RFS-ERDF-002.6

0052105

Environmental Restoration Disposal Facility

Waste Disposal Operations

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Leachate & Washwater Management Plan

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	DESIGN ENGINEERING								ENV. ENGR	SAFETY & HEALTH	FIELD SUPPORT	CADD	QA
	C/M/A	ELE.	MECH	CHEMICAL/ PROCESS	CONTROL SYSTEM	GEO-TECH	SAFETY ENGR.	NUCLEAR/ D&D					
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WASTE MANAGEMENT, INC.

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Waste Management Federal Services, Inc.

Review and Approval of Revised Project Procedures

ERDF Waste Disposal Operations

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WMFS ERDF Project Approvals

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ERDF Project Manager

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Section 3 Pages 7 through 9	Revision 2	08/23/99
Section 4 Pages 9 through 10	Revision 2	08/23/99
Section 5 Pages 10 through 11	Revision 2	08/23/99
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1.0 Purpose and Scope

1.1 Purpose

The purpose of this Leachate Management Plan is to establish the policy and procedures for properly managing leachate, decontamination washwaters and other contaminated waters generated as a result of operations generated at the Hanford Environmental Restoration Disposal Facility (ERDF). The plan lists the requirements, protocols, procedures, and documentation of the leachate management systems and washwater management systems used at the facility. Waste Management Federal Services, Inc. (WMFS) has responsibility for management of leachate and washwaters produced during waste disposal operations at the ERDF site in accordance with Subcontract 0600X-SC-G0006 and will implement the requirements identified in the plan. BHI has the responsibility of reporting requirements to DOE-RL and the regulators, and ensuring the leachate system is in compliance with current regulations based upon the designation status of the ERDF leachate.

1.2 Scope

The ERDF waste disposal operations will generate leachate that must be collected and appropriately managed. Leachate is any liquid, including any suspended components in the liquid that has percolated through or drained from the ERDF disposal cells where waste has been placed. The Tri-Parties have signed an amendment and associated Sampling and Analysis Plan to the ERDF Record of Decision (ROD) that excludes or de-lists the ERDF leachate from the list of regulated wastes contained in 40 CFR 261.31. In addition to leachate, it is expected that ERDF may generate water from disposal cells that have not received waste.

The ERDF waste disposal operations will also generate washwaters from decontamination operations that must be collected and appropriately managed. The scope of this plan includes the policy and procedures necessary to collect, sample, analyze, determine a disposal option, and implement that disposal option for leachate, washwaters, and other contaminated waters generated as a result of operations at the ERDF.

2.0 Leachate Collection System Operation

2.1 ERDF Liner System

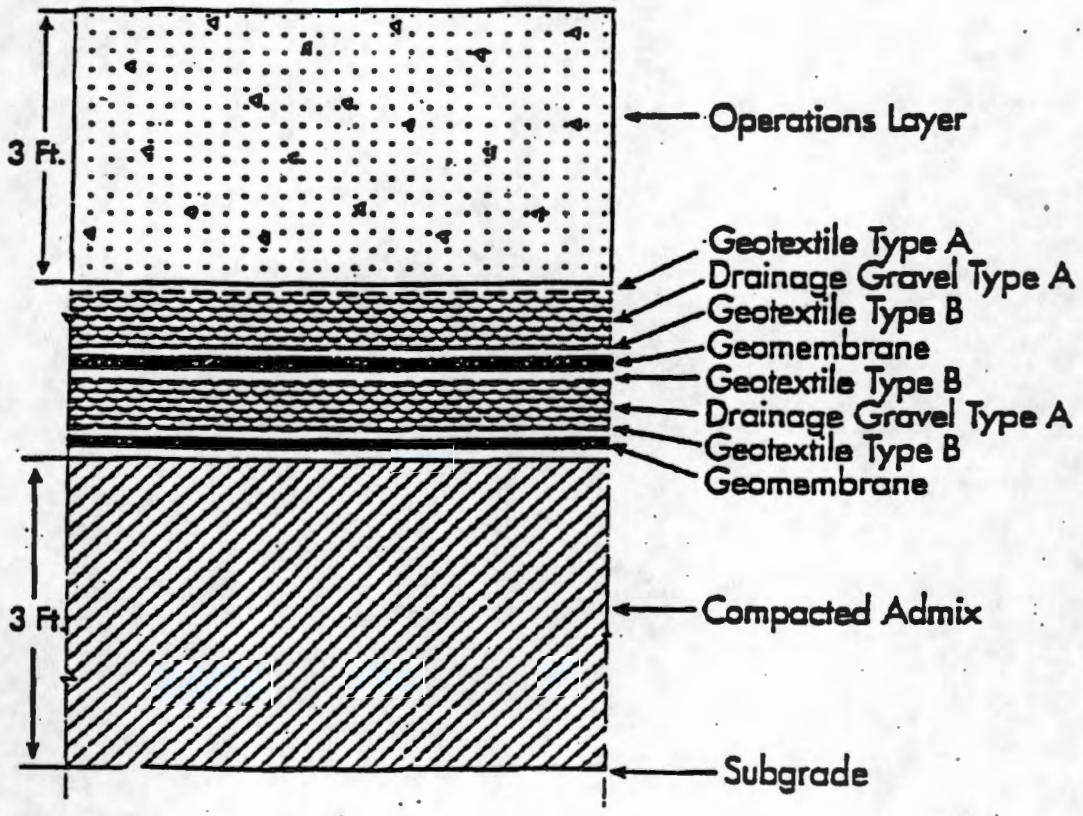
The ERDF landfill liner system is designed to meet EPA minimum technical requirements for landfills. The base and side slopes of the landfill are engineered systems that have primary and secondary liner systems that incorporate methods for leachate to be directed to a central collection sump as described in the following sections.

2.1.1 Landfill Base Liner

Figure 2-1 graphically displays the various components of the landfill liner on the base of the disposal cells. The engineered liner system starts with a three-foot layer of

compacted admix on which the secondary HDPE liner is laid. On top of the secondary liner is the secondary drainage gravel layer encased by an upper and lower layer of geotextile material. This layer provides the collection mechanism for secondary leachate to collect and drain to the secondary leachate sump. On top of the secondary leachate collection layer is the primary HDPE liner and another geotextile/drainage gravel/geotextile layer. This layer of geotextile, drainage gravel and geotextile provides the collection mechanism for primary leachate to collect and drain to the primary leachate sump. Finally, a three-foot compacted operations layer separates the primary liner/geocomposite from the active operational disposal cells.

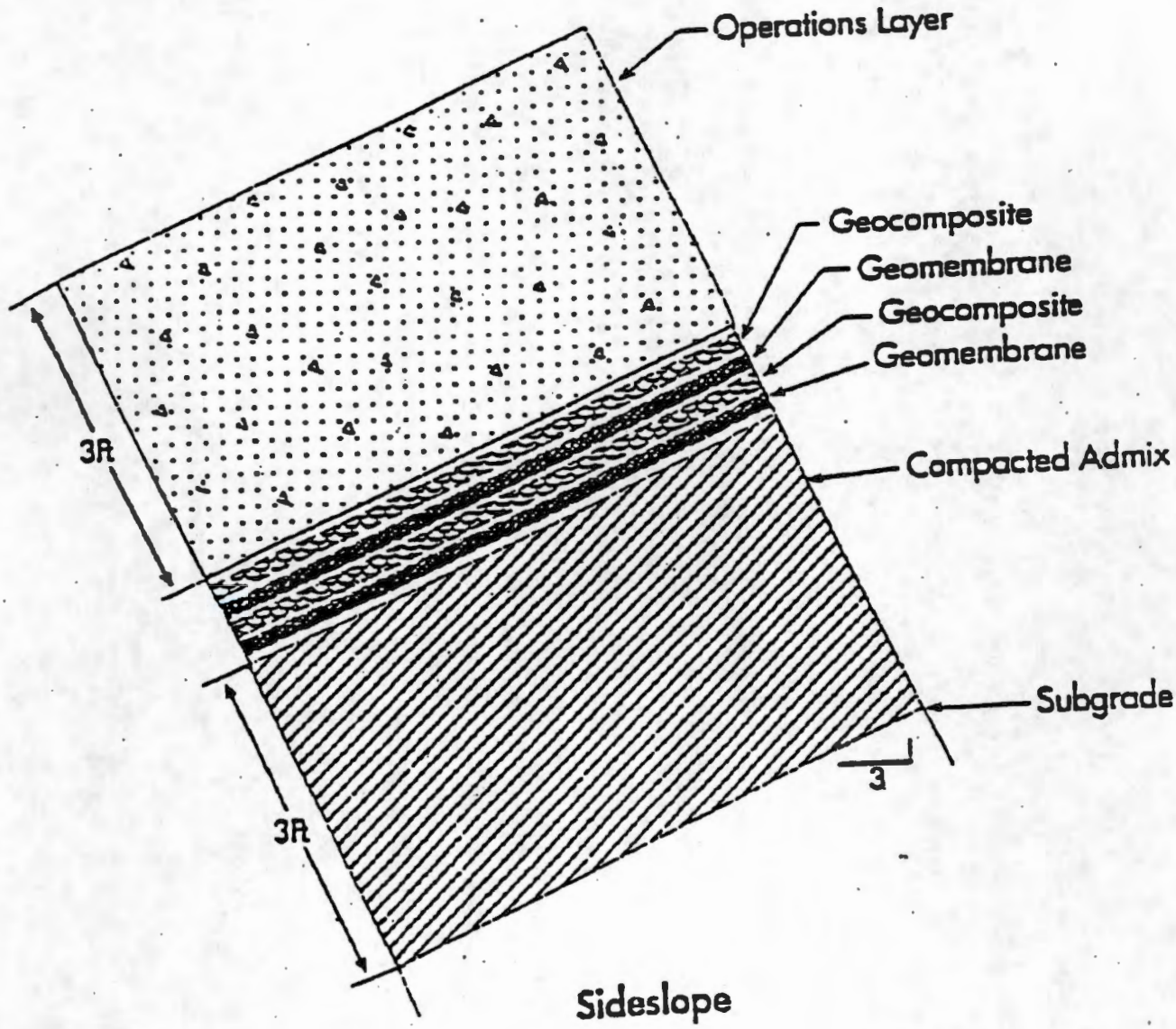
Figure 2-1, ERDF Base Liner Design



2.1.2 Landfill Slope Liner

Figure 2-2 graphically displays the various components of the landfill liner on the sloped sides of the disposal cells. The engineered liner system starts with a three-foot layer of compacted admix on which the secondary HDPE liner is laid. On top of the secondary liner is the secondary geocomposite that provides a collection mechanism for secondary leachate to drain down the slope of the landfill and to the base area/secondary leachate sump. On top of the secondary geomembrane is the primary HDPE liner and another geocomposite, which provides a collection mechanism for primary leachate to drain down the slope of the landfill and to the base area/primary leachate sump. Finally, a three-foot compacted operations layer separates the primary liner/geocomposite from the active operational disposal cells.

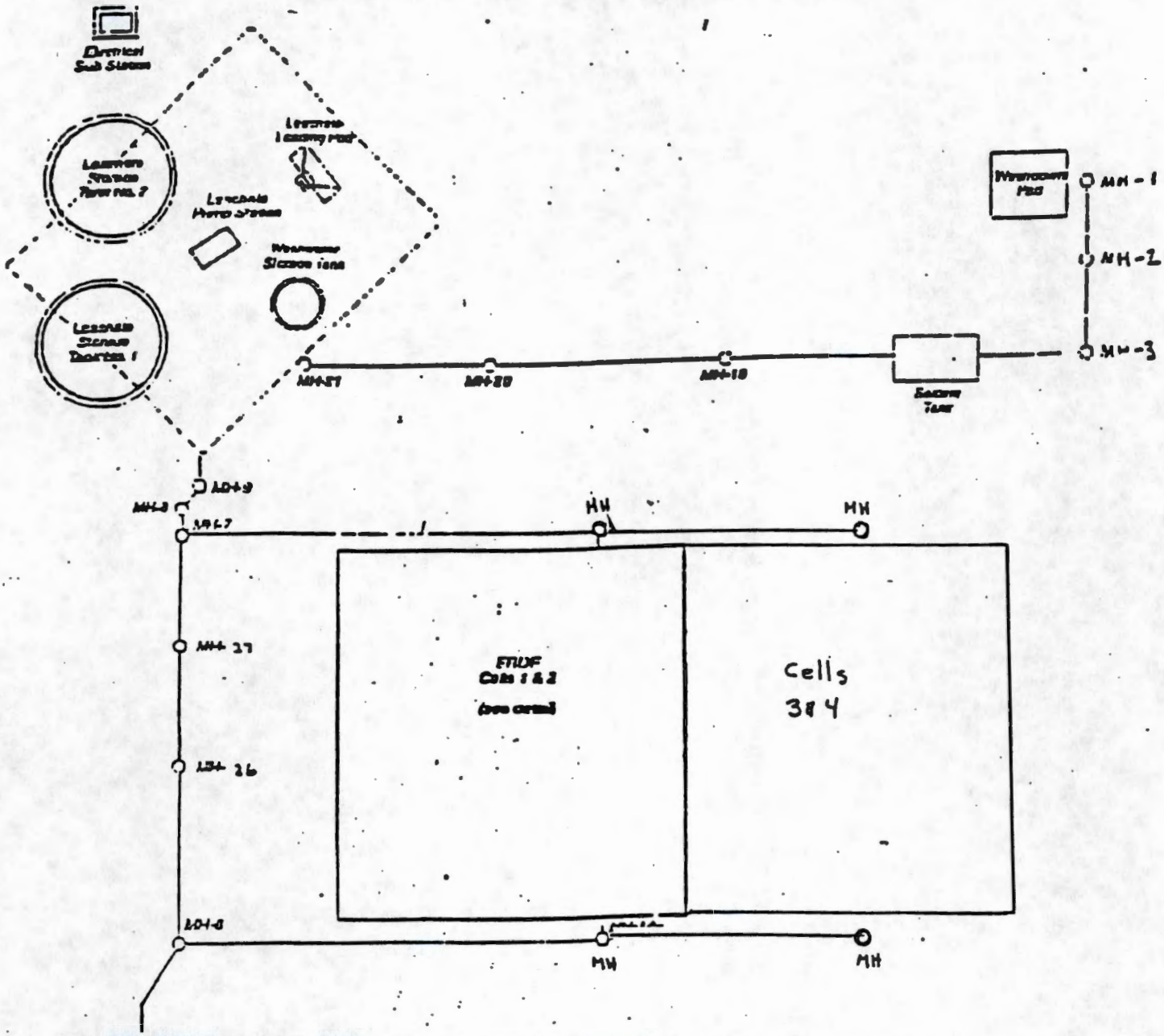
Figure 2-2, ERDF Slope Liner Design



2.2 Leachate Collection System Description

An engineered collection system is provided at the ERDF to collect both the primary and secondary leachate and to allow for disposition of the materials collected. The overall system is shown in Figure 2-3 and consists of the in-cell drainage/sumps, collection piping/storage, and leachate unloading and cross-site transfer subsystems that are described in the following sections. The leachate piping route on the north and south side of the trench is a 10" diameter pipe with secondary containment and leak detection, while the piping route on the west side of the trench is a 12" diameter pipe (with associated secondary containment and leak detection) to handle the combined flow from the cell. The collection system is designed to accommodate a total of four cells (BHI-00355, Design Analysis).

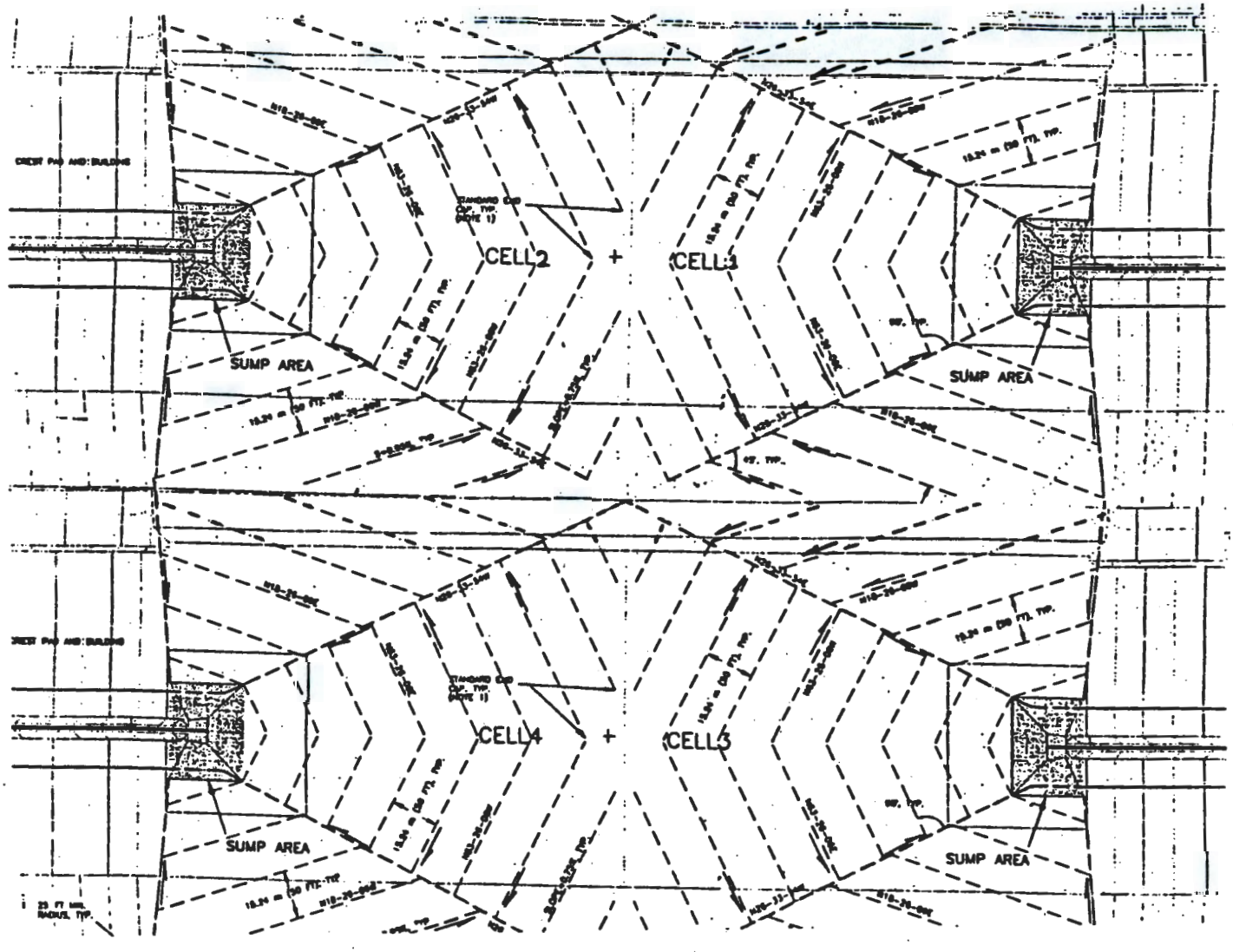
Figure 2-3, Leachate Collection System Overview



2.2.1 In-cell Drainage/Sumps

The leachate that collects in a cell is carried to a cell specific sump through a series of perforated pipes as shown in Figure 2-4. The leachate collects in the sump and is then pumped out using submersible pumps. There are two submersible pumps in the primary sump and a single submersible pump in the secondary sump. The leachate then passes through the crest pad and its associated instrumentation and flows by gravity into the leachate collection system shown previously in Figure 2-3.

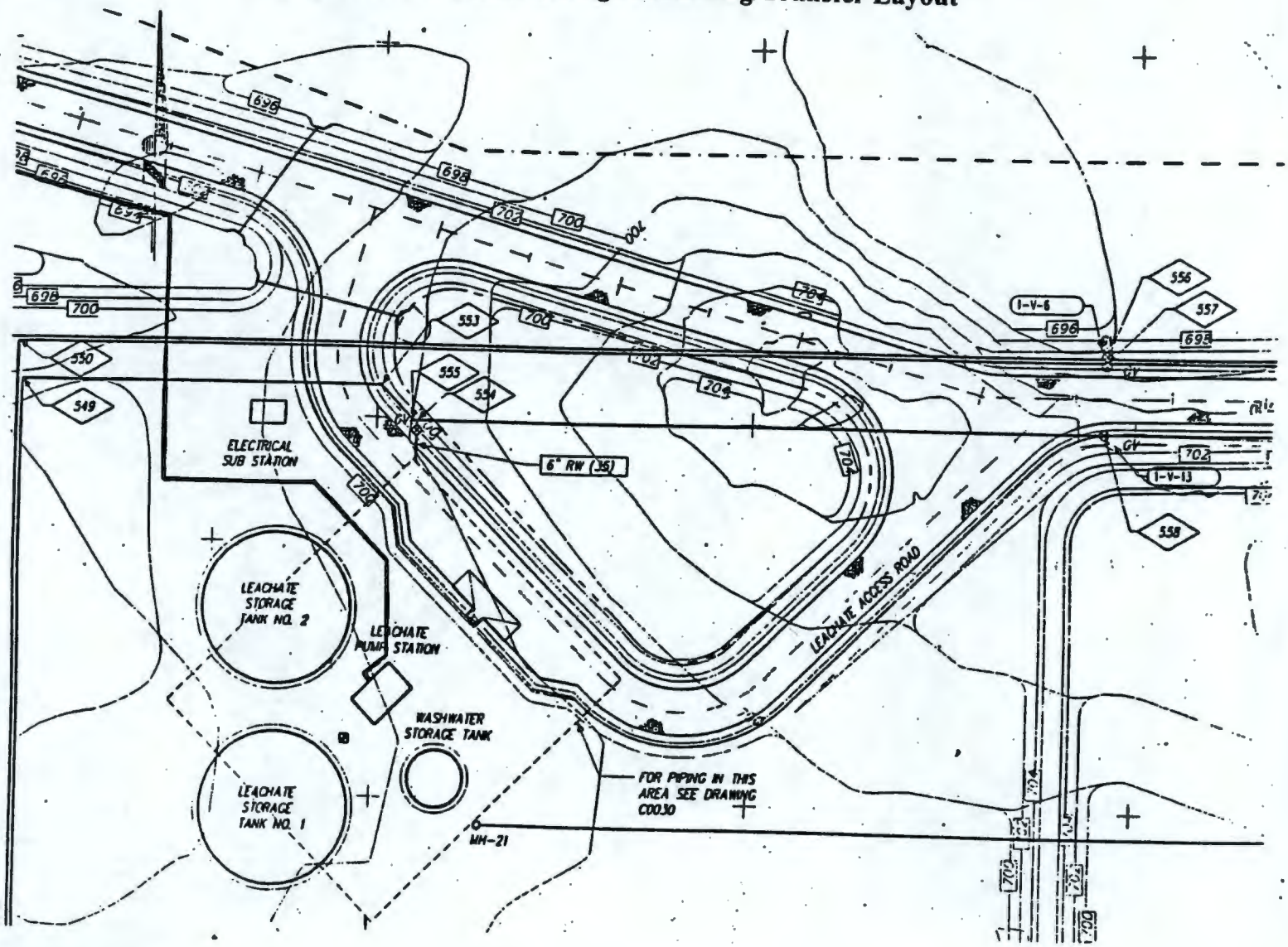
Figure 2-4, Cell Collection Piping



2.2.2 Leachate Storage/Unloading/Transfer System

The leachate is directed from the collection system to a storage/unloading/transfer system that is shown in Figure 2-5. The leachate storage system consists of two above ground modular storage tanks complete with secondary containment/leak detection and associated piping. The leachate unloading system consists of necessary pumps, piping, filters and loadout area with secondary containment to allow loading of the leachate into truck mounted tanks for disposition. Based upon the current delisting status of the ERDF leachate, secondary containment for the storage and loadout systems are not required. The leachate transfer system is a single walled pipe connected to the leachate house that allows transfer of leachate to the 200 Area Effluent Treatment Facility (ETF) via the cross-site transfer line.

Figure 2-5, Leachate Storage/Unloading/Transfer Layout



2.2.3 Sources of Liquids Within the Leachate Collection System

During ERDF operation, leachate will be generated from precipitation, moisture in the incoming soil, and compaction/dust control water. A water balance has been prepared (BHI-000734) which describes the various water sources and quantities of liquids associated with the ERDF leachate management strategy.

2.3 Washwater Collection System

An engineered collection system is provided at the ERDF to collect washwaters from decontamination operations to allow for disposition of the materials collected. The overall system is shown as part of Figure 2-3 and consists of decontamination pad drainage/sumps, collection piping/storage, a settling tank, a washwater storage tank, and unloading subsystems. Washwater is conveyed to the Washwater Storage Tank by gravity through double containment, pipes, manholes, and a settling tank. The settling tank is used to remove solids from the washwater prior to it being conveyed to the storage tank. The design is very similar to a septic tank with two collection chambers. Most of the solids are expected to settle out in the east chamber, although the quantity of solids will depend upon the waste types and operational procedures in the ERDF waste disposal operations. The washwater storage tank consists of an aboveground modular storage tank complete with secondary containment/leak detection and associated piping.

Secondary containment piping is terminated after penetrating each manhole and all secondary containment drains to downstream manholes. Each manhole is equipped with an alarm set to 0.5 inches off the manhole floor to identify the presence of liquids on the floor of a manhole. In addition to an alarm in the manhole, Manhole 21 also contains a motor operated valve that closes if liquid is detected by the flood alarm switch. This prevents water in the storage tank from draining back into Manholes 20 and 21 if a leak occurs upstream of either manhole.

3.0 Action Leakage Rate and Response Plan

3.1 Action Leakage Rate

The Action Leakage Rate (ALR) for a landfill is defined by EPA as the maximum design flow rate that the leak detection, collection, and removal system (LDS) can remove without the fluid head on the bottom liner exceeding 1 foot (FR57 No. 129, January 29, 1992, pgs 3462-3485). The ALR for ERDF was calculated in accordance with the referenced EPA guidance as presented in Appendix A. These calculations identified that the ALR for ERDF is 175 gallons per acre per day (gpad). The actual Secondary Leachate Collection System (SLCS) flow rate will be calculated on a weekly basis as part of the overall leachate inspections identified in Section 4.1 and compared with this level in determining when actions are required.

3.2 Response for Leakage Rates Less Than ALR

Under normal operating conditions, flows into the SLCS are expected to be less than the ALR. The SLCS is an automatic pumping system designed to maintain the cell secondary sump levels

within design parameters and no additional action is required. The pump is designed and installed to activate at a depth of 0.9 feet in the secondary containment sump and to automatically stop pumping when suction is lost at a depth of 0.7 feet.

3.3 Response for a Leakage Rate Above the ALR

3.3.1 Notifications

The following notification actions will be taken if flows into the SLCS is greater than the ALR.

1. WMFS will verbally notify BHI within 1 day of the time it is identified that the SLCS flow exceeds the ALR.

2. BHI/DOE-RL to provide verbal notification to EPA within 1 day of the time it is identified that the SLCS flow exceeds the ALR

3. BHI/DOE-RL to provide written notification to EPA within 7 days of identification that the SLCS flow exceeds the ALR.

4. BHI/DOE-RL to submit a preliminary written assessment of the situation within 14 days to EPA as to:

   The amount of liquids seen,
   Possible size, location, and cause of any leaks, and
   Short-term actions taken and planned.

5. BHI/DOE-RL to prepare a comprehensive written report describing the amounts of liquids, possible location, size, and cause of any leaks. Document in the report the leak determination methods used to identify the cause of exceeding the ALR.

6. BHI/DOE-RL to prepare a written report within 30 days of identifying the ALR has been exceeded and submit to the EPA with the following information: results of information gathering, actions taken, results of actions/investigations, planned short-term actions (and the basis for selection/implementation), and planned long-term actions (and the basis of selection/implementation).

3.3.2 Assessments for Size, Location and Cause of Leak

1. Assess the origin and amounts of liquids by source using available information, including the following:

   Precipitation data from the Hanford meteorological station located less than 1 mile from the ERDF,
   Water balance baseline information from the ERDF pre-operational water balance,
   Leachate flow rate trend analysis from recorded flow rate data and weekly ALR calculations, and

Operations estimates of water/leachate usage in the landfill to support compaction and dust suppression.

2. Examine the exposed side slope to identify the size, location, cause and severity of any observed leak.

3.3.3 Assessments for Impact of Leak

1. Assess whether the SLCS flow rate is greater than the SLCS pump capacity. Monitor the SLCS pump totalizer on a daily basis. The leak rate is considered to exceed the pump capacity when the total flow averages 21,600 gal/day over 3 or more consecutive days.

2. Perform a fingerprint or tracer type of study to determine the source of the leak and the hazards/mobility of the liquid if the previous assessments have not identified the source/reason for SLCS flow exceeding the ALR.

3. Perform limited waste retrieval to determine cause of leak if unable to determine from the above assessments.

3.3.4 Short Term Corrective Actions

1. Repair any observed damage through procedures, methods, and material equivalent to the original ERDF design, construction and construction quality assurance requirements.

2. If the capacity of the SLCS pump is exceeded, replace the pump with a larger pump capable of meeting the SLCS flow rate.

3.3.5 Long Term Corrective Actions

1. Perform large-scale waste retrieval to supplement investigation for leaks and partial or complete unit closure.

2. Waste placement into the cell in question should cease if the short-term corrective actions are unsuccessful.

4.0 Inspection Program

4.1 Periodic Inspections

Periodic inspections and monitoring of the leachate system will be accomplished as part of the overall ERDF maintenance and inspection program, per RFS-ERDF-002.7 and RFS-ERDF-010(H). These inspections will include above ground piping monitoring, liquid level monitoring in the leachate collection and washwater tanks, calculation of weekly SLCS flow rates (on a gallon per acre per day basis), flow rates, and other relevant factors in understanding the

operation of the leachate collection system. A log will be maintained of the quantity of leachate removed from the landfill cells and the level of leachate in the storage tanks.

4.2 Integrity Assessments

A periodic integrity assessment program will be used at ERDF to ensure that the primary piping system continues to be fit for use. This program will be performed every five years (unless recommended more frequently) and be monitored/approved by an independent, registered, professional engineer. The integrity assessment will be as follows:

4.2.1 Primary Piping

A hydrostatic test at 30 psig will be used to test the primary piping in the leachate and washwater collection systems.

4.2.2 Secondary Piping

A hydrostatic test at 15 psig will be used to test the secondary piping in the leachate and washwater collection systems.

4.3 Cross-Site Transfer Line Test

All transfers of leachate through the cross-site transfer line will be documented using the in-line flow meters at ERDF and Liquid Effluent Retention Facility (LERF). The two facilities' flow totalizer readings shall be within five percent to ensure potential for major leaks along the pipeline are minimized.

5.0 Sampling and Analysis

5.1 Sampling Objectives

The objective of sampling and analysis of the ERDF leachate and washwaters is to ensure the material meets the ETF waste acceptance criteria prior to transfer to the facility. The sample results can also be used to support the delisting status of the ERDF leachate.

In addition to the sampling needed for ETF acceptance, the ROD amendment includes the Environmental Restoration Disposal Facility Leachate Sampling and Analysis Plan for maintaining the delisting status of the ERDF leachate. The plan identifies the frequency of sampling, types of analyses and analyte levels required to maintain the delisting status of the ERDF leachate. These analyses are independent of those performed by WMFS, but the results may be used in conjunction with or in lieu of the analyses required for ETF acceptance of ERDF leachate.

5.2 Leachate and Washwater Sampling Methods

A representative sample from the leachate storage tank will be taken at the inner liner standpipe (a second standpipe also exists for the secondary liner) using a peristaltic pump at 1 foot

increments and composited. A representative sample from the washwater storage tank will be taken at the inner liner standpipe (a second standpipe also exists for the secondary liner) using a peristaltic pump at 1 foot increments and composited.

The required sampling equipment, labeling and chain-of-custody are briefly described in the following sections. Actual implementation of sampling activities will be in accordance with the Leachate & Washwater Management Procedures, RFS-ERDF-002.10(B) which will field implement the requirements of this plan. The Leachate and Washwater samples will be analyzed for: volatile organics, semi-volatile organics, heavy metals, anions, ammonia, pH, total dissolved solids, total organic carbon, and specific conductivity. Additional analytical procedures above these requirements shall be performed as necessary to quantify the presence of other hazardous constituents identified as present in the landfill.

5.2.1 Sampling Equipment

Equipment used in the collection of leachate and washwater samples will be appropriately decontaminated or cleaned prior to use and shall be in compliance with the requirements of the ERDF Quality Assurance Project Plan, RFS-ERDF-003 (QAPjP), QAI 11.2. Sample containers shall be purchased commercially and be accompanied by certification, which indicates the containers have been properly decontaminated. Sample containers and equipment shall be stored in such a manner as to prevent contamination prior to sampling activities

5.2.2 Labeling/Chain-of-Custody

Sample numbers for the samples shall be obtained from the Waste Acceptance Manager. Labeling and chain-of-custody shall be maintained at all times for leachate samples by implementing the requirements of QAI 13.1, Sample Handling and QAI 13.2, Chain-of-Custody from the ERDF QAPjP, RFS-ERDF-003.

6.0 Disposition Determination

The Tri-Parties have signed an amendment to the ERDF ROD that excludes or de-lists the leachate from the list of regulated waste contained in 40 CFR 261.31 and the leachate is therefore no longer considered a hazardous waste. The designation as non-hazardous will remain in effect as long as the leachate is managed in accordance with the amended ROD and associated Sampling and Analysis Plan, and the sample results are below the identified limits for the constituents of concern. The required controls for leachate, decontamination washwaters and other contaminated waters generated as a result of operations at the ERDF will be dependent upon the source and/or results of the sampling and analysis described in Section 5.0, but will reside in one of four categories:

- Clean waters from inactive cells will be released and disposed of as part of the ERDF storm water/runoff system,

- Leachate, decontamination washwaters and other contaminated waters generated as a result of operations that are non-regulated and are acceptable for reuse will be recycled within the ERDF cell as compaction and dust suppressant waters, and

- Leachate, decontamination washwaters and other contaminated waters generated as a result of operations that are non-regulated and are not recycled within the ERDF will be transferred via the cross-site transfer line to the ETF for treatment and disposal.

- Leachate, decontamination washwaters and other contaminated waters generated as a result of operations that are designated as hazardous waste will be transferred to the ETF or other approved treatment/disposal facility by tank trailer.

6.1 Basis of Leachate/Washwater Management Strategy

The ERDF is expected to generate leachate that does not require management as a hazardous waste. The ERDF ROD currently requires sufficient leachate storage capacity to ensure uninterrupted operations, complying with 40 CFR Part 264, Subpart N.

The Tri-Parties have determined that the ERDF leachate may be collected and stored at the ERDF for use at ERDF, as appropriate. Appropriate uses are limited to dust suppression and waste compaction. Compaction of the waste is necessary to minimize the potential for subsidence and to support a final surface cover. The following discussions concerning the use of the waters is the basis for the overall leachate management strategies discussed in this section.

6.1.1 Dust Suppression

If a landfill contains material that is subject to wind dispersal, the 40CFR264.301(j) and WAC 246 & 247 require the material to be managed to prevent wind dispersal. The ERDF operations involve bulk placement of soils and other materials that in an uncontrolled dry form could have a strong potential for dispersion in localized areas within the landfill and the surrounding areas. The potential for dispersion has been studied as part of the ERDF environmental monitoring program and the ERDF Safety Analysis (BHI-00370). The ERDF Safety Analysis requires soil fixative agents to be applied during non-operational times (at the end of shift operations) to fix the working place and minimize dispersion. Dust suppression programs have been incorporated into the operations procedures (within the ERDF Waste Materials Placement Procedure) including the use of water to suppress dust dispersion during the dumping operation and the waste placement into "lifts" within the landfill.

6.1.2 Waste Compaction

Compaction of waste within the landfill is also required to ensure that the wastes are placed in an engineered fill, to minimize the potential for subsidence, and to support the final surface barrier. The integrity of the final surface barrier is the ultimate objective of these compaction requirements in order to meet the requirements for the landfill cover in

40 CFR 264.310. Wastes and daily operating cover are required to be placed and compacted to 90% of modified proctor (ASTM D1557) maximum dry density. These compaction requirements lead to the use of water during compaction to achieve wastes at or near optimal moisture content to allow necessary compaction results to be achieved.

6.1.3 Water Balance

A water balance around the ERDF landfill was performed as part of the overall ERDF leachate management strategy (BHI-00734) to understand the amount of water necessary for dust suppression and compaction in comparison to the amount of leachate and washwaters that would be generated at the site. This study considered several water sources, including moisture contained in soil shipped for disposal, leachate used to dust control, etc. and precipitation. Pathways for water loss were evaporation and leachate collection. This study concluded that the required water needed for compaction and dust suppression was greater than the volume of leachate and decontamination washwater that would be generated at the site. These conclusions support the use of leachate and decontamination washwaters for use in the landfill as dust suppression and compaction purposes and is not considered placement of liquid wastes within a landfill.

Moisture addition in the ERDF landfill is required for both dust control and to facilitate compaction of waste material. The water balance study suggests an application rate for dust control of 0.50 gal/sqyd, with a service life of one hour. The daily work area in the landfill can be 100,000 sqft (11,100 sqyds). Applying this volume eight times per day equates to 44,000 gallons required for dust control. The water balance also assumes that an average of 2% moisture by weight will be added to facilitate compaction of incoming waste material. Daily receipts at the ERDF can average 3,000 tons of waste material. Assuming a 2% moisture addition is necessary, another 14,000 gallons is required which brings the total to 58,000 gallons per day. The total volume of moisture added to the landfill is subject to a great deal of variability due to weather effects such as temperature, relative humidity, and precipitation. Rather than create a complex set of moisture addition limits that are subject to many assumptions and changing conditions, the moisture addition will be based on the moisture measurement obtained daily with the nuclear moisture gage. The optimum moisture content for the incoming waste material is about 8%. After the daily moisture measurement, the value of the moisture content is communicated to dumping station personnel who control the quantity of moisture added to the waste during the unloading process. If the moisture content is greater than 8%, they will be instructed to reduce the amount of moisture added. This method of moisture control is based on the actual moisture content required to achieve optimum compaction of the waste material and also accounts for varying weather conditions.

6.2 Leachate and Washwater Management

6.2.1 Inactive Cells Containing No Waste

The leachate collection system for inactive cells in which no waste has been placed will be disconnected and will be routed to the ERDF storm water/runoff management system for disposal.

6.2.2 Leachate Storage Tank Level Management

The leachate storage tanks have a capacity of 580,000 gallons. The pumping capacity for transfer of leachate via the cross-site transfer line to ETF is 250 gpm. These capacities are sufficient to manage a 25 year, 24 hour rainfall event with an additional surge capacity of 160,000 gallons to be used for storage of leachate.

- Leachate will be collected in the leachate storage tanks. The leachate will be sampled every 200,000 gallons pumped into the storage tanks in accordance with the requirements of Section 5.0. The results of that sampling/analysis will determine the disposal option for the leachate as described below. Leachate will be managed by filling a leachate storage tank to its maximum level (approximately 7') at which point it will be isolated and leachate flow redirected to the other leachate storage tank. The isolated tank will then be sampled in accordance with the requirements of Section 5.0. The leachate will be transferred to the ETF to maintain the 24-hour, 25-year storm design capacity.

- During off-normal operations (periods of high precipitation), leachate will be pumped directly to ETF. A continuous sampler is available for use when direct transfer from ERDF to ETF is required to maintain operating conditions. All transfers of leachate through the cross-site transfer line will be documented using the in-line flow meters at ERDF and Liquid Effluent Retention Facility (LERF). The two facilities' flow totalizer readings shall be within five percent to ensure potential for major leaks along the pipeline are minimized.

6.2.3 Washwater Storage Tank Level Management

The washwater storage tank has a capacity of 23,750 gallons (assuming 1 foot of freeboard). This capacity allows for 8 weeks of decontamination operations (14,000 gallons), precipitation from a 25 year, 24 hour rain event (2,438 gallons), and a surge capacity of 7,312 gallons (which equates to an additional four weeks of decontamination operations). A sample will be taken at the direction of the Waste Acceptance Manager, but prior to the tank reaching 70% of the design capacity (16,625 gallons). This will ensure that operations are not impacted by the washwater analysis/disposition process due to a spare capacity of four weeks of continued decontamination operations.

6.3 Leachate and Washwater Disposition Determination

Waters collected in the leachate sump from cells where no waste placement has occurred will be directed to the storm water/runoff management systems using methods described in Section 6.2.1. Periodic radiological surveys as part of the overall ERDF radiological controls program (as identified in the ERDF Health & Safety Plan) will ensure that contamination is not spreading into any unused cell(s) within the landfill. These surveys will be documented and retained for review within the BHI Document Control Records. Waters collected in the leachate sump of unused cells will be routed to the leachate collection system should these radiological surveys identify contamination that is not readily contained and/or removed and disposed of in active portions of the landfill.

Leachate and washwater collected in the leachate and washwater storage tanks will be sampled/analyzed in accordance with Section 5.0. Based upon the results of these analyses, leachate and washwater will be considered acceptable for reuse as compaction and dust suppression water if:

- Known hazardous constituents are present at less than the delisting limits.
- Known hazardous constituents are present at less than the ERDF Waste Acceptance Criteria (BHI-00139).
- Known radiological constituents are present at less than the ERDF Waste Acceptance Criteria (BHI-00139).
- Known hazardous substances will not present a potential for an unacceptable work exposure (>50% of the OSHA PEL), based on an exposure assessment conducted in the ERDF Health and Safety Plan.

Leachate and washwater that is not acceptable for reuse will be transferred to the ETF, if acceptable, or transported to another approved facility for treatment and disposal.

Use of leachate and washwater for dust suppression and compaction purposes shall be maintained to the minimum necessary to support landfill operations. The overall waste addition process shall be controlled by the ERDF Waste Materials Management Procedures. The use of water will be minimized, and the water addition person will be informed of the results of the daily moisture content testing. The water addition person will use the results to adjust the quantities of water being sprayed.

7.0 Response to Leaks from Leachate Storage Tanks

With the Tri-Parties approval of the ERDF ROD amendment the leachate tanks are no longer regulated by the standards of 40 Code of Federal Regulations, section 264.196 and Washington Administrative Code 173-303-640(7). In order to establish a process for managing the tanks and any potential leaks, the EPA guidance for Action Leakage Rate determination was used to establish a Permissible Leakage Rate (PLR) for the primary liners of the leachate storage tanks. Appendix B is the PLR calculation for the leachate storage tanks. The flow rate used to

determine the PLR is 1696 gallons/day which equates to 1.2 gallons/minute. The PLR has an applied safety factor of 2. Leaks up to and including this volume will be managed by:

a. Place a collection basin under the tank drain valve,

b. Place a submersible pump with capacity greater than 1.2 gallons/minute into the collection basin,

c. Place submersible pump hose into primary tank liner,

d. Open tank drain valve and begin filling collection basin, and

e. Turn on submersible pump.

If the PLR is exceeded, the following actions will be taken:

a. Immediately stop the flow of leachate into the tank.

b. Notify BHI of all evidence of the leak. BHI will ensure appropriate notifications are made.

c. Remove leachate from the tank. As early as practicable, draw down the contents of the tank in question to the other tank, until the leak is repaired or the tank is emptied. If such transfer is not possible (due to the other tank being full, leaking, or otherwise impaired), begin transfer as quickly as possible to an appropriate treatment, storage or disposal facility.

d. The following shall be completed in an expeditious manner by the appropriate parties: Inspection and repair of the tank; appropriate tests of the repairs; certification of the repairs prior to returning the tank to service, with appropriate documentation.

e. If there has been a release into the secondary containment system, all released materials must be removed, to the other tank or other appropriate location, within 24 hours or as timely as possible to prevent harm to the environment.

Maintaining the tanks in accordance the these standards will ensure their viability and that they will be in compliance with the Federal and State hazardous waste regulations for above ground tanks if the ERDF leachate were to be designated as a hazardous waste.

Appendix A
Action Leakage Rate Calculation

1. Problem - Calculate the capacity of the Secondary Leachate Collection System (SLCS) for ERDF to determine the Action Leakage Rate (ALR) in accordance with the latest EPA guidance and RCRA regulations.

2. Sources - EPA published specific guidance for calculating site-specific ALR=s when the final "Leak Detection Rule" was published in the Federal Register on 1/29/92 (54 F.R. 3462, 1992). These guidelines will be followed to calculate the ERDF site-specific ALR as specified in 40 CFR 264.304.

3. Approach - The ALR is defined by EPA as "the maximum capacity of the SLCS so as not to exceed one foot head on the bottom liner" (formerly known as the rapid and extremely large rate in the proposed rues). The approach used to calculate the ALR for ERDF will be to:

   - Calculate capacity of the SLCS drainage layer as-built using EPA guidelines,
   - Apply the appropriate safety factors to the calculated ALR to account for uncertainties as specified by EPA, and
   - Check capacities of key SLCS components (i.e., SLCS pump) to ensure these do not limit the calculated ALR for the drainage layer.

4. AS-BUILT SECONDARY COLLECTION SYSTEM DESIGN - THE BASIC DESIGN OF THE BASE LINER SYSTEM IS SHOWN IN FIGURE 2-1. THE IMPORTANT FEATURES FOR DRAINAGE/SLCS DESIGN ARE THE DRAINAGE MATERIAL TYPE AND THE SLOPE:

   - Drainage Material - Drainage gravel with encasing geotextile materials,
   - Slope of Secondary Drainage in sump - 2% minimum (S=0.002) per Drawing 0600X-DD-C0043 (Cell 1) & 0600X-DD-C0044 (Cell 2).

- Calculation of SLCS Capacity - As an example, EPA proposed the following model to calculate flow originating from a hole in a geomembrane liner:

$$Q = k * h * \tan a * B$$

Where:	Q =	Flow rate in the leak detection layer
	k =	Hydraulic conductivity of the drainage medium
	h =	Head on the bottom of the liner
	Tan α_=	Slope of the leak detection system
	B=	Width of the flow in the leak detection system, perpendicular to the flow

The example given by EPA assumes the following values for the minimum acceptable system for a landfill under minimum technology requirements (MTR):

$k = 1 \times 10^{-2}$ cm/sec
h = 1 foot maximum
tan a = 1% minimum
B = 100 foot width of flow

.Combined with a safety factor of 2, this calculates to an EPA recommended minimum ALR of 100 gallons/acre/day (gpad) for landfills meeting the MTR.

For ERDF the following apply:

$k = 1 \times 10^{-1}$ cm/sec	Testing information ranges from 0.25 cm/sec up to 0.9 cm/sec, but this number was chosen to add some conservatism to the calculation.
h = 1 foot maximum	As required by EPA guidance
tan a = 0.02	Per drawing 0600X-DD-C0043 (Cell 1) and Drawing 0600X--DD-C0044 (Cell 2) which has the slope as 2% minimum

B = 100 feet Per Drawing 0600X-DD-C0045

Based on these factors, the flowrate (Q) for ERDF is calculated as:

$Q = (1 \times 10^{-1}\ cm/sec) * (1\ foot) * (0.02) * (100\ feet) = 0.2\ cm*ft^2/sec$

$= 0.2\ cm*ft^2/sec * (foot/30.48\ cm) * (7.48\ gallons/ft^3) * (86{,}400\ sec/day)$

$= 4240\ gallons/day$

6) ALR Calculation Taking Into Account Safety Factors - The ERDF design has the two cells at a surface area of 12 acres leading to an overall ALR of:

ALR = Q / Surface Area / Safety Factor

= (4240 gallons/day) / (12 Acres) / (2)

= 177 gallons/acre/day

7) SLCS Pumping Capacity - The leachate collection sump pump must be verified to be supportive of the selected ALR:

Secondary leachate sump pump - The leachate extraction pump capacity is 15 gpm which equates to a pump-out rate of:

Q = 15 gal/min * 60 min/hr * 24 hr/day / 12 acres

= 1,800 gpad

Conclusion: The SLCS pump is supportive of the selected ALR.

Permissible Leakage Rate Calculation

The same EPA guidance for determining Action Leakage Rate as used in Appendix A for the ERDF SLCS will be used to determine the Permissible Leakage Rate for the ERDF leachate and washwater tanks.

- Calculate capacity of the secondary tank liner using EPA guidelines,
- Apply the appropriate safety factors to the calculated PLR to account for uncertainties as specified by EPA, and

For each ERDF leachate tank the following applies:

$k = 1 \times 10^{-1}$ cm/sec	Information provided on Submittal No. 5-235-01A / Storage Tanks.
h = 1 foot maximum	As required by EPA guidance
tan a = 0.02	Per Technical Submittal 0600X-SP-M0006, rev. 1 which has the slope as 2% minimum
B = 40 feet	Per Technical Submittal 0600X-SP-M0006, rev. 1

Based on these factors, the flowrate (Q) for each leachate storage tank is calculated as:

$$Q = (1 \times 10^{-1}\ \text{cm/sec}) * (1\ \text{foot}) * (0.02) * (40\ \text{feet}) = 0.08\ \text{cm*ft}^2/\text{sec}$$

$$= 0.08\ \text{cm*ft}^2/\text{sec} * (\text{foot}/30.48\ \text{cm}) * (7.48\ \text{gallons/ft}^3) * (86{,}400\ \text{sec/day})$$

$$= 1696\ \text{gallons/day}$$

PLR Calculation Taking Into Account Safety Factors - The ERDF design has the two leachate storage tanks with a surface area of 5026 square feet leading to an overall PLR of:

$$PLR = Q / \text{Surface Area} / \text{Safety Factor}$$

$$= (1696\ \text{gallons/day}) / (5026\ \text{ft}^2) / (2)$$

$$= 0.2\ \text{gallons/ ft}^2\ \text{/day}$$

SLCS Pumping Capacity - The leachate storage tanks do not have pumps associated with the SLCS. There are valves located on the exterior of the tanks that can be opened to gravity drain the leachate.

ERDF Waste Disposal Operations
Subcontract 0600X-SC-G0006

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