Appendix E

Repository and Pond 4 Groundwater Contingency Plan (February 1998)

Note: Appendices to this plan are not included

Monticello Remedial Action Project

Operable Unit I Millsite Remediation

Repository and Pond 4 Groundwater Contingency Plan

Final

February 1998

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Prepared by
MACTEC Environmental Restoration Services, LLC
Grand Junction, Colorado

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Signature Page

Prepared by _____ 2/5/98
D. F. Brennecke, P.E. Date
Lead Design Engineer

Approved for release by _____ 2/5/98
M. C. Butherus Date
Monticello Programs Manager

Reviewed by _____ 2/5/98
B. Keshian, Jr. P. E. Date
Engineering Manager

Accepted by _____ 2/5/98
Ray Plieness Date
DOE–GJO Monticello Project Manager

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Executive Summary

This *Repository and Pond 4 Contingency Plan* addresses the contingency actions that the U.S. Department of Energy will take if the synthetic liners in Pond 4 and the Repository at the Monticello Millsite Remediation site do not perform as designed. Liner performance will be monitored in the liner systems. Monitoring the liner systems is preferable to monitoring groundwater because of the uncertainty associated with groundwater wells being reliable indicators of Repository and Pond 4 performance.

When certain thresholds are exceeded, system failures identified, or a release to the environment is established, the specified contingency actions will be implemented as outlined in Table 1. Contingency actions that may be implemented include:

- Notification of the U.S. Environmental Protection Agency and the State of Utah of any nonroutine problems or occurrences that affect the leachate collection removal system or the leak detection system of either the Repository or Pond 4.
- Additional measurement of leakage quantity and quality.
- Evaluation of potential change in groundwater quality resulting from either Repository or Pond 4 leakage. The evaluation will be based on mixing calculations that take Repository and Pond 4 leakage rates and quality and combine them with available flow rates and quality in the shallow groundwater system present at the site. The mixing calculation results will be compared to the Utah Groundwater Protection Levels to determine if the protection levels have been exceeded. Engineering Calculation E0121401 in Appendix F indicates how the mixing calculation will be performed.
- Inspection of the Pond 4 liner system.
- Installation of downgradient monitoring systems.
- Development of further corrective action plans.

Introduction

This document addresses specific contingency actions the U.S. Department of Energy (DOE) Grand Junction Office (GJO) will take, at a minimum, if the synthetic liner systems in Pond 4 and the Repository at the Monticello Millsite Remediation site do not perform as designed. This document explains how liner performance will be monitored and what contingency actions will be taken to protect the shallow groundwater system and any other groundwater systems that may be hydrologically connected to the shallow groundwater system beneath the Repository and Pond 4. Performance monitoring of the liner systems will provide a more reliable indicator of Repository and Pond 4 liner performance than monitoring wells can at this site. Groundwater information collected at the Repository site to date indicates that monitoring wells may not be a reliable indicator of Repository and Pond 4 liner performance for the following reasons:

- Shallow groundwater does not occur continuously across the Repository site.
- The continuity of lateral flow paths from one saturated area to another is uncertain.
- Wells that yield groundwater on the site do so sparingly and the collected samples are often highly turbid.
- Future groundwater levels in the area adjacent to the Repository are likely to decrease as a result of decreased recharge because of the Repository.
- Wet wells downgradient of the Repository and Pond 4 may or may not be within a lateral flow path originating from either the Repository or Pond 4.

Additionally, Pond 4 can be drained and the liner repaired if any problem with the Pond 4 liner occurs. On the basis of this information, groundwater quality monitoring systems will be installed only if required by the appropriate contingency action. The leak detection system (LDS) in both the Repository and in Pond 4 will function as the long term point of compliance. Using the LDS as the point of compliance is more restrictive than if the point of compliance were located at a monitoring well at the outside toe of slope because it will provide earlier detection of unacceptable performance. If the action leakage rate specified for either of these LDSs is ever exceeded, the appropriate contingency actions will be implemented.

This document will be the basis by which DOE–GJO, the Environmental Protection Agency (EPA), and the State of Utah can plan the appropriate level of site monitoring required if design standards are not met. The Utah Department of Environmental Quality (UDEQ) and EPA reserve the right to require monitoring for situations not anticipated in the Contingency Plan where they believe groundwater contamination may be occurring in violation of applicable State and Federal regulations. The contents of this document will be incorporated into the final Long Term Surveillance and Maintenance (LTSM) Plan along with other future contingency actions that are appropriate for the Millsite Remediation Project (Operable Unit I).

Contingency Plan

Table 1 presents the Contingency Plan for Pond 4 and the Repository. Events that trigger required contingency actions to protect the shallow groundwater are described in the table.

Table 1. Pond 4 and Repository Groundwater Contingency Plan

Performance Measurement Location	Event that Triggers Contingency Action	Contingency Action
Pond 4		
Leachate Collection/ Removal (LCR) Sump	Rate of leachate inflow into the LCR system is greater than 2,000 gal/day (851 gpad).	• Notify EPA/State of Utah. • Ensure that high-water level control and alarm in sump are set properly so that high-water level is not exceeded. • Ensure that back up sump pump is on site and available for use. • Prepare Corrective Action Plan. Plan will evaluate current conditions. Plan will address whether or not pond will be drained; and if it will be drained, when it will be drained, how it will be drained, where it will be drained to, how liner will be investigated for leaks, how repairs will be conducted, and any changes in monitoring.
Pond 4 Leak Detection System (LDS) Sump	Rate of leachate inflow into LDS is greater than zero gpad.	• Notify EPA/State of Utah. • Ensure that LCR sump and controls are properly operating. • Ensure that LDS level monitoring is properly operating. • Arrange to have LDS sump pump available for use. • Pump leachate out of LDS and begin regular monitoring of LDS. Monitoring will include measuring and recording both the rate of leakage into the LDS and the quality of the leachate. Rate of leakage will be monitored daily. • LDS leachate and Pond 4 water quality will be measured quarterly for heavy metals and radiologic components as listed in Appendix C and for any RCRA hazardous waste placed in the Repository and will be compared to each other and to Utah Groundwater Protection Levels for trend analysis only. Sampling also will occur quarterly for sodium, magnesium, calcium, potassium, chlorides, sulfates, carbonate, and bi-carbonate as indicators only. These constituents will not be compared against nor used to establish any groundwater protection levels. In addition, LDS leachate and Pond 4 water quality will be analyzed annually for all constituents listed in Appendix H. Protection levels will be calculated based on historical site background water quality established in 1992–1993 per Calculation E0128002 in Appendix C.
Pond 4 LDS Sump	Rate of leachate inflow into LDS is greater than the Action Leakage Rate (ALR) of 20 gpad and actual LDS leachate contaminant concentration mixing calculation shows that Utah Groundwater Protection Levels ***would not be*** exceeded.	Same actions as listed immediately above plus: • Sample LDS leachate and Pond 4 water quality monthly. • Evaluate mixing calculation with actual LDS leachate contaminant concentrations and compare to Utah Groundwater Protection Levels calculated based on historical site background water quality established in 1992–1993.

Table 1 (continued). Pond 4 and Repository Groundwater Contingency Plan

Performance Measurement Location	Event that Triggers Contingency Action	Contingency Action
Pond 4 LDS Sump	Rate of leachate inflow into LDS is greater than the ALR of 20 gpad and actual LDS leachate contaminant concentration mixing calculation shows that Utah Groundwater Protection Levels ***could be*** exceeded.	Same actions as listed immediately above plus: • Prepare Corrective Action Plan. Plan will address when Pond will be drained, how it will be drained, where it will be drained to, how liners will be investigated for leaks, how repairs will be conducted, and the approach for installing monitoring that will take into account current site conditions and that will address when, where, and what monitoring techniques will be installed, how current site conditions will be evaluated to determine which geologic formations will be monitored, how the monitoring locations will be monitored, and how background will be established at each monitoring location. • Drain pond and locate and repair leaks as outlined in Corrective Action Plan. • Resume operations.
Pond 4 LDS Sump	During repair of primary and secondary liner, damage to third liner is discovered.	• Notify EPA/State of Utah. • Collect soil samples at six inch increments for a total depth of 5 feet and test for contaminants found in pond LDS leachate. • After soil sample analysis is complete and it is determined that no contaminants are found in the soil above background concentrations, repair primary, secondary, and tertiary liners as required. Test all repair seams. • Resume operations. • Evaluate need to modify Corrective Action Plan based on information gathered during repairs.
Pond 4 LDS Sump	Soil sample contains contaminants found in pond LDS leachate at concentrations in excess of soil background concentrations within 5 foot depth. (Appendix D is the Sampling and Analysis Plan used to collect background samples. Appendix E presents background soil characterization results.)	• Notify EPA/State of Utah. • Determine the need to install down gradient monitoring as outlined in Corrective Action Plan. • Evaluate need to remediate soil to regulatory limits while repairs to liner are being made or after pond is decommissioned based on a comparison to background soil data. Implement preferred option. • Evaluate need to modify Corrective Action Plan.
Pond 4 Monitoring	Contaminants found in pond LDS leachate are found in monitoring locations above State of Utah Groundwater Protection Levels.	• Notify EPA/State of Utah • Revise corrective action plan based on current conditions to address installing additional monitoring techniques to determine extent of contamination, possible options for remedial corrective action, including taking pond out of service, and monitoring of all down gradient monitoring locations and surface-water seeps for contaminants found in pond LDS leachate until Utah Groundwater Protection Levels are achieved at all monitoring locations and surface-water seeps.

Table 1 (continued). Pond 4 and Repository Groundwater Contingency Plan

Performance Measurement Location	Event that Triggers Contingency Action	Contingency Action
Repository During Construction		
Repository LCR Sump	Leachate level in the LCR sump routinely exceeds the allowable high-water level.	• Investigate cause and take appropriate corrective action.
Repository LDS Sump	Leachate is pumped from LDS sump	• Notify EPA/State of Utah. • Inspect exposed liner around perimeter and at potential points of short circuiting. • Evaluate appropriateness of conducting intrusive investigation based on depth of tailings fill present. Perform intrusive investigation if appropriate. • Subcontractor repairs damaged areas as necessary. • Subcontractor begins daily review of LDS depth data and calculates/records daily leakage rate.
	Leakage rate into LDS sump is greater than 20 gpad.	• Contractor, Subcontractor, DOE, EPA, and State of Utah meet and discuss appropriate actions.
Repository After Final Acceptance by DOE		
Repository LCR Sump	Leachate level in the LCR sump exceeds the allowable high-water level.	• Check pump and controls for proper operation and correct deficiencies as required.
Repository LDS Sump	Leachate level in the LDS sump exceeds the allowable high-water level.	• Notify EPA/State of Utah. • Check pump and controls for proper operation and correct deficiencies as required.
Repository LDS Sump	Leakage rate into LDS sump is greater than zero gpad and less than 20 gpad.	• Notify EPA/State of Utah. • Check LCR pump and controls for proper operation and correct deficiencies as required. • Sample LDS leachate for heavy metals and radiologic components as listed in Appendix C and for any RCRA hazardous waste placed in the Repository on a quarterly basis to establish leachate quality trends for the first year that leachate is present in LDS. Evaluate possibility of lesser frequency after one year based on quantity and quality of leachate in LDS. Also sample quarterly for sodium, magnesium, calcium, potassium, chlorides, sulfates, carbonate, and bi-carbonate as indicators only. These constituents will not be compared against nor used to establish any groundwater protection levels. In addition, LDS leachate water quality will be analyzed annually for all constituents listed in Appendix H.

Table 1 (continued). Pond 4 and Repository Groundwater Contingency Plan

Performance Measurement Location	Event that Triggers Contingency Action	Contingency Action
Repository LDS Sump	Leakage rate into LDS sump is greater than 20 gpad.	Same actions as listed immediately above plus: • Inspect main drain leachate collection pipe with TV camera to try to determine location of leachate leakage. • Re-evaluate design mixing calculation with actual LDS leachate contaminant concentrations and compare to State of Utah Groundwater Protection Levels calculated based on historical site background water quality established in 1992-1993 per Calculation E0128002 in Appendix C.
Repository LDS Sump	Leakage rate into LDS sump is greater than 20 gpad and actual LDS leachate contaminant concentration mixing calculation shows that State of Utah Groundwater Protection Levels ***would not be*** exceeded.	• Evaluate mixing calculation with quarterly LDS leachate quality results. • Inform EPA/State of Utah of quarterly mixing calculation analysis.
Repository LDS Sump	Leakage rate into LDS sump is greater than 20 gpad and actual LDS leachate contaminant concentration mixing calculation shows that Utah Groundwater Protection Levels ***could be*** exceeded.	• Notify EPA/State of Utah. • Prepare corrective action plan that addresses current site conditions and that will address when, where, and what monitoring techniques will be installed, how current site conditions will be evaluated to determine which geologic formations will be monitored, how the monitoring locations will be monitored, how background will be established at each monitoring location, identification and monitoring of surface-water seeps, and the need for further study. • Install monitoring as outlined in Corrective Action Plan.
Repository Monitoring	Contaminants found in LDS leachate are found in monitoring locations above background levels.	• Notify EPA/State of Utah • Perform travel time calculation using contaminant concentrations found in LDS leachate and compare against State of Utah Groundwater Protection Levels calculated based on background established at respective monitoring location and applicable or relevant and appropriate regulations (ARAR) requirement to protect human health and the environment for 200 to 1,000 years (40 CFR 192).
Repository Monitoring	Travel time calculation using actual contaminant concentrations in the LDS leachate indicate contamination of the shallow groundwater above Utah Groundwater Protection Levels within 200 to 1,000 years.	• Notify EPA/State of Utah. • Assess need for further study and perform if appropriate. • Evaluate possibility of applying for alternative concentration levels. • Investigate possible options for remedial corrective action that are protective of human health and the environment and implement.

Summary of Operations

Pond 4

Pond 4 is designed to serve as a containment/evaporation pond for all construction water generated during Repository construction, during the placement of tailings in the Repository, and for leachate that drains from the tailings material after Repository construction is complete. If the capacity of Pond 4 is exceeded during the placement of tailings in the Repository, excess water will be hauled to Pond 3 and treated. No additional water from the Repository will be pumped into Pond 4 until the Pond 4 capacity problem is corrected. After Pond 3 is decommissioned, excess water in Pond 4 will either be treated in place and discharged or the contents will be hauled to an off-site treatment facility. Pond 4 will be decommissioned after the volumes of leachate draining from the Repository are reduced to a point where a different means of collecting the Repository leachate would be more economical. It is estimated that Pond 4 will be in service for 5 to 20 years before it is decommissioned, depending on the water content of the tailings during placement. Pond 4 has been sized to handle a worst-case scenario for leachate that could drain from the Repository after construction is complete (DOE 1995, Calculations E0269700 and E0292001). This worst-case scenario assumes that the tailings material reaches a saturation in excess of 70 percent. The construction specifications for placement of tailings materials should result in approximately a 60-percent saturation condition considering only the addition of compaction moisture. Extreme weather conditions could result in saturation rates greater than desired, which could ultimately influence how long Pond 4 will need to remain operational. The Pond 4 operational time frame will be reestimated after all contamination has been placed and actual in-place moisture contents are known.

Design features of Pond 4 include

- A double composite primary liner (60-mil high-density polyethylene [HDPE] geomembrane overlaying a geosynthetic clay liner [GCL]) overlying a geonet leachate collection/removal (LCR) system that overlies a secondary liner (single 60-mil HDPE geomembrane) overlying a geonet LDS that overlies a third double composite liner (60-mil HDPE overlying GCL) as shown in Figure 1.

- A geonet LCR system beneath the primary liner that will collect any leakage passing through the primary liner and that will maintain a head of no more than 0.25 inches on the secondary liner.

- A geonet LDS beneath the secondary liner that will collect any leakage passing through the secondary liner and that will maintain a head of no more than 0.25 inches on the third liner.

- A 5-gallon per minute (gal/min) pump that will pump fluids collected in the LCR sump back into Pond 4.

- Automatic electronic controls that will turn on the LCR pump at a normal high-water operating level (1 foot 6 inches deep, measured from the bottom of the LCR sump) in the LCR sump, record the cumulative volume of fluids pumped, record times when fluids are pumped, activate an alarm when the maximum high-water level is reached in the LCR sump, and provide remote status and control capabilities to a local maintenance person who can monitor and correct any operational problems that occur.

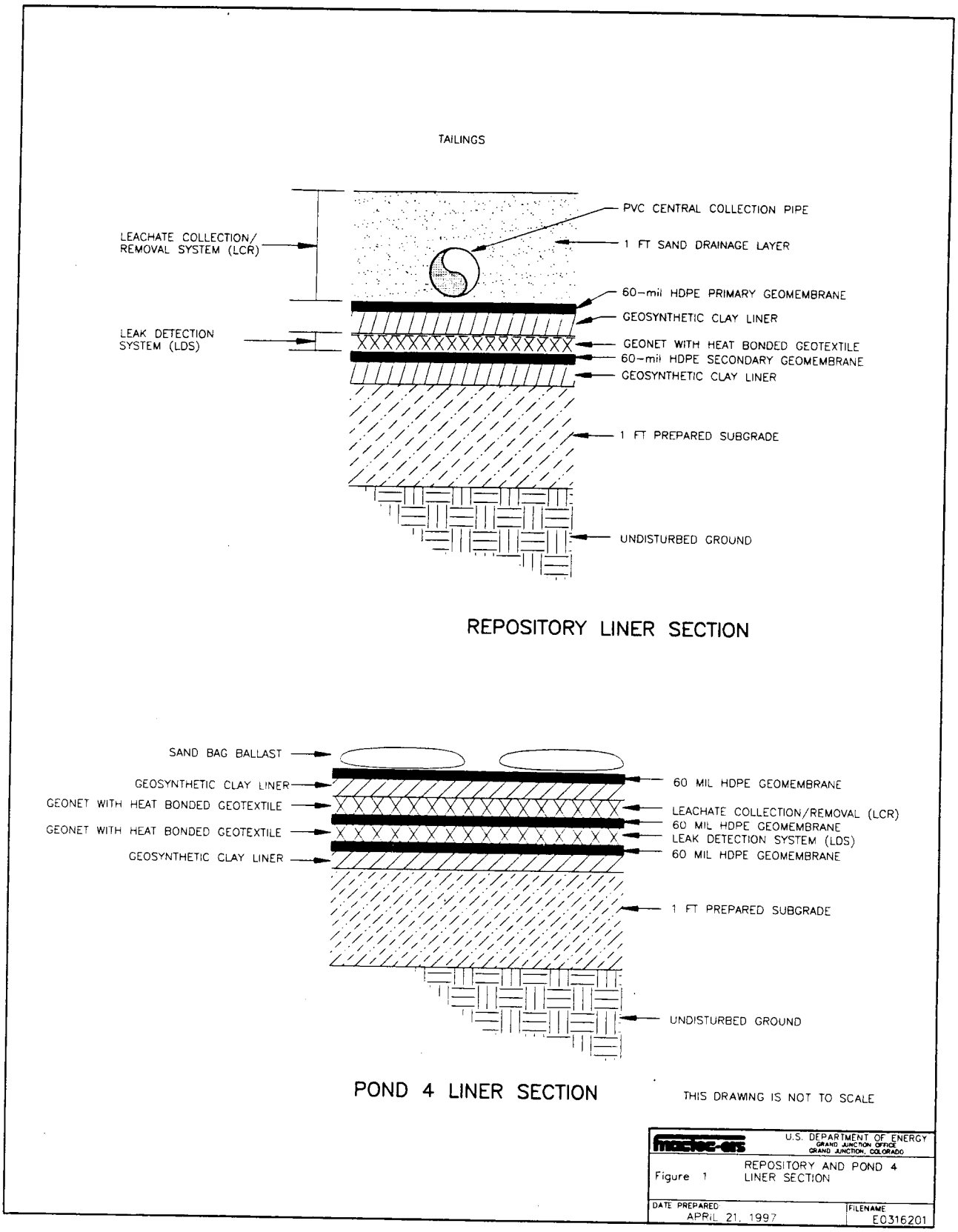


Figure 1. Repository and Pond 4 Liner Section

- Continuous electronic level monitoring in the LDS sump that will provide remote status to a local maintenance person. Levels will not be recorded electronically and no permanent pump will be installed in the LDS sump.

- The most important feature is that if a problem occurs in the primary liner system that cannot be controlled with the LCR pump, the pond can be pumped dry and the liner repaired. If Pond 4 must be drained after Pond 3 has been decommissioned, the water in Pond 4 will be treated and discharged or hauled to an approved off-site facility as appropriate.

Liquid levels in the LCR sump will be monitored and automatically controlled to ensure levels do not exceed the depth of the sump. If the controls malfunction and liquid levels build up in the LCR sump to a point where backup onto the pond floor could occur, a high-level alarm will be activated and will notify a local maintenance person so he/she can correct the situation when liquid levels are at or within 6 inches below the top of the sump. The cumulative liquid volumes pumped, as well as the respective dates and times, will be automatically recorded during each pump operation to allow rates of leakage through the primary liner to be calculated. This mode of operation will commence when Pond 4 is first put into operation and will continue until it is decommissioned.

Water-balance calculations (DOE 1995, Calculation E0292001) used to size Pond 4 indicate that the pond will be approximately one-half full after the first year of tailings placement into the Repository, with periods when the pond is dry. Water depths will continue to fluctuate and possibly increase in the pond until cover installation begins. However, this water balance calculation assumes a limited use of Pond 4 water for construction dust control in contaminated areas at the Repository. It is estimated that the need for construction water actually will be much greater and that the water depths in Pond 4 will be less than the water balance calculation indicates. Realistically, Pond 4 will only reach capacity if all the assumed extreme events happen. A more likely scenario is that the pond will only be half full or less when the Repository is closed.

The action leakage rate (ALR) for the Pond 4 LCR system is set at 2,000 gallons/day (851 gallons/acre/day [gpad]) based on negotiations with EPA and the State of Utah that were conducted on January 17, 1996, in Salt Lake City, Utah. One-half of the maximum capacity of the LCR system pump is equal to 1,500 gpad, or approximately 2.5 gal/min, using the pond floor acreage to calculate the leakage rate. This calculation is presented in Appendix A. The LCR system ALR accounts for a factor of safety greater than three to allow for unexpected conditions and restricts the head on the secondary liner on the pond floor to less than 0.25 inches.

The LDS ALR also was discussed and agreed to at the January 17, 1996 meeting. The LDS ALR will be zero gpad. When the flow into the LDS exceeds zero gpad, pumping and monitoring of the LDS will be required. All water pumped from the LDS will be discharged back into Pond 4. Monitoring will include measuring the rate of leakage into the LDS with a pump and a flow meter that will be installed when it is necessary to pump fluids from the LDS, as well as sampling the quality of the leachate and comparing the quality results to the quality of water in Pond 4 and to the State of Utah Groundwater Protection Levels (see Appendix C). If the flow into the LDS exceeds 20 gpad, a corrective action plan will be prepared by DOE, in consultation with EPA and the State of Utah, that will include when and how the pond will be drained, what repairs will be made, and where the water will be taken or treated.

Repository

The Repository is designed to permanently contain all of the materials removed from the Millsite and from Monticello Vicinity and Peripheral Properties. The design allows the materials to be isolated from

the environment so that release mechanisms such as leaching, radon flux, and wind and water transport cannot spread contamination into the environment.

Design features of the Repository pertaining to protection of the groundwater include

- An LCR system consisting of a 6- and 8-inch-diameter piping network within 12 inches of drainage sand above the primary liner that will maintain the head on the primary liner at no more than 12 inches.

- A double composite primary liner (60-mil HDPE geomembrane overlaying a geosynthetic clay liner) overlying a geonet LDS that overlies a secondary double-composite liner (60-mil HDPE geomembrane overlaying a geosynthetic clay liner) as shown in Figure 1.

- A geonet LDS beneath the primary liner that will collect any leakage passing through the primary liner and that will maintain a head of no more than 0.25 inches on the secondary liner.

- Pumping any fluids collected in the LCR system and LDS sumps into a double-lined leachate transmission line that will convey leachate to Pond 4.

- Automatic electronic controls that will turn on the pumps in either the LCR or the LDS sumps at normal high-water operating levels (2 feet 10 inches, measured from the bottom of the sump floors), continuously monitor and record sump liquid levels greater than 3 inches, record the cumulative volume of fluids pumped, record times when fluids are pumped, activate an alarm when the high-water levels in the sumps are exceeded, and provide remote status and control capabilities to a local maintenance person who can monitor and correct any operational problems that occur.

- The ability to inspect the main drain leachate collection pipe in the LCR piping network with a television camera.

If the level controls malfunction and liquid levels build up in either the LCR or the LDS 6 inches or more above the top of the respective sump, a high-level alarm will activate and will notify a local maintenance person so he/she can correct the situation. The cumulative liquid volumes pumped from each sump, as well as the respective dates and times, will be automatically recorded during each pump operation to allow liquid collection rates in the LCR as well as leakage rates into the LDS to be calculated. This mode of operation will commence when the Repository construction has been accepted by DOE. Initially, all sump pumps in the LCR and the LDS will be activated manually to ensure that the systems are functioning properly; however, the pumps can be activated automatically after the reliability of the systems are proven.

During construction, the operation will be similar; however, the construction Subcontractor will be required to provide pumps and fluid level monitoring equipment for the LCR sump suitable for the larger volume of water that may be encountered during construction operations. No volume measurements will be made for fluids pumped out of the LCR sump during construction activities.

Site Monitoring

Summary of Historical Data

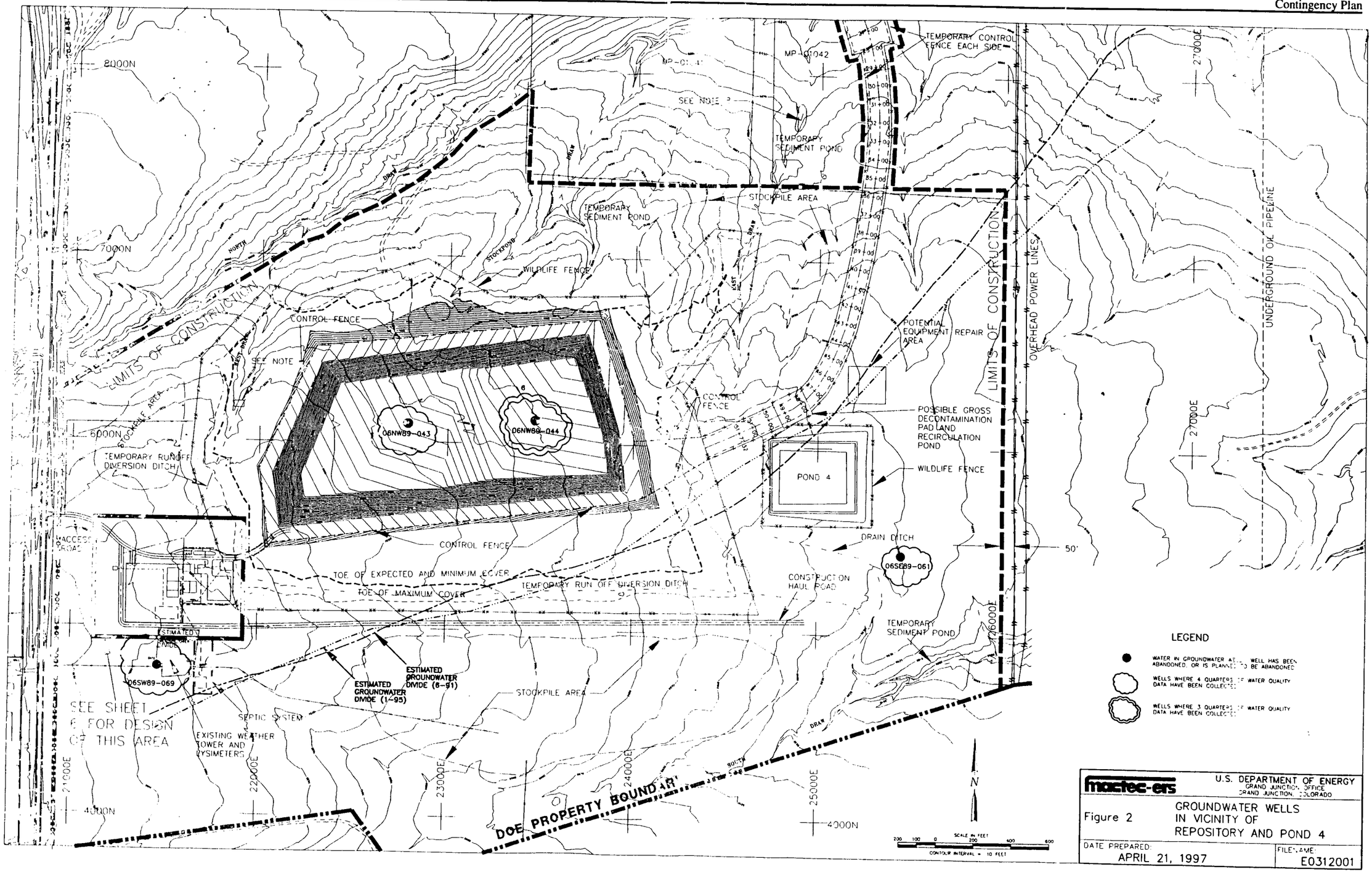
Water-level measurements were collected from a network of groundwater monitoring wells located at the Repository Site on the dates presented in Table 2. Analysis of these data indicates that a groundwater

divide exists as shown on Figure 2. Groundwater-level measurements indicate that groundwater on each side of this divide flows to different areas as shown on the groundwater contour maps in Appendix B. Figure 2 shows the location of the groundwater divide based on the June 1991 data and the location of the divide based on the January 1995 data. The January 1995 data are representative of a high groundwater surface where several wells have displayed their highest groundwater measurement to date.

Table 2. Dates of Water-Level Measurements

1989	1990	1991	1992	1993	1994	1995
12/3	1/3	1/9	9/6	1/5	3/1	1/16
12/9	1/17	2/16	10/14	2/10		2/13
12/11	2/16	3/19	12/16	3/23		3/20
12/18	3/1	4/18		4/12		4/25
	3/2	5/22		4/28		5/22
	4/12	6/7		5/13		6/12
	5/16	7/10		5/26		
	6/18	8/7		6/23		
	7/10	9/14		7/13		
	8/8	11/5		9/22		
	9/5			10/21		
	10/5			11/19		
	11/7					
	12/12					

Groundwater quality samples were collected and analyzed from select wells in August 1991, September 1992, February 1993, May 1993, and August 1993 to determine site-wide background water quality in the shallow groundwater. This information is presented as Calculation E0128002 (DOE 1995) in Appendix C and will be used as an initial basis of comparison against any future background groundwater quality samples that are collected as a result of future contingency actions. This historical site-wide background information has been used as the initial basis for calculating State of Utah Groundwater Protection Levels (Calculation E0128002 in Appendix C), which will be used initially to compare against leachate quality measured in Pond 4 and the Repository. Historical data from Wells 43, 44, and 69 will be used to assist with any comparisons associated with the Repository. Historical data from Well 61 will be used to assist with comparisons associated with Pond 4. All initial evaluations of leachate quality will be based on site-wide State of Utah Groundwater Protection Levels rather than protection levels based on historical data from the specific wells noted above. The location of these wells is shown on Figure 2. All of these wells have been abandoned.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LIMITS OF CONSTRUCTION
SEE NOTE
TEMPORARY CONTROL FENCE EACH SIDE
MP-01042
TEMPORARY SEDIMENT POND
STOCKPILE AREA
WILDLIFE FENCE
CONTROL FENCE
POTENTIAL EQUIPMENT REPAIR AREA
OVERHEAD POWER LINES
UNDERGROUND OIL PIPELINE
POSSIBLE GROSS DECONTAMINATION PAD LAND RECIRCULATION POND
POND 4
DRAIN DITCH
06SW89-069
06NW89-043
06NW89-044
06SE89-061
TEMPORARY RUNOFF DIVERSION DITCH
ACCESS ROAD
TOE OF EXPECTED AND MINIMUM COVER
TOE OF MAXIMUM COVER
CONSTRUCTION HAUL ROAD
ESTIMATED GROUNDWATER DIVIDE (1-95)
ESTIMATED GROUNDWATER DIVIDE (6-91)
SEPTIC SYSTEM
EXISTING WEATHER TOWER AND LYSIMETERS
SEE SHEET 6 FOR DESIGN OF THIS AREA
DOE PROPERTY BOUNDARY
DRAIN
NORTH
SOUTH
EAST
WEST
N
SCALE IN FEET
200 100 0 200 400 600
CONTOUR INTERVAL = 10 FEET
LEGEND
WATER IN GROUNDWATER AREA WELL HAS BEEN ABANDONED, OR IS PLANNED TO BE ABANDONED
WELLS WHERE 4 QUARTERS OF WATER QUALITY DATA HAVE BEEN COLLECTED
WELLS WHERE 3 QUARTERS OF WATER QUALITY DATA HAVE BEEN COLLECTED
U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION OFFICE
GRAND JUNCTION, COLORADO
Figure 2
GROUNDWATER WELLS IN VICINITY OF REPOSITORY AND POND 4
DATE PREPARED: APRIL 21, 1997
FILE NAME: E0312001

Monitoring Leachate Quality

If analysis of the quality of liquids pumped from the LDS in either the Repository or Pond 4 becomes necessary due to required contingency actions, the LDS liquids will be analyzed for all heavy metals and radiologic components identified in Calculation E0128002, which is presented in the *Millsite Remediation Final Design, Volume II* (DOE 1995) and included here in Appendix C. If RCRA hazardous waste is placed in the Repository, the constituents associated with the hazardous waste will be added to the Appendix C list and will be analyzed. In addition, the LDS liquids in both the Repository and Pond 4 will be analyzed annually for all constituents listed in Appendix H.

If performance of mixing calculations becomes necessary due to required contingency actions, the LDS liquid analytical results will be incorporated into a mixing calculation. Calculation E0121401 in Appendix F presents the design mixing calculation that was performed to determine the maximum possible leakage rate from the Repository for each contaminant constituent that would not cause the Utah Groundwater Protection Levels to be exceeded. This same calculation will be used and updated with the current LDS liquid analytical results to determine what the current allowable leakage rates are based on the leachate quality measured in the LDS. This updated allowable leakage rate will be compared to the calculated design leakage rate that is expected to pass through the secondary HDPE liner (tertiary HDPE liner in Pond 4). Calculation E0269503 in Appendix G presents this calculation and indicates that a leakage rate of 2×10^{-13} centimeters per second should be expected from the Repository and Pond 4. If the updated allowed leakage rate is less than the fixed calculated design leakage rate, additional contingency actions will be required as outlined in Table 1.

Use of Groundwater Monitoring

The Contingency Plan lays out the systematic process that will be followed to determine whether or not additional groundwater monitoring will be necessary. The need for monitoring will be contingent upon the progressive steps identified in the contingency plan. If leachate quantity and quality limits are exceeded, a corrective action plan will be written that will take into account the volume and quantity of leachate and the appropriateness and feasibility of installing monitoring techniques. The corrective action plan will also address specifics of future investigations that are appropriate.

If installation of groundwater quality monitoring becomes necessary for either Pond 4 or the Repository, background water quality will be established uniquely at each individual monitoring location that is installed. Background values will be established for all constituents identified and sampled for when the historical groundwater background values were established (Calculation E0128002 in Appendix C) This background water quality will be used to calculate the individual Utah Groundwater Protection Levels (UAC R317–6) that will be used for analysis at each respective monitoring location. Average site-wide protection levels will not be used for analysis due to the wide variability of groundwater quality that has been measured on the site. Because of this wide variability, upgradient monitoring most likely will not provide any useful data that would allow analysis of the effect of the Repository or Pond 4 on groundwater quality. However, upgradient monitoring may be installed if DOE, EPA and the State of Utah think it is appropriate based on current site conditions.

After background values have been established, groundwater quality samples from monitoring locations will be analyzed for the most mobile constituents found in the LDS liquids. Sodium, magnesium, calcium, potassium, chlorides, and sulfates also will be analyzed and will serve as indicators as to whether or not a leak has occurred. However, these constituents will not be compared or evaluated against any State of Utah Groundwater Protection Levels. These constituents will be used to indicate

whether or not contamination of the groundwater has occurred. Other constituents may be added to the analyte list if groundwater contamination occurs.

References

State of Utah, 1991. *Administrative Rules for Ground Water Quality Protection: R 317–6 Utah Administrative Code*. Utah Department of Environmental Quality, Division of Water Quality.

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Title 40, Protection of Environment, Part 192, "Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings."

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