Attachment 8
Response Action Plan
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M.0 Response Action Plan

US Ecology Idaho, Inc. (USEI) operates a Resource Conservation and Recovery Act (RCRA) hazardous waste treatment, storage and disposal facility (TSDF) near Grand View, Idaho. Among the RCRA permitted units at the facility are three surface impoundments and four landfills which are subject to the leak detection rules applicable to these types of units.

Although the specifics of each units liner systems vary, each has been designed and constructed and is operated with an underlying double liner system. For the landfill units, the design includes leachate collection and removal and leak detection, collection, and removal components. The surface impoundment liner systems only include leak detection, collection, and removal components. This Response Action Plan (RAP) documents the method of operation for these systems, including maintenance, monitoring, and contingency planning. This RAP follows guidance provided by the United States Environmental Protection Agency (USEPA) background documents (*Background Document on Proposed Liner and Leak Detection Rule*, USEPA May 1987 and *Action Leakage Rates for Leak Detection Systems*, USEPA January 1992), as well as the underlying regulations. The RAP addresses the following USEI RCRA permitted units:

- The Evaporation Pond
- Collection Pond No. 1
- Collection Pond No. 2(clean closed in October 2011)
- Collection Pond No. 3
- Landfill Cell 5 (closed in 2005)
- Landfill Cell 14
- Landfill Cell 15
- Landfill Cell 16

This RAP includes:

- A description of each of the above units (See Section M.4).
- An analysis of potential water sources and pathways to the landfill units and surface impoundments (see Section M.5).
- A description of the monitoring and inspection programs currently in place (See Section M.6).
- The development and calculation of the action leakage rates (ALRs) for each unit or subunit, as appropriate, which trigger response actions.
- A description of procedures for appropriate response actions for the landfills and for the surface impoundments.

M.1 Introduction

M.1.a Regulatory Requirements

As part of implementation of the leak detection standards included in the *USEPA Final Rule: Hazardous Waste: Liners and Leak Detection for Hazardous Waste Land Disposal Units* (Federal Register: Vol. 57, No. 19, Wednesday, January 29, 1992, p. 3462), a written RAP is required of owners or operators of landfill units and surface impoundments. The final rule and the associated background document *(Action Leakage Rates for Leak Detection Systems*, USEPA January 1992) require the establishment of an ALR. Definitions of the ALR and required response actions are identified for surface impoundments and landfill units, respectively, in 40 Code of Federal Regulations (CFR) 264.222, 224, 302 and 304. This RAP presents the basis for the establishment of ALRs and corresponding response actions for each of the USEI surface impoundment and landfill units which are subject to this requirement. This determination of ALRs and response actions meets or exceeds the requirements of Idaho Administrative Procedures Act

(IDAPA) 16.01.05.008 (40 CFR 264.222, 224, 302 and 304).

M.1.b Plan Intent

This RAP is a contingency planning document that outlines actions to be taken when measured flow rates from the leak detection, collection and removal system (LDCRS) component of the landfill unit and surface impoundment liner systems are observed at rates greater than the ALRs. The objective of this RAP is to define measures to be taken to prevent or minimize the migration of hazardous constituents out of the LDCRS systems for each unit. This RAP provides mechanisms for initiating appropriate response action(s) should the leakage rate in the LDCRS be observed above the ALR.

M.2 Leakage Rates

M.2.a Background

When establishing the leak monitoring and detection requirements for waste disposal unit liner systems, USEPA recognized that all liner systems will leak. USEPA provided guidance for determining acceptable liner leakage rates in its guidance documents under the double liner and leak detection system rule, promulgated on July 29, 1992. These documents include: (1) *Action Leakage Rates for Leak Detection Systems*, released in January 1992; and (2) *Background Document on Proposed Liner and Leak Detection Rule*, released in May 1987. In addition to expected normal leakage to the LDCRS component of the liner system, these documents provide a designation for leakage rates that are above expected normal leakage. This designation is *action leakage rate* (ALR). The purpose of establishing an ALR for a liner system is to provide a monitoring threshold which, when exceeded, will trigger various levels of response action(s) to prevent or mitigate potential release of hazardous constituents from the unit.

In its guidance documents, USEPA developed generic ALR rates for landfills, waste piles, and surface impoundments based on the minimum technical standards for those units. These generic ALRs are 100 gallons per acre-day (gpad) for landfills and waste piles and 1,000 gpad for surface impoundments.

In addition to establishing the generic leakage rates, USEPA recognized that the normal, expected leakage rate of a system will be affected by the type of unit (i.e., waste pile, landfill, etc.), the grade and shape of the unit, the liner system materials, the quality of liner construction inspection, and the depth of liquid on top of the liner. Therefore, the regulations require that unit-specific ALRs be developed for landfills, waste piles and surface impoundments constructed with design values that vary from the minimum technical standards.

In this RAP, USEI proposes to monitor for both the regulatory required unit-specific ALRs and for a more conservative (early warning) leakage flow rate. Hence, a newly defined Warning Leakage Rate (WLR) is provided for each landfill and surface impoundment at the facility. The WLR is a trigger for intermediate response actions to address potential leaks in the liner systems.

Unit-specific ALRs for the facility are also proposed. The ALRs, in this case, are defined per the regulations based on the lesser of the LDCRS capacity with no greater than one foot of water head on the bottom liner or the maximum LDCRS sump removal rates.

M.2.b Action Leakage Rate

As stated above, USEPA has established the method to be used for calculating ALRs for landfills, waste piles and surface impoundments. This ALR is based on a theoretical leakage calculation derived from Darcy's Law for non-turbulent flow through saturated media. The resulting leakage calculation models the capacity of a leak detection system.

M.2.b.(1) Surface Impoundment ALRs

As stated previously, the ALR values for Pond #1, Pond #3, and the original Evaporation Pond are conservatively based upon the generic value of 1000 gpad. The applicable ALR for the reconstructed Evaporation Pond is determined in Appendix D.4.11 in Attachment 17 and is summarized in Table M-1.

M.2.b.(2) Landfill ALRs

The ALRs for Landfill Cells 5, 14 and 15 are conservatively based upon the USEPA minimum technical standards. These minimum technical standards for landfills include:

- granular drainage layer thickness (h) of 1 foot,
- conductivity (k) of $1x10^{-2}$ cm/sec, and
- slope (α) of 1 percent.

These minimum design values (and an assumed flow width (B) of 100 feet) results in a flow rate (Q) of 210 (gad). A safety factor of two reduces this allowable flow to 100 gad for landfills.

By applying the leakage rates determined using the minimum technical requirements to each facility unit, and multiplying by the unit area, total unit ALRs for each unit can be determined and are summarized in Table M-1.

The ALR's for Landfill Cell 16 were calculated based upon unit specific geometry and flow capacity as presented in Appendix D.5.10.

M.2.c Warning Leakage Rate

In this RAP, the WLRs for Landfill Cells 14, 15, and 16 are determined for a liner system constructed to USEPA minimum technical standards. The WLRs for the Landfill Cells and the surface impoundments are calculated as 75% of the unit specific ALRs.

M.3 Response Actions

M.3.a Landfills

M.3.a.(1) Leakage Rates Above WLR but Below ALR

Upon the discovery/occurrence of leakage above the unit-specific WLR in any subcell or phase of a landfill, a record of the condition will be entered into the facility's operating record and the frequency of pumping from the affected sumps will be increased appropriately. Any exposed liner surface and the landfill dikes and anchor trenches in the affected subcell or phase of a landfill will be inspected for areas of potential migration pathways, and repairs will be made as appropriate. Once it is determined that the leakage rate has dropped below the WLR, the unit will be returned to normal operation.

M.3.a.(2) Leakage Rates Above ALR

Upon the discovery/occurrence of leakage above the ALR in any subcell or phase of a landfill, a record of the condition will be entered into the facility's operating record. Within seven days of the discovery of an ALR condition, USEI will notify the Idaho Department of Environmental Quality (IDEQ) in writing of the

occurrence of the ALR condition. This written notification will include:

- Name of facility
- IDEQ identification number
- Date of detection of liquid
- Volume of liquid found/removed
- Sample collection and analysis initiated (if any)
- Response actions taken

Upon discovery of leakage above the ALR rate, USEI will determine if waste receipt should be suspended or curtailed until the cause of the ALR is discovered and resolved. If possible, the affected subcell will be graded to promote the drainage of precipitation to adjacent, non-impacted subcells. Increased pumping frequency, and/or installation of pumps with higher pumping rates, from affected sumps will occur until the removal rate falls below the WLR.

USEI will conduct an investigation to attempt to determine the location and source of the leak. This investigation will be dependent on the circumstances of the ALR event and will be determined on a case-by-case basis. In all cases, identification and control of water source(s) and assessment of the potential for escape of hazardous constituents to the environment will be the immediate focus of this investigation. Based on this investigation, USEI will determine whether waste placement in the subcell should be suspended or curtailed, whether any waste should be removed to facilitate LDCRS repairs, and whether the unit should be closed. Samples of potential source water may be collected and analyzed to aid the investigation.

Upon control of the leakage source and/or the location of the defect(s), USEI will determine the steps necessary to conduct any cleanup and to repair any defects. This work will be completed prior to returning the affected portion of the landfill subcell or phase to normal active service.

A preliminary written assessment of the ALR condition will be established within 14 days of the onset of the ALR exceedance and submitted to the Regional Administrator. This assessment will include:

- volume of liquid removed from the LDCRS
- likely sources of liquids
- possible location, size, and cause of any defects
- short-term actions taken and planned

It is noted that cessation of the ALR condition during the assessment period may still require WLR-type response actions (i.e., increased pumping, continued sampling, etc.). The assessment implementation schedule will be updated as additional information is collected, additional response actions are determined, and system cleanup and repair work plans are completed.

M.3.a.(3) Response Action Reporting

Within 30 days of initiation of a response action and monthly thereafter as long as the flow rate to the leakage system exceeds the ALR, USEI will provide IDEQ with a written evaluation of the effectiveness of the response action, including an evaluation of potential additional response actions and a schedule for providing IDEQ with additional response action updates.
An ALR response action is determined to be complete when all the following conditions have been met:

- Leakage rates are below the ALR for two consecutive weeks.
- All required samples have been collected.
- All system cleanup has been completed.

- If required, all liner system damage is repaired and tested.
- No additional work is required.
- All USEI facility operating record notations have been made.
- All IDEQ notifications are submitted.

Within 60 days of completion of the response action, USEI will provide IDEQ with a written report describing the effectiveness of the response actions taken, including a description of the effectiveness of the action in preventing, to the extent feasible with current technology, hazardous constituent migration out of the landfill subcell or phase.

M.3.a.(4) Assessment of Effectiveness of Planned Response Actions

The planned response actions for the occurrence of leakage rates in landfills above the WLR but below the ALR are intended to prevent or minimize the potential for migration of hazardous constituents out of the affected unit. It is believed that the planned actions are appropriate and will allow USEI to achieve this goal by:

- Relieving the pressure on the bottom liner by increased pumping of leachate.
- Conducting an investigation of the liner system to determine defects and potential sources of the leachate.
- Initiating repair activities to the liner system as determined necessary by the investigation.

The planned response actions for the occurrence of leakage rates in landfills in excess of the ALR are designed to mitigate a condition which may result in potential migration of hazardous wastes out of the affected unit. This goal is accomplished by:

- Relieving the pressure on the bottom liner by increased pumping of leachate.

- Reducing potential sources of water through grading of the subcell waste surface to drain precipitation to adjacent, non-impacted subcells.

- Evaluating the need for ceasing or curtailing waste receipt in the unit. In addition, determine if waste is required to be removed for inspection or repair of the liner and finally, determine if the unit should be closed.

- Conducting an investigation of the liner system to determine defects and potential sources of the leachate.

- Initiating repair activities to the liner system as determined necessary by the investigation.

M.3.b Surface Impoundments

M.3.b.(1) Leakage Rates Above WLR but Below ALR

Upon the discovery/occurrence of leakage above the unit-specific WLR in any surface impoundment, a record of the condition will be entered into the facility's operating record. USEI will determine if waste placement should be suspended or curtailed or if any of the contents of the affected surface impoundment should be transferred to an alternate surface impoundment or other container until the cause of the exceedance of the WLR is discovered and resolved. If the affected surface impoundment is drained of liquid, the leakage rate will be monitored such that the location of the defect(s) may be correlated to the level of liquid in the impoundment.

If the approximate location of a defect can be determined, any exposed liner surface in the suspect area will be inspected visually for potential migration pathways. Additionally, USEI may employ such methods as dye tracer tests, ponding tests, and/or electrical resistivity surveys to determine the location of defects. Upon location of a defect, repairs will be made to the liner system as appropriate. Once it has been determined that the liner is functioning properly and the leakage rate has dropped below the WLR, normal operations will resume in the affected surface impoundment. A record of all testing and repair activities will be entered into the facility's operating record.

M.3.b.(2) Leakage Rates Above ALR

Upon the discovery/occurrence of leakage above the ALR in any surface impoundment, a record of the condition will be entered into the Facility Operating Record. Within seven days of the discovery of an ALR condition, USEI will notify the IDEQ of the occurrence of the ALR condition. This written notification will include:

- Name of facility
- IDEQ identification number
- Date of detection of liquid
- Volume of liquid found/removed
- Sample collection and analysis initiated (if any)
- Response actions taken

The frequency of pumping and/or the pumping rate from the affected sumps will be increased and no additional wastes will be added to the affected surface impoundment until the leakage rate falls below the ALR (additional storm water run-in to an affected Collection Pond will be removed as necessary.) Additionally, if deemed necessary by USEI, a portion or all of the contents of the affected surface impoundment may be pumped to an alternate surface impoundment or other containers until the cause of the ALR is discovered and resolved.

If the affected surface impoundment is drained of liquid, the leakage rate will be monitored such that the location of the defect(s) may be correlated to the level of liquid in the impoundment. When the approximate location of a defect is determined, any exposed liner surface in the suspect area will be inspected visually for potential migration pathways. Identification and control of water source(s) will be an additional focus of this liner system investigation. Samples of potential source water may be collected and analyzed. Additionally, USEI may employ such investigative methods as dye tracer tests, ponding tests and/or electrical resistivity surveys to determine the location of defects. Upon location of a defect, repairs will be made to the liner system as appropriate. Once it has been determined that the liner is functioning properly and the leakage rate has dropped below the WLR, normal active service will resume in the affected surface impoundment. A record of all testing and repair activities will be entered into the facilities operating record.

A preliminary written assessment of the ALR condition will be established within 14 days of the onset of the ALR exceedance and submitted to the Regional Administrator. This assessment will include:

- volume of liquid removed from the LDCRS
- likely sources of liquids
- possible location, size, and cause of any defects
- short-term actions taken and planned

It is noted that cessation of the ALR condition during the assessment period may still require WLR-type response actions (i.e., increased pumping, continued sampling, etc.). The assessment implementation schedule will be updated as additional information is collected, additional response actions are determined, and system cleanup and repair work plans are completed.

M.3.b.(3) Response Action Reporting

Within 30 days of initiation of a response action and monthly thereafter as long as the flow rate to the leakage system exceeds the ALR, USEI will provide IDEQ with a written evaluation of the effectiveness of the response action, including an evaluation of potential additional response actions and a schedule for providing IDEQ with additional response action updates.
An ALR response action is determined to be complete when all the following conditions have been met:

- Leakage rates are below the ALR for two consecutive weeks.
- All required samples have been collected.
- All system cleanup has been completed.
- If required, all liner system damage is repaired and tested.
- No additional work is required.
- All USEI facility operating record notations have been made.
- All IDEQ notifications are submitted.

Within 60 days of completion of the response action, USEI will provide IDEQ with a written report describing the effectiveness of the response actions taken, including a description of the effectiveness of the action in preventing, to the extent feasible with current technology, hazardous constituent migration out of the surface impoundment.

M.3.b.(4) Assessment of Effectiveness of Planned Response Actions

The planned response actions for the occurrence of leakage rates in surface impoundments above the WLR but below the ALR are intended to prevent or minimize the potential for migration of hazardous constituents out of the affected unit. It is believed that the planned actions are appropriate and will allow USEI to achieve this goal by:

- Relieving the pressure on the bottom liner by increased pumping of liquid.

- As determined necessary, reducing or eliminating the source of water through reduction or cessation of waste placement and removal of part or all of the impounded waste.

- Conducting an investigation of the liner system to determine defects and potential sources of the liquid.

- Initiating repair activities to the liner system as determined necessary by the investigation.

The planned response actions for the occurrence of leakage rates in surface impoundments in excess of the ALR are designed to mitigate a condition which may result in potential migration of hazardous wastes out of the affected unit. This goal is accomplished by:

- Relieving the pressure on the bottom liner by increased pumping of leachate.

- Eliminating the source of water by ceasing placement of waste and through removal of all or part of the impounded waste.

- Conducting an investigation of the liner system to determine defects and potential sources of the leachate.

- Initiating repair activities to the liner system as determined necessary by the investigation.

Table M-1 – Summary of ALR's(1) and WLR's(2)

Disposal Unit	Area (acres)	ALR (gpd)	WLR (gpd)
Evaporation Pond (1984)	2.31	2310	1732
Evaporation Pond (Reconstructed)	2.23	3,790	2,842
Collection Pond 1	0.38	380	285
Collection Pond 2(closed October 2011)	N/A	N/A	N/A
Collection Pond 3	0.54	540	405
Landfill Cell 5 – Phase 1 (Zones 1 and 2)	1.82	182	136
Landfill Cell 5 – Phase 2 (Section 2)	1.92	192	144
Landfill Cell 5 (Section 3)	1.62	162	121
Landfill Cell14 (Subcell 1)	4.47	447	335
Landfill Cell 14 (Subcell 2)	2.32	232	174
Landfill Cell 14 (Subcell 3)	2.75	275	206
Landfill Cell 14 (Subcell 4)	3.00	300	225
Landfill Cell 14 (Subcell 5)	3.00	300	225
Landfill Cell 14 (Subcell 6)	5.17	517	388
Landfill Cell 15 Phase I	12.5	1,210	907
Landfill Cell 15Phase II	8.5	850	637
Landfill Cell 15 Phase III/IV	17.3	1,730	1,297
Landfill Cell 16 (Subcell 16-1a)	9.0	1,440	1,080
Landfill Cell 16 (Subcell 16-2a)	9.0	1,440	1,080
Landfill Cell 16 (Subcell 16-1b) (3)	28.0	14,532	10,899
Landfill Cell 16 (Subcell 16-2b)(3)	28.0	14,532	10,899

(1) Based on a 7 day average
(2) Measured on any given day
(3) Should be adjusted to reflec the as-built footprint.
Note: ALR's based on EPA Guidance of 100 gpad for landfills and 1000 gpad for surface impoundments, except for Cell 16 and the Reconstructed Evaporation Pond, which have calculated ALR's.
Note: WLR = 75% of ALR as measured on any given day.

M.4 Unit Descriptions

The facility has three surface impoundments (the Evaporation Pond and Collection Pond Nos. 1 and 3) and four landfill units (Cells 5, 14, 15, and 16) for which a RAP is required by IDEQ regulations. Cell 5, which consists of three subcells, is located along the western edge of the site and received closure certification on February 6, 2006. Cell 14, which consists of six subcells, is located along the southern edge of the site. Cell 15, consists of three sub-cells (constructed in four phases), and Cell 16 consists of four sub-cells (constructed in multiple phases). The Evaporation Pond is located near the center of the eastern edge of the site. Collection Pond Nos. 1 and 3 are located in the northwest corner and north-central portions of the site, respectively. A tabular compilation of leachate collection and removal system (LCRS) and LDCRS data are shown in Table M-2 and M-3 respectively.

Each of the cells are double-lined landfill disposal units. Landfill Cells 14 and 15 are permitted for the disposal of both RCRA and Toxic Substances Control Act (TSCA) waste materials. Surface runoff from active portions of the site is collected in Collection Pond Nos. 1 and 3. The collected run-off is then transferred to the Evaporation Pond, as required, to maintain required storage capacity in the Collection Ponds. Leachate from the landfills is collected and transferred to the on-site leachate treatment system. Treated leachate is then transferred to the Evaporation Pond for evaporation. In addition to receiving potentially contaminated runoff and treated leachate, the Evaporation Pond is used to store/treat (evaporate) certain off-site aqueous wastes.

M.4.a Landfills

This section provides a brief overview of the landfill disposal units. Liner details, LCRS and LDCRS system components and operation and general disposal unit information are discussed.

The pumps currently in use in any LCRS and LDCRS system on site may be replaced with pumps capable of higher pumping rates if necessary. As leachate volumes decrease, pumps may also be replaced with pumps that have lower pumping rates if needed. All pumps will be of sufficient size to collect and remove liquids from the sump and prevent liquids from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v).

M.4.a.(1) Landfill Cell 5

Construction information for the LCRS and LDCRS systems of Landfill Cell 5 is summarized in Table M-4. This disposal unit was constructed in two phases. The southern section, Section 1, was constructed in Phase 1 in 1984. Sections 2 and 3 were built in Phase 2 in 1986. Closure Certification for Cell 5 was received on February 6, 2006. The LCRS and LDCRS systems of Sections 1, 2, and 3 are connected, continuous units. Additionally, Section 1 has a second LDCRS system (referred to as zone 2). Each of the three sections is partially separated by intersectional berms. These berms isolate water collecting in the LCRS and LDCRS systems of each section, although very large volumes of water collecting in these systems could feasibly overtop the intersectional berm and flow into an adjacent section.

Sections 2 and 3 of Cell 5 were designed and constructed in accordance with *Minimum Technology Guidance on Double-Liner systems for Landfills and Surface Impoundments-Design, Construction, and Operation* (EPA, May 1985 draft). Additional information concerning the construction of Cell 5 can be obtained from the following documents. These documents have been previously submitted to Region 10 USEPA and are also available on site.

1. *Construction Quality Assurance Report PCB Trench 5-Phase 1*. Included in ESII's *PCB Operation Plan*, 17 November 1986 submittal.
2. *Phase 1-Installation of Replacement Primary Liner PCB Trench No. 5* (April 1986).

3. *Phase 2-Construction of FML/Composite Double-Liner System Cell No. 5*, ESII, Grand View, Idaho (November 1986).
4. Drawing numbers: PRMI-L11, PRMI-L12, PRMI-L13, PRMI-L14, PRMI-L-15, PRMI-L16, PRMI-L17, and PRMI-L18 as contained in Section D of the RCRA Part B Permit Renewal Application (Permit Renewal Application)

M.4.a.(1)(a) Cell 5 - Section 1

The LCRS sump invert is 1.0 foot below the bottom of the primary liner. The LCRS sump has a volume of 166 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 9.5 feet of leachate as measured at the sump before overtopping into Section 2.

The zone 1 LDCRS sump invert is 2.0 feet below the bottom of the old primary liner. The zone 1 LDCRS sump has a volume of 2,585 gallons. The zone 1 LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the zone 1 LDCRS floor drainage layer is 0.02 cm/sec. The flow width, or perimeter of the zone 1 LDCRS sump, is 80 feet. The minimum floor slope of the zone 1 LDCRS (outside the LDCRS sump) is one percent.

The zone 2 LDCRS sump invert is 1.0 foot below the bottom of the secondary liner. The zone 2 LDCRS sump has a volume of 2,334 gallons. The zone 2 LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the zone 2 LDCRS floor drainage layer is 0.02 cm/sec. The flow width, or perimeter of the zone 2 LDCRS sump, is 80 feet. The minimum floor slope of the zone 2 LDCRS (outside the LDCRS sump) is one percent.

M.4.a.(1)(b) Cell 5 - Section 2

The LCRS sump invert is 1.0 foot below the bottom of the primary liner. The LCRS sump has a volume of 166 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 3.4 feet of leachate as measured at the sump before overtopping into Section 3.

The LDCRS sump invert is 3.7 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 1,698 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is 0.02 cm/sec. The flow width, or perimeter of the LDCRS sump, is 87 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is one percent.

M.4.a.(1)(c) Cell 5 - Section 3

The LCRS sump invert is 1.0 foot below the bottom of the primary liner. The LCRS sump has a volume of 166 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 3.2 feet of leachate as measured at the sump before overtopping into Section 2.

The LDCRS sump invert is 4.1 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 1,882 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is 0.02 cm/sec. The flow width,

or perimeter of the LDCRS sump, is 87 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is one percent.

M.4.a.(2) Landfill Cell 14

Construction information for the LCRS and LDCRS systems of Landfill Cell 14 is summarized in Table M-5. Cell 14 is divided into six subcells. The LCRS and LDCRS systems of Subcells 1 through 6 are connected, continuous units. Each of the six subcells is partially separated by intersectional berms. These berms isolate water collecting in the LCRS and LDCRS systems of each section, although very large volumes of water collecting in these systems could feasibly overtop the intersectional berm and flow into an adjacent section.

The design for Landfill Cell 14 appears on drawing numbers PRMI-L21, PRMI-L22, PRMI-L23, PRMI-L24, PRMI-L25, PRMI-L26, PRMI-L27, PRMI-L28, and PRMI-L29 of Section D of the Permit Renewal Application. The liner system for Cell 14 meets the *Minimum Technology Guidance on Double-Liner systems for Landfills and Surface Impoundments-Design, Construction, and Operation* (EPA, May 1985 draft).

M.4.a.(2)(a) Cell 14 - Subcell 1

The LCRS sump invert is 1.7 feet below the bottom of the primary liner. The LCRS sump has a volume of 892 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 15.1 feet of leachate as measured at the sump before overtopping into Subcell 2.

The LDCRS sump invert is 4.5 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 4,616 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is 5.8 cm/sec. The flow width, or perimeter of the LDCRS sump, is 129 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.a.(2)(b) Cell 14 - Subcell 2

The LCRS sump invert is 1.8 feet below the bottom of the primary liner. The LCRS sump has a volume of 949 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 9.3 feet of leachate as measured at the sump before overtopping into Subcell 3.

The LDCRS sump invert is 3.8 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 3,487 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is 5.8 cm/sec. The flow width, or perimeter of the LDCRS sump, is 120 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.a.(2)(c) Cell 14 - Subcell 3

The LCRS sump invert is 2.0 feet below the bottom of the primary liner. The LCRS sump has a volume of 1,038 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The

LCRS can hold 9.5 feet of leachate as measured at the sump before overtopping into Subcell 2.

The LDCRS sump invert is 3.4 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 2,491 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is 5.8 cm/sec. The flow width, or perimeter of the LDCRS sump, is 112 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.a.(2)(d) Cell 14 - Subcell 4

The LCRS sump invert is 4.1 feet below the bottom of the primary liner. The LCRS sump has a volume of 3,259 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 10.9 feet of leachate as measured at the sump before overtopping into Subcell 3.

The LDCRS sump invert is 4.0 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 3,551 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is six cm/sec. The flow width, or perimeter of the LDCRS sump, is 116.7 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.a.(2)(e) Cell 14 - Subcell 5

The LCRS sump invert is 3.6 feet below the bottom of the primary liner. The LCRS sump has a volume of 2,557 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 11.1 feet of leachate as measured at the sump before overtopping into Subcell 4 and 6.

The LDCRS sump invert is 4.0 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 3,250 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is six cm/sec. The flow width, or perimeter of the LDCRS sump, is 114 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.a.(2)(f) Cell 14 - Subcell 6

The LCRS sump invert is 3.5 feet below the bottom of the primary liner. The LCRS sump has a volume of 2,629 gallons. The LCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). The LCRS can hold 9.4 feet of leachate as measured at the sump before overtopping into Subcell 5.

The LDCRS sump invert is 3.9 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 2,955 gallons. The LDCRS pump is sized such that liquids can be collected and removed from the sump and are prevented from backing up into the drainage layer, as required by 40 CFR 264.301(c)(3)(v). Hydraulic conductivity of the LDCRS floor drainage layer is six cm/sec. The flow width, or perimeter of the LDCRS sump, is 108 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.a.(3) Landfill Cell 15 - Subcells 1 through 3

Construction information for the LCRS and LDCRS systems of Landfill Cell 15 is summarized in Table M-6.Cell 15 consists of three subcells constructed in four phases. Each drainage area has a minimum of 2% bottom slope. Each drainage area is equipped with a collector pipe with a minimum slope of 1.75%. Sump configuration, volumes, and original pump outputs are included in the respective Cell 15 Final Construction Reports.

M.4.a.(4) Landfill Cell 16

Construction information for the LCRS and LDCRS systems of Landfill Cell 16 is summarized in Table M-7. Cell 16 consists of four subcells constructed in multiple phases. Phase I construction was completed in 2012. The design for subsequent phases of Cell 16 was modified to include additional leachate sumps and slight modifications to the floor geometry.

Specific landfill design details are located in Appendices D.5.1 and D.5.10.

M.4.b Surface Impoundments

M.4.b.(1) Evaporation Pond

The Evaporation Pond was originally constructed in 1984 and all information contained in this section refers to the original construction. A reconstruction plan has been adopted and is included for future development. The reconstruction plan and all associated performance criteria are located in Appendix D.4.11 in Attachment 17.

The Evaporation Pond was designed and constructed in accordance with the requirements of IDAPA 16.01.05.008 (40 CFR 264.221(a)) and is used for the storage and treatment of aqueous hazardous wastes. Construction information, including details of the liner and LDCRS systems, for the Evaporation Pond is included in Table M-8. Construction information for the reconstructed Evaporation Pond is included in Table M-9.

In 1993, a new primary liner was installed directly over the old primary liner. During installation of the new primary liner, the old primary liner was cut and left in place. Additional information regarding the construction of the Evaporation Pond can be found in the Construction Quality Assurance Report, which is maintained at the USEI facility. Details on the leachate collection vault are shown on drawing number PRMI-L41 as contained in Section D of the Permit Renewal Application.

This impoundment can hold 13.65 feet of liquid as measured at the northwest corner of the base before encroaching on the required impoundment freeboard. This impoundment can hold 16.45 feet of liquid as measured at the northwest corner of the base before overtopping.
The LDCRS sump invert is 3.0 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 1,034 gallons. The LDCRS pump can remove leachate at a rate of nine gallons per minute. Hydraulic conductivity of the LDCRS floor drainage layer is 0.02 cm/sec. The flow width, or perimeter of the LDCRS sump, is 42 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.b.(2) Collection Pond Nos. 1, 2, and 3

The Collection Ponds were constructed in accordance with the requirements of IDAPA 16.01.05.008 (40 CFR 264.221(a)) and are used for the storage of run-off and, in the event that the Evaporation Pond is out of service, for storage of leachate from landfill units. Construction information, including details of the liner

and LDCRS systems, for the Collection Ponds is included in Table M-8. Additional information can be found in the Construction Quality Assurance Report, which is maintained at the USEI facility. As-built details are shown on drawing number PRMI-L31 and PRMI-L32 as contained in Section D of the Permit Renewal Application. Pond 2 was clean closed in 2011.

M.4.b.(2)(a) Collection Pond No. 1

This impoundment can hold 11.7 feet of liquid as measured at the west side floor before encroaching on the required impoundment freeboard. This impoundment can hold 14.5 feet of liquid as measured at the west side floor before overtopping.

The LDCRS sump invert is 3.0 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 1,034 gallons. The LDCRS pump can remove leachate at a rate of 0.1 gallons per minute. Hydraulic conductivity of the LDCRS floor drainage layer is 0.02 cm/sec. The flow width, or perimeter of the LDCRS sump, is 42 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.4.b.(2)(b) Collection Pond No. 2

Collection Pond 2 was clean closed in 2011.

M.4.b.(2)(c) Collection Pond No. 3

This impoundment can hold 9.6 feet of liquid as measured at the south end floor before encroaching on the required impoundment freeboard. This impoundment can hold 12.4 feet of liquid as measured at the south end floor before overtopping.

The LDCRS sump invert is 3.0 feet below the bottom of the secondary liner. The LDCRS sump has a volume of 1,034 gallons. The LDCRS pump can remove leachate at a rate of 0.1 gallons per minute. Hydraulic conductivity of the LDCRS floor drainage layer is 0.02 cm/sec. The flow width, or perimeter of the LDCRS sump, is 42 feet. The minimum floor slope of the LDCRS (outside the LDCRS sump) is two percent.

M.5 Leachate Collection System

This section describes the potential sources and pathways of liquids entering the LDCRSs, factors influencing liquid quantities in the LDCRSs, and mechanisms preventing migration of liquids from both the landfill units and surface impoundments.

M.5.a Landfill Cells

M.5.a.(1) Sources of Landfill Cell LDCRS Liquid

Liquids collected in both the LCRS and the LDCRS systems in the landfill units are removed from the collection sumps during normal pumping operations and sent to the on-site RCRA storage tanks prior to treatment. Leachate is pumped to containers or tank trucks to accurately determine the volume of liquid removed and then transferred to the on-site storage tanks. As an alternative, the leachate may be pumped directly to the RCRA storage tanks through welded HDPE pipe as described in Section D of the Permit Renewal Application. Potential sources of liquid in the LCRS and the LDCRS are discussed below.

M.5.a.(1)(a) Potential Sources of Liquid in the LCRS of Landfill Cells

Rainwater Infiltration
Rainwater infiltration as a result of rainwater falling on the open landfill cells percolates through the waste materials and reaches the LCRS. Rainfall induced increases in removal rates from the LCRS sumps lag the rainfall event for landfill cells because of the time required for the rainwater to percolate through the waste material. However, based on the average annual rainfall in the vicinity of the site (average annual precipitation of approximately seven inches per year), the contribution from this source is expected to be minimal.

Residual Construction Water
An additional source of liquid within the LCRS is from water in the LCRS during liner system installation. The quantity of liquid resulting from this source is estimated to be negligible in magnitude (but for newly constructed Cells) because of the age of these units. While the construction water can provide minimal volumes for extended periods of time, volumes attributable to this source will dissipate within a few months of waste placement. However, residual construction water is expected to be a significant source of water removed from the LCRS when new cell construction is first completed.

Rainwater Inflow at Anchor Trenches
Rainwater falling in the vicinity of the landfill unit liner anchor trenches has the potential to build up in the soils and overflow onto the primary liner. However, based on the low porosity of the site soils, the potential for rainwater inflow to enter in this manner is extremely small.

Contributions from Moisture Content of the Waste
Water present in some of the wastes may release and drain to the LCRS as the waste materials are consolidated. This continued compression of the wastes causes pore liquids to be displaced. Volumes from this source may vary widely.

Post-Closure Leakage
Once landfill operations are complete and the final cap is placed over the cell, the amount of water entering the LCRS from rainfall precipitation will diminish significantly. Before any water can enter the waste material and percolate to and leak through the LCRS, water must first pass through the landfill cap. The cap for Cell 5 consists of the following components:

- A minimum of 12 inches of intermediate soil cover over the waste material;
- A geotextile gas venting layer over the plateau areas of the cap;
- A geocomposite clay liner;
- A 40-mil HDPE cap liner;
- A geocomposite drainage net; and
- 30 inches of vegetated soil cover.

Therefore, significant contributions to the LCRS from this source are not anticipated. For landfills that are closed and capped with an alternate cover, such as an evapotranspiration (ET) cap, similar non-significant performance is expected.

M.5.a.(1)(b) Potential Sources of Liquid in the LDCRS in Landfill Cells

Primary Liner Imperfections/Leaks
Liquid flowing over the primary liner (potential sources described above) could pass through the primary liner to the LDCRS through undetected manufacturing or construction defects or subsequent damage during landfilling operation. Damage and/or defects in the primary liner could include pin holes, tears, incomplete fusion at welded seams, or imperfections in the liner material.

As stated in the USEPA guidance documents (*Background Document on Proposed Liner and Leak*

Detection Rule, USEPA May 1987 and *Action Leakage Rates for Leak Detection Systems*, USEPA January 1992), the number and size of defects to be expected in a flexible membrane liner installation are related to the level of quality assurance utilized during installation. Using the guidelines contained in these USEPA documents, an average of 1 defect per 1,000 lineal feet of seam is expected for reasonably good installation, adequate quality assurance, and repair of noted defects. Section 2.2.3.3.5 of the May 1987 USEPA guidance document also states that the maximum size of defects remaining after intensive construction quality assurance are equivalent to hole diameters of one to three millimeters (mm) for seam defects and up to five mm for appurtenance connections. A single 5 mm defect in the primary liner with 1 foot of leachate head will leak over 600 gallons per day into the LDCRS.

Leakage from Damage During Filling or Catastrophic Failure
Leaks may be caused by operational accidents or unforeseen catastrophic incidents (e.g., wind destruction, fire, vandalism) that would cause a loss of integrity in the primary liner system. These leaks may vary in size from pinholes less than 0.5 mm in diameter to readily observable breaches.

Residual Construction Water
An additional source of liquid within the LDCRS is from water that collected in the LDCRS during liner system installation. The quantity of liquid resulting from this source is estimated to be negligible in magnitude because of the age of these units. While the construction water can provide minimal volumes for extended periods of time, volumes attributable to this source will dissipate within a few months of waste placement. However, residual construction water is expected to be a significant source of water removed from the LDCRS when new cell construction is first completed.

Rainwater Inflow at Anchor Trenches
Rainwater falling in the vicinity of the landfill unit liner anchor trenches has the potential to build up in the soils and flow between the primary liner and secondary liner into the LDCRS. However, based on the low porosity of the site soils, the potential for rainwater inflow to enter from this source is extremely small.

Groundwater Infiltration
Since the uppermost aquifer is located more than 100 feet below the lowest point of the deepest landfill cell, groundwater entering the LDCRS is not possible.

M.5.a.(2) Potential Pathways of Liquid Entering the LDCRSs for Landfill Cells

Potential pathways for leakage into the landfill LDCRSs primarily include leakage through the primary liner. These potential pathways include:

- Pin-holes, tears, incomplete welds, seam defects or imperfections in the primary liner.
- Gaps in extrusion welds at cap strips and patches.
- Holes, tears or breaches in the primary liner resulting from operational accidents or catastrophic incidents.
- Gaps in extrusion welds at appurtenance connections.

Because of the presence of the LDCRS riser pipe that extends through the primary liner sump for Landfill Cell 5, Section 1, potential pathways for leakage also include:

- Gaps, pin-holes, tears, incomplete welds, seam defects or imperfections in sump riser pipe boots; and
- Inflow through the sump riser pipe.

M.5.a.(3) Factors Influencing Liquid Quantities in the Landfill Cell LDCRSs

Liquids collected in both the LCRS and the LDCRS systems in the landfill units are removed from the collection sumps during normal pumping operations and sent to the facility's RCRA tanks and leachate treatment system. The primary factors influencing the volume of liquid in the LDCRSs include:

- The volume of liquid in the LCRS.
- The head of liquid over a defect in the primary liner.
- The amount of rainfall precipitation.

Factors affecting quantities of liquid in the LCRS include the amount of rainfall and the moisture content of waste materials. If contributions from these sources increase, the head of liquid on the primary liner will increase. The head of liquid over a defect will increase the flow though the defect by the square of the head difference. Thus, doubling the depth of liquid over any given defect will increase the flow rate through the defect by 40 percent. Additionally, because the liner systems are constructed on a slight grade (1 to 4 percent slopes on the bottom of Landfill Cell 5 and greater than or equal to 2 percent slopes on the bottom of Landfill Cells 14, 15 and 16), an increase in liquid depth also means an increase in wetted primary liner surface area. This increase in wetted surface area means an increased probability that a defect is under a larger head and could potentially increase the quantity of liquid entering the LDCRS through the defect.

Rainwater infiltration into the LDCRS is minimal and does not generally significantly affect the liquid quantities present in the LDCRS. However, if removal rates from the LDCRS increase during or immediately following a rainfall event, it may indicate that defects are present in the side slopes of the primary liner or that inflow is occurring into either the LCRS or LDCRS at the anchor trench. If a flow rate increase lags the rainfall event in the landfill cell by a few days, this situation may indicate that defects are present in the base (floor) of the primary liner.

M.5.a.(4) Mechanisms Preventing Migration of Liquids from Landfill Cells

This site has a stormwater management system to control run-on from the surrounding clean areas from entering the waste handling portions of the site. This system includes a series of diversion dikes and channels around Cells 5 and 14.

The design of the landfill cells include several protective mechanisms to prevent the migration of hazardous constituents outside of these disposal units. These mechanisms include both primary and secondary HDPE liner and drainage systems, the 36-inch layer of low permeability soil below the secondary liners (except section 1 of Landfill Cell 5), the 130 feet or more of dry, native soils and clays present between the bottom of the landfill cells and the uppermost aquifer at the site, the routine monitoring and removal of liquids from both the LCRS and the LDCRS, the removal of ponded water from the surface of the landfills, and the regular inspection and maintenance of system components. USEI's current operating procedures minimize the volume of liquid on the LCRS.

M.5.b Surface Impoundments

M.5.b.(1) Sources of Surface Impoundment LDCRS Liquid

Liquids collected in the LDCRS systems in the surface impoundments are removed from the collection sumps as part of routine pumping operations. The liquid is pumped to containers or tank trucks to determine the volume of leachate removed and then returned either to the surface impoundment or transferred to another surface impoundment, storage tank, or treatment unit. Sources of liquid in the surface impoundments and potential sources of liquid in the LDCRS are discussed below.

M.5.b.(1)(a) Sources of Liquid in the Surface Impoundments

Surface Water
The primary purpose of three of the surface impoundments (Collection Pond Nos. 1, 2 and 3) is the collection and containment of surface run-off from active portions of the site. Surface water run-off flows to the Collection Ponds by gravity. Surface water run-off is routinely transferred to the Evaporation Pond, as necessary, by a pump and pipe system, tank trucks, or vacuum trucks.

Treated Leachate and Aqueous Wastes
The Evaporation Pond is primarily used to evaporate treated landfill leachates and on-site and off-site generated liquids. (Pan evaporation at the site is in excess of 50 inches per year.) When the Evaporation Pond is unable to store liquid, the Collection Ponds can also store treated leachate normally pumped to the Evaporation Pond.

Rainwater
Rainwater collects in the three surface impoundments during precipitation events. The average annual rainfall in the vicinity of the site is approximately seven inches.

Rainwater Inflow at Anchor Trenches
Rainwater falling in the vicinity of the surface impoundment liner anchor trenches has the potential to build up in the soils and flow onto the primary liner. Because the three Collection Ponds receive their influent water from stormwater run-off flowing over land and into the impoundments, anchor trench pathways could be a source of liquid in the LDCRS. Because the Evaporation Pond has elevated dike wells, the potential for rainwater inflow to enter from this source is small.

M.5.b.(1)(b) Potential Sources of Liquid in the LDCRS of Surface Impoundments

Primary Liner Imperfections/Leaks
Liquid in the impoundment (sources described above) will pass through the primary liner to the LDCRS through undetected manufacturing or construction defects. Any damage during operation to the primary liner that results in a hole or tear would also allow liquid to pass through the primary liner to the LDCRS. Damage and/or defects in the primary liner could include pin holes, tears, incomplete fusion at welded seams, or imperfections in the liner material.

As stated in the USEPA guidance documents (*Background Document on Proposed Liner and Leak Detection Rule*, USEPA May 1987 and *Action Leakage Rates for Leak Detection Systems*, USEPA January 1992), the number and size of defects to be expected in a flexible membrane liner installation are related to the level of quality assurance utilized during installation. Using the guidelines contained in these USEPA documents, an average of 1 defect per 1,000 lineal feet of seam is expected for reasonably good installation, adequate quality assurance, and repair of noted defects. Section 2.2.3.3.5 of the May 1987 USEPA guidance document also states that the maximum size of defects remaining after intensive construction quality assurance are equivalent to hole diameters of one to three millimeters (mm) for seam defects and up to five mm for appurtenance connections. A single 5 mm defect in the primary liner with 4 feet of liquid over it will result in over 1,300 gallons per day leakage into the LDCRS.

Leakage from Damage Because of Static Loadings or Catastrophic Failures
Leaks may be caused by operational accidents or unforeseen catastrophic incidents that would cause a loss of integrity in the primary liner system. These leaks may vary in size from pinholes less than 0.5 mm in diameter to readily observable breaches. Primary liner leaks from static loadings are not expected based on manufacturers data, laboratory testing, and estimated static loadings for the surface impoundments. Bottom heave and slope stability are also not anticipated to pose problems or produce undue stresses on the liner.

Residual Construction Water
An additional source of liquid within the LDCRS is from water that collected in the LDCRS during liner

system installation. The quantity of liquid resulting from this source is estimated to be negligible in magnitude because of the age of these units. While the construction water can provide minimal volumes for extended periods of time, volumes attributable to this source will dissipate within a few months of operation. However, residual construction water is expected to be a significant source of water removed from the LDCRS when new impoundment construction is first completed.

Rainwater Inflow at Anchor Trenches
Rainwater falling in the vicinity of the surface impoundment liner anchor trenches has the potential to build up in the soils and flow between the primary liner and secondary liner into the LDCRS. However, based on the low porosity of the site soils, the potential for rainwater inflow to enter from this source is small.

Groundwater Infiltration
Since the uppermost aquifer is located approximately 120 to 170 feet below the lowest point of the surface impoundments, groundwater entering the LDCRS is not possible.

M.5.b.(2) Potential Pathways of Liquid Entering the LDCRSs for Surface Impoundments

Potential pathways for leakage into the LDCRS primarily include passage through the primary liner. Potential pathways include:

- Pin-holes, tears, incomplete welds, seam defects or imperfections in the primary liner.
- Gaps in extrusion welds at cap strips and patches.
- Holes, tears or breaches in the primary liner resulting from operational accidents or catastrophic incidents.

M.5.b.(3) Factors Influencing Liquid Quantities in the Surface Impoundment LDCRSs

Liquids collected in the LDCRS systems of the surface impoundments are removed from the collection sumps during normal pumping operations and either returned to the surface impoundment or transferred to another surface impoundment, storage tank or treatment unit. The primary factor influencing the volume of liquid in the LDCRSs is the volume of liquid in the surface impoundment.

Factors affecting quantities of liquid in the surface impoundment include the amount of surface water run-off (directly related to the amount of precipitation) collected and the amount of on-site and/or off-site aqueous wastes that are generated and pumped to the surface impoundment. As the liquid level increases in the Evaporation Pond or Collection Ponds, the head of liquid on the primary liner increases. The head of liquid over a defect increases the flow though a defect by the square of the head difference. Thus, doubling the depth of liquid increases the flow rate through a defect by 40 percent.

M.5.b.(4) Mechanisms Preventing Migration of Liquids from Surface Impoundments

The design of the surface impoundments includes several protective mechanisms to prevent the migration of hazardous constituents from these units. These mechanisms include both primary and secondary HDPE liner and drainage systems, the presence of approximately 120 to 170 feet of dry native soils and clays between the bottom of the surface impoundments and the uppermost aquifer at the site, the routine monitoring and removal of liquids from the LDCRS, and the regular inspection and maintenance of system

components. USEI's current operating procedures minimize the volume of liquid in the LDCRS at any given time.

M.6 Monitoring Wells

M.6.a Landfill Cells

M.6.a.(1) LCRS and LDCRS Sump Monitoring and Pumping Program

To minimize the potential for leakage from the LCRS and LDCRS systems, liquid collected in the sumps of the LCRS and LDCRS is removed before it exerts excessive head on either of the liner systems. To accomplish this, liquid collected in the sumps is routinely monitored and removed to limit the area and depth of standing water on the primary and secondary liners.

The leachate levels in each LCRS sump in Landfill Cells 5, 14, 15, and 16 are inspected per the monitoring and inspection requirements for landfills as discussed in Section F of the Permit Renewal Application. If pumpable liquid is found in an LCRS sump, then the leachate is pumped until below the suction of the pump and until the leachate level is below the maximum allowable level. Leachate levels in the LCRSs are determined through the monitoring and inspection procedures detailed in Section F of the Permit Renewal Application.

Leachate pumped from the LCRS collection sumps is conveyed to the facility's RCRA storage tanks or treatment units either in tank trucks or pumped directly through the tank systems piping network. The leachate level before pumping, the leachate level after pumping, the volume pumped and the leachate destination are recorded as stated in Sections D and F of the Permit Renewal Application.

The LDCRS sumps of Cells 5, 14, 15 and 16 are inspected for the presence of liquid as part of the landfill inspections described in Section F of the Permit Renewal Application. For closed units, the LDCRS sumps will be inspected per Section I of the Permit Renewal Application.

If pumpable liquid is found in a zone, it is pumped dry to the extent practical. The leachate is pumped to containers or tank trucks to accurately determine the volume of liquid removed. The collected liquid is then transferred to the storage tanks or treatment units.

A chronological record of pumping events, liquid levels before and after pumping, volume of liquid removed and liquid destination is maintained on site. Because the flow rate to the LDCRS fluctuates, the volume of liquid removed from active landfill disposal units is determined weekly as a rolling four week average daily flow rate. Similarly, the pumping data of closed units will be determined quarterly as a rolling four month average daily flow rate because these units are pumped much less frequently. The average flow rates are compared to the ranges of leakage established in the RAP.

Section F of the Permit Renewal Application identifies the forms used to document the volume removed from the leak detection systems.

M.6.a.(2) Inspections

The active landfill area is monitored by USEI personnel during working hours when the landfills are in operation, USEI conducts inspections as described in Sections D and F of the Permit Renewal Application. Post-closure inspection/monitoring of the leak detection systems is described in Section I of the Permit Renewal Application. Landfill inspections are conducted pursuant to IDAPA 16.01.05.008 (40 CFR 264.303(b)). Landfill runon/runoff control systems are inspected for evidence of deterioration,

malfunction, or improper operation. Particular attention is given to the integrity of soil containment dikes. Wind dispersal and dust control measures are inspected for adequacy and effectiveness. Primary leachate collection/observation wells and secondary leak detection sumps are inspected routinely for the presence of liquids in accordance with IDAPA 16.01.05.008 (40 CFR 264.303(b)(3)). Post-closure landfill inspections will include inspection of the landfill covers for erosion damage, settlement, subsidence, or displacement; the condition of the vegetative cover; integrity of runon/runoff control measures; functioning of cover drainage systems; and the condition of any installed gas venting system and characterization of any off-gas as required. Post-closure inspections, monitoring, and maintenance of the LCRS and LDCRS systems will also be performed.

M.6.a.(3) Run-on/Run-off Controls

The storm water management plan for site operations is intended to prevent run-on of storm water from clean areas to waste handling portions of the facility. This is accomplished by constructing run-on diversion dikes around active areas of the facility. These structures surround each disposal unit to preclude surface water runon from entering the active landfill areas. As part of closure activities, the surface drainage system on and around the disposal units will be modified to direct surface run-off away from the closed units. A detailed Surface Drainage and Drainage Development Plan for USEI is provided in Appendix D.4.7 of Section D of the Permit Renewal Application.

During the landfill inspections and following storm events, the landfill run-on/run-off control systems are inspected for evidence of deterioration, malfunction or improper operation. Particular attention is given to the integrity of soil containment dikes, where present, and any blockage of the drainage channels, swales, culverts and other drainage structures.

M.6.a.(4) Maintenance

Because of the nature of the LDCRSs (i.e., in-place, underground field systems), routine maintenance procedures are not necessary for most of the components. However, the LDCRS leachate pumps are maintained and/or repaired as necessary.

If damage to the liner system is observed as a result of routine inspections or operations, repairs will be performed as soon as possible as described in Section D of the Permit Renewal Application.

M.6.a.(5) Leachate Sampling and Analysis

The leachate collected and removed from the LDCRSs may be sampled as necessary to determine the quality of leachate and potential source(s) of liquid. The actual concentrations of hazardous constituents in the leachate is largely dependent on the source of the liquid and/or its pathway to the LDCRS. The need for and frequency of sampling is dependent on the conditions present and the response actions being implemented.

The conditions under which leachate sampling will be performed are described in the RAP. Leachate is sampled and analyzed for tracer constituents because of the potential for these constituents to be present in the leachate based on the types of wastes disposed of in the landfill cells. Accordingly, results of such analyses are used to evaluate the potential source and location of any leaks. Additional parameters may be included on a case-by-case basis as dictated by the circumstances of the sampling.

M.6.b Surface Impoundments

M.6.b.(1) LDCRS Sump Monitoring and Pumping Program

To minimize the potential for leakage from the LDCRS systems in the surface impoundments, accumulated liquid collecting in the sumps of the LDCRS is removed before it reaches a depth which may exert excessive head on the secondary liner. To accomplish this, the LDCRS sumps are routinely monitored and if liquid is detected, the sump is pumped dry to the extent practical.

The collection sumps of the Collection Ponds and the Evaporation Pond are inspected for the presence of liquid as described in Section F of the Permit Renewal Application. The liquid levels in the LDCRS sumps are measured as part of the surface impoundment inspections.

If liquid is found in an LDCRS, the liquid is pumped until below the suction of the pump and until the liquid level is below the maximum allowable level. A backup pump is maintained at the facility. The liquid is pumped into a container or tank truck prior to placement in the surface impoundments, storage tanks or treatment units.

A chronological record of pumping events, liquid levels before and after pumping, volume of liquid removed, and liquid destination is maintained at the facility. The volume of leakage removed from the LDCRSs of the surface impoundments is determined and reviewed weekly as a rolling four week average daily flow rate. The average daily flow rates are compared to the ranges of leakage established in the RAP.

Section F of the Permit Renewal Application identifies the forms used to document the volume of liquid removed from the leak detection systems.

M.6.b.(2) Inspections

The surface impoundments are inspected as described in Sections D and F of the Permit Renewal Application. Surface impoundments are inspected for freeboard, structural integrity, evidence of leakage, erosion and liner integrity.

M.6.b.(3) Maintenance

Because of the nature of the leak detection systems (i.e., in-place, underground field systems), routine maintenance procedures are not necessary for most of the components. However, the LDCRS pumps are maintained and/or repaired as necessary.

If damage to the liner system is observed as a result of routine inspections or operations, repairs will be performed as soon as possible as described in Section D of the Permit Renewal Application.

M.6.b.(4) Leakage Sampling and Analysis

The leakage collected and removed from each LDCRS may be sampled, as necessary, to determine the quality of leakage and compatibility with the liner systems. The only potential source of liquid in each LDCRS is from leakage through or a breach in the primary liner. The need for and frequency of sampling is dependent on the conditions present and the response actions being implemented.

Leakage sampling will be performed under the conditions described in the RAP. Leakage is sampled and analyzed for tracer constituents because of the potential for these constituents to be present in the

leakage based on the types of wastes disposed of in the impoundments. The results of such analyses are used to evaluate the potential for incompatibility with the liner systems. Additional parameters may be included on a case-by-case basis as dictated by the circumstances of the sampling.

TABLE M-2
US ECOLOGY IDAHO, INC.
LCRS DATA

Unit	BOTTOM OF SUMP				TOP OF SUMP				AVE. 'D'	TOTAL VOL. (CF)	LCRS MATERIAL	SUMP NET VOL (1) (GAL)	SUMP MIN FLOOR SLOPE (%)	OVERFLOW ELEV.	OVERFLOW TO UNIT	MAX HEAD (FT) (2)	PUMPING RATE (gpm) (3)	REFERENCES
	LP ELEV.	AVE. 'W'	AVE. 'L'	AREA	MIN. ELEV.	AVE. 'W'	AVE. 'L'	AREA										
16-1a	2547.75	65.0	24.0	1,560	2,550.11	80.0	40.0	3,200	2.4	5,617	GRAVEL/GEONET	16,805	2%	2,555.00	16-2a	7.3	168	DESIGN DRAWINGS/SPECS
16-2a	2547.75	65.0	24.0	1,560	2,550.11	80.0	40.0	3,200	2.4	5,617	GRAVEL/GEONET	16,805	2%	2,555.00	16-1a	7.3	168	DESIGN DRAWINGS/SPECS
16-1b	2552.98	27.0	29.0	783	2,554.04	40.0	37.5	1,500	2.1	2,397	GRAVEL/GEONET	7,172	1%	2,562.58	16-1a	9.6	168	DESIGN DRAWINGS/SPECS
16-2b	2553.63	27.0	29.0	783	2,554.62	41.1	39.1	1,607	2.1	2,510	GRAVEL/GEONET	7,508	1%	2,562.58	16-2a	8.9	168	DESIGN DRAWINGS/SPECS
15-1	2563.90	46.0	15.0	690	2,568.07	66.3	43.0	2,851	4.2	7,383	GRAVEL/GEONET	19,328	2%	2,570.96	15-2	7.1	70	DESIGN DRAWINGS/SPECS
15-2	2552.35	48.0	15.0	720	2,555.57	67.0	43.0	2,881	3.2	5,798	GRAVEL/GEONET	15,178	2%	2,559.23	15-3	6.9	70	DESIGN DRAWINGS/SPECS
15-3	2541.40	20.0	20.0	400	2,543.80	66.5	35.0	2,328	2.4	3,273	GRAVEL/GEONET	8,569	2%	2,559.23	15-2	17.8	75	DESIGN DRAWINGS/SPECS
15-4 (4)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	FLOWS INTO 15-3 SUMP
14-1	2535.41	13.0	13.0	169	2,537.13	13.0	13.0	169	1.7	291	SAND/GEONET	892	2%	2,550.50	14-2	15.1	9	PHASE 1 CQA & AS-BUILTS
14-2	2540.29	13.0	13.0	169	2,542.12	13.0	13.0	169	1.8	309	SAND/GEONET	949	2%	2,549.60	14-3	9.3	9	PHASE 1 CQA & AS-BUILTS
14-3	2540.13	13.0	13.0	169	2,542.13	13.0	13.0	169	2.0	338	SAND/GEONET	1,038	2%	2,549.60	14-2	9.5	9	PHASE 1 CQA & AS-BUILTS
14-4	2540.1	13.4	12.8	172	2,544.10	36.2	39.0	1,408	4.1	3,259	GRAVEL/GEONET	10,456	2%	2,551.00	14-3	10.9	64	PHASE 2 CQA & AS-BUILTS
14-5	2542.9	14.2	17.3	245	2,546.40	34.1	34.8	1,186	3.6	2,557	GRAVEL/GEONET	8,357	2%	2,554.00	14-4, 14-6	11.1	64	PHASE 2 CQA & AS-BUILTS
14-6	2544.6	13.4	14.3	191	2,548.00	35.6	36.5	1,301	3.5	2,629	GRAVEL/GEONET	8,571	2%	2,554.00	14-5	9.4	64	PHASE 2 CQA & AS-BUILTS
5-1	2522.7	6.0	8.5	51	2,523.70	6.0	8.5	51	1.0	51	SAND	166	1%	2,532.15	5-2	9.5	9	PHASE 1 REPLACEMENT CQA
5-2	2528	6.0	8.5	51	2,529.00	6.0	8.5	51	1.0	51	SAND	166	1%	2,531.40	5-3	3.4	9	PHASE 2 CQA & AS-BUILTS
5-3	2582.2	6.0	8.5	51	2,529.20	6.0	8.5	51	1.0	51	SAND	166	1%	2,531.40	5-2	3.2	9	PHASE 2 CQA & AS-BUILTS

NOTES:

(1) VOLUME BASED ON A POROSITY OF 40% FOR GRAVEL AND 30% FOR SAND. ADJUSTMENTS ALSO MADE FOR 100% VOID VOLUME (EG., WITHIN HDPE PIPE SUMPS, CONCRETE MANHOLES, ETC.)

(2) MAXIMUM HEAD BASED ON OVERFLOW ELEVATION MINUS SUMP BOTTOM.

(3) BASED ON DISCUSSIONS WITH MIKE SPOMER AND RANDY ROEBER ON 6/23/98. (CELLS 15 AND 16 NOT INCLUDED)

(4) NO ADDITONAL SUMP COMPONENTS WERE CONSTRUCTED IN CONNECTION WITH SUBCELL 15-4, SINCE THE AREA FLOWS INTO THE 15-3 SUMP.

TABLE M-3
US ECOLOGY IDAHO, INC.
LDCRS DATA

Unit	LDCRS SUMP BOTTOM (TOP OF CONC.)				LDCRS TOP OF SUMP				AVE. 'D'	TOTAL VOL. (CF)	ADJUSTED VOL (CF)	LDCRS MATERIAL	VOL (Gal) (1)	MIN FLOOR SLOPE (%)	OVERFLOW ELEV.	OVERFLOW TO UNIT	MAX HEAD (FT)	PUMPING RATE (gpm)	REFERENCES
	LP ELEV.	AVE. 'W'	AVE. 'L'	AREA	MIN. ELEV.	AVE. 'W'	AVE. 'L'	AREA											
16-1a	2,545.76	0.0	10.5	0.0	2,547.76	20.0	22.3	446	2.0	446	178	GRAVEL/GEONET	1,334	20%	2,555.00	16-2a	9.2	35	DESIGN DRAWINGS/SPECS
16-2a	2,545.76	0.0	10.5	0.0	2,547.76	20.0	22.3	446	2.0	446	178	GRAVEL/GEONET	1,334	20%	2,555.00	16-1a	9.2	35	DESIGN DRAWINGS/SPECS
16-1b	2,550.98	0.0	12.4	0.0	2,552.98	9.0	21.0	189	2.2	208	83	GRAVEL/GEONET	622	20%	2,562.58	16-1a	11.6	10	DESIGN DRAWINGS/SPECS
16-2b	2,551.63	0.0	13.6	0.0	2,553.63	9.0	21.0	189	2.2	208	83	GRAVEL/GEONET	622	20%	2,562.58	16-2a	10.9	10	DESIGN DRAWINGS/SPECS
15-1	2,562.50	4.0	12.0	48.0	2,563.90	12.0	16.0	192	1.4	168	114	GRAVEL/GEONET	298	2%	2,570.96	15-2	8.5	7	DESIGN DRAWINGS/SPECS
15-2	2,554.70	4.0	12.0	48.0	2,556.00	12.0	16.0	192	1.3	156	102	GRAVEL/GEONET	267	2%	2,559.23	15-3	4.5	7	DESIGN DRAWINGS/SPECS
15-3	2,544.40	14.0	14.0	196.0	2,545.70	20.0	20.0	400	1.3	387	333	GRAVEL/GEONET	873	2%	2,559.23	15-2	14.8	7	DESIGN DRAWINGS/SPECS
15-4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	GRAVEL/GEONET	N/A	2%	N/A	N/A	N/A	7	FLOWS INTO 15-3 SUMP
14-1	2,528.98	12.0	22.0	264.0	2,533.95	39.5	45.0	1,778	4.5	4,616	1,859	GRAVEL	5,563	2%	2,549.00	14-2	20.0	9	CQA & AS-BUILTS
14-2	2,532.42	12.0	20.0	240.0	2,539.12	40.0	40.0	1,600	3.8	3,487	1,673	GRAVEL	5,007	2%	2,548.00	14-3	12.6	9	CQA & AS-BUILTS
14-3	2,535.60	13.5	17.0	229.5	2,538.32	32.0	39.0	1,248	3.4	2,491	1,303	GRAVEL	3,899	2%	2,548.00	14-2	12.4	9	CQA & AS-BUILTS
14-4	2,537.86	14.2	14.3	202.6	2,541.44	37.7	41.8	1,574	4.0	3,551	1,648	GRAVEL/GEONET	4,931	2%	2,550.00	14-3	12.1	9	CQA & AS-BUILTS
14-5	2,540.12	13.4	13.7	182.9	2,543.79	36.9	39.3	1,446	4.0	3,250	1,515	GRAVEL/GEONET	4,532	2%	2,553.00	14-4, 14-6	12.9	9	CQA & AS-BUILTS
14-6	2,541.70	14.4	15.2	218.9	2,545.26	36.8	35.6	1,310	3.9	2,955	1,369	GRAVEL/GEONET	4,096	2%	2,553.00	14-5	11.3	9	CQA & AS-BUILTS
5-1, ZONE 1	2,517.00	8.0	28.0	224.0	2,519.00	16.0	40.0	640	2.0	864	864	SAND	2,585	1%	2,531.15	5-2	14.2	0.1	PHASE 1 & REPLACEMENT CQA
5-1, ZONE 2	2,514.00	8.0	28.0	224.0	2,518.00	26.0	40.0	1,040	1.0	1,040	1,040	SAND	2,334	1%	2,526.30	CONFINED	12.3	0.1	PHASE 1 CQA & AS-BUILTS
5-2	2,525.40	11.0	13.0	143.0	2,529.10	25.0	31.0	775	3.7	1,543	1,543	SAND/GEONET	3,463	1%	2,530.20	5-3	4.8	0.1	PHASE 2 CQA & AS-BUILTS
5-3	2,525.40	11.0	13.0	143.0	2,529.50	25.0	31.0	775	4.1	1,727	1,727	SAND/GEONET	3,875	1%	2,530.20	5-2	4.8	0.1	PHASE 2 CQA & AS-BUILTS
POND 1	2,513.00	5.0	5.0	25.0	2,516.00	14.0	14.0	196	3.0	332	332	SAND	1,034	2%	2,533.00	ANCHOR TRENCH	20.0	VAC TRUCK	AS-BUILTS
POND 3	2,541.30	5.0	5.0	25.0	2,544.30	14.0	14.0	196	3.0	332	332	SAND	1,034	2%	2,560.00	ANCHOR TRENCH	18.7	VAC TRUCK	AS-BUILTS
EVAP POND (1984)	2,548.00	5.0	5.0	25.0	2,551.00	14.0	14.0	196	3.0	332	332	SAND	1,034	2%	2,569.57	ANCHOR TRENCH	21.6	VAC TRUCK	AS-BUILTS
EVAP POND (RECONS.)	2,553.01	0.0	19.0	0.0	2,555.00	23.9	25.0	598	2.0	598	239	GRAVEL/GEONET	1,788	17%	2,573.00	ANCHOR TRENCH	19.9	5	DESIGN DRAWINGS/SPECS

NOTES:

(1) VOLUME BASED ON A POROSITY OF 40% FOR GRAVEL AND 30% FOR SAND. ADJUSTMENTS ALSO MADE FOR 100% VOID VOLUME (EG., WITHIN HDPE PIPE SUMPS, CONCRETE MANHOLES, ETC.)

(2) MAXIMUM HEAD BASED ON OVERFLOW ELEVATION MINUS SUMP BOTTOM. (TOP OF CONCRETE, NOT BOTTOM OF SIDESLOPE RISER PIPE.)

TABLE M-4
US ECOLOGY IDAHO, INC.
LINER COMPONENT SYSTEM
LANDFILL CELL 5

		PHASE I (SECTION 1)		PHASE II (SECTIONS 2 AND 3)	
		FLOOR	SIDESLOPE	FLOOR	SIDESLOPE
	SURFACE AREA	5.56 ACRES			
	MAXIMUM CAPACITY	240,000 CUBIC YARDS			
	UNIT CONSTRUCTION	1984/1986	1984	1986	
LCRS	PROTECTIVE LAYER	6" ROAD MIX	NONE	6" OF SOIL	NONE
	SEPARATION LAYER	GEOTEXTILE FABRIC			
	PRIMARY LEACHATE COLLECTION ZONE	12" OF FREE-DRAINING GRANULAR MATERIAL(1)	SYNTHETIC DRAINAGE NET	12" OF FREE-DRAINING GRANULAR MATERIAL(1)	SYNTHETIC DRAINAGE NET
	PROTECTIVE LAYER	GEOTEXTILE FABRIC	NONE	GEOTEXTILE FABRIC	NONE
	PRIMARY SYNTHETIC LINER	60-MIL HDPE		80-MIL HDPE	
	BEDDING LAYER	3/4" SITE SOIL(3)	NONE		
LDCRS (ZONE 1)	PROTECTIVE LAYER	6" OF SOIL	NONE		
	SEPARATION LAYER	GEOTEXTILE FABRIC	NONE		
	SECONDARY LEACHATE COLLECTION ZONE	12" OF FREE-DRAINING GRANULAR MATERIAL(1)	SYNTHETIC DRAINAGE NET	12" OF FREE-DRAINING GRANULAR MATERIAL(1), SYNTHETIC DRAINAGE NET	SYNTHETIC DRAINAGE NET
	SECONDARY SYNTHETIC LINER	60-MIL HDPE	40-MIL HDPE	60-MIL HDPE	
	BEDDING LAYER	NONE	GEOTEXTILE FABRIC	36" CLAY/SOIL LINER(4)	
LDCRS (ZONE 2)	TERTIARY LEACHATE COLLECTION ZONE	12" OF FREE-DRAINING GRANULAR MATERIAL(1)	NONE		
	TERTIARY SYNTHETIC LINER	40-MIL HDPE	NONE		
	SUPPORT LAYER	FINE-GRADED AND COMPACTED NATIVE SUBSOIL			
	LINER FOUNDATION	NATIVE SUBSOIL			

(1) - WITH LEACHATE COLLECTION PIPE W/STONE ANNULUS AND GEOTEXTILE WRAP
(2) - COMPACTED TO 90% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY
(3) - COMPACTED TO DEVELOP A MAXIMUM PERMEABILITY OF $1X10^{-7}$ CM/SEC AT 92% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY

TABLE M-5
US ECOLOGY IDAHO, INC.
LINER COMPONENT SUMMARY
LANDFILL CELL 14

		FLOOR	SIDESLOPE
	SURFACE AREA	21.79 ACRES	
	MAXIMUM CAPACITY	2,101,739 CUBIC YARDS	
	UNIT CONSTRUCTION	PHASE 1 - 1988; PHASE 2 - 1993	
LCRS	PROTECTIVE LAYER	6" OF SOIL	NONE
	SEPARATION LAYER	GEOTEXTILE FABRIC	
	PRIMARY LEACHATE COLLETION ZONE	SYNTHETIC DRAINAGE NET, GEOTEXTILE FABRIC, 12" OF FREE-DRAINING GRANULAR MATERIAL(1)	SYNTHETIC DRAINAGE NET
	PRIMARY SYNTHETIC LINER	80-MIL HDPE	
LDCRS	PRIMARY LINER SUPPORT LAYER	12" - 18" OF LOW PERMEABILITY SOIL (2)	NONE
	SUPPORT/SEPARATION LAYER	GEOTEXTILE FABRIC	NONE
	SECONDARY LEACHATE COLLECTION ZONE	12" OF FREE-DRAINING GRANULAR MATERIAL(3), GEOTEXTILE FABRIC	SYNTHETIC DRAINAGE NET
	SECONDARY SYNTHETIC LINER	60-MIL HDPE	
	LOW PERMEABILITY SOIL LINER	36" SOIL LINER(4)	
	SUPPORT LAYER	FINE-GRADED AND COMPACTED NATIVE SUBSOIL	NONE
	LINER FOUNDATION	NATIVE SUBSOIL	

(1) - WITH LEACHATE COLLECTION PIPE W/STONE ANNULUS AND GEOTEXTILE WRAP DRAINING TO A LEACHATE REMOVAL SUMP
(2) - COMPACTED TO 90% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY
(3) - SLOPED TO DRAIN TO LEACHATE COLLECTION SUMPS
(4) - COMPACTED TO DEVELOP A MAXIMUM PERMEABILITY OF $1X10^{-7}$ CM/SEC AT 92% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY

TABLE M-6
US ECOLOGY IDAHO, INC.
LINER COMPONENT SUMMARY
LANDFILL CELL 15

		PHASES I, II, AND III		PHASE IV	
		FLOOR	**SIDESLOPE**	**FLOOR**	**SIDESLOPE**
	SURFACE AREA	41.78 ACRES			
	MAXIMUM CAPACITY	4,800,000 CUBIC YARDS			
	UNIT CONSTRUCTION	PHASE I - 2003; PHASE II - 2005; PHASE III - 2007		PHASE IV - 2009	
LCRS	PROTECTIVE LAYER	30" OF SELECT WASTE OR COMMON FILL		30" OF SELECT WASTE OR COMMON FILL	
	PRIMARY LEACHATE COLLETION	300-MIL GEOCOMPOSITE (1)		250-MIL GEOCOMPOSITE (1)	
	PRIMARY SYNTHETIC LINER	60-MIL HDPE		60-MIL HDPE	
LDCRS	SECONDARY LEACHATE COLLECTION	300-MIL GEOCOMPOSITE (1)		250-MIL GEOCOMPOSITE (1)	
	SECONDARY SYNTHETIC LINER	60-MIL HDPE		60-MIL HDPE	
	LOW PERMEABILITY SOIL LINER	36" COMPACTED CLAY LINER(2)		36" COMPACTED CLAY LINER(2)	
	LINER SUPPORT LAYER	MIN 12" OF COMPACTED SUBGRADE (3)		MIN 12" OF COMPACTED SUBGRADE (3)	
	LINER FOUNDATION	NATIVE SUBSOIL		NATIVE SUBSOIL	

(1) - SLOPED TO DRAIN TO LEACHATE COLLECTION SUMPS

(2) - COMPACTED TO DEVELOP A PERMEABILITY OF $1X10^{-7}$ CM/SEC OR LESS

(3) - COMPACTED TO 90% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY

TABLE M-7
US ECOLOGY IDAHO, INC.
LINER COMPONENT SUMMARY
LANDFILL CELL 16

SUBCELL 16-1 AND 16-2

		FLOOR	SIDESLOPE
	SURFACE AREA	73.92 ACRES	
	MAXIMUM WASTE CAPACITY (4)	10,018,000 CUBIC YARDS	
	UNIT CONSTRUCTION	PHASE 1 - 2012	
LCRS	PROTECTIVE LAYER	30" OF COMMON FILL	
	PRIMARY LEACHATE COLLECTION	GEOCOMPOSITE DRAIN (1)	
	PRIMARY SYNTHETIC LINER	60-MIL HDPE GEOMEMBRANE	
LDCRS	SECONDARY LEACHATE COLLECTION	GEOCOMPOSITE DRAIN (1)	
	SECONDARY SYNTHETIC LINER	60-MIL HDPE GEOMEMBRANE	
	LOW PERMEABILITY SOIL LINER	36" COMPACTED LINER(2)	
	SUPPORT LAYER	MIN 12" OF COMPACTED SUBGRADE (3)	
	LINER FOUNDATION	NATIVE SUBSOIL	

(1) - SLOPED TO DRAIN TO LEACHATE COLLECTION SUMPS
(2) - COMPACTED TO DEVELOP A PERMEABILITY OF $1X10^{-7}$ CM/SEC OR LESS
(3) - COMPACTED TO 90% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY
(4) - REDUCED FOR FROST PROTECTION MATERIALS

TABLE M-8
US ECOLOGY IDAHO, INC.
LINER COMPONENT SUMMARY
SURFACE IMPOUNDMENTS

		EVAPORATION POND	COLLECTION PONDS	
			NO. 1	NO. 3
	SURFACE AREA (ACRES)	2.31	0.38	0.54
	MAXIMUM CAPACITY (MILLION GALLONS)	4.474	0.575	0.775
	REQUIRED FREEBOARD (FT)	2.8	2.8	2.8
LCRS	SIDE SLOPE COVER	12" PRIMARY SOIL LINER (TO ELEVATION 2560 +- ONLY)	NONE	NONE
	BASE COVER	12" PRIMARY SOIL LINER OVER 4" - 6" OF GRANULAR MATERIAL	COBBLES OVER SAND, SEPARATED BY A GEOTEXTILE FABRIC	NONE
	PRIMARY SYNTHETIC LINER	80-MIL HDPE(1)	60-MIL HDPE	80-MIL HDPE(1)
LDCRS	SIDE SLOPES	SYNTHETIC DRAINAGE NET	SYNTHETIC DRAINAGE NET	
	BASE	12 - 18" OF FREE-DRAINING GRANULAR MATERIAL(2)	12" OF FREE-DRAINING GRANULAR MATERIAL (2)	
	SECONDARY SYNTHETIC LINER	40-MIL HDPE	40-MIL HDPE	
	BEDDING MATERIAL	NONE	GEOTEXTILE FABRIC	
	LINER SUBGRADE	NATIVE SUBSOIL	NATIVE SUBSOIL	

(1) - PRIMARY LINER INSTALLED DIRECTLY OVER CUT 60-MIL HDPE LINER

(2) - WITH PERFORATED COLLECTION PIPE SYSTEM DRAINING TO A LEACHATE REMOVAL SUMP

TABLE M-9
US ECOLOGY IDAHO, INC.
LINER COMPONENT SUMMARY
EVAPORATION POND (RECONSTRUCTED)

		EVAPORATION POND
	SURFACE AREA (ACRES)	2.23
	MAXIMUM CAPACITY (MILLION GALLONS)	5.5
	REQUIRED FREEBOARD (FT)	2.5 (1)
LCRS	SIDE SLOPE COVER	30" FROST PROTECTION
	BASE COVER	30" FROST PROTECTION
	PRIMARY SYNTHETIC LINER	60-MIL HDPE
LDCRS	SIDE SLOPES	SYNTHETIC DRAINAGE NET
	BASE	SYNTHETIC DRAINAGE NET
	SECONDARY SYNTHETIC LINER	60-MIL HDPE
	BEDDING MATERIAL	36-INCHES LOW PERMEABILITY CLAY
	LINER SUBGRADE	NATIVE SUBSOIL

Note:
1. Based upon 2.0 ft freebord, as required by permit, plus 0.5 ft reserve capacity for the 25-yr storm event.