

13.7 DEFECTS AND REPAIRS

Any portion of the GCL exhibiting flaws shall be repaired. Prior to acceptance of the installed GCL, the Installer shall locate and repair all damaged areas of the liner as directed by the Geosynthetic QAC. Defects or damage can be identified by either rips, tears, premature hydration of the GCL or delamination of the geotextiles.

Rips or tears in the GCL shall be covered by another piece of material meeting the project specifications. The material shall extend over the entire damaged area with a minimum 24-inch overlap in all directions. Addition of bentonite to patches shall be in accordance with the project specifications.

The QAC shall be notified when the GCL has been exposed to excessive moisture and has significantly hydrated prior to placement of overlying material. Significant hydration is indicated by dissociation of the geotextiles from the bentonite core or significant bentonite displacement caused by light foot traffic. The hydrated material shall be covered with new dry GCL material, removed and replaced with new dry GCL material, or used "as-is" at the discretion of the QAC. All defects and repairs shall be reported to the Project Manager.

13.8 GCL PROTECTION

All soil materials located on top of the GCL shall be deployed in such a manner as to ensure:

1. The GCL and underlying liner materials are not damaged.

2. Minimal slippage of the GCL on underlying layers occurs.

3. No excess tensile stress occur in the GCL.

Any noncompliance with these guidelines or the project specifications shall be noted by the Geosynthetic QAC and reported to the Project Manager.

APPENDIX

SPECIFICATIONS FOR HDPE GEOSYNTHETICS

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 1 – HDPE SMOOTH GEOMEMBRANE

Property	Qualifier	Unit	Specified Value[1]	All Thicknesses	Test Method
Thickness	min. average	Mils	40 60 80 100		ASTM D5199
Thickness	min. reading	Mils	36 54 72 90		ASTM D5199
Density (geomembrane)	min.	g/cc	0.940		ASTM D1505
Melt Index (resin)	max.	g/10 min.	1.0		ASTM D1238
Tensile Properties: (each direction)					
1. Yield strength	min.	lb/in^2 width	84 126 168 210	2100 psi	ASTM D638[2]
2. Break strength	min.	lb/in	152 228 304 380	3800 psi	ASTM D638[2]
3. Elongation at yield	min.	%	12		ASTM D638[2]
4. Elongation at break	min.	%	700		ASTM D638[2]
Tear Strength	min.	Lb	28 42 56 70	700 lb/in	ASTM D1004
Puncture Resistance	min.	Lb	72 108 144 180	1800 lb/in	ASTM D4833
Low Temperature	max.	Deg. C	-60		ASTM D746
Carbon Black Content	range	%	2.0 to 3.0		ASTM D4218
Carbon Black Dispersion	rating	N/A	A-1, A-2, or B-1		ASTM D5596
Environmental Stress Crack	min.	Hours	200		ASTM D5397 (single point)

Note:
[1] Property values listed in this table correspond with the current version of GRI (Geosynthetic Research Institute) GM-13.
[2] Test Methods modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 2 – HDPE TEXTURED GEOMEMBRANE

Property	Qualifier	Unit	Specified Value[1]	All Thicknesses	Test Method
Thickness [2]	min. average	Mils	40 60 80		ASTM D5994
Thickness (min. average) Lowest Individual Lowest Individual	min. reading	Mils	for 10 Values for 8 of 10 Values for 2 of 10 Values	nom. (-5%) -10% -15%	ASTM D5994
Density (geomembrane)[2]	min.	g/cc	0.940		ASTM D1505
Melt Index (resin)	max.	g/10 min.	1.0		ASTM D1238
Tensile Properties: (each direction)					
1. Yield strength	min.	lb/in^2 width	84 126 168	2100 psi	ASTM D638[3]
2. Break strength	min.	Lb/in	60 90 120	1500psi	ASTM D638[3]
3. Elongation at yield	min.	%	12		ASTM D638[3]
4. Elongation at break	min.	%	100		ASTM D638[3]
Tear Strength	min.	lb	28 42 56	700 lb/in	ASTM D1004
Puncture Resistance	min.	lb	60 90 120	1500 lb/in	ASTM D4833
Low Temperature	max.	Deg. C	-60		ASTM D746
Carbon Black Content[2]	range	%	2.0 to 3.0		ASTM D4218
Carbon Black Dispersion[2]	rating	N/A	A-1, A-2, or B-1		ASTM D5596
Environmental Stress Crack[2]	min.	Hours	200		ASTM D5397 (single point)

Note:
[1] Property values listed in this table correspond with the current version of GRI (Geosynthetic Research Institute) GM-13.
[2] Properties tested in weld zone.
[3] Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS				
TABLE 3 – 35 MIL SMOOTH GEOMEMBRANE				
Property	**Qualifier**	**Unit**	**Specified Value**	**Test Method**
Thickness	min. average	Mils	35	ASTM D5199
Thickness	min. reading	Mils	33	ASTM D5199
Density (geomembrane)	min.	g/cc	0.92	ASTM D1505
Tensile Properties: (each direction)				
1. Stress at Break	min.	Psi	3800	ASTM D638[1]
2. Strain at Break (2" gage length)	min.	%	750	ASTM D638[1]
3. Strain at Break (2.5" gage length [NSF])	min.	%	600	ASTM D638[1]
Carbon Black Content	min.	%	2.0	ASTM D4218
Multi-Axial Elongation	min.	%	30	ASTM D5617

Note:
[1]Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 4 - 35 MIL TEXTURED GEOMEMBRANE

Property	Qualifier	Unit	Specified Value	Test Method
Thickness[1]	min. average	mils	35	ASTM D5199
Thickness[1]	min. reading	mils	33	ASTM D5199
Density (geomembrane)[1]	min.	g/cc	0.92	ASTM D1505
Tensile Properties: (each direction)				
1. Stress at Break	min.	psi	2300	ASTM D638[2]
2. Strain at Break (2" gage length)	min.	%	300	ASTM D638[2]
3. Strain at Break (2.5" gage length [NSF])	min.	%	240	ASTM D638[2]
Carbon Black Content[1]	min.	%	2.0	ASTM D4218
Multi-Axial Elongation	min.	%	25	ASTM D5617

Note:
[1] Properties apply to base sheet
[2] Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 5 - 40 MIL SMOOTH GEOMEMBRANE

Property	Qualifier	Unit	Specified Value	Test Method
Thickness	min. average	Mils	40	ASTM D5199
Thickness	min. reading	Mils	36	ASTM D5199
Density (geomembrane)	min.	g/cc	0.92	ASTM D1505
Tensile Properties: (each direction)				
1. Stress at Break	min.	Psi	3800	ASTM D638[1]
2. Strain at Break (2" gage length)	min.	%	750	ASTM D638[1]
3. Strain at Break (2.5" gage length [NSF])	min.	%	600	ASTM D638[1]
Carbon Black Content	min.	%	2.0	ASTM D4218
Multi-Axial Elongation	min.	%	30	ASTM D5617

Note:
[1]Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 6 - 40 MIL TEXTURED GEOMEMBRANE

Property	Qualifier	Unit	Specified Value	Test Method
Thickness[1]	min. average	mils	40	ASTM D5199
Thickness[1]	min. reading	mils	36	ASTM D5199
Density (geomembrane) [1]	min.	g/cc	0.92	ASTM D1505
Tensile Properties: (each direction)				
1. Stress at Break	min.	psi	2300	ASTM D638[2]
2. Strain at Break (2" gage length)	min.	%	300	ASTM D638[2]
3. Strain at Break (2.5" gage length [NSF])	min.	%	240	ASTM D638[2]
Carbon Black Content[1]	min.	%	2.0	ASTM D4218
Multi-Axial Elongation	min.	%	25	ASTM D5617

Note:
[1] Properties apply to base sheet.
[2] Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 7 - HDPE GEOMEMBRANE SEAMS

Property	Qualifier	Unit	Specified Value				All Thicknesses	Test Method
Thickness	min. average	mils	40	60	80	100		
Bonded Seam Strength	min.	lb/in	80	120	160	200	2000 psi	ASTM D4437[1]
Peel Adhesion:								
Fusion	min.	lb/in	60	90	120	150	1500 psi	ASTM D4437[1]
Extrusion	min.	lb/in	52	78	104	130	1300 psi	ASTM D4437[1]

Note:
[1]Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 8 – HDPE SOLID GEONET

Property	Qualifier	Unit	Value	Test Method
Thickness	min.	Mils	200	ASTM D5199
Mass per Unit Area	min.	Lb/ft^2	0.16	ASTM D5261
Polyethylene Content	min.	%	95	- - -
Density (black resin)	min.	G/cc	0.940	ASTM D1505
Carbon Black Content	range	%	2.0 min.	ASTM D4218
Melt Index	max.	g/10 min.	1.0	ASTM D1238 (Condition 190/2.16)
Tensile Strength (machine direction)	min.	Lb/in	40	ASTM D5035
Transmissivity	min.	m^2/sec	1×10^{-3}	ASTM D4716[1]

Note:
[1]Test Methods Modified per Table 9.

GEOSYNTHETIC MATERIAL SPECIFICATIONS		
TABLE 9 -TEST METHOD MODIFICATIONS		
Property	**Test Method**	**Modifications**
Tensile Properties	ASTM D638	Type IV Die. ASTM D638 test specimen shall be used. The grip separation shall be 2.5 inches. This test does not require the use of extensometers. The rate of grip separation will be 2 inches per minute (20 inches for Coverseal). A gauge length of 1.3 inches for yield values, and 2.0 inches for break values shall be used to calculate elongation from grip movement.
Dimension Stability	ASTM D1204	100□C for 1 hour.
Tensile Strength	ASTM D5035	Test method modified as follows: 1) Use 4 in × 8 in specimens. 2) Use grip separation of 4 in. 3) Use test rate of 8 in/min. 4) Continue test until first strand separates completely.
Bonded Seam Strength and Peel Adhesion	ASTM D4437	For shear tests, the sheet shall yield before failure of the seam. For peel adhesion, seam separation shall not extend more than 10% into the seam. For either test, testing shall be discontinued when the sample has visually yielded. Sample failure shall conform to a passing configuration as outlined in (NSF Std. 54 Figure A-1).
Transmissivity	ASTM D4716	Gradient = 1.0; Confining Pressure = 15,000 psf (solid geonet), 4,000 psf Cap net measured between two steel plates one hour after application of confining pressure.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 10 – GEOSYNTHETIC CLAY LINER MATERIAL SPECIFICATIONS

BENTONITE[1]	Procedure	Frequency	English Units	SI Units
Swell Index	ASTM D5890	1/100,000 lbs. (50,000 kg)	24 ml / 2g min.	24 ml / 2g min.
Moisture Content	ASTM D4643	1/100,000 lbs. (50,000 kg)	12% max.	12% max.
Fluid Loss	ASTM D5891	1/100,000 lbs. (50,000 kg)	18 ml max.	18 max.
FINISHED GCL				
Bentonite Mass Per Unit Area[2]	ASTM D5261	1/40,000 ft^2 (1/4,000 m^2)	0.825 lb./sq. ft. MARV	4.02 kg/m^2 MARV
Grab Strength[3]	ASTM D4632	1/40,000 ft^2 (1/4,000 m^2)	95 lbs MARV	418 N MARV
Grab Elongation[3]	ASTM D4632	1/40,000 ft^2 (1/4,000 m^2)	75% Typical	75% Typical
Peel Strength[4]	ASTM D4632	1/40,000 ft^2 (1/4,000 m^2)	15 lb^2 min	66 N
Hydraulic Conductivity[5]	ASTM D5084	1/100,000 ft^2 (1/10,000 m^2)	5×10^{-9} cm/sec max.	5×10^{-9} cm/sec max.
Index Flux[5]	ASTM D5887	Once weekly (production)	1×10^{-8} m^3/m^2 /sec	1×10^{-8} m^3/m^2 /sec

1) Tests performed and values reported are for the "as received" bentonite, prior to incorporation into the final product.
2) Dried to a crystalline moisture content of approximately 6%.
3) Measured at final peak, in the weakest principal direction.
4) Modified to use a four inch wide grip. Reported as the average of the maximum peak for each specimen.
5) De-Aired Tap Water @ 5 psi maximum effective confining stress and 2 psi head.

MARV - Minimum Average Roll Value

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 11A – GEOMEMBRANE SEAMS

Property	Qualifier	Unit	Specified Value	Test Method
Bonded Seam Strength	min.	lb/in	35	ASTM D4437[1]
Peel Adhesion:				
Fusion	min.	lb/in	30	ASTM D4437[1]
Extrusion	min.	lb/in	25	ASTM D4437[1]

Note:
[1]Test Methods Modified Below

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 11B – GEOMEMBRANE TEST METHOD MODIFICATIONS

Property	Test Method	Modifications
Tensile Properties	ASTM D638	Type IV Die. ASTM D638 test specimen shall be used. The Grip separation shall be 2.5 inches. This test does not require the use of extensometers. The rate of grip separation will be 20 inches per minute. A gauge length of 1.3 inches for yield values, and 2.0 inches for break values shall be used to calculate elongation from grip movement.
Bonded Seam Strength and Peel Adhesion	ASTM D4437	For shear tests, the sheet shall yield before failure of the seam. For peel adhesion, seam separation shall not extend more than 50% into the seam. For either test, testing shall be discontinued when the sample has visually yielded or reaches the specified value, whichever comes first.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 11C – GEOMEMBRANE AIR PRESSURE TEST

Minimum Pressure		Maximum Pressure		[2]Maximum Pressure Drop	
(KPA)	(lb/in^2)	(KPA)	(lb/in^2)	(KPA)	(lb/in^2)
140	20	200	30	35	5.0

Note:
[2]Maximum pressure drop over two minutes.

GEOSYNTHETIC MATERIAL SPECIFICATIONS

TABLE 12 - "CAP NET" GEONET

Property	Qualifier	Unit	Value	Test Method
Thickness	min.	Mils	200	ASTM D5199
Mass per Unit Area	min.	Lbs/ft	0.13	ASTM D5261
Polyethylene Content	min.	%	95	---
Density (black resin)	min.	g/cc	0.940	ASTM D1505
Carbon Black Content	min.	%	2.0	ASTM D4218
Melt Index	max.	g/10 min	1.0	ASTM D1238 (Condition 190/2.16)
Tensile Strength (machine direction)	min.	lb/in	23	ASTM D5035[1]
Transmissivity	min.	m^2/sec	1×10^{-3}	ASTM D4716[1]

Note:
[1] Test Methods Modified per Table 9.

L

APPENDIX L

CLOSURE AND POST-CLOSURE COST ESTIMATES

Florida Department of Environmental Protection

Twin Towers Office Bldg., 2600 Blair Stone Road, Tallahassee, FL 32399-2400

DEP Form # 62-701.900(28)
Form Title: Financial Assurance Cost Estimate Form
Effective Date:
DEP Application No.
(Filled by DEP)

FINANCIAL ASSURANCE COST ESTIMATE FORM

Date: August 19, 2002 Date of DEP Approval: ____________

I. GENERAL INFORMATION:

Facility Name: Trail Ridge Class I Landfill
WACS or GMSID #: GMS3116P02787
Permit Application No.: 0013493-002-SC (Renewal of SC16-184444)
Expiration Date: November 25, 2002
Facility Address: 5110 U.S. Highway 301, Baldwin, Florida 32234
Permittee: Trail Ridge Landfill, Inc.
Mailing Address: Same as facility address

Latitude: 30°14'00"N Longitude: 82°02'30"W or UTM: ____________

Solid Waste Disposal Units Included in Estimate:

Phase/Cell	Acres	Date Unit Began Accepting Waste	Design Life of Unit From Date of Initial Receipt of Waste
I - V	144	18-May-92	20 +/- Years

Total Landfill Acreage included in this estimate: 119 Closure 144 Long Term Care

The entire landfill less closed areas (25 Ac +/-), after Fill Phase 10 (the estimated worse case).
(71.3 acres of top area and 47.7 acres of side slope)

Type of Landfill X Class I ____ Class III ____ C&D Debris

II. TYPE OF FINANCIAL ASSURANCE DOCUMENT (Check Type)

____ Letter of Credit*
____ Performance Bond*
____ Guaranty Bond*
____ Insurance Certificate
X Escrow Account
____ Trust Fund Agreement

* Indicates mechanisms that require use of a Standby Trust Fund Agreement

Northwest District	Northeast District	Central District	Southwest District	South District	Southeast District
160 Governmental Center	7825 Baymeadows Way, Ste. B200	3319 Maguire Blvd., Ste. 232	3804 Coconut Palm Dr.	2295 Victoria Ave., Ste. 364	400 North Congress Ave.
Pensacola, FL 32501-5794	Jacksonville, FL 32256-7590	Orlando, FL 32803-3767	Tampa, FL 33619	Fort Myers, FL 33901-3881	West Palm Beach, FL 33401
850-595-8360	904-448-4300	407-894-7555	813-744-6100	941-332-6975	561-681-6600

40 CFR Part 264 H as adopted by reference in Rule 62-701.603, Florida Administrative Code sets forth the method of annual Cost estimates may be adjusted using an inflation factor or be recalculating the maximum cost of closure in current dollars. Select one of the methods of cost estimate adjustment below.

☐ **(a) Inflation Factor Adjustment**

Inflation adjustments using an inflation factor may only be made when a Department approved closure cost estimate exists and no changes have occurred in the facility operation which would necessitate modification to the closure plan. The inflation factor is derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The inflation factor may also be obtained from the Solid Waste Financial Coordinator at (850) 488-0300.

This adjustment is based on the Department approved closure cost estimate dated: ____________

Latest Department Approved		Current Year		Inflation Adjusted
____________	X	____________	=	____________

This adjustment is based on the Department approved long-term care cost estimate dated: ____________

Latest Department Approved Annual Long-Term Care Cost Estimate		Current Year Inflation Factor		Inflation Adjusted Annual Long-Term Care Cost Estimate
____________	X	____________	=	____________

Number of Years of Long-Term Care Remaining: X ____________

Inflation Adjusted Long-Term Care Cost Estimate: = ____________

[X] **(b) Recalculate Estimates (see section V)**

IV. CERTIFICATION BY ENGINEER

This is to certify that the Financial Assurance Cost Estimates pertaining to the engineering features of this solid waste management facility have been examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgment, the Cost Estimates are a true, correct and complete representation of the financial liabilities for closing and long-term care of the facility and comply with the requirements of Florida Administrative Code (F.A.C.), Rule 62-701.630 and all other Department of Environmental Protection rules, and statutes of the State of Florida. It is understood that the Financial Assurance Cost Estimates shall be submitted to the Department **annually**, revised or adjusted as required by Rule 62-701.630(4), F.A.C.

Juanitta Bader Clem 9/25/02
Signature of Engineer

Juanitta Bader Clem, P.E.
Name & Title (please type)

43245
Florida Registration Number (affix seal)

14775 St. Augustine Road, Jax. FL 32258
Mailing Address

(904) 642-8990
Telephone Number

Chris Pearson
Signature of Owner/~~Operator~~

Chris Pearson, Operations Manager
Name & Title (please type)

(904) 630-4593
Telephone Number

chrisp@coj.net
Owner/Operator E-Mail Address

clemj@etminc.com
Engineer's E-Mail Address

V. RECALCULATE ESTIMATED CLOSING COSTS

For the time period in the landfill operation when the extent and manner of its operation makes closing most expensive.

*** Third Party Estimate/Quote must be provided for each item**
**** Costs must be for a third party providing all materials and labor**

DESCRIPTION	UNIT		QUANTITY	UNIT COST		TOTAL
1. Proposed Monitoring Wells			(Do not include wells already in existence)			
The monitoring wells have been installed as part of operation.	EA					$0.00
2. Slope and Fill (bedding layer between waste and barrier layer):						
Excavation	CY	NA	0	$0.00		$0.00
Placement and Spreading	SY		575,960	$0.99	(a)	$570,200.40
Compaction Included with Placement and Spreading	CY		0	$0.00		$0.00
Off-Site Material Included as part of operation	CY		0	$0.00		$0.00
Delivery Included as part of Placement and Spreading	CY		0	$0.00		$0.00
			Subtotal Monitoring Wells:			$570,200.40
3. Cover Material (Barrier Layer):						
Off-Site Clay	CY		76,956	$15.00	(b)	$1,154,340.00
Synthetics - 40 mil	SY		345,092	$3.105	(c)	$1,071,510.66
Synthetics - GCL	SY	NA	0	$0.00		$0.00
Synthetics - Geonet	SY	NA	0	$0.00		$0.00
Synthetics - Other	SY	NA	0	$0.00		$0.00
			Subtotal Barrier Layer Cover:			$2,225,850.66
4. Top Soil:						
Off-Site Material (sand)	CY		115,031	$6.27	(d)	$721,244.37
Off-Site Material (top soil)	CY		268,943	$12.00	(b)	$3,227,316.00
Delivery Included with material	CY		0	$0.00		$0.00
Spread Included with material	CY		0	$0.00		$0.00
			Subtotal Top Soil Cover:			$3,948,560.37

a. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received February 7, 1997 for Closure of Side Slope Units 1-4 and 12-20 and multiplied by an inflation factor of 1.02 for 1998, 1.01 for 1999, 1.015 for 2000 and 1.02 for 2001.
b. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received October 19, 2001 for Incremental Closure Construction.
c. Based upon Textured/Two Sides, 40 mil HDPE liner material from GSE as provided by Bob Trexler on August 19, 2002.
d. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received April 7, 2000 for Third Construction Increment and increased by an inflation factor of 1.02 for 2001.

DESCRIPTION	UNIT		QUANTITY	UNIT COST		TOTAL
5. Vegetative Layer:						
Sodding	SY		575,960	$1.87	(a)	$1,077,045.20
Hydroseeding Included with sodding	AC		0	$0.00		$0.00
Fertilizer Included with sodding	AC		0	$0.00		$0.00
Mulch	AC	N/A	0	$0.00		$0.00
Other	SY	N/A	0	$0.00		$0.00
			Subtotal Vegetative Layer:			$1,077,045.20
6. Stormwater Control System:						
Earthwork	CY		8,415	$5.71	(a)	$48,049.65
Grading Included with Earthwork	SY		0	$0.00		$0.00
Piping	LF		4,240	$90.48	(b)	$383,635.20
Ditches	LF	N/A	0	$0.00		$0.00
Berms	LF	N/A	0	$0.00		$0.00
Control Structures	EA	N/A	0	$0.00		$0.00
Other Terrace Drains	EA		56	$5,500.00	(b)	$308,000.00
Underdrain	LF		41,861	$16.00	(b)	$669,776.00
			Subtotal Stormwater Controls:			$1,409,460.85
7. Gas Controls: Passive						
Wells	EA	N/A	0	$0.00		$0.00
Pipe and Fittings	LF	N/A	0	$0.00		$0.00
Monitoring Probes The gas monitoring probes have been installed.	EA		0	$0.00		$0.00
NSPS/Title V requirements	LS		0	$0.00		$0.00
			Subtotal Passive Gas Controls:			$0.00

a. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received April 7, 2000 for Third Construction Increment and increased by an inflation factor of 1.02 for 2001.
b. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received October 19, 2001 for Incremental Closure Construction.

DESCRIPTION	UNIT	QUANTITY	UNIT COST		TOTAL
8. Gas Control: Active Extraction					
Traps	EA	5	$3,136.00	(a)	$15,680.00
Sump Installed during operation	EA	0	$0.00		$0.00
Flare Assembly	EA	1	$138,626.67	(a)	$138,626.67
Flame Arrestor Installed during operation	EA	0	$0.00		$0.00
Mist Eliminator Installed during operation	EA	0	$0.00		$0.00
Flow Meter Installed during operation	EA	0	$0.00		$0.00
Blowers Included with the Flare Assembly	EA	0	$0.00		$0.00
Collection System					
6" Pipes and Fittings	LF	7,000	$25.00	(b)	$175,000.00
8" Pipes and Fittings	LF	1,300	$30.00	(b)	$39,000.00
10" Pipes and Fittings	LF	4,700	$30.00	(b)	$141,000.00
Other (describe)					
Control Valves	EA	5	$3,000.00	(b)	$15,000.00
Wells (44 wells @ 140 FT.)	FT	6,160	$100.00	(b)	$616,000.00
Well Head Assembly	EA	44	$1,000.00	(b)	$44,000.00
		Subtotal Active Gas Extraction:			$1,184,306.67
9. Security System:	The security system was installed as part of the operation.				
Fencing	LF	0	$0.00		$0.00
Gate(s)	EA	0	$0.00		$0.00
Sign(s)	EA	0	$0.00		$0.00
Ditches	LF	0	$0.00		$0.00
		Subtotal Security System:			$0.00
10. Engineering:					
Closure Plan Report Including Closure Permit	LS	1	$70,000.00		$70,000.00
Certified Engineer Included in Certification of Closure	LS	0	$0.00		$0.00
NSPS/Title V Air Permit A Title V Air Permit has been issued	LS	0	$0.00		$0.00
Final Survey	LS	1	$60,000.00		$60,000.00
Certification of Closure	LS	1	$20,000.00		$20,000.00
Other (Detail)					
	LS	0	$0		$0.00
Construction Drawings	LS	1	$250,000		$250,000.00
		Subtotal Engineering:			$400,000.00

a. Unit price based upon Bid price from R.B. Baker Construction, Inc. received on June 29, 1998 for construction of Phase I Gas Management system and multiplied by an inflation factor of 1.01 for 1999, 1.015 for 2000 and 1.02 for 2001.
b. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received October 19, 2001 for Incremental Closure Construction.

11. Professional Services

	Contract Management			Quality Assurance			
	Rate/Hr	Hours	LS	Rate/Hr	Hours	LS	Total
.E. Supervisor	$125	104	$13,000	$105.00	100	$10,500	$23,500
On-Site Engineer	$0	0	$0	$65.00	1200	$78,000	$78,000
Office Engineer	$100	208	$20,800	$90.00	400	$36,000	$56,800
On-Site Technician	$75	1300	$97,500	$40.00	4800	$192,000	$289,500
Other (Explain)							
Clerical			$5,824				$5,824
Expenses			$10,000				$10,000

DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
Quality Assurance Testing	LS	1	$65,000.00	$65,000.00
		Subtotal Professional Services		$528,624.00
		Subtotal of 1-11 Above:		$11,344,048.15

12. Contingency	15	% of Total	$1,701,607.22
		Closing Cost Subtotal:	$13,045,655.37

13. Site Specific Costs (explain)

Mobilization/Demobilization (5.0% of Construction Cost)		$520,771.21
Waste Tire Facility (3900 tons at $102 per ton)	(a)	$397,800.00
Materials Recovery Facility	N/A	$0.00
Special Wastes		$50,000.00
Leachate Management System Modification	N/A	$0.00
Other - Bonds (1.0% of Construction Costs)		$104,154.24
Erosion Control (during construction)		$250,000.00
	Subtotal Site Specific Costs:	$1,322,725.45
	TOTAL CLOSING COSTS:	$14,368,380.82

a. Based upon Trail Ridge Landfill Inc.'s current cost to handle waste tire disposal.

VI. ANNUAL COST FOR LONG-TERM CARE

(Check Term Length)

________ 5 Years   ________ 20 Years   X 30 Years   ________ Other

See 62-701.600(1)a.1., 62-701.620(1), 62-701.630(3)a. and 62-701.730(11)b. F.A.C. for required term length. For landfills certified closed and Department accepted, enter the remaining long-term care length as "Other" and provide years remaining.

** Third Party Estimate/Quote must be provided for each item
** Costs must be for a third party providing all material and labor

All items must be addressed. Attach a detailed explanation for all items marked not applicable (N/A)

Description	Sampling Frequency (Events/yr.)	Number of Wells	$/Well/Event		$/Year	
1. Groundwater Monitoring (62-701.510(6), and (8)(a))						
Monthly	12	0	$0.00		$0.00	
Quarterly	4	0	$0.00		$0.00	
Semi-Annual	2	37	$346.80	(a) (c)	$25,663.20	
Annual		0	$0.00		$0.00	
Other						
Biennial Report	0.5	1	$5,200.00		$2,600.00	
Semi-Annual Report	2	1	$1,750.00		$3,500.00	(b)
Background	0.20	37	$1,053.66	(a) (c)	$7,797.08	(b)
		Subtotal Groundwater Monitoring:			$39,560.28	
2. Surface Water Monitoring (62-701.510(4), and (8)(b))						
Monthly	12	0	$0.00		$0.00	
Quarterly	4	0	$0.00		$0.00	
Semi-Annual*	2	2	$313.14	(a) (c)	$1,252.56	
* Semi-Annual report included with groundwater monitoring report.						
Annual	1	0	$0.00		$0.00	
		Subtotal Surface Water Monitoring:			$1,252.56	
3. Gas Monitoring						
Monthly	12	0	$0.00		$0.00	
Quarterly	4	10	$38.76	(c)	$1,550.40	
Semi-Annual	2	0	$0.00		$0.00	
Annual	1	0	$0.00		$0.00	
Semi-Annual Report	2		$650.00		$1,300.00	
		Subtotal Gas Monitoring:			$2,850.40	

a. Includes sampling and analysis.
b. Includes all reporting (groundwater, surface water and leachate).
c. Unit cost for 2000 has been multiplied by an inflation factor of 1.02 for 2001.

Description	Sampling Frequency (Events/yr.)	Number of Locations	$/Location/Event		$/Year
4. Leachate Monitoring (62-701.510(5), (6)(b) and 62-701.510(8))					
Monthly	12	0	$0.00		$0.00
Quarterly	4	0	$0.00		$0.00
Semi-Annual	2	2	$344.76	(a)	$1,379.04
Annual	1	0	$0.00		$0.00
Composite	4	1	$830.28	(a)	$3,321.12
		Subtotal Leachate Monitoring:			$4,700.16

DESCRIPTION	UNIT	QUANTITY		UNIT COST		ANNUAL COST
5. Leachate Collection/Treatment Systems Maintenance						
Maintenance						
Collection Pipes	LF	0		$0.00		$0.00
Sumps, Traps	EA	0		$0.00		$0.00
Lift Stations	EA	1		$30,000.00		$30,000.00
Cleaning	LS	0		$0.00		$0.00
Tanks	EA	0		$0.00		$0.00
Impoundments						
Liner Repair	SY	0		$0.00		$0.00
Sludge Removal	CY	0		$0.00		$0.00
Aeration System						
Floating Aerators	EA	0		$0.00		$0.00
Spray Aerators	EA	0		$0.00		$0.00
Disposal						
Off-Site (Includes Transportation and Disposal)	1000 gallons	3,838.53	(c)	$33.05	(b)	$126,848.06
		Subtotal Leachate Collection Maintenance				$156,848.06

(a) Includes sampling and laboratory analysis.
(b) Based upon current transportation cost of $175 per 6000 gallon load and a disposal cost of $19.40 per 5000 gallons.
(c) Based upon leachate generation rates at Trail Ridge Landfill from July 2000 thru June 2001.

6. Leachate Collection/Treatment Systems Operations

Operation		Hours	$/Hour		Total
P.E. Supervisor	HR	104	$26.66	(b)	$2,772.64
On-Site Engineer	HR	0	$0.00		$0.00
Office Engineer	HR	0	$0.00		$0.00
On-Site Technician	HR	416	$19.20	(b)	$7,987.20
Materials	LS	0	$0.00		$0.00
Subtotal Leachate Collection/Treatment System Maintenance & Operation:					$10,759.84

7. Maintenance of Groundwater Monitoring Wells Assume replacement of one well per year.

Monitoring Wells	LF	1	$5,652.80	(a)	$5,652.80
Replacement	EA	0	$0.00		$0.00
Abandonment	EA	0	$0.00		$0.00
Subtotal Groundwater Monitoring Well Maintenance:					$5,652.80

DESCRIPTION	UNIT	QUANTITY	UNIT COST		ANNUAL COST
8. Gas System Maintenance	Assume $30,000 per year for all maintenance.				
Piping, Vents	LF	0	$0.00		$0.00
Blowers	EA	0	$0.00		$0.00
Flaring Units	EA	0	$0.00		$0.00
Meters, Valves	EA	0	$0.00		$0.00
Compressors	EA	0	$0.00		$0.00
Flame Arrestors	EA	0	$0.00		$0.00
Operation	LS	0	$0.00		$0.00
Subtotal Gas System:					$30,000.00
9. Landscape					
Mowing	AC	155	$234.64	(a)	$36,369.20
Fertilizing	AC	155	$293.31	(a)	$45,463.05
Subtotal Landscape Maintenance					$81,832.25

a. Annual cost for1997 was multiplied by an inflation factor of 1.02 for 1998, 1.01 for 1999, 1.015 for 2000 and 1.02 for 2001.
b. Labor rates include direct and indirect labor costs, including benefits, etc. The 1997 rates were multipled by an inflation factor of 1.02 for 1998, 1.01 for 1999, 1.015 for 2000 and 1.02 for 2001.

DESCRIPTION	UNIT		QUANTITY	UNIT COST		ANNUAL COST
10. Erosion Control & Cover Maintenance						
Sodding	SY	*	15,004	$1.87	(a)	$28,057.48
Regrading Included with Seeding, Soil	SY	*	15,004	$0.99	(a)	$14,853.96
Liner Repair Included with Seeding,Soil	SY	**	7,502	$3.105	(b)	$23,293.71
Clay	CY	**	2,501	$15.00	(c)	$37,515.00
			Subtotal Erosion Control and Cover Maintenance:			$103,720.15

* 2% of the 155 acre landfill
** 1% of the 155 acre landfill

11. Storm Water Management System Maintenance						
Conveyance Maintenance	LS		1	$4,906.20	(a)	$4,906.20
Ditch Cleaning	LF		10,400	$1.06	(a)	$11,024.00
			Subtotal Storm Water System Maintenance:			$15,930.20
12. Security System Maintenance			Assume $10,000 per year for all maintenance.			
Fences	LF					
Gate(s)	EA					
Sign(s)	EA					
				Subtotal Security System:		$10,000.00
13. Utilities Include Leachate Pumps, Blowers, Lighting, etc.	LS		1	$42,726.00	(e)	$42,726.00
14. Administrative						
P.E. Supervisor	HR		2,080	$26.66	(d)	$55,452.80
On-Site Engineer	HR		0	$0.00		$0.00
Office Engineer	HR		0	$0.00		$0.00
On-Site Technician	HR		8,320	$19.20	(d)	$159,744.00
Other (Explain)			0	$0.00		$0.00
				Subtotal Administrative:		$215,196.80
15. Contingency	% of Total	N/A	0	$0.00		$0.00
				Subtotal Contingency:		$0.00

a. See Unit Costs in Closure Estimates above.
b. Based upon Textured/Two Sides, 40 mil HDPE liner material from GSE as provided by Bob Trexler on August 19, 2002.
c. Unit price based upon Bid prices from R.B. Baker Construction, Inc. received October 19, 2001 for Incremental Closure Construction.
d. Labor rates include direct and indirect labor costs, including benefits, etc. The 1997 rates were multiplied by an inflation factor of 1.02 for 1998, 1.01 for 1999, 1.015 for 2000 and 1.02 for 2001.
e. Based on average monthly utility cost of $3,560.

16. Site Specific Costs (explain)

	Unit Costs	
	LS	
	LS	
	LS	
	Subtotal Administrative:	$0.00

ANNUAL LONG-TERM CARE COST ($/Year)	$721,029.51
NUMBER OF YEARS OF LONG-TERM CARE	30
TOTAL LONG-TERM CARE COST ($)	$21,630,885.19