NM1 - ___3_____

CLOSURE PLAN REQUEST AND APPROVAL

July 31, 2017

State of New Mexico
Energy, Minerals and Natural Resources Department

July 31, 2017

Arif Mussani
Sundance Services, Inc.
1006 6th Street
Eunice, New Mexico 88231

RE: Approval of Closure/Post-Closure Plan for Commercial Surface Waste Management Facility (Permit NM1-3). South ½ of Section 29, Township 21 South, Range 38 East NMPM, Lea County, New Mexico

Mr. Mussani,

The Oil Conservation Division (OCD) has completed its review of the closure/post-closure plan submitted on your behalf by Gordon Environmental, Inc. dated September 29, 2016 regarding your existing commercial waste management facility operating at the location described above east of Eunice, NM. OCD approves this plan and permit NM1-3 is hereby modified with the following conditions:

1. Closure of the facility must begin on or before December 31st, 2017.

2. Sundance Services, Inc. shall provide a critical path schedule for each phase of closure at least 30 days prior to the commencement of closure activities at the facility.

3. Closure of the facility must be completed and commencement of the post-closure care period must begin on or before December 31st, 2022.

4. Prior to the removal of existing sumps, Sundance Services, Inc. must identify the locations of each sump. Soil testing beneath each sump must be in accordance with provisions of 19.15.36 NMAC.

5. Sundance Services, Inc. must immediately begin abandonment of existing wells and the installation of the new vadose zone monitoring wells specified in the closure/post-closure plan. In addition to those wells specified in the plan, two additional vadose zone monitoring wells must be installed along the southern property boundary between VZ-2 and VZ-3 and between VZ-4 and VZ-5. These additional wells shall be subject to the same monitoring schedule and parameters as the other wells.

6. At the beginning of the post-closure period, Sundance Services, Inc. shall undertake quarterly rather than annual monitoring events upon the vadose zone wells as well as after significant precipitation events (i.e. 24 hour, 25-year storms). This frequency may be reduced if it can be demonstrated there is a lack of recoverable groundwater in the wells, or the water quality data does not indicate contamination.

7. The cost estimate provided within the September 29, 2016 closure/post-closure plan is $3,395,000.00. Based upon subsequent discussions between Sundance Services, Inc. and the OCD, replacement financial assurance in the amount of $3,695,000.00 in a form acceptable to the OCD under the current regulations is required immediately. The additional financial assurance is required to further assure closure operations proceed in a timely fashion.

If and when each of the following closure milestones is achieved, the amount of required financial assurance shall be released in the amount of $50,000.00 for each milestone reached on time:

a. Installation of required groundwater monitoring wells and their initial sampling on or before December 31, 2017.

b. Removal of all produced water tanks, associated berms, and sumps on or before December 31, 2018.

c. Removal of all jet-out pits on or before December 31, 2019.

d. Draining of all process liquids and decommissioning of facility Ponds 5 and 6 on or before December 31, 2020.

e. East landfill slopes must be at final grades on or before December 31, 2021.

f. Ponds 2, 3, and 9 must be stabilized, all materials removed, the pond area appropriately remediated, and all remaining landfill slopes must be at final grades on or before December 31, 2022.

The amount of financial assurance may be modified from time to time based upon conditions at the facility or other factors. If performance or progress with any of the milestones described above is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Sundance Services, Inc. and those for which they are responsible, then Sundance Services, Inc. shall be entitled to an equitable adjustment in the milestone dates provided. Sundance Services, Inc.'s entitlement to an adjustment of the milestone date(s) is conditioned on such adjustment being essential to their ability to complete the milestone(s) within the dates defined. Causes of delay, disruption, or interference that may give rise to an adjustment in milestone dates include but are not limited to severe and unavoidable natural catastrophes such as fire, floods, epidemics, and earthquakes; abnormal weather conditions; and acts of war or terrorism.

This approved closure plan supersedes any prior closure plans or closure requirements. All requirements, including all statutes, rules, and orders, not related to facility closure and post-closure under the permit or 19.15.36 NMAC remain in full effect. Affirmation of acceptance by Sundance Services, Inc. of this permit modification is required by authorized signature below. If you have any questions, please contact Jim Griswold, OCD Environmental Bureau Chief at (505) 476-3465 or by email at *jim.griswold@state.nm.us*. On behalf of the Oil Conservation Division, I wish to thank you and your staff for your cooperation during this process.

Respectfully,

David Catanach
Director

CERTIFICATION

Sundance Services, Inc. by the signature of the authorized representative below, hereby accepts this modification to Permit NM1-3 and agrees to comply with the terms of the closure/post-closure plan and the conditions in this letter.

Accepted by SUNDANCE SERVICES, INC.

Signature: T. Mason

Title: C.F.O. / SECRETARY / TREASURER Date: 8/1/17

CLOSURE/POST-CLOSURE PLAN

SUNDANCE SERVICES, INC.

SEPTEMBER 2016

Prepared For:

Sundance Services, Inc.
1001 6th Street
Eunice, NM 88231

Submitted To:

New Mexico Energy, Minerals, and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505
505.476.3440

Prepared By:

Gordon Environmental, Inc.
213 S. Camino del Pueblo
Bernalillo, NM 87004
505.867.6990

Gordon Environmental, Inc.
Consulting Engineers

505.867.6990
505.867.6991 Fax

GORDON ENVIRONMENTAL, INC.

213 S. Camino del Pueblo
Bernalillo, New Mexico 87004

20 Years

September 29, 2016

Mr. Jim Griswold, Bureau Chief
Environmental Bureau
Oil Conservation Division
New Mexico Energy, Minerals and
Natural Resources Department
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Sundance Services, Inc. Surface Waste Management Facility [530.05.01]
Closure/Post-Closure Plan

Dear Mr. Griswold:

On behalf of our client, Sundance Services, Inc (SSI), Gordon Environmental, Inc. (GEI) is pleased to submit the enclosed Closure/Post-closure Plan (the Plan) for the existing Sundance Services, Inc. Surface Waste Management Facility to the Oil Conservation Division (OCD). This Plan addresses the closure requirements of the New Mexico (NM) Oil and Gas Rules, specifically the Surface Waste Management Facility Permit (NM-01-003) and the applicable standards in 19.15.36 NMAC and was updated to reflect the comments received from Mr. Jim Jordon.

We look forward to working with you and the OCD regarding the final approval of the Sundance Services, Inc. Closure/Post-closure Plan. Please contact GEI at 505.867.6990 or cfiedler@gordonenvironmental.com with your comments and questions.

Very truly yours,
Gordon Environmental, Inc.

Charles W. Fiedler, P.E.
Sr. Project Director

cc: Mr. Arif Musani, Sundance Services, Inc.
Mr. Andrew L. Wambsganss, Brown-Pruitt

Attachments: Sundance Services, Inc., Closure/Post-closure Plan

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

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1.0 INTRODUCTION

Sundance Services, Inc. (SSI) Surface Waste Management Facility is an active Facility operating pursuant to its current Permit (NM-01-0003) issued by the Oil Conservation Division (OCD) as last modified on 02/18/2002. The Facility is privately operated by SSI and has been accepting liquid and solid oil field waste from oil and gas exploration and production operations in southeastern New Mexico (NM) and west Texas (TX) for over thirty years.

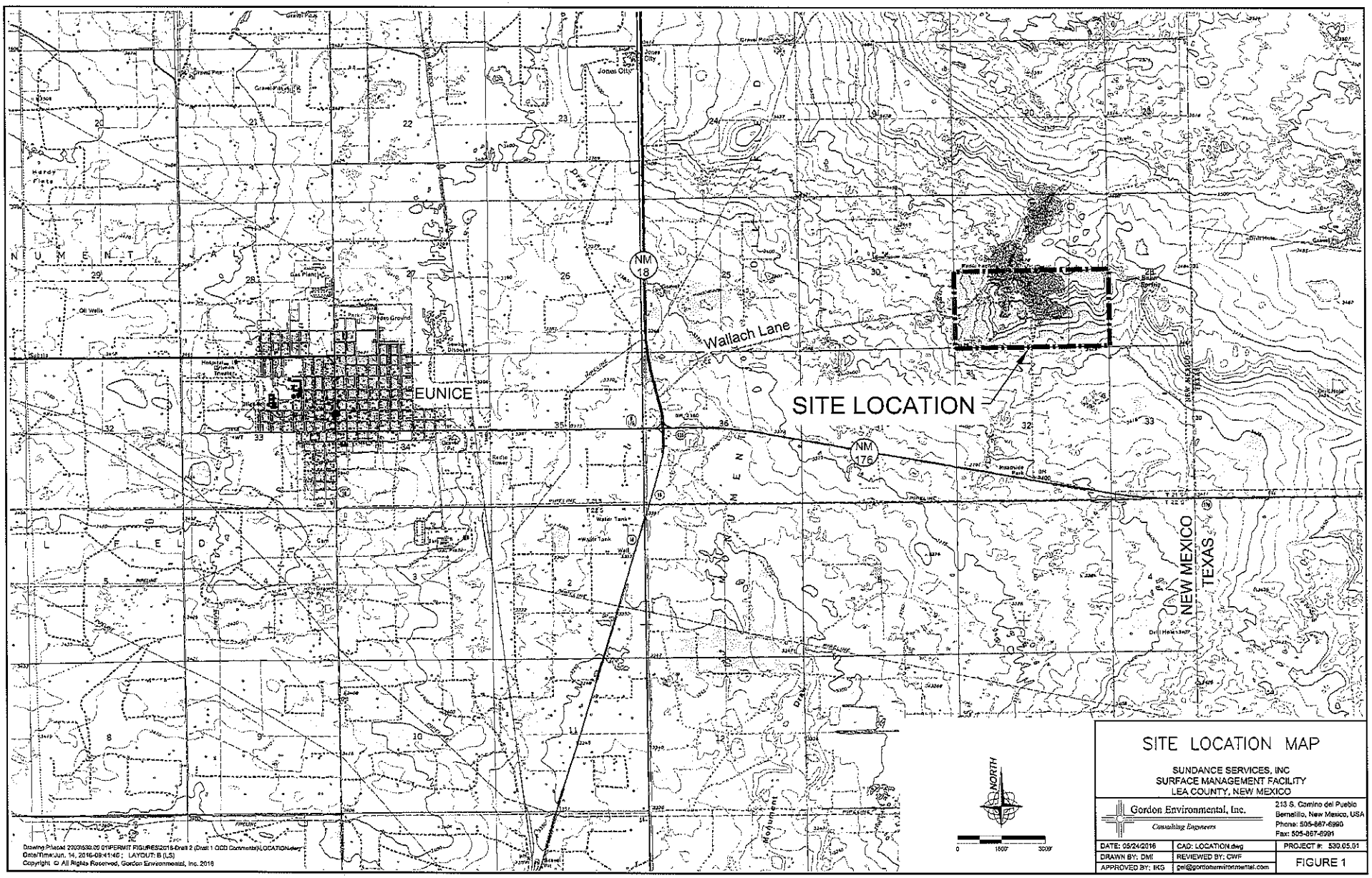
1.1 Site Location

The SSI Facility is located approximately 3 miles east of Eunice, NM; 18 miles south of Hobbs, NM; and approximately 0.5 miles west of the TX/NM state line in unincorporated Lea County, NM. The SSI site is comprised of a 320-acre ± tract of land located in the South ½ of Section 29, Township 21 South, Range 38 East, Lea County, NM. Site access will continue to be provided via NM 18 and Wallach Lane. Access may also be provided via replacement access through the proposed Sundance West, Inc. Surface Waste Management Facility (Sundance West). A Site Location Map is provided as **Figure 1**.

1.2 Facility Description

The SSI Facility is an existing commercial Surface Waste Management Facility that includes the following components, which are also identified on **Figure 2:**

- Liquid Oil Field Waste Processing Area (80 acres ±)
  - Produced Water Facility
  - Drilling Fluids
  - Basic Sediment and Water (BS&W)
  - Jet-Out Facility (SSI and Public)
  - Oil Recycling Facility
- Oil Field Waste Landfill (80 acres ±, Old and Current).
- Landfarm (Closed)



SITE LOCATION MAP

SUNDANCE SERVICES, INC
SURFACE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 05/24/2016	CAD: LOCATION.dwg	PROJECT #: 530.05.01
DRAWN BY: DMI	REVIEWED BY: CWF	FIGURE 1
APPROVED BY: IKG	gel@gordonenvironmental.com	

1.3 Facility Permit History and Closure Provisions

The SSI Facility initiated operations prior to specific OCD regulation of surface waste management facilities. Once OCD established surface waste management Facility regulations, SSI was originally permitted for continued operation under "Rule 711" (19.15.9.711 NMAC). The Closure provision of the original Permit requires that the Permittee develop a Closure Plan for submission to the OCD in Santa Fe for their approval prior to implementation. In accordance with the Rule 711 requirements of the prevailing Permit, this Closure Plan must be submitted within six (6) months after discontinuing operation of the Facility or within thirty (30) days of deciding to dismantle the Facility. The requirement to submit a Closure Plan tracks the requirements of 19.15.9.711(D) NMAC, the portion of Rule 711 section relating to Facility Closure. Rule 711 requires that the Permittee must also notify OCD 30 days prior to its intent to cease accepting wastes and close the Facility.

The current SSI Permit (issued 02/18/2002) includes a Closure provision (i.e., 2.g.) that states *"Closure will be pursuant to all OCD requirements in effect at the time of closure"*. This Permit condition appears to tie the closure requirements to the current Part 36 Rule, in particular 19.15.36.18(A) NMAC. This section requires that *"The operator shall notify the division's environmental bureau at least 60 days prior to cessation of operations...and provide a proposed schedule for closure."* In consideration of this Permit Condition, the Closure/Post Closure (C/PC) Plan contained herein was developed subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the OCD.

While the current Permit requires that "*The operator must complete cleanup of constructed facilities and restoration of the facility site within six (6) months of receiving the closure plan approval, unless an extension of time is granted by the Director.*" The current Part 36 Rule (19.15.36.18 NMAC) does not include a timeframe to complete closure. Considering the magnitude of the proposed closure for this facility, it is unrealistic to presume (as the Permit does) that this effort can be completed in six months. Sundance Services, Inc. hereby requests that the Director approve a period of five years to complete the proposed closure efforts outlined in this Plan.

1.4 Purpose

The purpose of this C/PC Plan (the Plan) is to comply with the requirements of 19.15.36.8.C(9) and 19.15.36.18 NMAC. This Plan describes the proposed procedures for closure and post-closure of the SSI Facility, including a C/PC Cost Estimate sufficient to close the Facility in a manner that it will protect fresh water, public health, safety and the environment.

The oil field waste processing and disposal infrastructure existing at the SSI Facility consists of the following permitted features:

- Evaporation Ponds (Ponds 1, 4, 5, 6, and 9)
- Landfill Operations (Closed Landfill and Current Landfill-Former Ponds 7 and 8)
- Below Grade Solids Receiving (SSI and Public Jet-Out Facilities)
- Landfarm (Closed-The Landfarm was never officially operated. In 2005 a single load consisting of 37cy of material was inadvertently deposited in this area. The material was immediately removed to the landfill for permanent onsite disposal as documented by OCD in a letter dated 12/02/2005. To confirm that the materials were completely removed, soil sample results were provided to OCD (11/03/2005 letter to OCD) upon removal confirming the absence of remaining materials. The site was graded, vegetated and routinely observed since closure.) Any remaining levees will be removed.
- Drilling Fluids Solidification and Stabilization Area (Ponds 2, and 3)
- Oil Treatment Plant (Produced Water Facility and Oil Recycling Facility)

To accomplish the closure outlined by this Plan, SSI is requesting the following exemptions:

- Landfill Expansion-In an effort to consolidate the relocated waste materials in as small a footprint as possible this Plan proposes that the active landfill will be expanded to the north, encompassing the existing excavations into the Chinle, and Ponds 1, 5, and 6 will be used for permanent waste storage, and will be filled connecting the Current Landfill to the Closed Landfill.
- Landfill Gas Management Plan-Due to the absence of readily biodegradable organics (putrescible) for the generation of methane, no Landfill Gas Management Plan is proposed.
- Groundwater Monitoring-Due to the absence of a shallow groundwater zone available for monitoring, a Vadose Zone Monitoring Plan proposes monitoring the interface of the unconsolidated sands and gravels of the Ogallala, Antlers, and Gatuña Formations (locally referred to as OAG) and the underlying red beds of the Chinle Group.
- Final Cover-Given the challenges of providing the prescriptive final cover (identified in 19.15.36.14(C)(8)), this plan proposes a performance-based cover design, supported by EPA's HELP Model demonstration that the proposed alternative final cover system will prevent the "bathtub effect".

These site features are identified on **Figure 2.** It is anticipated that closure of the SSI Facility will require five years to complete and will not be initiated until replacement operations are fully

developed and operational at the proposed, adjacent Sundance West Facility. Once a replacement component of the Sundance West Facility (i.e., Evaporations Ponds, Jet-Out, etc.) becomes operational, the comparable existing component of the SSI Facility will cease receiving materials and future receipts of the material managed by this operational component will be accepted and managed by the Sundance West Facility. While the goal is that replacement operational components at the Sundance West Facility will be developed simultaneously once the Permit is issued, it is anticipated that due to the various construction timeframes involved, some components of the operation will become available sooner than others. **Table 1**, SSI Closure Sequence, provides an outline of the sequence anticipated for closure as operational components become available at the Sundance West Facility. However, depending on the actual development of Sundance West, different combinations of the SSI site features may be closed at any time dependent on market conditions and logistical considerations at that time. This C/PC Plan may be modified by SSI to address changes on site or in accordance with operating conditions; and submitted and approved by OCD 30 days prior to implementation of the proposed change(s). This Plan may also be amended at the request of OCD per 19.15.36.18.A(5) NMAC.

TABLE 1
Closure Sequence (Phasing)[1]
Sundance Services, Inc.

Description
Phase I - Produced Water Receiving Operation.
• Produced Water load-out points dismantled • Produced Water Tanks relocated or recycled • Tank farm berm leveled • Produced Water Facility sampled for remediation confirmation • Evaporation Ponds cleared of surface oil
Phase II - Jet-Out Facilities Operation (Public and SSI).
• Jet-Out Pit containment (Public and SSI) demolished and removed to Landfill • Area contoured (excavated or backfilled, as required) • SSI Jet-Out area sampled for remediation confirmation
Phase III - Stabilization, Solidification and Oil Recovery Process (Ponds 2, 3, 4, & 9).
• Liquids removed and materials stabilized • Stabilized materials relocated to landfill containment areas • Stabilization area excavated for fill and cover on Landfill and Ponds • Stabilization area graded to drain • Oil Recovery Centrifuge removed • Boiler removed • Crude Oil Recovery Tank emptied and removed and recycled • Oil Sales Tank emptied and removed • Oil Recovery Facility Graded to drain • Areas sampled for remediation confirmation
Phase VI - Pond Closure (Ponds 1, 5, & 6) and Landfill (Ponds 7 & 8)/Containment Final Cover.
• Pond sediments solidified and consolidated • Additional fill placed in Ponds to achieve design grades for drainage • Final Cover placed on Ponds and Landfill areas • All closed areas seeded for vegetative cover

Note:

[1] *The Sundance Services, Inc. site closure sequence is subject to change depending on the pace of closure for a particular component.*

2.0 CLOSURE PLAN

2.1 Construction Schedule

SSI will formally notify OCD's Environmental Bureau at least 60 days prior to cessation of permanent operations at the SSI Facility. Included in this notification will be a proposed schedule for closure and monitoring activities. OCD conducted a pre-closure Facility inspection on 02/26/2015, attended by representatives of SSI and Gordon Environmental, Inc. Based on discussions and input from OCD during this inspection, SSI has formalized this C/PC Plan to address the anticipated closure activities and to provide a detailed preliminary plan of action for the final closure of the SSI Facility. Upon submittal of this Plan, OCD will review and provide comments on the contents of this C/PC Plan and proposed schedule.

SSI will commence the closure activities contained herein at the SSI Facility once OCD issues its approval of this Plan, and once the Sundance West Facility operations are underway as previously stated in Section 1.4. Closure procedures are summarized in **Table 2**.

TABLE 2
Closure Procedures
Sundance Services, Inc.

1.0 Oil Treatment Plant:
- 1.1 Liquids Removal
- 1.2 Evaporation Pond Sediment Removal or Encapsulation
- 1.3 Tank Removal
- 1.4 Jet-Out Facility Closure
- 1.5 Treatment Plant Disassembly
- 1.6 Stabilization and Solidification Area Closure
- 1.7 Site Sampling
- 1.8 Final Site Closure
- 1.9 Process Area Closure Documentation

2.0 Solid Waste Disposal Area:
- 2.1 Landfill Closure Construction
- 2.2 Final Cover
- 2.3 Vegetation
- 2.4 Landfill Closure Documentation

3.0 Miscellaneous Building and Structure Removal

4.0 Final Land Use

2.2 Liquids Removal

Produced water remaining in Produced Water Facility **(Figure 2)** will be pumped or transported to the evaporation ponds (Ponds 1, 5, and 6). These ponds will be monitored for free floating crude oil, which when observed will be removed and taken to the Oil Recovery Facility for processing **(Figure 2).** Evaporation may be conducted with the aid of a mechanical evaporation system (in Ponds 1, 5, and 6). Liquids may also be transferred to the Sundance West Facility for management to enhance the closure effort.

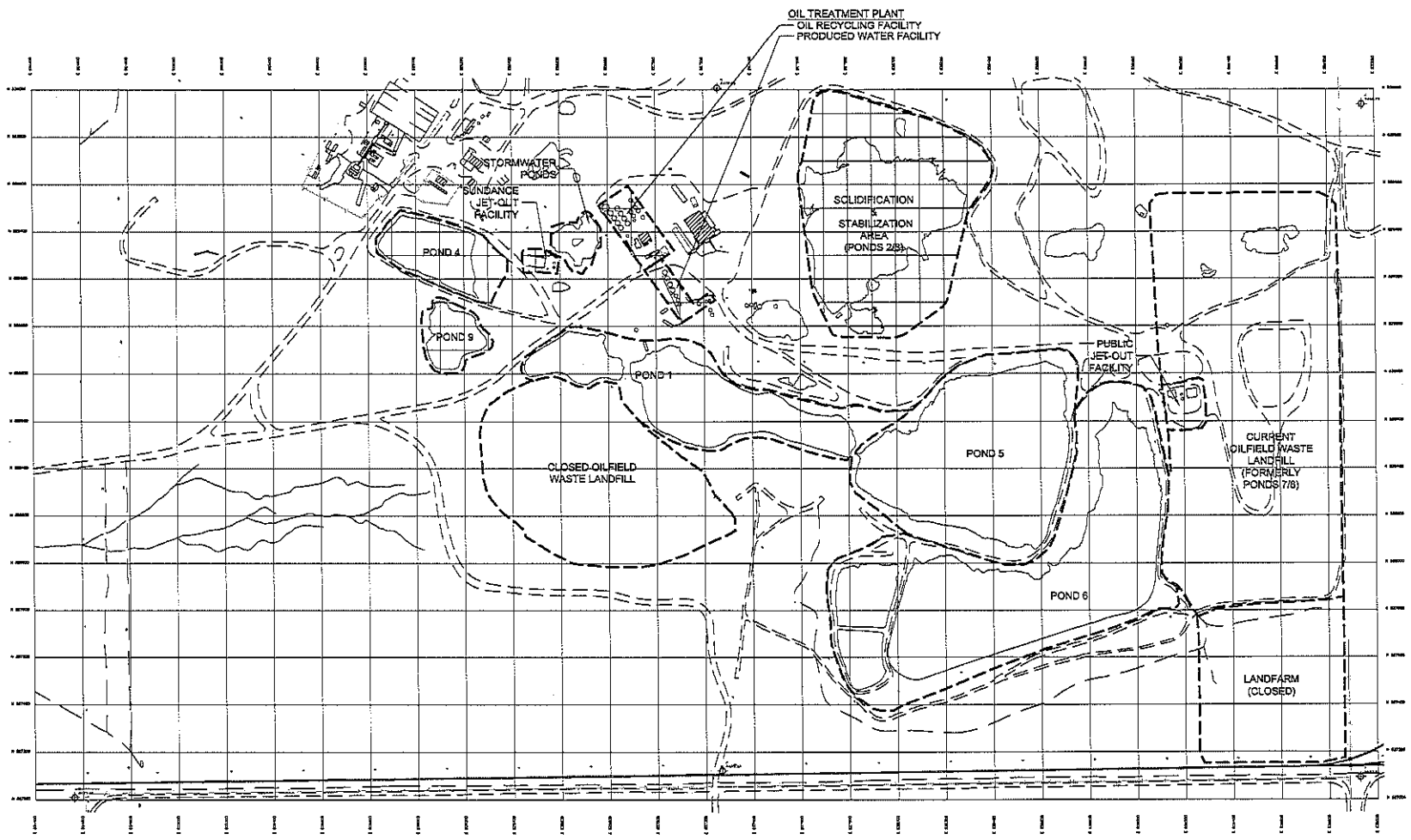
2.3 Evaporation Pond Closure (Ponds 1, 2, 3, 4, 5, 6, & 9)

SSI may introduce soils when sufficient evaporation has taken place to expedite solidification. Once solidification has been completed in the Ponds, the material will be contained "in place" in Ponds 1, 5 and 6, and transported from Ponds 2, 3, 4 and 9 to the proposed containment areas (Ponds 1, 5 and 6 and the Current Landfill). Solidification will be confirmed complete by the Paint Filter Test (EPA Method 9095A).

Once the sludge has been stabilized and consolidated or removed, above-ground pond containment levees may be excavated and deposited into the pond (Ponds 1, 5, and 6) to enhance the stabilization process and to provide material for leveling and grading the final contours of the pond cap. Additional onsite material, including that from the Stabilization and Solidification Area (Ponds 2, 3 and 4) and landfilled material (from the Current Landfill in Ponds 7 and 8, and from Pond 9) will be relocated to Ponds 1, 5 and 6 to establish a grade that promotes drainage (i.e., crowned) and that can be completed with a final cover cap and vegetated **(Figure 3)**. No oil field waste will be used in as final cover material.

2.4 Tank Removal

Upon closure, the 17 tanks associated with the Oil Recovery Facility and the 10 tanks associated with the Produced Water receiving Facility, all piping associated with the tanks and the equipment (i.e., centrifuge) will be emptied and cleaned. SSI will dispose of the residual exempt oil field waste removed from the tanks and deposit it in the Solidification and Stabilization Area (Ponds 2 and 3) for processing prior to landfill disposal or as fill in the other Ponds. If the SSI Landfill is not in operation at time of closure of the SSI Facility, remaining solids will be removed and disposed of in an OCD-approved surface waste management facility capable of managing the



LEGEND

APPROXIMATE UNIT BOUNDARIES

SAMPLING GRID (100' SPACING)

NOTE:
SEPTEMBER 8, 2014 AERIAL PHOTOGRAPHY PERFORMED BY BLUE SKIES CONSULTING LLC. MAPPING PERFORMED BY AEROTECH MAPPING INC.

NORTH

0 200 400

SAMPLING GRID (TYPICAL)

SUNDANCE SERVICES, INC
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-0990
Fax: 505-867-0991

DATE: 09/09/2016	CAD: SAMPLING GRID.dwg	PROJECT #: 020.06.01
DRAWN BY: DMI	REVIEWED BY: DWF	FIGURE 3
APPROVED BY: SG	gel@gordonenvironmental.com	

waste stream. SSI will reuse (i.e., for Sundance West), recycle or remove the tanks, infrastructure, and equipment from the site and document to OCD accordingly.

2.5 Jet-Out Facility

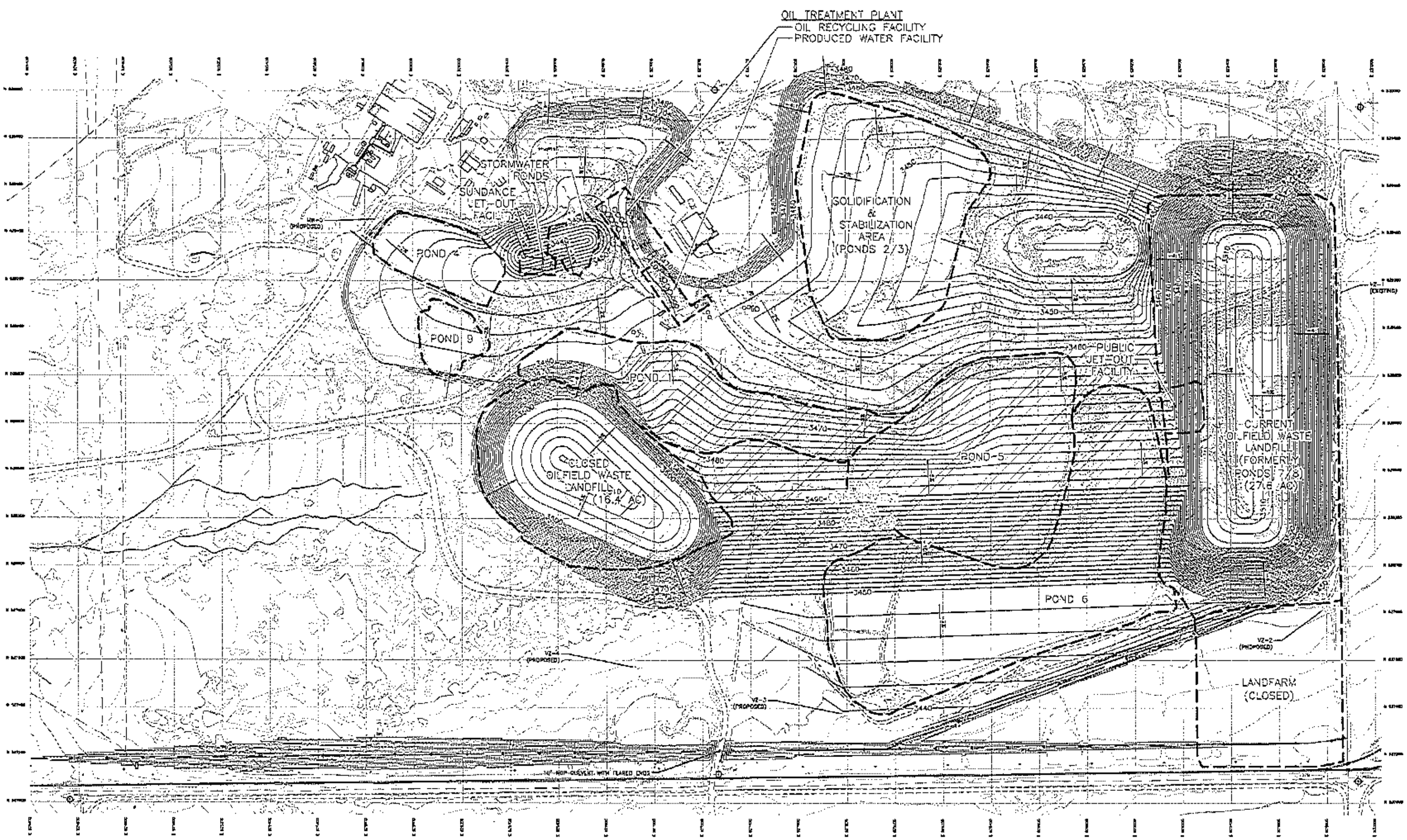
Closure of the Jet-Out Facilities (both Public and SSI Facilities) will consist of dismantling the above-grade installations for recycling (of clean elements) or on-site disposal In the Landfill. The tanks will be cleaned for re-use or recycled as scrap metal. The concrete liner will be exhumed and disposed of on-site in the Landfill. Once the operational features have been removed, the SSI Jet-Out Facility area will be sampled for potential contamination as described in Section 2.8 and depicted on **Figure 3**. The Public Jet-Out Facility will be within the Landfill closure containment area and will not require sampling for closure,

2.6 Treatment Plant

Once crude oil recovery processes have been completed, the Liquid Oilfield Processing Area (i.e., the Treatment Plant) will be disassembled. Associated piping leading to or from the treatment plant storage tanks will be removed, cleaned and recycled for reuse. Once equipment, tanks, piping, and buildings have been dismantled (if applicable) the treatment plant area will be sampled for potential contamination as described in Section 2.8 and depicted on **Figure 3**.

2.7 Stabilization and Solidification Area Closure (Ponds 2, 3, 4 and 9)

Upon successful completion of the stabilization and solidification of remaining materials in the Stabilization and Solidification Area (Ponds 2, 3, 4, and 9), these materials will be allowed to dry to a consistency (i.e., paint filter test) that lends itself to management and removal to the Landfill. This material may be used for fill to bring other Ponds (i.e., Ponds 1, 5, & 6) to grade prior to capping. Once material removal is complete, this area will be sampled for potential contamination as described in Section 2.8 and depicted in **Figure 3**. Once the materials have been removed, the area will be excavated for final cover on the Landfill and Ponds 1, 5, and 6. The area will then be leveled and graded to drain as depicted in **Fignre 4**. No oil field waste will be used in as final cover material.



Volumetrics Compared to Existing Grade Survey, Sep. 2014			
Area	Cut vol	Fill vol	Net vol
	(Cu. Yards)	(Cu. Yards)	(Cu. Yards)
Landfill (old & New, plus 'saddle' between	488,657.29	2,418,376.04	1,929,918.95
Pond Areas	1,852,700.11	44,412.38	(1,808,287.72)
Drainage Channels	85,320.18	1,747.67	(83,572.50)
Total	2,426,677.58	2,464,536.90	37,859.33

LEGEND

APPROXIMATE UNIT BOUNDARIES

CALICHE INTERFACE

NOTE:

SEPTEMBER 8, 2014 AERIAL PHOTOGRAPHY PERFORMED BY BLUE SKIES CONSULTING LLC. MAPPING PERFORMED BY AEROTECH MAPPING INC.

FINAL GRADING PLAN

SUNDANCE SERVICES, INC
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers

213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 06/09/2016	CAD: FINAL GRADING .dwg	PROJECT #: 530.09.01
DRAWN BY: ASM	REVIEWED BY: CWF	FIGURE 4
APPROVED BY: IKG	ge@gordonenvironmental.com	

Drawing:P:\Client 530\530.09.01\PERMIT FIGURES\2016-Draft 2 (Draft 1 OCD Comments)\FINAL GRADING PLAN-dwg.dwg
Date/Time:Jun. 09, 2016-12:23:30 ; LAYOUT: 0 (L0)

2.8 Site Sampling

A NORM Survey (in compliance with 20.3.14 NMAC) will be conducted for all of the Ponds (Ponds 1, 2, 3, 4, 5, 6, and 9) when evaporation has been completed as required by the Permit. Once operations cease in the areas that are proposed for excavation and removal of waste rather than containment in place (i.e., Ponds 2, 3, 4, and 9), sampling will be conducted in accordance with industry standards (i.e., United States Environmental Protection Agency (EPA) publication SW-846: *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Chapter 9*) and tested for TPH, BTEX, metals and other organics listed in Subsections A and B of 20.6.2.3103 NMAC (per 19.15.36.18 (E) The areas proposed for excavation and removal of waste are:

- Evaporation Ponds 4 and 9
- Jet Out Facilities associated with the public and SSI operations
- Stabilization and Solidification Areas associated with Ponds 2 & 3
- Oil Treatment Plant-Oil Recycling Facility and Produced Water Facility areas will be tested for major cations and anions, and RCRA metals in compliance with 19.15.36.18 (D)).

A typical sampling grid is provided as **Figure 3** (at 5 tests per acre on a 100-ft gridded plat containing at least four equal sections and a minimum of 4 samples per feature identified and approved by OCD), which illustrates the proposed sampling locations to document proper closure in the areas identified for excavation and removal of potential contaminants. Soil samples will be taken at select locations in these areas and at select depths within the in-situ soil, including at least one from the first foot of soil; and one within 36 to 42 inches below the surface.

Sample results will be submitted to OCD's Environmental Bureau (Santa Fe). Provided the sample results indicate no contamination persists at these areas of the Facility in excess of allowable levels, SSI will proceed with final site closure and post-closure activities. If contamination is observed at 42 inches, excavation and sampling will continue to the depth where no contamination is observed. If contamination is detected, the affected zone will be excavated and disposed of in the SSI solid waste disposal area, and the area will be tested until confirmed to meet applicable regulatory standards. Although highly unlikely, should the SSI Landfill not be in operation at the time of closure of the SSI Facility, remaining solids (stabilized materials) will be removed from this area and disposed of in an OCD-approved surface waste management facility as required by 19.15.36.18.

2.9 Final Site Closure – Waste Excavation and Removal Areas

Upon confirmation that that contamination levels have been remediated below regulatory thresholds, the areas proposed for excavation and removal of waste (see list in Section 2.8) will be re-graded (i.e., crowned or contoured) for their intended final use and to promote drainage. Activities to be conducted during this period include:

- Submittal of Notice of Intent (NOI) to the EPA for a Construction General Permit (CGP) and Stormwater Pollution Prevention Plan (SWPPP) implementation
- Evaporation and sedimentation pond berm removal and backfilling
- Stabilization and solidification area containment berm removal and grading
- Site grading and re-contouring
- Site revegetation

Re-vegetation of the SSI site (i.e., equal to 70% of the nature perennial vegetative cover) will be conducted during the optimum planting period, whenever possible (per 19.15.36.18 A(6) NMAC). Examples of seed types identified and recommended by the Natural Resource Conservation Service (NRCS) as acceptable cover for the local and are described in **Table 3.** If vegetation cannot adequately be established, SSI will consult with OCD to identify practical stabilization alternatives (e.g., desert pavement, organic mulch, etc.). The Closure Documentation Record (**Attachment A**), or a similar template, will be used to record the field activities specific to final site closure. A licensed NM Professional Engineer, experienced in applicable environmental engineering, will supervise closure construction and certify completion of closure activities.

2.10 Final Site Closure – Containment-in-Place Areas

The areas identified for containment-in-place will require special handling to provide a stable and environmentally secure closure. The areas proposed for containment-in-place include:

- Evaporation Ponds 1, 5, & 6
- Current Oilfield Waste Landfill (Formerly Ponds 7 & 8)
- Closed Oilfield Waste Landfill

The final cover proposed for these areas includes a performance-based "alternative cover" (i.e., ET) configuration in accordance with Paragraph (9) of Subsection C of 19.15.36.14 NMAC that meets the requirements of 19.15.36.18 D(2)(b) NMAC for landfill cell closure. The proximity of the areas proposed for containment-in-place and other engineering and design constraints result in

an integrated final cover system as show on **Figure 4**. No oil field waste will be used in as final cover material.

EPA's "hydrologic evaluation of landfill performance" (HELP Model) was used to demonstrate that the proposed alternative final cover will prevent the "bathtub effect" as outlined in the regulations by showing no leakage through the cover system. The alternative cover soils used in the HELP Model are derived from averaged values from laboratory analysis of near-surface soils (10-20 feet deep) and are represented by HELP Model Default Soil Characteristics; Soil Texture Class 9. Soil Texture Class 9 defines a soil with the following characteristics:

- Unified Soil Classification System (USCS) - ML
- Saturated Hydraulic Conductivity -1.9×10^{-4} cm/sec
- Total Porosity – 0.501 vol. / vol.
- Field Capacity – 0.284 vol. / vol.
- Wilting Point – 0.135 vol. / vol.

Weather data used in the HELP Model are derived from Hobbs, NM (Evapotranspiration); Roswell, NM (Precipitation); and Midland, TX (Temperature). The alternative (evapotranspiration) cover will consist of a 24-inch soil erosion layer and a 6-inch infiltration layer as shown on **Figure 5**.

The integrated final cover system for each of the three areas proposed for containment-in-place have differing final closure slope configurations and associated HELP Model inputs. Evaporation Ponds 1, 5, & 6 have three discreet slope configurations and therefore three HELP Model outputs - North Saddle Slope; South Saddle Slope 10 percent; and South Saddle Slope 2 percent. Similarly, Oilfield Waste Landfill area (Formerly Ponds 7 & 8) HELP Model outputs are – East Top and East Side Slopes; and Oilfield Waste Landfill (old) HELP Model outputs are – West Top and West Side Slopes. Model results are provided in **Attachment B** (HELP Model) and summarized in **Table 3**.

TABLE 3
HELP Model Summary
Alternate Final Cover System
Sundance Services, Inc.

	Simulation	Vegetative (Erosion) Layer 1			Barrier (Infiltration) Layer 2			HELP Model Results
		HELP Model Soil Texture Type	Layer Thickness (in)	Hydraulic Conductivity K_{sat} (cm/s)	HELP Model Soil Texture Type	Layer Thickness (in)	Hydraulic Conductivity K_{sat} (cm/s)[1]	Percolation Leakage Through Layer 2 (in)
Landfills & Ponds 1&5 (North Side)	Crown 5%	9	24	1.9×10^{-4}	9	6	1.9×10^{-4}	0.0000
Landfill Closed & Current	Side Slopes 25%	9	24	1.9×10^{-4}	9	6	1.9×10^{-4}	0.0000
South Side of Ponds 1 & 5	South Side Slope	9	24	1.9×10^{-4}	9	6	1.9×10^{-4}	0.0000
	West Side Slopes	9	24	1.9×10^{-4}	9	6	1.9×10^{-4}	0.0000

NOTE: 1. Soils with a Hydraulic Conductivity of 1.9×10^{-4} are available onsite within the OAG surficial formation.

2.10.1 Evaporation Pond Closure

The Evaporation Ponds that will be closed and contained-in-place will require remediation prior to closure. This effort will require the removal of free liquids prior to solidifying and stabilizing the remaining sludges. Once remediated, the remaining solidified sludges will be compacted and encapsulated with additional fill material from the closure of other operations at the SSI Facility. Materials from remediation of Ponds 2, 3, 4 & 9, the Jet-Out Facilities and the Landfills will be relocated into areas comprised of Ponds 1, 5 and 6 to fill these areas to grade. Final cover will be installed within one year of achieving the final grading plan approved by OCD under this Closure Plan. The overall final grading contours for the Evaporation Pond Closure are provided in **Figure 4**.

The final cover proposed for these waste containment areas (Ponds 1, 5 & 6) includes a performance-based "alternative cover" (i.e., ET) configuration. This alternative (evapotranspiration) cover for the Evaporation Ponds will consist of a 24-inch soil erosion layer; and a 6-inch infiltration layer ($k \leq 1.9 \times 10^{-4}$ cm/sec) as shown on **Figure 5**. Based on the results provided in **Attachment B** (HELP Model) and summarized in **Table 3**, the proposed alternative final cover for the ponds is proven to prevent the "bathtub effect" as outlined in the regulations (Paragraph (9) of Subsection C of 19.15.36.14 NMAC), and as a more sustainable design option using locally available resources.

Final slopes will be constructed in accordance with the Final Grading Plan provided in **Figure 4**. The top crown on the ponds will be constructed at a design grade of 5%. The final cover, as well as other disturbed areas of the site, will be seeded with native vegetation. Vegetation on the site will be planted during the optimum planting period, whenever possible. Examples of seed types identified and recommended by the NRCS as acceptable cover for the local climate and precipitation include, but are not limited to the recommendations outlined in **Table 4**:

TABLE 4
NRCS Recommended Seed Mix
Sundance Services, Inc.[1,2,3,4]

Grass Species	% of Mix	RATE (PLS/Acre)[5]	Lbs. PLS/Acre[6]
Bluegrama (Native)	40	1.5	1.2
Buffalograss (burs)	10	16	3.2
Green Sprangletop	10	1.7	0.34
Sand Dropseed	10	0.5	0.1
Sideoats (Vaughn)	20	4.5	1.8
Western Wheatgrass (Native)	10	8	1.6
Totals	**100%**	**32.2**	**8.24**

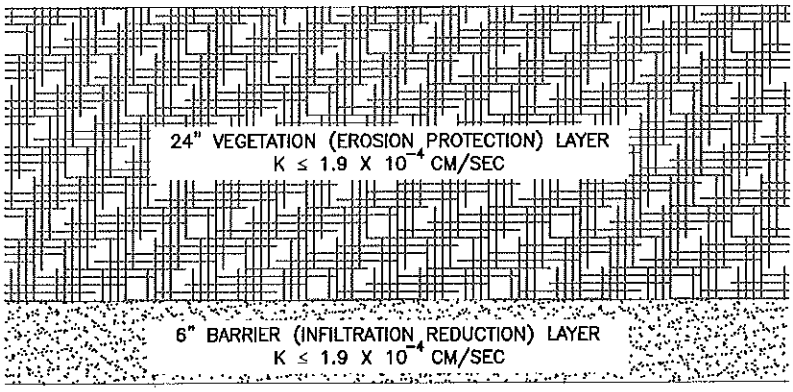
Notes:

1. *Lea County NRCS recommends doubling the seeding rate on critical area plantings.*
2. *These grasses are fairly shallow rooted; well adapted to Lea County; are available from area growers; and will aid in erosion control once established.*
3. *NRCS recommends that seeding a cover crop of sorghum in the spring at 8 lbs/acre will stabilize the site initially.*
4. *Subject to change based on changes in NRCS requirements, new technology, etc.*
5. *PLS = pure live seed per acre*
6. *Lbs. = pounds of PLS per acre*

2.10.2 Solid Waste Disposal Area Closure

It is anticipated that the SSI Landfill will be the final area closed at the Facility due to the need for disposal of wastes from other on-site process units during closure. Final cover will be installed within one year of achieving the final grading plan approved by OCD under this Closure Plan. The overall final grading contours for the Landfill are provided in **Figure 4**. The final cover proposed for the SSI Landfill includes an alternative sideslope and crown cover configuration.

The final cover proposed for these areas includes a performance-based "alternative cover" (i.e., ET) configuration. This alternative (evapotranspiration) cover for the Oilfield Waste Landfills will consist of a 24-inch soil erosion layer; and a 6-inch infiltration layer ($k \leq 1.9 \times 10^{-4}$ cm/sec) as shown on **Figure 5**. Based on the results provided in **Attachment B** (HELP Model) and summarized in **Table 3**, the proposed alternative final cover for the Landfills is proven to prevent the "bathtub effect" as outlined in the regulations (Paragraph (9) of Subsection C of 19.15.36.14 NMAC), and as a more sustainable design option using locally available resources.



FINAL COVER DETAIL

FINAL COVER PROFILE

SUNDANCE SERVICES, INC.
SURFACE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 06/13/2016	CAD: FINAL COVER.dwg	PROJECT #: 530.05.01
DRAWN BY: DMI	REVIEWED BY: CWF	FIGURE 5
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.05.01\PERMIT FIGURES\2016-Draft 2 (Draft 1 OCD Comments)\FINAL COVER 3.dwg
Date/Time:Jun. 14, 2016-09:45:45

Final slopes will be constructed in accordance with the Final Grading Plan (**Figure 4**). The side slopes will be regraded to no greater that 25% (4 horizontal to 1 vertical) and the top crown will be graded at a design slope of 5%. The final cover, as well as other disturbed areas of the site, will be seeded with native vegetation. Vegetation on the site will be planted during the optimum planting period, whenever possible. Examples of seed types identified and recommended by the NRCS as acceptable cover for the local climate and precipitation include, but are not limited to those varieties identified in **Table 4.** If vegetation cannot adequately be established, SSI will consult with OCD to identify practical stabilization alternatives (e.g., desert pavement, organic mulch, etc.).

The Closure Documentation Record (**Attachment A**) or a similar template will be used to record the field activities specific to final site closure. Documentation of closure activities including, but not limited to, monitoring results, site inspection data, and soil sampling and maintenance procedures will be submitted to OCD in the Final Closure Report. Closure construction activities will be supervised by a licensed NM Professional Engineer experienced in waste facility technology, who will certify the closure.

2.11 Miscellaneous Building and Structure Removal

At this time, it is anticipated that closed portions of the SSI Facility site will revert to open space around the vehicle maintenance and operational offices that will remain on the Facility to support future infrastructure. Should an alternative land use be identified that could utilize the other remaining structures and buildings, they will be cleaned and left in place. If not, other buildings and miscellaneous structures will be dismantled, and where practical, recycled or reused.

Non-recyclable materials will be disposed of in the SSI Landfill, Sundance West Landfill, or other OCD-approved landfill. Once buildings and structures are removed, the areas will be inspected for contamination following the protocol detailed in Section 2.8. Should contamination be discovered, the zone will be excavated and disposed of in the solid waste disposal unit, and the area will be tested until confirmed to meet regulatory standards outlined in Section 2.8 for Oil Treatment Processing Areas. If the SSI Landfill is not in operation at time of closure, remaining materials will be removed from the Facility and disposed of in an OCD-approved surface waste management facility.

2.12 Final Land Use

At this time, SSI has not established a use for the Facility after closure beyond reverting to open pasture. Should a specific use be determined later, SSI will notify OCD and request approval to be released from the following post-closure activities provided there has not been a release to the vadose zone or ground water pursuant to 19.15.30 and 19.15.29 NMAC.

3.0 POST-CLOSURE PLAN

3.1 Post-Closure Maintenance

Oil Treatment Plant

SSI will conduct post-closure monitoring of the Oil Treatment Plant for a period of no less than 3 years. This inspection will include all areas previously occupied by Oil Recycling Facility and Produced Water Facility. During the post-closure care period, SSI proposes to inspect and maintain the site at least quarterly, and immediately after a documented 24 hour, 25-year storm event, whichever is more frequent as defined on the Site Inspection Checklist (**Attachment C**). Should deficiencies or discrepancies be discovered during the site inspections in these areas, SSI will conduct corrective measures. If there has been a documented release to the groundwater, SSI will comply with the requirements of 19.15.30 and 19.15.29 NMAC.

Landfill Area

SSI will monitor and provide post-closure maintenance for the Landfill Facility and Evaporation Pond 1, 5, & 6 areas that encapsulate waste materials for a period of not less than 30 years. During the post-closure care period, SSI proposes to inspect and maintain the final cover at least quarterly, and immediately after a documented 24 hour, 25-year storm event, whichever is more frequent as defined on the Site Inspection Checklist (**Attachment C**). Upon successful re-vegetation efforts resulting in at least 70% coverage or other approved erosion control methods (desert pavement, mulch, etc.), SSI plans to reduce the inspection frequency subject to OCD approval. Post-closure care inspections will typically include:

- Vegetative growth observation
- Erosion
- Differential settlement
- Vegetative stress (i.e., potential gas migration)

In addition, water quality monitoring will be performed and reported on an annual basis for the post-closure period as shown on **Attachment C**.

3.2 Post-closure Monitoring

SSI will conduct routine Vadose Zone monitoring of the Facility in accordance with the Vadose Zone Monitoring Plan included with the Closure Plan as **Attachment D**. This Plan describes the Vadose Zone monitoring system and sampling protocol that will be implemented following the closure of the Facility. Five Vadose Zone Monitoring Point have been identified on **Figure 4**. Their locations were selected at points on the Chinle Formation (Redbed) interface with the overburden where liquids would be likely to accumulate. Once the Vadose Zone monitoring system has been installed, the existing monitoring points identified in the current Permit will be plugged and abandoned. Plugging will be performed in accordance with the Office of State Engineer requirements. Current analytical data associated with recent monitoring events is routinely provided to OCD in accordance with the current Permit and is available in OCD files.

3.3 Reporting

Reports of post-closure activities including, but not limited to site inspection data and maintenance procedures will be submitted to OCD within 45 days from the end of each calendar year, or as otherwise required.

4.0 FINANCIAL ASSURANCE

4.1 Closure/Post Closure Cost Estimate

The Cost Estimate (**Attachment E**) for the closure and post-closure activities described in this C/PC Plan is presented in current dollars and conservatively assumes that third party contractors will perform closure and post-closure activities at the site, as required by 19.15.36.8.C(9) NMAC. Preparation of the C/PC Cost Estimate further assumes that no contamination or remedial activities are required due to releases into the environment. The current estimate of SSI closure construction and post-closure operations is provided as **Attachment E**.

This estimate will be revised accordingly should unforeseen conditions arise. Upon OCD approval of the requested this C/PC Plan, SSI will elect a financial assurance mechanism pursuant to 19.15.36.11.E NMAC, and submit the appropriate documentation to OCD based on the estimates

provided in this Plan. The documentation of the selected financial assurance mechanism will be included as **Attachment F**.

4.2 Release of Financial Assurance

Upon successful completion of closure activities for the entire Facility, or portions of the operation (i.e., the Jet-Outs, Ponds, Solidification and Stabilization Area, the Landfill grading; components of the process that have ceased operation); and after OCD concurrence that the closure activities are complete; OCD will release the financial assurance mechanism in-place for that component of closure of the Facility. After the post-closure periods have expired (i.e., 3 years for waste processing Ponds 2 & 3/Ponds 2, 3, 4 & 9 that were remediated, and 30 years for the 2 Landfills and Ponds 1, 5, & 6 that are closed containment units), SSI will request release from the remaining financial assurance requirements for the Facility or portions that have been successfully closed in accordance with OCD regulations.

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

ATTACHMENT A

CLOSURE DOCUMENTATION RECORD (TYPICAL)

ATTACHMENT A
Closure Documentation Record (Typical)
Sundance Services, Inc.

Pond or Tank	Location		Location Closure				Revegetation			
			Liner		Tank					
Number	Lat. (Northing)	Lon. (Easting)	Removed	Tested	Cleaned	Removed	Installed	Date	Certified	Date

Date: _____ **Recorded By:** _____

Inspected By: _____ **Certified By:** _____

Comments: _____

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

ATTACHMENT B

HELP MODEL

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**
 **                HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**
 **                  HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)
**
 **                     DEVELOPED BY ENVIRONMENTAL LABORATORY
**
 **                       USAE WATERWAYS EXPERIMENT STATION
**
 **                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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 PRECIPITATION DATA FILE:     C:\sun\attchb.1\RAINFC1.D4
 TEMPERATURE DATA FILE:       C:\sun\attchb.1\TEMPFC1.D7
 SOLAR RADIATION DATA FILE:   C:\sun\attchb.1\SOLARFC1.D13
 EVAPOTRANSPIRATION DATA:     C:\sun\attchb.1\EVAPFC1.D11
 SOIL AND DESIGN DATA FILE:   C:\sun\attchb.1\CROWN.D10
 OUTPUT DATA FILE:            C:\sun\attchb.1\CROWN.OUT


 TIME:  10:32     DATE:   9/ 9/2016


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      TITLE:  SSI Landfill Final Cover - Crown 5%

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

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 9

THICKNESS	=	24.00	INCHES
POROSITY	=	0.5010	VOL/VOL
FIELD CAPACITY	=	0.2840	VOL/VOL
WILTING POINT	=	0.1350	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1362	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000006000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 2.01 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 9

THICKNESS	=	6.00	INCHES
POROSITY	=	0.5010	VOL/VOL
FIELD CAPACITY	=	0.2840	VOL/VOL
WILTING POINT	=	0.1350	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.5010	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000006000E-03	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 9 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 5.% AND A SLOPE LENGTH OF 252. FEET.

SCS RUNOFF CURVE NUMBER	=	87.70	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	46.300	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.268	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	12.024	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.240	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	6.274	INCHES
TOTAL INITIAL WATER	=	6.274	INCHES

TOTAL SUBSURFACE INFLOW = 0.00 INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Hobbs New Mexico

STATION LATITUDE	=	32.26 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.20
START OF GROWING SEASON (JULIAN DATE)	=	67
END OF GROWING SEASON (JULIAN DATE)	=	317
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	9.20 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	40.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	27.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	46.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	48.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ROSWELL NEW MEXICO

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.46	0.54	0.79	1.93	1.85
2.16	2.37	2.54	1.54	0.55	0.55

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MIDLAND TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
42.20	46.90	53.40	62.20	70.60	78.30
80.30	79.10	72.70	62.80	51.00	43.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MIDLAND TEXAS
AND STATION LATITUDE = 32.40 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.67	2129434.000	100.00
RUNOFF	0.231	38839.867	1.82
EVAPOTRANSPIRATION	11.939	2006536.500	94.23
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.500	84057.344	3.95
SOIL WATER AT START OF YEAR	6.274	1054408.870	
SOIL WATER AT END OF YEAR	6.774	1138466.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.331	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.56	3119360.500	100.00
RUNOFF	0.364	61254.465	1.96
EVAPOTRANSPIRATION	17.767	2986005.000	95.72
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.429	72101.023	2.31
SOIL WATER AT START OF YEAR	6.774	1138466.120	
SOIL WATER AT END OF YEAR	7.203	1210567.120	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.040	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.16	2884064.000	100.00
RUNOFF	0.224	37591.539	1.30
EVAPOTRANSPIRATION	15.687	2636453.750	91.41
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	1.250	210018.453	7.28
SOIL WATER AT START OF YEAR	7.203	1210567.120	
SOIL WATER AT END OF YEAR	8.370	1406659.370	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.083	13926.198	0.48
ANNUAL WATER BUDGET BALANCE	0.0000	0.293	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.25	2226914.250	100.00
RUNOFF	0.478	80371.937	3.61
EVAPOTRANSPIRATION	14.000	2352907.750	105.66
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-1.228	-206365.594	-9.27
SOIL WATER AT START OF YEAR	8.370	1406659.370	
SOIL WATER AT END OF YEAR	7.225	1214220.000	
SNOW WATER AT START OF YEAR	0.083	13926.198	0.63
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.418	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.23	2895829.500	100.00
RUNOFF	0.489	82139.234	2.84
EVAPOTRANSPIRATION	17.044	2864526.500	98.92
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-0.302	-50837.547	-1.76
SOIL WATER AT START OF YEAR	7.225	1214220.000	
SOIL WATER AT END OF YEAR	6.922	1163382.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	1.282	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.33	0.28	0.60	0.56	1.97	1.29
	2.59	2.09	2.42	1.23	1.40	1.01
STD. DEVIATIONS	0.37	0.07	0.51	0.45	1.86	1.57
	1.22	1.44	1.54	1.42	1.70	0.70
RUNOFF						
TOTALS	0.001	0.000	0.000	0.000	0.089	0.072
	0.070	0.013	0.040	0.065	0.008	0.000
STD. DEVIATIONS	0.001	0.000	0.000	0.000	0.167	0.128
	0.069	0.018	0.089	0.146	0.012	0.001
EVAPOTRANSPIRATION						
TOTALS	0.639	0.364	0.691	0.524	2.207	1.176
	2.282	2.495	1.794	1.216	1.078	0.822
STD. DEVIATIONS	0.542	0.094	0.565	0.407	1.821	1.734
	1.087	1.318	1.296	0.685	0.315	0.183
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

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

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES		CU. FEET	PERCENT
PRECIPITATION	15.77	(2.637)	2651120.5	100.00
RUNOFF	0.357	(0.1282)	60039.41	2.265
EVAPOTRANSPIRATION	15.287	(2.3591)	2569285.75	96.913
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 2	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.130	(0.9368)	21794.73	0.822

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.03	341180.062
RUNOFF	0.377	63438.6289
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 2	0.000	
SNOW WATER	1.33	223721.8280

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2714
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1350

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.9162	0.1632
2	3.0060	0.5010
SNOW WATER	0.000	

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 **             HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**
 **               HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)
**
 **                DEVELOPED BY ENVIRONMENTAL LABORATORY
**
 **                  USAE WATERWAYS EXPERIMENT STATION
**
 **             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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 PRECIPITATION DATA FILE:      C:\sun\attchb.1\RAINFC1.D4
 TEMPERATURE DATA FILE:        C:\sun\attchb.1\TEMPFC1.D7
 SOLAR RADIATION DATA FILE:    C:\sun\attchb.1\SOLARFC1.D13
 EVAPOTRANSPIRATION DATA:      C:\sun\attchb.1\EVAPFC1.D11
 SOIL AND DESIGN DATA FILE:    C:\sun\attchb.1\SOUTHSS.D10
 OUTPUT DATA FILE:             C:\sun\attchb.1\southss.OUT


 TIME:  10:34     DATE:   9/ 9/2016


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     TITLE:  SSI Landfill Final Cover - South Sideslope 10%

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

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 9

THICKNESS	=	24.00	INCHES
POROSITY	=	0.5010	VOL/VOL
FIELD CAPACITY	=	0.2840	VOL/VOL
WILTING POINT	=	0.1350	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1361	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000006000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 2.01 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 9

THICKNESS	=	6.00	INCHES
POROSITY	=	0.5010	VOL/VOL
FIELD CAPACITY	=	0.2840	VOL/VOL
WILTING POINT	=	0.1350	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.5010	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000006000E-03	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 9 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 10.% AND A SLOPE LENGTH OF 400. FEET.

SCS RUNOFF CURVE NUMBER	=	87.60	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	17.400	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.267	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	12.024	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.240	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	6.273	INCHES
TOTAL INITIAL WATER	=	6.273	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Hobbs New Mexico

STATION LATITUDE	=	32.26 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.20
START OF GROWING SEASON (JULIAN DATE)	=	67
END OF GROWING SEASON (JULIAN DATE)	=	317
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	9.20 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	40.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	27.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	46.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	48.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ROSWELL NEW MEXICO

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.46	0.54	0.79	1.93	1.85
2.16	2.37	2.54	1.54	0.55	0.55

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MIDLAND TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
42.20	46.90	53.40	62.20	70.60	78.30
80.30	79.10	72.70	62.80	51.00	43.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MIDLAND TEXAS
AND STATION LATITUDE = 32.40 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.67	800262.437	100.00
RUNOFF	0.224	14151.144	1.77
EVAPOTRANSPIRATION	11.921	752955.375	94.09
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.525	33155.988	4.14
SOIL WATER AT START OF YEAR	6.273	396196.469	
SOIL WATER AT END OF YEAR	6.798	429352.469	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.026	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.56	1172286.620	100.00
RUNOFF	0.354	22385.635	1.91
EVAPOTRANSPIRATION	17.801	1124346.500	95.91
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.405	25554.270	2.18
SOIL WATER AT START OF YEAR	6.798	429352.469	
SOIL WATER AT END OF YEAR	7.202	454906.719	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.222	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.16	1083859.870	100.00
RUNOFF	0.215	13573.433	1.25
EVAPOTRANSPIRATION	15.676	990149.250	91.35
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	1.269	80137.398	7.39
SOIL WATER AT START OF YEAR	7.202	454906.719	
SOIL WATER AT END OF YEAR	8.388	529810.500	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.083	5233.604	0.48
ANNUAL WATER BUDGET BALANCE	0.0000	-0.160	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.25	836896.562	100.00
RUNOFF	0.468	29568.730	3.53
EVAPOTRANSPIRATION	14.023	885727.000	105.83
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-1.241	-78399.234	-9.37
SOIL WATER AT START OF YEAR	8.388	529810.500	
SOIL WATER AT END OF YEAR	7.230	456644.906	
SNOW WATER AT START OF YEAR	0.083	5233.604	0.63
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.088	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.23	1088281.500	100.00
RUNOFF	0.480	30311.012	2.79
EVAPOTRANSPIRATION	17.059	1077498.500	99.01
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-0.309	-19528.504	-1.79
SOIL WATER AT START OF YEAR	7.230	456644.906	
SOIL WATER AT END OF YEAR	6.921	437116.406	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.456	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.33	0.28	0.60	0.56	1.97	1.29
	2.59	2.09	2.42	1.23	1.40	1.01
STD. DEVIATIONS	0.37	0.07	0.51	0.45	1.86	1.57
	1.22	1.44	1.54	1.42	1.70	0.70
RUNOFF						
TOTALS	0.001	0.000	0.000	0.000	0.087	0.070
	0.067	0.012	0.039	0.064	0.007	0.000
STD. DEVIATIONS	0.001	0.000	0.000	0.000	0.165	0.125
	0.067	0.018	0.087	0.143	0.011	0.000
EVAPOTRANSPIRATION						
TOTALS	0.641	0.364	0.691	0.528	2.213	1.176
	2.283	2.497	1.795	1.215	1.071	0.823
STD. DEVIATIONS	0.542	0.093	0.567	0.407	1.820	1.728
	1.092	1.322	1.294	0.689	0.310	0.184
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

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

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES		CU. FEET	PERCENT
PRECIPITATION	15.77	(2.637)	996317.4	100.00
RUNOFF	0.348	(0.1274)	21997.99	2.208
EVAPOTRANSPIRATION	15.296	(2.3738)	966135.31	96.971
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 2	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.130	(0.9489)	8183.99	0.821

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.03	128218.852
RUNOFF	0.373	23578.9277
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 2	0.000	
SNOW WATER	1.33	84076.8906

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2720
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1350

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FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.9147	0.1631
2	3.0060	0.5010
SNOW WATER	0.000	

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 **                HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE
**
 **                  HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)
**
 **                     DEVELOPED BY ENVIRONMENTAL LABORATORY
**
 **                       USAE WATERWAYS EXPERIMENT STATION
**
 **                FOR USEPA RISK REDUCTION ENGINEERING LABORATORY
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 PRECIPITATION DATA FILE:     C:\sun\attchb.1\RAINFC1.D4
 TEMPERATURE DATA FILE:       C:\sun\attchb.1\TEMPFC1.D7
 SOLAR RADIATION DATA FILE:   C:\sun\attchb.1\SOLARFC1.D13
 EVAPOTRANSPIRATION DATA:     C:\sun\attchb.1\EVAPFC1.D11
 SOIL AND DESIGN DATA FILE:   C:\sun\attchb.1\SSLOPES.D10
 OUTPUT DATA FILE:            C:\sun\attchb.1\SSlopes.OUT


 TIME:  10:33     DATE:   9/ 9/2016


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      TITLE:  SSI Landfill Final Cover - Side Slopes 25%

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

LAYER 1

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 9

THICKNESS	=	24.00	INCHES
POROSITY	=	0.5010	VOL/VOL
FIELD CAPACITY	=	0.2840	VOL/VOL
WILTING POINT	=	0.1350	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1362	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000006000E-03	CM/SEC

NOTE: SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY 2.01 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.

LAYER 2

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 9

THICKNESS	=	6.00	INCHES
POROSITY	=	0.5010	VOL/VOL
FIELD CAPACITY	=	0.2840	VOL/VOL
WILTING POINT	=	0.1350	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.5010	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.190000006000E-03	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE # 9 WITH A POOR STAND OF GRASS, A SURFACE SLOPE OF 25.% AND A SLOPE LENGTH OF 200. FEET.

SCS RUNOFF CURVE NUMBER	=	88.40	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	24.800	ACRES
EVAPORATIVE ZONE DEPTH	=	24.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	3.268	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	12.024	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.240	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	6.274	INCHES

TOTAL INITIAL WATER	=	6.274	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Hobbs New Mexico

STATION LATITUDE	=	32.26 DEGREES
MAXIMUM LEAF AREA INDEX	=	1.20
START OF GROWING SEASON (JULIAN DATE)	=	67
END OF GROWING SEASON (JULIAN DATE)	=	317
EVAPORATIVE ZONE DEPTH	=	24.0 INCHES
AVERAGE ANNUAL WIND SPEED	=	9.20 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	40.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	27.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	46.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	48.00 %

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR ROSWELL NEW MEXICO

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
0.46	0.46	0.54	0.79	1.93	1.85
2.16	2.37	2.54	1.54	0.55	0.55

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MIDLAND TEXAS

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
42.20	46.90	53.40	62.20	70.60	78.30
80.30	79.10	72.70	62.80	51.00	43.50

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR MIDLAND TEXAS
AND STATION LATITUDE = 32.40 DEGREES

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ANNUAL TOTALS FOR YEAR 1

	INCHES	CU. FEET	PERCENT
PRECIPITATION	12.67	1140604.000	100.00
RUNOFF	0.286	25773.869	2.26
EVAPOTRANSPIRATION	11.887	1070153.870	93.82
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.496	44676.441	3.92
SOIL WATER AT START OF YEAR	6.274	564780.125	
SOIL WATER AT END OF YEAR	6.770	609456.562	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.239	0.00

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ANNUAL TOTALS FOR YEAR 2

	INCHES	CU. FEET	PERCENT
PRECIPITATION	18.56	1670845.370	100.00
RUNOFF	0.443	39843.648	2.38
EVAPOTRANSPIRATION	17.681	1591742.620	95.27
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	0.436	39259.082	2.35
SOIL WATER AT START OF YEAR	6.770	609456.562	
SOIL WATER AT END OF YEAR	7.206	648715.625	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.011	0.00

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ANNUAL TOTALS FOR YEAR 3

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.16	1544811.750	100.00
RUNOFF	0.294	26484.334	1.71
EVAPOTRANSPIRATION	15.620	1406207.870	91.03
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	1.245	112119.445	7.26
SOIL WATER AT START OF YEAR	7.206	648715.625	
SOIL WATER AT END OF YEAR	8.369	753375.687	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.083	7459.389	0.48
ANNUAL WATER BUDGET BALANCE	0.0000	0.119	0.00

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ANNUAL TOTALS FOR YEAR 4

	INCHES	CU. FEET	PERCENT
PRECIPITATION	13.25	1192818.000	100.00
RUNOFF	0.554	49871.777	4.18
EVAPOTRANSPIRATION	13.960	1256744.500	105.36
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-1.264	-113798.227	-9.54
SOIL WATER AT START OF YEAR	8.369	753375.687	
SOIL WATER AT END OF YEAR	7.187	647036.812	
SNOW WATER AT START OF YEAR	0.083	7459.389	0.63
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.050	0.00

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ANNUAL TOTALS FOR YEAR 5

	INCHES	CU. FEET	PERCENT
PRECIPITATION	17.23	1551113.750	100.00
RUNOFF	0.570	51308.441	3.31
EVAPOTRANSPIRATION	16.923	1523502.620	98.22
PERC./LEAKAGE THROUGH LAYER 2	0.000000	0.000	0.00
AVG. HEAD ON TOP OF LAYER 2	0.0000		
CHANGE IN WATER STORAGE	-0.263	-23697.777	-1.53
SOIL WATER AT START OF YEAR	7.187	647036.812	
SOIL WATER AT END OF YEAR	6.924	623339.062	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.531	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	0.33	0.28	0.60	0.56	1.97	1.29
	2.59	2.09	2.42	1.23	1.40	1.01
STD. DEVIATIONS	0.37	0.07	0.51	0.45	1.86	1.57
	1.22	1.44	1.54	1.42	1.70	0.70
RUNOFF						
TOTALS	0.001	0.000	0.000	0.000	0.102	0.085
	0.087	0.018	0.049	0.075	0.012	0.001
STD. DEVIATIONS	0.003	0.000	0.000	0.000	0.187	0.149
	0.082	0.024	0.107	0.165	0.018	0.002
EVAPOTRANSPIRATION						
TOTALS	0.628	0.368	0.713	0.524	2.179	1.151
	2.267	2.490	1.793	1.215	1.068	0.818
STD. DEVIATIONS	0.541	0.097	0.548	0.407	1.784	1.720
	1.075	1.316	1.302	0.683	0.311	0.179
PERCOLATION/LEAKAGE THROUGH LAYER 2						
TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 2

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

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	INCHES		CU. FEET	PERCENT
PRECIPITATION	15.77	(2.637)	1420038.5	100.00
RUNOFF	0.429	(0.1362)	38656.41	2.722
EVAPOTRANSPIRATION	15.215	(2.3352)	1369670.37	96.453
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.00000	(0.00000)	0.000	0.00000
AVERAGE HEAD ON TOP OF LAYER 2	0.000	(0.000)		
CHANGE IN WATER STORAGE	0.130	(0.9447)	11711.79	0.825

****
******

****
*****

PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	2.03	182748.719
RUNOFF	0.419	37694.3750
PERCOLATION/LEAKAGE THROUGH LAYER 2	0.000000	0.00000
AVERAGE HEAD ON TOP OF LAYER 2	0.000	
SNOW WATER	1.33	119833.7270

MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2709
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.1350

****
*****

****
*****

FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	3.9182	0.1633
2	3.0060	0.5010
SNOW WATER	0.000	

****
*****

****
*****

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

ATTACHMENT C

SITE INSPECTION CHECKLIST (TYPICAL)

ATTACHMENT II.4.D
Post-Closure Site Inspection Checklist (Typical)
Sundance Services, Inc.

Date: _____ Inspector(s): _____

Time: _____ _____

Weather:

Temperature _____ deg. F Precipitation (last 24 hours) _____ inches

Skies _____

Wind Speed _____ mph

Wind Direction _____ *(direction blowing from)*

NOTES:
"X" indicates that a Deficiency has been noted. "P" indicates that a Photograph has been taken. "S" indicates that a Sample has been collected. Complete descriptions of Deficiencies, Photographs, and Samples are provided on attached pages. Items are referenced by Location.

Vegetation Condition

Location	Item			
	Vegetation Stress	Vegetation Dieback	Vectors	Sample

Surface Water Management System

Location	Deficiency			Sample
	Erosion/ Siltation	Structural Defect	Flow Obstruction	

NOTES: _____

_____

Corrective Actions Taken

Date	Deficiency		Sample
	Location	Corrective Actions	

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

ATTACHMENT D

VADOSE ZONE MONITORING PLAN

SUNDANCE SERVICES, INC.

VADOSE ZONE MONITORING PLAN

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SUNDANCE SERVICES, INC.

VADOSE ZONE MONITORING PLAN

1.0 INTRODUCTION

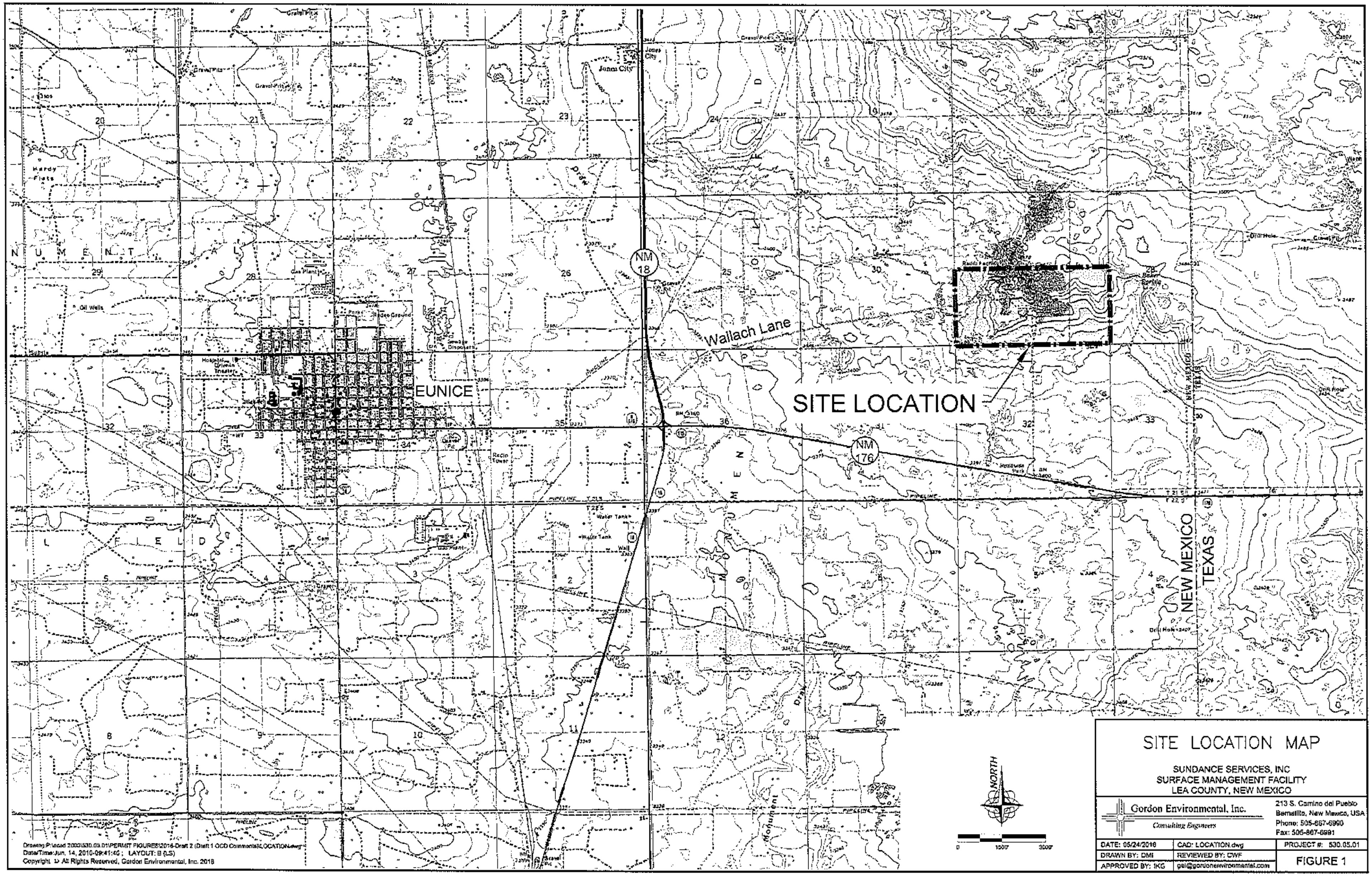
Sundance Services, Inc. (SSI Facility) is an operational Surface Waste Management Facility for oil field waste processing and disposal services. The proposed SSI Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically Part 36 and Permit NM-01-0003, administered by the Oil Conservation Division (OCD). The Facility is owned by, and will be constructed and operated by, Sundance Services, Inc.

1.1 Purpose

The purpose of this Vadose Zone Monitoring Plan (the Plan) is to provide SSI plans for the monitoring, recordkeeping, and reporting procedures for the site's vadose zone monitoring system during a subsequent to closure. The Plan, as presented herein, is based, in part, on the proposed Closure and Post-closure Plan that this plan is attached to.. This Plan identifies the locations of up to five vadose zone monitoring points that are positioned appropriately to provide for early detection of potential fluid releases at the site; and provides additional guidance for monitoring point installation.

1.2 Site Location

The SSI Facility is located approximately 3 miles east of Eunice, NM; 18 miles south of Hobbs, NM; and approximately 0.5 miles west of the TX/NM state line in unincorporated Lea County, NM. The SSI site is comprised of a 320-acre ± tract of land located in the South ½ of Section 29, Township 21 South, Range 38 East, Lea County, NM. Site access will continue to be provided via NM 18 and Wallach Lane. Access may also be provided via replacement access through the proposed Sundance West, Inc. Surface Waste Management Facility (Sundance West). A Site Location Map is provided as **Figure 1**.



SITE LOCATION MAP

SUNDANCE SERVICES, INC
SURFACE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 05/24/2016	CAD: LOCATION.dwg	PROJECT #: 530.05.01
DRAWN BY: DMI	REVIEWED BY: CWF	FIGURE 1
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing: P:\acad 2003\530.05.01\PERMIT FIGURES\2016-Draft 2 (Draft 1 OCD Comments)\LOCATION.dwg
Date/Time: Jun. 14, 2016-09:41:46 ; LAYOUT: B (LS)

1.3 Facility Description

The SSI Facility is an existing commercial Surface Waste Management Facility that includes the following components, which are also identified on **Figure 2**:

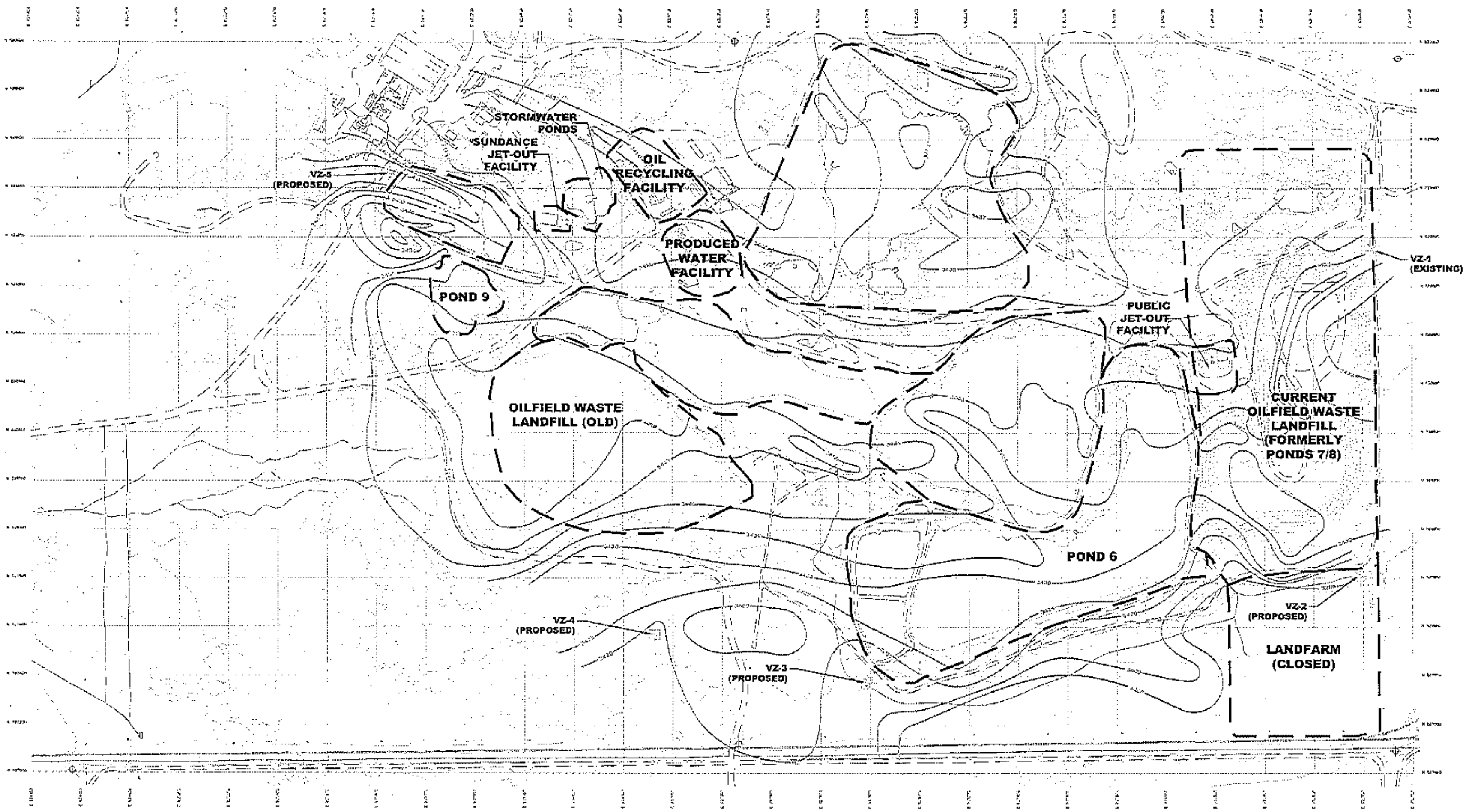
- Liquid Oil Field Waste Processing Area (80 acres ±)
  - Produced Water Facility
  - Drilling Fluids
  - Basic Sediment and Water (BS&W)
  - Jet Out Facility (SSI and Public)
  - Oil Recycling Facility
- Oil Field Waste Landfill (80 acres ±, Old and Current).
- Landfarm (Previously Closed with OCD)

2.0 VADOSE ZONE MONITORING NETWORK

The proposed vadose zone monitoring system for the SSI Facility is designed to provide for earliest possible detection of potential fluid releases from the closed Landfill and Ponds. The hydrogeologic setting lies near the boundary between the Southern High Plains Section and the Pecos Valley Section of the Great Plains Physiographic Province. The physiographic province is characterized by mildly deformed Triassic and Permian sedimentary rocks capped by the late Miocene-Pliocene Ogallala Formation. The local Site region is underlain primarily by the Late Tertiary/Quaternary-aged pedogenic caprock caliche that developed on all pre-Quaternary formations on the southern High Plains. Young windblown sands of the Blackwater Draw Formation (BDF) overlie the caprock caliche. Unconsolidated to semi-consolidated sands and gravels of the Ogallala, Antlers, and Gatuña Formations (locally referred to as OAG) lie between the caprock and underlying red beds of the Dockum Group (Chinle Group). In summary, the vadose zone monitoring wells (VZs) will be positioned such that downgradient wells are located downslope on the mapped redbed surface (i.e., Chinle Formation) to the east, south and west of the Facility. No upgradient wells are proposed considering that the OAG has been excavated, exposing the redbed surface north of the SSI Facility (**Figure 2**). The redbed structure map provided as **Figure 3** presents a detailed depiction of the terrain on the redbed surface at the Facility; as well as a high confidence level that the proposed downgradient VZs are positioned directly downslope from the closed waste disposal areas in the zone most appropriate for detection of a potential release.

2.1 Monitoring Well Locations

Figure 3 depicts the location of the proposed vadose zone monitoring network designed specifically to address both the known slope of the redbed surface relative to the closed Landfills and Ponds.



LEGEND

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- TOP OF REDBED CONTOUR

NOTE:
SEPTEMBER 9, 2014 AERIAL PHOTOGRAPHY PERFORMED BY BLUE SKIES CONSULTING LLC. MAPPING PERFORMED BY AEROTECH MAPPING INC.

NORTH

0 200' 400'

CHINLE FORMATION (REDBED) SURFACE
SUNDANCE SERVICES, INC
SURFACE WASTE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 05/24/2016	CAD: REDBED CONTOURS.dwg	PROJECT #: 530.03.01
DRAWN BY: DMI	REVIEWED BY: CWF	FIGURE 3
APPROVED BY: IKG	gei@gordonenvironmental.com	

The monitoring network strategy consists of the following elements, which are designed to correlate with the closed Landfills and Ponds shown in **Figure 3**:

1. Well VZ-1 is an existing well that was installed in 2009, east of and downgradient to the Landfills eastern boundary. This installation meets the specifications referenced in Section 2.2.
2. Following approval of the Closure Plan, wells VZ-2, VZ-3, VZ-4 and VZ-5 will be installed to evaluate ambient conditions; and will be constructed in accordance with the specifications listed in Section 2.2. Wells VZ-2, VZ-3, VZ-4 and VZ-5 will be positioned as "sentinel" downgradient wells around the remainder of the closed perimeter, and are specifically located in proximity to identified depressions in the redbed interface (See **Figure 3**) where liquids would be expected to accumulate.

2.2 Well Drilling and Completion

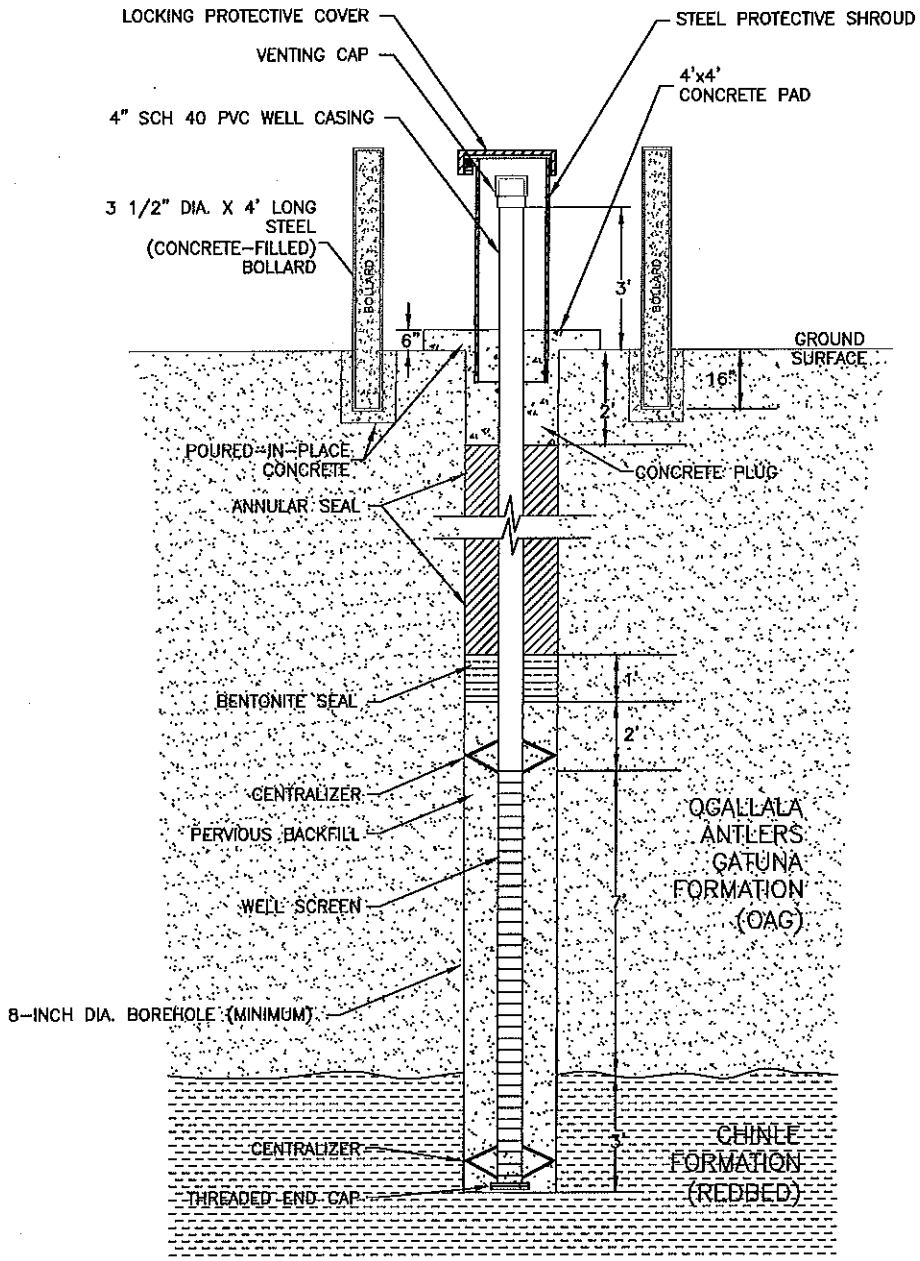
Prior to installation of the vadose zone monitoring wells, drilling permits will be obtained from the New Mexico Office of the State Engineer (NMOSE). The vadose zone monitoring wells will be installed using hollow-stem auger drilling methods; and no fluids will be introduced into the borings during drilling. Undisturbed, depth-referenced samples of penetrated sediments will be collected on at least 5-ft intervals using split-spoon sampling equipment. Drive blow counts will be logged during each sampling interval to allow precise determination of the upper redbed surface in each boring; which has typically been well-defined during other subsurface investigations. A qualified hydrogeologist will be present on-site during drilling activities; and will prepare detailed descriptions of the lithology, texture, sorting, rounding, color, and degree of lithification and moisture content of each sample and stratigraphic unit that is penetrated.

Although split-spoon sampling offers ample opportunity to identify saturated sediments with a high degree of confidence, each boring will be further evaluated for the presence of free water. Upon reaching total depth, the drilling rig will be placed on standby for a minimum of two hours, during which time the inside of the augers will be sounded to check for the potential for accumulating fluid.

The vadose zone monitoring wells will be constructed in accordance with the specifications set forth in **Table 1**, and the well detail sheet provided as **Figure 4**:

TABLE 1
Vadose Zone Monitoring Well Installation Specifications
Sundance Services, Inc.

- The well borehole will be drilled a minimum of 4 inches (in) larger than the casing diameter to allow for the emplacement of the well casing and annular space materials.
- Each boring will be advanced approximately 3 ft into the indurated Chinle Formation (redbed).
- Care will be taken not to introduce contamination to the well, i.e., all tools will be decontaminated prior to drilling the borehole.
- Each well will be constructed with 4-in inside diameter (ID) Schedule 40 (SCH 40) polyvinylchloride (PVC) flush-joint casing equipped with a threaded end cap.
- The well casing will extend from the bottom of the borehole to at least 3 ft above ground surface.
- The well casing will be constructed with a 10-ft length of 0.010-in slotted well screen. The well screen will be positioned with the lowermost portion extending approximately 3 ft below the detected upper redbed surface and the upper portion extending approximately 7 ft into the overlying alluvium. Casing centralizers will be placed at the top and bottom of the screened interval as shown on **Figure 4**.
- The remaining well casing will be constructed with solid 4-in ID SCH 40 PVC flush-joint casing equipped with a venting cap.
- The annular space from the bottom of the borehole to 2 ft above the top of the well screen will be packed with 10-20 grade silica sand.
- A minimum of 1 ft of the annular space above the upper surface of the silica sand will be sealed with hydrated granular bentonite or bentonite chips.
- The annular space above the bentonite seal to 3 ft below ground surface will be sealed with bentonite-cement grout (minimum 2% - 5% bentonite).
- The upper 3 ft of the annular space will be filled with concrete to anchor a steel protective shroud.
- The steel protective shroud shall be minimum 6-inch ID, and will be equipped with a 2-piece cast locking protective cover. The locking protective cover shall be positioned a minimum of 6 in from the top of the PVC well casing to allow for easy access for removal of the PVC vent cap.
- A 4-ft x 4-ft x 6-in-thick concrete pad will be poured around the steel protective shroud. The pad will be radially sloped away from the well to promote stormwater drainage away from the well; and will be protected on each corner by a steel, concrete-filled bollard.
- The top of PVC casing, top of steel shroud, and top of concrete pad of the new monitoring well will be surveyed, referenced to a standard horizontal grid and elevations relative to the site control; and will be subsequently mapped by a licensed surveyor. The location of the well will be determined to within one-tenth of a foot, and the height above sea level at the top of the casing will be determined to within one-hundredth of a foot.
- Well completion data; NMOSE drilling permits and well records; and survey location information will be submitted to OCD in a "Well Completion Report".



TYPICAL VADOSE ZONE MONITORING WELL

NOT TO SCALE

LEGEND

CASING: 4" DIA. SCH 40 PVC

SCREEN: 4" DIA. 0.010" MACHINE SLOT SCH 40 PVC

PERVIOUS BACKFILL: 10-20 COLORADO® SILICA SAND OR EQUIVALENT

ANNULAR SEAL: NEAT CEMENT WITH 2% TO 5% BENTONITE

NOTE:

SPECIFIC VERTICAL DIMENSIONS FOR EACH NEW WELL WILL BE INCLUDED IN OSE AND OCD SUBMITTALS.

DRAFT

VADOSE ZONE MONITORING WELL CONSTRUCTION DETAIL

SUNDANCE SERVICES, INC.
SURFACE MANAGEMENT FACILITY
LEA COUNTY, NEW MEXICO

Gordon Environmental, Inc.
Consulting Engineers
213 S. Camino del Pueblo
Bernalillo, New Mexico, USA
Phone: 505-867-6990
Fax: 505-867-6991

DATE: 05/26/2016	CAD: VADOSE MW .dwg	PROJECT #: 530.05.01
DRAWN BY: DMI	REVIEWED BY: CWF	FIGURE 4
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\530.05.01\PERMIT FIGURES\2016-Draft 2 (Draft 1 OCD Comments)\UPDATED VADOSE MW.dwg
Date/Time:May. 27, 2016-08:16:21

3.0 VADOSE ZONE MONITORING PROGRAM

Evidence of fluids in the VZs should not necessarily be attributed to impacts from the Landfill; and the fluid's origin must be interpreted correctly. For example, reconfiguration of Facility stormwater controls may alter surface water recharge to the subsurface, eliminating the source water. In addition, it is possible that some liquids may accumulate in a monitoring well from condensation within the well casing. The following sections describe the planned monitoring protocol for the SSI Facility vadose zone monitoring network.

3.1 Monitoring Schedule

The proposed vadose zone monitoring program will initially include inspection of each well for the presence of fluid. After the initial inspection, each VZ will be monitored for the presence of free liquids on an annual basis as required by 19.15.36.18.D (3)(b) NMAC.

3.2 Monitoring Assessment

Monitoring for the presence of liquid will be performed by lowering a calibrated electronic tape (i.e., water level indicator) that emits an audible signal when a water surface is penetrated. Total well depth measurements will also be recorded with the same electronic tape. **Appendix A** to this Plan is a typical field information form that may be used for routine vadose zone monitoring purposes.

If the water level indicator shows that free liquids are present in the well casing, an attempt will be made to evacuate the liquid to investigate its origin by lowering a 2-in PVC or Teflon bailer to remove the liquid from the well for sampling/testing purposes. A low flow or "micro-purge" technique may also be used in-lieu of the bailer. If a sufficient liquid sample cannot be retrieved, then the quantity of liquid in the well will be considered *de minimus*; and likely the result of condensation. The same procedures will be used to check for liquid and evacuate (as necessary or if possible) for each subsequent monitoring event.

If a sufficient quantity of liquid is available to allow sample collection, the liquid will be field-screened for specific conductance (SC), pH, and temperature (i.e., field parameters). In addition, initial sampling will include independent qualified commercial laboratory analysis for the parameters identified in **Table 2**. The initial field and laboratory data will be evaluated to determine if the water encountered is the result of surface water infiltration; or potential impacts

from the closed Landfills or Ponds. The data collected will be compared to regulatory groundwater standards established by the OCD and the Water Quality Control Commission (WQCC).

If the initial analyses indicate that no impact from the closed Landfills or Ponds is evident (based on a comparison to the regulatory groundwater standards previously identified), then routine monitoring of the available groundwater will continue on a semi-annual basis, as applicable for wells with a measurable (recoverable) water column. If subsequent monitoring indicates elevated readings (i.e., above the regulatory groundwater standards) relative to the initial analysis (i.e., greater than the OCD and WQCC standards), additional samples will be collected for laboratory analyses, and the data will be evaluated in accordance with the following Section to determine if a release from the closed Landfills or Ponds is possible.

3.3 Monitoring Data Evaluation

If the groundwater analysis indicates that a groundwater sample exceeds the regulatory groundwater standards, OCD will be notified within 48 hours and well verification re-sampling (VRS) for the parameters listed in **Table 2** will be conducted within 2-weeks. If the VRS analytical results indicate that a potential release may have occurred, the SSI Facility will provide notification of the discovery to the OCD Hobbs district office following the release notification procedures outlined in 19.15.29 NMAC.

Within 60-days of the receipt of notice from the OCD that an Abatement Plan is required, the SSI Facility will submit an Abatement Plan Proposal (in accordance with 19.15.30.13) detailing the proposed course of action to investigate further the potential release; and/or complete any mitigation measures as appropriate.

If this further evaluation indicate that the release is contained and no impacts have occurred, the monitoring data will be maintained as part of the Facility Operating Record, and submitted with annual vadose zone monitoring data for the Facility.

TABLE 2
Vadose Zone Monitoring Parameters
Sundance Services, Inc.

Field Parameters

- Specific Conductance
- pH
- Total Well Depth
- Temperature
- Depth to Water

Major Cations

- Calcium
- Magnesium
- Sodium
- Iron
- Potassium

Major Anions

- Fluoride
- Nitrate as N
- Sulfate
- Chloride
- Phosphorous

RCRA Metals

- Arsenic
- Barium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Silver

Organic Compounds

- Benzene
- Toluene
- Ethylbenzene
- Xylenes

Additional Parameters

- Total Dissolved Solids (TDS)
- Total Petroleum Hydrocarbons (TPH)

SUNDANCE SERVICES, INC.

VADOSE ZONE MONITORING PLAN

APPENDIX A
VADOSE ZONE MONITORING FORM
(TYPICAL)

APPENDIX A

Vadose Zone Monitoring Form (Typical)

Sundance Services, Inc.

ng Personnel _____

In mation

Date and Amount of Last Precipitation: _____

Temp: _____ °F

Wind Speed: _____ mph

Wind Direction: _____

Barometric Pressure: _____ inches mercury (Hg)

Weather Conditions: _____

nt Information

Monitoring Equipment Used: _____

Date and Time Last Calibrated: _____

Monitoring Equipment Used: _____

Date and Time Last Calibrated: _____

I.D.	Monitoring Date (dd/mm/yy)	Total Well Depth (fbtoc)	Depth to Water (fbtoc)	Field Parameter Measurement			Water Volume Removed (gallons)	Sample Collected?		Observations (e.g., color, odor, clarity, etc.)
				Temperature (oC)	pH (standard units)	Specific Conductance (mS/cm)		Y	N	
-1										
-2										
-3										
-4										
-5										

bove mean sea level
below top of PVC casing

SUNDANCE SERVICES, INC.

VADOSE ZONE MONITORING PLAN

APPENDIX B

VADOSE ZONE MONITORING WELLS

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

ATTACHMENT E

CLOSURE/POST-CLOSURE COST ESTIMATES

COST ESTIMATE TASK SUMMARY
CLOSURE/POST-CLOSURE
SUNDANCE SERVICES, INC.

TASK	COST ESTIMATE
1.0 LANDFILL CLOSURE CONSTRUCTION	$1,075,200
2.0 LANDFILL MAINTENANCE (Post-Closure)	$204,000
3.0 ENVIRONMENTAL MONITORING (Post-Closure)	$300,000
4.0 POND AND PROCESSING AREA CLOSURE CONSTRUCTION	$1,781,000
5.0 PROCESS AREA MAINTENANCE (Post-Closure)	$34,800
TOTAL COST ESTIMATE	$3,395,000

TASK 1.0
LANDFILL CLOSURE CONSTRUCTION
CLOSURE COST ESTIMATE
SUNDANCE SWERVICES, INC.

TASK 1.0	Unit	Unit Quantity	Unit Cost	Total Cost
1.0 Waste Relocation (Current Landfill Only)	CY	500,000	$1.00	$500,000
1.1 Final Cover Installation				
1.1.1 Final Grading & Contouring				
1.1.1.1 Current Landfill (Completed w/waste relocation)	AC	27.6	$0.00	$0
1.1.1.2 Closed Landfill	AC	16.4	$500.00	$8,200
1.1.1.3 Containment Ponds 1, 5, & 6 (Completed with reloc	AC	44.5	$0.00	$0
1.1.2 Install and compact 6" Infiltration (Barrier) Layer				
1.1.2.1 Current Landfill	CY	22,500	$1.50	$33,750
1.1.2.2 Closed Landfill	CY	13,500	$1.50	$20,250
1.1.2.3 Containment Ponds 1, 5, & 6	CY	37,500	$1.50	$56,250
1.1.3 Install 24" Erosion (Vegetative) Layer				
1.1.3.1 Current Landfill	CY	90,000	$1.00	$90,000
1.1.3.2 Closed Landfill	CY	54,000	$1.00	$54,000
1.1.3.3 Containment Ponds 1, 5, & 6	CY	150,000	$1.00	$150,000
1.1.4 Vegetative Layer Seeding (Class A)				
1.1.4.1 Current landfill	AC	27.6	$1,500	$41,400
1.1.4.2 Closed Landfill	AC	16.4	$1,500	$24,600
1.1.4.3 Containment Ponds 1, 5, & 6	AC	44.5	$1,500	$66,750
			Task Subtotal	**$1,045,200**
1.2 Final Cover CQA				
1.2.1 Inspection and Testing	LS	1	$25,000	$25,000
1.2.2 Certification	LS	1	$5,000	$5,000
			Task Subtotal	**$30,000**
			TOTAL COST	**$1,075,200**

Notes:

1. Closure costs are based on contracting with a qualified third party to complete and certify closure. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. Final cover installation costs assume that:
   - The greatest area requiring final cover is 88.5 acres ±.
   - All soils necessary for closure are available on-site.
3. CY = Cubic Yard
   AC = Acre
   LS = Lump Sum

TASK 2.0
LANDFILL MAINTENANCE
POST-CLOSURE COST ESTIMATE
SUNDANCE SERVICES, INC.

TASK 2.0	Unit Quantity	Unit	Unit Cost	Total Cost Per Year	Total Cost For 30 Years
2.1 Final Cover Inspection and Reporting					
2.1.1 Inspection	2	events/yr	$400	$800	$24,000
2.1.2 Recordkeeping and Reporting	2	events/yr	$400	$800	$24,000
			Task Subtotals	**$1,600**	**$48,000**
2.2 Final Cover Maintenance					
2.2.1 Cover Maintenance	1	AC/yr	$1,000	$1,000	$30,000
2.2.2 Vegetation	2	AC/yr	$1,500	$3,000	$90,000
			Task Subtotals	**$4,000**	**$120,000**
2.3 Surface Water Management System					
2.3.1 Inspection/Repairs	1	events/yr	$600	$600	$18,000
			Task Subtotals	**$600**	**$18,000**
2.4 Fencing					
2.4.1 Inspection/Repairs	1	events/yr	$600	$600	$18,000
			Task Subtotals	**$600**	**$18,000**
			TOTAL COST	**$6,800**	**$204,000**

Notes:

1. Post-closure maintenance costs are based on contracting with a qualified third party to conduct post-closure care maintenance for the landfill. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. AC = Acre
   LS = Lump Sum

TASK 3.0
ENVIRONMENTAL MONITORING
POST-CLOSURE COST ESTIMATE
SUNDANCE SERVICES, INC.

TASK 3.0	Unit Quantity	Unit	Unit Cost	Total Cost Per Year	Total Cost for 30 Years
3.1 Vadose Zone Monitoring					
3.1.1 Field Services/Lab Analysis/Reporting	1	events/yr	$10,000	$10,000	$300,000
			Task Subtotal	**$10,000**	**$300,000**
			TOTAL COST	**$10,000**	**$300,000**

Notes:

1. Closure costs are based on contracting with a qualified third party to conduct post-closure monitoring for the landfill. The activities included in this cost estimate are based on current dollars, previous experience with landfills located in arid climates, and current subcontractor costs.
2. Assume monitoring 5 wells (i.e., sampling and analysis costs).
3. LS = Lump Sum

TASK 4.0

POND AND PROCESSING AREA CLOSURE CONSTRUCTION
CLOSURE COST ESTIMATE
SUNDANCE SERVICES, INC.

Task 4.0	Units	Unit Cost	Total Quantity	Total Cost
4.1 Evaporation Pond				
4.1.1 Liquids Transport/Disposal				
4.1.1.1 Transport Liquid	BBL	$0.01	100,000	$ 1,000
4.1.1.2 Disposal Liquids	BBL	$0.50	100,000	$ 50,000
4.1.1.3 Remove/Transport Sludge (included w/Pond Excavation)	CY	$2.50	0	$ -
4.1.1.4 Sludge Solidification	CY	$1.00	250,000	$ 250,000
			Task Subtotal	**$ 301,000**
4.1.2 Pond Excavation, Backfill and Contouring				
4.1.2.1 Excavate Ponds 2, 3, 4, & 9/Backfill in Ponds 1, 5 & 6	CY	$0.50	1,575,000	$ 787,500
			Task Subtotal	**$ 787,500**
4.1.3 Sampling	EA	$1,000	500	$ 500,000
4.1.3 Seeding Ponds 2, 3, 4, & 9	AC	$1,500	45	$ 67,500
			Task Subtotal	**$ 567,500**
Pond Closure Subtotal:			**$**	**1,656,000**
4.2 Site Work				
4.2.1 Tank Removal	LS		$	25,000
4.2.2 Building Removal	LS		$	25,000
4.2.3 Process Equipment Removal	LS		$	25,000
4.2.4 Earthwork	LS		$	10,000
Site Work Subtotal:			**$**	**85,000**
4.3 Engineering				
4.3.1 CQA/Certification	LS		$	40,000
Engineering Subtotal:	LS		**$**	**40,000**
Total:			**$**	**1,781,000**

Notes:

1. Closure costs are based on contracting with a qualified third party to complete and certify closure.
2. Assumes remaining, unevaporated capacity of ponds is remediated onsite.
3. Assumes remaining solids in each pond at closure are solidified and disposed onsite.
4. Site Sampling is conducted to a depth confirmed clean.
5. CY = Cubic Yard
   AC = Acre
   LS = Lump Sum
   EA = EachAcre
   BBL = Barrell (US)

TASK 5.0
POND AND TREATMENT PLANT MAINTENANCE
POST-CLOSURE COST ESTIMATE
SUNDANCE SERVICES, INC.

TASK 5.0	Unit Quantity	Unit	Unit Cost	Total Cost Per Year	Total Cost For 3 Years
5.1 Surface Inspection and Reporting					
5.1.1 Inspection	2	events/yr	$400	$800	$2,400
5.1.2 Recordkeeping and Reporting	2	events/yr	$400	$800	$2,400
			Task Subtotals	**$1,600**	**$4,800**
5.2 Surface Maintenance					
5.2.1 Cover Maintenance	1	AC/yr	$1,000	$1,000	$3,000
5.2.2 Vegetation	2	AC/yr	$1,500	$3,000	$9,000
			Task Subtotals	**$4,000**	**$12,000**
5.3 Fencing					
5.3.1 Inspection/Repairs	1	events/yr	$600	$600	$3,600
			Task Subtotals	**$600**	**$18,000**
			TOTAL COST	**$6,200**	**$34,800**

Notes:
1. Pond (Ponds 2, 3, 4, & 9) and Treatment Plant closure maintenance costs are based on contracting with a qualified third party to conduct post-closure care maintenance. The activities included in this cost estimate are based on current dollars, previous experience with closures located in arid climates, and current subcontractor costs.
2. AC = Acre
   LS = Lump Sum

CLOSURE/POST-CLOSURE PLAN
SUNDANCE SERVICES, INC.

ATTACHMENT F

FINANICAL ASSURANCE DOCUMENTATION

TO BE PROVIDED UPON CLOSURE PLAN APPROVAL

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720
District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 125006

CONDITIONS

Operator: SUNDANCE SERVICES, INC. P.O. Box 1737 Eunice, NM 88231	OGRID: 149972
	Action Number: 125006
	Action Type: [C-137] Non-Fee SWMF Submittal (SWMF NON-FEE SUBMITTAL)

CONDITIONS

Created By	Condition	Condition Date
bjones	None	7/13/2022