NM1-57

Revised Permit Application

June 2014

Volume 2, Part 1 of 2: Facility Management Plans

STATE OF NEW MEXICO
DIRECTOR OF OIL CONSERVATION DIVISION

IN THE MATTER OF THE APPLICATION OF DNCS PROPERTIES, LLC FOR A SURFACE WASTE MANAGEMENT FACILITY PERMIT

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

NOVEMBER 2013
(UPDATED JUNE 2014)

VOLUME II: FACILITY MANAGEMENT PLANS

Prepared For:

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Submitted To:

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Oil Conservation Division
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APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

TABLE OF CONTENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

TABLE OF CONTENTS (cont.)

VOLUME IV: SITING AND HYDROGEOLOGY

LIST OF PERMIT PLANS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

LIST OF ATTACHMENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

1.0 INTRODUCTION

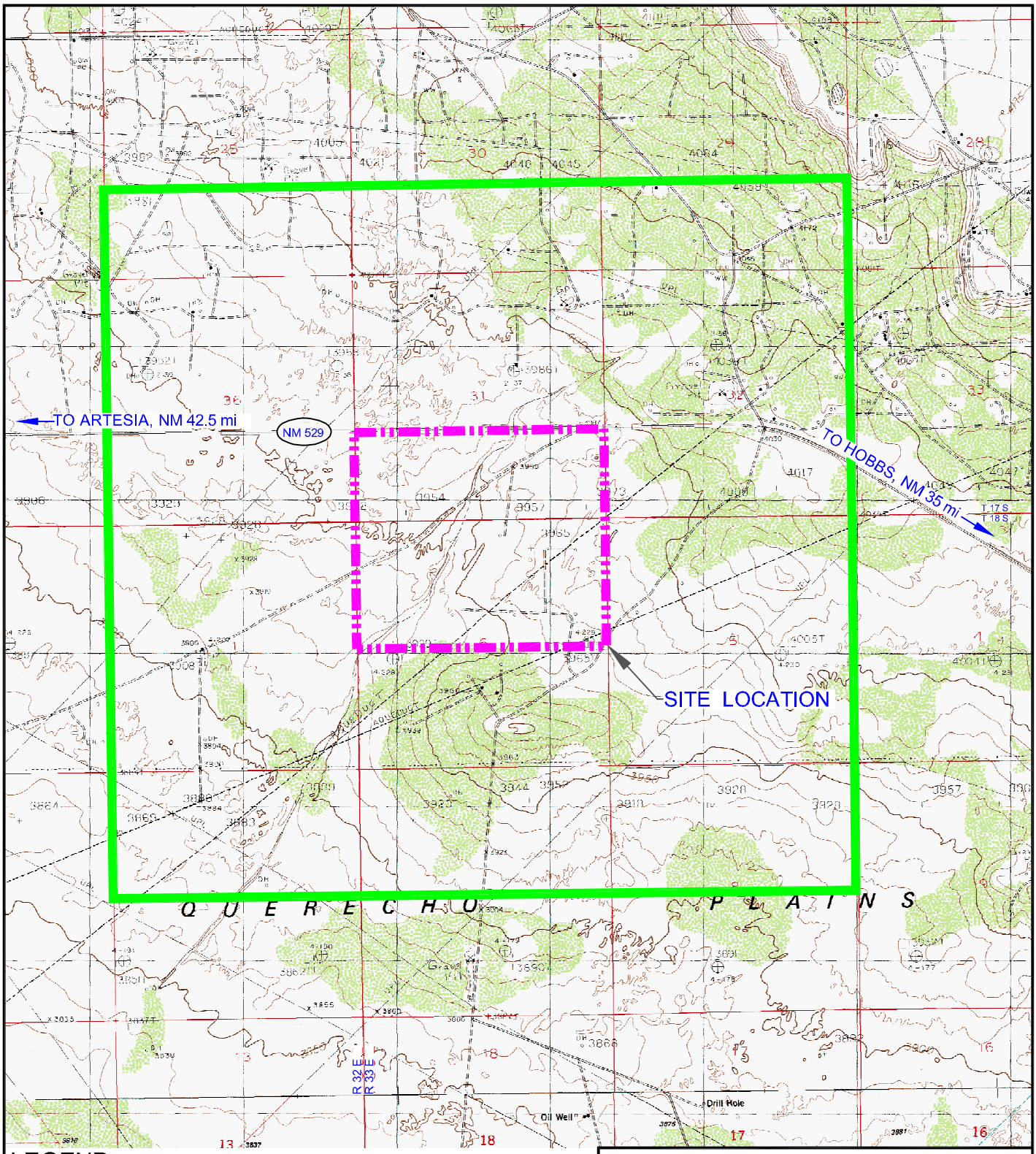
DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Purpose

The purpose of this Operations, Inspection & Maintenance Plan (the Plan) is provide guidance to the DNCS Facility staff in the daily operational procedures that have been established in compliance with 19.15.36.8 and 19.15.36.13 NMAC to provide protection of fresh water, public health, safety, and the environment. **Table II.1.1** (OCD Requirements) provides an outline of the specific 19.15.36 NMAC requirements addressed by this Plan.

1.2 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.1.1**). The areas proposed for waste processing (177 acres ±) and landfilling (318 acres ±) comprise a total facility footprint of 495 acres ±. Site access will be provided on the south side of NM 529.



LEGEND

SITE BOUNDARY

1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 12, 2014-12:57:58 ; LAYOUT: A (P)

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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

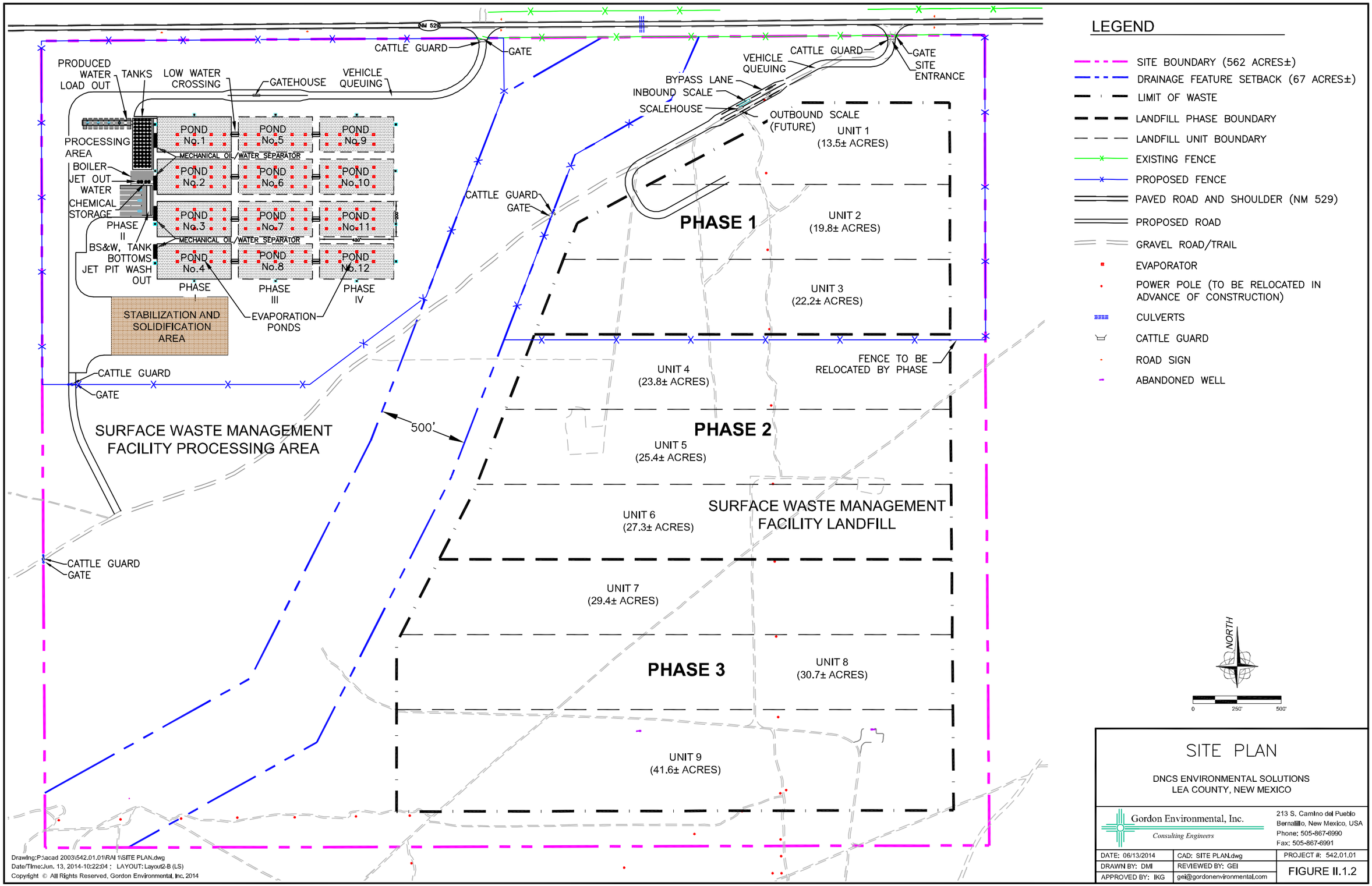
DATE: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.1.1
APPROVED BY: IKG	gei@gordonenvironmental.com	

TABLE II.1.1
OCD Requirements: 19.15.36 NMAC
DNCS Environmental Solutions

19.15.36.8.C(4)	*a description of the surface waste management facility with a diagram indicating the location of fences and cattle guards, and detailed construction/installation diagrams of pits, liners, dikes, piping, sprayers, tanks, roads, fences, gates, berms, pipelines crossing the surface waste management facility, buildings and chemical storage areas;*
19.15.36.8.C(7)	*an inspection and maintenance plan that complies with the requirements contained in Subsection L of 19.15.36.13 NMAC;*
19.15.36.8.C(14)	*a best management practice plan to ensure protection of fresh water, public health, safety and the environment;*
19.15.36.13.L	*Each operator shall have an inspection and maintenance plan that includes the following:*
	(1) *monthly inspection of leak detection sumps including sampling if fluids are present with analyses of fluid samples furnished to the division; and maintenance of records of inspection dates, the inspector and the leak detection system's status;*
	(3) *inspections of the berms and the outside walls of pond levees quarterly and after a major rainfall or windstorm, and maintenance of berms in such a manner as to prevent erosion.*

1.3 Facility Description

The DNCS Facility is a proposed new Surface Waste Management Facility that will include two main components; an oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±). Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Plan provided as **Figure I.1.2** identifies the locations of the Processing Area and Landfill facilities, which are further detailed on the **Permit Plans** (**Volume III.1**). The proposed facilities are detailed in **Table II.1.2**, and are anticipated to be developed in four primary phases as described in **Table II.1.3**.



SITE PLAN

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

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

DATE: 06/13/2014	CAD: SITE PLAN.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.1.2
APPROVED BY: IKG	gei@gordonenvironmental.com	

TABLE II.1.2
Proposed Facilities[1]
DNCS Environmental Solutions

Description	No.
Oil field waste disposal landfill	1
Produced water load-out points	9
Produced water receiving tanks	12
Produced water settling tanks	48
Mechanical oil/water separation unit	4
Evaporation ponds	12
Stabilization and Solidification Area	1
Oil treatment plant	1
Crude oil recovery tanks	5
Oil sales tanks	5
Customer jet wash	1 (6 bays)

Note:
[1]Subject to change. The proposed facilities are based on projected waste types and volumes; therefore this list may be modified in response to changes in waste streams, market conditions, technology, etc.

TABLE II.1.3
DNCS Development Sequence[1]
DNCS Environmental Solutions

Description	Summary	Year No.[2]
Phase I - Initial Landfill & Produced Water Processing Operation.		
• Initial Landfill Cell (13.5-acres) • Produced water load-out points (4) • Tank farm berm (complete) • Boiler (75 HP) running a heat transfer fluid tank farm • Produced Water Receiving Tanks (4), 1,000 bbl capacity[3] • Settling Tanks (16), 1,000 bbl capacity • Crude Oil Recovery Tank (1), 1,000 bbl capacity • Oil Sale Tank (1), 1,000 bbl capacity • Mechanical Oil/Water Separation Unit • Ponds (4) capable of evaporating 3,000 bbl of liquid per day	The oil recovered from the Produced Water Processing Operations process is anticipated to be 6 bbl per day. This material will be pumped to the heated crude oil recovery tank for further processing before being pumped to the oil sale tank.	1
Phase II - Jet-Out Pit Operation.		
• Jet-Out Pit (six-station) for handling basic sediment and water (BS&W), tank bottoms, oily drilling muds and tank wash-outs • Additional crude oil recovery tank (1), 1,000 bbl capacity • Install 5-acre Stabilization and Solidification area	The oil recovered from the top of the Jet-Out Pit will be pumped to a heated Crude Oil Recovery Tank installed in the Tank Farm. Oil recovery from the Produced Water Tanks will also be plumed to this tank. Water recovered from the Pit will be pumped to the Produced Water Receiving Tanks. Sediments from the Pit will be bucket-loaded out of the pit and transferred to the Stabilization and Solidification Area for processing prior to landfilling.	2
Phase III - Expanded Produced Water Processing Operation.		
• Produced water load-out points (4) • Additional Produced Water Receiving Tanks (4), 1,000 bbl capacity • Additional Settling Tanks (16), 1,000 bbl capacity • Additional Crude Oil Recovery Tanks (3), 1,000 bbl capacity • Additional Oil Sales Tanks (2), 1,000 bbl capacity • Additional (2) Mechanical Oil/Water Separation Units • Additional ponds (4) capable of evaporating an additional 5,000 bbl per day of liquid	The additional oil recovered from the expanded Produced Water Processing Operation process, anticipated to be 6 bbl per day, will pumped to the Crude Oil Recovery tanks for further processing.	3
Phase VI - Ultimate Produced Water Processing Facility.		
• Additional Produced Water Receiving Tank (4), 1,000 bbl capacity • Additional Settling Tanks (16), 1,000 bbl capacity • Additional Oil Sales Tanks (1), 1,000 bbl capacity • Additional Mechanical Oil/Water Separation Unit • Additional ponds (4) capable of evaporating an additional 4,000 bbl per day of liquid	The additional oil recovered from the ultimate Produced Water Processing Facility will be pumped to the Crude Oil Recovery Tank for further processing.	4

Notes:

[1] *The DNCS site development sequence is subject to change. Different combination of these improvements may be constructed at any time.*

[2] *Estimated number of years after OCD Surface Waste Management Facility Permit issued*

[3] *bbl = barrels of oil*

2.0 GENERAL FACILITY INFORMATION

2.1 Land Use and Zoning

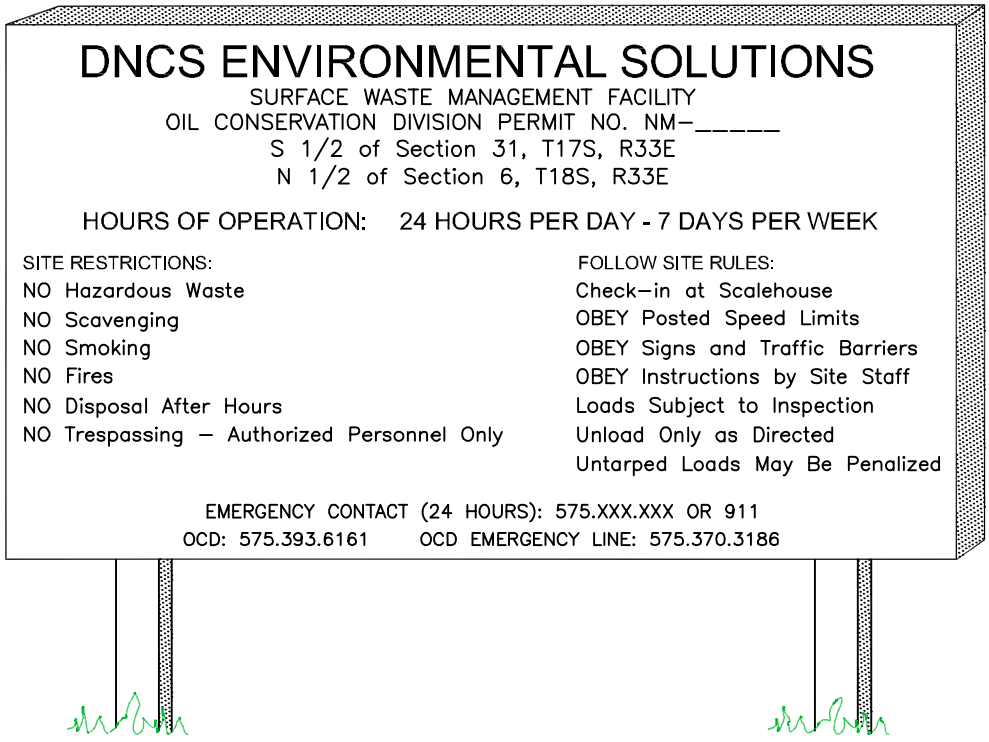
The DNCS Facility is located within a 562 acre ± tract in unincorporated eastern Lea County, approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles south of Maljamar, NM (**Figure II.1.1**). The Facility is surrounded by undeveloped space on all sides with NM 529 situated along the northern boundary and mineral exploration (oil and gas) the only local development. The closest permanent residence is located in Maljamar, NM, approximately 6.3 miles to the northwest. Lea County does not have zoning specifications on land use in unincorporated areas.

2.2 Access Control

Access control for DNCS will be provided by perimeter fencing for both the Processing Area and the Landfill; cattle guards; locking gates; and employee presence when open for waste receipts. No oil field waste will be accepted unless an attendant is on duty. The Facility will be gated and locked when the site is not attended. The Site Location Map is plotted on the most recent United States Geological Survey (USGS) map (**Figure II.1.1**) and shows the Facility location in relation to state roads and adjacent features. The Site Plan, provided as **Figure II.1.2,** provides a plan view of the Facility showing the proposed layout, fencing, gates, and cattle guards.

2.3 Site Signs

A sign will be posted at the Facility entrance which identifies the location of the site, hours of operation, emergency telephone numbers, and delivery instructions (**Figure II.1.3A**). Additional site rules that are applicable to both Facility personnel and customers will be posted at the receiving areas and along the access roads to advise drivers concerning speed limits, prohibited activities, acceptable waste types, delivery instructions, and other health and safety precautions. Example signs are provided in **Figure II.1.3B**. Identification and cautionary signs for pits, ponds, and tanks in the Processing Area will also be installed at the Facility as needed.



SITE ENTRANCE SIGN (TYPICAL)

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: ENTRANCE SIGN.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.1.3A
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\ENTRANCE SIGN.dwg
Date/Time:Jun. 12, 2014-13:39:17

DNCS ENVIRONMENTAL SOLUTIONS

LEA COUNTY, NEW MEXICO

S ½ SECTION 31, T17S, R 33E
N ½ SECTION 6, T18S, R 33E

OIL CONSERVATION DIVISION PERMIT NO. NM-_____

SITE SIGNS (TYPICAL)

DNCS ENVIRONMENTAL SOLUTIONS
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: 10/23/2013	CAD: SITE SIGNSdwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.1.3B
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\PERMIT FIGURES\SITE SIGNS.dwg
Date/Time:Oct. 23, 2013-14:48:58

2.4 Traffic

Traffic will arrive at the DNCS Facility by traveling east or west on NM 529, turning south at the site access points into the Processing Area or Landfill. Traffic for the Facility is not anticipated to have an impact on current public transportation patterns. Vehicles accessing the Facility, including staff, are anticipated initially to average 100 vehicles per day (vpd). Daily traffic flow into the Facility may increase to over 500 vpd as oil field production activities continue to increase and more companies utilize the Facility. Traffic flow for the DNCS Facility is depicted on **Figures II.1.4A** (Processing Area) and **II.1.4B** (Landfill).

3.0 FACILITY PERSONNEL

3.1 Requirements and Duties

Daily operations at the Facility will be supervised by the DNCS management team located onsite in the Processing Area Gatehouse and the Landfill Scalehouse (**Figure II.1.2**). Management and administrative support will be provided by DNCS personnel routinely on-site. Disposal operations will only be conducted when an attendant is on duty. Acceptance criteria for the oil field waste are described in the Oil Field Waste Management Plan (**Volume II.2**). The initial general staffing list for the Facility is provided in **Table II.1.4**, subject to adjustment in response to changes in incoming waste volumes, market demands, technology updates, etc.

TABLE II.1.4
Facility Staffing List
DNCS Environmental Solutions

Description	Number
General Manager	1
Plant Supervisor	1-2
Equipment Operator	4-6
Laborer	2-4

NM 529

CATTLE GUARD

GATE

GATEHOUSE

VEHICLE QUEUING

PRODUCED WATER LOAD OUT

PROCESSING AREA

TANKS

BOILER

JET OUT WATER

CHEMICAL STORAGE

BS&W, TANK BOTTOMS JET PIT WASH OUT

MECHANICAL OIL/WATER SEPARATOR

MECHANICAL OIL/WATER SEPARATOR

EVAPORATION POND POND No.1

EVAPORATION POND POND No.2

EVAPORATION POND POND No.3

EVAPORATION POND POND No.4

EVAPORATION POND POND No.5

EVAPORATION POND POND No.6

EVAPORATION POND POND No.7

EVAPORATION POND POND No.8

EVAPORATION POND POND No.9

EVAPORATION POND POND No.10

EVAPORATION POND POND No.11

EVAPORATION POND POND No.12

PHASE I

PHASE III

PHASE IV

STABILIZATION AND SOLIDIFICATION AREA

CATTLE GUARD

GATE

LEGEND

- SITE BOUNDARY (562 ACRES±)
- DRAINAGE FEATURE SETBACK (67 ACRES±)
- EXISTING FENCE
- PROPOSED FENCE
- PAVED ROAD AND SHOULDER (NM 529)
- PROPOSED ROAD
- GRAVEL ROAD/TRAIL
- CATTLE GUARD
- ROAD SIGN
- INBOUND TRAFFIC ROUTE
- OUTBOUND TRAFFIC ROUTE

NORTH

0 125' 250'

PROCESSING AREA TRAFFIC FLOW PLAN

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: TRAFFIC FLOW A.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.1.4A
APPROVED BY: IKG	gel@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\TRAFFIC FLOW A.dwg
Date/Time:Jun. 13, 2014-10:49:14 ; LAYOUT: B (LS)

NM 529

GATE

CATTLE GUARD

SITE ENTRANCE

VEHICLE QUEUING

INBOUND SCALE

SCALEHOUSE

OUTBOUND SCALE (FUTURE)

UNIT 1
(13.5± ACRES)

PHASE 1

UNIT 2
(19.8± ACRES)

LEGEND

- SITE BOUNDARY (562 ACRES±)
- DRAINAGE FEATURE SETBACK (67 ACRES±)
- LIMIT OF WASTE
- LANDFILL PHASE BOUNDARY
- LANDFILL UNIT BOUNDARY
- EXISTING FENCE
- PROPOSED FENCE
- PAVED ROAD AND SHOULDER (NM 529)
- PROPOSED ROAD
- GRAVEL ROAD/TRAIL
- CATTLE GUARD
- ROAD SIGN
- POWER POLE
- INBOUND TRAFFIC ROUTE
- OUTBOUND TRAFFIC ROUTE

NORTH

0 75' 150'

LANDFILL TRAFFIC FLOW PLAN

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

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

DATE: 10/23/2013	CAD: TRAFFIC FLOW B.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.1.4B
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\PERMIT FIGURES\TRAFFIC FLOW B.dwg
Date/Time:Oct. 23, 2013-13:54:25 ; LAYOUT: LayoutB-B (LS)

3.2 Training Requirements

Training for personnel will include health and safety protection, waste screening, fire prevention, emergency response, etc. Emergency Coordinators for the proposed Facility are identified in the Contingency Plan (**Volume II.5**). A trained operator or designated representative with full knowledge of the 19.15.36 NMAC Rules and the DNCS Permit requirements will be present at all times while the Facility is in operation. Facility staff will be required to read this Plan, the Oil Field Waste Management Plan (**Volume II.2**), the Hydrogen Sulfide (H_2S) Prevention and Contingency Plan (**Volume II.3**), and the Contingency Plan (**Volume II.5**). Signature sheets acknowledging that this requirement has been met will be retained in the Facility Operating Record in accordance with the Safety Communications Program (**Attachment II.1.A**).

4.0 FACILITY OPERATIONAL PROCEDURES

The operational procedures for the DNCS Facility are designed to maximize the efficiency of waste receiving, processing, and disposal; and to protect the health and safety of Facility staff and delivery personnel. Detailed operational procedures are enumerated in each of the applicable sections of this Plan for oil field waste stream processing, landfill disposal, contingency planning, recordkeeping, personnel training, etc. Oil field waste disposal operations will be conducted in a safe and environmentally sound manner in accordance with 19.15.36 NMAC.

4.1 Noise Control

There are no permanent residences within 6 miles of the Facility, and most heavy equipment operations (i.e., the Landfill) will be conducted below grade and behind berms, which will aid in noise control. Surrounding lands are unoccupied, or consist of cattle grazing and development related to oil and gas exploration.

4.2 Odor Control

Prior to oil field waste acceptance, vehicles will be randomly screened for the presence of hydrogen sulfide (H_2S). If H_2S is detected above 10 parts per million (ppm), the load will be treated with calcium hypochlorite [$Ca(ClO)_2$] to lower the H_2S to acceptable levels prior to unloading operations. In addition, at least 1,000 gallons of chemicals such as bleach will be maintained on-site to control H_2S and its associated odors originating from the evaporation ponds or other operating units. Downwind land uses (i.e., primarily to the north and northwest) are vacant.

4.3 Dust Control

The access roads and active areas within the Facility will be treated with water, approved recycled waters or dust palliatives, as needed, from a water truck to reduce dust. The posted speed limit will be 15 miles per hour (mph) inside the property which will assist in limiting the amount of dust generated by onsite traffic. Routine operations listed on **Table II.1.5** are the most likely sources of dust, along with recommended primary and secondary control measures:

TABLE II.1.5
Dust Control
DNCS Environmental Solutions

A water truck will be available to apply water, approved recycled waters, or dust palliatives to the access roads and active areas within the DNCS Facility as needed to reduce dust. In addition, the posted speed limit will be 15 mph inside the property. Listed below are routine operations that are the most likely sources of dust, along with recommended primary and secondary control measures:

- **Disposal Operations -**
  - Primary Control Measure: Paving of high-traffic areas, apply water to unpaved roads as necessary, enforce speed limit posted on-site.
  - Secondary Control Measure: Apply dust palliatives to unpaved portions of the Facility, provide additional pavement.
- **Excavations -**
  - Primary Control Measure: Water areas prior to and during excavation. Water areas of excavation and haul roads during and at the end of each day to form a dust-binding soil crust.
  - Secondary Control Measure: Phase work to reduce the amount of disturbed surfaces, apply additional water, work at lower elevations and higher areas when wind velocity is low.

- **Stockpiles -**
    - Primary Control Measure: Pre-water areas prior to excavation. Apply water to short-term stockpiles and when transporting soils, stockpile below-grade or behind berms.
    - Secondary Control Measure: Control vehicle access to the area. Apply dust surfactant to long-term stockpiles or apply seed/mulch to prevent erosion.
- **Track out extending onto public roadways –**
    - Primary Control Measure: Pave permanent on-site entrance roadways, sweep as necessary.
    - Secondary Control Measure: Apply recycled asphalt, caliche/gravel pads or similar materials at the transition from unpaved to paved roadways.
- **Unpaved roadways and parking areas –**
    - Primary Control Measure: Limit vehicle speed via posting speed limits; apply water, use aggregate or caliche.
    - Secondary Control Measure: Apply water and surfactants to unpaved roads and parking lots, as needed, provide additional pavement.

4.4 Minor Spills/Releases

The spill or release of a potentially hazardous material at the Facility is most likely to involve fuel or various vehicle fluids (i.e., engine oil, hydraulic oil, antifreeze, etc.). Other materials most likely to present a concern as a result of normal operations include petroleum products and petroleum wastes delivered to the Facility. Spills involving these types of materials could occur during fueling, routine maintenance operations or during unloading for processing/disposal of waste. These minor spills will be cleaned up immediately upon discovery.

The Facility will maintain spill clean-up kits on-site that include absorbent materials, shovels, and small containment buckets. Waste materials resulting from minor spills and clean-up will be managed and disposed of in accordance with the Oil Field Waste Management Plan (**Volume II.2**). Although highly unlikely, large spill/releases from onsite ponds and tanks may occur. The response procedures for this type of release are detailed in the Contingency Plan (**Volume II.5**).

5.0 LANDFILL OPERATIONS

The proposed DNCS Landfill operation will provide for the permanent disposal of exempt waste generated in the development and production of oil and gas resources. The Landfill operation will be guided by the Landfill design presented in **Volume III** (Engineering Design and Calculations); and detailed in the **Permit Plans** (**Volume III.1**).

5.1 Landfill Equipment

Table II.1.6 identifies the equipment proposed for the landfill operations. This inventory has proven effective at similar facilities in managing ongoing construction and operations. Pieces of equipment may be added or subtracted from the list corresponding to the rate of waste flow, projected earthmoving activities, changes in technology, etc. Some operating and construction functions, such as mass excavation and geosynthetic liner installation, will be subcontracted to qualified firms. The equipment inventory demonstrates both the redundancy and back-up capabilities of the on-site Landfill equipment. Following is a summary of functions and capabilities of the major units:

- The compactors are high-ground-pressure pieces of equipment specially designed for waste receiving; compaction, daily cover application, and related fill face activities.
- The scrapers are used primarily for earthmoving activities, such as excavation of new cells and hauling of cover material from designated stockpiles. Scrapers will often deliver soil directly from the excavation of a new cell to an area near the active fill face. The scrapers can apply daily, intermediate, and final cover at a high rate of delivery.
- Dozers are tracked pieces of equipment that are used to move soil and waste, usually for short distances. The dozers assist the scrapers in preparation of new cells, and can apply cover at the fill face. Dozers are versatile pieces of equipment that are also valuable in cover maintenance, road grading, and waste compaction as back-ups to the compactors, graders, and front-end loaders.
- Front-end loaders are used for earthmoving activities and cell construction tasks. They can be used for excavation of soil or movement of waste, and for delivery and application of cover material. Front-end loaders can provide back-up to scrapers and dozers, and can be used for road and drainage maintenance, if necessary.
- The water wagon will be used on a daily basis to control dust that could originate from on-site roads, active excavations, covered areas, etc. The water sources for the wagon will be on-site tanks and ponds.
- The motor grader is effective is temporary roadway construction, maintenance, and drainage improvements.

TABLE II.1.6
Landfill Equipment (Typical)
DNCS Environmental Solutions

Type	Number	Primary Purpose
CAT 970 Loader	1	Earthmoving
CAT 950 Loader	1	Earthmoving
CMI 390 Compacter	2	Waste compaction
CAT 627 Scrapers	2	Daily cover operations/earthmoving
CAT 621 Water Wagon	1	Dust control
CAT D8 Dozer	1	Waste and soil spreading/compaction
CAT D6 Dozer	1	Waste and soil spreading/compaction
CAT MG140 Motor Grader	1	Road and drainageway maintenance

Notes:
1. *Equivalent models may be substituted.*
2. *The number of each equipment type is matched to the projected waste types and volumes; the list may be modified in response to changes in waste streams, technology, etc.*
3. *Equipment is subject to routine replacement.*
4. *There will be arrangements made with local equipment vendors for maintenance and back-up leasing.*

5.2 Waste Characteristics

DNCS Landfill will accept exempt oil field wastes generated from oil and gas exploration and production operations. No hazardous waste will be accepted at DNCS. The Facility will require documentation for accepting oil field wastes, including OCD Form C-138 *(Request for Approval to Accept Solid Waste)*, and will screen incoming waste in accordance with the Oil Field Waste Management Plan (**Volume II.2**). **Table II.1.7** lists proposed waste receipts sorted by type with a corresponding estimate of volume and proportion. The initial average daily solid waste disposal (oil field waste) acceptance rate is anticipated to be 500 cubic yards (yd^3) per day, equal to approximately 500 tons per day (2,000 pounds per yd^3).

TABLE II.1.7
Landfill Waste Characterization and Anticipated Daily Waste Receipts[1]
DNCS Environmental Solutions

Origin	Approximate Proportion	Daily Average (yd^3)[1,2]
Contaminated Soil	60%	300
Drilling Mud	30%	150
Stabilized Tank Bottoms	5%	25
Other Wastes	5%	25
Totals	**100%**	**500**

Notes:
[1]Values based on anticipated initial volumes of waste that will be delivered from area oil field production activities.
[2]yd^3 = cubic yards
[3]1 yd^3 oil field waste = 2,000 pounds (lbs)

5.3 Sequence of Landfill Development

The DNCS Landfill site development plan is presented on the Site Plan (**Figure II.1.2**) and on **Permit Plans, Sheet 3** (**Volume III.1**); and is further described in **Table II.1.8**. The Landfill will consist of three Units (I-III), each of which will contain several waste cells. Landfill development will commence with the "North Phase" as shown on **Permit Plans, Sheets 6** and **7** (**Volume III.1**). Unit I will be developed first with the construction of Cell 1 in the northeast corner of Unit I. Cell development will progress southward through Unit I before continuing in Units II and III. The proposed disposal process is the "area fill" method for all cells. Each cell will be equipped with a composite liner/leachate collection system and stormwater controls demonstrated to meet applicable engineering standards and OCD requirements.

Cells may be developed in segments and combinations, and more than one cell may be in operation at any one time in response to incoming waste volumes, the progress of site development, and providing available disposal volume below-grade. The objective is to provide a sufficient area for disposal while keeping the total disturbed area to a minimum. When cells reach interim or final grade, additional cover will be applied as needed to achieve the required cover thickness, and the area will be graded and vegetated within 12 months once the final grade is achieved. Soils may be temporarily stored and covered above interim or final grade.

TABLE II.1.8
Landfill Development Sequence
DNCS Environmental Solutions

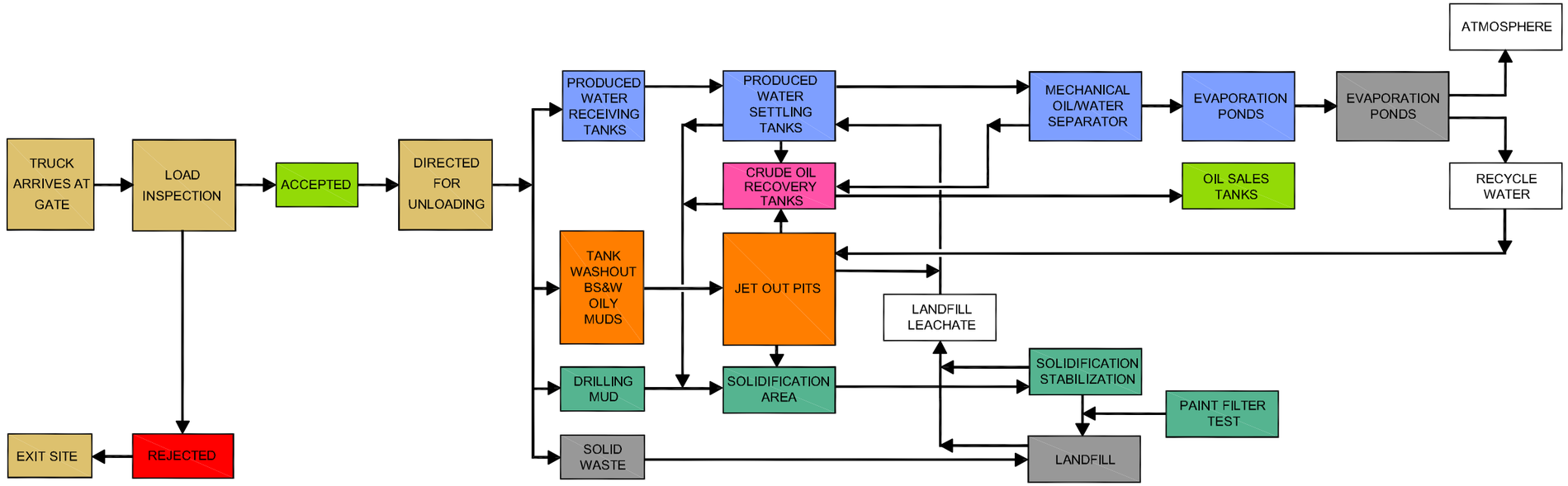
1. **Planning**
   a. Confirm that the cell area has been cleared for excavation (e.g., utilities).
   b. Review Permit Plans, Construction Plans, and any pertinent Permit Documents and Permit Conditions.
   c. Establish survey line/grade controls, construction benchmarks, etc.
   d. Develop cell-specific sequence of development, contractor coordination, equipment, and staffing requirements.
2. **Earthwork**
   a. Clear and dispose of vegetation.
   b. Stockpile select surface soils for later use as topsoil.
   c. Excavate cell to design grades.
   d. Install stormwater management systems (e.g., drainage basins and drainageways).
   e. Extend on-site access roads to provide cell ingress and egress.

3. **Environmental Control Systems**
   a. Compact and test subgrade, prepare for liner installation (CQA Plan, **Volume II.7**).
   b. Notify OCD via a milestone schedule and at least 72 hours prior to liner installation.
   c. Install FML composite liner system on cell floor.
   d. Construct leachate collection systems for cells, including risers and sumps as shown on the **Permit Plans** (**Volume III.1**).
   e. Install protective soil layer from designated stockpile (and stormwater segregation systems if applicable).
   f. Submit Engineering Certification of completed construction to OCD.
4. **Operations**
   a. Use excavated soil from next cell for daily, intermediate, and final cover for current or previously filled cells.
   b. Use stockpiles as necessary to supplement cover supplies.
   c. Install subsequent cells consistent with 1, 2, and 3 above.
   d. Extend roadways, drainage systems, etc., in advance of need.

5.4 Daily Landfill Operating Procedures

Vehicles delivering waste will approach the DNCS Facility entrance from the east or west on NM 529, which is located adjacent to the northern boundary of the site. NM 529 is a paved, two-lane highway with no special weight restrictions, and paved, full-width shoulders. The site entrance sign will identify prohibited materials and rules of conduct on-site (**Figure II.1.3**). Disposal operations will only be conducted when an attendant is on duty. At the Landfill Scalehouse, waste loads will be screened to confirm that the solid waste materials are acceptable for disposal at DNCS. Waste identification, tracking, and screening are addressed in the Oil Field Waste Management Plan provided in **Volume II.2**. Vehicles with acceptable loads will be directed to proceed on the interior roads in accordance with signs and direction by facility personnel to the working face for unloading. A description of the solid waste disposal process is included on the Process Flow Diagram (**Figures II.1.5A** and **II.1.5B**).

Unacceptable waste loads will be managed in accordance with the Contingency Plan (**Volume II.5**). If a load is rejected it will be returned to the generator. The width of the daily cell and working face will be maintained to the minimum dimensions necessary to accommodate traffic. At the initial anticipated rate of waste receipts (500 gate yd^3/day), the unloading area will generally be maintained at a width of 50-100 ft to accommodate peak hourly traffic flow. Soil cover (or an appropriate alternate cover) will be applied to the Landfill's active face on an as-needed basis to control dust, debris, odors, vectors or other potential nuisances.



PROCESS FLOW DIAGRAM

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/10/2014	CAD: PROCESS FLOW.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.1.5A
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\PROCESS FLOW.dwg
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PROCESS DESCRIPTION:

1. A WASTE VEHICLE ARRIVES AT THE GATE.
2. PAPERWORK IS CHECKED AGAINST DNCS ENVIRONMENTAL SOLUTIONS RECORDS TO CONFIRM ACCEPTABLE DOCUMENTATION.
3. THE WASTE LOAD IS VISUALLY AND PHYSICALLY INSPECTED, AND EITHER ACCEPTED TO PROCEED FOR UNLOADING, OR REJECTED AND RETURNED TO THE GENERATOR.
4. ACCEPTED LOADS ARE DIRECTED TO ONE OF FIVE LOCATIONS:

TANKERS CONTAINING PRODUCED WATER ARE DIRECTED TO ONE OF SIX LOAD OUT POINTS AT THE PRODUCED WATER SETTLING TANKS MANIFOLD.
PRODUCED WATER IS DISCHARGED INTO A 1,000 BBL SURGE TANK FOR INITIAL SETTLING AND SEPARATION.
OIL ACCUMULATING AT THE TOP OF THE TANKS IS TRANSFERRED TO THE CRUDE OIL RECOVERY TANKS IF ADDITIONAL PROCESSING IS REQUIRED.
PRODUCED WATER IS TRANSFERRED IN SERIES THROUGH FOUR 1,000 BBL OIL SEPARATION TANKS.
UP TO FIVE DAYS TOTAL SETTLING TIME IS PROVIDED FOR THE PRODUCED WATER WITH AT LEAST ONE DAY HEATED.
LIQUIDS ARE REMOVED FROM THE PRODUCED WATER SETTLING TANKS AND TRANSFERRED TO THE EVAPORATION PONDS THROUGH A MECHANICAL OIL/WATER SEPARATOR.
SLUDGES AND SEDIMENT SETTLING TO THE BOTTOM OF THE TANK IS TRANSFERRED TO THE SOLIDIFICATION AND STABILIZATION AREA.
MECHANICAL EVAPORATORS CIRCULATE THE WATER WITHIN THE EVAPORATION PONDS TO ENHANCE EVAPORATION TO THE ATMOSPHERE.
SOME WATER IS RECYCLED TO THE TANKER JET OUT FOR TANK CLEANING.

TANKERS CONTAINING BS&W PROCESS WATER AND LIQUID TANK BOTTOMS ARE DIRECTED TO THE JET OUT PIT.
ALL BS&W TANK BOTTOM LIQUIDS RECEIVED ARE DISCHARGED INTO THE JET OUT PIT.
TANK TRUCKS ACCEPTED FOR WASHOUT ARE DIRECTED TO ONE OF SIX JET OUT PITS.
APPROXIMATELY 10 BBLS OF FRESH/RECYCLED WATER ARE PROVIDED TO RINSE OUT THE INTERIOR OF THE TANKS.
THE CLEANED TANK TRAILER IS RETURNED FOR SERVICE.
OIL THAT ACCUMULATES AT THE TOP OF THE JET OUT PITS IS TRANSFERRED TO THE CRUDE OIL RECOVERY TANK FOR PROCESSING, IF REQUIRED.
WATER THAT SETTLES TO THE BOTTOM OF THE TANKS IS TRANSFERRED TO THE PRODUCED WATER SETTLING TANKS.
SLUDGES AND SEDIMENT SETTLING TO THE BOTTOM OF THE TANK IS TRANSFERRED TO THE SOLIDIFICATION AND STABILIZATION AREA.

THE CRUDE OIL RECOVERY TANKS SEPARATE THE OIL FROM ANY REMAINING WATER AND RETURNS THE WATER TO THE PRODUCED WATER SETTLING TANKS.
SOLIDS RECOVERED FROM THE CRUDE OIL RECOVERY TANKS ARE REMOVED TO THE STABILIZATION/SOLIDIFICATION PROCESSING AREA.
OIL RECOVERED FROM THE CRUDE OIL RECOVERY TANKS IS TRANSFERRED TO THE OIL SALES TANKS.

TANKERS CONTAINING DRILLING MUD AND CUTTINGS ARE DIRECTED TO THE SOLIDIFICATION AND STABILIZATION AREA.
SLUDGES AND SEDIMENT COLLECTED FROM THE BOTTOM OF THE TANKS ARE SOLIDIFIED WITH A BULKING MATERIAL LIKE SAND OR ONSITE SOIL.
DRILLING MUDS ARE SOLIDIFIED AND STABILIZED USING THREE PARTS SOIL TO ONE PART MUD PRIOR TO PAINT FILTER TEST AND LANDFILLING.
LIQUIDS RECOVERED FROM THE SOLIDIFICATION/STABILIZATION PROCESS ARE TRANSFERRED TO THE PRODUCED WATER SETTLING TANKS.

LOADS OF CONTAMINATED SOIL AND SOLID WASTE ARE DIRECTED TO THE LANDFILL FOR DISPOSAL.
LEACHATE GENERATED BY LANDFILL OPERATION MAY BE TRANSFERRED TO PRODUCED WATER SETTLING TANKS.

PROCESS FLOW DESCRIPTION

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

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DATE: 06/10/2014	CAD: PROCESS FLOW DESCRIPTION.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.1.5B
APPROVED BY: IKG	gei@gordonenvironmental.com	

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The **Permit Plans** (**Volume II.1**) illustrate that the Facility will utilize the "area method" of filling in vertical lifts. The first lift of waste placed over a newly constructed liner segment will be a minimum of 5 ft in thickness, and will then be carefully worked out over the leachate collection protective soil layer from the edge of the cell (i.e., uncompacted). The first lift of waste over the leachate pipe may be pushed off from prior fill areas to avoid landfill equipment traffic over the pipe. If necessary, temporary "ramps" of waste and/or clean fill will be constructed over the leachate pipes and protective layer in order to facilitate traffic flow. The waste in the first lift will be carefully inspected to ensure that waste types that could impact the liner system (e.g., pipes and metal debris) are excluded from the initial lift. This layer will be placed in a manner that protects the liner and leachate collection system.

Waste placement will generally move from the lower (downgradient) portions of the cell to the higher (upgradient) elevations. With the exception of the first lift of oil field waste being spread on a newly constructed cell, waste will be compacted in shallow lifts (e.g., 2 – 3 ft thick) by specialized waste compaction equipment. Repeated passes by the waste compactor or dozer will consolidate the material to the smallest practical volume. This practice will confine the dimensions of the working face, maximize the use of available capacity, reduce the potential for future settlement, and limit the amount of cover required.

In order to control litter and mitigate potential odors, the active working face will be covered with 6 inches of soil cover, or an approved alternate cover, as needed. DNCS will place an intermediate cover at least 6-inches thick, in addition to daily cover, over areas of the landfill that will not receive further oil field waste for one month or more, but have not reached final elevation. Areas of intermediate cover will be properly sloped to promote clean run-off and minimize leachate generation, and may be used for temporary cover stockpiles. Intermediate cover may be seeded with temporary grasses such as rye if the area will not be subject to additional landfilling within 12 months. If long-term re-vegetation is required, native grass will be applied after consultation with the local Natural Resources Conservation Service (NRCS) representative (see Closure/Post-closure Plan, **Volume II.4**). Areas of intermediate

cover will be inspected periodically for erosion and settlement, and prompt regrading and maintenance action will be initiated as required. An Intermediate Cover Inspection and Maintenance Plan is provided as **Attachment II.1.G**.

5.5 Waste Capacity and Longevity

Table II.1.6 provides a projection of daily waste receipts and lists the categories of anticipated wastes that will be received at this facility. This estimate uses initial projected daily waste receipts of 500 yd^3 per day average. Volumetrics (**Volume III.2**), summarizes the capacity and longevity calculations for the engineering design provided in this Application for Permit. The volume of excavation (cut) from the cells and drainage basins is designed to provide more than sufficient soil for daily, intermediate, and final cover for all Units. The DNCS Landfill (Phases I-III) gross airspace is approximately 39,669,800 yd^3, with approximately 33,666,826 yd^3 (i.e., 33,666,826 tons) of net airspace (i.e., waste capacity). The longevity of the Landfill, operating 365 days per year, is projected as follows:

- 184.5 years @ 500 tons per day
- 92.2 years @ 1,000 tons per day
- 36.9 years @ 2,500 tons per day

There are many factors that can have an impact on the duration of operations of the DNCS Landfill. Oil field activity, the price of oil in the marketplace spurring new development activities, closure of other disposal facilities, new processing technologies and the introduction of new waste streams have the potential to increase or decrease the rate at which airspace is depleted. In response to these factors, DNCS may make arrangements for the lease of additional equipment to accommodate variations in waste receipts.

5.6 Landfill Gas Safety Management

Surface waste management facilities that include a landfill are required to have a gas safety management plan per 19.15.36.13.O NMAC. The Plan should describe in detail the procedures and methods that will be used to prevent landfill-generated gases from interfering or conflicting with the landfill's operation, and methods to protect fresh water, public health, safety and the environment.

Landfill Gas (LFG) is typically produced when there is a significant supply of readily putrescible organic material, moisture; and a lack of oxygen in the fill. Oil field wastes do not contain significant amounts of putrescible (organic) wastes and will not provide a suitable environment for LFG production. Typical oil field wastes do not generate significant quantities of LFG, nor the requisite pressure to promote migration. Conventional landfill gas monitoring and control systems will not be effective at the DNCS Facility. The waste matrix itself will inhibit migration or collection of LFG if it is comprised primarily of soils with <5% degradable organics, as anticipated; therefore no conventional LFG monitoring or controls are proposed in this Application for Permit.

However, DNCS will implement a gas monitoring program consisting of testing incoming vehicles during unloading to ensure that hydrogen sulfide (H_2S) gas concentrations do not exceed 10 ppm on-site or at the property boundary. H_2S monitors that issue a visual and audible signal at 10 ppm will be installed in areas around the solid waste disposal cells, treating plant, liquid solidification, and evaporation ponds to ensure compliance with regulatory alert levels. Monitoring points may be added or replaced as operations are extended. Details of the H_2S gas monitoring program are presented in the Hydrogen Sulfide (H_2S) Prevention Contingency Plan provided in **Volume II.5.** In addition, the proposed vadose zone monitoring wells will be monitored for methane as part of routine vadose zone monitoring activities as described in the Vadose Zone Monitoring Plan (**Volume II.8**). These wells are capable of detecting gas in the in the flow zone before it reaches the property line.

5.7 Leachate Monitoring

A leachate management plan that describes the anticipated amount of leachate, leachate handling, storage and disposal is required for new landfills per 19.15.36.8.C(12) NMAC. A Leachate Management Plan for the DNCS Landfill is provided as **Volume II.9**. The Leachate Management Plan details the procedures that will be used to manage contact waters generated at the DNCS Landfill during the permit period and following closure. The Leachate Management Plan has been developed to address the design and performance requirements of 19.15.36.14 NMAC; and to addresses leachate management, including amounts and rates of leachate generation, treatment alternatives, disposal options, etc.

5.8 Waste Disposal Alternatives

DNCS Landfill is designed to operate as an all-weather facility under most foreseeable conditions. The site's proposed layout, paved roadways, and operating practices will provide flexibility with regard to fill face location and access. In the event of a temporary disruption to service such as storms or high winds, the following alternatives may be implemented:

- In the event of inclement weather, select a daily fill face location that is readily accessible to established roadways.
- The proposed equipment available for daily operations (see **Table II.1.5**) includes significant back-up for any unplanned downtime.
- Additional waste compacting and earthmoving equipment can be leased under routine arrangements with suppliers.
- Temporary storage of waste at the fill face could be implemented to address short-term equipment shortages.
- Waste compaction and covering tasks could be extended beyond normal hours to complete the day's activities.

In the unlikely event of a complete disruption of access, the Facility would be temporarily closed and the customers notified. The commercial waste flow could be temporarily stored at generator sites, or diverted to other OCD permitted facilities.

5.9 Operating Hours

DNCS plans to have continuous waste disposal services available twenty-four hours per day, seven days per week. These hours will be posted at the site entrance and will be subject to routine review and adjustment as required to match the availability of waste for disposal. DNCS may truncate operating hours due to reduced waste receipts, inclement weather conditions (e.g., high winds), etc. Site maintenance and construction activities, including cell preparation and application of cover, may take place at any time, even if the Landfill is not open for receiving waste.

5.10 Vadose Zone Monitoring

Vadose zone monitoring is described in detail in the Vadose Zone Monitoring Plan provided as **Volume II.8**. The proposed vadose zone monitoring program will initially include inspection of each well for the presence of fluid in advance of the applicable disposal area construction. After the initial inspection, each vadose well (VW) will be monitored for the

presence of free liquids on a monthly basis for a period of 12 months. If the monthly monitoring results continually indicate the absence of fluid, the subject wells will be transitioned to quarterly monitoring. The continued lack of fluids in the VWs may be the subject of future specific approvals by OCD for a reduced monitoring frequency (i.e., semi-annual or annual). Additional details are provided in **Volume II.8**.

6.0 LIQUID WASTE PROCESSING

6.1 Operational Rate

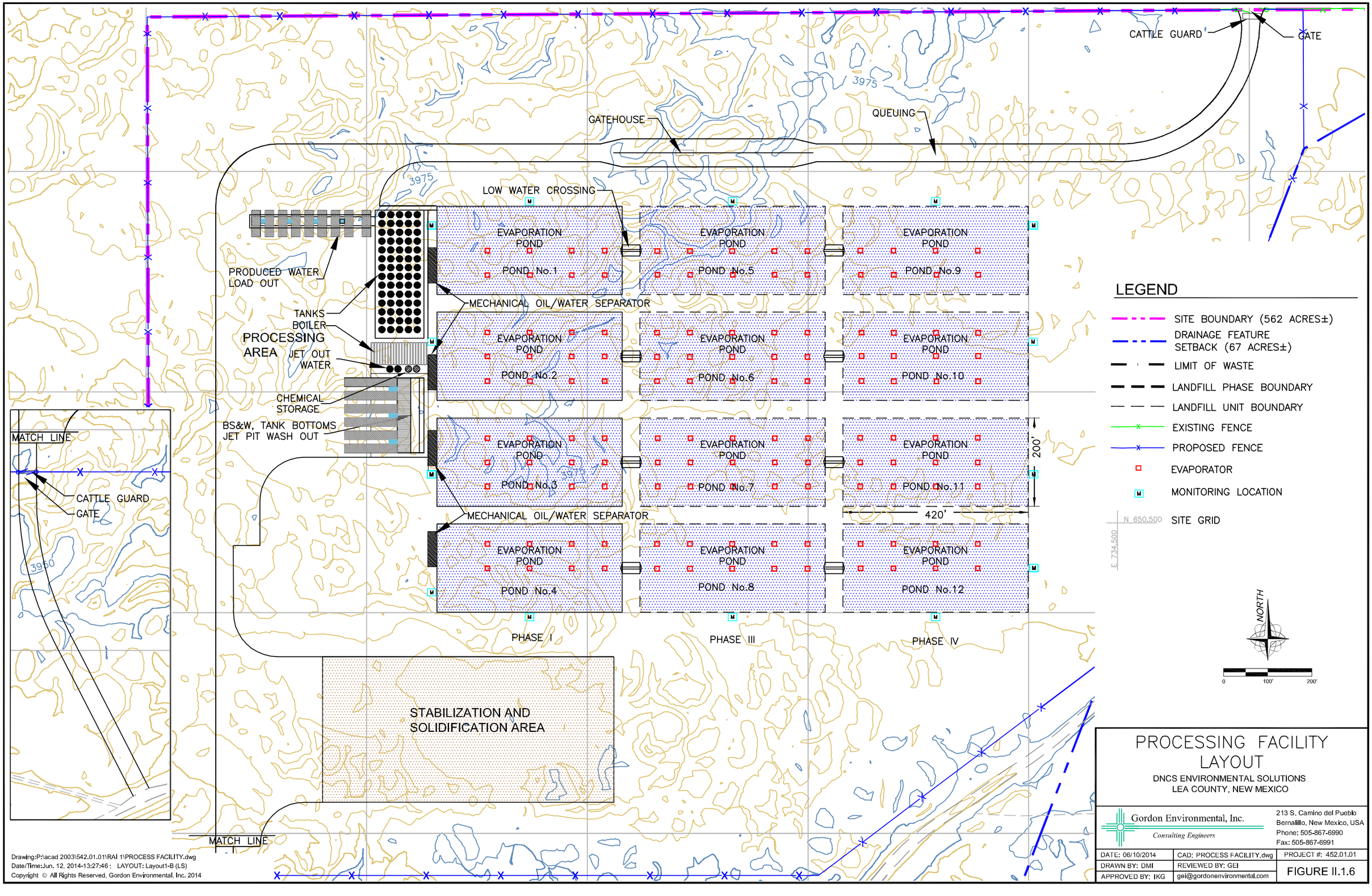
Liquid oil field wastes (produced water) will be accepted for processing at the DNCS Facility. The average operational rate for the fully developed DNCS Facility is estimated at 9,000 barrels per day (bbl/day) of liquid oil field waste. The operational rate may increase to over 12,000 bbl/day dependent upon market conditions and the rate of facilities development.

Basic Sediments and Water (BS&W) wastes will be accepted for processing at the DNCS Jet-Out Pit. The average operational rate for the fully developed Jet-Out operation is estimated at 1,000 bbl/day of BS&W wastes. The operational rate may increase to over 2,000 bbl/day dependent upon market conditions and the rate of facility development.

Drilling Mud waste will also be accepted for stabilization and solidification. The average operational rate for the fully developed stabilization and solidification area is estimated at 2,000 bbl/day depending on market conditions.

6.2 Processing

The equipment that anticipated to be used for liquid oil field waste processing is listed in **Table II.1.9**. Oil field waste receiving and processing activities will take place within the fenced Facility (**Figures II.1.2** and **II.1.6**). A description of the liquid waste processing operation is provided on the Process Flow Diagram (**Figures II.1.5A** and **II.1.5B**). The location of the liquid waste processing facilities at DNCS is provided on the Processing Facility Layout provided as **Figure II.1.6** and detailed in the **Permit Plans** (**Volume III.1**).



PROCESSING FACILITY LAYOUT

DNCS ENVIRONMENTAL SOLUTIONS
LEA COUNTY, NEW MEXICO

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DATE: 06/10/2014	CAD: PROCESS FACILITY.dwg	PROJECT #: 452.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.1.6
APPROVED BY: IKG	gei@gordonenvironmental.com	

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TABLE II.1.9
Processing Equipment
DNCS Environmental Solutions

Description	Number	Capacity
Stationary		
Produced Water Tanks	60	1,000 bbl
Crude Oil Receiving Tanks	5	1,000 bbl
Oil Sales Tanks	5	1,000 bbl
Mechanical oil/water separation unit	4	100 bbl
Evaporation Ponds (1-12)	12	73,700 bbl
Mechanical Evaporation Units	130	340 bbl/day/unit
Jet-Out Pit	1	1,200 bbl
Stabilization and Solidification Area	-	10 Acres
Boiler/Heat exchanger	1	Each
Burner fuel tanks	1	238 bbl
Mobile		
Rubber Tired Loader	1	CAT 950 or equivalent
Floatation Track-Dozer	1	CAT D-6 or equivalent
Off Road Dump Truck	1	CAT 725 or equivalent
Roll-off Boxes	5	5-40 cy
Roll-off Tilt-frames	1	Up to 40 cy boxes

Note: The number, type, and capacity of the processing may be adjusted in response to changes in waste receipts, waste types, new technologies, etc.

The produced water processing rate is highly dependent upon evaporation, which is also influenced by climate and seasonal fluctuations (Evaporation Calculations, **Volume III.10**). When tanks and ponds are approaching capacity, acceptance of liquid oil field waste may be temporarily suspended. Specifications for the proposed treatment plant equipment, including the produced water processing tanks, boiler, the diffused air floatation system, and mechanical evaporation systems are included in **Attachment II.1.B**. Receiving and storage tanks used at the Facility will be leak-proof; compatible with the proposed waste stream; and manufactured of non-biodegradable materials (e.g., fiber reinforced plastics or steel).

Produced Water will be received through the Produced Waste Load-Out stations and transferred to the heated Produced Water Receiving Tanks. Oil, water and sediments will be removed as the Produced Water passes through a series of these tanks. Water discharge from the tanks will flow through a diffused air flotation (DAF) system to remove residual oils prior

to entering the evaporation ponds. The ponds will be monitored to confirm that the DAF is adequately removing oil from the liquids discharged to the pond. Oil that accumulates in the ponds will be skimmed and removed for additional processing. Oil collected from the Produced Water Receiving Tanks will be transferred to the Crude Oil Receiving Tanks for final dewatering prior to storage in the Oil Sales Tanks. Liquids within the ponds will be pumped through mechanical evaporators to dissipate the liquid to the atmosphere.

BS&W waste will be discharged to the Jet-Out Pit where solids will be allowed to settle and liquids will be removed for processing through the Produced Water processing system. Solids removed from the Jet-Out Pit will be transferred to the Stabilization and Solidification Area for processing prior to landfilling. Fresh water will be available to flush out the tankers after they discharge their contents.

Drilling Muds and other wet solids will be deposited in the Stabilization and Solidification Area. Dry soil will be mixed with the deposited materials to solidify them to a level that they will pass the Paint Filter Test (**Attachment II.1.F**). Once solidified, the resulting material will be transported to the landfill for disposal. Liquids collected in the Stabilization and Solidification Area Sump will be transferred for processing through the Produced Water Processing System.

7.0 FACILITY INSPECTION AND MAINTENANCE

General inspection of the overall physical condition of the DNCS Facility, including pond operations, treatment plant, tank farm, evaporation spray system, jetout pit, stabilization and solidification area and the landfill will be conducted on an ongoing basis by DNCS personnel when operations are active. Additional formal inspections will be conducted and recorded on the appropriate recordkeeping forms as listed in **Table II.1.10**. Templates for the inspection forms are provided as **Attachments II.1.C** and **II.1.D** and will include the inspection date, and the name and signature of the inspector. Inspections and maintenance operations will be completed in compliance with 19.15.36.13.L NMAC. The following sections describe the formal inspections for each component of the DNCS Facility.

TABLE II.1.10
Facility Inspections
DNCS Environmental Solutions

Section	Component/Details	Frequency[1]	Recording Form
7.1	**Evaporation Spray System** Weather station Plume height Over spray	Daily	Facility Inspection Form (Attachment II.1.C)
7.2	**Solid Waste Disposal Landfill** Disposal operations and location Free liquids Stormwater controls Litter, vectors, odors Daily cover	Daily	Facility Inspection Form (Attachment II.1.C)
7.3	**Overall Facility Operation** Signs Security (fencing/gates) Stormwater control systems (runon/runoff) Access roads OCD Permit compliance Construction activity	Weekly	Facility Inspection Form (Attachment II.1.C)
7.4	**Treatment Plant, Tanks and Sumps** Containment berm Tank condition Tank leak test (annual) Signage Pipe and valve condition Sump condition	Weekly	Facility Inspection Form (Attachment II.1.C)
7.5	**Tank Farm & Pump System (Process Area)** Containment and liner Tank condition Tank leak test (annual) Signage Pipe and valve condition Sump condition	Weekly	Facility Inspection Form (Attachment II.1.C)
7.6	**Pit and Pond Operation** Depth of liquids in sumps Pond levees Piping condition and status	Weekly	Pond Integrity/Leak Detection Inspection Form (Attachment II.1.D)
7.7	**Solid Waste Disposal Landfill** Leachate Collection Sump	Monthly	Facility Inspection Form (Attachment II.1.C)
7.8	**Pond Containment System** Rainfall Wind speed/direction Damage assessment	Quarterly	Pond Integrity/Leak Detection Inspection Form (Attachment II.1.D)
7.9	**Landfill and Process Area** Vadoze Zone Monitoring	Quarterly	Facility Inspection Form (Attachment II.1.C)

Notes:

[1] *When operations are active.*

[2] *Report discovery of liquid in the leak detection system to OCD within 24-hrs of observation.*

7.1 Mechanical Evaporation System (Processing Area)

The evaporation ponds will rely on mechanical evaporators to enhance the rate of evaporation of the overall system. Specifications for the spray systems are included in **Attachment II.1.B**. The mechanical evaporation system will be inspected on a daily basis when operations are active with maintenance performed on an as-needed basis. The inspections will be documented on the Inspection Form included as **Attachment II.1.C**. At a minimum, the mechanical evaporation system weather station (set at a wind velocity threshold of 12 mph) and spray system plume height will be checked during the daily inspection. The plume height will be adjusted to an elevation that prevents overspray from leaving the confines of the evaporation ponds.

7.2 Solid Waste Disposal Landfill

The solid waste disposal area will typically be inspected on a daily basis when operations are active. The inspections will be documented on the Inspection Form, included as **Attachment II.1.C**. At a minimum, the items listed in **Table II.1.10** will be checked during the daily inspection. During the inspection, current disposal locations and operations will be compared to the OCD-approved DNCS Permit, with any deviations recorded and reported to the Facility Manager. The inspector will also evaluate and record the potential presence of free liquids derived from disposal activities; the condition of stormwater run-on/runoff controls; and the presence of windblown debris, vectors, or odors. Finally, the inspector will record the condition of previously applied soil cover and need for additional cover, grading or vegetation. Deficiencies will be repaired or addressed as soon as practical.

7.3 Overall Facility Operation

A thorough inspection of the specific processing areas, landfill, and sumps will be conducted on a weekly basis when operations are active and documented on the Facility Inspection Form included as **Attachment II.1.C.** The overall Facility inspection portion of the form will, at a minimum, document the items listed in **Table II.1.10**. Should the inspector note on the inspection form construction, planned construction or major design or operational changes, OCD will be notified and approvals obtained, if necessary. Inspection forms will be kept and

maintained at the DNCS Facility Administrative Office or other secure location and be made available for OCD review upon request.

7.4 Treatment Plant, Tanks and Sumps (Processing Area)

The processing area physically separates oil from water through the use of tanks and other equipment. Weekly inspections of the processing area and tanks will be conducted. The inspections will be documented on the Inspection Form included as **Attachment II.1.C**. At a minimum, the inspections will include and document the items listed in **Table II.1.10**. Any equipment identified during inspections or mechanical testing which require corrective action will be taken offline until repairs are completed as necessary.

The Treatment Plant will be inspected for proper function of the boiler plant, piping and proper liquid flow operation. Should any defect that seriously jeopardizes the plant operation or safety of the operation be identified, the system will be shut down until repairs are completed. Pond detection sumps will be inspected at least weekly, and fluid will be removed as necessary to prevent overflow. If the sump integrity has failed, OCD will be notified within 48 hours of discovery, and the sump contents and associated contaminated soil will be removed and disposed of in the solid waste disposal area. A report describing subsequent investigations and remedial actions taken will be submitted to OCD.

7.5 Tank Farm and Pump System (Processing Area)

The Tank Farm is designed to contain the capacity of the maximum number of interconnected tanks plus 30%. In this case, there is a maximum of five 1,000 bbl tanks connected for a total of 5,000 bbl. The tank farm is designed to accommodate in excess of 6,500 bbl before flowing to the evaporation ponds. Once the DNCS Facility is permitted; a Spill Prevention, Control, and Countermeasures (SPCC) Plan that applies to petroleum product storage and distribution systems will be developed. Weekly inspections of the tank farm will be conducted in compliance with the SPCC Plan. At a minimum the inspections will include and document the items listed in **Table II.1.10**. The inspections will be documented on the Inspection Form included as **Attachment II.1.C**. Any items identified during inspections which require corrective action will be addressed immediately, and if required, the specific process

equipment will be taken offline until repairs are completed. Detection sumps will be inspected monthly. If the sump integrity has failed, OCD will be notified within 48 hours of discovery, and the sump contents and contaminated sediments will be removed and disposed of at DNCS or another OCD-approved facility. A report describing subsequent investigations and remedial actions taken will be submitted to the OCD.

7.6 Pond Operation (Processing Area)

A thorough inspection of the leak detection system and sump will be conducted on a weekly basis and documented on the Pond Integrity/Leak Detection Inspection Form included in **Attachment II.1.D**. At a minimum, the items listed in **Table II.1.10** will be documented. Prior to placing a newly constructed pond or a pond that has undergone repair or cleaning into service, liquids will be removed from above the primary liner and from the leak detection system. Once in service, it is anticipated liquid may be present at all times due to condensation and nominal leakage through the primary liner. The sumps are 2 ft deep and have a capacity of >1,200 gallons (gal) using a porosity of 35% for the granular material (3/4" – 2" select aggregate. **Attachment II.1.E** is a summary table from an authoritative publication on potential geomembrane liner leakage for 40 mil high density polyethylene (HDPE) lined ponds. As shown on the table, the combined projected permeation/pinhole leakage rate ranges from 9.5 to 138 gal/acre/day. Using a very conservative value of 75 gal/acre/day for the combined leakage/permeation rate (**Attachment II.1.E**), this provides 16 days of storage at a depth of 2 ft in the sump. The rate of 75 gal/acre/day is considered very conservative as it is based on 40 mil HDPE (vs. the actual 60 mil HDPE pond liner provided); a fluid depth of 10 ft; and a high number of large pin holes. As additional protection, a geosynthetic clay liner (GCL) will be installed under the leak detection sumps (**Volume III.1**, **III.3,** and **Permit Plans**).

The liquid levels in the sumps will be monitored approximately weekly immediately after ponds are put into service and documented. Should the lack of liquids become apparent after a series of inspections, the monitoring frequency may be extended to monthly. Upon discovery of excessive liquid presence in a leak detection system (i.e., > 2 ft), OCD will be notified within 24 hours and the affected pond area drained. Prior to placing the pond back into service, DNCS will initiate corrective action which may include but is not limited to:

- Actions undertaken to locate source(s) of leakage
- Repair procedures
- More frequent sump liquid level monitoring and/or pumping
- Liquids testing
- Vadose monitoring (if required)

7.7 Pond Containment System (Processing Area)

A thorough inspection of the berms and the outside walls of pond levees will be conducted at least quarterly, and after any major rainfall or windstorm. For purposes of this inspection frequency, a major rainfall is defined as a documented 25-year, 24-hour rainfall event, and a major windstorm is defined as sustained wind speeds in excess of 45 mph for a one hour period. The inspections will be documented and retained on the Pond Integrity/Leak Detection Inspection Form included in **Attachment II.1.D**. At a minimum, the inspection shall consist of the items listed in **Table II.1.10**. The inspection will address any erosion, liner damage and maintenance required with a timeframe to complete required repairs. In addition, the depth of sludge build-up in the bottom of the pond will be measured during the quarterly inspections and documented. Sludge in excess of 12 inches will be removed, dewatered, stabilized and disposed of on-site or at an OCD-approved facility.

7.8 Below-grade Tanks and Sumps

No below-grade tanks or sumps, other than the sumps previously mentioned with the leak detection system, are proposed for the DNCS Facility.

8.0 EMERGENCY SITUATIONS AND EQUIPMENT BREAKDOWN

Response to emergency situations involving the actions of the Emergency Coordinator, fire prevention and protection, incident response, and notification procedures are described in detail in the Contingency Plan (**Volume II.5**).

8.1 Equipment Breakdown

In the case of unplanned equipment downtime, the following measures will be deployed:

- Delivery of liquid oil field waste will be delayed if storage capacity is unavailable in the receiving tanks.

- Downtime associated with mobile equipment (i.e., skid-steer loader, forklift) will be addressed by deploying alternative on-site units (e.g., end loaders) and arrangements with local equipment vendors for immediate maintenance and lease of temporary replacement units.
- DNCS's proposed preventive maintenance plan has proven to be highly effective at preventing unplanned downtime through routine inspection and regular maintenance of processing equipment.

9.0 RECORD KEEPING REQUIREMENTS

DNCS is required to keep detailed records for the DNCS Facility as described throughout this Application. In addition, the Facility will meet the OCD requirements for reporting as detailed in the Management Plans provided in **Volume II** of this Application. Records will be retained for a minimum of 5 years and will be made available for OCD review and inspection upon request.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.A

SAFETY COMMUNICATIONS PROGRAM (TYPICAL)

ATTACHMENT II.1.A
Safety Communications Program (Typical)
DNCS Environmental Solutions

Safety Meeting Attendance Sheet

Date: _____ Time: _____

Topic: _____

Presenter: _____ Department: _____

Instructions:

1. This form must be completed at each safety meeting.
2. Make additional copies as required.
3. Keep copy of completed attendance sheets in binder.

Printed Name	Signature

Absent	Date Covered

ATTACHMENT II.1.A
Safety Communications Program (Typical)
DNCS Environmental Solutions

Annual Training Schedule[1]

Month	Yard Topics	Office Topics
January	Lockout/Tagout Program	Lockout/Tagout Program
	SWPPP	SWPPP
	Good Housekeeping	Good Housekeeping
February	Material Acceptance & Handling	Material Acceptance & Handling
	Form C-133 & C-138 reconciliation	Form C-133 & C-138 reconciliation
	H_2S screening	H_2S screening
March	Non-exempt liquids recognition	Non-exempt liquids recognition
	H_2S Treatment Procedures	H_2S Treatment Procedures
April	Site Contingency Plan	Site Contingency Plan
	H_2S Contingency Plan	H_2S Contingency Plan
	Hazard Communications	Hazard Communications
	Emergency Evacuation Drill	Emergency Evacuation Drill
May	Spill Prevention & Control	Spill Prevention & Control
	Site Generated Waste Disposal	Site Generated Waste Disposal
	Heat Stress	Heat Stress
June	Confined Space	Confined Space
	Site Inspection	Site Inspection
	Incident & Injury reporting	Incident & Injury reporting
	First Aid/Bloodborne Pathogens	First Aid/Bloodborne Pathogens
July	Migratory Bird Prevention	Migratory Bird Prevention
August	Employee Safety	Employee Safety
	PPE	PPE
	3-Point Contact	3-Point Contact
September	Industrial Powered Trucks	Recordkeeping
	Skid Loader	
	Sky Trak	
	Loader	
	High Voltage Training	
October	Cold Weather Stress	Cold Weather Stress
	Fire Extinguisher Use	Fire Extinguisher Use
November	Sexual Harassment	Sexual Harassment
	Drug & Alcohol	Drug & Alcohol
	Cell Phone usage	Cell Phone usage
December	Employee Benefits	Employee Benefits
	Temp. Employee Safety	Temp. Employee Safety

Note:
[1] Typical training schedule and content subject to change

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.B

EQUIPMENT SPECIFICATIONS

Applications
- Automotive
- Biodiesel
- Car Wash Industry
- Dairy Industry
- Food Processing Industry
- Iron Removal
- Latex Removal
- Metals Treatment
- Mining Industry
- Odor Control
- Petrochemical Industry
- Poultry Industry

Products
- Activated Carbon
- Air Treatment Systems
- Bag Filtration
- Biological Treatment
- Chemicals (Specialty)
- Clarifiers
- Dissolved Air Flotation
  - Integrated Treatment Systems
  - V-Series Industrial DAF
- Dewatering
- Dust Collection
- Electrocoagulation
- Evaporators
- Filter Screens
- Membrane Filtration
- Microbial Bacteria
- Oil/Water Separators
- Ozone
- Polymer Blenders
- Pressure Filtration
- Separators/Strainers
- Tanks
- Wet Scrubbers

DAF Systems > Dissolved Air Flotation (DAF) Systems (V Series)

Up To 99.9% TSS/FOG Removal and 75% BOD Reduction... Unmatched Performance!

Dissolved Air Flotation (DAF) is a water treatment process that clarifies wastewater through the removal of suspended matter such as oil, greases or solids. Removal is achieved by injecting pressurized air into the wastewater where micro-bubbles then interact with the suspended solid particles. This interaction causes these particles to float to the surface of the DAF where they are then skimmed and separated.

V-Series Dissolved Air Flotation systems benefits:

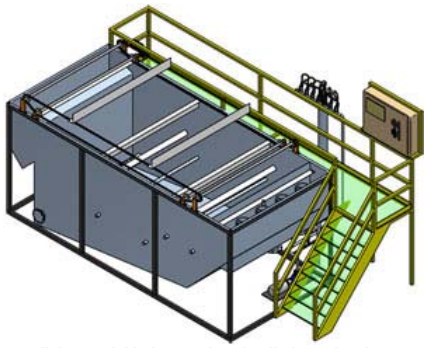
- Performance guarantee providing assurance that your discharge requirements will be met or exceeded.
- Cleanest effluent levels of any Dissolved Air Flotation (DAF) presently available with TSS as low as 5 ppm.
- Lowest ongoing maintenance requirements of any Dissolved Air Flotation (DAF) system.
- Compact, optimized foot print that is also easy to operate and maintain.
- Capable of producing 10% dry sludge.

Technical Benefits:

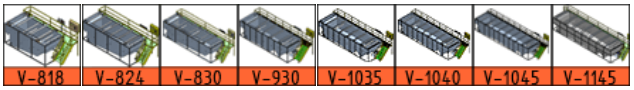
- Increased air to solid ratio.
- Air bubbles down to 5 microns in size (allowing for greater sludge separation and dryer sludge).
- Multi-Point Air Injection creating a constant upward pressure on the sludge.
- Counter Flow Sludge Skimming eliminating possibility of driving sludge back into the cleaner water.
- Weir and skimmer system polisher at the final stage of the process, resulting in lowering TSS count in effluent water.

Ecologix High Performance 99.9% TSS/FOG & 75% BOD Reduction - Dissolved Air Flotation System

Model	Flow Rate Based Upon (up to) 2500 ppm TSS	Flow Rate Based Upon 2500 - 5000 ppm TSS
V-409	60 GPM	30 GPM
V-410	100 GPM	50 GPM
V-512	200 GPM	100 GPM
V-617	400 GPM	200 GPM
V-725	600 GPM	300 GPM
V-730	800 GPM	400 GPM
V-735	1000 GPM	500 GPM
V-818	600 GPM	300 GPM
V-824	800 GPM	400 GPM
V-830	1000 GPM	500 GPM
V-930	1200 GPM	600 GPM
V-1035	1400 GPM	700 GPM
V-1040	1600 GPM	800 GPM
V-1045	1800 GPM	900 GPM
V-1145	2000 GPM	1000 GPM



Click a model below to view detailed 3-D drawings



Ecologix V Series DAF Systems are a complete Dissolved Air Flotation System comprising the following components:

- 304 Stainless Steel construction.
- Overall customized to fit allocated space - Includes stainless header entering DAF including four ½" penetrations with ½" ball valves for whitewater addition/chemical addition/sample port.
- Recirculation aeration pump with aeration valves.
- Surface skimmer system complete with #50 SS chain and four (4) SS skimmer blades - Bolt-on and manually adjustable. VFD motor 0-13rpm, 195:1 gear reduction.
- Bottom settled solids removal cones with dump valves Effluent weirs with Quick-Release Locking Handles (manually adjustable)
- One (1) 2" air driven sludge transfer pump Staircase and Catwalk for DAF – Bolt work platform and staircase frame made of carbon steel with safety yellow fiberglass grating.
- Chemical Metering Feed Pumps (pH, Coagulation, Flocculation) Control System, featuring:
  - NEMA 4X stainless steel enclosure with fused disconnect(s).
  - Allen Bradley PLC Control System with touch screen - including aeration and chemical feed pumps
  - All necessary starters, fuse disconnects, status lights, switches.
  - Common 460V/3/60 power supply required.
  - Common 460V/3/60 power supply to be provided by customer.

General Description

DAF is a highly efficient method for removal of turbidity, color, suspended solids and other contaminants from water. A recirculation loop of pressurized water is saturated with dissolved air using a multistage impeller pump. The product of this process is termed "whitewater." Whitewater discharges into calculated points along the pipe flocculator. Microscopic air bubbles become entrained in the floc particles. When the floc particles leave the pipe flocculator and enter the body of the DAF, they rise to the surface and form a sludge blanket. As the sludge blanket thickens, a skimmer drive transfers sludge to the DAF sludge sump. From the sump, sludge is pumped to dewatering equipment. The treated water gravity flows from the DAF vessel to a clear well or city discharge point.

Flocculation Mixing Tube

The flocculator is designed to thoroughly mix raw influent with water treatment polymers and dissolved air. It consists of a spiraled mixing tube with strategically placed polymer injection ports, highly aerated/pressurized water, and sample ports. A metered control valve manifold ensures accurate flow of pressurized, highly aerated water into the mixing pipe flocculator to enhance coalescing of microscopic air bubbles and wastewater mixing. Polymer injection ports are quick-connected, allowing easy removal and re-insertion during system operation. The Dissolved Air Flotation process utilizes design principles unique to our DAF system. The design allows for highly effective flocculator units to be installed in a footprint significantly smaller than that of other systems. Plant wastewater enters the DAF system via an ascending pipe flocculator which acts as both a flash mixer (lower section) and a gentle mixer (upper section) for superior flocculation.

Pressurized Water Recirculation

Clean, treated water removed from the wastewater discharge cell is pressurized and fed back into the system via inlet ports on the flocculator. Additionally, pressurized water is injected into the flotation cell. The Pressurized Recirculation Loop Creates Whitewater, which is a key factor to water treatment success. The Pressurization Pump is sized to provide adequate recirculation water flow at 400' TDH. The pump is installed on the DAF flotation cell skid. The Air Dissolving Tank provides the retention time necessary to allow injected air to dissolve, creating "whitewater". The tank is supplied complete with internal piping, inlet/outlet flanges, pressure gauge, pressure bleed-off valve, and air control assembly (solenoid valve, filter/ regulator/gauge, rotometer, and check valve).

The pumps we use are side-channel multi-stage pumps, which is a unique product with characteristics of both displacement pumps and centrifugal pumps. At low flow and high pressures, our self-priming pumps have a noticeable advantage over centrifugal pumps. It allows trouble free handling of Maximum gas contents of 50% and attains pump heads which are many times greater per stage than that generated by radial flow centrifugal pumps. These pumps are essentially immune to cavitation at variable vapor pressure and therefore flow is not interrupted during partial degassing. The pressure rate is up to 10 times higher than that generated by normal pump impellers rotating at the same speed. The best part is that we can generate more air with extremely small bubble sizes of 20 microns and smaller that remain in solution for over 30 minutes, resulting in extremely efficient separation of solids from the water and very dry sludge.

Dual Chamber Chemical Reaction Tank

The Reaction tank is designed specifically as an option to allow for longer chemical contact time. The tank allows for 5 minutes of chemical reaction time per chamber. The Dual Chamber Reaction Tank features plate mounted agitators and typically utilizes a Walchem dual probe pH controller to aid in automated chemical dosage and operator monitoring. The unit can also be outfitted with a stainless steel chemical metering pump stand for application of sulfuric acid, acidic coagulants or caustic soda. This feature allows for short distance pipe runs of hazardous chemicals and minimizes operator exposure.

Flotation Cell

The flotation cell is a rectangular vessel designed to provide controlled influent wastewater velocity and optimized surface area. It contains an inlet diffusion pipe, sludge rake, and one or more blow-down valves. The blow-down valve permits removal of the small portion of sludge that settles in the flotation cell.

Sludge Rake

The sludge rake assembly consists of a stainless steel chain and a three-blade scraper arrangement. The sludge scrapers skim the surface of the sludge in the flotation cell and transfer the floating solids to the sludge sump. From the sludge sump a pump removes the sludge to the Thickening/Sludge Dewatering Tank.

The Sludge Rake moves the Floating Sludge Blanket to the Sludge Sump for removal. The Sludge Rake Operates with Variable Speed Control on an Adjustable Timer that is Set According to Flow Rate and Solids Loading.

Sludge Sump

Thickened sludge skimmed from the DAF discharges into a sludge sump. The sump has a hopper bottom with inclined sides to allow sludge to gravity feed to the suction side of the sludge transfer pump.

Discharge Cell

The discharge cell is designed to allow clean, treated water to flow downward and away from rising sludge, and then upward through a clear-well section. It contains a wastewater baffle, adjustable weir, pressurized water diffusion pipe, and blow-down valve. Clean, treated effluent, flows down and under the flotation cell, upward through a clear-well and then over an adjustable weir into a collection launder. The weir is made to be adjustable with threaded bolts. A portion of the clean, treated water, is removed from this cell via a recirculation water header piped to the suction inlet of the pressurized water recirculation pump. A portion of the pressurized water is piped into the inclined section of the flotation cell. A blow-down valve permits removal of the small portion of sludge that settles in the discharge cell. As a result of these extra clarification steps our clean water is commonly as much as 5-6 times purer than other competitive DAF systems.

Clear Well & Dewatering

Some systems employ a clear well for finished clean water inspection, post pH adjustment, or as a short term holding reservoir when the water needs to be transferred to another location for discharge or reuse. The clear well is constructed as a low side wall stainless steel tank for easy visual reference of effluent quality.

Mechanical Construction

The DAF vessel is constructed of 304L Stainless Steel with suitable stiffeners to prevent deformation under all normal stresses incurred during erection and operation. The unit can also be skid-mounted for mobility. All joints are double welded and leak tested prior to shipment. A DAF-mounted catwalk and ladder are provided for operator access to the top of the DAF vessel on large units. Handrails are painted yellow per OSHA regulations. The DAF mixing-pipe flocculator is fabricated out of 304L Stainless Steel (316SS is optional). The flocculator is mounted on legs, and connects to the main DAF unit via a 150lb flange. The flocculator and DAF system are pressure tested prior to shipment.

Automatic Control Systems

The control panel for each system can be designed to include as much or as little automation as desired by the operator and project engineers. They are designed to provide fully automatic operation utilizing a PLC (Programmable Logic Controller). User interface with the control system is provided in the form of panel-mounted selector switches, Allen-Bradley AC variable drive terminals, a pH controller, alarm with lights/horn and a panel-mounted process display terminal. Process variables and chemical dosage set points are monitored and changed via the panel-mounted display terminal. Chemical pump rates follow process flow which is monitored and controlled by a magmeter and proportional valve. Polymer usage is automatically displayed in ml/min and lbs/day on the panel-mounted display. System kilowatt-hour usage is also monitored and displayed. A fail-safe operation mode is provided that will allow the system to be operated manually in the event of a computer malfunction. A semi-automatic mode is also designed into the Ecologix control system to provide maintenance and operational flexibility.

Sludge Holding Tank / Dewatering

The sludge that has been removed from the wastewater by the scraper is pumped into a sludge holding tank for further thickening. From there it is pumped into a dewatering system such as Filter Press or Belt Press for final dewatering. The end result is a 25%-50% dry sludge by weight that is solid to the touch and can be safely disposed of to a land fill.

Most common industries served by Ecologix DAF Systems

Food Processing:
- Dairy Plants
- Meat Processing/Packing (Beef, Pork, Poultry)
- Frozen Food
- All Other Food Processing Plants

Heavy Industry:
- Automotive Paint Lines
- Bio-Fuel Wastewater Treatment
- Metal Finishing
- Oil Drilling/Produced Water
- Tanker Deballasting
- PetroChemical Processing

Other:
- Ground Water Remediation
- Commercial Laundry/Linen Supply
- Ink & Dye Removal
- Landfill Leachate Wastewater

METALS REMOVAL

Removes all common metals to less than 1ppm and into the parts per billion (ppb) level count in a continuous flow process at flow rates up to and over 1,000 GPM. Oils, grease and other contaminants are removed in the same step. Because the CRM operates in a continuous process, you can run the rest of your plant without worrying about overloading the waste treatment system.

POULTRY PROCESSING

The V series DAF system for the Poultry Processing Industry treats every type of waste stream created by eviscerating, further processing and cleaning. The system operates in a continuous process using minimal amounts of chemistry in a self-contained, skid-mounted unit that uses little floor space and requires minimal operator intervention. *The powerful microscopic bubbles float solids to the surface as shown to the right.*

The Application
Ecologix supplies wastewater treatment systems to both poultry kill plants and further processing plants. Poultry processing creates different types of waste streams depending on the type of plant and its products.

Kill Plants
Plants that process chickens or turkeys and ice pack whole birds for shipping typically run two shifts which produce two distinct types of waste.
(System Design - Typical for Poultry Processing) **PDF**

First Shift (slaughter)
Dirt, grit from craws feathers, blood and feces from the eviscerating lines make up the waste stream. Turkey plants produce heavier loadings of dirt and grit.

Second Shift (cleaning)
This is the more difficult of the two streams being made up of blood and dirt combined with high pH cleaners. The timing of the waste flows is difficult as well. Chillers and scolders are usually dumped within an hour of one another. Systems must be sized to accommodate the surges especially in plants with contracted cleaning services where the contractor is under time restrictions and pushes the waste treatment system to its limit.

Further Processing
Whether combined with kill operations or a separate plant, further processing introduces a wide range of contaminants beyond those found in the birds themselves. Cooking produces large volumes of fat, oils and greases from the birds and from frying operations. Ingredients such as breading, seasoning, marinade, flour, starch and sugar complicate the waste treatment process. Flour and sugar, for example, quickly become dissolved making it extremely difficult to remove. Cleaning introduces high pH cleaners from boil-out steps and other cleaning operations.

The Challenge
The challenge is to design a waste treatment system that can handle the wide fluctuations in waste streams from shift to shift. Designing a good system requires an in-depth knowledge of the poultry industry and a specific understanding of each customer's operations. The system must be sized to accommodate the volume and timing of various flows. It must also easily adapt to changing waste conditions without putting unreasonable demands on the operators. Finally, a waste treatment system must be cost effective. It cannot use up vast tracts of valuable floor space nor can it use large quantities of chemicals. It must absolutely keep the customer in compliance with the POTW's discharge limits.

INDUSTRIAL LAUNDRY and TEXTILE RENTAL

Our DAF systems apply to both Industrial Laundry operations and Textile Rental companies operating their own washing plants.

The Application
Textile Rental Companies and Industrial Laundry Operations wash a wide variety of products from napkins and table linens to shop rags and floor mats. These different wash products produce different types of waste streams that can vary from batch to batch.

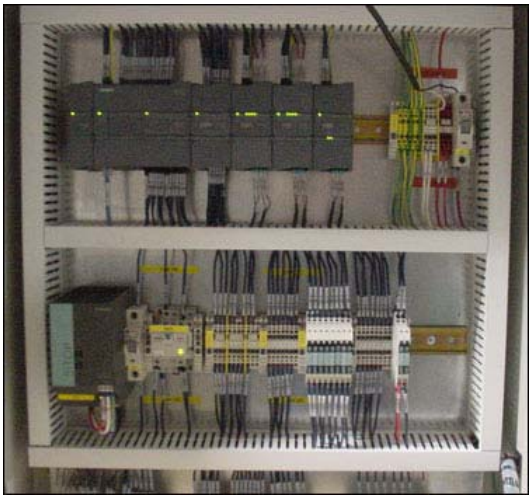
Challenges
Discharge limits imposed on laundries are becoming ever more stringent. Lower limits are forcing plant managers to upgrade existing waste treatment systems or install new systems where none were needed in the past.

Depending on the product mix in the washroom, the time of day, the season or other factors, the nature of the waste stream sent to the waste treatment system can fluctuate widely. Traditional waste treatment methods rely on large equalization tanks and long dwell times to archive proper treatment conditions. These systems use large quantities of chemicals and take up vast amounts of valuable floor space. On top of the waste treatment challenges, water supplies are dwindling and the cost of clean incoming plant water is becoming significant.

DAF SHIPPING PHOTOS




DAF CONTROL PANEL PHOTOS



Activated Carbon | Aeration | Air Treatment | Bag Filters & Housings| Chemicals | Dissolved Air Flotation | Dust Collection | Evaporators | Filter Presses | Flocculation | Inline Filter Vessels | Membrane Filtration | Odor Control |Ozone | Oil Water Separators | Sewage Systems | Liquid and Vapor Phase Vessels | Wet Scrubbers

High-Tech Consultants, Inc.

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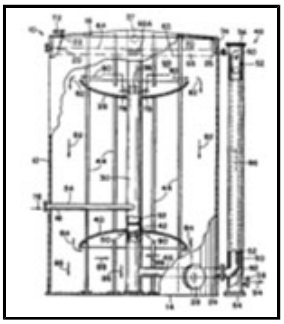


Water Clarification

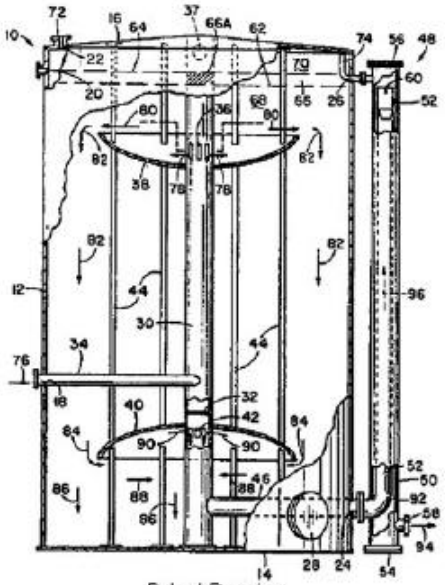
High-Tech Designs That Work For You

Water treating is often considered a "black art". That it is little understood in the oil production industry may be an understatement. The fact is that water treating is a very complex issue; too complex to be mixed with other operational issues. Few operators have the luxury of a staff with enough time to fully comprehend the subject. And so, the subject of water treating is rarely adequately addressed. This costs the industry hundreds of millions each year in plugged disposal and injection wells, pipelines, tanks, and in lost productivity.

Clean water can be injected or disposed of at almost no cost to the produce. However, water with just a few parts per million of oil and iron sulfide can cost millions.

HTC developed the HWSB™ design to produce high quality water without a pressure vessel, without filtration, and without moving parts. This High-Tech design is so innovative it was granted patents in the US and Canada.

The HWSB™ is over 70% hydraulically efficient. This compares to <3% for most other designs.



Patent Drawing

SMI 420F EVAPORATOR

OVERVIEW

The SMI® 420F Evaporator is a floating unit, designed for effective operation in small areas, especially sites containing large particles or highly corrosive water. The 420F Evaporator is durable, simple to use and easy to maintain – a reliable way to manage excess water.

BENEFITS

Low Buildup: the SMI® 420F Evaporator is designed with a minimal amount of top surface area to control the build-up of residue or ice, helping to reduce clean up and maintenance!

High Performance: High-speed fan blade rotation creates an optimum water droplet distribution for evaporation. Annual evaporation rates up to 70% have been achieved with the 420F, and averages are typically between 25% and 60%. Evaporation rates depend on many factors, including ambient temperature, relative humidity, water make-up and wind conditions.

Easy Maintenance: The machine is designed for easy cleaning and maintenance. It requires no weekly bearing lubrication, as it is lubricated for the life of the motor.

Minimal Clogging: The SMI® 420F Evaporator can pass particles up to 3/16 inch (4.7 mm) in diameter, which reduces the need for pre-filtering, filter cleaning and the hassles of clogged nozzles.

Extreme Duty: This design has evolved from 10 years of experience in industrial and extreme outdoor applications. Polyethylene pontoons are filled with closed-cell polyurethane foam, ensuring buoyancy even after any accidental puncturing of the plastic outer shell. Critical components are manufactured from stainless steel for extended life in harsh environments.

FEATURES

Floating unit supported by plastic pontoons containing closed-cell PU foam

Low plume height for shorter drift distance, allowing longer operation in swirling or changing winds

Heavy industrial construction, including stainless control panel, motor enclosure, manifold and fan blade, increasing durability and life span

Vibration sensor included to shut down motor before catastrophic failure due to residue or ice build-up

Stainless steel submersible pump attached to floating frame

SMI 420F EVAPORATOR

Fan

Frame

Pontoon

AUTOMATION ■ ENGINEERING ■ CONSTRUCTION ■ EQUIPMENT

SPECIFICATIONS

Fan and Head System

- 25 HP industrial grade world motor (for 3 phase / 480 volt / 60 cycle and 3 phase / 400 volt / 50 cycle power; motors for other voltages available upon request)
- Stainless steel casing protects motor and enhances cooling
- Patented stainless steel fan blades (optional scale-resistant coating)
- Vibration sensor for motor shut off

Floating Platform

- Galvanized steel construction with stainless steel fasteners
- Plastic pontoon composed of UV-stabilized polyethylene shell with closed-cell polyurethane foam
- 7.5 HP submersible stainless steel pump for 3 phase / 480 volt / 60 cycle power (specified for 80 gpm (303 lpm) at 100 psi (7 bar))

Water System

- Standard flow, stainless steel water manifold for average evaporation conditions. Designed for flow rate of 66 gpm (250 lpm) at 100 psi (7 bar) water pressure

Electrical

- 25 HP premium efficiency fan motor rotating at 3600 rpm (480 volt / 60 cycle) or 2900 rpm (400 volt / 50 cycle)
- Stainless Steel control panel with start and stop buttons
- 150 foot (45 m) electrical cord

Warranty

- Full one year warranty on all parts and workmanship

Options

- For acidic or high-alkaline water applications, stainless steel construction and acid-resistant coating
- Special scale-resistant coating on fan to reduce residue build-up on blades
- 10 HP submersible stainless steel pump for 3 phase / 400 volt / 50 cycle
- Optional high flow, stainless steel water manifold for above average evaporation. Designed for flow rate of 91 gpm (344 lpm) at 100 psi (7 bar) water pressure
- Y-line manual flush filter for dirtier water

SMI Evaporative Solutions
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Fax: 989-631-3162
Website: www.evapor.com

Fulton®

Thermal Fluid Heaters

Vertical Coil, Vertical Tubeless, Electric and Horizontal

Sizes from 75,000 to 40,000,000 BTU/HR

The heat transfer innovators.

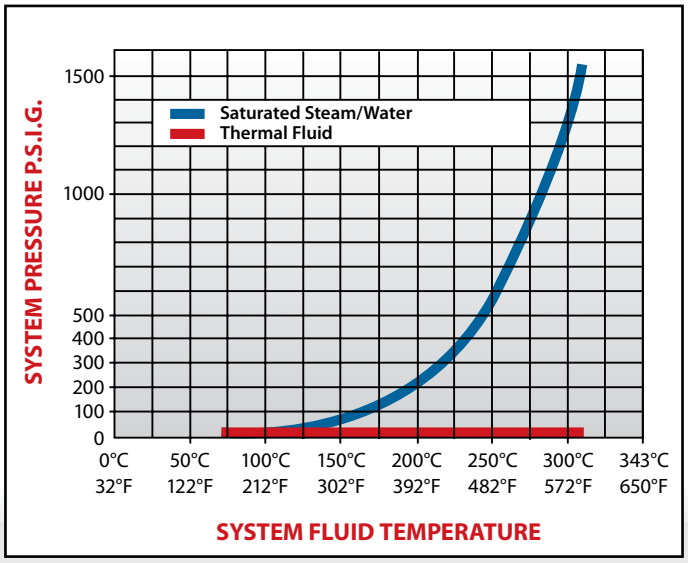
THERMAL FLUID FEATURES AND BENEFITS

KEY FEATURES

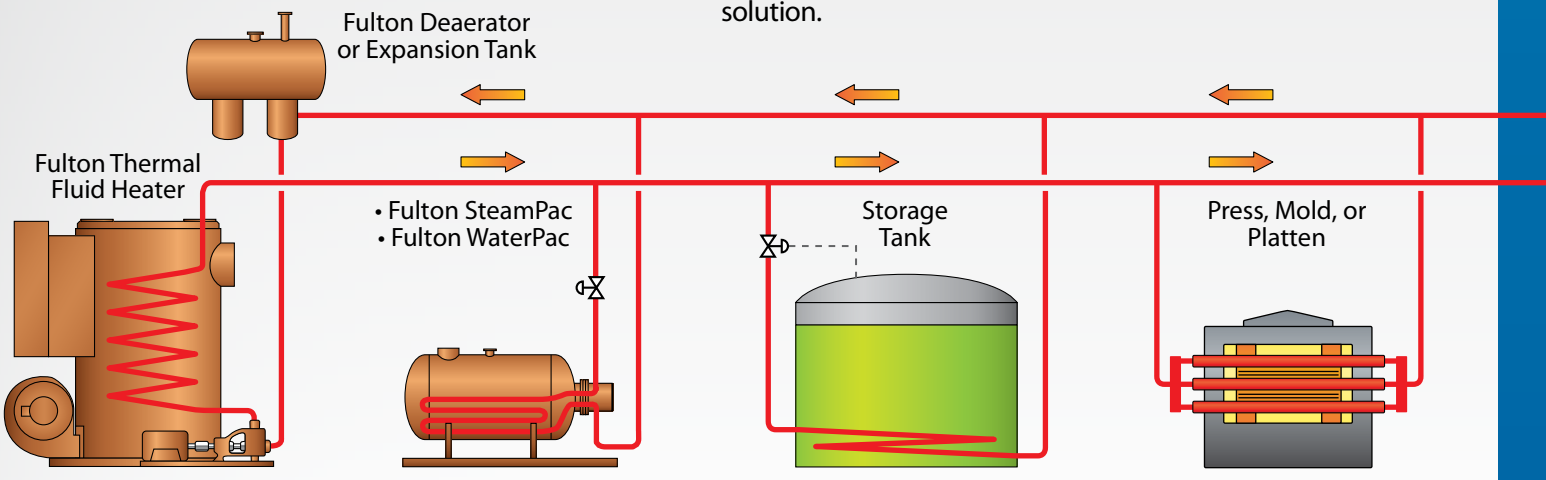
- No Corrosion or Freezing
- High Operating Temperatures (up to 750° F) with Low System Pressure
- Minimum Maintenance - Burner, Pump and Controls
- Simple Circuit; No Blow-Downs, Steam Traps or Condensate Return Systems
- Fulton's Combination Expansion / Deaerator Thermal Buffer Tank Provides Pipework Simplification, Protection of Thermal Fluid from Oxidation and Continuous Deaeration of Fluid to Avoid Pump Cavitation
- Heaters are Built and Tested to ASME Code Section VIII Div. I as standard. ASME Code Section I is available upon request
- Fulton Heaters are Manufactured Individually for Maximum Flexibility and to Customer Specifications
- Fulton Heaters and Accessory Components (Pumps, Expansion Tanks, Control Valves, etc.) Can Be Skid Mounted to Save Time and On-Site Fabrication

THERMAL FLUID VS. STEAM

A thermal fluid (hot oil) system operates in a closed loop circulation system with minimal pressure. Fulton thermal fluid systems can reach 750° F (345° C) making them an ideal choice for many process heat applications.



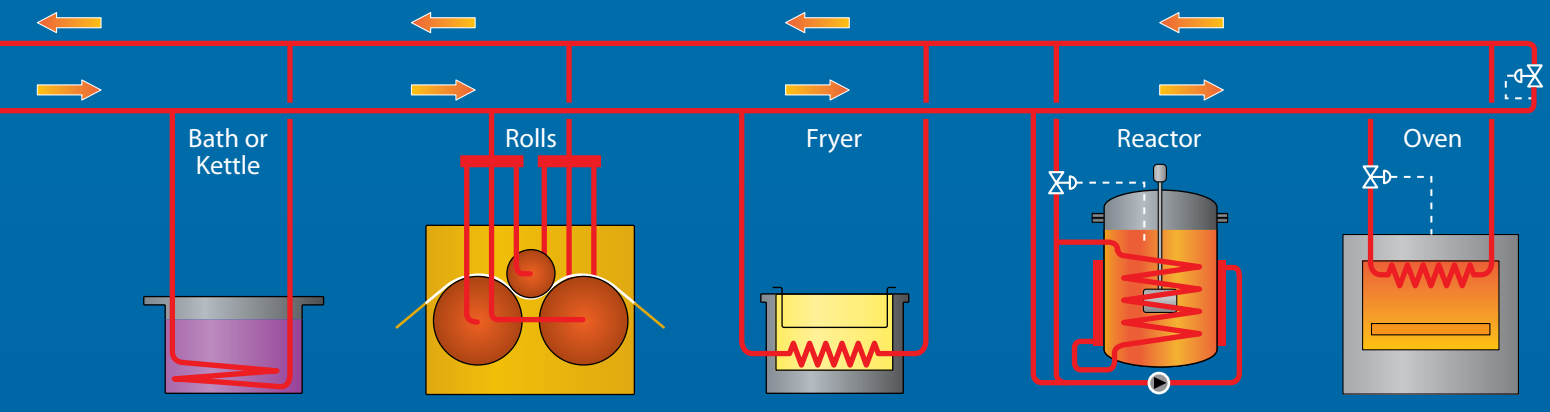
The choice between a steam system or a thermal fluid system is governed by the process requirements. The range or process temperature is a deciding factor. If the system's required temperature is above the freezing point of water (32° F) and below approximately 350° F, the choice is usually steam. However, if the required temperature is below 32° F or above 350° F, thermal fluid may be a better solution.



APPLICATIONS

Fulton heaters are used in a variety of applications throughout many industries. Food, plastic and chemical processing, as well as pharmaceutical and bio-fuel production, are only a few examples of the many existing applications using Fulton equipment.

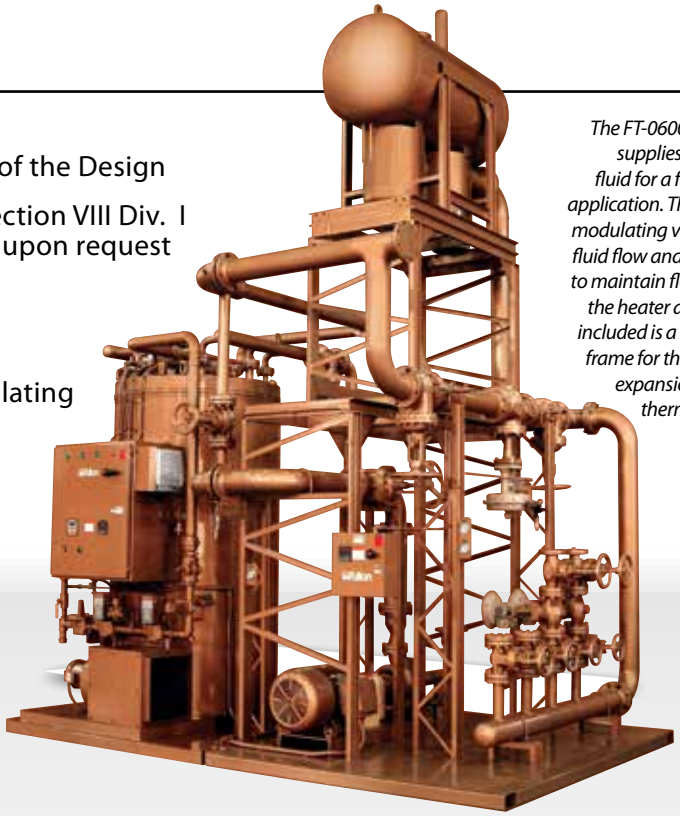
- Adhesives
- Asphalt
- Autoclaves
- Bio-fuel
- Chemical Reactors
- Deodorization
- Distillation
- Food Processing (frying, baking, etc.)
- Gas Processing / Oil Processing
- Inks & Dyes
- Laminating
- Laundry
- Marine Heating and Shipboard Services
- Metal Finishing
- Mining
- Ovens
- Paint and Varnish Manufacture
- Paper Converting Machinery
- Plastics
- Printing and Packaging Machinery
- Rubber and Rubber Compounds
- Surface Pre-Treatment and Finishing
- Tank Farms/Pipe and Pump Tracing
- Textile Machinery
- Unfired Steam or Hot Water Generation
- Uranium Processing
- Waste Treatment/Dryers



C-MODEL
VERTICAL COIL DESIGN

KEY FEATURES

- Vertical 4-Pass Design
- Preheated Combustion Air is an Integral Part of the Design
- Heaters are Built and Tested to ASME Code Section VIII Div. I as standard. ASME Code Section I is available upon request
- 800,000 BTU/Hr to 14,000,000 BTU/Hr Output
- Operating Temperatures to 750° F
- Gas, Oil or Dual Fuel Burners; On/Off or Modulating
- Low Emission Natural Gas Burners are Available
- Minimal Refractory Results in Low Thermal Inertia and Prevents Overheating of the Fluid in the Event of a Pump or Power Failure
- Customized Controls Available
- Customized Heaters Available
- High Efficiencies
- Even Heating



The FT-0600-C shown here supplies 600° F thermal fluid for a food processing application. The skid includes modulating valves to control fluid flow and a bypass valve to maintain flow throughout the heater at all times. Also included is a custom 3-piece frame for the top-mounted expansion / deaerator / thermal buffer tank.

MODELS	FT-C	0080	0120	0160	0240	0320	0400	0600	0800	1000	1200	1400
Specifications												
Heat Output	1,000 BTU/HR	800	1,200	1,600	2,400	3,200	4,000	6,000	8,000	10,000	12,000	14,000
	1,000 KCAL/HR	200	300	400	600	800	1,000	1,500	2,000	2,500	3,000	3,500
Thermal Fluid Content	Gallons	10	21	19	31	68	76	132	201	290	383	460
	Liters	38	80	72	116	258	288	498	648	1,097	1,448	1,741
Recommended Flow Rate	GPM	50	75	100	150	250	250	375	500	615	730	800
	M3/HR	11.4	17	22.7	34	56.8	56.8	85.2	113.6	139	167	182
Approximate Fuel Usage												
Light Oil *	GPH	7.1	10.7	14.3	21.4	28	35.3	53	69.3	87.1	104.5	122
	LPH	27	40.6	54.1	81	108.8	136	201	263.7	329.6	395.5	461.5
Natural Gas *	FT3/HR	998	1,498	1,998	2,999	4,000	4,997	7,498	9,997	12,496	14,998	17,500
	M3/HR	38.3	42.4	56.5	84.9	113.2	141.5	212.3	283	353.8	424.6	495.5
Power												
Typical Circulating Pump	HP	10	10	15	15	20	20	30	40	50	50	60
	KW	7.5	7.5	11.2	11.2	14.9	14.9	22.5	29.5	37.3	37.3	45
Typical Burner Motor	HP	1.5	3	3	3	5	7.5	7.5	15	20	20	20
	KW	1.1	2.2	2.2	2.2	3.7	5.6	5.6	11.2	11.2	15	15

* Please consult factory for additional fuel options. Fuel up to No. 6 Oil available for large units (FT-0600-C and larger). Voltage 3 Phase for Burner and Pump - Each unit has an incorporated step down transformer. Efficiency up to 80% Minimum Based on High Heating Value of the Fuel (No. 2 Oil @ 140,000 BTU/GHHV; Natural Gas @ 1,000 BTU/ft3HHV) Circulating pump motor sizes based on standard pressure (55 PSIG) and viscosity 1 cs, specific gravity 0.7, with 25-37 PSID available head for installation. All Units are Modulated. Operating specifications may change based on field conditions.

A LOOK INSIDE

THE COMBUSTION PROCESS

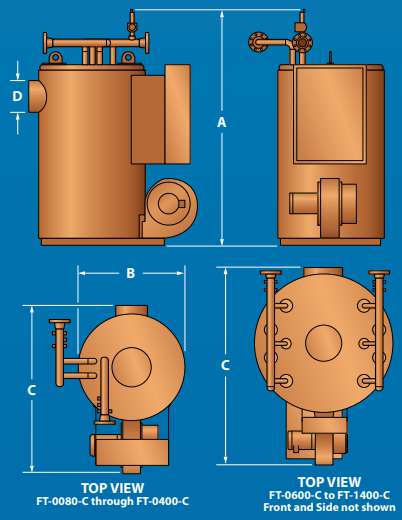
1 The combustion air enters the burner fan inlet, travels upward between the inner and outer jacket, preheating the air before it enters the top mounted burner.

2 Hot gases travel down the full length of the vessel creating the first (radiant) pass.

3 The gases then travel back across the inner row of coils, creating the second (convection) pass.

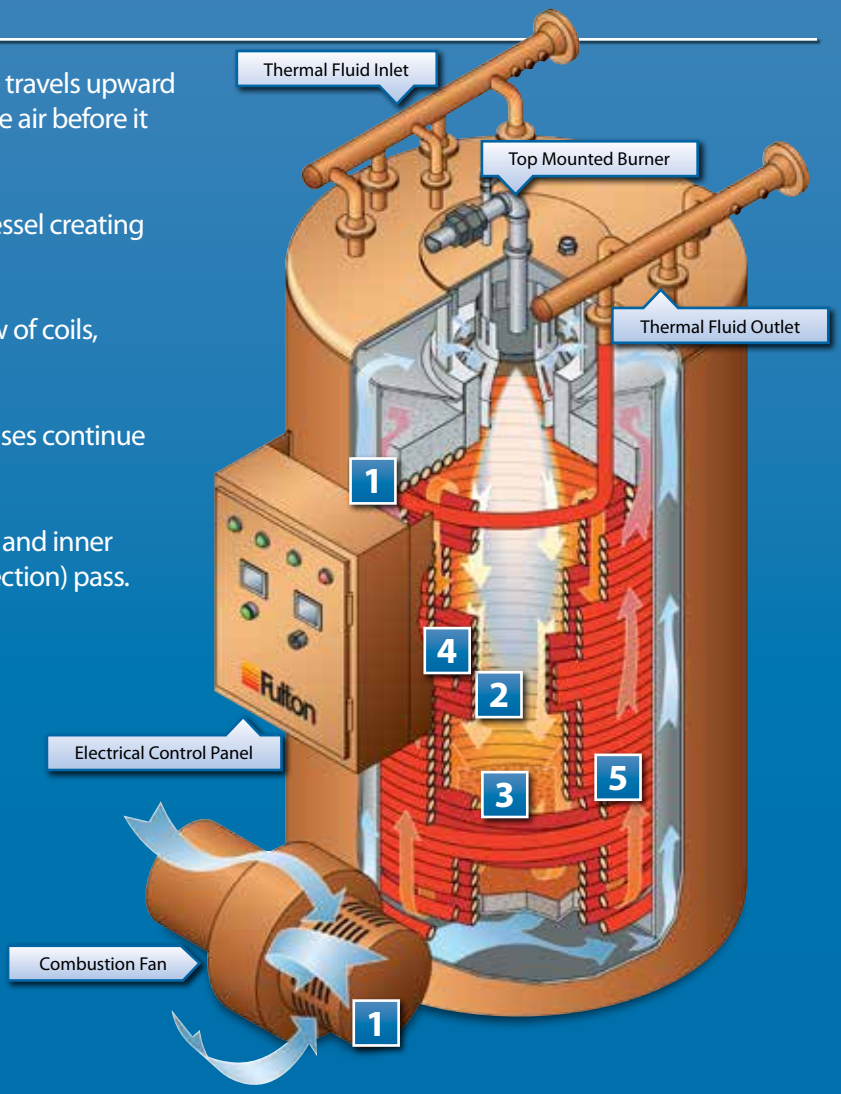
4 The third (convection) pass is created as the gases continue back down between the inner and outer coil.

5 The last pass is upward between the outer coil and inner jacket to the flue outlet, creating the fourth (convection) pass.



TOP VIEW
FT-0080-C through FT-0400-C

TOP VIEW
FT-0600-C to FT-1400-C
Front and Side not shown



MODELS	FT-C	0080	0120	0160	0240	0320	0400	0600	0800	1000	1200	1400
Dimensions												
Heater Inlet/Outlet Connections	IN	1.25	1.5	2	2.5	3	3	4	4	6	6	6
	MM	32	38	51	64	76.3	76	102	102	152	152	152
(A) Overall Height	IN	73.7	80.7	80.6	89.7	100.6	112.4	143.6	143	146.5	146.4	163.1
	MM	1,872	2,050	2,046	2,278	2,556	2,856	3,648	3,632	3,721	3,718	4,144
(B) Heater Width	IN	31.6	34.4	45.9	50.1	49.3	49.3	63.4	70.5	95	108.4	108.4
	MM	803	873	1,165	1,273	1,252	1,252	1,611	1,791	2,413	2,753	2,753
(C) Overall Depth	IN	46.2	60.6	60.6	66.6	80.6	80.6	88.1	107.75	135.1	152.9	152.9
	MM	1,173	1,540	1,540	1,691	2,046	2,046	2,237	2,736	3,432	3,882	3,882
(D) Flue Outlet Diameter	IN	10	10	10	12	14	14	18	20	20	22	22
	MM	254	254	254	305	356	356	457	508	508	559	559
Recommended Stack Diameter	IN	10	12	12	14	18	18	22	24	24	26	26
	MM	254	304	304	356	457	457	558	609	609	661	661
Approximate Dry Weight	LB	1,500	2,100	2,550	3,400	5,300	5,300	8,250	11,450	19,250	21,700	23,000
	KG	700	950	1,150	1,550	2,400	2,400	3,750	5,200	8,750	9,850	10,455

Specifications and Dimensions are approximate. Consult factory for model specific electrical requirements. We reserve the right to change specifications and/or dimensions without notice. Diagram for guidance purposes only. Comprehensive details of dimensions, connections, etc. for each model are given on product dimension data sheets available from Fulton.

A-MODEL
VERTICAL TUBELESS DESIGN

KEY FEATURES

- Vertical Annular Design
- Heaters are Built and Tested to ASME Code Section VIII Div. I as standard. ASME Code Section I is available upon request
- 207,000 BTU/Hr to 1,736,000 BTU/Hr Output
- Operating Temperatures to 600° F
- Gas or Oil Fired Burners, On/Off or Modulating
- Low Emission Gas Burners are Available
- Customized Controls Available
- Customized Heaters Available

Pictured here is a skid mounted FT-0690-A thermal fluid heater with a deaerator / thermal buffer tank and a circulation pump.

MODELS	FT-A	0200	0380	0520	0690	1050	1740
Specifications							
Heat Output	1,000 BTU/HR	207	348	519	693	1,052	1,736
	1,000 KCAL/HR	52	88	131	175	265	437
Thermal Fluid Content	Gallons	23	38	45	65	98	117
	Liters	87	144	170	246	371	443
Recommended Flow Rate	GPM	90	90	125	125	150	200
	M3/HR	21	21	28	28	34	46
Approximate Fuel Usage • Light Oil	GPH	2.2	3.2	4.7	6.7	9.4	15.8
	LPH	8.3	11.9	17.8	25.4	35.6	60
Approximate Fuel Usage • Natural Gas	FT3/HR	259	435	649	866	1,315	2,170
	M3/HR	7.2	12.2	18.4	24.2	36.8	60.8
Power							
Typical Circulating Pump	HP	10	10	15	15	15	20
	KW	7.5	7.5	11.2	11.2	11.2	14.9
Typical Burner Motor	HP	.33	.33	.33	.75	.75	1.5
	KW	.248	.248	.248	.56	.56	1.1

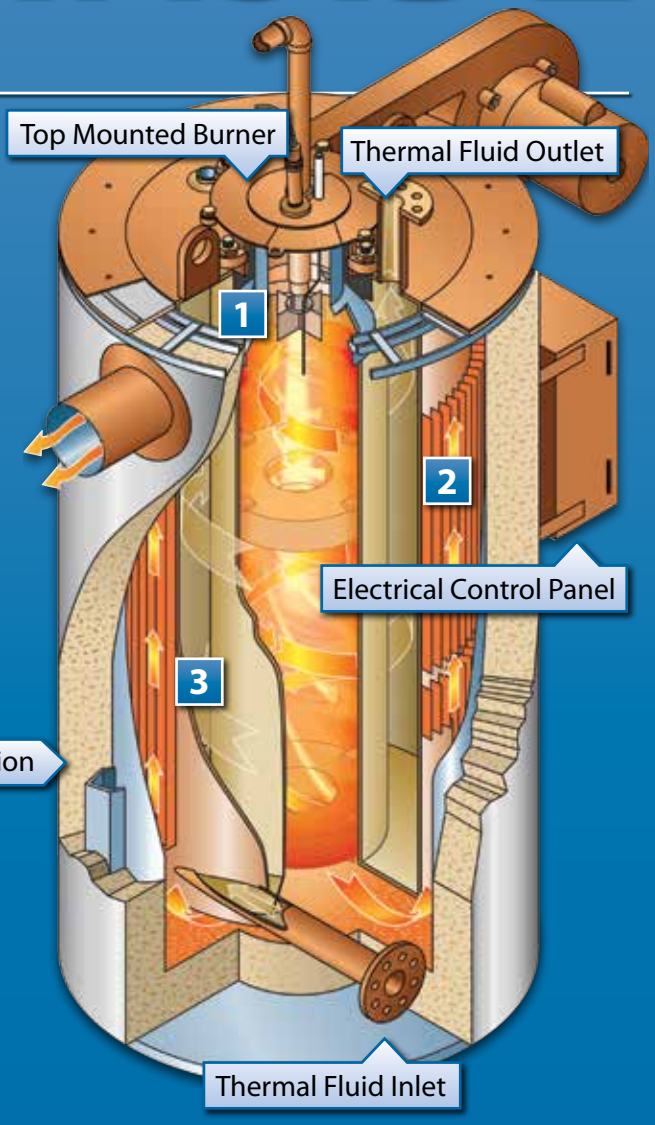
A LOOK INSIDE

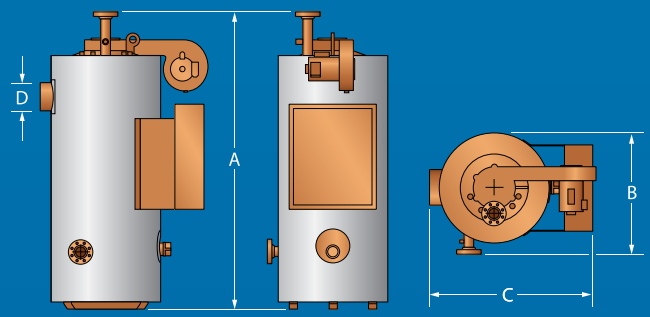
THE COMBUSTION PROCESS

1 The top-mounted down-fired burner delivers a spinning flame down the length of the furnace. As the flame swirls downward in a controlled flow pattern, the fluid spirals upward in the pressure vessel.

2 Hot gases from the flame are carried up the outside of the vessel in the secondary flue passage convection area.

3 Convection fins welded along the full length of the vessel transmit the remaining heat through the outer side of the fluid vessel and into the fluid. The result is even heating of thermal fluids for optimum thermal efficiency.





Specifications and Dimensions are approximate. Consult factory for model specific electrical requirements. We reserve the right to change specifications and/or dimensions without notice.

Diagram for guidance purposes only. Comprehensive details of dimensions, connections, etc. for each model are given on product dimension data sheets available from Fulton.

MODELS	FT-A	0200	0380	0520	0690	1050	1740
Dimensions							
Heater Inlet/Outlet Connections	IN	1.5	1.5	2	2	2	2.5
	MM	38	38	51	51	51	64
(A) Overall Height	IN	69	75	85	86	86	110
	MM	1,752	1,905	2,159	2,185	2,185	2,794
(B) Heater Width	IN	26	28	30	36	44	44
	MM	660	710	760	915	1,120	1,120
(C) Overall Depth	IN	43	45.5	46	56	64	64
	MM	1,092	1,156	1,168	1,422	1,626	1,626
(D) Flue Outlet Diameter	IN	6	6	8	10	12	12
	MM	152	152	203	254	305	305
Approximate Dry Weight	LB	1,850	2,100	2,300	3,400	4,400	7,200
	KG	840	955	1,045	1,540	1,995	3,275

N-MODEL
VERTICAL ELECTRIC DESIGN

KEY FEATURES

- Compact Vertical Design
- Heaters are Built and Tested to ASME Code Section VIII Div. I as standard. ASME Code Section I is available upon request
- 74,000 BTU/Hr to 1,685,000 BTU/Hr Output
- Operating Temperatures to 650° F
- Low Watt Density Elements Result in Low Film Temperatures and Long Element Life
- Customized Controls Available, Including (but not limited to) Class 1, Division 1 or 2 groups C&D of NEC Code
- Customized Heaters Available

Pictured here is a skid mounted FT-0640-N electric thermal fluid heater with an expansion / deaerator / thermal buffer tank and a circulation pump.

MODELS	FT-N	0075	0150	0225	0300	0375	0430	0640	0860	1070	1290	1500	1720
Specifications													
	KW	22	44	66	88	110	126	189	252	315	378	441	504
Heat Input	1,000 BTU/HR	75	150	225	300	375	429	644	859	1,074	1,289	1,504	1,719
	1,000 KCAL/HR	18.9	37.8	56.7	75.6	94.5	108	162	216	271	325	379	433
Heat Output	1,000 BTU/HR	74	148	222	294	368	420	631	842	1,053	1,263	1,474	1,685
	1,000 KCAL/HR	18.6	37.3	59.9	74.1	92.7	105.8	159	212.2	265.4	318.3	371.4	424.6
Thermal Fluid Content	Gallons	18	36	42	54	63	79	79	102	127	152	168	185
	Liters	68	136	159	204	238	299	299	386	480	575	636	700
Recommended Flow Rate	GPM	50	50	50	90	90	125	125	150	150	175	200	200
	M3/HR	11.4	11.4	11.4	20.5	20.5	28.4	28.4	34	34	39.8	45.5	45.5
Power													
Typical Circulating Pump Motor	HP	7.5	7.5	7.5	10	10	15	15	15	15	15	20	20
	KW	5.6	5.6	5.6	7.5	7.5	11.2	11.2	11.2	11.2	11.2	14.9	14.9
Amps	208V	61	122	183	245	306	350	525	700	875	1,050	1,224	1,399
	220V	53	106	159	212	265	303	455	607	758	910	1,061	1,212
	480V	26	53	79	106	132	151	228	303	379	455	531	606

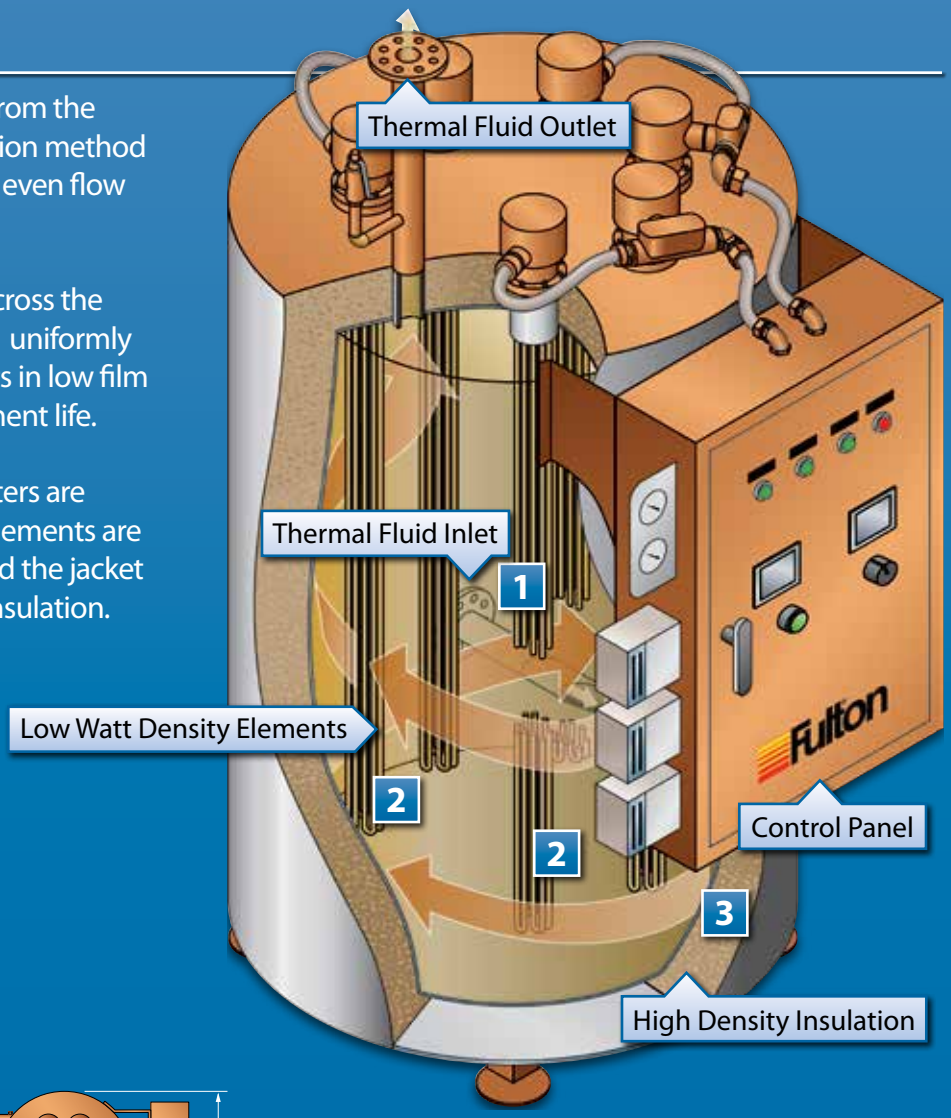
A LOOK INSIDE

OPERATING PRINCIPLE

1 Thermal fluid enters the heater from the lower right side. This unique circulation method (upward spiraling fluid) results in an even flow of thermal fluid within the vessel.

2 The thermal fluid flows evenly across the multiple low watt density elements, uniformly heating the thermal fluid. This results in low film temperatures and assures long element life.

3 Fulton electric thermal fluid heaters are nearly 100% efficient because the elements are totally immersed in thermal fluid and the jacket is fully insulated with high density insulation.



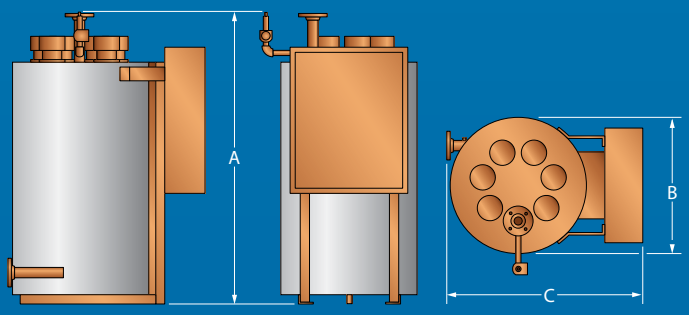


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Diagram for guidance purposes only. Comprehensive details of dimensions, connections, etc. for each model are given on product dimension data sheets available from Fulton.

MODELS	FT-N	0075	0150	0225	0300	0375	0430	0640	0860	1070	1290	1500	1720
Dimensions													
Heater Inlet	IN	1.5	1.5	1.5	1.5	1.5	2	2	2	2	2	2.5	2.5
	MM	38	38	38	38	38	51	51	51	51	51	64	64
(A) Overall Height	IN	70	70	70.5	70	70	90.5	90.4	90.8	89.8	91.2	93	93
	MM	1,778	1,778	1,791	1,778	1,778	2,299	2,296	2,306	2,281	2,317	2,362	2,362
(B) Heater Width	IN	20	26	28	32	32	32	32	38	44	50	54	58
	MM	508	660	711	813	813	813	813	965	1,118	1,270	1,372	1,473
(C) Overall Depth	IN	37.5	43	43.5	47.5	47.5	47.5	49.5	53.8	58.4	65.7	71.8	75.7
	MM	953	1,092	1,105	1,207	1,207	1,207	1,257	1,365	1,257	1,669	1,823	1,993
Approximate Dry Weight	LB	1,060	1,220	1,400	1,540	1,660	2,040	2,200	2,370	2,650	2,950	2,950	3,600
	KG	481	555	636	700	756	927	1,000	1,077	1,205	1,341	1,341	1,636

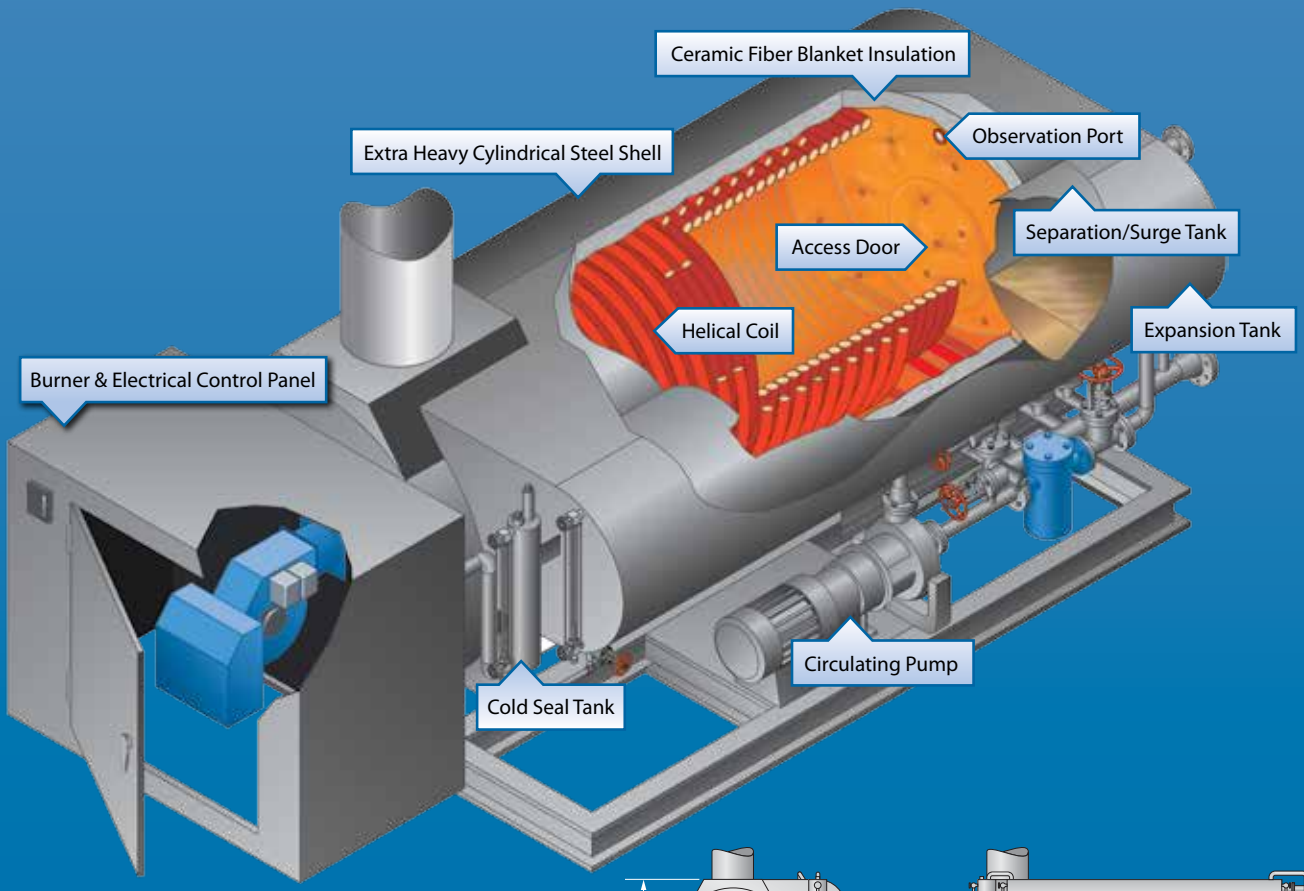
HOPKINS
HORIZONTAL COIL DESIGN

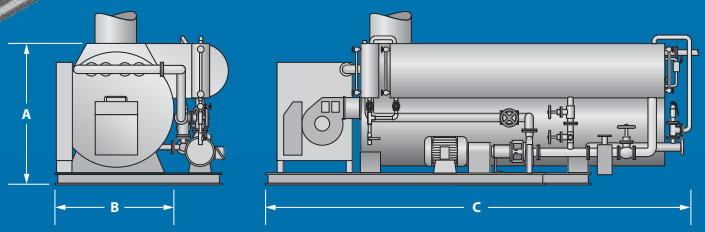
KEY FEATURES

- Horizontal 2-Pass Design
- 1,000,000 BTU/Hr to 40,000,000 BTU/Hr Output
- Heaters are Built and Tested to ASME Code Section VIII Div. I as standard. ASME Code Section I is available upon request
- Operating Temperatures to 650° F
- Modulating Gas, Oil or Dual Fuel Burners
- Alternative Fuel Capabilities
- Open Protocol Burner
- Skid-Mounted Systems Available, Including Circulating Pump and Expansion Tank
- Customized Controls and Coil Designs Available
- Water - Glycol Heaters Available
- Available With or Without Integral Expansion Tank

MODELS	HPN	100S	200S	350S	600S	800S	1000S	1200S	1400S	1600S	2000S	2400S	3000S	4000S
Specifications														
Heat Output	Million BTU/hr	1	2	3.5	6	8	10	12	14	16	20	24	30	40
	Million Kcal/hr	.25	.5	.875	1.5	2	2.5	3	3.5	4	5	6	7.5	10
Flow Rate-Standard *1	GPM	75	150	265	425	600	725	900	1050	1200	1500	1800	2250	3000
	M3/min	18	35	61	97	137	165	205	239	273	341	409	511	682
Flow Rate-Low Flow *2	GPM	40	75	135	225	300	375	450	525	600	750	900	1125	1500
	M3/min	10	18	31	52	69	86	103	120	97	171	205	256	341
Circulating Pump Motor-STD	HP	7.5	15	20	30	40	50	60	75	100	100	125	150	200
	kW	5.6	11.2	14.9	22.5	29.8	37.3	45	56	74.5	74.5	93.2	111.8	149
Circulating Pump Motor-LF	HP	7.5	7.5	15	20	30	30	40	30	40	50	60	75	100
	kW	5.6	5.6	11.2	14.9	22.5	22.5	29.8	22.5	29.8	37.3	45	56	74.5
Blower Motor	HP	1/3	1	2	7.5	10	10	5	7.5	7.5	15	20	25	30
	kW	.25	.7	1.5	5.6	7.5	7.5	4.3	5.6	5.6	11.2	14.9	18.6	22.5
Light Oil (approx. fuel usage)*3	GPH	8.8	17.5	30.6	52.5	70	87.5	104.9	122.4	139.9	174.9	209.8	262.3	349.7
	LPH	33.3	66.2	115.8	198.7	265	331.2	397	463.3	529.5	662	794	992.8	1324
Natural Gas (approx. fuel usage)*3	FT3/hr	1,334	2,667	4,667	8,000	10,667	13,334	16,000	18,667	21,334	26,667	32,000	40,000	53,334
	M3/hr	37.4	75	131	224	299	373.4	448	522.7	597.4	747	896	1120	1493.4

A LOOK INSIDE





Specifications and Dimensions are approximate. Consult factory for model specific electrical requirements. We reserve the right to change specifications and/or dimensions without notice.

Diagram for guidance purposes only. Comprehensive details of dimensions, connections, etc. for each model are given on product dimension data sheets available from Fulton.

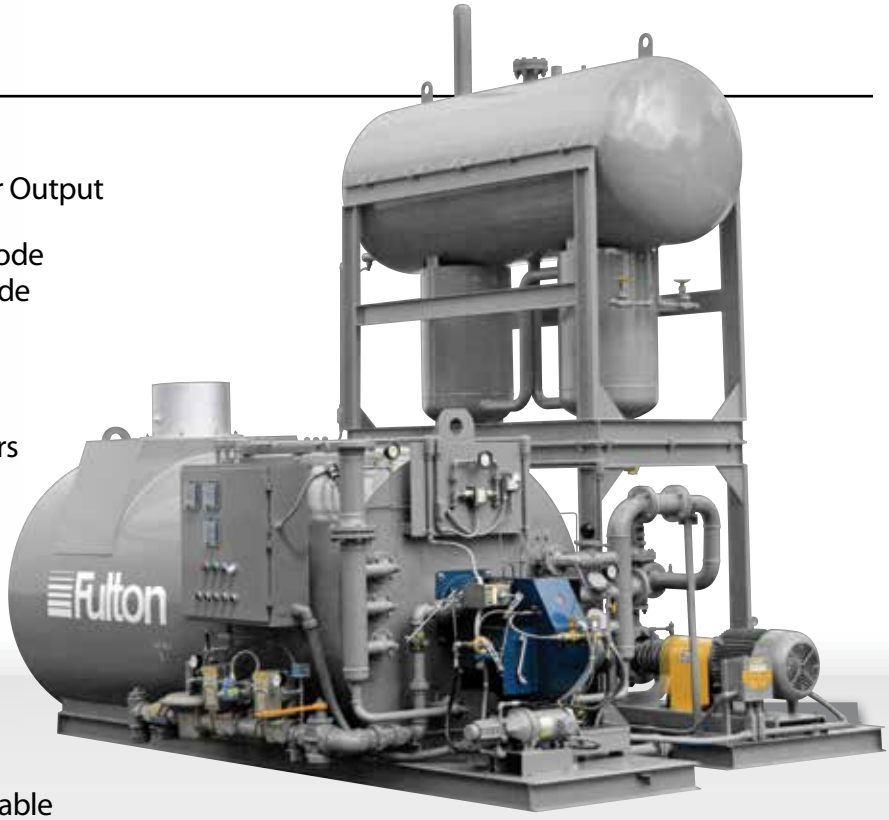
***NOTE:** Dimensions shown are for the Hopkins model without the integral expansion tank.

MODELS	HPN	100S	200S	350S	600S	800S	1000S	1200S	1400S	1600S	2000S	2400S	3000S	4000S
Dimensions														
(A) Overall Height (w/o Stack)	IN	51	60	62	82	82	105	105	106	106	125	133	133	142
	MM	1,295.4	1,524	1,575	2,083	2,083	2,667	2,667	2,692.4	2,692.4	3,175	3,378	3,378	3,607
(B) Overall Width	IN	42	50	50	74	93	87	103	110	110	123	130	130	142
	MM	1,067	1,270	1,270	1,880	2,362	2,210	2,617	2,794	2,794	3,124	3,302	3,302	3,607
(C) Overall Length	IN	115	152	211	231	302	311	360	408	444	450	550	575	648
	MM	2,921	3,861	5,359	5,867	7,671	7,899	9,144	10,363	11,278	11,430	13,970	14,605	16,459
Inlet/Outlet Connections	IN	2	3	3	4	6	6	8	8	8	10	12	12	12
	MM	51	76.2	76.2	102	152.4	152.4	203	203	203	254	305	305	305
Thermal Liquid Volume	Gallons	45	86	168	426	661	724	853	1,168	1,400	1,721	2,322	3,180	4,626
	Liters	170	325	635	1,612	2,502	2,740	3,228	4,421	5,299	6,514	8,789	12,037	17,511
Approx. Dry Weight	LB	3,936	6,800	9,052	14,350	18,500	23,100	26,800	30,500	32,600	41,400	68,000	74,000	80,000
	KG	1,785	3,084	4,106	6,509	8,392	10,478	12,156	13,835	14,787	18,779	30,844	33,566	36,287
Approx. Flooded Weight	LB	4,310	7,514	10,447	17,886	23,987	29,110	33,880	40,195	44,220	55,685	87,273	100,394	118,396
	KG	1,955	3,408	4,739	8,113	10,880	13,204	15,368	18,232	20,058	25,258	39,586	45,538	53,704
Floor Loading	LB/FT3	129	143	143	151	123	155	132	129	131	145	176	194	186
	KG/M3	2,066	2,291	2,291	2,419	1,970	2,483	2,115	2,066	2,099	2,323	2,819	3,108	2,980

ALLIANCE
HORIZONTAL COIL DESIGN

KEY FEATURES

- Compact Horizontal 3-Pass Design
- 2,400,000 BTU/Hr to 20,000,000 BTU/Hr Output
- Heaters are Built and Tested to ASME Code Section VIII Div. I as standard. ASME Code Section I is available upon request.
- Operating Temperatures to 650° F
- Modulating Gas, Oil or Dual Fuel Burners
- Low Emission Gas Burners
- Alternative Fuel Capabilities
- Open Protocol Burner
- Skid Mounted Systems Available, Including Circulating Pump and Expansion Tank
- Customized Controls and Heaters Available



Shown here is an FT-0600-HC horizontal heater skid mounted with circulation pump and a combination expansion / deaerator / thermal buffer tank, designed for barge cargo heating.

MODELS	HC	0240	0400	0600	0800	1000	1200	1600	2000
Specifications									
Heat Output	1,000 BTU/HR	2,400	4,000	6,000	8,000	10,000	12,000	16,000	20,000
	1,000 KCAL/HR	600	1,000	1,500	2,000	2,500	3,000	4,032	5,040
Thermal Fluid Content	Gallons	75	115	190	264	325	508	480	1,150
	Liters	284	435	719	998	1,230	1,921	1,817	4,353
Recommended Flow Rate	GPM	150	300	400	600	850	1,200	1,200	1,500
	M3/HR	35	69	91	137	193	273	273	341
Approximate Fuel Usage									
Light Oil	GPH	23	39	58	77	96	115	143	179
	LPH	88	148	220	292	364	436	542	678
Natural Gas	FT3/HR	3,200	5,340	8,000	10,700	13,340	16,000	20,000	25,000
	M3/HR	91	152	227	304	378	454	566	708
Power									
Typical Circulating Pump Motor	HP	15	25	30	50	60	75	100	125
	KW	11.2	18.7	22.5	37.3	45	56	74.5	93.2
Typical Burner Motor	HP	2	5	7.5	10	15	15	30	30
	KW	1.5	3.7	5.6	7.5	11.2	11.2	22.4	22.4

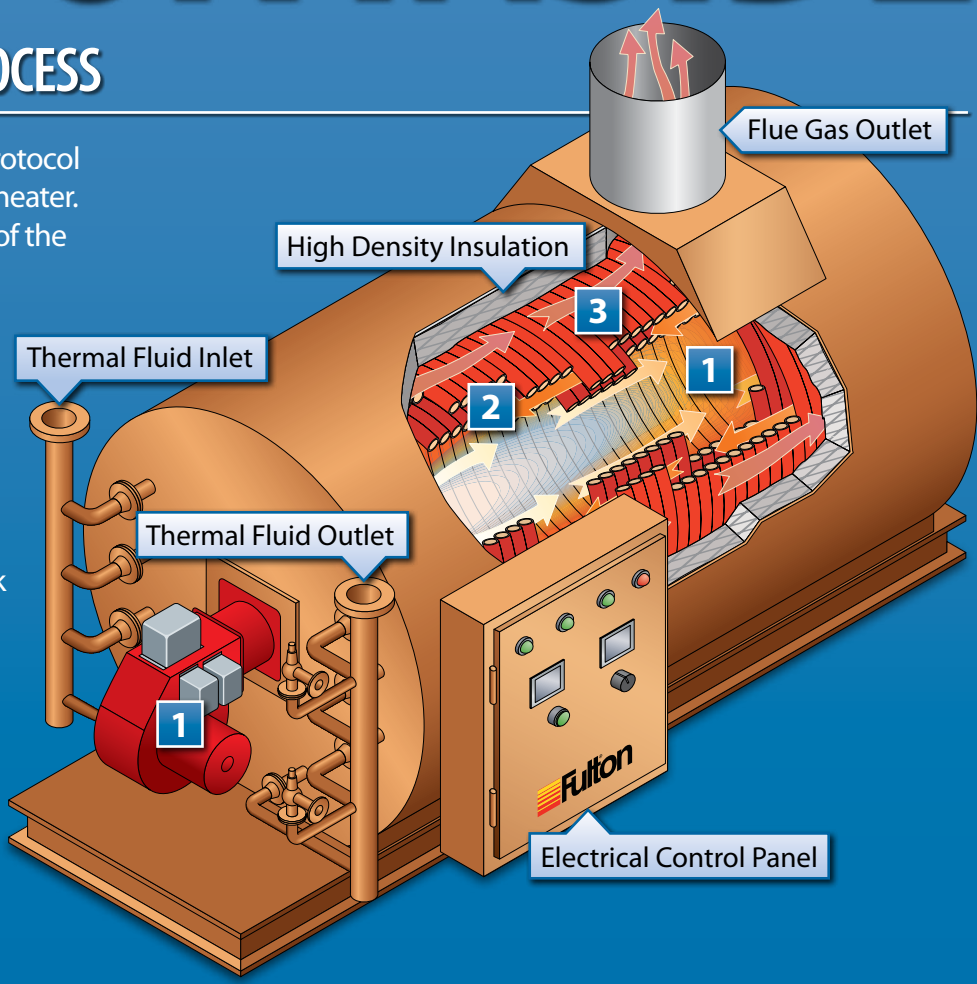
A LOOK INSIDE

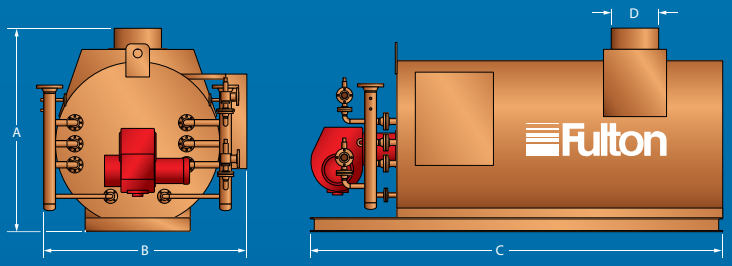
THE COMBUSTION PROCESS

1 Air and fuel mix in the open protocol burner located at the front of the heater. The burner fires down the center of the vessel forming the first pass.

2 The hot gases turn at the rear of the vessel and return between two rolls of coils to the front end plate forming the second pass.

3 The hot gases then flow along the outside of the coils to the back of the heater, forming the third pass and then exit out the flue.





Specifications and Dimensions are approximate. Consult factory for model specific electrical requirements. We reserve the right to change specifications and/or dimensions without notice.

Diagram for guidance purposes only. Comprehensive details of dimensions, connections, etc. for each model are given on product dimension data sheets available from Fulton.

MODELS	HC	0240	0400	0600	0800	1000	1200	1600	2000
Dimensions									
Heater Inlet/Outlet Connections	IN	2.5	3	4	6	6	6	8	8
	MM	64	76	102	152	152	152	203	203
(A) Overall Height	IN	64	68	78	107	107	131	114	118
	MM	1,626	1,727	1,981	2,718	2,718	3,327	2,896	2,997
(B) Heater Width	IN	62	62	81	95	95	130	118.5	119.5
	MM	1,575	1,575	2,057	2,413	2,413	3,302	3,010	3,035
(C) Overall Depth	IN	134	137	157	208	182	240	327	351
	MM	3,404	3,480	3,988	4,623	4,623	6,096	8,306	8,915
(D) Flue Outlet Diameter	IN	12	14	18	22	22	22	36	36
	MM	305	356	457	559	559	559	914	914
Approximate Dry Weight	LB	5,000	7,500	9,500	12,500	19,250	21,700	39,000	39,000
	KG	2,272	3,409	5,455	5,682	8,750	9,864	17,728	17,728

UNFIRED STEAM AND HOT WATER GENERATORS

STEAM GENERATOR KEY FEATURES

- Vertical Design 10 HP to 100 HP
- Horizontal Design 70 HP to 415 HP (Custom sizes are available)
- Standard Designs 15 PSIG to 150 PSIG (custom operating pressures are available)
- Built and Stamped to ASME Code Section VIII Div. I
- Complete with Modulating Thermal Fluid Control Valve and Custom Control Panel
- May be Skid Mounted with Blowdown Separators, Return Tanks, Deaerator Tanks, Feedwater Pumps, Chemical Tanks and Water Softeners

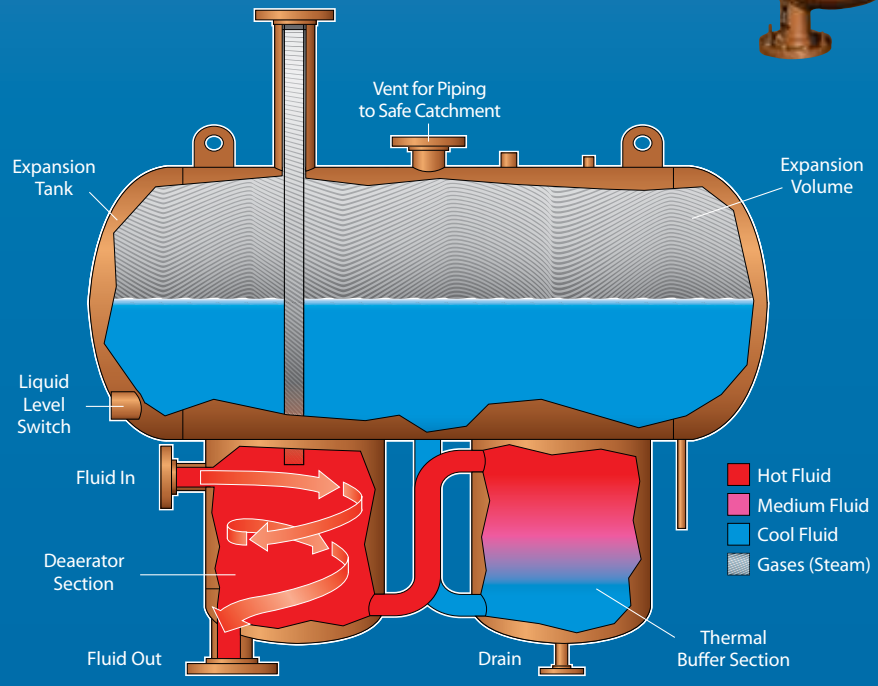
HOT WATER GENERATOR KEY FEATURES

- Custom Designs Available
- Carbon Steel or Stainless Steel
- Built and Stamped to ASME Code Section VIII Div. I
- Complete with Modulating Thermal Fluid Control Valve
- Instantaneous Hot Water Generation, or Can Be Used with a Storage Tank

EXPANSION/DEAERATOR/ THERMAL BUFFER TANK

KEY FEATURES

- Designed to Work as an Open-Atmospheric System Where Applicable, Eliminating the Expense of an Inert Gas Blanket
- Continuous Deaeration of Steam and Other Non-Condensibles
- Protects Fluid from Oxidation
- Simplification of Pipework
- Ease of Installation
- Standard 2-Pipe Expansion Tanks also Available



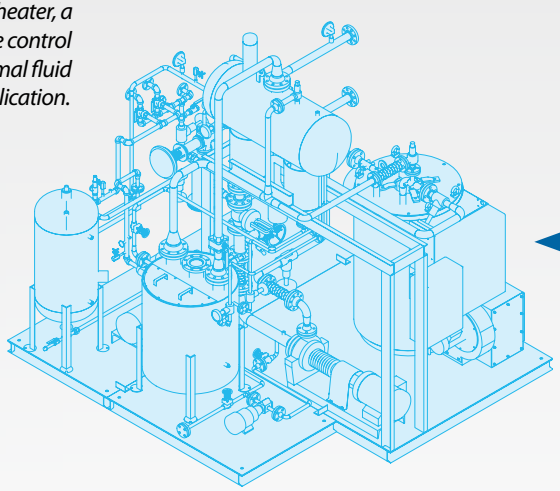
MODELS	FT-L	0200	0500	1000	1500	2000	3000	5000
Tank Sizing and Capacities								
Capacity	Gallons	52	132	264	397	528	793	1,310
	Liters	196	499	999	1,502	1,998	3,001	4,958
Initial Fill	Gallons	25	40	80	90	145	215	300
	Liters	94	151	302	340	548	813	1,135
Available for Expansion	Gallons	46	121	232	380	444	717	1,168
	Liters	174	458	878	1,438	1,680	2,714	4,421
Max System Volume	Gallons	184	525	1,000	1,400	1,700	2,600	4,600
	Liters	696	1,987	3,785	5,299	6,435	9,842	17,412
Dry Weight	LB	636	970	1,350	1,710	2,550	3,200	5,300
	KG	289	440	612	776	1,134	1,451	1,637

CUSTOM ENGINEERED SKIDDED SYSTEMS

Fulton's engineering and design capabilities are unmatched in the industry, providing comprehensive solutions to custom-designed thermal fluid systems. Our team of engineers and project managers assist in the specification and design of a "turnkey" system for each application. All engineered systems come with state-of-the-art operating controls and can have single-point electric, fuel supply, thermal fluid drain/fill, inlet/outlet, and any other applicable connection. From design to complete fabrication, trust Fulton and our many years of experience to build a system you can rely on for years to come.

The skid system shown here included one FT-0240-C heater, a circulating pump, expansion tank and a temperature control unit (TCU). This system was designed to provide thermal fluid and hot water to several dryers for a wastewater application.

This system includes two FT-0600-C thermal fluid heaters skid mounted with three circulating pumps (one pump acts as a backup for either heater), and one FT-5000-L expansion tank (not shown). These heaters are used to provide process heat for the manufacture of asphalt roofing shingles.



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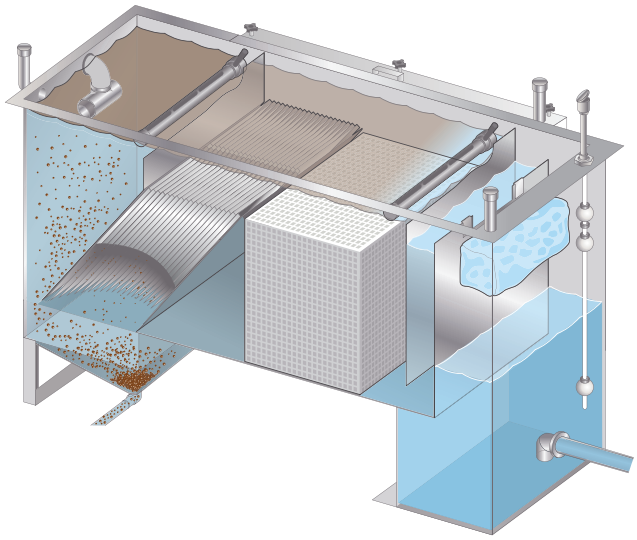
FTC-BRO_2013-1218

Clarification Separator

A HIGH-EFFICIENCY OIL WATER SEPARATOR

- Reduces coalescing media failure
- Reduces pretreatment needs
- Reduces posttreatment needs
- Lowers total cost of ownership



HQI Clarification Separator is recommended for any application that has oil and a high concentration of settleable and suspended solids.

DESIGN

The HQI Clarification Separator is a horizontal gravity flow pretreatment solution designed to separate settleable solids (specific gravity greater than water), suspended solids (specific gravity the same as water), and free and dispersed (non-emulsified) oil.

Units are built out of stainless steel or carbon steel. We offer several coating solutions for your specific application, such as brine water or frac water.

For a full list of options, such as pump packages and control panels, see: www.hydroquipinc.com/HQI-CS

Our Clarification Separator, when used in conjunction with posttreatment filtration, such as reverse osmosis (RO), dissolved air flotation (DAF) or electrocoagulation (EC), treats wastewater so it can be recycled or discharged.

This unit lowers the total cost of ownership of the entire water treatment system by:

- preventing large amounts of solids from entering coalescing chamber, reducing coalescing media failure.
- eliminating need of inefficient settling basins or frac tanks prior to treatment process.
- decreasing amount of carry-over entering into posttreatment process.

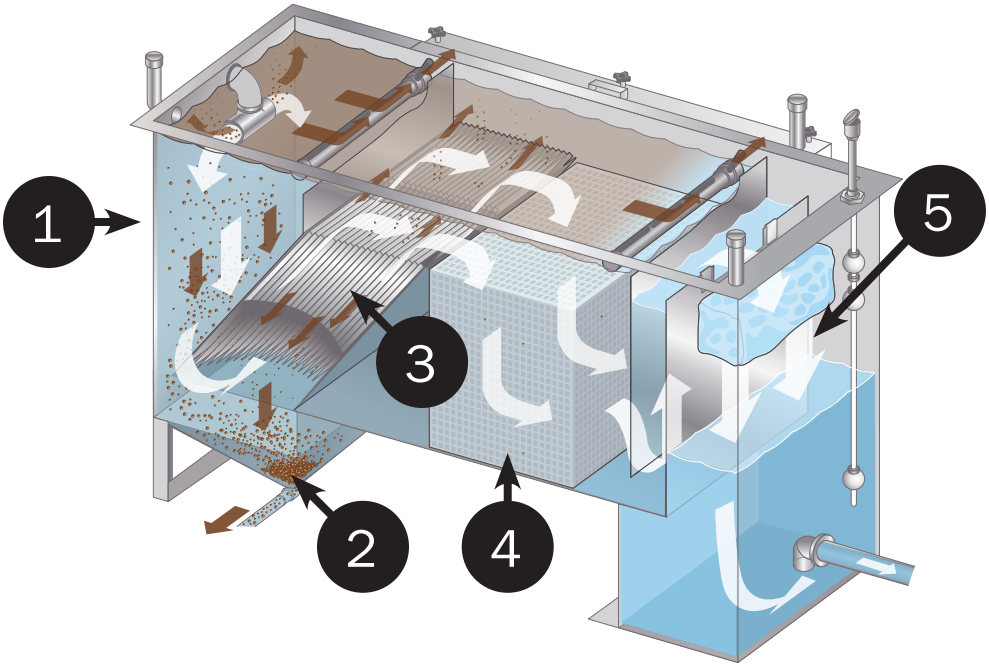
OIL & GAS APPLICATIONS

- Onshore and Offshore Drilling Operations
- Oil Refineries
- Flowback Water from Hydraulic Fracturing
- Produced Water
- Waste Oil Processing Facilities
- Frac Water

OTHER APPLICATIONS

- Washing Applications
- Industrial Applications

5 STAGES OF SEPARATION



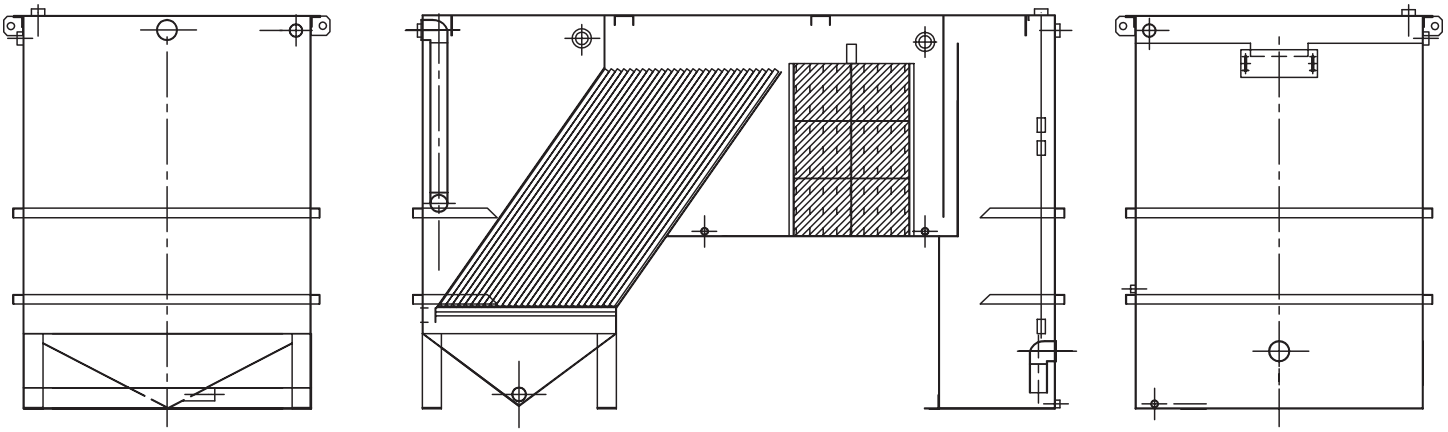
1. The **free oil** (150 micron in size or greater) is separated in the inlet quiescent zone. (Pipe skimmer provided to decant oil.)

2. The **settleable solids** will flow downward into the hopper section for removal.

3. The **suspended solids** and dispersed oil will flow upward through the inclined plates section, where most of the suspended solids will slide down the plates into the hopper (based on a design of .25 gpm per square foot of projected plate surface area).

4. The **remaining suspended solids** and **dispersed oil** will flow into the separation compartment where the coalescing plates will separate the oil 30 micron or greater to the surface for removal and the remaining suspended solids will be captured in the coalescing plates. The amount of solids in the plates will determine the frequency of plate cleaning. (Pipe skimmer for removal of separated oil.)

5. The flow of water will go over the overflow weir plate into the **clean water** compartment where absorption bags will prevent any carryover from being discharged. (Optional float switch shown.)



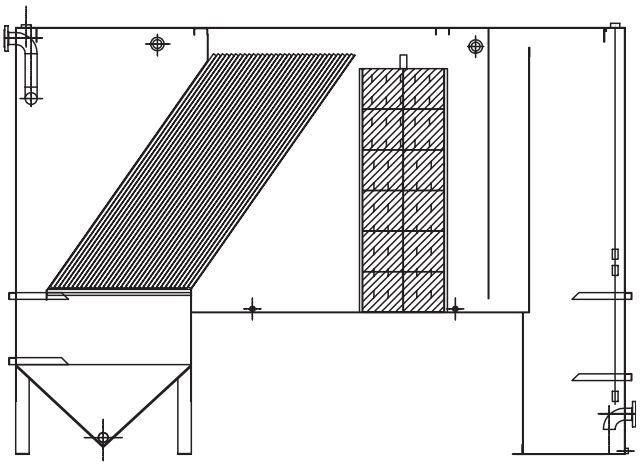
LEFT SIDE VIEW ELEVATION RIGHT SIDE VIEW

SPECIFICATIONS FOR SMALLER UNITS (SINGLE-HOPPER)

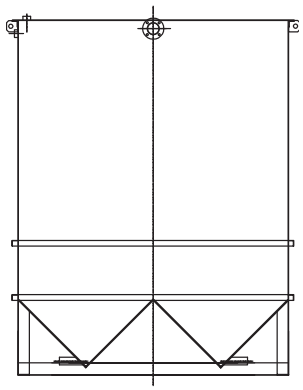
*Dimensions are approximate and may vary depending on your application.

Model	BPD (BARRELS PER DAY)	Inlet Outlet Dia.	Width	Height	Length	Clarifier Projected Plate (FT^2)	Separator Coalescing Media (FT^3)	Flow Rate (GPM)	Sludge Volume (GAL)	Capacity (GAL)
HQI-CS-10	342	2"	2' 4"	4' 10"	7' 0"	40	4	10	27	300
HQI-CS-20	685	2"	3' 4"	5' 10"	8' 0"	80	6	20	32	652
HQI-CS-30	1,028	2"	3' 4"	5' 10"	9' 2"	120	12	30	45	645
HQI-CS-50	1,714	3"	4' 4"	5' 10"	9' 8"	200	24	50	85	968
HQI-CS-75	2,571	3"	4' 4"	7' 10"	10' 6"	300	24	75	85	1,766
HQI-CS-100	3,428	4"	5' 4"	7' 10"	11' 0"	400	30	100	107	1,931
HQI-CS-150	5,142	6"	6' 6"	8' 4"	12' 0"	600	64	150	300	3,483

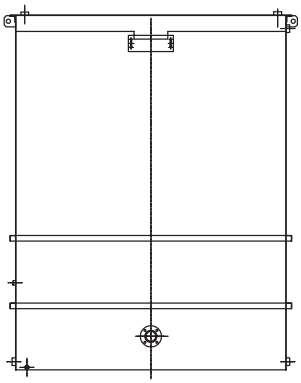
Oil Removal of 20 Micron Based on Flow Rates
Clarifier Projected Plate based on .25 gpm per sq. ft.
Design Temperature 40° F (5° C)



ELEVATION



LEFT SIDE VIEW



RIGHT SIDE VIEW

SPECIFICATIONS FOR LARGER UNITS (DOUBLE-HOPPER)

*Dimensions are approximate and may vary depending on your application.

Model	BPD (BARRELS PER DAY)	Inlet Outlet Dia.	Width (FT)	Height (FT)	Length (FT)	Clarifier Projected Plate (FT^2)	Separator Coalescing Media (FT^3)	Flow Rate (GPM)	Sludge Volume (GAL)	Capacity (GAL)
HQI-CS-200	6,857	6"	7' 6"	9' 6"	14' 0"	800	80	200	300	5,496
HQI-CS-250	8,571	8"	8' 6"	10' 6"	15' 0"	1,000	96	250	350	6,986
HQI-CS-300	10,285	8"	8' 6"	10' 6"	16' 0"	1,200	120	300	400	6,846
HQI-CS-350	12,000	8"	8' 6"	10' 6"	18' 0"	1,400	144	350	425	7,633
HQI-CS-400	13,714	8"	8' 6"	10' 6"	19' 0"	1,600	150	400	500	8,138
HQI-CS-450	15,428	8"	8' 6"	10' 6"	20' 0"	1,800	168	450	525	8,612
HQI-CS-500	17,142	8"	8' 6"	10' 6"	21' 4"	2,000	210	500	550	9,220
HQI-CS-550	18,857	8"	8' 6"	10' 6"	22' 6"	2,200	210	550	675	9,765
HQI-CS-600	20,570	10"	9' 6"	10' 6"	22' 0"	2,400	252	600	700	12,285
HQI-CS-700	24,000	10"	10' 6"	11' 6"	25' 0"	2,800	280	700	750	15,440
HQI-CS-800	27,428	10"	10' 6"	11' 6"	26' 0"	3,200	315	800	775	16,077
HQI-CS-900	30,850	12"	10' 6"	11' 6"	27' 0"	3,600	350	900	800	16,717

Oil Removal of 30 Micron Based on Flow Rates
Clarifier Projected Plate based on .25 gpm per sq. ft.
Design Temperature 40° F (5° C)

HYDRO QUIP

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SECTION 11XXX

DISSOLVED AIR FLOTATION (DAF) CLARIFIER SPECIFICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish complete, tested and operating, the equipment as shown on the Drawings and as specified herein.

B. Work Included in This Section:
   1. Dissolved Air Flotation with selected options.

1.02 SUBMITTALS

A. Shop Drawings: Upon agreement to terms, and receipt of a purchase order, Ellis Corporation will submit 2 sets of shop drawings (approval drawings) of the DAF clarifier and included options. Shop drawings to be reviewed by the ENGINEER (Or agent). Requests for modifications to the shop drawings will be addressed by Ellis Corporation and revised shop drawings will be resubmitted to the ENGINEER until satisfactory to the ENGINEER. Approved drawings will be signed and returned to Ellis Corporation.

B. Manuals: Ellis will furnish 2 sets of operation and maintenance manuals prior to or with delivery of the DAF separator.

1.03 QUALITY ASSURANCE

A. All equipment furnished under this section shall be tested prior to delivery. All welded joints shall be double welded and leak tested. All electrical components shall be shop tested for proper operation, rotation, and response.

1.04 WARRANTY

A. Ellis Corporation warrants the equipment manufactured by it to be free from defects in material and workmanship for a period of 1 (one) year from the date of shipment, provided the machine is operated normally and at its rated capacity. Modifications to the equipment or the use of repair parts not approved by the company will subject the warranty to cancellation.

1.05 The Dissolved Air Flotation System shall be designed, manufactured and warranted by Ellis Corporation, Industrial Water Division, Itasca, Ill.

Water Pollution Control Systems
1400 West Bryn Mawr Avenue, Itasca, Illinois 60143 · 630-250-9222 · Fax 630-250-9241 · www.elliscorp.com/water

PART 2 - PRODUCTS

2.01 DISSOLVED AIR FLOTATION CLARIFIER

The Dissolved Air Flotation Clarifier is specifically designed to remove fats, oils, greases (FOG) and other suspended solids from a wastewater flow. Equipment is completely assembled and ready for installation on a concrete pad. Typical removal rates (with proper chemical treatment) are 95% and greater for both FOG's and suspended solids.

A. Separation Chamber
The separation chamber provides an excellent medium for solids flotation. Strategically placed baffles force float to the top of the unit, while driving sludge to the bottom and allowing clean water to carry through. The design allows for minimal velocities in the float region and the large float area in a compact design.

B. Skimmer Assembly
The all stainless steel surface skimmers are designed to skim the topmost portion of the accumulated float. The design of the skimmer is of the Ferris wheel type with the end of the skimming blade always pointing downward. The blade is mounted in a pivot to allow the skimmer to rotate during the skim and return cycle. This will prevent solids from accumulating on the blade surface. Skimmer driven by a variable speed drive.

C. Float Chamber
The float chamber is designed to isolate the solids from the waste stream and to provide storage capacity. The bottom of this chamber has sloped sides to form a "V" bottom to permit near complete pump out of the accumulated solids. The chamber also has provisions for sludge removal.

D. Solids chamber and auger
The lower portion of the solids chamber has sloped sides to form a "V" bottom chamber extending the length of the solids chamber. The "V" bottom chamber is equipped with a slowly rotating ribbon type screw auger to convey heavy gritty solids to a sludge discharge nozzle.

E. Effluent Chamber
An effluent chamber is provided to isolate clean water from the waste stream. Water flows into the effluent chamber via an adjustable weir. Positioning the 304 stainless steel adjustable weir sets the water level. This chamber has a discharge nozzle and provisions for recycle flow.

F. Dissolved Air Flotation pump
The dissolved air flotation pump is provided to dissolve the air into the water. An air control system is provided to meter air into the pump at specified rates. Air bubbles of roughly 30 micron will result through proper operation of the pump. Cast iron casing with 316 SS shaft and flooded suction.

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G. Materials of Construction
Tank is fabricated of heavy duty A-36 Carbon Steel Plate or 304 SS. Joints are double welded and leak tested. Exterior Structural members are constructed of A-36 carbon steel.

H. Finish – Stainless steel does not receive coatings
Interior: Surface prepared to SSPC-SP-10, near white metal blast and coated with multiple coats of coal tar epoxy, 14-16 dmt.

Exterior: Surfaces prepared to SSPC-SP-6, commercial blast and coated with a chromate free primer, rust color, 4 dmt. Top coat polyurethane enamel, 2 dmt. Finish color safety blue.

2.02 SLUDGE PUMPOUT SYSTEM – THIS IS OPTION "A"

A. An electrically operated progressive cavity positive displacement pump with intermittent timer. Automatic operation with manual override. System installed with PVC piping.

2.03 CHEMICAL PUMPS

A. Chemical pumps are supplied to inject chemicals into a preceding chemical mix tank to the DAF. The pumps are rated for 10 gph.

2.04 CONTROL PANEL

A. NEMA-4 Control panel with indicator light(s), switch(es), timer(s), motor starter(s), alarm light(s), alarm(s) with silence switch. Panel to control all components furnished by Ellis Corporation.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Equipment will be delivered to project site (terms as per contract). Installation Contractor is responsible for preparation of concrete pad (or other approved surface) and all anchor bolts. Holes for anchor bolts are as per shop drawings.

3.02 START-UP ASSISTANCE

A. Ellis Corporation will assist in the start-up of the system and instruction in the proper use of the equipment if required.

END OF SECTION

Water Pollution Control Systems
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APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.C

INSPECTION FORM (TYPICAL)

ATTACHMENT II.1.C
Inspection Form (Typical)
DNCS Environmental Solutions

Date: _____ **Print Name:** _____

Others: _____ **Signature:** _____

Inspection will be in accordance with NMOCD operational conditions.

Item	Satisfactory	Action Required
Entrance Sign		
Berms and outside pond levees		
Tank Labels		
Sumps		
Pond levels three-foot free board		
Free oil on Pits-Ponds		
Pit and Pond condition		
Pit and Pond marker numbers		
Treatment Plant inspection		
Solid waste disposal area inspection		
Blowing trash		
Fences and Gates		
Leak detection sumps - Landfill - Liquid present?		(Monthly analysis required if yes)
Leak detection sumps - Evaporation Ponds - Liquid present?		(Monthly analysis required if yes)
Leak detection sumps - Jet Out Pit - Liquid present?		(Monthly analysis required if yes)
Leak detection sumps - Stab. & Solid. - Liquid present?		(Monthly analysis required if yes)
Landfill Leachate Sump		
Groundwater Monitoring		
Pond Sludge Depth		

***Comments & Repairs:** _____

H_2S

READINGS ARE TO BE TAKEN 4 FT DOWNWIND FROM EVAPORATION PONDS

Evaporation Pond (readings in ppm):

POND
1
2
3
4
5
6
7
8
9
10
11
12

*In the event that a reading of 10 ppm is registered at the Facility, personnel will evacuate the area and operator will monitor H_2S levels at the downwind of the Pond. If H_2S levels reach 20 ppm, the Facility will be closed and notification will be given to the following:

DNCS Office	575-XXX-XXXX	NMOCD Hobbs	575-393-6161
New Mexico State Police	575-392-5580	NMOCD Santa Fe	505-476-3440
Lea County Sheriff	575-397-3611		

Receipt & Approval

Name: _____

Date: _____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.D

POND INTEGRITY/LEAK DETECTION INSPECTION FORM (TYPICAL)

ATTACHMENT II.1.D
Pond Integrity/Leak Detection Inspection Checklist (Typical)
DNCS Environmental Solutions

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.

POND CONDITION

Location	Item			
	Erosion	Vegetation Established	Vectors	Sample

LEAK DETECTION SYSTEM

Riser #	Deficiency	
	Depth of H_2O	Structural Defect

NOTES: _____

_____

_____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.E

POTENTIAL GEOMEMBRANE LINER LEAKAGE

Attachment II.1.E
Potential Geomembrane Liner Leakage
DNCS Environmental Solutions

Title: Leakage Through Liners Constructed with Geomembranes - Part 1. Geomembrane Liners

Written by: J.P. Giroud and R. Bonaparte
Published in: Geotextiles and Geomembranes **Volume:** 8 **Issue:** 2 **Pages:** 27 to 67
Phone: +31 20-485-3757 ~ **Web Site:** http://www.elsevier.com

How impermeable are 'impermeable liners'? All liners leak, including geomembranes, but how much? What are the mechanisms of leakage through liners constructed with geomembranes? To answer these questions, a detailed review of leakage mechanisms, published and unpublished data, and analytical studies has been carried out with the goal of providing practical design recommendations. In particular, it appears that a composite liner (i.e. geomembrane on low-permeability soil) is more effective in reducing the rate of leakage through the liner than either a geomembrane alone or a soil liner (low-permeability soil layer) alone. However, the paper shows that the effectiveness of composite liners depends on the quality of the contact between the geomembrane and the underlying low-permeability soil layer.

Table 1
Calculated Leakage Rates Due to Pinholes and Holes in a Geomembrane

Water depth on top of the geomembrane, h_w						
	Defect Diameter	0.003 m (0.01 ft)	0.03 m (0.1 ft)	0.3 m (1 ft)	3 m (10 ft)	30 m (100 ft)
Pinholes	0.1 mm (0.004 in)	0.006 (0.0015)	0.06 (0.015)	0.6 (0.15)	6 (1.5)	60 (15)
	0.3 mm (0.012 in)	0.5 (0.1)	5 (1)	50 (13)	500 (130)	5000 (1 300)
Holes [a]	2 mm (0.08 in)	40 (10)	130 (30)	400 (100)	1300 (300)	4000 (1 000)
	11.3 mm (0.445 in)	1 300 (300)	4 000 (1 000)	13 000 (3 000)	40 000 (10 000)	130 000 (30 000)
Values of leakage rate in liters/day (gallons/day)						

Table 2
Calculated Unitized Leakage Rates Due to Permeation of Water Through an HDPE Geomembrane

Water depth on top of the geomembrane, h_w						
	0 m (0 ft)	*0.003 m (0.01 ft)*	*0.03 m (0.1 ft)*	*0.3 m (1 ft)*	*3 m (10 ft)*	*>10 m (>30 ft)*
Coefficient of migration, m_g(m^2/s)	0	$9x10^{-20}$	$9x10^{-18}$	$9x10^{-16}$	$9x10^{-14}$	$3x10^{-13}$
Unitized leakage rate, q_q	0	$9x10^{-17}$	$9x10^{-15}$	$9x10^{-13}$	$9x10^{-11}$	$3x10^{-10}$
(m/s)	0	$8x10^{-5}$	0.008	0.8	80	260
(lphd)	0	$8x10^{-6}$	0.0008	0.08	8	28
(gpad)						

Notes: These values of utilized leakage rates were calculated using eqn (5) and assuming a geomembrane thickness of 1 mm (40 mils). The coefficients of migration used to calculate the unitized leakage rates in this table were obtained from eqns (19) and (20), with $C_1 = 1x10^{-22}$ m^4 $kg^{-2}s^3$, $n = 2$, and $m_{gmax} = 3x10^{-13}$ m^2/s.

The water depths used here correspond to the typical values defined in Section1.3.6. (To use eqn (19), it is necessary to know the pressure difference, Δp. According to eqn (1), water depths, h_w, are approximately equal to hydraulic head differences, Δh, which are related by eqn (12) to pressure differences, Δp.)

- data used in calculations

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.F

PAINT FILTER TEST PROTOCOL

USEPA METHOD 9095B

METHOD 9095B

PAINT FILTER LIQUIDS TEST

1.0 SCOPE AND APPLICATION

1.1 This method is used to determine the presence of free liquids in a representative sample of waste.

1.2 The method is used to determine compliance with 40 CFR 264.314 and 265.314.

2.0 SUMMARY OF METHOD

2.1 A predetermined amount of material is placed in a paint filter. If any portion of the material passes through and drops from the filter within the 5-min test period, the material is deemed to contain free liquids.

3.0 INTERFERENCES

3.1 Filter media were observed to separate from the filter cone on exposure to alkaline materials. This development causes no problem if the sample is not disturbed.

3.2 Temperature can affect the test results if the test is performed below the freezing point of any liquid in the sample. Tests must be performed above the freezing point and can, but are not required to, exceed room temperature of 25 ^{o}C.

4.0 APPARATUS AND MATERIALS

4.1 Conical paint filter -- Mesh number 60 +/- 5% (fine meshed size). Available at local paint stores such as Sherwin-Williams and Glidden.

4.2 Glass funnel -- If the paint filter, with the waste, cannot sustain its weight on the ring stand, then a fluted glass funnel or glass funnel with a mouth large enough to allow at least 1 in. of the filter mesh to protrude should be used to support the filter. The funnel should be fluted or have a large open mouth in order to support the paint filter yet not interfere with the movement, to the graduated cylinder, of the liquid that passes through the filter mesh.

4.3 Ring stand and ring, or tripod.

4.4 Graduated cylinder or beaker -- 100-mL.

5.0 REAGENTS

5.1 None.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

A 100-mL or 100-g representative sample is required for the test. If it is not possible to obtain a sample of 100 mL or 100 g that is sufficiently representative of the waste, the analyst may use larger size samples in multiples of 100 mL or 100 g, i.e., 200, 300, 400 mL or g. However, when larger samples are used, analysts shall divide the sample into 100-mL or 100-g portions and test each portion separately. If any portion contains free liquids, the entire sample is considered to have free liquids. If the sample is measured volumetrically, then it should lack major air spaces or voids.

7.0 PROCEDURE

7.1 Assemble test apparatus as shown in Figure 1.

7.2 Place sample in the filter. A funnel may be used to provide support for the paint filter. If the sample is of such light bulk density that it overflows the filter, then the sides of the filter can be extended upward by taping filter paper to the inside of the filter and above the mesh. Settling the sample into the paint filter may be facilitated by lightly tapping the side of the filter as it is being filled.

7.3 In order to assure uniformity and standardization of the test, material such as sorbent pads or pillows which do not conform to the shape of the paint filter should be cut into small pieces and poured into the filter. Sample size reduction may be accomplished by cutting the sorbent material with scissors, shears, a knife, or other such device so as to preserve as much of the original integrity of the sorbent fabric as possible. Sorbents enclosed in a fabric should be mixed with the resultant fabric pieces. The particles to be tested should be reduced smaller than 1 cm (i.e., should be capable of passing through a 9.5 mm (0.375 inch) standard sieve). Grinding sorbent materials should be avoided as this may destroy the integrity of the sorbent and produce many "fine particles" which would normally not be present.

7.4 For brittle materials larger than 1 cm that do not conform to the filter, light crushing to reduce oversize particles is acceptable if it is not practical to cut the material. Materials such as clay, silica gel, and some polymers may fall into this category.

7.5 Allow sample to drain for 5 min into the graduated cylinder.

7.6 If any portion of the test material collects in the graduated cylinder in the 5-min period, then the material is deemed to contain free liquids for purposes of 40 CFR 264.314 and 265.314.

8.0 QUALITY CONTROL

8.1 Duplicate samples should be analyzed on a routine basis.

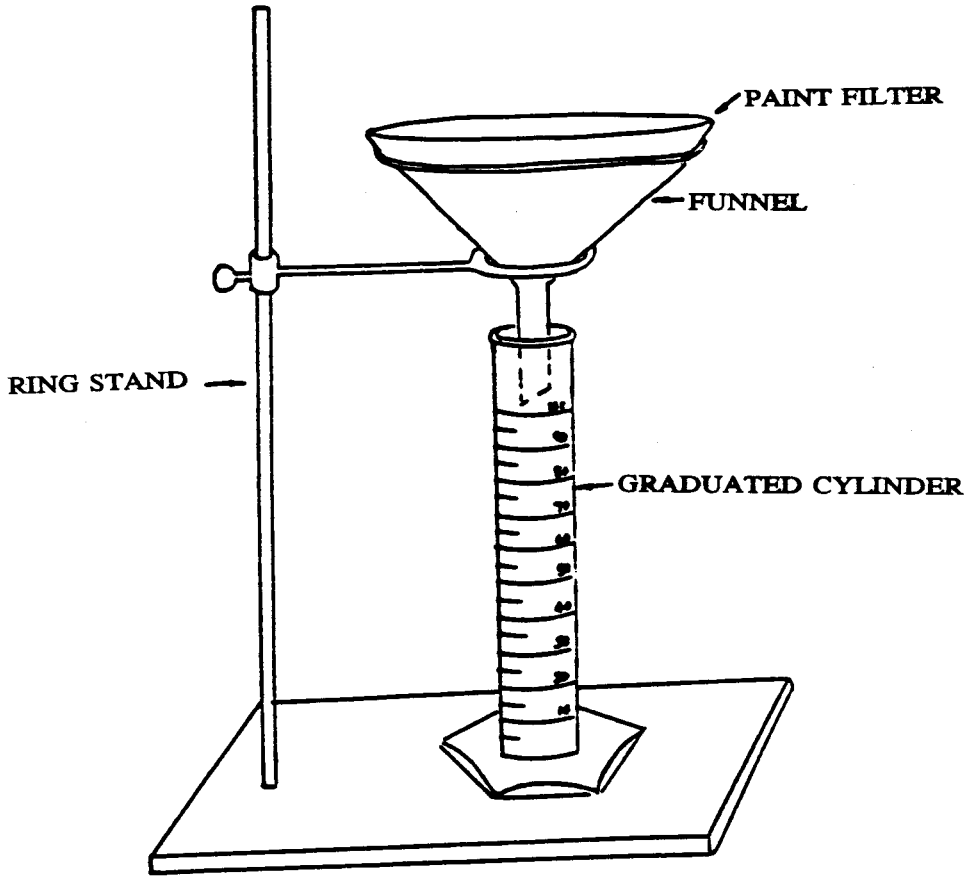
9.0 METHOD PERFORMANCE

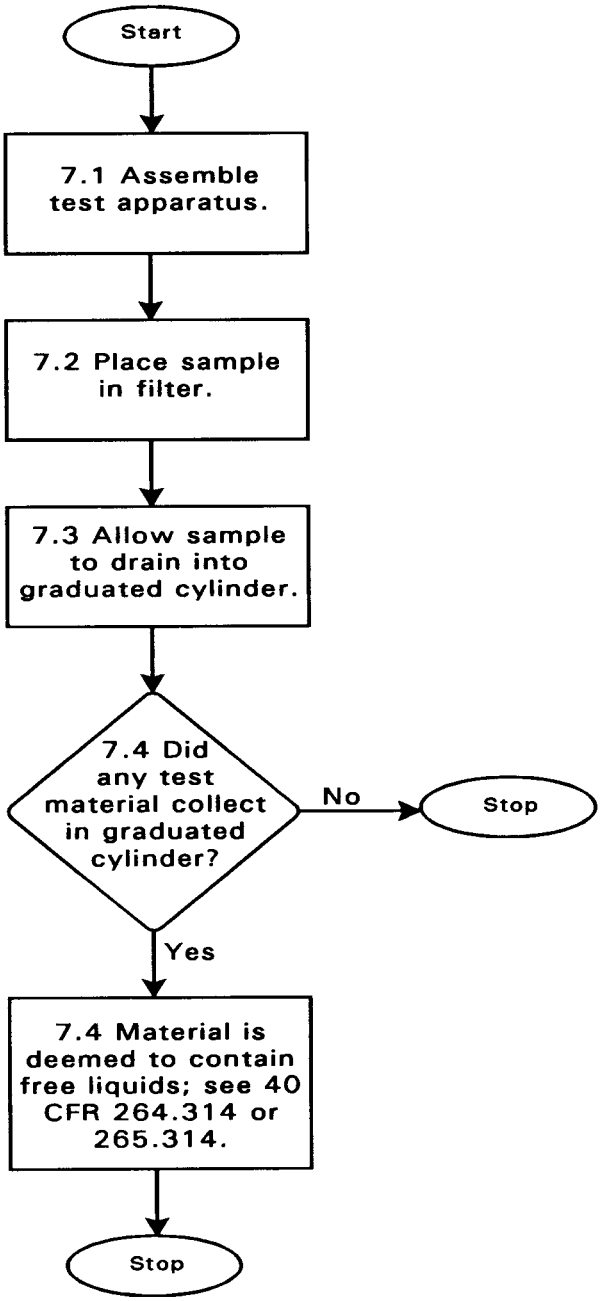
9.1 No data provided.

10.0 REFERENCES

10.1 None provided.

FIGURE 1
PAINT FILTER TEST APPARATUS




Start
7.1 Assemble test apparatus.
7.2 Place sample in filter.
7.3 Allow sample to drain into graduated cylinder.
7.4 Did any test material collect in graduated cylinder?
No
Stop
Yes
7.4 Material is deemed to contain free liquids; see 40 CFR 264.314 or 265.314.
Stop

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 1: OPERATIONS, INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.G

INTERMEDIATE COVER INSPECTION AND MAINTENANCE PLAN

ATTACHMENT II.1.G

INTERMEDIATE COVER INSPECTION AND MAINTENANCE PLAN

TABLE OF CONTENTS

LIST OF FIGURES

1.0 INTRODUCTION

In accordance with 19.15.36.14(7)(a-c) NMAC landfills are required to provide intermediate cover for areas that will not receive additional oil field waste for one month or more. In addition to being approved by the Oil Conservation Division, intermediate cover must be stabilized with vegetation, and inspected and maintained to prevent erosion and manage infiltration or leachate during the oil field waste deposition process. DNCS Properties, LLC (DNCS) is requesting deviation from the vegetation requirement. DNCS proposes to maintain, as best possible, natural vegetation on the intermediate cover, but does not plan to seed intermediate cover. This Intermediate Cover Inspection and Maintenance Plan (the Plan) provides a protocol for regular monitoring and maintenance of intermediate cover at the DNCS Environmental Solutions Surface Waste Management Facility Landfill.

2.0 INTERMEDIATE COVER

At DNCS, intermediate landfill cover is proposed to consist of a soil cover a minimum of 6-inches thick. Intermediate cover will be placed over areas of the landfill that will not receive further oil field waste for one month or more, but have not reached final grades. Intermediate cover is graded to promote positive drainage and limit erosion and infiltration. The intermediate cover will be inspected and maintained until additional waste placement has been conducted or final cover is constructed. If additional waste placement is to occur, the upper layer of intermediate cover may be removed prior to additional waste placement. Inactive areas with intermediate cover will be stabilized via the routine inspection and maintenance program described below:

2.1 Intermediate Cover Inspection Program

Areas of the DNCS Landfill that have intermediate cover installed will be inspected routinely, at a minimum of once per month and also after significant ($\geq$ 0.5 inches) rain events. Inspections will be recorded on a form similar to that provided as **Figure II.1.G.1** (Intermediate Cover Inspection Form). The form will be used to record intermediate cover observations, and photo-documentation will supplement the record as necessary. The Intermediate Cover Inspection Forms will be maintained as part of the Facility Operating Record, and will elaborate on the following items, as applicable:

- Evidence of leachate
- Unusual odors

- Exposed waste
- Cracks greater than one inch in width and six inches in depth
- Surface water ponding
- Eroded or scoured soils
- Dead or stressed vegetation (if applicable)
- Vegetation growing taproots in areas not designated to accommodate them
- Vectors, such as flies and rodents
- Recordkeeping and reporting

Deficiencies identified during site inspections will be corrected within 90 days. Upon completion of the corrective action, appropriate documentation will be made on the Intermediate Cover Inspection Form and placed in the Facility Operating Record.

2.2 Intermediate Cover Maintenance Program

It is expected that routine site maintenance will be necessary to maintain intermediate cover. Intermediate cover is expected to require periodic maintenance such as soil enhancement/repair, and attention to naturally established vegetative cover.

2.2.2 Soil Repair

Intermediate cover repairs may be necessary due to ponding, surface water erosion or wind erosion. Ponding can result from differential settlement of the landfill contents, and erosion can be caused by runoff in areas without established vegetation or by repeated wind gusts. Areas where impacts are evident will be promptly repaired to maintain the integrity of the cover. Recently filled and covered areas will require the most maintenance since differential settlement decreases rapidly with time, and erosion is minimized as vegetation is established. Soil for repairs will be obtained from on-site sources. Repairs will be made on an as-needed basis.

2.2.3 Vegetation

Intermediate cover will not be seeded for vegetative growth; however, DNCS will routinely attempt to maintain any naturally-established vegetative cover. Routine care includes, but is not limited to, the removal of undesirable plant species (e.g., taproots) and maintenance of native plant species as appropriate.

FIGURE II.1.G.1
Intermediate Cover Inspection Form
DNCS Environmental Solutions - Surface Waste Management Facility

Date: _____ **Page** _____ of _____

Inspector(s): **Weather:** Temperature: _____ °F

_____ Skies: _____

_____ Precipitation: _____ inches (last 24 hours)

Intermediate Cover										
Location	**Odor**	**Leachate Seep**	**Exposed Waste**	**Cracks**	**Ponding**	**Erosion**	**Vegetation**		**Vectors**	**Sample**
							Stress	**Taproots**		

"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.

Field Notes: _____

Corrective Action Required: _____

Corrective Action Completed: _____ _____
Signature Date

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

1.0 INTRODUCTION

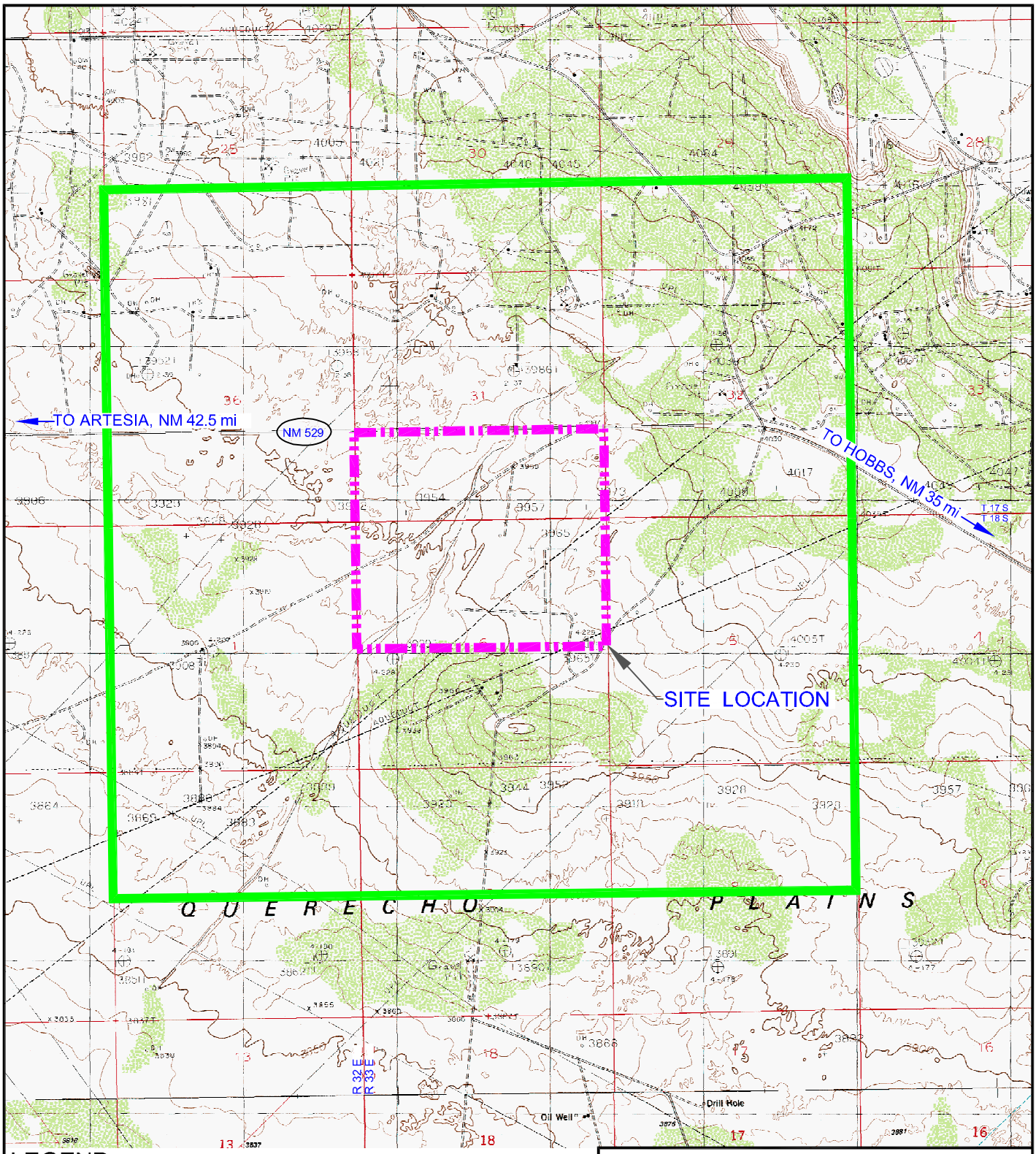
DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oilfield waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.2.1**). Site access will be provided via the south side of NM 529.

1.2 Facility Description

The DNCS Facility is a proposed new Surface Waste Management Facility that will include two main components; a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±). Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Development Plan provided in the **Permit Plans** identifies the locations of the Processing Area and Landfill facilities.



LEGEND

- SITE BOUNDARY
- 1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.2.1
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 12, 2014-12:48:59 ; LAYOUT: A (P)

2.0 PURPOSE

This Oil Field Waste Management Plan (the Plan) addresses the requirements of 19.15.36.13, 14, 15, and 17 NMAC, and establishes an internal control program that will be followed by DNCS to ensure that oil field wastes receive attention commensurate with the associated risk. The purpose of this Plan is to provide waste identification, tracking and screening mechanism for OCD waste that may require special handling to meet regulatory requirements and/or to protect employee health and safety. The oil field wastes discussed in this Plan will be limited to those materials that have met specific disposal requirements as described in Sections 13, 14, 15, and 17 of 19.15.36 NMAC; and 19.15.35.8 NMAC.

3.0 OIL FIELD WASTE ACCEPTANCE PROGRAM

A decision to approve or disapprove incoming oil field waste for management at the DNCS Facility will be clearly documented for each load received at the Facility, as delineated on **Table II.2.1**. Disposal operations at DNCS will only be conducted when an attendant is on duty. DNCS plans to conduct Facility operations 24 hours a day, 7 days a week. The Facility will be secured with barbed wire fencing, cattle guards, and locking gates to prevent any unauthorized access or disposal when an attendant is not on duty. The temporary parking areas will be inspected for leakage, and vehicles will be required to have any valves or access ports secured and locked to prevent spillage or tampering. At a minimum, the following Waste Acceptance Protocol (**Table II.2.1**) requirements must be met prior to managing oil field waste at DNCS:

TABLE II.2.1
Waste Acceptance Protocol
DNCS Environmental Solutions

The Facility will notify the customer of necessary conditions/limitations that apply to managing the waste, and the customer will be required to comply with the conditions/limitations.

The customer must provide OCD Form C-138, *Request for Approval to Accept Solid Waste* (**Attachment II.2.A**) to the Facility that issues the following certification that the waste is exempt oil field waste.

I do hereby certify that, according to the Resource Conservation and Recovery Act (RCRA) and Environmental Protection Agency's July, 1988, regulatory determination, any and all waste delivered to DNCS from the above locations is: EXEMPT oilfield waste. This waste is

in compliance with Regulated Levels of Naturally Occurring Radioactive Material (NORM) pursuant to 20 NMAC 3.1 Subpart 1403.C and D.

Should the generator or their authorized representative fail to sign the OCD Form C-138, the load of oil field waste will be rejected.

1. For Exempt Liquid Wastes:

Commercial or industrial customers will also be required to provide a valid *Authorization to Move Produced Water*, OCD Form C-133 (**Attachment II.1.B**). After authenticating the OCD Form C-133, DNCS will verify that the customer is an authorized hauler by checking it against the OCD monthly updated list located at http://www.emnrd.state.nm.us/ocd/Statistics.htm. DNCS will pursue the following protocol in managing the OCD Form C-133:

a) Monthly, the General Manager will provide the Facility personnel an updated list.
b) The OCD Form C-133 list will be maintained onsite in the DNCS administrative files.
c) Prior to accepting any material, Facility personnel will ensure that the hauling company has a valid OCD Form C-133 approval.
d) If a valid OCD Form C-133 is not on file, the hauler will not be allowed to unload the liquid waste.
e) The General Manager or other appropriate DNCS management personnel will be contacted if assistance is needed.

2. For Solid Waste:

In addition to providing OCD Form C-138, solid waste receipts will be subject to confirmation that the materials pass the Paint Filter Test (EPA 9095B). The protocol for this test is included as **Attachment II.2.C.**

3. For Materials Delivered to be Stabilized and Solidified:

These materials will be stabilized and solidified utilizing the procedures outlined in **Volume II, Section 1** and confirmed that the materials pass the Paint Filter Test prior to transporting them to the landfill for disposal.

3.1 Prohibited Wastes

Regulated non-exempt hazardous waste and non-exempt Naturally Occurring Radioactive Material (NORM) wastes which are subject to other Federal or State regulations are prohibited at DNCS. Generators/haulers with these wastes will be referred to a United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) permitted facility (i.e., WCS, Andrews County, TX).

3.2 Oil Field Waste Inspection and Management

Once the required paperwork has been reviewed and verified, each load will be inspected to ensure compliance with 19.15.36.13.F NMAC. Inspections consist of:

1. Examination of Fluid from Load

a) Loads will be checked prior to acceptance to check for the presence of non-permitted materials (e.g., compressor oil) and to determine the solid content of the load (i.e., is the load "clean" or "dirty") for the purposes of proper handling.

b) Every truck will stop at an inspection landing (similar to the one shown in **Figure II.2.2**) for evaluation by site personnel.

c) Facility personnel will not step onto the truck until the driver has placed the truck in park with the brake applied, opened the door, and has his/her legs outside the cab. This is to ensure the truck does not move while Facility personnel are on the truck.

d) Facility personnel will wear neoprene or other heavy duty non-permeable gloves.

e) The cap on the tank will be opened and a metal rod will be inserted to the bottom of the tank.

f) Care will be exercised because hydrogen sulfide (H_2S) may be present when the cap is opened. If there is any indication that H_2S may be present, the H_2S safety procedures will be followed (**Volume II.3**).

g) Based on whether the rod contacts the metal bottom of the tank, or is slowed by sludge/solid material, Facility personnel will be able to gauge if the load may potentially be laden with sediment.

h) The metal rod will be pulled out from the tank and the fluid on the rod examined for the presence of oils or other non-exempt materials.

i) Odor can also be an indication if the load contains fluids that are non-exempt. Non-exempt waste with potential odors include:

   a. Septic conditions
   b. Caustic or acid cleaners
   c. Methanol, unused
   d. Pesticide and herbicide wastes
   e. Solvents, spent (including waste solvents)

   Non-compliant wastes are not accepted and will be rejected and returned to the Hauler/Generator.

2. Presence of H_2S

DNCS will monitor for H_2S on a continual basis on each oil field delivery waste vehicle arriving at the site. Monitoring for H_2S will be completed as follows:

a) The battery and calibration date on the monitor will be checked to ensure both are current.

INSPECTION LANDING EXAMPLE

DNCS ENVIRONMENTAL SOLUTIONS
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: 10/22/2013	CAD: INSPECTION.dwg	PROJECT #: 542.01.01
DRAWN BY: JFP	REVIEWED BY: DRT	FIGURE II.2.2
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\PERMIT FIGURES\INSPECTION.dwg
Date/Time:Oct. 23, 2013-13:26:44

b) DNCS personnel will position themselves as far away from the cap opening on the tank as possible, in order to minimize the potential for exposure. Safety is the most important consideration when checking for H_2S.
c) DNCS personnel will use the H_2S monitor to determine the potential presence and concentration of H_2S (for specific operational instructions, refer to specific owner's manual for the monitoring instrument).
d) The tube wand will be used to acquire a sample, and the H_2S reading and related notes will be recorded on the DNCS Disposal Log (**Attachment II.3.D**).

In the event of an H_2S detection of 10 ppm or greater, the following procedures will also be implemented by DNCS personnel:

a) Notification of the presence of H_2S will be provided to both the driver (hauler) and the generator.
b) The generator will be provided the option of allowing DNCS to treat the load on-site. Should the generator decline treatment, the load will be rejected and directed to leave the DNCS Facility.
c) If the generator requests treatment, DNCS personnel will add calcium hypochlorite ($Ca(ClO)_2$) to the load at the levels corresponding to **Table II.3.6.**
d) Once the $Ca(ClO)_2$ has been added, the load will be "rolled" [i.e., trucks will use their air pumps to "roll" air through the tank to allow for mixing of the contents and the added $Ca(ClO)_2$] to assist the chemical reaction. After approximately 20 minutes, the load will be re-sampled for the presence of H_2S. Treatment will continue until the H_2S reading is below 1 ppm. Once the H_2S measurement reads below 1 ppm, the load will be directed to the receiving area for processing.
e) Treatment information and the final H_2S measurement will be recorded on the DNCS Disposal Log (**Attachment II.3.D**).
f) DNCS personnel will contact the Generator's Plant Manager or General Manager if assistance is needed.

3. Presence of Non-Exempt fluids

a) In the event compressor oil or other non-exempt fluids are detected, a sample of the fluid will be collected in a sample container.
b) The date, generating company, hauler, and location will be noted on the container.
c) The hauler will be prevented from unloading at the Facility.
d) The Facility will contact the generator's Plant Manager or General Manager if assistance is needed.
e) Samples will be maintained at the Facility for two weeks for inspection by the generator's personnel and OCD, as necessary.

4. Presence of High Solids Content

a) In the event high solid/sludge content is suspected, a sample of the material will be collected in a sample container.
b) The date, company, hauler, and location will be noted on the container.

c) If the load cannot be accepted through the Produced Water Receiving Tanks due to high solids content, the hauler will contact the generator for permission to be charged for the cost of discharging through the Jet Out Pit.
d) If the load cannot be accepted due to high solid content, the hauler will contact the production company to inform them that the load has been rejected, and the hauler will be prevented from unloading at the Facility.
e) The Facility will contact the Generator's Plant Manager or General Manager if assistance is needed.
f) Samples will be maintained at the Facility for two weeks for inspection by the generator's personnel.

5. Unloading

a) DNCS anticipates a maximum of 8 unloading stations for Produced Water Receiving, and a maximum of 6 Jet Out Pit Bays.
b) To minimize the chance for conflicts between trucks, only 14 trucks will be allowed past the inspection platform(s) at any one time once the Facility is fully operational. Prior to ultimate development, the number of trucks allowed past the inspection platform(s) will be limited to the total number of Produced Waters Receiving stations and Jet Out Pit Bays that are available for use.
c) Trucks will pull up to the load-out station or back into the Jet Out Pit Bays as instructed by Facility personnel.
d) Drivers will connect their grounding straps to the grounding stakes at their specific Load-Out Point.
e) Trucks will off-load materials to Jet Out Tanks as appropriate.
f) Trucks will exit the Facility as instructed.
g) Failure of drivers to follow these procedures will be brought to the attention of Facility management for proper resolution with the hauling company.

3.3 Recordkeeping

Upon receipt of oil field waste, Facility employees will record the following into the Facility Disposal Log Book or similar (**Attachment II.2.D**).

- Generator
- Origin
- Date received
- Quantity
- Transporter
- Disposal location

Logbooks will be maintained for a minimum of 5 years after operations at the Facility have ceased. At the end of each month, the DNCS General Manager will compile information to be

submitted electronically to OCD on the OCD Form C-115, *Operator's Monthly Report* (**Attachment II.2.E)**.

4.0 TRAINING

Facility employees will be trained and updated in the identification of oil field waste on at least an annual basis. Spotters and/or equipment operators will be present at the Facility when oil field waste is unloaded in order to check for unauthorized waste. In addition to the routine customer screening process, new customer oil field waste deliveries will receive focused supervision and scrutiny.

At a minimum, inspection personnel will be trained to identify suspicious wastes based on visual (and olfactory) characteristics in addition to the waste screening procedures outlined in Section 2.2 of this Plan. Specific items that will be on the training agenda include:

- Hazardous placarding or markings
- Proper form identification and use
- H_2S screening
- Non-exempt liquids recognition
- "Chemical" odors
- Excessive solids recognition
- Employee safety and personal protective equipment (PPE) use
- Site-generated waste handling and disposal

Whenever a suspicious waste is identified, Facility inspection personnel will follow specific procedures that may include:

- Identifying the unacceptable waste by characteristic, estimated quantity, transport vehicle, and the names and addresses of those associated with the waste load
- Questioning the driver of the vehicle
- Reviewing existing generator paperwork
- Contacting the possible source (i.e., generator) and questioning the originator of waste pursuant to the regulations.
- Denying access to the vehicle
- Calling the Division and/or Hazardous Waste Bureau, as applicable
- Using protective equipment
- Calling an emergency response agency, if required
- Contacting laboratory support, if necessary
- Document load refusal on C-138 (**Attachment II.2.A**)

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

ATTACHMENT II.2.A
REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE
OCD FORM C-138

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-138
Revised August 1, 2011

*Surface Waste Management Facility Operator and Generator shall maintain and make this documentation available for Division inspection.

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

1. Generator Name and Address:

2. Originating Site:

3. Location of Material (Street Address, City, State or ULSTR):

4. Source and Description of Waste:

Estimated Volume _____ yd^3 / bbls Known Volume (to be entered by the operator at the end of the haul) _____ yd^3 / bbls

5. GENERATOR CERTIFICATION STATEMENT OF WASTE STATUS

I, _____, representative or authorized agent for _____ do hereby certify that according to the Resource Conservation and Recovery Act (RCRA) and the US Environmental Protection Agency's July 1988 regulatory determination, the above described waste is: (Check the appropriate classification)

☐ RCRA Exempt: Oil field wastes generated from oil and gas exploration and production operations and are not mixed with non-exempt waste. *Operator Use Only: Waste Acceptance Frequency* ☐ *Monthly* ☐ *Weekly* ☐ *Per Load*

☐ RCRA Non-Exempt: Oil field waste which is non-hazardous that does not exceed the minimum standards for waste hazardous by characteristics established in RCRA regulations, 40 CFR 261.21-261.24, or listed hazardous waste as defined in 40 CFR, part 261, subpart D, as amended. The following documentation is attached to demonstrate the above-described waste is non-hazardous. (Check the appropriate items)

☐ MSDS Information ☐ RCRA Hazardous Waste Analysis ☐ Process Knowledge ☐ Other (Provide description in Box 4)

GENERATOR 19.15.36.15 WASTE TESTING CERTIFICATION STATEMENT FOR LANDFARMS

I, _____, representative for _____ do hereby certify that representative samples of the oil field waste have been subjected to the paint filter test and tested for chloride content and that the samples have been found to conform to the specific requirements applicable to landfarms pursuant to Section 15 of 19.15.36 NMAC. The results of the representative samples are attached to demonstrate the above-described waste conform to the requirements of Section 15 of 19.15.36 NMAC.

5. Transporter:

OCD Permitted Surface Waste Management Facility

Name and Facility Permit #:

Address of Facility:

Method of Treatment and/or Disposal:

☐ Evaporation ☐ Injection ☐ Treating Plant ☐ Landfarm ☐ Landfill ☐ Other

Waste Acceptance Status:

☐ **APPROVED** ☐ **DENIED** (Must Be Maintained As Permanent Record)

PRINT NAME: _____ TITLE: _____ DATE: _____

SIGNATURE: _____ TELEPHONE NO.: _____

Surface Waste Management Facility Authorized Agent

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

ATTACHMENT II.2.B

AUTHORIZATION TO MOVE PRODUCED WATER

OCD FORM C-133

Submit a single copy to
Santa Fe Office

State of New Mexico
Energy Minerals and Natural Resources

Form C-133
Revised August 1, 2013

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

AUTHORIZATION TO MOVE PRODUCED WATER

Transporter Name:_____

Business (Physical) Address in New Mexico:

_____

_____

Contact Mailing Address (If different):

_____

_____

Business Phone: _____
Business Fax: _____

Contact Phone: _____
Contact Fax: _____

1. Attach a copy of the applicant's New Mexico Public Regulation Commission (PRC) Warrant for Transportation Services.

2. Identify the form of the applicant's business entity: (Example: corporation, limited liability company [LLC], limited partnership, limited liability partnership, partnership, sole proprietor): _____

A. If the applicant is a corporation or LLC, provide the Secretary of State corporation number:
_____

B. If the applicant is a limited partnership or limited liability partnership, provide the Secretary of State file number: _____

C. If the applicant is any other form of partnership, identify all partners:
_____

D. If the applicant is a sole proprietor, provide the name of the sole proprietor:
_____

(Note: If the form of your business entity changes, the name of your business changes, or the business address changes, you must re-apply for authorization.)

It is the responsibility of each holder of an approved Form C-133 to comply with 19.15.34 NMAC and familiarize its personnel with that rule's requirements. Failure to move or dispose of produced water in accordance with 19.15.34 NMAC may be cause for cancellation of the Form C-133.

"I hereby certify that the information above is true and complete to the best of my knowledge and belief." (Application must be signed by person who is authorized to obligate the company applying for the permit)

Signature:_____ Date:_____

Printed Name:_____ Title:_____

E-mail Address:_____

(This space for State use)

Approved by:_____ Title:_____

Date:_____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

ATTACHMENT II.2.C

PAINT FILTER TEST PROTOCOL

USEPA METHOD 9095B

METHOD 9095B

PAINT FILTER LIQUIDS TEST

1.0 SCOPE AND APPLICATION

1.1 This method is used to determine the presence of free liquids in a representative sample of waste.

1.2 The method is used to determine compliance with 40 CFR 264.314 and 265.314.

2.0 SUMMARY OF METHOD

2.1 A predetermined amount of material is placed in a paint filter. If any portion of the material passes through and drops from the filter within the 5-min test period, the material is deemed to contain free liquids.

3.0 INTERFERENCES

3.1 Filter media were observed to separate from the filter cone on exposure to alkaline materials. This development causes no problem if the sample is not disturbed.

3.2 Temperature can affect the test results if the test is performed below the freezing point of any liquid in the sample. Tests must be performed above the freezing point and can, but are not required to, exceed room temperature of 25 ^{o}C.

4.0 APPARATUS AND MATERIALS

4.1 Conical paint filter -- Mesh number 60 +/- 5% (fine meshed size). Available at local paint stores such as Sherwin-Williams and Glidden.

4.2 Glass funnel -- If the paint filter, with the waste, cannot sustain its weight on the ring stand, then a fluted glass funnel or glass funnel with a mouth large enough to allow at least 1 in. of the filter mesh to protrude should be used to support the filter. The funnel should be fluted or have a large open mouth in order to support the paint filter yet not interfere with the movement, to the graduated cylinder, of the liquid that passes through the filter mesh.

4.3 Ring stand and ring, or tripod.

4.4 Graduated cylinder or beaker -- 100-mL.

5.0 REAGENTS

5.1 None.

6.0 SAMPLE COLLECTION, PRESERVATION, AND HANDLING

A 100-mL or 100-g representative sample is required for the test. If it is not possible to obtain a sample of 100 mL or 100 g that is sufficiently representative of the waste, the analyst may use larger size samples in multiples of 100 mL or 100 g, i.e., 200, 300, 400 mL or g. However, when larger samples are used, analysts shall divide the sample into 100-mL or 100-g portions and test each portion separately. If any portion contains free liquids, the entire sample is considered to have free liquids. If the sample is measured volumetrically, then it should lack major air spaces or voids.

7.0 PROCEDURE

7.1 Assemble test apparatus as shown in Figure 1.

7.2 Place sample in the filter. A funnel may be used to provide support for the paint filter. If the sample is of such light bulk density that it overflows the filter, then the sides of the filter can be extended upward by taping filter paper to the inside of the filter and above the mesh. Settling the sample into the paint filter may be facilitated by lightly tapping the side of the filter as it is being filled.

7.3 In order to assure uniformity and standardization of the test, material such as sorbent pads or pillows which do not conform to the shape of the paint filter should be cut into small pieces and poured into the filter. Sample size reduction may be accomplished by cutting the sorbent material with scissors, shears, a knife, or other such device so as to preserve as much of the original integrity of the sorbent fabric as possible. Sorbents enclosed in a fabric should be mixed with the resultant fabric pieces. The particles to be tested should be reduced smaller than 1 cm (i.e., should be capable of passing through a 9.5 mm (0.375 inch) standard sieve). Grinding sorbent materials should be avoided as this may destroy the integrity of the sorbent and produce many "fine particles" which would normally not be present.

7.4 For brittle materials larger than 1 cm that do not conform to the filter, light crushing to reduce oversize particles is acceptable if it is not practical to cut the material. Materials such as clay, silica gel, and some polymers may fall into this category.

7.5 Allow sample to drain for 5 min into the graduated cylinder.

7.6 If any portion of the test material collects in the graduated cylinder in the 5-min period, then the material is deemed to contain free liquids for purposes of 40 CFR 264.314 and 265.314.

8.0 QUALITY CONTROL

8.1 Duplicate samples should be analyzed on a routine basis.

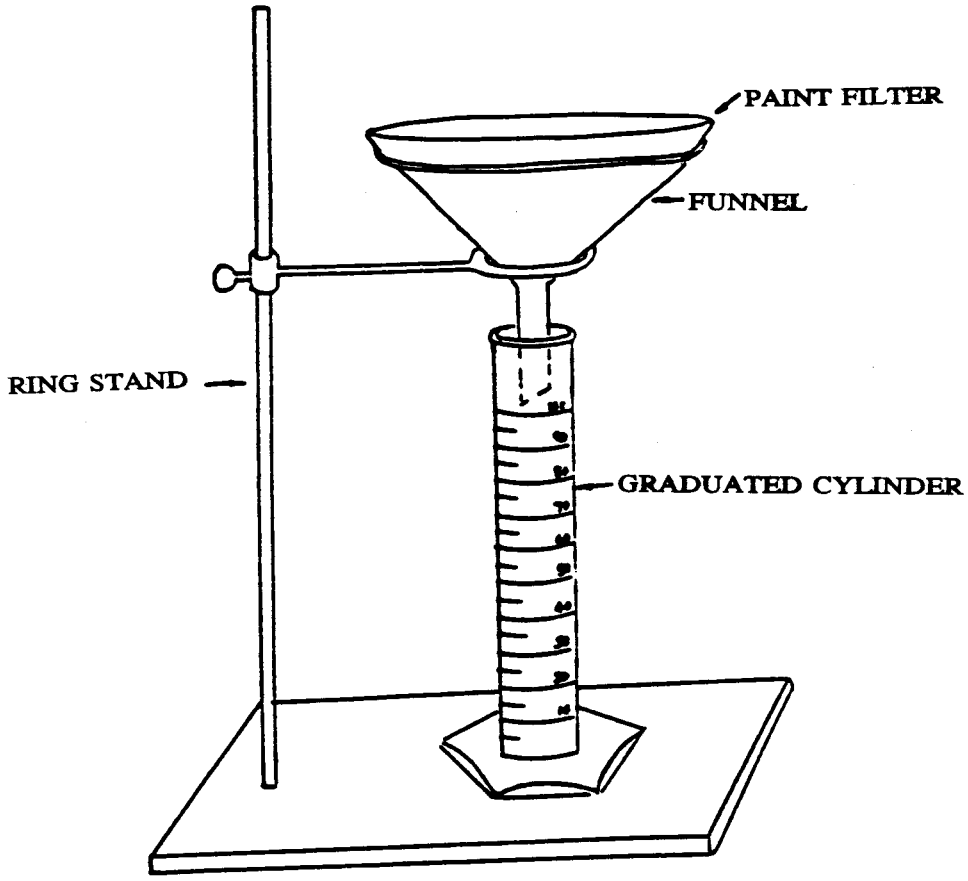
9.0 METHOD PERFORMANCE

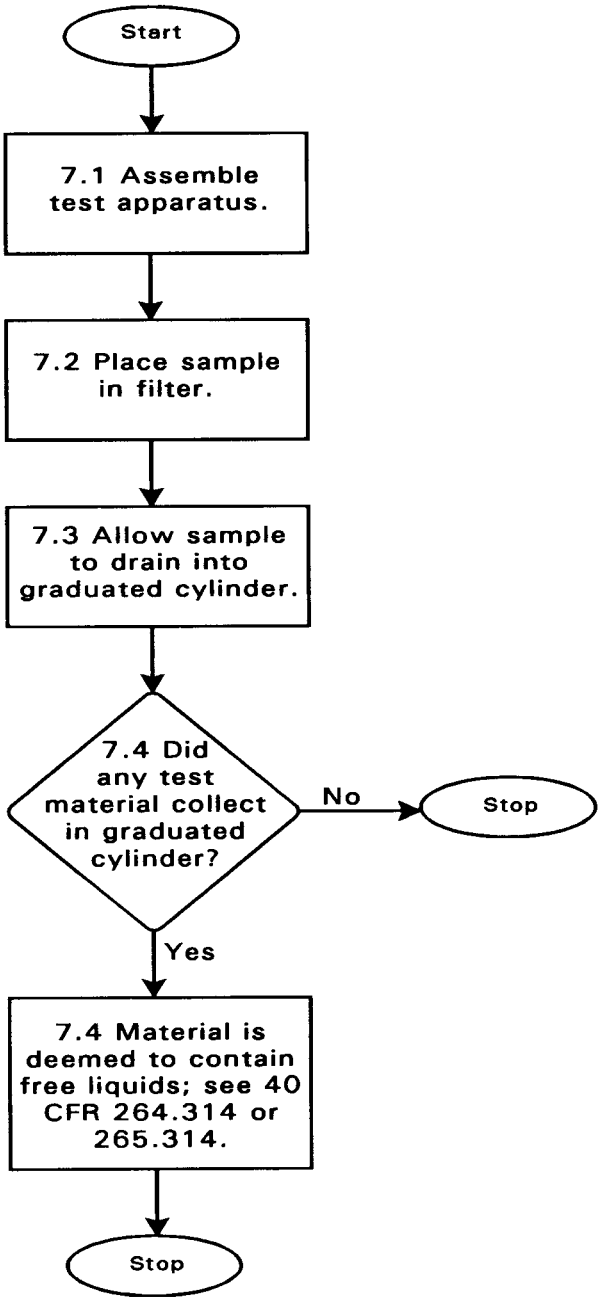
9.1 No data provided.

10.0 REFERENCES

10.1 None provided.

FIGURE 1
PAINT FILTER TEST APPARATUS




Start
7.1 Assemble test apparatus.
7.2 Place sample in filter.
7.3 Allow sample to drain into graduated cylinder.
7.4 Did any test material collect in graduated cylinder?
No
Stop
Yes
7.4 Material is deemed to contain free liquids; see 40 CFR 264.314 or 265.314.
Stop

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

ATTACHMENT II.2.D

DISPOSAL LOG (TYPICAL)

ATTACHMENT II.2.D
Disposal Log (Typical)
DNCS Environmental Solutions

Lea County, NM
NMOCD #_____

Date: _____ **Page _____ of _____**

Generator	Origin	Hauler	Soil (yards)	Mud (bbls)	Fluids (bbls)	Bottoms (bbls)	Cuttings (yards)	Washout	Sulfur (tons or bbls)	Trash (sales)	Disposal Location
		Totals:									

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 2: OIL FIELD WASTE MANAGEMENT PLAN

ATTACHMENT II.2.E

OPERATOR'S MONTHLY REPORT

OCD FORM C-115

District I
1625 North French, Hobbs, NM 88241
District II
1301 West Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South Saint Francis Drive
Santa Fe, NM 87505

OPERATOR'S MONTHLY REPORT

Form C-115 First Page
Revised January 22, 2004
Instruction on Reverse Side
1 ☐ Amended Report

2 Operator	3 OGRID:	4 Month/Year
5 Address:		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 . AND NAME No. and Name & U-L-S-T-R PI No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/conden-sate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Prod-uced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.
24

Signature	Printed Name & Title	E-mail Address	Date	Phone Number

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 . AND NAME No. and Name & U-L-S-T-R PI No.	8 C O D E 1	9 Volume	10 Pressure	11 C O D E 2	12 Barrels of Oil/conden-sate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Prod-uced	16 C O D E 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 C O D E 4	23 Oil on hand at end of month

2 Operator	3 OGRID	4 Month/Year	6 Page 3 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 . AND NAME No. and Name & U-L-S-T-R PI No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/conden-sate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Prod-uced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month

2 Operator	3 OGRID	4 Month/Year	6 Page 4 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 . AND NAME No. and Name & U-L-S-T-R PI No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/conden-sate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Prod-uced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

TABLE OF CONTENTS

LIST OF FIGURES

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

LIST OF TABLES

LIST OF ATTACHMENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

1.0 INTRODUCTION

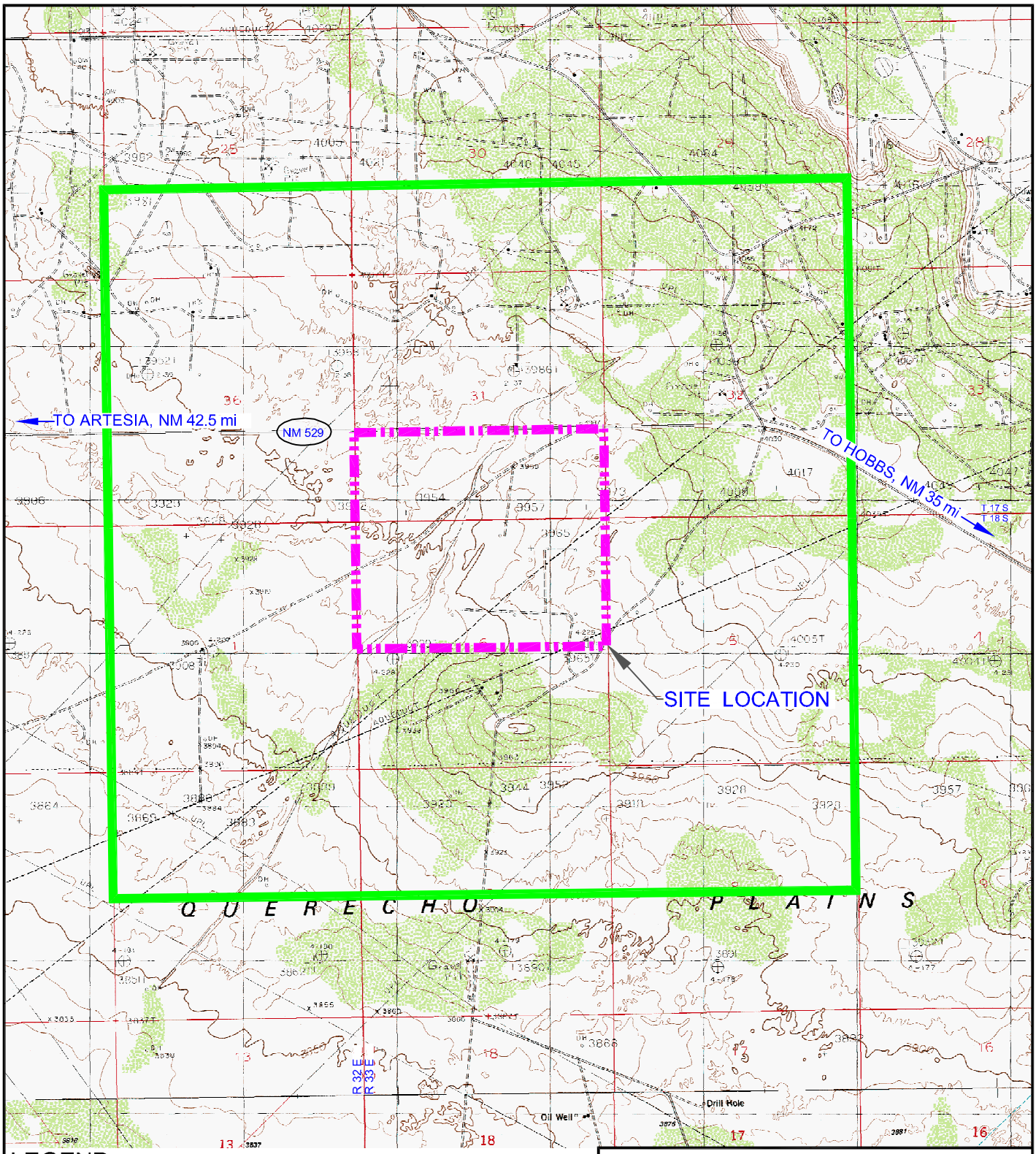
DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.3.1**). Site access will be provided via the south side of NM 529.

1.2 Facility Description

The DNCS Facility is a proposed new Surface Waste Management Facility that will include two main components, a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±). Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Plan provided as **Figure II.3.2** identifies the locations of the Processing Area and Landfill facilities. The proposed facilities are detailed in **Table II.3.1**, and are planned to be developed in four primary phases.



LEGEND

SITE BOUNDARY

1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

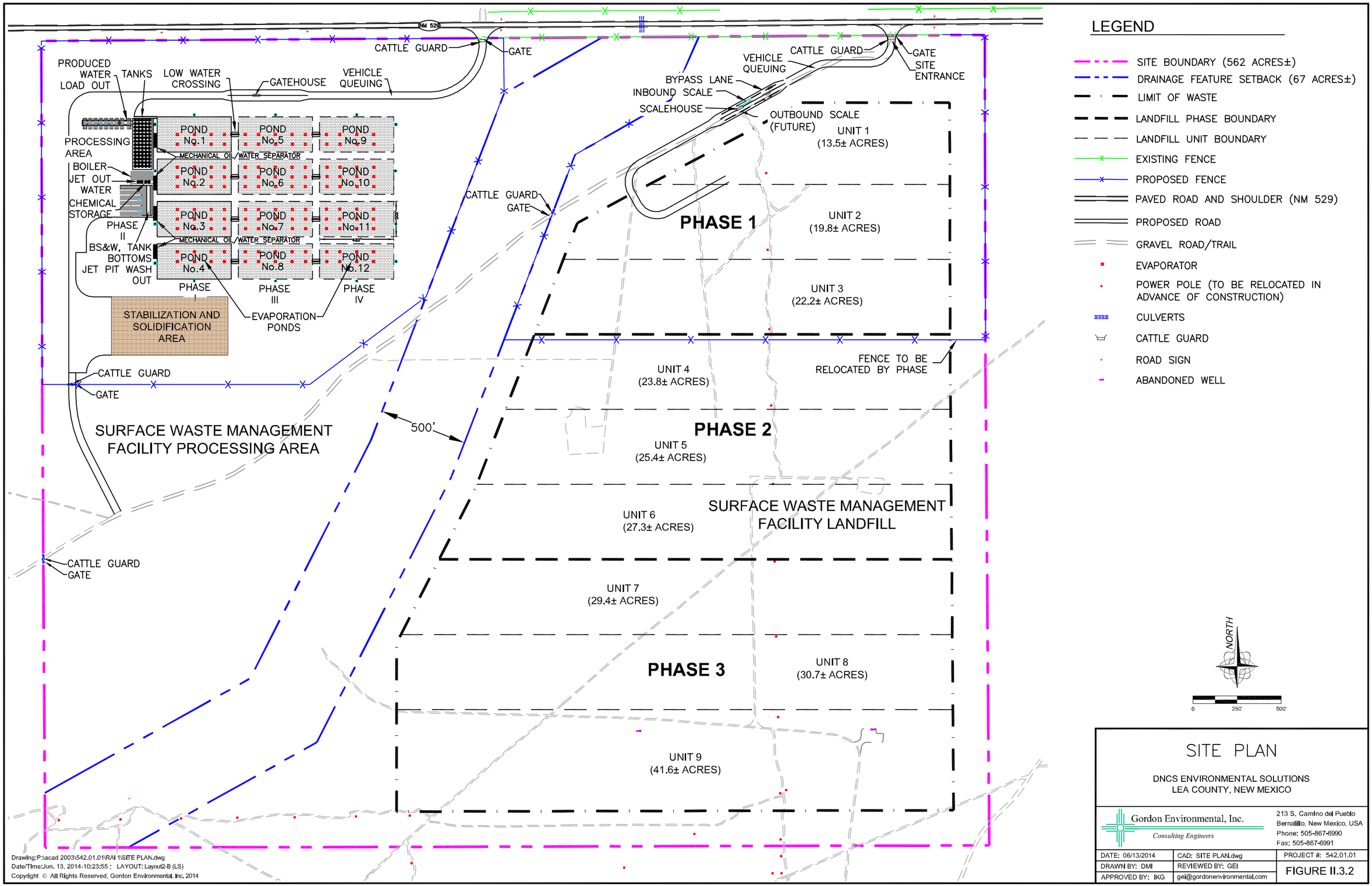
Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 13, 2014-07:13:02 ; LAYOUT: A (P)

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.3.1
APPROVED BY: IKG	gei@gordonenvironmental.com	



SITE PLAN

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: SITE PLAN.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.3.2
APPROVED BY: IKG	gei@gordonenvironmental.com	

TABLE II.3.1
Proposed Facilities[1]
DNCS Environmental Solutions

Description	No.
Oil field waste disposal landfill	1
Produced water load-out points	9
Produced water receiving tanks	12
Produced water settling tanks	48
Mechanical oil/water separation unit	4
Evaporation ponds	12
Stabilization and Solidification Area	1
Oil treatment plant	1
Crude oil receiving tanks	5
Oil sales tanks	5
Customer jet wash	1 (6 bays)

Note:
[1]Subject to change. The proposed facilities are based on projected waste types and volumes; therefore this list may be modified in response to changes in waste streams, technology, etc.

1.3 Purpose

The purpose of this Hydrogen Sulfide (H_2S) Prevention and Contingency Plan (the Plan) is to enhance awareness and establish measures to protect employees from occupational exposure to H_2S while allowing them to perform their assigned duties. The Plan is also designed to protect customers and visitors to the DNCS Facility, as well as the general public and nearby land users.

This Plan prescribes measures for:

- Providing routine H_2S monitoring of incoming wastes.
- Installation of monitoring points at the Facility evaporation ponds.
- Routine perimeter monitoring, and the potential for permanent monitoring stations.
- Regular monitoring in and around incoming oil field waste transportation vehicles.
- Augmenting the monitoring procedures in the event that H_2S is detected in excess of 10 parts per million (ppm).

DNCS will invite the local emergency response authorities identified in **Table II.3.2** to the site for a briefing on this Plan. During this briefing, DNCS will discuss notification, emergency response procedures, and evacuation plans. The H_2S monitoring program will be implemented during the active life of the Facility.

TABLE II.3.2
Emergency Response Agencies and Contacts
DNCS Environmental Solutions

Agency/Organization	Emergency Number
1. Fire	
Maljamar Fire Department	911 or (575) 676-4100
2. Police	
Lea County Sheriff's Department	911 or (575) 396-3611
New Mexico State Police	911 or (575) 392-5580
3. Medical/Ambulance	
Lea County EMS	911
Lea Regional Medical Center 5419 N. Lovington Highway Hobbs, NM 88240	(575) 492-5000
4. Response Firm	
Phoenix Environmental, LLC. 2113 N French Drive Hobbs, NM 88240	(575) 391-9685
5. OCD Emergency Response Contacts	
Oil Conservation Division 1625 N. French Drive Hobbs, NM 88240	(575) 393-6161
Mobile Phone	(575) 370-3180
Oil Conservation Division 1220 South St. Francis Drive Santa Fe, NM 87505	(505) 476-3440
6. State Emergency Response Contacts	
Environmental Emergency 24 hr. (NMED)	(505) 827-9329
New Mexico Environment Department Solid Waste Bureau, Santa Fe	(505) 827-0197
7. Local Emergency Response Contacts	
Lea County Emergency Management	(575) 391-2983
8. Federal Emergency Response Contacts	
National Emergency Response Center (U.S. Coast Guard)	(800) 424-8802
Region VI Emergency Response Hotline (USEPA)	(214) 665-2200

1.4 Hydrogen Sulfide Characteristics

H_2S is a colorless and flammable gas with a distinct odor. Being heavier than air, H_2S tends to accumulate at the floor of poorly ventilated spaces. It is found in petroleum and natural gas and is sometimes present in groundwater. The odor of hydrogen sulfide gas can be perceived at levels as low as 10 parts per billion (ppb). At levels of 50-100 ppm, it may cause the human sense of smell to fail. Limited exposure to low concentrations of H_2S can result in eye irritation, sore throat, coughing, shortness of breath, and fluid in the lungs. These symptoms usually recede in a few weeks in the absence of continued exposure. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness. Exposure to high concentrations of H_2S can lead to eye damage, loss of sense of smell, pulmonary edema (swelling and/or fluid accumulation in the lungs), loss of breathing and death. General risks associated with H_2S contact are summarized on **Table II.3.3**, and more detailed chemical hazard information for H_2S is provided on the material safety data sheet (MSDS) furnished in **Attachment II.3.A**.

TABLE II.3.3
H_2S Exposure Health Risk
DNCS Environmental Solutions

H_2S EXPOSURE LEVEL[1]	**HEALTH RISK**
Low (0-10 ppm)	Eye, nose, and throat irritation; coughing, shortness of breath, fluid in the lungs
Moderate (10-50 ppm)	Headache, dizziness, nausea and vomiting, coughing and breathing difficulty, loss of sense of smell
High (50-200 ppm)[2]	Severe respiratory tract irritation, loss of sense of smell, eye damage, shock, convulsions, coma, pulmonary edema (swelling and/or fluid accumulation in the lungs), death

[1]*General data obtained from www.safetydirectory.com*
[2]*NIOSH Immediate Danger to Life or Health (IDLH) is 100 ppm*

The oil field waste types, and engineering design and operating procedures specific to the DNCS Facility, will mitigate against the potential release of H_2S in to the environment. The measures deployed by DNCS that minimize the potential generation of releases include:

- Screening of existing and new deliveries
- Load inspections for the presence of H_2S as outlined in the Oil Field Waste Management Plan (**Volume II.2**)

- Onsite H_2S treatment of incoming loads to ensure that the acceptance criteria of no measurable H_2S (< 1 ppm) is met
- Constant evaporation pond testing
- Employee training

The cornerstone of this Plan consists of routine H_2S monitoring conducted for the Facility evaporation ponds and incoming waste streams to ensure that the regulatory limits for H_2S are not exceeded. The monitoring is intended to confirm that the H_2S concentration being accepted at the Facility is less than 1 ppm. This approach to monitoring and treatment has proven effective in reducing H_2S concentrations and successful in eliminating the need for H_2S Contingency Plan implementation as described in 19.15.11.9 NMAC (i.e., to address H_2S > 100 ppm). In addition, this Plan follows American Petroleum Institute (API) Recommended Practice 55 (RP-55), paragraph 7.6 to address H_2S >30 ppm (**Table II.3.4**).

1.5 Regulatory Requirements: 19.15.36 NMAC and 19.15.11 NMAC

The Rules for Surface Waste Management Facilities (19.15.36 NMAC) address the monitoring and management of H_2S in 19.15.36.8.C.(8):

19.15.36.8 SURFACE WASTE MANAGEMENT FACILITY PERMITS AND APPLICATION REQUIREMENTS

C. Application requirements for new facilities, major modifications and permit renewals. An applicant or operator shall file an application, form C-137, for a permit for a new surface waste management facility, to modify an existing surface waste management facility or for permit renewal with the environmental bureau in the division's Santa Fe office. The application shall include:

(8) a hydrogen sulfide prevention and contingency plan that complies with those provisions of 19.15.11 NMAC that apply to surface waste management facilities;

Additionally, this H_2S monitoring program is intended to demonstrate compliance with 19.15.36.8.C.(8) NMAC (Surface Waste Management), and the requirements of 19.15.11 NMAC (Hydrogen Sulfide Gas), as well as, other permit conditions that may apply to this Facility. Should monitoring results identify unexpected concentrations of H_2S in excess of 100 ppm (RP-55 limit = 30 ppm) in a public area, the requirements of 19.15.11.8.C NMAC will be implemented and this Plan, developed specifically to be responsive to 19.15.11.9 NMAC, will be implemented as required with proper notification.

TABLE II.3.4
API Recommended Practice 55
DNCS Environmental Solutions

7.6 IMMEDIATE ACTION PLAN

Each contingency plan should contain a condensed "Immediate Action Plan" to be followed by designated personnel any time they receive notice of a potentially hazardous hydrogen sulfide or sulfur dioxide discharge. For the protection of personnel (including the general public) and abatement of the discharge, this "Immediate Action Plan" should include, but not be limited to, the following provisions:

a. Alert and account for facility personnel.
   1. Move away from the hydrogen sulfide or sulfur dioxide source and get out of the affected area.
   2. Don proper personal breathing equipment.
   3. Alert other affected personnel.
   4. Assist personnel in distress.
   5. Proceed to the designated emergency assembly area.
   6. Account for on-site personnel.

b. Take immediate measures to control the present or potential hydrogen sulfide or sulfur dioxide discharge and to eliminate possible ignition sources. Emergency shutdown procedures should be initiated as deemed necessary to correct or control the specific situation. When the required action cannot be accomplished in time to prevent exposing operating personnel or the public to hazardous concentrations of hydrogen sulfide or sulfur dioxide, proceed to the following steps, as appropriate for the site specific conditions.

c. Alert the public (directly or through appropriate government agencies) that may be subjected to an atmosphere exposure exceeding 30 ppm[21] of hydrogen sulfide or 10[21] ppm of sulfur dioxide.

d. Initiate evacuation operations.

e. Contact the first available designated supervisor on the call list (refer to Par. 7.4.a). Notify the supervisor of circumstances and whether or not immediate assistance is needed. The supervisor should notify (or arrange for notification of) other supervisors and other appropriate personnel (including public officials) on the call list.

f. Make recommendations to public officials regarding blocking unauthorized access to the unsafe area and assist as appropriate.

g. Make recommendations to public officials regarding evacuating the public and assist as appropriate.

h. Notify, as required, state and local officials and the National Response Center to comply with release reporting requirements (i.e., 40 *Code* of *Federal Regulations Parts 302* and 355) (refer to Par. 4.4).

i. Monitor the ambient air in the area of exposure (after following abatement measures) to determine when it is safe for re-entry.

[2l]Emergency Response Planning Guide Level 2 (ERPG-2), refer to Reference 27. ERPG-2 is defined as the maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.

Note: This sequence (Par. 7.6) should be altered to fit the prevailing situation. Certain actions, especially those dealing with the public, should be coordinated with public officials.

This Table is extracted from the American Petroleum Institute (API) Recommended Practices for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide, Recommended Practice 55, Second Edition, February 15, 1995

2.0 EMERGENCY COORDINATORS

DNCS has designated individual specialists with the responsibility and authority to implement response measures in the event of an emergency which threatens freshwater, public health, safety or the environment per 19.15.36.13.N.(3) NMAC. The Primary, Alternate, and on-site Emergency Coordinators (ECs; **Table II.3.5**) will be thoroughly familiar with all aspects of this Plan; operations and activities at the Facility; location and characteristics of waste to be managed; the repository of all records within the Facility; and the Facility layout. **Table II.3.5** provides a list of names, designations, titles, and phone numbers for each EC, who will be formally identified to OCD prior to commencing Facility operations.

TABLE II.3.5
List of Emergency Coordinators*
DNCS Environmental Solutions

Primary Emergency Coordinator

Name:	TBD	Work Phone:	(575) TBD
Title:	Facility Manager	Mobile Phone:	(575) TBD

Alternate Emergency Coordinator

Name:	TBD	Work Phone:	(575) TBD
Title:	Facility Operator	Mobile Phone:	(575) TBD

Onsite Emergency Coordinator

Name:	TBD	Work Phone:	(575) TBD
Title:	Facility Operator	Mobile Phone:	(575) TBD

**To be determined (TBD)*

The ECs are responsible for coordinating emergency response measures and have the authority to commit the resources required for implementation of this Plan. A designated EC will be available to respond to emergencies 24 hours a day, 7 days a week. The DNCS employee who identifies an emergency situation will contact an EC directly; or via phone or radio. Contact will be attempted with each EC (Primary, Alternate, and the On-site) until communication is achieved (**Table II.3.5**). Upon arrival at the scene of an emergency, the first EC to arrive will assume responsibility for initiating response measures. If more than one EC responds, authority is assigned to the highest-ranking EC.

In the rare case that an EC cannot be contacted in an emergency, the DNCS employee who identifies the emergency will make every effort to follow the emergency procedures outlined in this Plan until an EC or emergency authority (local, state, or federal; **Table II.3.2**) arrives to assist or take charge. The term "EC" as used throughout this Plan to references the responsible Emergency Coordinator at the scene of an emergency regardless of whether that EC is the Primary, Alternate, On-site EC, or EC designee. This Plan will be amended as described in Section 8.0 if the list of ECs changes, with updates submitted in a timely manner to OCD and filed on-site.

3.0 MONITORING

3.1 Incoming loads

DNCS will monitor for H_2S on a continual basis on every oil field delivery waste vehicle arriving at the site, as described in the Oil Field Waste Management Plan (**Volume II.2**). Monitoring results will be recorded on the OCD Form C-138 under "Source and Description of Waste" (**Attachment II.3.B**) and retained as part of the Facility Operating Record. DNCS personnel will wear H_2S personal monitors under circumstances where H_2S may be present, including when they are testing or unloading materials that may contain H_2S. The monitors will issue a visual and audible signal at 10 ppm of H_2S in the ambient air that becomes more rapid at 20 ppm. In the event of an H_2S detection of 10 ppm or greater, the following procedures will be implemented:

- Notification of the presence of H_2S will be provided to both the driver (hauler) and the generator.
- The generator will be provided the option of allowing DNCS to treat the load on-site. Should the generator decline treatment, the load will be rejected and directed to leave the DNCS Facility.
- If the generator requests treatment, DNCS personnel will add calcium hypochlorite ($Ca(ClO)_2$) to the load at the levels corresponding to **Table II.3.6.**
- Once the $Ca(ClO)_2$ has been added, the load will be "rolled" (i.e., trucks will use their air pumps to "roll" air through the tank to allow for mixing of the contents and the added $Ca(ClO)_2$ to assist the chemical reaction. After approximately 20 minutes, the load will be re-sampled for the presence of H_2S. Treatment will continue until the H_2S reading is below 1 ppm. Once the H_2S measurement reads below 1 ppm, the load will be directed to the receiving area for processing.

TABLE II.3.6
H_2S Treatment for Vehicles [1]
DNCS Environmental Solutions

H_2S PPM[2]	$Ca(ClO)_2$ "Coffee Cans" Required[3]
<50	1.0
50-100	1.5
100-150	2.0
150-200	2.5
200-250	3.0
250-300	3.5
300-350	4.0
350-400	4.5
400-450	5.0
450-500	5.5
500-550	6.0
550-600	6.5
600-650	7.0
650-700	7.5
700-750	8.0
750-800	8.5
800-850	9.0
850-900	9.5
900-950	10.0
950-1000	10.5

Notes:
[1]*Typical volume of truck is 80 bbl. One coffee can equals 34.5 oz of product.*
[2]*PPM = parts per million*
[3]*$Ca(ClO)_2$ = calcium hypochlorite*

- Treatment information and the final H_2S measurement will be recorded on the OCD Form C-138 under "Source and Description of Waste" (**Attachment II.3.B**).
- DNCS personnel will contact the generator's Plant Manager or General Manager if assistance is needed.

3.2 Evaporation Pond Monitoring

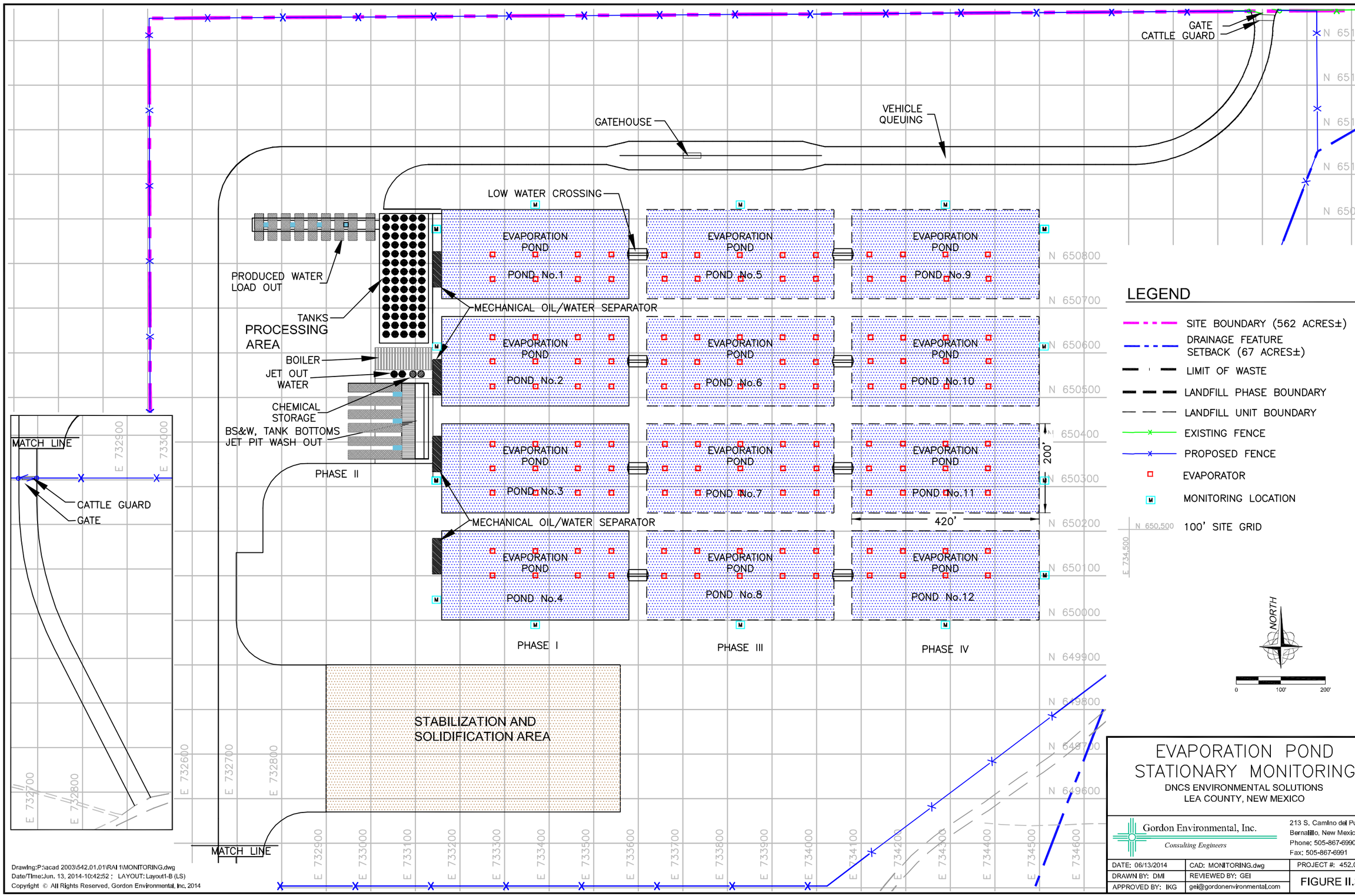
3.2.1 Stationary Monitors

Evaporation ponds will be monitored for the presence of H_2S by recording at continuous monitors maintained along the outside perimeter of the pond area as shown on **Figure II.3.3**. These monitors will be wired directly to the office for remote observation. H_2S readings and wind speed/direction will be logged and recorded twice daily on the DNCS Daily Air and Water Inspection Form (**Attachment II.3.C**). The EC will be notified, and will implement the procedures outlined below if H_2S readings are $\geq$ 10 ppm. If H_2S readings are $\geq$ 20 ppm, the employee will implement the procedures listed in **Table II.3.7**.

- A second reading will be taken on the downwind berm within one hour
- The dissolved oxygen and dissolved sulfide levels of the pond will be tested immediately and the need for immediate treatment determined
- Tests for H_2S levels will be made at the fenceline downwind from the area of concern

If two (2) consecutive H_2S readings of 10 ppm or greater are recorded:

- The EC will notify the Hobbs office of the OCD immediately (**Table II.3.2**)
- DNCS will commence hourly monitoring on a 24-hour basis
- DNCS will lower the pond level so that the mechanical evaporation system will circulate the entire pond
- DNCS will obtain daily analysis of dissolved sulfides in the pond



LEGEND

- SITE BOUNDARY (562 ACRES±)
- DRAINAGE FEATURE SETBACK (67 ACRES±)
- LIMIT OF WASTE
- LANDFILL PHASE BOUNDARY
- LANDFILL UNIT BOUNDARY
- EXISTING FENCE
- PROPOSED FENCE
- EVAPORATOR
- M MONITORING LOCATION
- 100' SITE GRID

NORTH

0 100' 200'

EVAPORATION POND STATIONARY MONITORING

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: MONITORING.dwg	PROJECT #: 452.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.3.3
APPROVED BY: IKG	gei@gordonenvironmental.com	

TABLE II.3.7
Implementation, Assessment, and Notification Procedures for H_2S
DNCS Environmental Solutions

1. **EVACUATE AREA AND NOTIFY THE ECs:** The employee who first becomes aware of the H_2S alarm will immediately evacuate the area, don protective personal breathing equipment and notify the Primary EC, and the Alternate EC and On-site EC if necessary. Notification will be made in person, via telephone, or via radio. The responding EC will assume full authority over the situation. Properly protected responders will then assist any affected personnel or customers.
2. **REMAIN UPWIND OF RELEASE:** Persons evacuated from the release area should remain away and upwind from the area of the release until an assessment of the conditions has been made.
3. **ASSESS THE AMOUNT OF RELEASE:** The EC will assess the source, severity, and extent of the alarm. Monitoring equipment will be operated by trained personnel.
4. **MONITOR DOWNWIND IF $H_2S \geq 10$ PPM**: In the event a reading of 10 ppm is registered, the area will be evacuated and Facility personnel will monitor the H_2S levels along the downwind boundary of the Facility.
5. **EVACUATE AND CLOSE THE FACILITY IF $H_2S \geq 20$ PPM AT DOWNWIND BOUNDARY:** If levels reach 20 ppm at the downwind boundary, the Facility will be evacuated and closed. Evacuation procedures are enumerated the Site Evacuation Plan provided as **Figure II.3.4**. Additionally, DNCS will notify all persons within one-half mile of the fence line. (No residents are currently within one-half mile.)
6. **NOTIFICATION OF AUTHORITIES:** Notification will be provided to the New Mexico State Police, Lea County Sheriff, Lea County Emergency Management, and OCD (**Table II.3.1**). In addition, medical authorities will be contacted if needed. DNCS will also notify Phoenix Environmental (if necessary) in Hobbs (**Table II.3.1**) to provide response personnel, equipment, and supplies to mitigate the source of an H_2S reading of $\geq$10 ppm.
7. **RECORDKEEPING:** DNCS will log and report to the OCD all incidences where an H_2S reading of $\geq$10 ppm is registered at the ponds (also see Section 6.0). Records will be maintained for at least 5 years at the DNCS administrative offices.

3.2.2 Dissolved Oxygen and pH Monitoring

Dissolved oxygen and pH levels are key indicators of the efficacy of treatment and removal of H_2S during the aeration process in the evaporation ponds. The chemical reaction of H_2S and oxygen to produce sulfate as an end product is dependent upon the level of both dissolved oxygen and pH. Daily tests will be conducted and records made for each pond. If the pH falls below 8.0, remedial steps will be taken immediately to raise the pH. DNCS proposes to use

sodium hydroxide (caustic agent) to raise the pH to the optimal level of 8.2-9.0. Dissolved oxygen levels will be tested on a daily basis to ensure a residual of 0.5 ppm is maintained. The dissolved oxygen level will be taken at the beginning of each day (or at least once per 24-hour period), one foot off the bottom of each pond at various locations and recorded. If any tests show a dissolved residual oxygen level of less than 0.5 ppm, immediate steps will be under taken to oxygenate the pond and create a residual oxygen level within the pond of at least 0.5 ppm. Remedial measures may include addition of chemicals or increased aeration. The pH readings will be recorded daily on the Daily Air and Water Inspection Form (**Attachment II.3.C**).

4.0 IMPLEMENTATION, ASSESSMENT, AND NOTIFICATION

The following subsections present a series of procedures for implementation, assessment, and notification of appropriate authorities in the unlikely event that a H_2S emergency develops (19.15.11.9 NMAC).

4.1 Implementation

This H_2S Contingency Plan will be implemented when an imminent or actual emergency situation develops that represents a potential impact to fresh water, public health, safety or the environment. The circumstances that could require implementation of this Plan includes the release of H_2S gas.

Table II.3.7 lists the implementation, assessment, and notification procedures that will be followed in the event of an emergency. Assessment and notification are discussed further in Sections 4.2 and 4.3.

4.2 Assessment

In the event of a release, the EC will immediately identify the character, source, amount and extent of released materials, if possible; as well as assess the potential impact to fresh water, public health, safety or the environment. During an emergency, the EC may amend this Plan, as necessary, to protect fresh water, public health, safety or the environment (19.15.11.9.F NMAC). The EC will also assess the circumstances of an emergency situation and determine the responses required to:

- provide notifications to appropriate agencies and the general public
- implement appropriate response and recordkeeping procedures

The assessment provides the EC with critical data needed to determine whether an evacuation is necessary, whether emergency authorities should be contacted, and whether DNCS should attempt to control the release with on-site personnel and equipment. **Table II.3.8** provides OCD descriptions of "major" and "minor" releases which are applicable for assessment purposes (19.15.29.7 – 11 NMAC). This section contains additional, detailed information regarding the Site Evacuation Plan, and Section 5.0 addresses control procedures.

4.2.1 Site Evacuation Plan

Based upon the type of waste materials and treatment received at DNCS, the potential for a Facility evacuation is unlikely (19.15.11.9.B.(2)(a) NMAC). However, various circumstances could arise warranting a Facility evacuation. In an emergency situation, the EC is the individual responsible for determining when evacuation of the Facility is required. Imminent or actual dangers that constitute a situation that could require evacuation include:

- Detection of H_2S levels at ≥10 ppm (evacuate the immediate area and monitor downwind levels)
- Detection of H_2S levels at ≥20 ppm (evacuate and close the Facility)

When conditions warrant immediate evacuation (e.g., H_2S ≥20 ppm), on-site persons (e.g., Facility personnel, haulers, visitors, vendors, etc.) will be directed to proceed immediately to the Processing Area Gatehouse or the Landfill Scalehouse (as applicable) to evacuate through the main gates (**Figure II.3.4**), the primary evacuation route. DNCS Personnel will exercise good judgment and common sense in using the primary evacuation route to exit the Facility, or selecting the most appropriate alternative evacuation route, if necessary. Assembly points and primary/secondary evacuation routes are provided on **Figure II.3.4.** Driving directions to the nearest hospital are included as **Figure II.3.5**, and **Table II.3.9** provides detailed procedures for evacuating the Facility.

TABLE II.3.8
Part 29: Release Notification
DNCS Environmental Solutions

19.15.29.7 DEFINITIONS:

A. "Major release" means:

(1) an unauthorized release of a volume, excluding gases, in excess of 25 barrels;

(2) an unauthorized release of a volume that:

- **(a)** results in a fire;
- **(b)** will reach a watercourse;
- **(c)** may with reasonable probability endanger public health; or
- **(d)** results in substantial damage to property or the environment;

(3) an unauthorized release of gases in excess of 500 MCF; or

(4) a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

B. "Minor release" means an unauthorized release of a volume, greater than five barrels but not more than 25 barrels; or greater than 50 MCF but less than 500 MCF of gases.

19.15.29.8 RELEASE NOTIFICATION:

A. The person operating or controlling either the release or the location of the release shall notify the division of unauthorized release occurring during the drilling, producing, storing, disposing, injecting, transporting, servicing or processing of oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixture of the chemicals or contaminants, in accordance with the requirements of 19.15.29 NMAC.

B. The person operating or controlling either the release or the location of the release shall notify the division in accordance with 19.15.29 NMAC with respect to a release from a facility of oil or other water contaminant, in such quantity as may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

19.15.29.9 REPORTING REQUIREMENTS: The person operating or controlling either the release or the location of the release shall provide notification of releases in 19.15.29.8 NMAC as follows.

A. The person shall report a major release by giving both immediate verbal notice and timely written notice pursuant to Subsections A and B of 19.15.29.10 NMAC.

B. The person shall report a minor release by giving timely written notice pursuant to Subsection B of 19.15.29.10 NMAC.

19.15.29.10 CONTENTS OF NOTIFICATION:

A. The person operating or controlling either the release or the location of the release shall provide immediate verbal notification within 24 hours of discovery to the division district office for the area within which the release takes place. In addition, the person shall provide immediate verbal notification of a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC to the division's environmental bureau chief. The notification shall provide the information required on form C-141.

B. The person operating or controlling either the release or the location of the release shall provide timely written notification within 15 days to the division district office for the area within which the release occurs by completing and filing form C-141. In addition, the person shall provide timely written notification of a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC to the division's environmental bureau chief within 15 days after the release is discovered. The written notification shall verify the prior verbal notification and provide appropriate additions or corrections to the information contained in the prior verbal notification.

19.15.29.11 CORRECTIVE ACTION: The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.

NM 529

CATTLE GUARD
GATE

GATEHOUSE
A

PROCESSING AREA

PHASE I
PHASE III
PHASE IV

STABILIZATION AND SOLIDIFICATION AREA

B

CATTLE GUARD
GATE

CATTLE GUARD
GATE

SITE ENTRANCE
SCALEHOUSE
A

CATTLE GUARD
GATE

B

CATTLE GUARD
GATE

UNIT 1
(13.5± ACRES)

PHASE 1

UNIT 2
(19.8± ACRES)

UNIT 3
(22.2± ACRES)

UNIT 4
(23.8± ACRES)

PHASE 2

UNIT 5
(25.4± ACRES)

UNIT 6
(27.3± ACRES)

UNIT 7
(29.4± ACRES)

PHASE 3

UNIT 8
(30.7± ACRES)

UNIT 9
(41.6± ACRES)

LEGEND

- SITE BOUNDARY (562 ACRES±)
- DRAINAGE FEATURE SETBACK (67 ACRES±)
- LIMIT OF WASTE
- LANDFILL PHASE BOUNDARY
- LANDFILL UNIT BOUNDARY
- EXISTING FENCE
- PROPOSED FENCE
- PAVED ROAD AND SHOULDER (NM 529)
- PROPOSED ROAD
- GRAVEL ROAD/TRAIL
- POWER POLE
- CULVERTS
- CATTLE GUARD
- ROAD SIGN
- OBJECT
- ABANDONED WELL
- PRIMARY EVACUATION ROUTE
- SECONDARY EVACUATION ROUTE
- A — PRIMARY MEETING LOCATION
- B — SECONDARY MEETING LOCATION

NORTH

0 250' 500'

SITE EVACUATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: EVACUATION.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.3.4
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\EVACUATION.dwg
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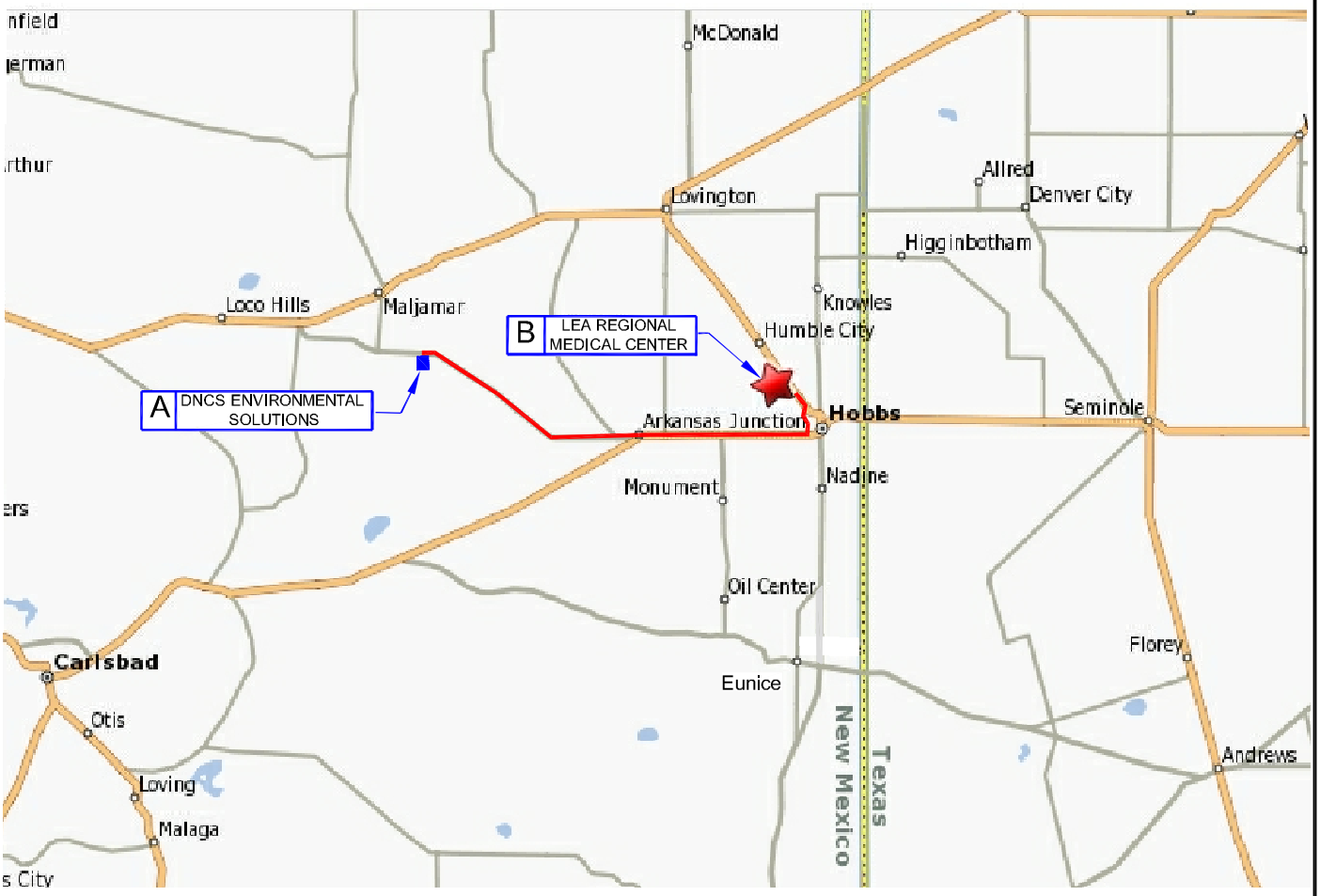

A: DNCS ENVIRONMENTAL SOLUTIONS. NM 529

1. Head EAST on NM-529 toward DOG LAKE RD.	20.2 mi
2. Turn LEFT onto US-180 E / US-62/HOBBS Hwy.	11.9 mi
3. Turn LEFT onto Co Rd 66A / NW COUNTY ROAD.	3.5 mi
4. Turn LEFT onto NM-18 N / N LOVINGTON HWY.	1.8 mi
5. Arrive 5419 N LOVINGTON HWY	0.0 mi

B: Lea Regional Medical Center, 5419 N Lovington Hwy, Hobbs, NM 88240-9100

Note: A to B Travel Estimates: 42 minutes / 37.4 miles

HOSPITAL LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 09/18/13	CAD: HOSPITAL LOCATION.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.3.5
APPROVED BY: IKG	gei@gordonenvironmental.com	

NORTH
NOT TO SCALE

Map downloaded from MAPQUEST, September 15, 2009
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TABLE II.3.9
Evacuation Procedures
DNCS Environmental Solutions

When evacuation is required, the following procedures will be followed:

1. Facility personnel will be alerted directly or using the Facility telephone, cellular telephones, or radios.
2. Vehicles delivering waste will be diverted away from the location of the emergency and routed towards the Facility exit (**Figure II.3.2**).
3. All Facility operating equipment will be shut down.
4. Personnel will be directed to proceed to the Processing Area Gatehouse or the Landfill Scalehouse (as applicable), which will be the primary meeting locations (**Figure II.3.4**). The EC will identify missing persons at that time.
5. If the emergency involves the Gatehouse or Scalehouse or its immediate environs, the Facility secondary assembly point and evacuation routes will be utilized (as applicable).
6. Once assembled, personnel will stand by to afford assistance and coordinate further actions.

4.3 Notification of Authorities and General Public

This Section provides a series of procedures for implementation and notification of appropriate authorities in the event that a specific emergency develops (19.15.11.16 NMAC). Whenever there is an imminent or actual emergency, the EC will immediately contact on-site persons (Facility personnel, visitors, vendors, haulers, etc.) via on-site communication systems, as well as notify the appropriate state and local agencies (**Table II.3.2**), as necessary. OCD will be notified within 4 hours after the Contingency Plan has been activated.

Table II.3.2 provides a list of emergency response agencies and contacts that may need to be notified depending on the type and extent of an emergency situation. **Table II.3.2** will be posted as appropriate and near on-site telephones for easy access by DNCS personnel. Fire, police, and medical authorities will be contacted, as necessary, in an emergency situation (**Table II.3.2**).

In the case of an H_2S emergency where H_2S is $\geq$10 ppm, notification will be provided to the New Mexico State Police, Lea County Sheriff, and OCD (also listed on **Table II.3.2**):

- OCD
  Hobbs, NM (575) 393-6161
  Mobile Phone (575) 370-3180
  Santa Fe, NM (505) 476-3440
- New Mexico State Police 911 or (575) 392-5580
- Lea County Sherriff's Dept. 911 or (575) 396-3611
- Lea County Emergency Management (575) 391-2983

DNCS will also notify Phoenix Environmental (if necessary) in Hobbs (**Table II.3.2**) to provide response personnel, equipment, and supplies to mitigate the source of an H_2S reading ≥10 ppm.

Table II.3.8 provides specific information regarding notification of OCD in the case of a release, which by definition includes breaks, leaks, spills, releases, fires or blowouts. In addition, **Table II.3.8** also provides OCD definitions for "major" and "minor" releases.

Additional State, Federal, and other local emergency contact numbers are provided and should be used as deemed appropriate to the situation (**Table II.3.2**). If the EC determines that the incident could threaten fresh water, human health, public safety or the environment beyond the limits of the Facility, the EC will notify the National Response Center and USEPA at the following phone numbers (also included on **Table II.3.2**):

- National Response Center - 24 Hr. Hotline: (800) 424-8802
- Region VI Emergency Response Hotline (USEPA): (214) 665-2200

The EC's notification to authorities will include the following information, as listed on the Incident Report Form (**Attachment II.3.D**):

- name and telephone number of person reporting the incident
- name and address of Facility
- time and type of incident (e.g., hazardous material release, fire)
- name and quantity of material(s) involved, to the extent known
- extent of injuries, if any
- possible hazards to human health or the environment
- other information requested by the response entity

5.0 EMERGENCY EQUIPMENT

The following sections describe emergency equipment at DNCS that will be available for responding to emergency situations. An Emergency Response Equipment List describing the equipment, quantity, location, and uses is provided as **Table II.3.10**.

TABLE II.3.10
Emergency Response Equipment List[1]
DNCS Environmental Solutions

Equipment Description	Quantity	Location	Use(s)
10 lb ABC rated fire extinguisher	2	Gatehouse/Scalehouse[2]	Firefighting
10 lb ABC rated fire extinguisher	2	Trucks	Firefighting
10 lb ABC rated fire extinguisher	1	Heavy Equipment	Firefighting
20 lb ABC rated fire extinguisher	1	Oil Process Tanks	Firefighting
20 lb ABC rated fire extinguisher	1	Oil Sales Tanks	Firefighting
20 lb ABC rated fire extinguisher	1	Produced Water Receiving Tanks	Firefighting
20 lb ABC rated fire extinguisher	1	Diesel Storage Tank	Firefighting
Loader	1	Facility	Berm Repair
Oil Booms	4	NE Corner of Pond	Oil Containment
Self-contained Breathing Apparatus	1 per employee	Gatehouse/Scalehouse[2]	Protective gear for employees
Pair leather gloves	1 per employee	Assigned to employee	Protective gear for employees
NOMEX Coveralls	7 per Employee	Assigned to Employee	Protective gear for employees
Pair safety glasses	1 per employee	All employee workstations	Protective gear for employees
Round-point wood handled shovels	2	Gatehouse/Scalehouse[2]	Contain spillage, putting out fires
First Aid Kit	1	Gatehouse/Scalehouse[2]	First Aid
First Aid Kit	1 per vehicle	Facility Vehicles	First Aid
Eye Wash Station	1	Produced Water Receiving Tanks	First Aid
Portable 2-way radio	1 per employee	Base unit at Gatehouse/Scalehouse[2]	Communications
Cell Phones	min. 3	Facility Manager Facility Operator Facility Operator	Communications
Office Phone	2	Gatehouse/Scalehouse[2]	Communications
Mobile pressure washer	1	Mobile	Decontaminating equipment

Notes:
[1]Subject to change in response to waste receipts, regulatory requirements, technology, etc.
[2]The Gatehouse is associated with the Processing Area, and the Scalehouse is associated with the Landfill.

5.1 Internal Communications

Communications at DNCS will be accomplished via cellular telephones, land lines, and two-way radios. These systems provide Facility personnel with immediate emergency notification capabilities, and the opportunity to receive instructions in the event of an emergency incident. Any mechanical difficulties with the communications equipment will be promptly repaired. Internal communication devices are also listed on **Table II.3.10.**

5.2 External Communications

The land-line telephones and cell phones located at DNCS will have outside access in the event that notification of the local emergency response authorities is required (i.e., fire department, ambulance, etc.). Key Facility personnel including the ECs, Facility Manager, etc., will carry cellular telephones for contacting outside agencies. The cellular telephones also provide a backup means for contacting emergency authorities in the event they cannot be reached by conventional telephone lines. Emergency phone numbers will be posted in the Processing Area Gatehouse and the Landfill Scalehouse and provided to employees on laminated pocket cards. External communication devices are also listed on **Table II.3.10.**

5.3 Personnel Protection, First Aid, and Safety Equipment

Personal protective equipment (PPE) necessary for responding to a potential release of hazardous materials will be maintained in on-site buildings (Processing Area Gatehouse and the Landfill Scalehouse and the Produced Water Facility) and/or issued to each employee (**Table II.3.10**). These items include Tyvek suits, gloves, safety glasses, hearing protection, self-contained breathing apparatus (SCBA), etc.

First aid and safety equipment will be maintained at strategic locations at DNCS as shown on **Table II.3.10**. Safety equipment located at the Facility includes industrial first aid kits, fire extinguishers, an eye wash station, etc. An emergency shower will be located at the Produced Water Facility. First aid kits will be placed in the Processing Area Gatehouse and the Landfill Scalehouse and the Produced Water Facility. In addition, first aid kits will be maintained in all Facility vehicles, including heavy equipment. Prominent signs will be placed identifying the location of health and safety equipment, and emergency response items (e.g., fire extinguishers).

6.0 RECORDKEEPING

The EC will be responsible for ensuring that emergency response actions are fully documented. The Primary EC may complete the documentation requirements or delegate to another EC. The Incident Report Form (**Attachment II.3.D**) illustrates the information that will be recorded as a result of any emergency incident and related response action. This form will be signed by both the EC and the Facility Manager. Copies of the form filed for each incident will be retained for OCD review as part of the Facility Operating Record.

In addition, in the case of an unauthorized release at DNCS, the OCD will be notified pursuant to 19.15.29 NMAC. As defined by OCD a "release" is any "*breaks, leaks, spills, releases, fires or blowouts involving crude oil, produced water, condensate, drilling fluids, completion fluids or other chemical or contaminant or mixture thereof, including oil field wastes and natural gases to the environment"* (19.15.2.7.R(4) NMAC). A major release (19.15.29 NMAC; **Table II.3.8**) includes an unauthorized release of any volume which may, with reasonable probability, endanger public health; or an unauthorized release of natural gases in excess of 500 thousand cubic feet (mcf); or a release of any volume which may with reasonable probability endanger public health or results in substantial damage to property or to the environment, cause detriment to water, or exceed the standards in 19.15.30 NMAC. A major release requires both immediate verbal notification (within 24 hours), as well as timely written notification to OCD (within 15 days) using OCD Form C-141 (*Release Notification and Corrective Action*). A minor release (**Table II.3.8**) is an unauthorized release of greater than 50 mcf but less than 500 mcf of natural gases. A minor release requires timely written notice. A copy of OCD Form C-141 is provided as **Attachment II.3.E**. Copies of the Form filed for each incident will be retained on-site as part of the Facility Operating Record.

7.0 COORDINATION AGREEMENTS

A copy of this Plan will be made available to the organizations identified in **Table II.3.2**. This Plan serves to familiarize each of the identified organizations with the operations of the Facility and types of emergencies and responses that may be required. Each agency will be encouraged to visit the Facility for purposes of assessing site operations, and providing input regarding emergency response procedures (19.15.11.9.B.(2)(e) NMAC).

8.0 PLAN AMENDMENT

The EC will be responsible for assuring that updates to or amendments of this Plan are conducted and recorded in the event of any of the following (19.15.11.9.F NMAC):

1. The Facility Permit is revised or modified with potential impacts on this Plan.
2. The OCD mandates it, including responses to regulatory updates.
3. The Plan fails in an emergency.

4. Modification to the Facility design, construction, operation, maintenance or other circumstances that changes the potential circumstance or locations for fires, explosion, or releases of hazardous oil field waste constituents; or related changes in the appropriate emergency response.
5. The list of ECs changes.
6. The list of emergency equipment changes significantly.

The updated Plan will be distributed to OCD and made available to the organizations identified in **Table II.3.1** with a cover letter highlighting any substantive changes. Proposed changes will be in compliance with 19.15.36 NMAC.

9.0 TRAINING

The EC or Facility training representative will ensure all new and existing employees are trained on the H_2S Prevention and Contingency Plan at least annually; or when significant changes to the Plan have been made, whichever is more frequent. Prior to any new employee commencing work, a training session separate from the standard annual training will be conducted to provide specific proficiency in H_2S safety and procedures. Training will include both classroom drills and field exercises simulating H_2S monitoring, potential releases, and evacuation procedures. Included in this training are H_2S hazards identification and detection, personal protection, and contingency procedures.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

ATTACHMENT II.3.A

MATERIAL SAFETY DATA SHEET FOR H_2S

MATERIAL SAFETY DATA SHEET

Hydrogen Sulfide

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name:	Hydrogen Sulfide
Synonyms:	H2S Sour Gas Sulfuretted Hydrogen Hepatic Gas Hydrosulfuric Acid Alliance - Hydrogen Sulfide - 1605 Ferndale - Hydrogen Sulfide - 1605 LAR - Acid Gas LAR - Sour Gas Santa Maria - Acid gas Santa Maria - Sour Gas Trainer - Hydrogen Sulfide - S173 Wood River - Hydrogen Sulfide - 100240
Intended Use:	Refinery by-product
Chemical Family:	Inorganic Gas

Responsible Party:	ConocoPhillips 600 N. Dairy Ashford Houston, Texas 77079-1175
MSDS Information:	800-762-0942 MSDS@conocophillips.com

Emergency Overview

24 Hour Emergency Telephone Numbers:
Spill, Leak, Fire or Accident Call CHEMTREC:
North America: (800) 424-9300
Others: (703) 527-3887 (collect)

California Poison Control System: (800) 356-3219

Health Hazards/Precautionary Measures: Poisonous hydrogen sulfide gas. Harmful if inhaled. Causes severe eye irritation. Use with ventilation adequate to keep exposure below recommended limits, if any. Do not breathe gas. Avoid contact with eyes. Wash thoroughly after handling.

Physical Hazards/Precautionary Measures: Flammable gas. Can cause flash fire. Keep away from heat, sparks, flames, static electricity or other sources of ignition. Do not enter storage areas or confined space unless adequately ventilated.

Appearance:	Colorless
Physical Form:	Gas
Odor:	Rotten egg (odorless at high concentrations or after prolonged exposure at low concentrations)

NFPA 704 Hazard Class:

Health:	4 (Extreme)
Flammability:	4 (Extreme)
Instability:	0 (Least)

2. COMPOSITION / INFORMATION ON INGREDIENTS

HAZARDOUS COMPONENTS					
Component / CAS No:	**Percent (%)**	**ACGIH:**	**OSHA:**	**NIOSH:**	**Other:**
Hydrogen Sulfide 7783-06-4	100	10 ppm TWA 14 mg/m^3 TWA 15 ppm STEL 21 mg/m^3 STEL	20 ppm CEIL 50 ppm 10 min. peak	100 ppm IDLH	---

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

1%=10,000 PPM.
NE=Not Established

3. HAZARDS IDENTIFICATION

Potential Health Effects

Eye: Severe eye irritant. Contact may cause stinging, watering, redness, swelling, and eye damage.

Skin: Skin contact is unlikely. No information available on skin absorption.

Inhalation (Breathing): Toxic. May be harmful if inhaled.

Ingestion (Swallowing): This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Signs and Symptoms: Effects of overexposure may include irritation of the eyes, nose, throat, and respiratory tract, blurred vision, photophobia (sensitivity to light), and pulmonary edema (fluid accumulation in the lungs). Severe exposures can result in nausea, vomiting, muscle weakness or cramps, headache, disorientation and other signs of nervous system depression, irregular heartbeats (arrhythmias), sudden collapse, respiratory failure, convulsions and death.

Cancer: There is no information available on the cancer hazard of this material.

Target Organs: No data available for this material.

Developmental: Inadequate data available for this material.

Other Comments: Hydrogen sulfide is a poisonous gas with the smell of rotten eggs. The smell disappears rapidly because of olfactory fatigue so odor may not be a reliable indicator of exposure.

Pre-Existing Medical Conditions: Conditions aggravated by exposure may include respiratory (asthma-like) disorders.

4. FIRST AID MEASURES

Eye: Immediately move victim away from exposure and into fresh air. If irritation or redness develops, flush eyes with clean water and seek immediate medical attention. For direct contact, immediately hold eyelids apart and flush the affected eye(s) with clean water for at least 20 minutes. Seek immediate medical attention.

Skin: First aid is not normally required. However, it is good practice to wash any chemical from the skin.

Inhalation (Breathing): Immediately move victim away from exposure and into fresh air. If respiratory symptoms or other symptoms of exposure develop, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): This material is a gas under normal atmospheric conditions and ingestion is unlikely.

Notes to Physician: In high doses hydrogen sulfide may produce pulmonary edema and respiratory depression or paralysis. The first priority in treatment should be the establishment of adequate ventilation and the administration of 100% oxygen. Animal studies suggest that nitrites are a useful antidote; however, documentation of the efficacy of nitrites in humans is lacking. If the diagnosis of H2S is confirmed and the patient does not respond rapidly to supportive care, the use of nitrites is an alternative treatment. For adults the dose is 10 ml of a 3% NaNO2 solution (0.5 gm NaNO2 in 15 mL water) I.V. over 2-4 minutes. Dosage should be adjusted in children or in presence of anemia. Follow blood pressure, methemoglobin levels, arterial blood gases, and electrolytes closely in serious cases.

5. FIRE-FIGHTING MEASURES

Flammable Properties:

Flash Point:	10°F / -12°C
Test Method:	Test Method Unknown
OSHA Flammability Class:	Flammable Gas
LEL%:	4.0
UEL%:	46.0
Autoignition Temperature:	500°F / 260°C

Unusual Fire & Explosion Hazards: This material is flammable and can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. Vapors are heavier than air and can accumulate in low areas. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. If container is not properly cooled, it can rupture in the heat of a fire. Closed containers exposed to extreme heat can rupture due to pressure buildup.

Extinguishing Media: Dry chemical or carbon dioxide is recommended. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces.

Fire Fighting Instructions: For fires beyond the incipient stage, emergency responders in the immediate hazard area should wear bunker gear. When the potential chemical hazard is unknown, in enclosed or confined spaces, or when explicitly required by DOT, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area, keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. If this cannot be done, allow fire to burn. Move undamaged containers from immediate hazard area if it can be done with minimal risk. Stay away from ends of container.

Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done with minimal risk.

6. ACCIDENTAL RELEASE MEASURES

Flammable. Keep all sources of ignition and hot metal surfaces away from spill/release. The use of explosion-proof electrical equipment is recommended.

Stay upwind and away from spill/release. Notify persons down wind of the spill/release, isolate danger area and keep unauthorized personnel out. Stop spill/release if it can be done with minimal risk. Wear appropriate protective equipment including respiratory protection as conditions warrant (see Section 8).

Water spray may be useful in minimizing or dispersing vapors (see Section 5).

Notify fire authorities and appropriate federal, state, and local agencies. If spill/release in excess of EPA reportable quantity (see Section 15) is made into the environment, immediately notify the National Response Center (phone number 800-424-8802).

7. HANDLING AND STORAGE

Handling: The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-704 and/or API RP 2003 for specific bonding/grounding requirements.

Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. The use of appropriate respiratory protection is advised when concentrations exceed any established exposure limits (see Sections 2 and 8).

Use good personal hygiene practices.

Storage: Keep container(s) tightly closed. In a tank, barge, or other closed container, the vapor space above materials that contain hydrogen sulfide (H2S) may result in concentrations immediately dangerous to life or health (IDLH). Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits (see Section 2), additional engineering controls may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used (see appropriate electrical codes).

Personal Protective Equipment (PPE):

Respiratory: Use a NIOSH approved self-contained breathing apparatus (SCBA) or equivalent operated in a pressure demand or other positive pressure mode in oxygen deficient environments (oxygen content <19.5%) or if exposure concentration is unknown or if conditions immediately dangerous to life or health (IDLH) exist.

A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

Skin: Not required based on the hazards of the material. However, it is considered good practice to wear gloves when handling chemicals.

Eye/Face: The use of a face shield and chemical goggles to safeguard against potential eye contact, irritation, or injury is recommended.

Other Protective Equipment: A source of clean water should be available in the work area for flushing eyes and skin. Impervious clothing should be worn as needed.

Suggestions for the use of specific protective materials are based on readily available published data. Users should check with specific manufacturers to confirm the performance of their products.

9. PHYSICAL AND CHEMICAL PROPERTIES

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm).

Appearance:	Colorless
Physical Form:	Gas
Odor:	Rotten egg (odorless at high concentrations or after prolonged exposure at low concentrations)
Odor Threshold:	0.0047 ppm
pH:	Not applicable
Vapor Pressure (mm Hg):	554.6 psia @ 100°F (38°C)
Vapor Density (air=1):	1.20
Boiling Point:	-60°F / -12°C
Melting/Freezing Point:	-86°F / -66°C
Solubility in Water:	Slight
Partition Coefficient (n-octanol/water) (Kow):	No data
Specific Gravity:	1.2 (Gas)
Heat Value (BTU):	-6552 (BTU/lb)

Percent Volatile:	100%
Evaporation Rate (nBuAc=1):	>1
Molecular Weight:	34.08
Flash Point:	10°F / -12°C
Test Method:	Test Method Unknown
LEL%:	4.0
UEL%:	46.0
Autoignition Temperature:	500°F / 260°C

10. STABILITY AND REACTIVITY

Stability: Stable under normal ambient and anticipated storage and handling conditions of temperature and pressure. Flammable gas.

Conditions to Avoid: Avoid high temperatures and all sources of ignition (see Sections 5 and 7). Toxic fumes can be released on heating.

Materials to Avoid (Incompatible Materials): Avoid contact with nitric acid, strong oxidizing agents.

Hazardous Decomposition Products: Combustion can yield sulfur oxides.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Chronic Data:

No definitive information available on carcinogenicity, mutagenicity, target organ, or developmental toxicity.

Acute Data:

Hydrogen Sulfide - CAS: 7783-06-4
Dermal LD50 = Not Applicable
LC50 = 600 ppm, 30 min. (Human)
Oral LD50 = Not Applicable

12. ECOLOGICAL INFORMATION

Not evaluated at this time.

13. DISPOSAL CONSIDERATIONS

This material, if discarded as produced or spilled to soil or water, would be a RCRA "listed" hazardous waste, as would any soils or waters contaminated by spills of the material. This material is listed as hydrogen sulfide (U135). Further, this material, once it becomes a waste, is subject to the land disposal restrictions at 40 CFR 268.40 and must be treated prior to disposal to meet specific standards. Consult state and local regulations to determine whether they are more stringent than the federal requirements.

Container contents should be completely used and containers should be emptied prior to discard. Container rinsate could be considered a RCRA hazardous waste and must be disposed of with care and in full compliance with federal, state and local regulations. Larger empty containers, such as drums, should be returned to the distributor or to a drum reconditioner. To assure proper disposal of smaller empty containers, consult with state and local regulations and disposal authorities.

14. TRANSPORTATION INFORMATION

DOT

Note: This material normally remains in plant and does not enter the public transportation system. i.e. rail, highway, air or water.

IMDG

ICAO/IATA

	LTD. QTY.	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	---	---	---
Max. Net Qty. Per Package:	---	---	---

15. REGULATORY INFORMATION

U.S. Regulations:

EPA SARA 311/312 (Title III Hazard Categories)
Acute Health: Yes
Chronic Health: No
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

SARA - Section 313 and 40 CFR 372:
This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372:
Hydrogen Sulfide.....7783-06-4.....100%

EPA (CERCLA) Reportable Quantity (in pounds):
Petroleum Exemption applies to this material.

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):
This material contains the following chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372:
Hydrogen Sulfide.....7783-06-4.....500

California Proposition 65:
Warning: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):
-- None Known --

Carcinogen Identification:
This material has not been identified as a carcinogen by NTP, IARC, or OSHA.

TSCA:
All components are listed on the TSCA inventory.

International Regulations:

Canadian Regulations:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the CPR.

Domestic Substances List: Listed
WHMIS Hazard Class:
B1 - Flammable Gases
D1A - Materials Causing Immediate and Serious Toxic Effects - Very Toxic Material
D2B - Materials Causing Other Toxic Effects - Toxic Material

16. OTHER INFORMATION

Issue Date:	13-Oct-2005
Previous Issue Date:	28-Dec-2000
Revised Sections or Basis for Revision:	Responsible party (Section 1) Added facility synonyms - SEE SECTION 1.
MSDS Code:	001909

Disclaimer of Expressed and implied Warranties:
The information presented in this Material Safety Data Sheet is based on data believed to be accurate as of the date this Material Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

ATTACHMENT II.3.B

REQUEST FOR APPROVAL TO ACCCEPT SOLID WASTE

OCD FORM C-138

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-138
Revised August 1, 2011

*Surface Waste Management Facility Operator and Generator shall maintain and make this documentation available for Division inspection.

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

1. Generator Name and Address:

2. Originating Site:

3. Location of Material (Street Address, City, State or ULSTR):

4. Source and Description of Waste:

Estimated Volume _____ yd^3 / bbls Known Volume (to be entered by the operator at the end of the haul) _____ yd^3 / bbls

5. GENERATOR CERTIFICATION STATEMENT OF WASTE STATUS

I, _____, representative or authorized agent for _____ do hereby certify that according to the Resource Conservation and Recovery Act (RCRA) and the US Environmental Protection Agency's July 1988 regulatory determination, the above described waste is: (Check the appropriate classification)

☐ RCRA Exempt: Oil field wastes generated from oil and gas exploration and production operations and are not mixed with non-exempt waste. *Operator Use Only: Waste Acceptance Frequency* ☐ *Monthly* ☐ *Weekly* ☐ *Per Load*

☐ RCRA Non-Exempt: Oil field waste which is non-hazardous that does not exceed the minimum standards for waste hazardous by characteristics established in RCRA regulations, 40 CFR 261.21-261.24, or listed hazardous waste as defined in 40 CFR, part 261, subpart D, as amended. The following documentation is attached to demonstrate the above-described waste is non-hazardous. (Check the appropriate items)

☐ MSDS Information ☐ RCRA Hazardous Waste Analysis ☐ Process Knowledge ☐ Other (Provide description in Box 4)

GENERATOR 19.15.36.15 WASTE TESTING CERTIFICATION STATEMENT FOR LANDFARMS

I, _____, representative for _____ do hereby certify that representative samples of the oil field waste have been subjected to the paint filter test and tested for chloride content and that the samples have been found to conform to the specific requirements applicable to landfarms pursuant to Section 15 of 19.15.36 NMAC. The results of the representative samples are attached to demonstrate the above-described waste conform to the requirements of Section 15 of 19.15.36 NMAC.

5. Transporter:

OCD Permitted Surface Waste Management Facility

Name and Facility Permit #:

Address of Facility:

Method of Treatment and/or Disposal:

☐ Evaporation ☐ Injection ☐ Treating Plant ☐ Landfarm ☐ Landfill ☐ Other

Waste Acceptance Status:

☐ **APPROVED** ☐ **DENIED** (Must Be Maintained As Permanent Record)

PRINT NAME: _____ TITLE: _____ DATE: _____

SIGNATURE: _____ TELEPHONE NO.: _____

Surface Waste Management Facility Authorized Agent

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

ATTACHMENT II.3.C

DAILY AIR AND WATER INSPECTION REPORT FORM H_2S MONITOR

(TYPICAL)

ATTACHMENT II.3.C
Daily Air and Water Inspection (Typical)
DNCS Environmental Solutions

YEAR_____ MONTH_____ WEEK BEGINNING_____

AMBIENT AIR WIND SPEED/DIRECTION
A.AM READINGS, NOTE INTIALS AND TIME
B.PM READINGS, NOTE INTIALS AND TIME
SUMP LEVELS
A. POND AND SLAB CHECKED DAILY,NOTE INTIALS AND TIME
B. PUMP SUMP CHECKED AM & PM,NOTE INTIALS AND TIME
C. LOADING AREA SUMP CHECKED AM & PM, NOTE INTIALS AND TIME

LOADING SUMP EMPTIED
A. LOADING AREA SUMP EMPTIED AT 4 PM, NOTE INTIALS AND TIME
CONCRETE SLAB EMPTIED
A.SLAB EMPTIED AT 4 PM, NOTE INTIALS AND TIME

Date	Sun	Mon	Tues	Wed	Thu	Fri	Sat
Ambient Air H2S (AM)							
H2S Reading (ppm)							
Wind Speed (mph)							
Wind Direction							
Initials and Time							
Ambient Air H2S (PM)							
H2S Reading (ppm)							
Wind Speed (mph)							
Wind Direction							
Initials and Time							
Sump Levels							
AM Pond Sump (ft)							
AM Cement Slab (ft)							
AM Loading Area (ft)							
AM Pump House Sump (ft)							
Intials and Time							
PM Loading Area (ft)							
PM Pump House(ft)							
Intials and Time							
Loading Sump Emptied							
Intials and Time							
Concrete Slab Emptied							
Intials and Time							
Pond Conditions							
Pond Level							
Overflow Color							
Pond Color							
Water Temperature							
pH							
Dissolved Oxygen							
Total Chlorine							
Dissolved H2S/Sulfides							
Bleach/Chemical							
Volume							
Time							
Initials							
Volume							
Time							
Initials							
Volume							
Time							
Initials							
Manager Verification							
Intials and Time							

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

ATTACHMENT II.3.D

INCIDENT REPORT FORM (TYPICAL)

INCIDENT REPORT FORM
DNCS Environmental Solutions

Lea County, NM

Type of Incident and General Information

- ❑ Work Related Injury/Illness
- ❑ Property Damage
- ❑ Vehicular Accident
- ❑ Unsafe Act/Near Miss
- ❑ Vandalism/Criminal Activity
- ❑ Other _____ (i.e., spill, release, fire, explosion, hot load, etc.)

Employee Name: _____ Job Title: _____

Phone No: _____ Date of Incident: _____ Time of Incident: _____ AM/PM

Location of Incident: _____

Start of Shift:_____ Weather:_____

Date and Time Reported to Management: Date: _____ Time: _____ AM/PM

Reported to: _____ Title: _____ Reported by: _____

What was the injury category of incident at the time it was first reported to management?

[ ] N/A. Employee does not claim an injury associated with this incident
[ ] Notice Only of Injury, Declined Medical Treatment at this time
[ ] First Aid done on site, Declined Medical Treatment at this time
[ ] Medical Treatment. Transported by _____ to _____
[ ] Fatality, employee

THIS SECTION FILLED OUT BY EMPLOYEE

Employee's Description of Incident / Declaración del empleado de los hechos

Were you injured? *(Ud. se lastimó ?)* **Yes [ ] No [ ]**

Type of Injury: *(Tipo de lesión)* _____

Part of Body: _____ Left _____ Right _____
(Parte del cuerpo) *(Izq)* *(Der)*

Explain in your own words what happened. *(Explique en sus propias palabras lo que sucedió)*

_____

_____

_____

_____

_____

Employee Signature: (*Firma del empleado*) _____

Date: (*Fecha*) _____

INCIDENT REPORT FORM
DNCS Environmental Solutions

TO BE FILLED OUT BY EMERGENCY COORDINATOR

Describe in order of occurrence the events leading to the incident and/or injury. Reconstruct the sequence of events that led to the incident. _____

_____

_____

_____

_____

Identify possible hazards to human health or the environment: _____

_____

_____

_____

_____

Identify name and quantity of material(s) involved: _____

_____

_____

_____

_____

CORRECTIVE ACTIONS. (Equipment, Practices, Environment, Retraining) Steps that have been, or will be taken to prevent recurrence: _____

_____

_____

_____

_____

Date Corrective Action Completed: _____

- I have been briefed on the corrective actions outlined above
- *Estoy consciente de las acciones correctivas mencionadas anteriormente en esta hoja*

_____
Employee's Signature

_____
Date

Report Reviewed and Concluded By:

_____
Emergency Coordinator's Signature

_____
Date

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 3: HYDROGEN SULFIDE (H_2S) PREVENTION AND CONTINGENCY PLAN

ATTACHMENT II.3.E

RELEASE NOTIFICATION AND CORRECTIVE ACTION

OCD FORM C-141

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☐ Final Report

Name of Company	Contact
Address	Telephone No.
Facility Name	Facility Type

Surface Owner	Mineral Owner	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County

Latitude_____ Longitude_____

NATURE OF RELEASE

Type of Release	Volume of Release	Volume Recovered
Source of Release	Date and Hour of Occurrence	Date and Hour of Discovery
Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☐ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

Describe Area Affected and Cleanup Action Taken.*

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature:	OIL CONSERVATION DIVISION	
Printed Name:	Approved by Environmental Specialist:	
Title:	Approval Date:	Expiration Date:
E-mail Address:	Conditions of Approval:	Attached ☐
Date: Phone:		

* Attach Additional Sheets If Necessary

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

TABLE OF CONTENTS

LIST OF FIGURES

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

LIST OF TABLES

LIST OF ATTACHMENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

1.0 INTRODUCTION

DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Purpose

The purpose of this Closure/Post-Closure (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 DNCS Facility, including a C/PC Cost Estimate sufficient to close the Facility in a manner that will protect fresh water, public health, safety and the environment.

The oil field waste processing and disposal infrastructure is anticipated to be developed and operated in four phases (Phases I-IV) over a projected multi-year time period to allow for the development of services in response to the needs of the oil and gas industry. **Table II.4.1**, DNCS Development Sequence, provides an outline of the projected phased development, including an implementation schedule for the installation of waste processing and disposal activities at the DNCS Facility. However, different combinations of these improvements may be constructed at any time dependent on market conditions and logistical considerations. This C/PC Plan may be modified by DNCS to address changes in site or operating conditions; and submitted and approved by OCD 30 days prior to implementation of proposed change. This Plan may also be amended at the request of OCD per 19.15.36.18.A.(5) NMAC.

TABLE II.4.1
DNCS Development Sequence[1]
DNCS Environmental Solutions

Description	Summary	Year No.[2]
Phase I - Initial Landfill & Produced Water Processing Operation.		
• Initial Landfill Cell (13.5-acres) • Produced water load-out points (4) • Tank farm berm (complete) • Boiler (75 HP) running a heat transfer fluid tank farm • Produced Water Receiving Tanks (4), 1,000 bbl capacity[3] • Settling Tanks (16), 1,000 bbl capacity • Crude Oil Recovery Tank (1), 1,000 bbl capacity • Oil Sale Tank (1), 1,000 bbl capacity • Mechanical Oil/Water Separation Unit • Ponds (4) capable of evaporating 3,000 bbl of liquid per day	The oil recovered from the Produced Water Processing Operations process is anticipated to be 6 bbl per day. This material will be pumped to the heated crude oil recovery tank for further processing before being pumped to the oil sale tank.	1
Phase II - Jet-Out Pit Operation.		
• Jet-Out Pit (six-station) for handling basic sediment and water (BS&W), tank bottoms, oily drilling muds and tank wash-outs • Additional crude oil recovery tank (1), 1,000 bbl capacity • Install 5-acre Stabilization and Solidification area	The oil recovered from the top of the Jet-Out Pit will be pumped to a heated Crude Oil Recovery Tank installed in the Tank Farm. Oil recovery from the Produced Water Tanks will also be plumed to this tank. Water recovered from the Pit will be pumped to the Produced Water Receiving Tanks. Sediments from the Pit will be bucket-loaded out of the pit and transferred to the Stabilization and Solidification Area for processing prior to landfilling.	2
Phase III - Expanded Produced Water Processing Operation.		
• Produced water load-out points (4) • Additional Produced Water Receiving Tanks (4), 1,000 bbl capacity • Additional Settling Tanks (16), 1,000 bbl capacity • Additional Crude Oil Recovery Tanks (3), 1,000 bbl capacity • Additional Oil Sales Tanks (2), 1,000 bbl capacity • Additional (2) Mechanical Oil/Water Separation Units • Additional ponds (4) capable of evaporating an additional 5,000 bbl per day of liquid	The additional oil recovered from the expanded Produced Water Processing Operation process, anticipated to be 6 bbl per day, will pumped to the Crude Oil Recovery tanks for further processing.	3
Phase VI - Ultimate Produced Water Processing Facility.		
• Additional Produced Water Receiving Tank (4), 1,000 bbl capacity • Additional Settling Tanks (16), 1,000 bbl capacity • Additional Oil Sales Tanks (1), 1,000 bbl capacity • Additional Mechanical Oil/Water Separation Unit • Additional ponds (4) capable of evaporating an additional 4,000 bbl per day of liquid	The additional oil recovered from the ultimate Produced Water Processing Facility will be pumped to the Crude Oil Recovery Tank for further processing.	4

Notes:

[1] The DNCS site development sequence is subject to change. Different combination of these improvements may be constructed at any time.

[2] Estimated number of years after OCD Surface Waste Management Facility Permit issued

[3] bbl = barrels of oil

1.2 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.4.1**). Site access will be provided via the south side of NM 529.

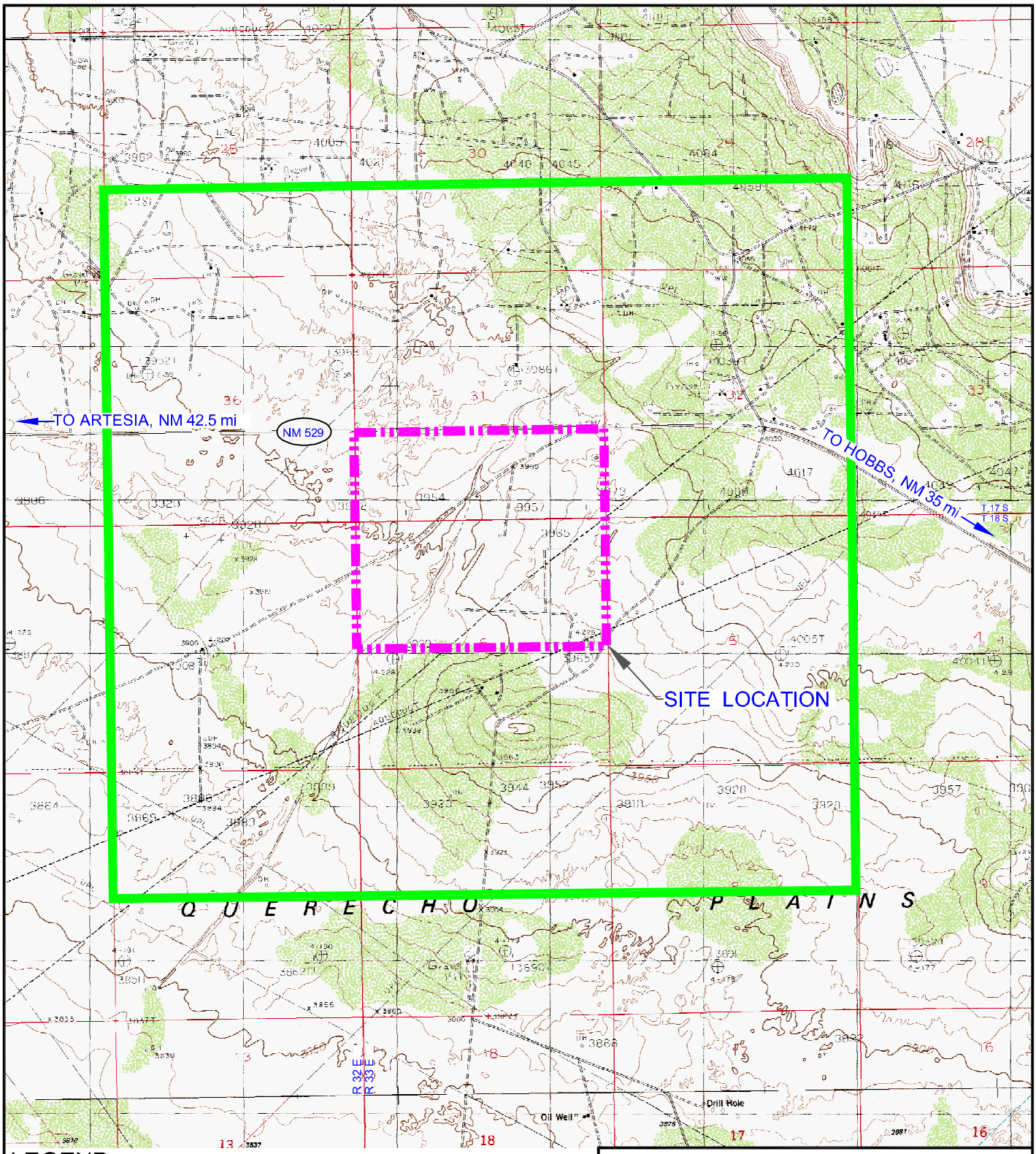
1.3 Facility Description

The DNCS Facility is a proposed new Surface Waste Management Facility that will include two main components; a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±). Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site **Permit Plans**, **Sheet 3** identifies the locations of the Processing Area and Landfill facilities.

2.0 CLOSURE PLAN

2.1 Construction Schedule

DNCS will notify OCD's Environmental Bureau at least 60 days prior to cessation of permanent operations at the DNCS Facility. Included in this notification will be a proposed schedule for closure and monitoring activities. During the 60 day period after notification, it is anticipated that DNCS will coordinate the required site inspection by OCD. During this period, DNCS and OCD will additionally review and modify part of this C/PC Plan and proposed schedule that may be required for the protection of fresh water, public health, safety, or the environment that may result from the required OCD review or site inspection(s). Should OCD not notify DNCS of modification or additions to the C/PC Plan, DNCS will commence the following closure activities at the Facility provided the Director has not extended, in good cause, the OCD's response to the closure notification, as summarized on **Table II.4.2**.



LEGEND

SITE BOUNDARY

1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 12, 2014-12:54:56 ; LAYOUT: A (P)

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.4.1
APPROVED BY: IKG	gei@gordonenvironmental.com	

TABLE II.4.2
Closure Procedures
DNCS Environmental Solutions

- Processing Area:
  - Liquids Removal
  - Evaporation Pond Liner Removal
  - Tank Removal
  - Jet Wash Facility Closure
  - Treatment Plant Disassembly
  - Site Sampling
  - Final Site Closure
- Solid Waste Disposal Area:
  - Landfill closure construction
  - Final cover
  - Vegetation
  - Landfill closure documentation
- Miscellaneous Building and Structure Removal
- Final Land Use

2.2 Liquids Removal

Produced water remaining in receiving tanks will be pumped or transported to the evaporation ponds. Once all produced water is placed into the ponds, and free floating crude oil is removed and taken to the treating plant, evaporation will be conducted with or without the aid of a mechanical evaporation system. DNCS may introduce soils when sufficient evaporation has taken place to expedite solidification. Once solidification has been completed and the waste has been tested, the material will be encapsulated at the solid waste disposal area (DNCS Landfill). Although highly unlikely, should the DNCS Landfill not be in operation at the time of closure, all remaining liquids or solids will be removed from the ponds and disposed of in an OCD-approved surface waste management facility.

2.3 Evaporation Pond Liner Removal

Upon successful liquids removal, the remaining sludge, if any, will be allowed to dry to a consistency that lends itself to management and removal (i.e., paint filter test). Although highly unlikely, should the DNCS Landfill not be in operation at the time of closure, remaining solids will be removed from the ponds and disposed of in an OCD-approved surface waste management facility as self-generated exempt waste in conformance with current operating standards.

Once the sludge has been removed, the high-density polyethylene (HDPE) liner system components will be thoroughly cleaned in accordance with 19.15.35.8 NMAC. DNCS proposes to cut the HDPE liner material and geocomposite into manageable pieces and disposal of the material in the DNCS Landfill; or to transport the material to a New Mexico Environment Department Solid Waste Bureau approved recycling or disposal facility upon approval from OCD.

2.4 Tank Removal

Upon closure, all tanks, piping and equipment will be emptied and cleaned. DNCS will dispose of the residual exempt oil field waste removed from the tanks and deposit it in the solidification area. If the DNCS Landfill is not in operation at time of closure, remaining solids will be removed and disposed of in an OCD-approved surface waste management facility capable of managing the exempt waste stream. DNCS will reuse, recycle or remove the tanks, infrastructure, and equipment from the site within 90 days of closure and notify OCD accordingly.

2.5 Jet Wash Facility

Closure of the Jet Wash Facility will consist of dismantling the above-grade installations for recycling (of clean elements) or on-site disposal. The tanks will be cleaned for re-use or recycled as scrap metal. The liner and gravel from the leak detection zone will be exhumed and disposed of on-site. If the DNCS Landfill is not in operation at time of closure, all remaining solids will be removed from the Facility and disposed of in an OCD-approved surface waste management facility following OCD procedures.

2.6 Treatment Plant

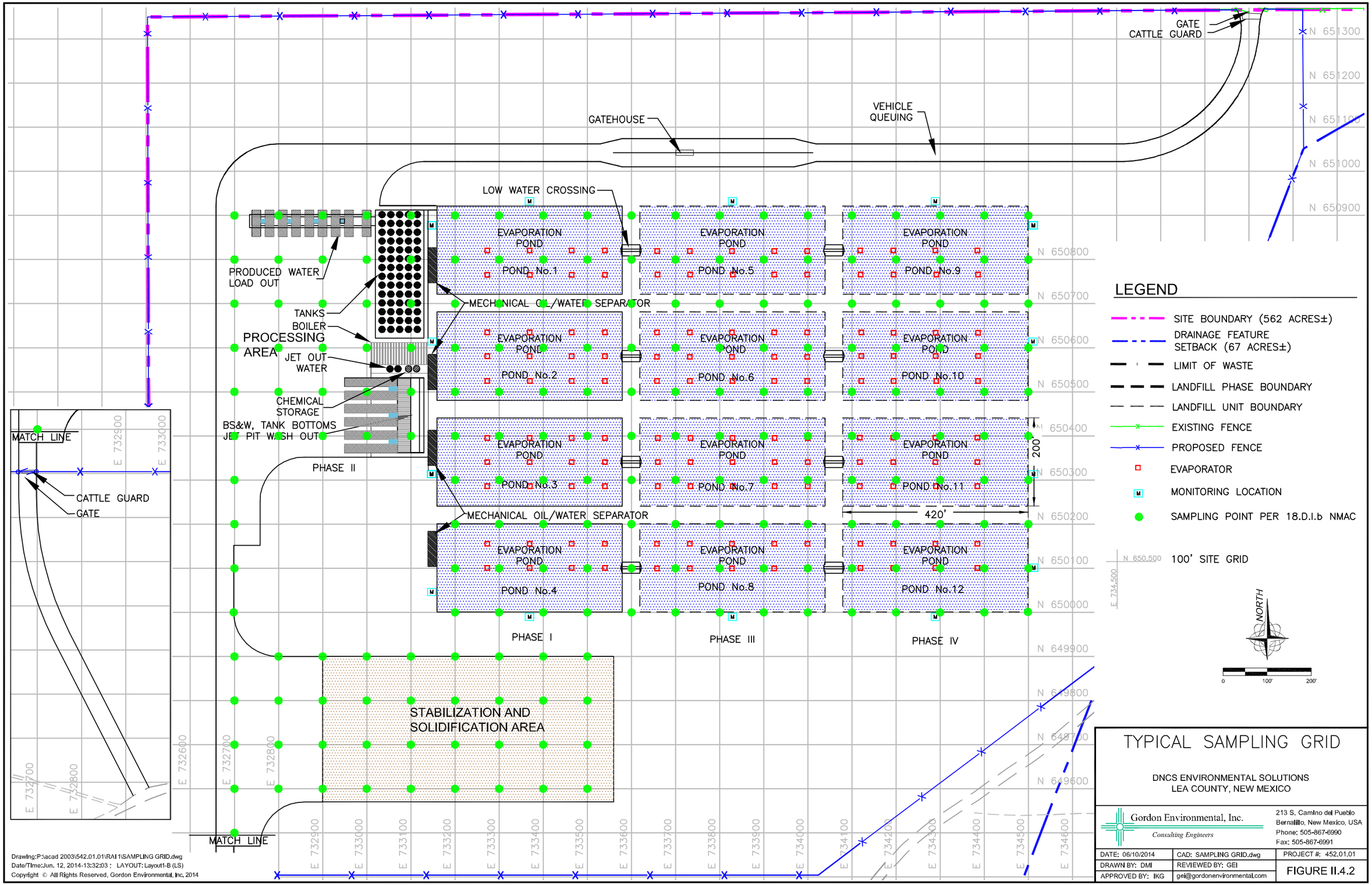
Once crude oil recovery processes have been completed, the treatment plant will be disassembled. Associated piping leading to or from the treatment plant will be removed, cleaned and recycled for reuse. Once equipment, tanks, piping, and buildings have been dismantled (if applicable) the treatment plant will be inspected for contamination. If contamination is discovered, the affected zone will be excavated and disposed of in the solid waste disposal area, and the area will be tested until confirmed to meet applicable regulatory standards. If the DNCS Landfill is not in operation at time of closure, remaining solids will be removed from the Facility and disposed of in an OCD-approved surface waste management facility following OCD disposal protocols.

2.7 Site Sampling

Once Processing Area tanks, equipment, and liners have been removed, but prior to backfilling ponds and site leveling, the site will be sampled in accordance with chapter nine of United States Environmental Protection Agency (EPA) publication SW-846; *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. A typical sampling grid is provided as **Figure II.4.2** (@ 5 tests/acres), which illustrates the proposed sampling locations for the DNCS Processing Area to document proper closure. Soil samples will be taken at select locations in the areas used for shipping and receiving, treatment and storage areas, and the evaporation ponds area. The soil samples will be taken 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. Samples will be evaluated for the following constituents:

- TPH
- BTEX
- Metals and organics listed in Water Quality Control Commission (WQCC) 20.6.2.3103.A&B

Samples will be submitted to the OCD's Environmental Bureau (Santa Fe). Provided the sample results indicate no contamination persists at the Facility in excess of allowable levels, DNCS 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.



TYPICAL SAMPLING GRID

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/10/2014	CAD: SAMPLING GRID.dwg	PROJECT #: 452.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.4.2
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\SAMPLING GRID.dwg
Date/Time:Jun. 12, 2014-13:32:03 ; LAYOUT: Layout1-B (LS)

2.8 Final Site Closure – Processing Area

Upon OCD determination that no contamination is present at DNCS at regulatory thresholds, the Processing Area will be re-graded to the intended final use. 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
- Site grading and re-contouring
- Site revegetation

Re-vegetation of the DNCS site (equal to 70% of the nature perennial vegetative cover) will be conducted during the optimum planting period, whenever possible. Examples of seed types identified and recommended by the NRCS as acceptable cover for the local and are described in **Table II.4.3.** The Closure Documentation Record (**Attachment II.4.C**), or a similar template, will be used to record the field activities specific to final site closure. A licensed New Mexico Professional Engineer, experienced in environmental engineering, will supervise closure construction and certify completion of closure activities.

2.9 Solid Waste Disposal Area

It is anticipated that the DNCS Landfill will be the final area closed at the DNCS Facility due to the need for disposal of wastes from other on-site process units under premature or routine closure conditions. Final cover will be installed within one year of achieving the final waste elevations, or an intermediate grading plan approved by OCD under early clousre. The overall final grading contours for the Landfill are provided in the **Permit Plans, Sheet 5**. The final cover proposed for the DNCS Landfill includes a prescriptive crown, and an alternative sideslope cover configuration. The prescriptive cover (crown) was designed in compliance with 19.15.36.14.C(8) NMAC, and consists of:

- a 12-inch erosion layer
- a 12-inch protection layer
- a 12-inch drainage layer ($k \geq 1 \times 10^{-2}$ cm/sec)
- 60-mil double-sided, textured, HDPE liner
- a 12-inch foundation layer

The alternative (evapotranspiration) cover for the sideslopes will consist of a 12-inch erosion layer; a 24-inch infiltration layer ($k \leq 5 \times 10^{-5}$ cm/sec); and a 12-inch intermediate cover layer as shown on **Figure II.4.3**. Based on the results provided in **Volume III.4** (HELP Model), the proposed alternative final cover for the sideslopes is proven to provide superior performance in preventing liquid migration through the cover when compared to the prescriptive cap outlined in the regulations; and the prescriptive design is not stable on sideslopes.

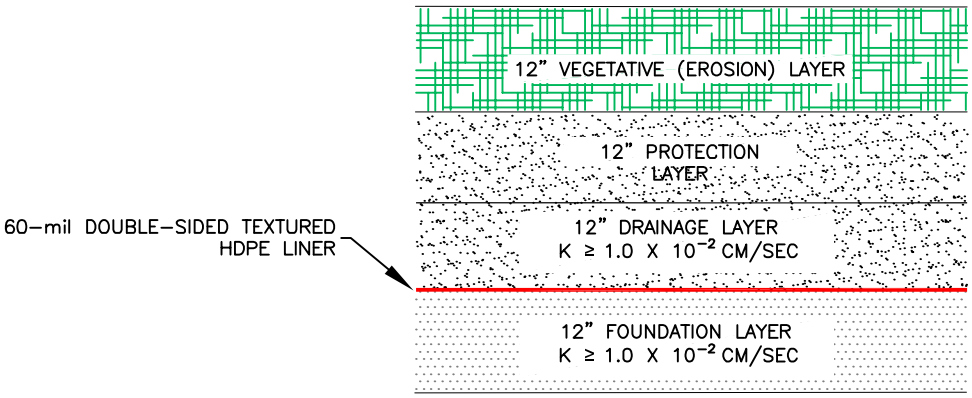
Final slopes will be constructed in accordance with the Final Grading Plan (**Permit Plans, Sheet 5**). The side slopes will be no greater that 25% (4 horizontal to 1 vertical) and the top crown will be constructed at a design grade of 5%. Details for the final cover design are shown on the **Permit Plans, Sheet 8**. 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 Natural Resource Conservation Service (NRCS) as acceptable cover for the local climate and precipitation include, but are not limited to:

TABLE II.4.3
NRCS Recommended Seed Mix
DNCS Environmental Solutions[1,2,3,4]

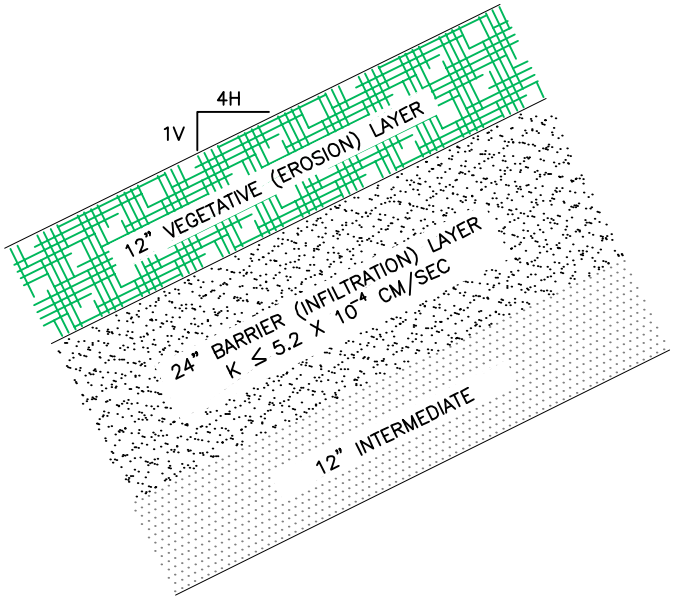
Grass Species	% of Mix	RATE (PLS/Acre)[5]	Lbs. PLS/Acre[6]
Bluegrama (Native)	40	1.5	1.2
Buffalograss (burs)	10	16	3.2
Green Sprangletop	10	1.7	0.34
Sand Dropseed	10	0.5	0.1
Sideoats (Vaughn)	20	4.5	1.8
Western Wheatgrass (Native)	10	8	1.6
Totals	**100%**	**32.2**	**8.24**

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*



FINAL COVER DETAIL CROWN
PRESCRIPTIVE DESIGN



FINAL COVER DETAIL SIDESLOPE
EVAPOTRANSPORATION DESIGN

FINAL COVER PROFILE

DNCS ENVIRONMENTAL SOLUTIONS
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: 10/22/2013	CAD: FINAL COVER.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.4.3
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\PERMIT FIGURES\FINAL COVER.dwg
Date/Time:Oct. 31, 2013-14:06:23

The Closure Documentation Record (**Attachment II.4.C**) 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, soil sampling and maintenance procedures will be submitted to OCD in the Final Closure Report. Closure construction activities will be supervised by a licensed New Mexico Professional Engineer experienced in waste facility technology, who will certify the closure.

2.10 Miscellaneous Building and Structure Removal

At this time, it is anticipated that the DNCS Facility site following closure will revert to open space or livestock grazing, Should an alternate land use be identified that could utilize the remaining structures and buildings, they will be cleaned and left in place with the exception of below-grade sumps. If not, all buildings and miscellaneous structures will be dismantled, and where practical, recycled or reused. Non-recyclable material will be disposed of in the DNCS Landfill, or other OCD-approved landfill. Once building, structures and sumps are removed, the areas will be inspected for contamination. 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. If the DNCS 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.

2.11 Final Land Use

At this time DNCS has not established a use for the Facility after closure beyond open pasture. Should a specific use be determined, DNCS 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

Landfill Area

DNCS will monitor and provide post-closure maintenance for the Landfill Facility for a period of not less than 30 years. During the post-closure care period, DNCS 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 II.4.D**). Upon successful re-vegetation efforts resulting in at least 70% coverage or other approved erosion control methods (gravel mulches, etc.), DNCS 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, vadose zone monitoring will be performed and reported on an annual basis as shown on **Attachment II.4.A.4**.

Processing Area

DNCS will conduct post-closure monitoring of the Processing Area for a period of no less than 3 years. Should deficiencies or discrepancies be discovered during the site inspections in these or other areas of the landfill, DNCS will conduct corrective measures. If there has been a documented release to the vadose zone or groundwater, DNCS will comply with the requirements of 19.15.30 and 19.15.29 NMAC.

3.2 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 II.4.A**) 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 also assumes that no contamination or remedial activities are required due to releases into the environment. The

current estimate for Phase I (**Table II.4.1**) of DNCS closure construction and post-closure operations and is provided as **Attachment II.4.A**.

This estimate will be revised accordingly as additional Phases (**Table II.4.1**) of DNCS construction and operations are implemented, or should unforeseen conditions arise, as well as annually once Phase Development is complete. Upon Division approval of the requested permit, DNCS 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.

4.2 Release of Financial Assurance

Upon successful completion of closure activities for the entire Facility, or portions of the operation (i.e., sections of the Landfill that have reached final grade; components of the process that have ceased operation); and after OCD concurrence; DNCS will request the release of 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 pits/ponds, and 30 years for the Landfill), provided there is no contamination evident and the site has established re-vegetation in accordance with the regulations, DNCS will request release from the remaining financial assurance requirements for the Facility or portions that have been successfully closed.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

ATTACHMENT II.4.A

CLOSURE/POST-CLOSURE COST ESTIMATES

ATTACHMENT II.4.A.1
PHASE I CLOSURE/POST-CLOSURE
COST ESTIMATE SUMMARY
DNCS Environmental Solutions

TASK	COST ESTIMATE
1.0 LANDFILL CLOSURE CONSTRUCTION	**$282,648**
2.0 LANDFILL MAINTENANCE	**$448,800**
3.0 ENVIRONMENTAL MONITORING	**$125,400**
4.0 POND AND PROCESSING AREA CLOSURE (see Att. II.4.A.5)	**$406,954**
5.0 PROCESSING AREA MAINTENANCE	**$62,040**
TOTAL COST ESTIMATE	**$1,325,842**

ATTACHMENT II.4.A.2
PHASE I LANDFILL CLOSURE CONSTRUCTION
CLOSURE COST ESTIMATE
DNCS Environmental Solutions Landfill (Unit 1 - 13.5 acres ±)

TASK 1.0	Unit Quantity	Unit	Unit Cost	**Total Cost**
1.1 Final Cover Installation				
1.1.1 Install and compact 24" Infiltration (Barrier) Layer	43,516	CY	$3.50	$152,308
1.1.2 Install 12" Erosion (Vegetative) Layer	21,758	CY	$2.50	$54,396
1.1.3 Vegetative Layer Seeding (Class A)	13.5	AC	$1,500.00	$20,250
			Task Subtotal	**$226,953**
1.2 Final Cover CQA				
1.2.1 Inspection and Testing	1	LS	$25,000	$25,000
1.2.2 Certification	1	LS	$5,000	$5,000
			Task Subtotal	**$30,000**
			TASK TOTALS	**$256,953**
			Independent Project Manager and Contract Administration Cost (10% of Task Totals)	$25,695
			TOTAL COST	**$282,648**

Notes:

1. Phase I 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 13.5 acres ± (Unit 1).
   - ▸ 12" of intermediate cover is already installed.
   - ▸ All soils necessary for closure are available on-site.
3. CY = Cubic Yard
   AC = Acre
   LS = Lump Sum
4. Due to the perimeter location there is no final cover "crown", and related geosyntheic layers in Unit 1.

ATTACHMENT II.4.A.3
PHASE I LANDFILL MAINTENANCE
POST-CLOSURE COST ESTIMATE
DNCS Environmental Solutions

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	$1,000	$2,000	$60,000
2.1.2 Recordkeeping and Reporting	2	events/yr	$400	$800	$24,000
			Task Subtotals	**$2,800**	**$84,000**
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 Leachate System					
2.3.1 Inspection/Repair	1	LS	$400	$400	$12,000
2.3.2 Disposal	4	events/yr	$1,000	$4,000	$120,000
			Task Subtotals	**$4,400**	**$132,000**
2.4 Surface Water Management Systems					
2.4.1 Inspection/Repairs	2	events/yr	$600	$1,200	$36,000
			Task Subtotals	**$1,200**	**$36,000**
2.5 Fencing					
2.5.1 Inspection/Repairs	2	events/yr	$600	$1,200	$36,000
			Task Subtotals	**$1,200**	**$36,000**
			TASK TOTALS	**$13,600**	**$408,000**
			Independent Project Manager and Contract Administration Cost (10% of Task Totals)	$1,360	$40,800
			TOTAL COST	**$13,600**	**$448,800**

Notes:

1. Phase I 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

ATTACHMENT II.4.A.4
PHASE I ENVIRONMENTAL MONITORING
POST-CLOSURE COST ESTIMATE
DNCS Environmental Solutions

TASK 3.0	Unit Quantity	Unit	Unit Cost	Total Cost Per Year	Total Cost
3.1 Landfill Gas Monitoring[3]					
3.1.1 Field Services/Reporting (30 years)	0	events/yr	$0	$0	$0
			Task Subtotal	**$0**	**$0**
3.2 Vadose Zone Monitoring					
3.2.1 Field Services/Lab Analysis/Reporting (30 years)	1	events/yr	$2,300	$2,300	$69,000
			Task Subtotal	**$2,300**	**$69,000**
3.3 NPDES Monitoring					
3.3.1 Field Services/Reporting (30 years)	1	LS	$1,500	$1,500	$45,000
			Task Subtotal	**$1,500**	**$45,000**
			TASK TOTALS	**$3,800**	**$114,000**
			Independent Project Manager and Contract Administration Cost (10% of Task Totals)	$380	$11,400
			TOTAL COST	**$4,180**	**$125,400**

Notes:

1. Phase I 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 no water in vadose wells (i.e., sampling and analysis costs not included).
3. Included with Task 3.2.
4. LS = Lump Sum

ATTACHMENT II.4.A.5
PHASE I POND AND PROCESSING AREA CLOSURE CONSTRUCTION
CLOSURE COST ESTIMATE
DNCS Environmental Solutions

Task 4.0	Units	Unit Cost	Total (28 acres)	
			Quantity	Cost
4.1 Evaporation Pond				
4.1.1 Liquids Transport/Disposal				
4.1.1.1 Transport Liquid	bbl	$1.75	240	$ 420
4.1.1.2 Disposal Liquids	bbl	$0.95	240	$ 228
4.1.1.3 Remove/Transport Sludge	ton	$6.50	4,840	$ 31,460
4.1.1.4 Disposal Sludge	ton	$15.00	4,840	$ 72,600
4.1.1.5 Liner Removal/Transport	yd^3	$4.00	200	$ 800
4.1.1.6 Disposal Liner	yd^3	$4.25	200	$ 850
			Task Subtotal	**$ 106,358**
4.1.2 Pond Backfill and Contouring				
4.1.2.1 Soil On-site	yd^3	$1.00	0	$ -
4.1.2.2 Place and Compact Soil	yd^3	$3.00	15,000	$ 45,000
			Task Subtotal	**$ 45,000**
4.1.3 Sampling	each	$200	300	$ 60,000
4.1.4 Seeding	acres	$1,200	28	$ 33,600
			Task Subtotal	**$ 93,600**
Pond Closure Subtotal:			**$**	**244,958**
4.2 Site Work				
4.2.1 Tank Removal	Lump Sum		$	25,000
4.2.2 Building Removal	Lump Sum		$	25,000
4.2.3 Process Equipment Removal	Lump Sum		$	25,000
4.2.4 Earthwork	Lump Sum		$	10,000
Site Work Subtotal:			**$**	**85,000**
4.3 Engineering				
4.3.1 CQA/Certification	Lump Sum		$	40,000
Engineering Subtotal:	Lump Sum		**$**	**40,000**
4.4 Totals				
4.4.1 Subtotal			$	369,958
4.4.2 Adminstration Cost (10%)			$	36,996
Total:			**$**	**406,954**

Notes:

1. Phase I closure costs are based on contracting with a qualified third party to complete and certify closure.
2. Assume 1,000 gallons of residual water in each pond transported up to 50 miles for disposal.
3. Assume 6" of sludge remaining in each pond at closure transported up to 50 miles for disposal.
4. Site Sampling is conducted during the CQA phase.

ATTACHMENT II.4.A.6
PROCESS AREA MAINTENANCE
POST-CLOSURE COST ESTIMATE
DNCS Environmental Solutions

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	$1,000	$2,000	$6,000
5.1.2 Recordkeeping and Reporting	2	events/yr	$400	$800	$2,400
			Task Subtotals	**$2,800**	**$8,400**
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	2	events/yr	$600	$1,200	$3,600
			Task Subtotals	**$1,200**	**$36,000**
			TASK TOTALS	**$8,000**	**$56,400**
			Independent Project Manager and Contract Administration Cost (@ 10%)	$800	$5,640
			TOTAL COST	**$8,000**	**$62,040**

Notes:

1. Phase I post-closure maintenance costs are based on contracting with a qualified third party to conduct post-closure care maintenance for the Processing Area. 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

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

ATTACHMENT II.4.B

FINANICAL ASSURANCE DOCUMENTATION

TO BE PROVIDED UPON PERMIT APPROVAL

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

ATTACHMENT II.4.C

CLOSURE DOCUMENTATION RECORD (TYPICAL)

ATTACHMENT II.4.C
Closure Documentation Record (Typical)
DNCS Environmental Solutions

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: _____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 4: CLOSURE/POST-CLOSURE PLAN

ATTACHMENT II.4.D

SITE INSPECTION CHECKLIST (TYPICAL)

ATTACHMENT II.4.D
Post-Closure Site Inspection Checklist (Typical)
DNCS Environmental Solutions

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: _____

_____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 5: CONTINGENCY PLAN

TABLE OF CONTENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 5: CONTINGENCY PLAN

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 5: CONTINGENCY PLAN

1.0 INTRODUCTION

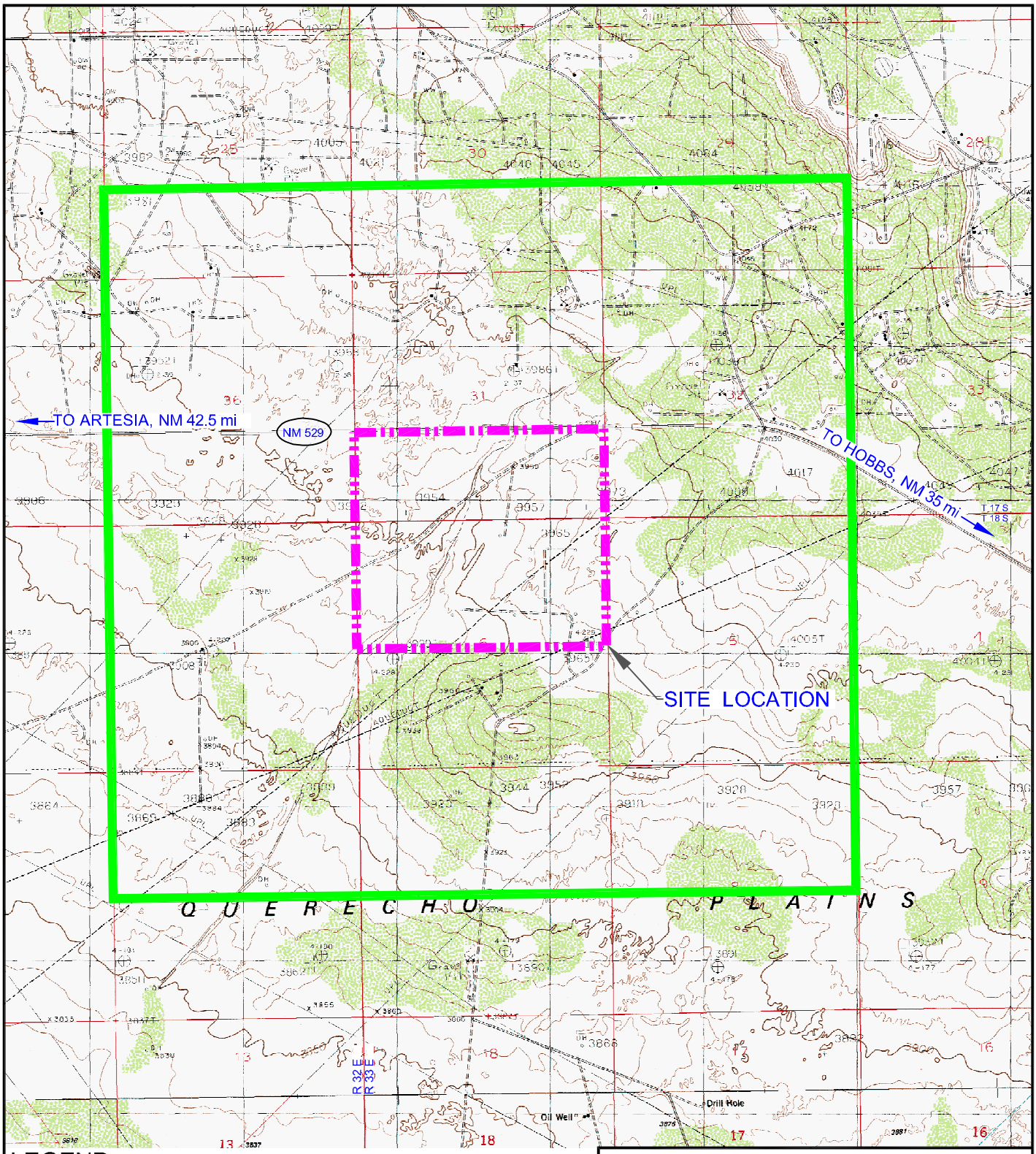
DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.5.1**). Site access will be provided via the south side of NM 529.

1.2 Facility Description

The DNCS Facility is a proposed new Surface Waste Management Facility that will include two main components; a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±). Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Plan provided as **Figure II.5.2** identifies the locations of the Processing Area and Landfill facilities. The proposed facilities are detailed in **Table II.5.1**, and are anticipated to be developed in four primary phases.



LEGEND

SITE BOUNDARY

1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

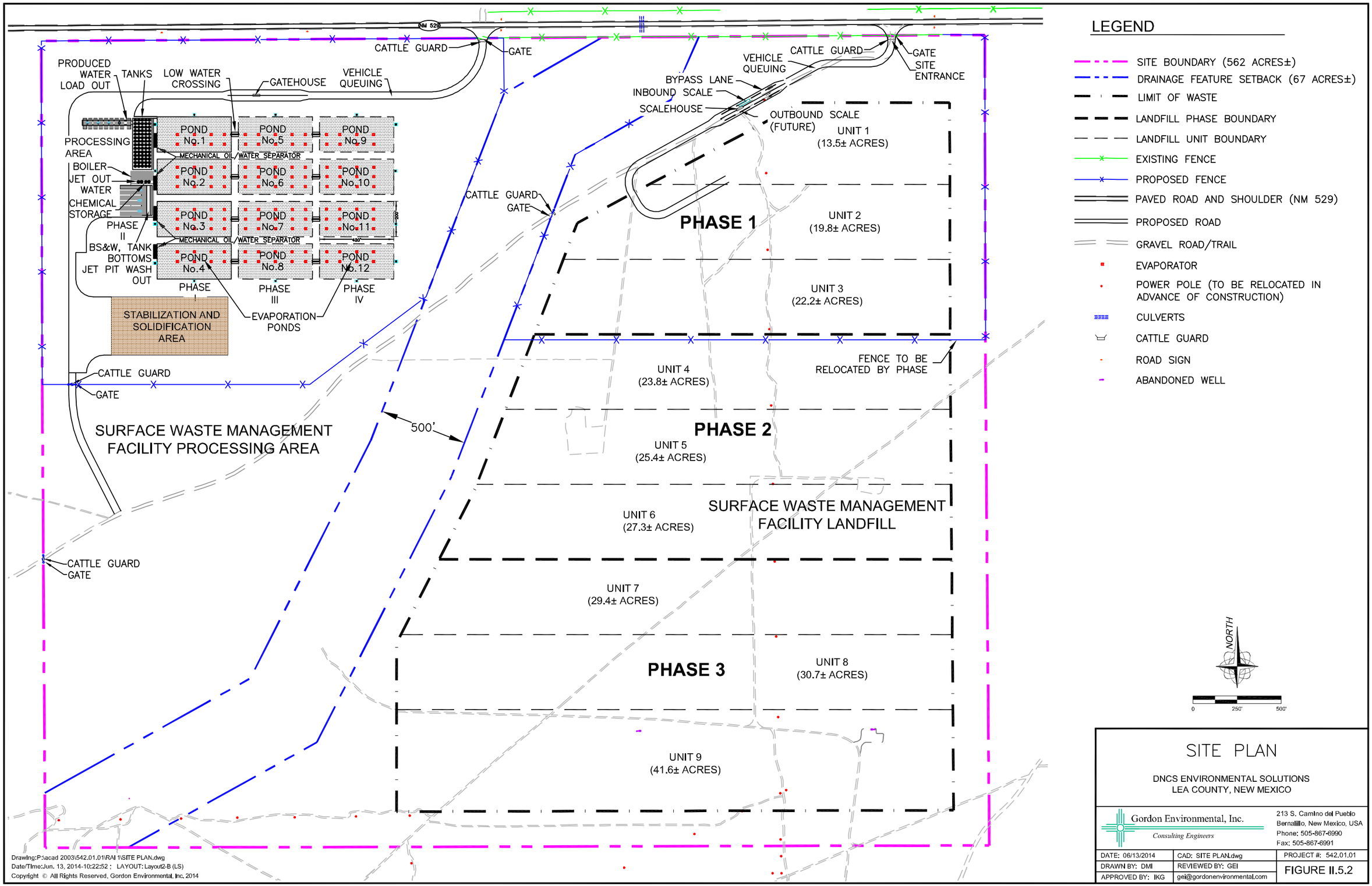
Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 12, 2014-12:51:58 ; LAYOUT: A (P)

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.5.1
APPROVED BY: IKG	gei@gordonenvironmental.com	



SITE PLAN

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: SITE PLAN.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.5.2
APPROVED BY: IKG	gei@gordonenvironmental.com	

TABLE II.5.1
Proposed Facilities[1]
DNCS Environmental Solutions

Description	No.
Oil field waste disposal landfill	1
Produced water load-out points	9
Produced water receiving tanks	12
Produced water settling tanks	48
Mechanical oil/water separator unit	4
Evaporation ponds	12
Stabilization and Solidification Area	1
Oil treatment plant	1
Crude oil receiving tanks	5
Oil sales tanks	5
Customer jet wash	1 (6 bays)

Note:
[1]Subject to change. The proposed facilities are based on projected waste types and volumes; therefore this list may be modified in response to changes in waste streams, technology, etc.

1.3 Purpose

This document has been prepared to address the requirements of 19.15.36.13.N NMAC which specify that each operator of a surface waste management facility must prepare and have available a Contingency Plan (the Plan). This Plan is designed to minimize hazards to fresh water, public health, safety or the environment from fires, explosions or an unplanned sudden or non-sudden release of contaminants or oil field waste to air, soil, surface water or ground water. Applicable provisions of this Plan will be implemented immediately whenever there is a fire, explosion or release of contaminants or oil field waste constituents that could threaten fresh water, public health, safety or the environment. This Plan is supplemented by the H_2S Prevention and Contingency Plan (**Volume II.3**), as a cross-reference.

This Plan is organized for easy reference by Facility personnel, whom will be required to read it. Copies of this Plan will be maintained in a readily accessible location at the Landfill Scalehouse and the Processing Area Gatehouse. In addition, copies of the Plan will be made available to the emergency agencies identified in **Table II.5.2**. Agencies listed on **Table II.5.2** will be invited to the site for the purposes of familiarizing themselves with the Facility and reviewing the Plan's contents with DNCS (19.15.36.13.N.(2) NMAC). As detailed in Section 10 of this Plan, whenever significant changes to the Plan are made, revised copies of the Plan will replace existing copies, and the agencies listed in **Table II.5.2** will be provided with the most recent Plan updates. Definitions specific to this Plan are provided in **Table II.5.3** as specified in 19.15.2.7 NMAC, and a more comprehensive list of definitions is included as **Table I.5** (**Volume I**).

2.0 EMERGENCY COORDINATORS

DNCS has designated specific individuals with the responsibility and authority to implement response measures in the event of an emergency which may threaten freshwater, public health, safety or the environment per 19.15.36.13.N.(3) NMAC. The Primary, Alternate, and On-site Emergency Coordinators (ECs; **Table II.5.4**) will be thoroughly familiar with aspects of this Plan; operations and activities at the DNCS Facility; location and characteristics of waste to be managed; the location of records within the Facility; and the Facility layout. **Table II.5.4** lists the names, designations, titles, and phone numbers for each EC, each of whom will be designated prior to Facility operations, as notified and updated to OCD.

The ECs are responsible for coordinating emergency response measures and have the authority to commit the resources required for implementation of this Plan. A designated EC is available to respond to emergencies 24 hours a day, 7 days a week. The DNCS employee who identifies an emergency situation will contact an EC directly or via phone. Contact will be attempted with each EC (Primary, Alternate, and the On-site) until communication is achieved (**Table II.5.4**). Upon arrival at the scene of an emergency, the first EC to arrive will assume responsibility for initiating response measures. If more than one EC responds, authority is assigned to the highest-ranking EC.

TABLE II.5.2
Emergency Response Agencies and Contacts
DNCS Environmental Solutions

Agency/Organization	Emergency Number
1. Fire	
Maljamar Fire Department	911 or (575) 676-4100
2. Police	
Lea County Sheriff's Department	911 or (575) 396-3611
New Mexico State Police	911 or (575) 392-5580
3. Medical/Ambulance	
Lea County EMS	911
Lea Regional Medical Center 5419 N. Lovington Highway Hobbs, NM 88240	(575) 492-5000
4. Response Firm	
Phoenix Environmental, LLC. 2113 N French Drive Hobbs, NM 88240	(575) 391-9685
5. OCD Emergency Response Contacts	
Oil Conservation Division 1625 N. French Drive Hobbs, NM 88240	(575) 393-6161
Mobile Phone	(575) 370-3180
Oil Conservation Division 1220 South St. Francis Drive Santa Fe, NM 87505	(505) 476-3440
6. State Emergency Response Contacts	
Environmental Emergencies 24 hr. (NMED)	(505) 827-9329
New Mexico Environment Department Solid Waste Bureau, Santa Fe	(505) 827-0197
7. Local Emergency Response Contacts	
Lea County Emergency Management	(575) 391-2983
8. Federal Emergency Response Contacts	
National Emergency Response Center (U.S. Coast Guard)	(800) 424-8802
Region VI Emergency Response Hotline (USEPA)	(214) 665-2200

TABLE II.5.3
Definitions
DNCS Environmental Solutions

Barrel: *shall mean 42 United States gallons measured at 60 degrees Fahrenheit and atmospheric pressure at the sea level*. [19.15.2.7.B.(3) NMAC]

Division: *shall mean the New Mexico energy, minerals and natural resources department, oil conservation division.* [19.15.2.7.D.(4) NMAC]

Fresh water: *(to be protected) includes the water in lakes and playas (regardless of quality, unless the water exceeds 10,000 mg/l TDS and it can be shown that degradation of the particular water body will not adversely affect hydrologically connected fresh ground water), the surface waters of streams regardless of the water quality within a given reach, and underground waters containing 10,000 mg/l or less of TDS except for which, after notice and hearing, it is found there is no present or reasonably foreseeable beneficial use that contamination of such waters would impair.* [19.15.2.7.F.(3) NMAC]

Hazard to public health:
exists when water that is used or is reasonably expected to be used in the future as a human drinking water supply exceeds at the time and place of the use, one or more of the numerical standards of Subsection A of 20.6.2.3103 NMAC, or the naturally occurring concentrations, whichever is higher, or if a toxic pollutant as defined at Subsection WW of 20.6.2.7 NMAC affecting human health is present in the water. In determining whether a release would cause a hazard to public health to exist, the director investigates and considers the purification and dilution reasonably expected to occur from the time and place of release to the time and place of withdrawal for use as human drinking water. [19.15.2.7.H.(2) NMAC]

Oil field waste:
shall mean waste generated in conjunction with the exploration for, drilling for, production of, refining of, processing of, gathering of or transportation of oil, gas or carbon dioxide;-waste generated from oil field service company operations; and waste generated from oil field remediation or abatement activity regardless of the date of release. Oil field waste does not include waste not generally associated with oil and gas industry operations such as tires, appliances or ordinary garbage or refuse unless generated at a division-regulated facility, and does not include sewage, regardless of the source. [19.15.2.7.O.(3) NMAC]

Release: *shall mean all breaks, leaks, spills, releases, fires or blowouts involving oil, produced water, condensate, drilling fluids, completion fluids or other chemical or contaminant or mixture thereof, including oil field wastes and gases to the environment.* [19.15.2.7.R.(4) NMAC]

Waste (non-hazardous):
Non-hazardous waste shall mean non-exempt oil field waste that is not hazardous waste. [19.15.2.7.W.(1) NMAC]

TABLE II.5.4
List of Emergency Coordinators
DNCS Environmental Solutions

Primary Emergency Coordinator

Name:	TBD	Work Phone:	(575) TBD
Title:	Facility Manager	Mobile Phone:	(575) TBD

Alternate Emergency Coordinator

Name:	TBD	Work Phone:	(575) TBD
Title:	Facility Operator	Mobile Phone:	(575) TBD

Onsite Emergency Coordinator

Name:	TBD	Work Phone:	(575) TBD
Title:	Facility Operator	Mobile Phone:	(575) TBD

**To be determined (TBD)*

In the rare case that an EC cannot be contacted in an emergency, the DNCS employee who identifies the situation should make every effort to follow the emergency procedures outlined in this Plan until an EC or emergency authority (local, state, or federal; **Table II.5.2**) arrives to assist or take control. The term "EC" as used throughout this Plan, references the responsible Emergency Coordinator at the scene of an emergency regardless of whether that EC is the Primary, Alternate, On-site EC, or EC designee. This Plan will be amended as described in Section 10.0, if the list of ECs changes.

3.0 PREVENTION MEASURES

3.1 Waste Inspection and Screening

RCRA-exempt oil field wastes will be accepted at the DNCS Facility. It is unlikely that defined hazardous wastes will be delivered to this Facility, and DNCS will implement a waste inspection and screening program at the Processing Area Gatehouse and Landfill Scalehouse to preclude acceptance of unauthorized wastes as described in the Oil Field Waste Management Plan (**Volume II.2**). The OCD Form C-138 (Request for Approval to Accept Solid Waste) is provided as **Attachment II.5.A**, which identifies the documentation required for each generator to certify the waste characteristics. It is possible that hazardous materials could become a concern if they arrive with other typical waste materials (19.15.36.13.N.(6) NMAC). If this occurs, the generator will be notified and the entire load will be rejected and returned for proper management. The waste inspection and screening program has been established in order to identify hazardous materials before they become a health and safety liability.

3.2 Fire Prevention and Preparedness

DNCS will implement a program of fire preventative and preparedness measures, as well as employee training. Preventive measures taken to avoid fires will include regular inspections of incoming vehicles to identify incompatible or problematic wastes, and indication of suspect loads.

A list of available emergency response equipment is provided in **Table II.5.5** in accordance with the requirements of 19.15.36.13.N.(4) NMAC. Control preparation procedures for potential fire emergencies include:

- Placement and maintenance of ABC-type fire extinguishers in structures and equipment.
- Implementation of a site-wide communication network to optimize mobilization of appropriate response personnel and equipment.
- Well established emergency response procedures, documented and posted at the Gate House and provided to each employee on a laminated pocket cards.

Employee fire prevention and preparedness training will include the following:

- Training of equipment operators to identify suspect incompatible problematic wastes loads and measures for mitigation.
- Training of site personnel in waste screening (see Section 3.1), flammables identification, etc.
- Training on fire response technique, notification procedures, fire response equipment, etc.

4.0 IMPLEMENTATION, ASSESSMENT, AND NOTIFICATION

The following subsections present a series of procedures for implementation, assessment, and notification of appropriate authorities in the unlikely event that a specific emergency develops (19.15.36.13.N.(1) NMAC).

4.1 Implementation

This Contingency Plan will be implemented when an imminent or actual emergency situation develops that represents a potential impact to freshwater, public health, safety or the environment. Situations that could require implementation of this Plan include:

TABLE II.5.5
Emergency Response Equipment List[1]
DNCS Environmental Solutions

Equipment Description	Quantity	Location	Use(s)
10 lb ABC rated fire extinguisher	2	Gatehouse/Scalehouse[2]	Firefighting
10 lb ABC rated fire extinguisher	2	Trucks	Firefighting
10 lb ABC rated fire extinguisher	1	Heavy Equipment	Firefighting
20 lb ABC rated fire extinguisher	1	Oil Process Tanks	Firefighting
20 lb ABC rated fire extinguisher	1	Oil Sales Tanks	Firefighting
20 lb ABC rated fire extinguisher	1	Produced Water Receiving Tanks	Firefighting
20 lb ABC rated fire extinguisher	1	Diesel Storage Tank	Firefighting
Loader	1	Facility	Berm Repair
Oil Booms	4	NE Corner of Pond	Oil Containment
Self-contained Breathing Apparatus	1 per employee	Gatehouse/Scalehouse[2]	Protective gear for employees
Pair leather gloves	1 per employee	Assigned to employee	Protective gear for employees
NOMEX Coveralls	7 per Employee	Assigned to Employee	Protective gear for employees
Pair safety glasses	1 per employee	All employee workstations	Protective gear for employees
Round-point wood handle shovels	2	Gatehouse/Scalehouse[2]	Contain spillage, putting out fires
First Aid Kit	1	Gatehouse/Scalehouse[2]	First Aid
First Aid Kit	1 per vehicle	Facility Vehicles	First Aid
Eye Wash Station	1	Produced Water Receiving Tanks	First Aid
Portable 2-way radio	1 per employee	Base unit at the Gatehouse/Scalehouse[2]	Communications
Cell Phones	min. 3	Facility Manager Facility Operator Facility Operator	Communications
Office Phone	2	Gatehouse/Scalehouse[2]	Communications
Mobile pressure washer	1	Mobile	Decontaminating equipment

Notes:

[1]Subject to change in response to waste receipts, regulatory requirements, technology, etc.

[2]The Gatehouse is associated with the Processing Area, and the Scalehouse is associated with the Landfill.

- fire/explosions
- release of contaminants or oil field waste constituents

Table II.5.6 lists the implementation, assessment, and notification procedures that will be followed in the case of an emergency. Assessment and notification are discussed further in subsections 4.2 and 4.3.

TABLE II.5.6
Implementation, Assessment, and Notification Procedures for Releases
(Breaks, Leaks, Spills, Releases, Fires or Blowouts)
DNCS Environmental Solutions

1. **NOTIFY THE ECs:** The employee who first becomes aware of the emergency will immediately notify the Primary EC, and the Alternate EC and On-site EC if necessary. Notification will be made in person, via telephone, or via radio. The responding EC will assume full authority over the situation.
2. **ASSESS SOURCE, AMOUNT, AND EXTENT OF RELEASE:** The EC will assess the source, amount, and extent of spill or release, or released material resulting from a fire or explosion and determine possible hazards to fresh water, public health, safety or the environment.
3. **CONTROL MEASURES OR EVACUATION:** The EC's assessment of the emergency situation will be the basis for attempting to control the release or for implementing an evacuation, as well as for notifying the appropriate state and local authorities if their assistance is needed. **Table II.5.8** provides Evacuation Procedures and a Site Evacuation Plan is provided as **Figure II.5.3** (also refer to control measures in Section 5.0).
4. **CONTAIN AND PREVENT SPREAD OF RELEASE:** If deemed safe by the EC, the appropriate DNCS response equipment and personnel will be dispatched to the scene of the release. Personnel will initiate actions within their scope of training to contain the release and prevent the spread and/or windblown dispersion of the release. Depending on the type of release, appropriate equipment may include deployment of absorbents for spills, fire extinguishers, and/or earthmoving equipment.
5. **NOTIFICATION OF EMERGENCY AUTHORITIES:** If the EC's assessment indicates a need to notify appropriate state and local emergency authorities, notification will be initiated immediately. A list of state and local response agencies with phone numbers is provided as **Table II.5.2**. OCD will be notified as necessary in accordance with **Table II.5.7** (Release Notification and Corrective Action).
6. **DIVERT TRAFFIC AND RESTRICT PERSONS FROM AREA:** DNCS personnel not actively involved in release control operations will be restricted from the area until the area is determined to be safe by the EC and, if appropriate, the on-scene senior emergency authority (i.e., fire, police, hazard or other official). Vehicular traffic will be diverted away from release response activities until the situation is abated.

4.1.1 Fires/Explosions

Potential scenarios for fires include ignition of mobile equipment while operating or during servicing, or the ignition of oil-contaminated wastes. It is also possible that a chemically incompatible material may be transported to the Facility. Personnel are trained in the identification, prevention and control of fires or explosions.

4.1.2 Spills/Releases

The spill or release of a hazardous material at DNCS is most likely to involve fuel or various vehicle maintenance materials (i.e., engine oil, hydraulic oil, antifreeze, etc.). Spills involving these types of materials could potentially occur during fueling, routine maintenance operations or during unloading or processing of waste. In addition, the possibility exists for a spill of a hazardous material that may be inadvertently transported to the Facility. Although highly unlikely, spill/releases from pond and tanks on-site are addressed in Section 5.2.

4.2 Assessment

In the event of a spill, release, fire, or explosion the EC will immediately identify the character, source, amount and extent of released materials, if possible; as well as assessing the potential impact to fresh water, public health, safety or the environment (19.15.36.13.N.(10) NMAC). During an emergency, the EC may amend this Plan as necessary to protect fresh water, public health, safety or the environment (19.15.36.13.N.(14) NMAC). The EC will also assess the circumstances of an emergency situation and determine the responses required to:

- provide notifications to appropriate agencies
- implement appropriate recordkeeping procedures

This assessment provides the EC with critical data needed to determine whether an evacuation is necessary, whether emergency authorities are needed, and whether DNCS will attempt to control the release with on-site personnel and equipment. **Table II.5.7** provides OCD descriptions of “major” and “minor” releases which are applicable for assessment purposes (19.15.29.7 – 11 NMAC). This section prescribes additional detailed information regarding the Site Evacuation Plan, and Section 5.0 addresses control restrictions.

TABLE II.5.7
Part 29: Release Notification
DNCS Environmental Solutions

19.15.29.7 DEFINITIONS:

A. "Major release" means:

(1) an unauthorized release of a volume, excluding gases, in excess of 25 barrels;

(2) an unauthorized release of a volume that:

- **(a)** results in a fire;
- **(b)** will reach a watercourse;
- **(c)** may with reasonable probability endanger public health; or
- **(d)** results in substantial damage to property or the environment;

(3) an unauthorized release of gases in excess of 500 MCF; or

(4) a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

B. "Minor release" means an unauthorized release of a volume, greater than five barrels but not more than 25 barrels; or greater than 50 MCF but less than 500 MCF of gases.

19.15.29.8 RELEASE NOTIFICATION:

A. The person operating or controlling either the release or the location of the release shall notify the division of unauthorized release occurring during the drilling, producing, storing, disposing, injecting, transporting, servicing or processing of oil, gases, produced water, condensate or oil field waste including regulated NORM, or other oil field related chemicals, contaminants or mixture of the chemicals or contaminants, in accordance with the requirements of 19.15.29 NMAC.

B. The person operating or controlling either the release or the location of the release shall notify the division in accordance with 19.15.29 NMAC with respect to a release from a facility of oil or other water contaminant, in such quantity as may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC.

19.15.29.9 REPORTING REQUIREMENTS: The person operating or controlling either the release or the location of the release shall provide notification of releases in 19.15.29.8 NMAC as follows.

A. The person shall report a major release by giving both immediate verbal notice and timely written notice pursuant to Subsections A and B of 19.15.29.10 NMAC.

B. The person shall report a minor release by giving timely written notice pursuant to Subsection B of 19.15.29.10 NMAC.

19.15.29.10 CONTENTS OF NOTIFICATION:

A. The person operating or controlling either the release or the location of the release shall provide immediate verbal notification within 24 hours of discovery to the division district office for the area within which the release takes place. In addition, the person shall provide immediate verbal notification of a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC to the division's environmental bureau chief. The notification shall provide the information required on form C-141.

B. The person operating or controlling either the release or the location of the release shall provide timely written notification within 15 days to the division district office for the area within which the release occurs by completing and filing form C-141. In addition, the person shall provide timely written notification of a release of a volume that may with reasonable probability be detrimental to water or exceed the standards in Subsections A and B or C of 19.15.30.9 NMAC to the division's environmental bureau chief within 15 days after the release is discovered. The written notification shall verify the prior verbal notification and provide appropriate additions or corrections to the information contained in the prior verbal notification.

19.15.29.11 CORRECTIVE ACTION: The responsible person shall complete division-approved corrective action for releases that endanger public health or the environment. The responsible person shall address releases in accordance with a remediation plan submitted to and approved by the division or with an abatement plan submitted in accordance with 19.15.30 NMAC.

4.2.1 Site Evacuation Plan

Based upon operational safeguards and the type of waste materials proposed for receipt at DNCS, the potential for a Facility evacuation is unlikely (19.15.36.13.N.(5) NMAC). In an emergency situation, the EC is the individual responsible for determining when evacuation of the DNCS Facility is required. Imminent or actual dangers that constitute a situation that could require evacuation include:

- A generalized fire or threat of fire that cannot be avoided.
- An explosion or the threat of explosion that cannot be averted.
- A major spill or leak that cannot be contained and constitutes a potential threat to human health or the environment.

When conditions warrant immediate evacuation of on-site persons (e.g., Facility personnel, transporters, visitors, vendors, etc.) everyone will be directed to proceed immediately to the Landfill Scalehouse or the Processing Area Gatehouse (as applicable), DNCS's primary evacuation route. DNCS Personnel will exercise good judgment and common sense in using the primary evacuation route to exit the Facility, or selecting the most appropriate alternative evacuation route, if necessary. Assembly points, primary and secondary evacuation routes are provided on **Figure II.5.3**. Driving directions to the nearest hospital are included as **Figure II.5.4**, and **Table II.5.8** provides detailed procedures for evacuating the Facility.

TABLE II.5.8
Evacuation Procedures
DNCS Environmental Solutions

When evacuation is required, the following procedures will be followed:

1. Facility personnel will be alerted directly or using the Facility telephone, cellular telephones, or radios.
2. Vehicles delivering waste will be diverted away from the location of the emergency and routed towards the Facility exit (**Figure II.3.2**).
3. Facility operating equipment will be shut down.
4. Personnel will be directed to proceed to the Processing Area Gatehouse or the Landfill Scalehouse (as applicable), which will be the primary meeting locations (**Figure II.3.4**). The EC will identify missing persons at that time.
5. If the emergency involves the Gatehouse or Scalehouse or its immediate environs, the Facility secondary assembly point and evacuation routes will be utilized (as applicable).
6. Once assembled, personnel will stand by to afford assistance, if and as needed, or to evacuate the Site.

NM 529

CATTLE GUARD
GATE

GATEHOUSE
A

PROCESSING AREA

PHASE I
PHASE III
PHASE IV

STABILIZATION AND SOLIDIFICATION AREA

B

CATTLE GUARD
GATE

CATTLE GUARD
GATE

SITE ENTRANCE
SCALEHOUSE
A

CATTLE GUARD
GATE

B

CATTLE GUARD
GATE

UNIT 1
(13.5± ACRES)

PHASE 1

UNIT 2
(19.8± ACRES)

UNIT 3
(22.2± ACRES)

UNIT 4
(23.8± ACRES)

PHASE 2

UNIT 5
(25.4± ACRES)

UNIT 6
(27.3± ACRES)

UNIT 7
(29.4± ACRES)

PHASE 3

UNIT 8
(30.7± ACRES)

UNIT 9
(41.6± ACRES)

LEGEND

- SITE BOUNDARY (562 ACRES±)
- DRAINAGE FEATURE SETBACK (67 ACRES±)
- LIMIT OF WASTE
- LANDFILL PHASE BOUNDARY
- LANDFILL UNIT BOUNDARY
- EXISTING FENCE
- PROPOSED FENCE
- PAVED ROAD AND SHOULDER (NM 529)
- PROPOSED ROAD
- GRAVEL ROAD/TRAIL
- POWER POLE
- CULVERTS
- CATTLE GUARD
- ROAD SIGN
- OBJECT
- ABANDONED WELL
- PRIMARY EVACUATION ROUTE
- SECONDARY EVACUATION ROUTE
- A — PRIMARY MEETING LOCATION
- B — SECONDARY MEETING LOCATION

NORTH

0 250' 500'

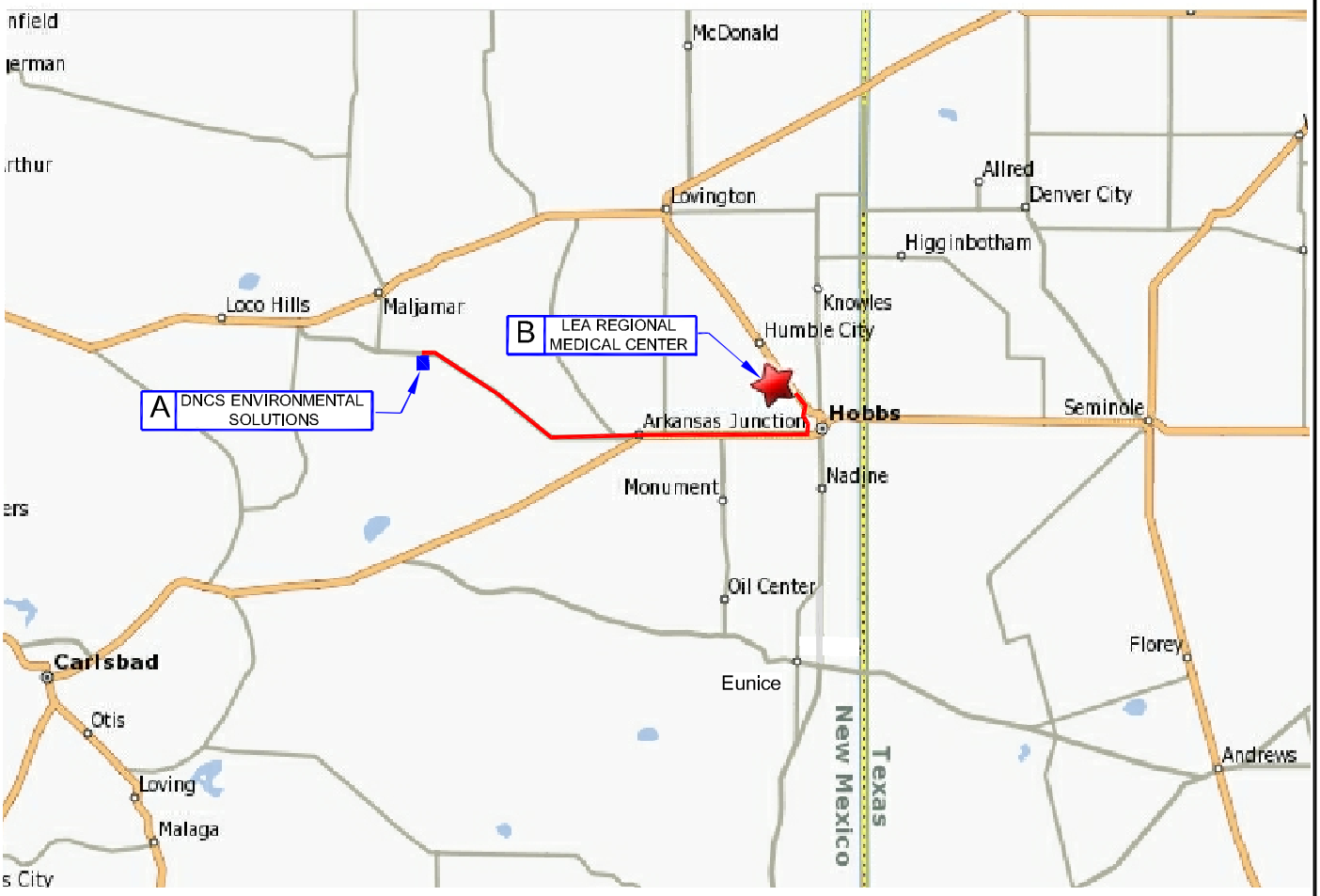
SITE EVACUATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: EVACUATION.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.5.3
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\EVACUATION.dwg
Date/Time:Jun. 13, 2014-10:36:15 ; LAYOUT: B (LS)



A: DNCS ENVIRONMENTAL SOLUTIONS. NM 529

1. Head EAST on NM-529 toward DOG LAKE RD.	20.2 mi
2. Turn LEFT onto US-180 E / US-62/HOBBS Hwy.	11.9 mi
3. Turn LEFT onto Co Rd 66A / NW COUNTY ROAD.	3.5 mi
4. Turn LEFT onto NM-18 N / N LOVINGTON HWY.	1.8 mi
5. Arrive 5419 N LOVINGTON HWY	0.0 mi

B: Lea Regional Medical Center, 5419 N Lovington Hwy, Hobbs, NM 88240-9100

Note: A to B Travel Estimates: 42 minutes / 37.4 miles

HOSPITAL LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 09/18/13	CAD: HOSPITAL LOCATION.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.5.4
APPROVED BY: IKG	gei@gordonenvironmental.com	

NORTH
NOT TO SCALE

Map downloaded from MAPQUEST, September 15, 2009
Drawing:P:\acad 2003\542.01.01\PERMIT FIGURES\HOSPITAL LOCATION.dwg
Date/Time:Sep. 19, 2013-08:39:11

4.3 Notification of Authorities

The following discussion presents a series of procedures for implementation and notification of appropriate authorities in the event that a specific emergency develops (19.15.36.13.N.(1) NMAC). Whenever there is an imminent or actual emergency, the EC will immediately notify on-site persons (Facility personnel, visitors, vendors, transporters, etc.) via on-site communication systems, as well as notify the appropriate state and local agencies as necessary (19.15.36.13.N.(9) NMAC).

Table II.5.1 provides a list of emergency response agencies and contacts that may need to be notified depending on the type and extent of an emergency situation. **Table II.5.1** will be posted as appropriate and near on-site telephones for easy access by DNCS personnel. Fire, police, and medical authorities should be contacted as necessary in an emergency situation (**Table II.5.1**). The adjacent property users should be notified if there is an immediate threat to human health and the environment in the area, such as fire, explosions or H_2S release (land currently vacant).

In the case of an H_2S emergency where $H_2S \geq 10$ ppm site personnel will follow the H_2S plan in **Volume II.3**. However**,** notification will be provided to the New Mexico State Police, Lea County Sheriff, and OCD (also listed on **Table II.5.1**):

- OCD
  Hobbs, NM (575) 393-6161
  Mobile Phone (575) 370-3180
  Santa Fe, NM (505) 476-3440
- New Mexico State Police 911 or (575) 392-5580
- Lea County Sherriff's Dept. 911 or (575) 396-3611
- Lea County Emergency Management (575) 391-2983

DNCS will also notify Phoenix Environmental if necessary (**Table II.5.2**) to provide response personnel, equipment, and supplies to mitigate the source of an H_2S reading of ≥ 10 ppm at the property boundary.

Table II.5.7 provides specific information regarding notification of OCD in the case of a release, which by definition includes breaks, leaks, spills, releases, fires or blowouts (**Table II.5.3**). In addition, **Table II.5.7** also provides OCD definitions for "major" and "minor" releases.

Additional State, Federal, and other local emergency contact numbers are provided and should be used as deemed appropriate to the situation. If the EC determines that the incident could threaten fresh water, human health, public safety or the environment beyond the limits of the DNCS Facility, the EC will notify the National Response Center and New Mexico Environment Department (NMED) spill emergencies at the following phone numbers (also included on **Table II.5.1**):

- National Response Center - 24 Hr. Hotline: (800) 424-8802
- NMED Environmental Emergencies - 24 Hr. Hotline: (505) 827-9329

The EC's notification to authorities must include the following information, as listed on the Emergency Response Record Keeping Form:

- name and telephone number of person reporting the incident
- name and address of Facility
- time and type of incident (e.g., hazardous material release, fire)
- name and quantity of material(s) involved, to the extent known
- extent of injuries, if any
- possible hazards to human health or the environment

5.0 CONTROL PROCEDURES

This section provides information for the EC and DNCS personnel regarding control procedures for different types of releases including fires, explosions, spills, and releases. The focus of the EC's initial efforts will be the protection of Facility personnel and those using the Facility. Control procedures should only be implemented by the EC and DNCS personnel once an assessment of the situation and possible hazards to fresh water, public health, safety or the environment has been completed. Persons should not attempt to contain or control fires, explosions, spills, leaks, breaks, or blowouts that are beyond the scope of their safety, training, and available response equipment. Once the appropriate state and local agencies arrive on scene, these authorities will take control of the situation, as appropriate.

The following subsections provide the EC and DNCS personnel with specific control procedures for emergency situations. Note that in the case of an H_2S emergency situation, the procedures outlined in **Volume II.3** (Hydrogen Sulfide (H_2S) Prevention and Contingency Plan) should be followed.

5.1 Fire Control Guidelines

Fire response equipment available at DNCS is identified on **Table II.5.5**. Fire control efforts will not be initiated until untrained personnel or customers are at a safe distance. The following general guidelines for fire control will be followed in the event of a fire or explosion at DNCS:

TABLE II.5.9
Fire/Explosion: Control Guidelines
DNCS Environmental Solutions

1. **INITIATE FIRE CONTROL:** The EC and DNCS personnel will initiate response actions within the scope of their training to control the spread of the fire.
2. **P.A.S.S. METHOD:** Fires will generally be controlled with ABC-type fire extinguishers using the P.A.S.S. method (Pull pin, Aim nozzle, Squeeze trigger, Sweep from side to side to extinguish).
3. **SMOTHER METHOD:** Fires may also be smothered with cover materials (i.e., soil, caliche) when possible to extinguish.
4. **AVAILABLE WATER SOURCES:** Fires may be doused or hosed with available equipment, water truck, etc.
5. **EVACUATE AND NOTIFY EMERGENCY AUTHORITIES:** If at any time the scope of the fire is beyond the capabilities of DNCS personnel to contain and/or extinguish it, the EC will contact the local Fire Department or the Lea County Emergency Management (**Table II.5.2**) for assistance. Personnel and visitors will be instructed to evacuate the area.
6. **MONITOR SITUATION:** The EC will monitor for leaks, pressure buildup, gas generation or rupture in valves, pipes or equipment as appropriate (19.15.36.13.N.(11) NMAC).
7. **RECORDKEEPING/REPORTING:** The EC will complete an Incident Report Form (**Attachment II.5.B**) and maintain a copy in the Facility Operating Record, readily accessible for OCD inspection.

After responding to the incident, the EC will meet with involved personnel and response agencies, if appropriate, to assess the cause of the emergency and document the incident. The Incident Report Form (**Attachment II.5.B**) will reflect the details of emergency and the resulting actions. The identified causative agent will be removed from the vicinity of the

Facility if the possibility of re-ignition exists. Appropriate actions to prevent recurrence of fire will be developed and implemented. Personnel involved with the handling, transport, and placement of materials at the Facility will be informed of the resultant actions. Significant changes in operating protocol or procedures resulting from this meeting will be documented and added as an amendment to the Plan (see Section 10.0).

5.2 Spills/Release Control Guidelines

The waste inspection and screening program (see Section 3.0) has been implemented in order to intercept potential unauthorized wastes inadvertently delivered to DNCS before they are unloaded at the Facility. Emergency equipment for response to such releases includes, but is not limited to, the items provided in the Emergency Response Equipment List (**Table II.5.5**). Containment/control and characterization of potential releases will be conducted only after untrained personnel are at a safe distance. At that point, the EC will then implement the following procedures for managing existing or potential release (19.15.36.13.N.(6) NMAC):

Immediately after an emergency situation, the EC will make arrangements for the segregation, storage, or disposal of recovered wastes, water, or contaminated materials resulting from the incident. An evaluation of the contamination will be carried out as soon as time permits to prevent future accidents. The Incident Report Form (**Attachment II.5.B**) will reflect the details of emergency and the resulting actions.

Although operating procedures, roadways, unloading areas, and general areas surrounding the DNCS Facility will be maintained in an effort to minimize the potential for a release or spill of hazardous materials, provisions have been developed to improve procedures if an event warrants review and modification. After responding to the incident, the EC will meet with involved personnel to determine the cause of the spill. Appropriate actions to prevent its recurrence will be developed and implemented. Personnel involved with the handling and transport of hazardous materials will be informed of the procedures/protocol that is developed in response to knowledge gained from past response procedures. Significant changes in operating protocol or procedures resulting from this meeting will be documented and added as an amendment to this Plan. Plan amendments will be documented and disseminated as outlined in Section 10.0, including OCD.

TABLE II.5.10
Spill/Release: Control Guidelines
DNCS Environmental Solutions

1. **INITIATE CONTROL:** The EC and DNCS personnel will initiate response actions within the scope of their training to control the spill/release.
2. **REMOVAL OR SEGREGATION:** Determine if the material can be safely removed to a designated waste inspection/segregation area for further evaluation. If the materials cannot be safely relocated, contain them for investigation and sampling using the spill control list. If necessary, shut down operations until safe conditions are restored.
3. **CONTAIN RELEASE:** Attempt to contain the release to the smallest area possible. Examples of equipment available for spill containment are non-reactive sorbent materials, oil booms, sand, shovels and heavy equipment. A third-party contractor is also available for emergency response to augment efforts by on-site personnel.
4. **SAMPLING:** After isolating the contaminants and contaminated media, inspect them to determine if sampling is appropriate. If appropriate, isolate contaminants in the waste inspection or segregation area, or in designated leak-proof containers, until characterization is complete.
5. **CLEANUP:** After the release has been contained and necessary samples have been obtained, cleanup will be initiated by removing the spilled materials, sorbent materials, soils used for containment, etc.
6. **EQUIPMENT MONITORING:** Pertinent liners and equipment, including valves and pipes, will be monitored for leaks, pressure buildup, gas generation or rupture as appropriate (19.15.36.13.N.(11) NMAC).
7. **VERIFICATION SAMPLING:** Dependent on the type of material spilled, the EC will assess requirements for cleanup verification including the collection of samples for appropriate analytical testing.
8. **DISPOSAL OR PROCESSING:** When visual and/or laboratory characterization is complete, determine appropriate processing or disposal procedures for that waste type. Send residuals for disposal to a Facility that is approved for managing that type of waste.
9. **EVACUATE AND NOTIFY EMERGENCY AUTHORITIES:** If at any time the scope of the spill/release is beyond the capabilities of the on-site personnel to contain and/or extinguish it, the EC will contact the local Fire Department or Lea County Emergency Management (**Table II.5.1**) for assistance. Personnel and visitors will be instructed to evacuate the area.
10. **RECORDKEEPING/REPORTING:** The EC will complete an Incident Report Form (**Attachment II.5.B**) and maintain a copy in the Facility Operating Record, readily accessible for OCD inspection.

5.3 Clean, Replace, and Inspect Equipment

Following an emergency incident, emergency response equipment used will be inspected, decontaminated/cleaned and made fit for re-use, or replaced as necessary, so that the equipment will be available when Facility operations resume. The inspection of equipment will take place before operations resume ensuring that each item is in proper working condition. This inspection will include a review of the Facility infrastructure to ensure that a potential hazard has not been created as a result of responding to the emergency. Prescribed procedures may include lock-out/tag-out on processing equipment until inspection and repairs can be completed. Remedial activities, as a result of this inspection, may include recharging of fire extinguishers, replacement of personal protective gear, restocking of disposable items, etc. The EC will verify that response equipment has been properly decontaminated and returned to its original location and is fit for future use.

6.0 STORAGE AND TREATMENT OF RELEASED MATERIALS

Spilled or otherwise contaminated material approved for disposal at the DNCS Landfill will be managed in accordance with standard operating practices. Other hazardous spilled materials will be containerized, stored and disposed of in accordance with applicable local, state and federal regulatory requirements; potentially including third-party services (i.e., Phoenix Environmental, Hobbs, NM). No oil field waste, which may be incompatible with the released material, will be treated, stored, or disposed of until cleanup procedures are complete (19.15.36.13.N.(12), (13) NMAC).

7.0 EMERGENCY EQUIPMENT

The following sections describe emergency equipment that is available at DNCS for responding to emergency situations. An Emergency Response Equipment List describing the equipment, quantity, location, and uses is provided as **Table II.5.5**.

7.1 Internal Communications

Communications at the DNCS Facility will be accomplished via cellular telephones, land lines, and two-way radios. These systems provide Facility personnel with immediate and redundant emergency notification capabilities, and the opportunity to receive instructions in the event of an emergency incident. Mechanical difficulties with the communications equipment will be promptly repaired. Internal communication devices are also listed on **Table II.5.5**.

7.2 External Communications

The telephones located at DNCS will have outside access in the event that notification of the local emergency response authorities is required (i.e., EMS, fire department, ambulance, etc.). In addition, key Facility personnel including the ECs, General Manager, etc., will carry cellular telephones for contacting each other and outside agencies. The cellular telephones will also provide a backup means for contacting emergency authorities in the event they cannot be reached by conventional telephone lines. Emergency phone numbers will be posted in the Landfill Scalehouse and the Processing Area Gatehouse and provided to employees. External communication devices are also included on **Table II.5.5**.

7.3 Fire Prevention

Portable ABC-type fire extinguishers will be located in Facility vehicles and mobile equipment, as well as within the Landfill Scalehouse and the Processing Area Gatehouse, and tanks areas. Fire extinguishers will be maintained in accordance with state and local fire codes and regulations and routinely serviced. On-site earthmoving equipment will be available to move and apply cover material for control of smoldering loads. Cover material will be readily available throughout the site.

7.4 Personnel Protection, First Aid, and Safety Equipment

Personal protective equipment (PPE) necessary for preliminary response to a release of hazardous materials will be maintained in on-site buildings (Landfill Scalehouse/Processing Area Gatehouse, etc.) and/or issued to each employee (**Table II.5.5**). These items may include Tyvek suits, gloves, safety glasses, hearing protection, etc.

First aid and safety equipment will be maintained at various locations at the DNCS Facility (**Table II.5.4**). Safety equipment located at the Facility will include industrial first aid kits, emergency shower/eye wash station, etc. First aid kits will be placed in the Landfill Scalehouse/Processing Area Gatehouse and the Produced Water Facility. An emergency shower and eye wash station will be located at the Produced Water Facility. In addition, first aid kits will be maintained in Facility vehicles, including heavy equipment. Prominent signs will be placed identifying the location of health and safety equipment, and emergency response items (e.g., fire extinguishers).

7.5 Spill Response Equipment

Spill response equipment, including heavy equipment and hand-gear, will be stored at specific locations around the Facility (**Table II.5.5**).

8.0 RECORDKEEPING

The EC will be responsible for ensuring that emergency response actions are fully documented. The Incident Report Form (**Attachment II.5.B**) illustrates the information that will be recorded as a result of emergency incident and related response action. This form will be signed by both the EC and the Facility Manager. Copies of the form filed for each incident will be retained as part of the DNCS Facility Operating Record.

In addition, in the case of an unauthorized release at the DNCS Facility, the OCD will be notified pursuant to 19.15.29 NMAC. As defined by OCD in **Table II.5.2**, a "*release*" is "*breaks, leaks, spills, releases, fires or blowouts involving crude oil, produced water, condensate, drilling fluids, completion fluids or other chemical or contaminant or mixture thereof, including oil field wastes and natural gases to the environment*" (19.15.2.7.R.(4) NMAC). A major release (19.15.29 NMAC; **Table II.5.6**) includes *an unauthorized release of a volume in excess of 25 barrels; or of any volume which results in a fire, will reach a water course, may with reasonable probability endanger public health or results in substantial damage to property or to the environment, cause detriment to water or exceed the standards in 19.15.30 NMAC*. A major release requires both immediate verbal notification (within 24 hours) as well as timely written notification to OCD (within 15 days) using OCD Form C-141

(**Attachment II.5.C**) relating to *Release Notification and Corrective Action*. A minor release (**Table II.5.6**) is an unauthorized release of greater than 5 barrels but less than 25 barrels. A minor release requires timely written notice only. A copy of OCD Form C-141 is provided as **Attachment II.5.C**. Copies of the form filed for each incident will be retained as part of the DNCS Facility Operating Record.

9.0 COORDINATION AGREEMENTS

A copy of the Contingency Plan will be made available to the organizations identified in **Table II.5.2**. The Contingency Plan serves to familiarize each of the identified organizations with the operations of the Facility and types of emergencies and responses that may be required. Each agency will be encouraged to visit the Facility for purposes of assessing site operations and providing input regarding emergency response procedures (19.15.36.13.N.(2) and (7) NMAC).

10.0 PLAN AMENDMENT

The EC will be responsible for assuring updates to or amendments of the Contingency Plan. Amendments to the Contingency Plan will be made within five working days in the event of the following (19.15.36.13.N.(8) NMAC):

1. The Facility Permit is revised or modified.
2. The Plan fails in an emergency.
3. Modification to the Facility design, construction, operation, maintenance or other circumstances that changes the potential for fires, explosion, or releases of hazardous oil field waste constituents; or related changes in the appropriate emergency response.
4. The list of ECs changes.
5. The list of emergency equipment changes significantly.

The Contingency Plan amendments will be distributed to OCD and made available to each of the organizations identified in **Table II.5.1** with a cover letter highlighting substantive changes. Proposed changes will be in compliance with 19.15.36.13.N NMAC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 5: CONTINGENCY PLAN

ATTACHMENT II.5.A

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

OCD FORM C-138

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-138
Revised August 1, 2011

*Surface Waste Management Facility Operator and Generator shall maintain and make this documentation available for Division inspection.

REQUEST FOR APPROVAL TO ACCEPT SOLID WASTE

1. Generator Name and Address:

2. Originating Site:

3. Location of Material (Street Address, City, State or ULSTR):

4. Source and Description of Waste:

Estimated Volume _____ yd^3 / bbls Known Volume (to be entered by the operator at the end of the haul) _____ yd^3 / bbls

5. GENERATOR CERTIFICATION STATEMENT OF WASTE STATUS

I, _____, representative or authorized agent for _____ do hereby certify that according to the Resource Conservation and Recovery Act (RCRA) and the US Environmental Protection Agency's July 1988 regulatory determination, the above described waste is: (Check the appropriate classification)

☐ RCRA Exempt: Oil field wastes generated from oil and gas exploration and production operations and are not mixed with non-exempt waste. *Operator Use Only: Waste Acceptance Frequency* ☐ *Monthly* ☐ *Weekly* ☐ *Per Load*

☐ RCRA Non-Exempt: Oil field waste which is non-hazardous that does not exceed the minimum standards for waste hazardous by characteristics established in RCRA regulations, 40 CFR 261.21-261.24, or listed hazardous waste as defined in 40 CFR, part 261, subpart D, as amended. The following documentation is attached to demonstrate the above-described waste is non-hazardous. (Check the appropriate items)

☐ MSDS Information ☐ RCRA Hazardous Waste Analysis ☐ Process Knowledge ☐ Other (Provide description in Box 4)

GENERATOR 19.15.36.15 WASTE TESTING CERTIFICATION STATEMENT FOR LANDFARMS

I, _____, representative for _____ do hereby certify that representative samples of the oil field waste have been subjected to the paint filter test and tested for chloride content and that the samples have been found to conform to the specific requirements applicable to landfarms pursuant to Section 15 of 19.15.36 NMAC. The results of the representative samples are attached to demonstrate the above-described waste conform to the requirements of Section 15 of 19.15.36 NMAC.

5. Transporter:

OCD Permitted Surface Waste Management Facility

Name and Facility Permit #:

Address of Facility:

Method of Treatment and/or Disposal:

☐ Evaporation ☐ Injection ☐ Treating Plant ☐ Landfarm ☐ Landfill ☐ Other

Waste Acceptance Status:

☐ **APPROVED** ☐ **DENIED** (Must Be Maintained As Permanent Record)

PRINT NAME: _____ TITLE: _____ DATE: _____

SIGNATURE: _____ TELEPHONE NO.: _____

Surface Waste Management Facility Authorized Agent

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 5: CONTINGENCY PLAN

ATTACHMENT II.5.B

INCIDENT REPORT FORM (TYPICAL)

INCIDENT REPORT FORM
DNCS Environmental Solutions

Lea County, NM

Type of Incident and General Information

- ❑ Work Related Injury/Illness
- ❑ Property Damage
- ❑ Vehicular Accident
- ❑ Unsafe Act/Near Miss
- ❑ Vandalism/Criminal Activity
- ❑ Other _____ (i.e., spill, release, fire, explosion, hot load, etc.)

Employee Name: _____ Job Title: _____

Phone No: _____ Date of Incident: _____ Time of Incident: _____ AM/PM

Location of Incident: _____

Start of Shift:_____ Weather:_____

Date and Time Reported to Management: Date: _____ Time: _____ AM/PM

Reported to: _____ Title: _____ Reported by: _____

What was the injury category of incident at the time it was first reported to management?

[ ] N/A. Employee does not claim an injury associated with this incident
[ ] Notice Only of Injury, Declined Medical Treatment at this time
[ ] First Aid done on site, Declined Medical Treatment at this time
[ ] Medical Treatment. Transported by _____ to _____
[ ] Fatality, employee

THIS SECTION FILLED OUT BY EMPLOYEE

Employee's Description of Incident / Declaración del empleado de los hechos

Were you injured? *(Ud. se lastimó ?)* **Yes [ ] No [ ]**

Type of Injury: *(Tipo de lesión)* _____

Part of Body: _____ Left _____ Right _____
(Parte del cuerpo) *(Izq)* *(Der)*

Explain in your own words what happened. *(Explique en sus propias palabras lo que sucedió)*

_____

_____

_____

_____

_____

Employee Signature: (*Firma del empleado*) _____

Date: (*Fecha*) _____

INCIDENT REPORT FORM
DNCS Environmental Solutions

TO BE FILLED OUT BY EMERGENCY COORDINATOR

Describe in order of occurrence the events leading to the incident and/or injury. Reconstruct the sequence of events that led to the incident. _____

_____

_____

_____

_____

Identify possible hazards to human health or the environment: _____

_____

_____

_____

_____

Identify name and quantity of material(s) involved: _____

_____

_____

_____

_____

CORRECTIVE ACTIONS. (Equipment, Practices, Environment, Retraining) Steps that have been, or will be taken to prevent recurrence: _____

_____

_____

_____

_____

Date Corrective Action Completed: _____

- I have been briefed on the corrective actions outlined above
- *Estoy consciente de las acciones correctivas mencionadas anteriormente en esta hoja*

_____
Employee's Signature

_____
Date

Report Reviewed and Concluded By:

_____
Emergency Coordinator's Signature

_____
Date

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 5: CONTINGENCY PLAN

ATTACHMENT II.5.C

RELEASE NOTIFICATION AND CORRECTIVE ACTION

OCD FORM C-141

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-141
Revised August 8, 2011

Submit 1 Copy to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☐ Initial Report ☐ Final Report

Name of Company	Contact
Address	Telephone No.
Facility Name	Facility Type

Surface Owner	Mineral Owner	API No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County

Latitude_____ Longitude_____

NATURE OF RELEASE

Type of Release	Volume of Release	Volume Recovered
Source of Release	Date and Hour of Occurrence	Date and Hour of Discovery
Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☐ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*

Describe Area Affected and Cleanup Action Taken.*

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature:	OIL CONSERVATION DIVISION	
Printed Name:	Approved by Environmental Specialist:	
Title:	Approval Date:	Expiration Date:
E-mail Address:	Conditions of Approval:	Attached ☐
Date: Phone:		

* Attach Additional Sheets If Necessary

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 6: MIGRATORY BIRD PROTECTON PLAN

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF Tables

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 6: MIGRATORY BIRD PROTECTON PLAN

1.0 INTRODUCTION

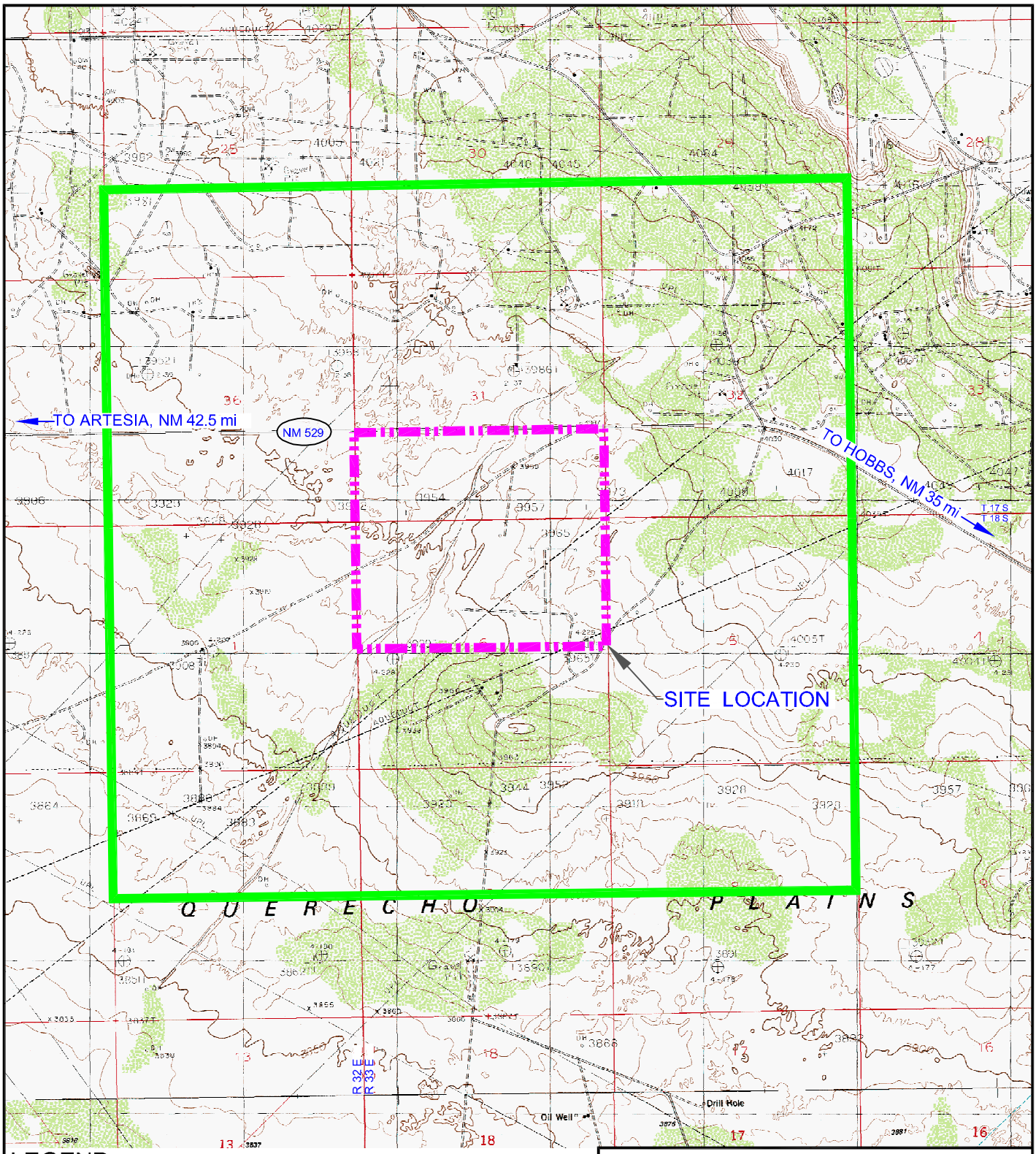
DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC. DNCS will coordinate with USEPA Region 6 regarding this Plan if so directed by OCD.

1.1 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.6.1**). Site access will be provided via the south side of NM 529.

1.2 Description

The DNCS Facility is a proposed new Surface Waste Management Facility that will include two main components; a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±). Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Development Plan provided in the **Permit Plans, Sheet 3** identifies the locations of the Processing Area and Landfill facilities.



LEGEND

SITE BOUNDARY

1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 12, 2014-12:53:00 ; LAYOUT: A (P)

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.6.1
APPROVED BY: IKG	gei@gordonenvironmental.com	

1.3 Purpose

This Migratory Bird Protection Plan (the Plan) for the DNCS Facility has been prepared in accordance with requirements of 19.15.36.13.I and 19.15.36.17.C.(3) NMAC. This Plan describes the procedures for migratory bird protection at DNCS. DNCS is not proposing to install screening, netting or covering over the evaporation ponds. Instead, DNCS is proposing alternate procedures that have proven historically effective in discouraging bird propagation; and which fulfill the requirements of 19.15.36.13.I and 19.15.36.17.C.(3) NMAC for equal protection of migratory birds.

This Plan may be modified by DNCS to address changes in site conditions following OCD review and approval of the proposed change. This Plan may also be amended at the request of OCD should conditions warrant.

2.0 MIGRATORY BIRD PREVENTION

2.1 Siting Perspective

DNCS proposes an exception to the screening/netting requirements of 19.15.36.17.C.(3) NMAC, although DNCS plans to meet the requirements of this Rule through an alternative monitoring method described herein. Additionally, DNCS does not anticipate that the ponds will be potentially hazardous to migrating birds as oil will be removed from the water prior to discharge into ponds. There is a significant absence of habitat for migratory birds congregating around, or landing in, the vicinity of the DNCS Facility. This is due primarily to the lack of a food source at the Facility that limits avian sustainability, and the lack of other nearby suitable habitat. In addition, as documented in Volume IV.1 (Siting Criteria), no evidence of wetlands are documented at the site.

2.2 Human and Mechanical Intervention

DNCS Processing Area operations, as proposed in this Application, have been designed to eliminate oil from accumulation on the evaporation ponds. This will be accomplished utilizing tanks and equipment that separate the oil from the water prior to discharge into the evaporation ponds. The anticipated absence of oil in the evaporation ponds eliminates the concerns typically associated with migratory birds being endangered if they land on the evaporation ponds. In the

unlikely event that oil is found on an evaporation pond, the following actions will be implemented. Operations at the Processing Area Facility will be manned by at least two employees 24 hours per day. During the occurrence the Facility Manager, operators and employees will conduct periodic (every fifteen minutes) inspection rounds making note of any migratory bird activity in or surrounding the evaporation ponds. Should migratory bird activity be discovered at the Facility, inspection and scare tactic frequency will be increased to alleviate the roosting of the birds.

In order to prevent oil sheen accumulation on the surface of the ponds (19.15.36.17.C.(1) NMAC), Facility personnel will work continually throughout each day to ensure the Produced Water Settling Tanks are functioning properly, removing the oil from the water prior to discharging to the evaporation ponds. If oil is observed on the evaporation ponds, effort will be made to remove the visible oil layer from the evaporation ponds immediately. This will be accomplished by using booms to bring the oil sheen to the banks of the ponds where the oil will be removed by vacuum trucks and returned to the Produced Water Receiving Tanks.

Operations will not lend the Facility to migratory bird congregation, with proposed operations 24 hours per day, 7 days per week, and 365 days per year. During this time, the mechanical evaporation systems will be in full operation, truck traffic will be consistently entering and leaving the Facility, and pumps will be transferring waters to and from the evaporation ponds. General activities at the site will involve human and truck motion, a natural deterrent to wildlife.

3.0 MIGRATORY BIRD LANDING CONTINGENCY

3.1 Migratory Bird Rescue

In the unlikely event that a bird lands on a pond and becomes contaminated, Facility employees will immediately utilize a boat and side ropes to retrieve the bird. Upon retrieval, Facility employees will transport the bird to a local veterinary clinic for treatment. Bird rescue procedures adapted from those of the International Bird Rescue Research Center are provided in **Table II.6.1**.

TABLE II.6.1
Bird Rescue Protocol
DNCS Environmental Solutions

a. The bird's entire body is immersed in a one percent solution of Dawn and warm water (warm enough to approximate the bird's internal body temperature. Once wet, the bird is unable to thermo regulate) by one person while a second vigorously agitates the water into the bird's feathers.
b. A WaterPik® filled with the same solution is used to clean the head.
c. A soft toothbrush and cotton swabs are used to loosen dried oil around the head and eye area.
d. When the water becomes dirty, the bird is moved to a second pan. The washing process is repeated as often as necessary.
e. The bird is considered clean when the tub of water is clear and free of oil.
f. The bird is moved to another pan of clean warm water for rinsing.
g. A WaterPik filled with the warm water is used to clean the head.
h. When the water becomes soapy, the bird is moved to a second pan. The rinsing process is repeated as often as necessary to remove the remaining soap.
i. The bird is considered rinsed when no soap is visible in a fresh pan of water.
j. After wash and rinse, the cleaned bird is placed in a protective net-bottomed pen. As it rests, the bird will begin to preen its own feathers back into place. The complete realignment of feathers in a tight overlapping pattern creates a waterproof seal.
k. The bird is fed a nutritious food mixture to assure proper nourishment, plenty of fluids, as well as vitamins and medications, and is allowed free access to food.
l. The bird is released when it is stable, healthy, and completed preening. The bird shall be taken to a local veterinary clinic for examination prior to release.

3.2 Screening and Netting

Although it is highly unlikely the DNCS Facility will have a migratory bird issue based on the described preventative methodology and lack of suitable habitat and food, DNCS is committed to the protection of migratory birds. Should migratory bird landings become an ongoing concern, DNCS will implement more aggressive techniques, such as netting or screening, after review and discussion with OCD and wildlife experts.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

TABLE OF CONTENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

LIST OF TABLES

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

LIST OF ATTACHMENTS

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

1.0 PROJECT OBJECTIVES

The Construction Quality Assurance (CQA) Plan has been developed to document the measures that will be used to ensure that the environmental control systems will be constructed in compliance with:

- 19.15.36.14.D NMAC
- 19.15.36.14.E NMAC
- 19.15.36.17.B NMAC
- The approved Permit Plans
- The permit and any permit conditions
- This CQA Plan
- Industry standards and other applicable technical criteria

This CQA Plan establishes the quantitative criteria that will be used in the field and laboratory to measure the quality of the installed infrastructure. Specific construction elements that are addressed in this Plan includes:

- Inspection and compaction of the subgrade and liner foundation
- Installation of the geosynthetic clay liner
- Installation of the primary geomembrane
- Installation of the geonet leak detection layer
- Installation of the secondary geomembrane
- Installation of the leachate drainage layer and collection system
- Installation of the protective soil layer
- Ancillary installations as needed to complete the above

This CQA Plan is a quality control plan meeting the specifications of 19.15.36.14.D NMAC, 19.15.36.14.E NMAC, and 19.15.36.17.B NMAC. No revisions to the technical specifications should be allowed without the express approval of the Engineer. The Engineer is a registered professional engineer in New Mexico with applicable experience in geosynthetics design and construction. This Plan may be updated to address changes in materials, technologies, test methods, etc. in consultation with the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division; and more specifically revisions will be made to the applicable geosynthetics testing standards as implemented. Additionally, the Oil Conservation Division shall be notified at least 72 hours prior to primary liner installation so the leak detection layer may be inspected.

Table II.7.1 lists the applicable testing required for each construction element. The Table identifies:

- Key property being evaluated
- The appropriate type of test procedure and method
- The sampling strategy and frequency

TABLE II.7.1 (SHEET 1 of 2)
Summary of Required COA Standards

Element	Key Property	CQA/CQC Test	Sampling Plan	Sampling Frequency	Standard Test Method
Excavation Required: Subgrade Layer Material Evaluation	Maximum Density	Proctor Test	Judgmental	1 per 5000 cy	ASTM D698
Fill Required: Subgrade Layer Material Evaluation	Maximum Density	Proctor Test	Judgmental	1 per 5000 cy	ASTM D698
Subgrade Layer Construction Quality Evaluation	In-Place Density	Nuclear Density Test	Random within grid	4 per acre per lift	ASTM D2922
	No angular stones	Visual	Judgmental	100%	NA
Geosynthetic Clay Liner	Conformance	Mass per unit area, Free Swell, Fluid Loss	Systematic	1 per 100,000 sf	ASTM D5993, D5890, D5891
	Surface Defects	Visual	100%	100%	NA
Primary and Secondary Liner Geomembrane	Conformance	Thickness, Density,Tensile properties, Tear reistance, Carbon black content, Carbon black dispersion, Puncture resistance	Systematic	1 per 100,000 sf	ASTM D5199/D5994, D1505, D6693, D1004, D1603, D5996, D4833
	Surface Defects	Visual	100%	100%	NA
Primary and Secondary Liner Geomembrane Seaming Procedures	Subgrade	Visual	100%	100%	NA
	Anchor Trench	Visual	100%	100%	NA
	Temporary Anchor	Visual	100%	100%	NA
	Sheet Placement	Visual	100%	100%	NA
	Overlap of Sheets	Measurement	100%	100%	NA
	Cleanliness of Seam	Visual	100%	100%	NA
	Extent of Grinding	Measurement	100%	100%	NA
Liner Geomembrane Seams	Test Seams	Tensiometer	Systematic	in accordance with specifications	NA
	Field Hot Wedge Seams	Non-Destructive Tests (Pressure Dual Seam)	100%	100%	NA
		Destructive Tests (peel & shear strength)	Random within a grid and Judgmental	1 per 500 feet	ASTM D413 and D6392
	Field Extrusion Fillet Seams	Non-Destructive Tests (Vacuum Box Testing)	100%	100%	ASTM D4437
		Destructive Tests (peel & shear strength)	Random within a grid and Judgmental	1 per 500 feet	ASTM D413 and D6392

TABLE II.7.1 (SHEET 2 of 2)
Summary of Required CQA Standards

Element	Key Property	CQA/CQC Test	Sampling Plan	Sampling Frequency	Standard Test Method
Geonet	Conformance	Thickness, Density, Wide width tensil properties, Mass per unit area, Carbon black, Melt index	Systematic	1 per 100,000 sf	ASTM D4354, D1777, D1505, D1682, D3776, D1603, D1238
	Anchor Trench	Visual	100%	100%	NA
	Temporary Anchor	Visual	100%	100%	NA
	Sheet Placement	Visual	100%	100%	NA
	Overlap and Tying of Sheets	Measurement	100%	100%	NA
Protective Soil Layer	Permeability	Lab Permeability	Random	1 per Source	ASTM D2434 or Falling Head
	Particle Size	Gradation of Soil	Random	1 per 1,500 cy	ASTM C136
	Thickness of Protective Soil Layer	Surveying or Direct Test	Within a grid	5 per acre	NA
Geotextile	Conformance	Thickness, Weight, Tensile strength, Mullen burst strength, Puncture strength, Trapezoidal tear strength, AOS	Systematic	1 per 100,000 sf	ASTM D5199, D5261, D4632, D3786, D4833, D4533, D4751
	Overlap	Measurement	100%	100%	NA
	Seams	Visual Observation	100%	100%	NA
Leachate Collection System	Grade	Surveying	NA	1 per 50 lf	NA
	Product specs, placement and	Visual Observation	100%	100%	NA
Leachate Pipe Envelope	Minimize clogging	Gradation of Gravel	Random	1 per Source	ASTM C136
	Placement and workmanship	Visual Observation	100%	100%	NA

2.0 PROJECT ORGANIZATION

2.1 Project Organization

The Project Team shall be identified in advance of construction, and each Team member will be assigned specific responsibilities as discussed in this section.

2.2 Authority and Responsibilities

2.2.1 Owner

The Owner has the responsibility for scheduling and administration, which may include, but not be limited to:

- Contractor procurement.
- Some or all of the construction tasks.
- Assignments of duties of Project Team and orientation of the Project Staff to the needs and requirements of the project.
- Approval of project-specific procedures and internally prepared plans, drawings, and reports.
- Serving as the "Collection point" for Project Staff reporting project documents and activities.
- Point of collection for archived destruction test (DT) samples.

2.2.2 Site CQA Engineer

The Site CQA Engineer shares responsibilities with the Owner/Operator for addressing technical and administrative issues. The Site CQA Engineer must be present at the outset of major undertakings and at critical times during the construction. The Site CQA Engineer's staff shall be on-site continually for construction activities. The Site CQA Engineer will also be on-site, as necessary, to perform the following:

- Periodic review of submittals from the Site CQA Manager.
- Approval of any CQA Plan revisions.
- Administrative functions as necessary to staff and maintain personnel for the CQA activities.
- Periodic review and assessment of the CQA Plan as implemented to determine completeness and compliance.
- Spot-checking of field and laboratory methods and results for accuracy.
- Acceptance and approval of materials and workmanship.
- Compilation and submission of Certification Reports and other project deliverables.
- Design and certification responsibilities mandate that this site CQA Engineer must be a Professional Engineer properly registered in the State of New Mexico; who possesses demonstrated competence and experience in waste containment engineering.

2.2.3 Site CQA Manager

- Review moisture-density curves correlated to compaction specifications for the borrow source or in-situ subgrade.
- Review Field Grain Size Analysis of materials to confirm suitability.
- Perform nuclear density testing as necessary for in-place compaction confirmations.
- Conduct verification testing for thickness and placement of materials.
- Perform inspection and documentation of synthetic materials installation.
- Review of documentation from contractors as enumerated in this CQA Plan.
- Review CQA activities.
- Notification to appropriate personnel of nonconformance, or changes in CQA procedures.
- Completion of Project CQA audits.
- Scheduling, at regular intervals, CQA meetings with project staff and Subcontractors.
- Reporting, on a regular basis, to the Site CQA Engineer the results of reviews, inspections, and audits.
- Identifying for the Site CQA Engineer project issues, which require his direct involvement.
- Maintaining records of reviews, inspections, audits, and their results.
- Collection of Daily Field Reports from Contractor, which are to be provided no later than 24 hours after each shift has ended.
- Maintenance of calibration records of the instrumentation used on-site in the implementation of this plan.
- Other duties as directed by the Site CQA Engineer.

2.2.4 Contractor

Responsibilities of the Contractor may include:

A) Management of daily field operations (labor and equipment allocation).
B) Submission of Daily Field Progress Reports to the Site CQA Manager.
C) Implementation of tasks relative to this CQA Plan specific to his assigned construction activities per contract.
D) Submittal of required as-built drawings and certificates to the Site CQA Manager.
E) Submittal of required work plans to the Site CQA Engineer.

Work and materials installed by the Contractor shall be guaranteed for at least two (2) years from date of completion.

The Contractor/Installer must construct this project in a workmanlike manner, in conformance with the plans and specifications. The purpose of the CQA program is to provide independent confirmation of compliance with the plans and specifications for the Owner's benefit.

2.3 Documentation

1. Data will be gathered or developed in accordance with procedures appropriate for the intended use of the data and will be of significant or greater quality to stand up to scientific and regulatory scrutiny.
2. Data will be of known or acceptable precision, accuracy, representatives, completeness, and comparability within the limits of the project.

The quality of the measurement data can be defined in terms of the following elements:

1. Completeness - the adequacy in quantity of valid measurements to reduce the potential for misinterpretation.
2. Representativeness - the extent to which discrete measurements accurately describe the greater picture of which they are intended to represent. Good representativeness is achieved through careful, informed selection of sampling site.
3. Accuracy and Precision - the agreement between a measurement and the true value and the degree of variability in this agreement, respectively. Accuracy and precision of data collected in the investigation will depend upon the measurement standards used and the competent use of them by qualified personnel.
4. Comparability - the extent to which comparisons among different measurements of the same quantity or quality will yield valid conclusions. Comparability among measurements will be achieved through the use of standard procedures and standard field data sheets.
5. Traceability - the extent to which data can be substantiated by hard-copy documentation. Traceability documentation exists in two essential forms: that which links quantitation to authoritative standards, and that which explicitly describes the history of each sample from collection to analysis.

The fundamental mechanisms that will be employed to achieve these quality goals can be categorized as prevention, assessment and correction, as follows:

1. Prevention of defects in the quality through planning and design, documented instructions and procedures, and careful selection and training of skilled, qualified personnel;
2. Quality assessment through a program of regular audits and inspections to supplement continual informal review;
3. Permanent correction of conditions adverse to quality through a closed-loop corrective action system.

The Site CQA Manager shall maintain current records, on appropriate CQA forms, of quality control operations, inspections and tests performed relative to the work of suppliers and contractors. **Table II.7.2** is an index of CQA Forms which are typically used for the Liner CQA program.

TABLE II.7.2
CQA Forms Index

Form No.	Title
1.	Liner Quality Control Project Specifications **(Attachment II.7.A)**
2.	Approval/Authorization to Proceed Form **(Attachment II.7.B)**
3.	Daily Summary Report **(Attachment II.7.C)**
4.	Field Compaction Testing Form **(Attachment II.7.D)**
5.	GCL Inventory Control Log **(Attachment II.7.E)**
6.	FML Inventory Control Log **(Attachment II.7.F)**
7.	Geonet Inventory Control Log (**Attachment II.7.G)**
8.	Geotextile Inventory Control Log (**Attachment II.7.H**)
9.	Leachate Collection and Extraction Pipe Inventory Control Log (**Attachment II.7.I**)
10.	GCL Deployment Log **(Attachment II.7.J)**
11.	FML Deployment Log **(Attachment II.7.K)**
12.	FML Trial Seaming Test Log **(Attachment II.7.L)**
13.	FML Seaming Log **(Attachment II.7.M)**
14.	FML Seam Pressure Test Log **(Attachment II.7.N)**
15.	FML Destructive Field Test Record **(Attachment II.7.O)**
16.	FML Seam Vacuum Test/Repair Log **(Attachment II.7.P)**
17.	Geonet Deployment Log **(Attachment II.7.Q)**
18.	Geotextile Deployment Log **(Attachment II.7.R)**

Photographs may also be used to document the progress and acceptability of the work and may be incorporated into the Daily Summary Report; if photographic documentation is used, each photo shall be identified with the following information:

- Date
- Time of Day
- Location

Originals of the photographs will be retained at the offices of the Site CQA Engineer, and select photocopies will be submitted with Engineering Certification Reports as applicable.

3.0 CONSTRUCTION QUALITY ASSURANCE OBJECTIVES

3.1 Allowable Variations

It is the objective of this CQA Plan that test results must meet the applicable specified values. Should a test result not achieve the specified value for a material, it must be replaced or repaired; or for operation, the operation must be repeated until it is acceptable. However, as stated by Daniel and Koerner, *"it is unrealistic to think that 100 percent of all CQA tests will be in compliance with specifications."* Variations due to isolated anomalies in material, sample disturbance, human testing errors, or other factors may result in failing tests, yet these tests are not indicative of the general quality of the construction. For this reason, the Site CQA Engineer

may accept a small percentage of outliers. The total number of outliers will not exceed the maximum allowable number as defined in Waste Containment Facilities – Guidance for Construction Quality Assurance and Construction Quality Control of Liner and Cover Systems 2nd Edition (Daniel, D.E. and Koerner, R.M.), 2007.

4.0 SITE PREPARATION

4.1. General

The following is a list of the work to be included in site preparation by the Contractor:

A) Field check utilities and groundwater monitoring well locations, as appropriate.
B) Mark survey hub markers and permanent benchmarks.
C) Strip topsoil and any other material deemed unsuitable by the Engineer, or his representative, and stockpile at designated location.
D) Strip or remove brush, and non-mowable vegetation, surface debris and similar materials from existing surface and relocate to a designated area on the site. Stumps, logs, roots, etc. will be completely removed.
E) Excavate to design grade at the direction of the Site CQA Manager.
F) The existing surfaces will be proof rolled to check stability conditions of existing surface and to provide a trafficable, reasonably smooth, working surface for construction equipment.
G) Contractor will be responsible for costs associated with repairing and/or replacement of the ground surface utilities, and appurtenant facilities damaged by the Contractor, to the satisfaction of the Owner. Any damage resulting from unauthorized intrusion upon or use of off-site areas will be completely and immediately repaired, solely at the expense of the Contractor.

The following is a list of requirements related to site grading:

A) Relocate exposed debris outside the limits of the construction area to locations as directed by Owner.
B) Remove and dispose of coarse vegetation. Vegetation removal will be accomplished in such a manner as to minimize the amount of bare soil exposed at any given time.
    1) Stripped vegetation may be stockpiled temporarily at the site, provided that it is stockpiled in a manner, which prevents movement of the material off-site due to wind, water, or other factors.
    2) Residual vegetative matter, such as stumps, will be transported to the designated on-site area or removed off-site by the Contractor under authorization by the Owner.

4.2. Survey Coordinate System

The site will be surveyed and integrated into a grid system so that locations of sample and testing points made during construction can be readily discernible by the CQA personnel. This grid system should consist of equidistant spaced parallel lines, l00-foot on center, projecting north to south and east to west within the limits of the site. In addition, permanent project benchmarks will be placed by the Owner or his representative in the vicinity of the site for correlation of lift

thickness, site liner construction, etc. This grid system will be coincident with the existing and former site coordinate system for future reference. The project limits will be staked out by the Owner or his representative based on record drawings

4.3. Subgrade Development

Subgrade development will be required prior to landfill cell or pond construction. The existing topography will be contoured to the subgrade elevations shown on the drawings identified by the Site CQA Manager. The subgrade will be constructed, prepared and protected in accordance with the procedures stated below.

4.3.1 Subgrade Preparation

A) Establish required lines, levels and contours. Place grade stakes as required by Contractor's methods a minimum 100' on center.
B) Before grading commences, adjust monitoring wells and piezometer heights in the area to be graded in accordance with details shown on the drawings if applicable. Such adjustments will be made under direct surveillance of the Site CQA Manager. Any wells adjusted without the Site CQA Manager being present will be re-established at the Contractor's expense.
C) No subgrading will begin in a given area prior to approval of the area by the Site CQA Manager.

4.3.2 Excavating to Subgrade Elevation

A) Excavated material will be placed on-site as directed by Owner.
B) Adequate grade control during subgrade preparation/construction is imperative. Should insufficient grade control during this phase occur, the Site CQA Manager may stop work until the situation has been rectified.

4.3.3 Filling to Subgrade Elevation and Berm Construction

A) Engineer will collect samples of proposed in-situ or borrow fill material in advance of construction for determination of soil characteristics (e.g. Standard Proctor)
B) Materials will be obtained from designated in-situ areas, borrow sources, or stockpiles.
C) No fill will be used for subgrade or berm construction without approval of the Site CQA Manager.
D) Place fill material to the required elevations as shown on the drawings.
E) Place suitable fine grained subgrade soils in 6-inch finshed lifts and compact to 90-percent of the maximum dry density, as determined by the Standard Proctor Compaction Test (ASTM D698).
F) Place berm material in maximum 12-inch finished horizontal lifts over the prepared surface. Compact to not less than 90-percent of the maximum dry density, as determined by the Standard Proctor Compaction Test (ASTM D698).
G) The surface of each lift will be scarified prior to placing the next lift, if applicable.
H) The moisture content of fill material will be adjusted in the stockpile, borrow area, and/or other approved areas to maintain uniform moisture content of fill. Uniform moisture

distribution will be obtained by mixing with disc, harrow, and pulverizers or by otherwise manipulating the soil prior to compaction.

I) The final surface of subgrade and berms will be rolled smooth, free of protrusions and will contain no lumps, angular materials or large rocks. Roll the exposed surface transverse to slopes.

4.4. Final Subgrade Inspection and Protection

The final subgrade lift will conform to the following specifications:

A) The upper 6-inches shall be comprised of suitable fine grained soils and compacted to a minimum 90-percent of the maximum dry density as determined by the Standard Proctor Test (ASTM D698)
B) The surface of the final lift of subgrade will be free of angular material or stones greater than one-half inch in diameter.
C) The final lift will be wetted and smooth rolled. Abrupt changes of grade will be regraded.
D) Completed subgrade will be protected from traffic, erosion and damage of any kind.
E) Completed subgrade will be kept free of trash and debris.
F) Prior to placement of liner system, any areas of subgrade damaged by traffic, erosion, settlement, or another cause, will be repaired and the grades shown on the drawings will be re-established. Exposed subgrade, which has significantly dried or exhibits desiccation will be wetted and compacted prior to fill placement. Disturbed areas will be reshaped, scarified, recompacted and rolled prior to further work.
G) The condition of the subgrade will be approved by the Site CQA Manager prior to placement of any additional layers or liner system materials immediately in advance of installation.

4.5. Subgrade and Berm Testing

The following tests will be performed on the subgrade soils prior to compaction:

A) One particle size distribution per 1,000-cubic yards of borrow using ASTM D422.
B) One Standard Proctor moisture density relationship per 5,000 cubic yards of borrow using ASTM D698.
C) One Atterberg Limits per 5,000 cubic yards of borrow using ASTM D423 and D424.

The following tests will be performed during construction:

A) One field compaction test will be performed at a frequency of a minimum 4 tests per acre per 6-in lift for confirmation of density of the subgrade soils and 12-in for confirmation of density of soils used in berm construction.
B) The subgrade will be required to meet an elevation tolerance of 0.2’±; and the sidewalls a vertical tolerance of 0.50’± based on a regular grid established by site survey.

5.0 ANCHOR TRENCH

1. The anchor trench shall be constructed as shown on the construction drawings and as specified in the CQA Plan. The anchor trench shall be backfilled and compacted by the Contractor as approved by the Site CQA Manager. Trench backfill material shall be placed and compacted by rolling with a rubber-tired wheel or mechanical tampers. Approval of compaction equipment shall be obtained from the Site CQA Manager before any compaction begins.
2. Care shall be taken when backfilling the trenches to prevent any damage to the geomembrane. At no time shall construction equipment make direct contact with geosynthetic materials.
3. Anchor trench backfill shall be compacted to 90% Standard Proctor Dry Density.

6.0 GEOSYNTHETIC CLAY LINER (GCL)

6.1 GCL Properties

1. The GCL installed directly in contact with the subgrade material under the leak detection sumps in the ponds shall be a reinforced GCL, and as defined by compliance with the requirements listed in **Table II.7.3** or approved by Engineer as equivalent.

TABLE II.7.3
Technical Specifications
Geosynthetic Clay Liner (GCL)

MATERIAL	PROPERTY	UNIT	CERTIFIED VALUE	TEST METHOD[1]
Nonwoven Cover Geotextile	Grab Strength	lbs	170	ASTM D4632
	Grab Elongation	%	50	ASTM D4632
	Mass/Unit Area	$^{oz}/_{yd^2}$	6.0	ASTM D5261
Bentonite	Free Swell	ml	24/2g min	ASTM D5890
	Fluid Loss	ml	18 max	ASTM D5891
	Bentonite Mass/Unit Area	lbs/ft^2	0.75	ASTM D5993
	Grab Strength[2]	lbs	90	ASTM D4632
	Permeability	cm/sec	$5x10^{-9}$	ASTM D5887
Woven Base Fabric	Mass/Unit Area	$^{oz}/_{yd^2}$	3.2	ASTM D5261
GCL Hydrated Internal	Shear Strength	lbs/ft^2	500	ASTM D5321 ASTM D6243

Notes:

1. *Standard test methods will be updated to reflect the most current industry standards.*
2. *Grab tensile tests in machine direction.*

2. The primary component in the GCL is high-quality sodium bentonite (montmorillonite). The bentonite used in the manufacture of the GCL must be demonstrated to meet the testing and acceptance criteria listed in **Table II.7.3**. The testing shall be performed on the bentonite obtained from the finished GCL product.
3. Bentonite Sealing Compound (BSC) and Granular Bentonite (GB) shall be applied to ensure tightness at penetrations and structures. The BSC and GB shall be supplied by the manufacturer and shall be comprised of the same bentonite used in the manufacturing of the GCL. The BSC shall be a mixture of non-aqueous liquid suspension agent, which creates a paste-like texture. The suspension agents used in the manufacture of the BSC shall be non-toxic, water- soluble and shall not restrict the bentonite's ability to swell and absorb water upon hydration.
4. Longitudinal seams can also be sealed using the Winning Edge^{TM} which eliminates the need for free bentonite on those seams.

6.2 Delivery, Storage and Handling

1. The GCL rolls shall be packaged and shipped by appropriate means to prevent damage of the geomembrane rolls. Off-loading and storage of the GCL is the responsibility of the Contractor/Installer. The Contractor shall be responsible for replacing any damaged or unacceptable material discovered upon arrival at no cost to the Owner.
2. The GCL storage area will be designated by the Site CQA Manager/Owner. No off-loading shall be performed unless the Site CQA Manager is present. Damage during off-loading shall be documented by the Site CQA Manager. Any damaged rolls must be separated from the undamaged rolls until the proper disposition of that material has been determined by the Site CQA Manager.
3. A steel support pipe shall be inserted through the roll core. Slings or lifting chains shall be attached at the ends of the support pipe to the bucket of a front-end loader or lifting device. A spreader bar, which is used to support the pipe, must be long enough to prevent damage to the edges of the GCL during hoisting.
4. The rolls of GCL shall be stored in their original, unopened, wrapped cover in a clean, dry area, stacked no higher than three rolls high. The material shall be stored off the ground on pallets and shall be covered with a heavy, protective tarpaulin or enclosed within a storage facility. Care shall be used to keep the bentonite clean and free from debris prior to installation.
5. The installer shall be responsible for the transportation of each roll of GCL from the storage area to its proposed panel location. The contractor shall not drive upon the GCL panels with equipment exceeding 6 psi and shall be responsible for replacing any material damaged during installation until the GCL is accepted by the Site CQA Manager/Owner.

6.3 Manufacturer Quality Control Documentation

Prior to installation commencement of any GCL material, the Contractor shall provide the following information to the Site CQA Manager, certified by the manufacturer for the delivered GCL.

1. Manufacturer's certification verifying that the quality of the raw materials used to manufacture the GCL meets the Manufacturer specifications.
2. Each roll delivered to the project site shall have the following identification information:
    - Manufacturer's name
    - Product identification
    - Roll number
    - Roll dimensions
3. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, frequency and test results. At a minimum, the following results shall be provided in accordance with test requirements specified in **Table II.7.3:**
    - Free swell (ASTM D5890)
    - Fluid loss (ASTM D5891)
    - Bentonite mass/unit area (ASTM D5993)
    - Grab strength (ASTM D4632)
    - Permeability (ASTM D5887)

6.4 Conformance Testing

1. The Site CQA Manager will group the documentation of the delivered rolls into the manufacturer's listed lot numbers. The Site CQA Manager may, at his/her discretion, subdivide the manufacturer's listed lots into smaller lots for purposes of conformance testing.
2. Based on the requirements outlined in ASTM D4354, the Site CQA Manager will determine the number of sampling units within each lot or at a minimum, 1 test per 100,000 ft^2 of delivered GCL.
3. The Site CQA Manager shall cut or observe the sampling (i.e. if contractor is responsible for conformance samples) from randomly selected rolls which have been delivered to the site, one foot wide by roll width Sampling Units, which shall be used for field and laboratory testing as described below. A measuring device and straight edge shall be used to ensure uniformity of length and width. Moisture content, bentonite content, and unit weight testing shall be performed on delivered rolls by an approved independent laboratory. The method used for determining specification conformance shall be in accordance with ASTM D4759.
    a) The entire sample unit will be loosely rolled and the width of each sample shall also be measured and recorded.
    b) The sample shall then be unrolled and spread out on a clean, dry area at the site. The Site CQA Manager (or Contractor) shall randomly cut five 12 inch by 6 inch specimens from varying places across the sample. Each specimen will be immediately packaged up in a "zip-lock" bag marked with the project name, roll number, lot number, and specimen number.
    c) The five specimens shall be sent to an independent laboratory for fluid loss, bentonite content and mass per unit area testing (ASTM D5891, ASTM D5890 and ASTM D5993, respectively).

i. The average of the fluid loss, bentonite content, and mass per unit area of the five specimens will be provided by the independent laboratory in accordance with ASTM D5891, ASTM D5890, and ASTM D5993.
ii. If any two samples from a given lot being tested for bentonite content falls below the specified values, the entire lot shall be rejected.
iii. If any one of the samples from a given lot being tested for bentonite content falls below the specified values, an additional set of samples shall be taken from the lot (the number of samples taken for the second set shall be equal to that taken from the first set). If any one of the samples from the second set fails to meet the specified criteria, the entire lot shall be rejected.

4. Conformance test results shall be reviewed by the Site CQA Officer and lots shall be accepted or rejected, prior to the placement of the GCL. Test results shall meet, or exceed, the property values listed in **Table II.7.3**. In case of failing test results for any given lot sample, the lot shall be resampled and retested. This retesting shall be paid for by the manufacturer. If the test values from the resamples pass the acceptable specification values listed in **Table II.7.3**, then the lot shall be accepted.

6.5 GCL Placement

1. As each roll is moved from the storage area by the Installer, the labels shall be removed by the installer and submitted to the Site CQA Manager. The rolls of GCL shall be brought to the area to be lined with a front-end loader and support pipes set up such that the GCL roll is fully supported across its length. A spreader bar or similar device shall be used to prevent the lifting chains or slings from damaging the edges. Dragging of the GCL panels over the surface shall be minimized. Travel on the GCL is permissible if low-ground pressure equipment (6 psi or less) is used. The Site CQA Manager shall be informed as to the equipment to be used and shall approve same.
2. The flexible membrane liner shall be placed over the GCL during the same day as the placement of the GCL. Only those GCL panels which can be anchored and covered the same day shall be placed in position.
3. The GCL shall not be installed in standing water or during rain. The GCL must be dry when installed and must be dry when covered.
4. In areas where wind is prevalent, GCL installation should be started at the upwind side of the project and proceed downwind. The leading edge of the GCL shall be secured at times with sandbags or other means sufficient, and approved by the Site CQA Manager, to secure it down during high winds.
5. The GCL shall be installed in a relaxed condition and shall be free of tension or stress upon completion of the installation. Stretching of the GCL to fit will not be allowed. The GCL shall be straightened to smooth out creases or irregularities in the runs.

6.6 Field Seams

1. Longitudinal seams shall be a minimum of 9 inches on the cell floor (up to 10% slope); and 12 inches for sideslopes (>10%).
2. Soil, gravel, or other debris shall be removed from the overlap area.

3. Seam overlap shall be placed such that the direction of flow is from the top sheet to the bottom sheet to form a shingle effect.
4. On slopes, runs shall be from crest to toe with the GCL machine direction running perpendicular to the base. On slopes greater than or equal to 20%, the number of seams will be minimized, and end seam overlap will be increased to a minimum of 36 inches.
5. If the temperatures are higher than 85°F and humidity is low, contraction may occur soon after placement when no confining stress or soil cover is placed. In order to account for the possibility of contraction under these conditions, the seam overlap shall be increased to a minimum of twelve inches on longitudinal seams and 36 inches on end seams, or 4% of the distance to the next parallel seam, whichever is greater. Free bentonite shall be used to seal seam. Free bentonite is not necessary on longitudinal seams if the Winning Edge™ seam is used.
6. Once the first run has been laid, adjoining runs shall be laid with 9-inch minimum overlap or use of the Winning Edge™, on the longitudinal seams and 12 inches on end seams.

6.7 Field Quality Control

1. The Installer shall provide the Site CQA Manager with daily reports addressing the following:
    - subgrade approval for areas expected to be covered by GCL
    - the total amount and location of panels placed
    - total amount and location of seams completed
    - location of repairs
    - weather conditions
2. The Installer's Superintendent and the Site CQA Manager shall provide 100% inspection of the installation to ensure compliance with the construction drawings, technical specifications, and manufacturer recommended procedures.
    a) The surface of the GCL shall be clean and free of debris at the time of inspection.
    b) The Installer and the Site CQA Manager shall record each roll number and lot number as panels are deployed and a general description of the location of each panel.
    c) The Installer and the Site CQA Manager shall inspect the overlap for each panel.
    d) The Installer and the Site CQA Manager shall inspect the anchoring and sealing around penetrations and structures.
    e) The Installer and the Site CQA Manager shall inspect the geotextile quality, bentonite uniformity, and degree of hydration on the GCL. Areas requiring repair shall be marked and subsequently repaired in accordance with the Repair Procedures listed in this CQA Plan.
    f) The Installer and the Site CQA Manager shall re-inspect areas previously marked as requiring repair.

6.8 Repair Procedures

1. Seam and non-seam areas of the GCL shall be inspected for identification of defects, holes, and any sign of contamination by foreign matter in accordance with the Field Quality Control procedures listed in this CQA Plan.

2. Any defects shall be repaired by the Installer, by placing a GCL patch with a minimum 12 inch overlap in all directions.
3. Horizontal patch seams shall be secured with adhesive glue as approved by the Site CQA Manager and manufacturer's recommendations.
4. Patches and repairs shall not be allowed on slopes greater than 5H:1V, unless they are securely anchored with an adhesive or other approved method. Alternatively, the patches can be placed under the defective liner in order to prevent slippage of the patch.
5. For any repair method, surfaces shall be clean and dry at the time of the repair.
6. Each completed repair shall be inspected in accordance with the Field Quality Control procedures listed in this CQA Plan.

6.9 GCL Acceptance

1. The GCL shall be accepted by the Site CQA Manager when the installation is complete, and documentation of installation is completed and verification of the adequacy of field seams and repairs, are complete.
2. Approval of any subsequent post-liner construction, as well as payment requests of the same, will not be granted until required documentation is provided by the Installer and approved by the Site CQA Officer.

7.0 FLEXIBLE GEOMEMBRANE LINER (FML)

1. The flexible membrane (FML) used for liner installation shall be textured 60-mil thick HDPE for landfill sideslopes and smooth 60-mil thick HDPE for the landfill floor and ponds. Reinforced polyester 30-mil geomembrane will be used for the tank farm and jet out pit.
2. The geomembrane shall be manufactured of new, prime first-quality products designed and manufactured specifically for the purpose of liquid containment in hydraulic structures and chemically resistant to leachate.
3. The geomembrane material shall be so produced as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter.
4. The sheets shall have NSF label of approval and shall be manufactured in a minimum 15 foot seamless width. Labels on the roll shall identify the thickness, length, width and manufacturer's lot number.
5. The geomembrane rolls shall meet the minimum properties listed in **Table II.7.4** for textured HDPE liner, **Table II.7.5** for smooth HDPE liner**,** and **Table II.7.6** for reinforced polyester liner.
6. Extrudate welding rods shall be of the same compound as the geomembrane and supplied by the manufacturer and shall be delivered in the original sealed containers. Each container shall have a label bearing the brand name, manufacturer's lot number and complete directions as to proper storage.

7.1 Manufacturer Quality Control Documentation

Prior to installation commencement of any geomembrane material, the Contractor shall provide to the Site CQA Manager the following information certified by the manufacturer for the delivered geomembrane.

1. Origin, identification and production of the resin (supplier's name, brand name and production plant).
2. Copies of quality control certificates issued by the resin supplier.
3. Manufacturer's certification verifying that the quality of the resin used to manufacture the geomembrane meets the resin specifications fingerprint properties shown in **Table II.7.4** for 60-mil textured HDPE liner, **Table II.7.5** for smooth HDPE liner, and **Table II.7.6** for the reinforced polyester liner.
4. Each roll delivered to the project site shall have the following identification information:
    - Manufacturer's name
    - Product identification
    - Thickness
    - Roll number
    - Roll dimensions
5. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, frequency, and test results. At a minimum, the following test results shall be provided in accordance with applicable test requirements specified in **Tables II.7.4** and **II.7.5** for the HDPE liner:
    - Thickness (smooth, ASTM D 5199; textured, ASTM D5994)
    - Density (ASTM D1505)
    - Tensile properties (ASTM D638, as modified by annex A)
    - Tear properties (ASTM D6693)
    - Carbon black content (ASTM D 1603 or ASTM D 4218)
    - Carbon black dispersion (ASTM D5596)
    - Puncture Resistance (ASTM D4833)
    - Notched constant tensile load (ASTM D 5397, Appendix)
    - Interface Friction Angle (Textured Geomembrane) [GRI - GS -7]
6. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, frequency, and test results. At a minimum, the following test results shall be provided in accordance with applicable test requirements specified in **Table II.7.6** for the reinforced polyester liner:
    - Thickness (ASTM D751, Optical Method)
    - Weight (ASTM D751)
    - Break strength (ASTM D751 Grab Tensile Method, Procedure A)
    - Break elongation (ASTM D751)
    - Tear strength (ASTM D751)
    - Puncture Resistance (ASTM D4833)
    - Hydrostatic resistance (ASTM D751, Procedure A)
    - Bursting strength (ASTM D751, Ball Tip)

7.2 Conformance Testing

1. Conformance testing shall be performed by an independent Quality Assurance Laboratory at a minimum of 1 per 100,000 ft^2. As stated in the contract documents, the Site CQA Manager or Installer shall obtain the samples from the roll, mark the machine direction and identification number. The number of lots and samples will be determined in accordance with ASTM D4354. The following conformance tests shall be conducted at the independent laboratory for the HDPE liner material:
    - Thickness (ASTM D5199, or ASTM D5994)
    - Density (ASTM D1505)
    - Tensile properties (ASTM D6693)
    - Tear resistance (ASTM D1004)
    - Carbon black content (ASTM D1603, or ASTM D4218)
    - Carbon black dispersion (ASTM D5996)
2. Conformance testing shall be performed by an independent Quality Assurance Laboratory at a minimum of 1 per 100,000 ft^2. As stated in the contract documents, the Site CQA Manager or Installer shall obtain the samples from the roll, mark the machine direction and identification number. The number of lots and samples will be determined in accordance with ASTM D4354. The following conformance tests shall be conducted at the independent laboratory for the reinforced polyester liner material:
    - Thickness (ASTM D751, Optical Method)
    - Weight (ASTM D751)
    - Break strength (ASTM D751, Grab Test Method, Procedure A)
    - Break elongation (ASTM D751)
    - Tear strength (ASTM D751)
    - Puncture resistance (ASTM D4833)
3. These conformance tests shall be performed in accordance with **Tables II.7.4, II.7.5**, and **II.7.6**.
4. Conformance test results shall be reviewed by the Site CQA Officer, and lots shall be accepted or rejected prior to the placement of the geomembrane. Test results shall meet, or exceed, the property values listed in **Tables II.7.4** and **II.7.5.** If the sampling results do not meet property values for any individual lot sample, the lot shall be resampled and retested. This retesting shall be paid for by the manufacturer or installer. If the test values from the resamples pass the acceptable specification values listed in **Tables II.7.4**, **II.7.5**, and **II.7.6,** the lot shall be accepted.

TABLE II.7.4
Technical Specifications
60-mil HDPE Textured Geomembrane

PHYSICAL PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD[3]**
Thickness	Minimum Average	mils	57	ASTM D5994
	Lowest individual for 8 out of 10 values	mils	54	
	Lowest individual for any of the 10 values	mils	51	
Density	Minimum	g/cc	0.94	ASTM D1505
Melt Index	Range	g/10 min	≤1.0	ASTM D1238
Tensile Properties (each direction):				ASTM D6693, Type IV Dumbell,
Break Strength	Minimum Average	lb/in	90	2 ipm
Yield Strength	Minimum Average	lb/in	126	
Elongation at Break	Minimum Average	%	100	G.L. = 2.0 in
Elongation at Yield	Minimum Average	%	12	G.L. = 1.3 in
Tear Resistance	Minimum	lb	42	ASTM D1004
Puncture Resistance	Minimum	lb	90	ASTM D4833
Carbon Black Content	Minimum	%	2.0	ASTM D1603
Carbon Black Dispersion	Rating	N/A	Note 1	ASTM D5596
Asperity Height	Minimum Average	N/A	Note 2	GRI GM 12
Notched Constant Tensile Load	Minimum	hours	300	ASTM D5397, Appendix
SEAM PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD[3]**
Thickness	Minimum	mils	60	ASTM D5199/ D5994
Bonded Seam Strength	Minimum	lb/in	120	ASTM D6392
Tensile Properties:				
Fusion Weld	Minimum	lb/in	90	ASTM D 6392
Extrusion Weld	Minimum	lb/in	78	ASTM D6392

Notes:

(1) Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

(2) 10 mil average. 8 of 10 readings ≥ 7 mils. Lowest individual reading ≥ 5 mils.

(3) Standard test methods will be updated to reflect the most current industry standards.

TABLE II.7.5
Technical Specifications
60-mil HDPE Smooth Geomembrane

PHYSICAL PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD[2]**
Thickness	Minimum Average Minimum	mils mils	60 54	ASTM D5199
Density	Minimum	g/cc	0.94	ASTM D1505
Melt Index	Range	g/10 min	≤1.0	ASTM D1238
Tensile Properties (each direction): Break Strength Yield Strength Elongation at Break Elongation at Yield	 Minimum Average Minimum Average Minimum Average Minimum Average	 lb/in lb/in % %	 228 126 700 12	ASTM D6693, Type IV Dumbell, 2 ipm G.L. = 2.0 in G.L. = 1.3 in
Tear Resistance	Minimum	lb	42	ASTM D1004
Puncture Resistance	Minimum	lb	108	ASTM D4833
Carbon Black Content	Minimum	%	2.0	ASTM D1603
Carbon Black Dispersion	Rating	N/A	Note 1	ASTM D5596
Notched Constant Tensile Load	Minimum	hours	300	ASTM D5397, Appendix
SEAM PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD[2]**
Thickness	Minimum	mils	60	ASTM D5199/ D5994
Bonded Seam Strength	Minimum	lb/in	120	ASTM D6392
Tensile Properties: Fusion Weld Extrusion Weld	 Minimum Minimum	 lb/in lb/in	 90 78	 ASTM D6392 ASTM D6392

Notes:

(1) Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

(2) Standard test methods will be updated to reflect the most current industry standards.

TABLE II.7.6
Technical Specifications
30-mil Reinforced Polyester Geomembrane

PHYSICAL PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD[1]**
Thickness	Minimum Average	mils	30	ASTM D751 (Optical Method)
Weight	Minimum	oz/yd^2	30 ± 2	ASTM D751
Break Strength	Minimum	lb	550	ASTM D751 Grab Test Method Procedure A
Break Elongation	Minimum	%	20	ASTM D751
Tear Strength	Minimum	lb	40	ASTM D751
Puncture Resistance	Minimum	lb	275	ASTM D4833
Hydrostatic Resistance	Minimum	psi	800	ASTM D751, Procedure A
Bursting Strength	Minimum	lb	750	ASTM D751, Ball Tip
SEAM PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD[1]**
Bonded Seam Strength	Minimum	lb	575	ASTM D751 Grab Test Method Procedure A
Peel Adhesion	Minimum	lb/2 in	40	ASTM D413

Notes:
(1) Standard test methods will be updated to reflect the most current industry standards.

7.3 Delivery, Storage and Handling

1. The geomembrane rolls shall be packaged and shipped by appropriate means to prevent damage of the geomembrane rolls. Off-loading and storage of the geomembrane is the responsibility of the Installer. The Installer shall be responsible for replacing any damaged or unacceptable material at no cost to the Owner.
2. No off-loading shall be performed unless the Site CQA Manager is present. Damage during off-loading shall be documented by the Site CQA Manager. Damaged rolls must be separated from the undamaged rolls until the proper disposition of that material has been determined collectively by the installer and Site CQA Manager.
3. The geomembrane rolls shall be stored so as to be protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions and excessive heat that may damage the geomembrane material. The rolls shall be stored on a prepared surface (not wooden pallets) and shall not be stacked more than two rolls high.

7.4 Guarantee

1. The Contractor shall guarantee the HDPE and reinforced polyester geomembrane against defects in installation and workmanship for the period of two years commencing with the date of final acceptance by the Owner. The guarantee shall include the services of qualified service technicians and materials required for the repairs at no expense to the Owner.

7.5 Quality Assurance

1. In addition to manufacturer and installer requirements for qualifications and certification specified in submittals, the Quality Assurance consists of conformance testing of the material delivered to the site and field quality control during installation.
2. Conformance testing requirements are listed in this CQA Plan. The purpose of conformance testing is to assure that the supplied material conforms to the specifications and to the manufacturer's quality control certificates.
3. Field quality control requirements are specified in this CQA Plan. The purpose of field quality control procedures is to assure that the geomembrane has been installed in accordance with the specifications and manufacturer's recommendations.
4. Quality control forms for geomembrane installation documentation are used for field installation documentation. Sample project forms are listed on **Table II.7.7**.

TABLE II.7.7
FML Project CQA Forms

Form No.	Title
1.	Liner Quality Control Project Specifications **(Attachment II.7.A)**
2.	Approval/Authorization to Proceed Form **(Attachment II.7.B)**
3.	Daily Summary Report **(Attachment II.7.C)**
4.	FML Inventory Control Log **(Attachment II.7.F)**
5.	FML Deployment Log **(Attachment II.7.K)**
6.	FML Trial Seaming Test Log **(Attachment II.7.L)**
7	FML Seaming Log **(Attachment II.7.M)**
8.	FML Seam Pressure Test Log **(Attachment II.7.N)**
9.	FML Destructive Field Test Record **(Attachment II.7.O)**
10.	FML Seam Vacuum Test/Repair Log **(Attachment II.7.P)**

Photo-documentation will be also used to record the cell construction. Select photographs shall include date, time, location, and Site CQA Manager; and shall be included in the Liner Certification Report submitted to OCD.

7.6 Geomembrane Placement

1. Weather Conditions
   Geomembrane placement shall not proceed at an ambient temperature below 40 degrees F or above 104 degrees F unless otherwise authorized, in writing, by the Site CQA Manager. Geomembrane placement shall not be performed during precipitation, excessive moisture, in an area of ponded water, or excessive winds. Observation of temperature, humidity, precipitation, and wind shall be noted on CQA forms to ensure that weather conditions are acceptable prior to geomembrane placement.
2. Method of Placement
   a) No more material than can be seamed on that same day shall be deployed.
   b) Each panel of the geomembrane shall be rolled out and installed in accordance with the approved construction drawings. The layout shall be designed to keep field joining of the HDPE geomembrane to a minimum and consistent with proper methods of HDPE geomembrane installation, seaming, etc.
   c) Geomembrane rolls shall be placed using proper spreader and rolling bars with cloth slings.
   d) The Site CQA Manager shall inspect each panel, after placement and prior to seaming, for damage and/or defects. Defective or damaged panels shall be replaced or repaired, as approved by the Site CQA Manager.
   e) The installer shall avoid dragging the geomembrane sheets on rough soil subgrades.
   f) Geomembranes shall be anchored as shown on the construction drawings and consistent with manufacturer's recommendations.
   g) Personnel working on the geomembrane shall not smoke, wear damaging shoes or involve themselves in any activity that may damage the geomembrane.

h) Vehicular traffic across the geomembrane shall not be allowed on the liner material.
i) Damage shall be recorded and located on the as-built drawings.
j) When tying into existing geomembrane, final excavation to previously installed liner segments shall be performed by hand to prevent damage. Damaged sections of previously installed liner at the boundary zone shall be removed and replaced. New liner segments shall be seamed only to competent segments of previously installed liner as approved by the Site CQA Manager.
k) The geomembrane shall be kept free of debris, unnecessary tools and materials. In general, the geomembrane area shall remain neat in appearance.
l) The method used to unroll the panels shall neither score, scratch or crimp the geomembrane, nor damage the underlying liner system components or subgrade.
m) Adequate loading (e.g., sand bags or similar items that will not damage the geomembrane) shall be placed to prevent uplift by wind. In cases of high wind, continuous loading is recommended along edges of panels to minimize wind flow under the panels.
n) Direct contact with the geomembrane shall be minimized; i.e., the geomembrane under traffic areas shall be protected by geotextile, extra geomembrane, or other suitable materials.
o) Sufficient slack shall be placed in the geomembrane to compensate for the coldest temperatures envisioned so that no tensile stresses are generated in the geomembrane or in its seams either during installation or subsequently after the geomembrane is covered.
p) The geomembrane shall have adequate slack such that it does not lift up off of the subgrade or substrate material at any location within the facility, i.e., no "trampolining" of the geomembrane shall be allowed to occur at any time.
q) The geomembrane shall not have excessive slack to the point where creases fold over upon themselves either during placement and seaming, or when the protective soil or drainage materials are placed on the geomembrane.
r) Permanent (fold over type) creases in the covered geomembrane shall not be permitted. Creases shall be repaired in accordance with this CQA Plan and manufacturer’s recommendations.
s) The amount of slack to be added to the deployed and seamed geomembrane should be carefully considered and calculated, taking into account the type of geomembrane and the geomembrane's temperature during installation versus its final temperature in the completed facility.

3. Field Seams
   a) Individual panels of geomembrane shall be laid out and overlapped by a minimum of 4 inches (or three inches for extrusion fillet welding) but no more than 6 inches prior to welding. The area to be welded shall be cleaned and prepared in accordance with the quality control welding procedures.
   b) If the overlap is too wide to contain the hot wedge welding machine, "float" the liner into better position by lifting it high enough to draw air beneath it, guiding it upon the air to an improved position. Avoid dragging the liner, particularly across rough soil subgrades.

c) If overlap between the placed liners is excessive, the excess must be trimmed away. This should be done by trimming the lower sheet. If this is not possible and the upper sheet must be trimmed, use a knife with a shielded or hook blade.
d) Cutting and preparation of odd-shaped sections or small fitted pieces should be completed at least 50 feet ahead of the seaming operation, so that seaming may be conducted with the fewest interruptions.
e) Liner panel overlaps shall be shingled so the upper panel is hydraulically upgradient of lower panel.
f) Sheets which are overlapped and ready for seaming must be clean. If dirty, they must be wiped clean with dry rags.
g) The seam area must be completely free of moisture before the overlapping sheets can be properly seamed. Dry rags should be used to wipe any such moisture up from the seam surface. Air blowers may also be used.
h) Seaming is not to be performed when the soil surface beneath the liners is saturated, because the hot seaming apparatus will draw moisture into the ongoing seam. Seaming activity on frozen soil is unacceptable for the same reason.
i) Double track hot wedge fusion welder shall be used for straight welds.
j) Extrusion welder shall be used for cross seam tees, patches and repairs and penetration boots.
k) The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the geomembrane material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.
l) No "fish mouths" will be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped and a patch fusion weld shall be applied. Welds upon completion of the work shall be tightly bonded. Any geomembrane area showing damage due to excessive scuffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of geomembrane. The number of patches per 100 foot length shall not exceed five. If more than five patches per 100 foot length are necessary, then the entire 100 foot length of seam shall be removed. Further welding will cease at this time and the Site CQA Manager shall be notified.
m) Seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the as-built drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be welded together.
n) Fusion welded "T" seams (i.e., the result of the geomembrane panels placed perpendicular to each other) shall be double welded where possible. Extrusion welding shall be used for the second weld.
o) Extrudate shall be free of debris, dry and protected from damage.
p) If an extrusion welder is stopped for longer than one minute, it shall be purged to remove heat-degraded extrudate. Purged extrudate shall be placed on a sacrificial sheet and disposed of.
q) No horizontal seams shall be constructed on slopes greater than or equal to 5H:1V and no horizontal seams shall be located within 5 feet of the sideslope toe.

r) Vertical panels placed on sloped surfaces shall extend 10 feet inward from the toe of slope and 3 feet from the edge of the trench.
s) In the anchor trench, seams shall extend a minimum 12 inches.
t) Factory seams, field seams and repair welds shall meet seam strength requirements specified in **Tables II.7.4, II.7.5,** and **II.7.6.**
u) For geomembrane installation in geometrically unique areas, the number of field seams shall be minimized.
v) No solvent or adhesive may be used unless the product is approved by the Site CQA Officer.

7.7 Hot Wedge Fusion Welding

The objective of hot wedge seaming is to heat two facing liner surfaces to their melting point before forcing them together and creating a permanent bond. The wedge is situated between the overlap of the two liners; it reduces the surface tension of the viscous polymer sheets and acts as a scraper and mixer, so that the nip rollers can pressure the two liners together. The result is that the two facing surfaces are bonded into one continuous molecular structure. Types of thermoplastic liners can be seamed by the hot wedge method, but temperature settings will vary according to their specific polymer components:

TABLE II.7.8
Typical Wedge Temperature Ranges for
Hot Wedge Seaming of Thermoplastic Liners

LINER TYPE	FAHRENHEIT (°F)	CELSIUS (°C)
HDPE		
Minimum[1] Temperature	600	320
Maximum[2] Temperature	750	400

[1] *For dry, warm weather seaming conditions*
[2] *For damp, cold weather seaming conditions*

a) The hot wedge system should be properly positioned for completing the desired single or dual (split) seam.
b) Ambient variables such as temperature, cloud cover, and wind speed may make it necessary to vary the temperatures used successfully in a variety of ambient conditions, so that the hot wedge can be more accurately adjusted if new conditions are met, or if personnel changes are necessary.
c) The drive motor should be off when positioning the welding machine to seam. Place the machine where the sheets overlap. Guide the overlapped material between the idlers and the wedge, and into the drive/nip rollers. When continuing a weld that has been abandoned mid-seam, the liners must be spread where the seam leaves off and loaded into the respective sides of the machine. Raise the machine a few inches, load the bottom sheet first, and then load the top sheet. When the nip rollers engage and the wedge is in position, turn on the drive motor. Immediately engage the sheets when they are between

the nip rollers to prevent an imminent melt-through. Move the hot wedge into position and lock it.

d) The Operator must constantly monitor the temperature controls, as well as the completed seam passing out of the machine. Occasional adjustments in temperature or speed will be necessary to maintain a consistent weld. Visual inspection and constant hand testing by the peel method (or other) is also recommended.

e) On some soils, the device tends to "bulldoze" into the ground as it travels, causing soil to enter the weld. A seam with soil trapped in its weld is unacceptable. To keep this from happening, the operator should lift the front of the machine slightly. Alternatively, a moveable base for the machine to travel on can be used. Scrap strips of geotextile or geomembrane have proven to be effective materials upon which the welder can maintain traction. It may also be necessary to change the size of the rollers in loose soils.

f) A small amount of "squeeze-out" or "flashing" is a reliable indication that proper temperatures have been achieved. The melted polymer will laterally extrude, or squeeze-out of the seam zone in properly welded seams, but not to excess. An excessive amount of extruded hot melt indicates that excessive heat or pressure, or both, was applied. Reduce the temperature and/or pressure to correct the situation.

g) The hot wedge device has just a few adjustable parts, but it is critical that they be checked after a day of seaming. The machine should be cleaned daily.

7.8 Extrusion Welding

a) The upper sheet's leading edge must be ground to a 45º bevel. It is imperative that the sheet be lifted up and away from the lower sheet during the beveling so that no deep gouges are cut in the lower sheet. Grinding should therefore be done before tack welding.

b) After beveling, the upper sheet is lowered and laid flat against the lower sheet. The horizontal surface grinding across the interface of both sheets is completed. Surface sheen in the area to be seamed must be removed. Material dust generated by grinding the liner sheets must be wiped or blown away from the seaming zone.

c) Grinding marks should run perpendicular to the seam. Though this process is slower than grinding parallel to the seam, it does not create the deep parallel grooves that significantly decrease the thickness of the parent material that can lead to seam failure. Parallel grinding marks can also initiate stress cracking.

d) Grind marks should never be deeper than 10% of the sheet thickness. Optimally, they should be about 5% of the sheet thickness. The only purpose of grinding is the removal of oxide layers and dirt from the liner surfaces, and the roughening of their interface for extrudate.

e) Grinding marks should not extend beyond 1/4 inch of either side of the extrudate after its placement. For example, if the final extrudate bead width is 1-1/2 inches, the width of the grinding trail should not exceed 2 inches.

f) Seaming must take place no more than 10 minutes after grinding, so that surface oxide layers do not reappear where the extrudate must be placed.

g) The hand grinder should never be left running when it is not in use. If it makes contact with the liner while running it will cause serious damage.

h) A hot air gun may be used to "tack" the two sheets together, ahead of the extrusion welder. The hot air gun prepares the seam for the extrusion welder by heating the ground

surface and by creating a light bond between the two sheets, securing their position. The hot air gun is not meant to create a primary seam. No heat distortion should be evident on the surface of the upper sheet.

i) The extrusion welder's barrel shall be purged of heat-degraded extrudate before starting a seam. This must be done every time the extruder is restarted after two or more minutes of inactivity. The purged extrude shall not be discharged onto the surface of previously placed liner, or onto prepared subgrade, where it would eventually form a hard lump under the liner and cause stress concentrations and possibly premature failure.

j) Molten, highly viscous extrudate is deposited along the overlapped seam. The center of the extrudate pass directly along the edge of the upper liner, at sufficient width to completely cover the edge and most of the outlying grind marks, at least to within 1/4 inch of their extremity.

k) The extrudate should be approximately twice the specified sheet thickness, measured from the top of the bottom sheet to the top or "crown" of the extrudate. Excessive "squeeze out" is acceptable, if it is equal on both sides and will not interfere with subsequent vacuum box testing. If however, the extrudate can be pulled by its squeeze-out off the seam, the extrudate is unacceptable. The presence of squeeze-out may indicate that the extrusion die was not riding directly against the liner, that the extrudate temperature was improper for adequate flow, or that the seaming rate was too slow.

l) Where possible, inspect the underside of the lower for heat distortion. This can be done at the end of seams, and wherever samples are cut out of the seam. A slight amount of thermal "puckering" on relatively thin liners (less than 50 mil) is acceptable. It indicates that heat penetrated entirely through the sheet. However, if the underside is greatly distorted, either lower the temperature or increase the rate of seaming.

m) If the seaming process must be interrupted at mid-seam, the extrudate should trail off gradually, not terminate in a large mass of solidified extrudate. Where such welds are abandoned long enough to cool, they must be ground prior to continuing with new extrudate over the remainder of the seam. Grind where the extrudate trail-off begins. This restart procedure must be followed for patches, pipes, fittings, appurtenances and "T" and "Y" shaped items.

n) The extrudate bead should be visually inspected. Look to see that its alignment is straight, its height is appropriate, and its surface texture is uniform. No bubbles or pock marks should appear in the extrudate, which indicate the undesirable presence of air, water or debris within the extrudate rod or palletized polymer.

o) Grind marks should not be visible more than 1/4 inch beyond the extrudate. These should be very light and not contain heavy gouges. As stated previously, grinding is considered excessive when it is deeper than 10% of the liner thickness. It is unacceptable to apply additional extrudate over the original extrusion fillet seam in an area of excessive grinding. A cap strip shall be placed over the entire portion of the seam where excessive grinding is seen.

7.9 Field Quality Control

1. Start-up Testing
   A trial weld, 10 feet long for hot wedge welding and 3 feet long for extrusion welding, from each welder/welding machine shall be run upon the beginning of each shift, every four hours thereafter and at the discretion of the Site CQA Manager, under the same conditions that exist for the geomembrane welding. The trial weld shall be marked with date, ambient temperature, welder's name, and welding machine number. A tensiometer provided by the Installer shall be required to be on-site before and during geomembrane installation for the purpose of testing samples. Specimens of weld l inch wide shall be cut from the trial weld and tested on site for shear and peel strength in accordance with **Tables II.7.4, II.7.5,** and **II.7.6**. No welder may start work until the trial weld has been approved by the Site CQA Manager.
2. Nondestructive Seam Testing
   a) The installer shall perform nondestructive tests on field seams over their full length. The purpose of this test is to assure continuity and integrity of the seams. Vacuum and air pressure tests shall be used for nondestructive testing. The vacuum test shall be used for extrusion welds and single-track hot wedge welds. The air pressure test shall be used for double track hot wedge welds.
   b) Vacuum Testing
      Equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:
      (l) A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, porthole or valve assembly and a vacuum gauge.
      (2) A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
      (3) A rubber pressure/vacuum hose with fittings and connections.
      (4) A plastic bucket and wide paintbrush.
      (5) A soapy solution.

The following procedures shall be followed by the installer:

(1) Excess sheet overlap shall be trimmed away.
(2) Clean the window, gasket surfaces and check for leaks.
(3) Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.
(4) Wet a strip of geomembrane approximately 12 inch by 48 inch (length of box) with the soapy solution.
(5) Place the box over the wetted area and compress.
(6) Close the bleed valve and open the vacuum valve.
(7) Ensure that a leak-tight seal is created.
(8) For a minimum period of ten seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
(9) If no bubbles appear after ten seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum of 3 inch overlap and repeat the process.

(10) Areas where soap bubbles appear shall be marked and repaired in accordance with the Repair Procedures contained in this CQA Plan.

If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the Site CQA Manager for uniformity and completeness.

3. Air Pressure Testing (for double track fusion seams only)

   The following procedures are applicable to those processes which produce a double seam with an enclosed space. Equipment for testing double fusion seams shall be comprised of the following:

   (1) An air pump equipped with pressure gauge capable of generating and sustaining a pressure of 35 psi and mounted on a cushion to protect the geomembrane.
   (2) A manometer equipped with a sharp hollow needle, or other approved pressure feed device.

The following procedures shall be followed by the installer:

(1) Seal one end of the seam to be tested.
(2) Insert needle or other approved pressure feed device through the sealed end of the channel created by the double wedge fusion weld.
(3) Energize the air pump to verify the unobstructed passage of air through the channel.
(4) Seal the other end of the channel.
(5) Energize the air pump to a pressure of 35 psi, close valve, and sustain pressure for approximately 5 minutes.
(6) If loss of pressure exceeds 1% ±, or pressure does not stabilize, locate faulty area, repair and retest.
(7) Remove needle or other approved pressure feed device and seal.

7.10 Destructive Seam Testing

The purpose of the destructive testing is to evaluate seam strength properties. An average minimum of one test sample shall be obtained per 500 feet of performed seam length. The location of samples shall be determined by the Site CQA Manager. Selection of such locations may be prompted by suspicion of overheating, contamination, or other potential cause that may adversely impact the welds. This may result in more than one sample per 500 feet of seam length. Sampling shall be performed by the installer. Testing of field samples shall be performed by the installer in the presence of the Site CQA Manager as described below.

1. Sampling Procedures
   a) Samples shall be cut by the installer at locations chosen by the Site CQA Manager as the seaming progresses.
   b) The seams shall not be covered by another material before they have been tested and accepted by the Site CQA Manager.
   c) Upon obtaining each sample, assign a number to the sample and mark it accordingly.
   d) Record sample location on layout drawing.
   e) Record purpose of the sample, statistical routine or suspicious weld area.
   f) Record date, time, location, roll, seam number, master seamer, welding apparatus, and ambient temperature.

g) Holes in the geomembrane resulting from destructive seam testing shall be immediately repaired in accordance with the Repair Procedures contained in this CQA Manual.

2. Size and Disposition of Samples
   a) The samples shall be 12 inches wide by 36 inches long with the seam centered lengthwise. The sample shall be cut into three pieces of equal length and distributed as follows:
      (1) One portion to the Installer for field testing; 12 inch by 12 inch.
      (2) One portion for the independent geosynthetic laboratory quality assurance testing; 12 inch by 12 inch.
      (3) One portion to the Landfill Manager for archive storage in the Site Operating Record; 12 inch by 12 inch.
   b) The portion of the seam samples for geosynthetic laboratory quality assurance testing will be packed and shipped to an independent lab for testing by the Installer.
3. Field Testing
   a) The following shall be performed by the Installer in the presence of the Site CQA Manager for samples designated for field sampling.
      (1) The Installer shall cut ten 1-inch wide replicate specimens from the sample to be tested for shear and peel strength, in accordance with the criteria set in **Tables II.7.4, II.7.5,** and **II.7.6**.
      (2) Any specimen that fails through the weld or by fusion at the weld sheet interface is a non-FTB (Film Tearing Bond) break and shall be considered a failure.
      (3) The Installer shall test five specimens for shear seam strength and five for peel strength. Four out of the five replicate test specimens shall pass for the seam to be acceptable. A specimen must pass both Sections 1 and 2 above to be acceptable.
4. Quality Assurance Laboratory Test
   a) The Installer shall package and ship destructive test samples designated for laboratory testing to the independent Quality Assurance Laboratory. The laboratory must be approved by the Site CQA Officer.
   b) Laboratory tests shall include shear and peel strength tests. The minimum acceptable values obtained in these tests shall be in accordance with **Tables II.7.4, II.7.5,** and **II.7.6**.
   c) At least five specimens shall be tested each for shear and peel strength. A passing test shall meet the minimum required values in at least four of the five specimens tested for each method.
   d) Any specimen that fails through the weld or by fusion at the weld sheet interface is a non-FTB (Film Tearing Bond) break and shall be considered a failure.
   e) The Independent Laboratory shall provide verbal test results to the Site CQA Manager no more than 24-hours after they receive the samples. The Site CQA Manager shall review the laboratory results as soon as they become available.
5. Procedures for Destructive Test Failure
   a) The following procedures shall apply whenever a sample fails a destructive test, whether that test is conducted in the field or by the laboratory. The Installer has two options:
      (1) The installer can repair the seam between any two passing test locations.

(2) The installer can retrace the welding path to an intermediate location 10 feet (on both sides) from the location of the failed test and take a sample for an additional field test. If these tests pass, then the seam shall be repaired. If the test fails, then the process is repeated to establish the zone in which the seam should be repaired. This process may only be repeated twice. After the third failed test, the entire seam must be repaired.

b) Acceptable repaired seams shall be bound by two locations from which sample passing destructive tests have been taken. In cases where repaired seam exceeds 150 feet, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with this CQA Plan.

c) The Installer shall document actions taken in conjunction with destructive test failures.

7.11 Repair Procedures

1. Any portion of the geomembrane exhibiting signs of defect, failing a destructive or a nondestructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be made by the Site CQA Manager.
2. The repair procedures available include:
   a. Defective seams shall be restarted/reseamed as described in this CQA Plan.
   b. Small holes shall be repaired by extrusion cap welding. If the hole is larger than 1/4 inch, it shall be patched with a piece of material extending six inches out from the damaged area.
   c. Tears shall be repaired by patching. The sharp end of a tear on a slope, or in an area of particular stress, must be rounded prior to patching.
   d. Blisters, large holes, undispersed raw materials, and contamination by foreign matter shall be repaired by patches.
   e. HDPE surfaces to be patched shall be abraded and cleaned no more than one hour prior to the repair. No more than 10% of the thickness shall be removed.
   f. Patches shall be round or oval in shape, made of the same geomembrane, and extend to a minimum of six inches beyond the edge of defects. Patches shall be of the same compound and thickness as the geomembrane specified. Patches shall have their top edge beveled prior to placement on the geomembrane in accordance with this CQA Plan. Patches shall be applied and the repair made using methods discussed in the CQA Plan.
3. Restart/Reseaming Procedures - Fillet Extrusion Welds
   The Fillet Extrusion Welds process shall restart by grinding the existing seam and rewelding a new seam. Welding shall commence where the grinding started and must overlap the previous seam by at least two inches. Reseaming over an existing seam without regrinding shall not be permitted.
4. Restart/Reseaming Procedures - Hot Wedge Welds
   Over the length of the seam failure, the Installer shall either cut out the old seam, reposition the panel and reseam, or add a cap strip, as required by the Site CQA Manager.
5. For any repair method, the following provisions shall be satisfied:

a) Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair.
b) Surfaces shall be clean and dry at the time of the repair.

6. Repair Verification
   a) Each repair shall be numbered and logged by the installer and the Site CQA Manager. Each repair shall be nondestructively tested using the methods described in Section 5.10, Subsection 2 “Non-Destructive Testing” as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150 feet long may be of sufficient length to require destructive test sampling, at the discretion of the Site CQA Manager. Failed tests indicate that the repair shall be redone and retested until passing test results are achieved. The Site CQA Manager shall observe nondestructive testing of repairs. The installer shall record the number of each repair, date and test outcome.
7. Disposal of Waste Material
   Upon completion of installation, the Installer shall dispose of trash, waste material, etc., and shall leave the premises in a neat and acceptable condition.

7.12 Geomembrane Acceptance

The Installer shall retain ownership and responsibility for the geomembrane until acceptance by the Owner. The geomembrane liner shall be accepted by the Owner when the following conditions are met:

1. Installation is finished.
2. Verification in the form of a certificate of acceptance of the adequacy of field seams and repairs, including associated testing, is complete.
3. Certification by the Site CQA Manager that the geomembrane was installed in accordance with the Construction Drawings, this CQA Plan and manufacturers recommendations.
4. Certification, including "as built" drawing(s) and installation documentation, is provided by the Installer to the Site CQA Manager.

8.0 GEONET

8.1. Geonet Properties

Geonet is proposed as the leak detection layer for the evaporation ponds and landfill.

1. The geonet shall be manufactured of new, prime first-quality materials designed and manufactured specifically for the purpose of planar drainage of liquid and chemically resistant to leachate.
2. Geonets are unitized sets of parallel ribs positioned in layers to form a three-dimensional structure such that liquid can be transmitted within their open spaces.
3. The geonet material shall meet the minimum properties listed in **Table II.7.9.**

8.2 Manufacturer Quality Control Documentation

Prior to installation commencement of any geonet material, the Contractor shall provide to the Site CQA Manager the following information certified by the manufacturer for the delivered geomembrane.

1. Origin, identification and production of the resin (supplier's name, brand name and production plant).
2. Copies of quality control certificates issued by the resin supplier.
3. Manufacturer's certification verifying that the quality of the resin used to manufacture the geonet meets the resin specifications fingerprint properties shown in **Table II.7.9**.
4. Each roll delivered to the project site shall have the following identification information:
    - Manufacturer's name
    - Product identification
    - Thickness
    - Roll number
    - Roll dimensions
5. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, frequency, and test results. At a minimum, the following test results shall be provided in accordance with applicable test requirements specified in **Tables II.7.9.**

TABLE II.7.9
Technical Specifications
HDPE Geonet

PHYSICAL PROPERTIES				
PROPERTY	**QUALIFIER**	**UNIT**	**VALUE**	**TEST METHOD**
Thickness	Minimum	mils	200	ASTM D1777
Density	Minimum	g/cc	0.94	ASTM D1505
Melt Index	Range	g/10 min	0.1 - 1.1	ASTM D1238
Carbon Black Content	Range	%	2.0 - 3.0	ASTM D1603
Tensile Strength	Minimum	lb/in	42	ASTM D1682
Mass Per Unit Area	Minimum	lb/ft^2	0.16	ASTM D3776
Transmissivity (loaded)	Minimum	m^2/sec	$1x10^{-3}$	ASTM D4716

Notes:
1. Values representative of GSE 200-mil geonet or equivalent.
2. Standard test methods will be updated to reflect the most current industry standards.

8.3 Conformance Testing

1. Conformance testing shall be performed by an independent Quality Assurance Laboratory at a minimum of 1 per 100,000 ft^2. The Site CQA Manager or Installer shall obtain the samples from the roll, mark the machine direction and identification number. The number of lots and samples will be determined in accordance with ASTM D4354. The following conformance tests shall be conducted at the independent laboratory:
    - Thickness (ASTM D 1777)
    - Density (ASTM D 1505)
    - Wide width tensile properties (ASTM D 1682)
    - Mass per unit area (ASTM D 3776)
    - Carbon black (ASTM D 1603)

- Melt Index (ASTM D 1238)

2. These conformance tests shall be performed in accordance with **Tables II.7.9.**
3. Conformance test results shall be reviewed by the Site CQA Officer, and lots shall be accepted or rejected prior to the placement of the geomembrane. Test results shall meet, or exceed, the property values listed in **Tables II.7.9.** If the sampling results do not meet property values for any individual lot sample, the lot shall be resampled and retested. This retesting shall be paid for by the manufacturer or installer. If of the test values from the resamples pass the acceptable specification values listed in **Tables II.7.9,** the lot shall be accepted.

8.4 Delivery, Storage and Handling

1. The geonet rolls shall be packaged and shipped by appropriate means to prevent damage of the geonet rolls. Off-loading and storage of the geomembrane is the responsibility of the Installer. The Installer shall be responsible for replacing any damaged or unacceptable material at no cost to the Owner.
2. No off-loading shall be performed unless the Site CQA Manager is present. Damage during off-loading shall be documented by the Site CQA Manager. Damaged rolls must be separated from the undamaged rolls until the proper disposition of that material has been determined collectively by the installer and Site CQA Manager.
3. The geonet rolls shall be stored so as to be protected from puncture, dirt, grease, water, moisture, mud, mechanical abrasions and excessive heat that may damage the geonet material. The rolls shall be stored on a prepared surface (not wooden pallets) and shall elevated from the ground (a minimum of 3 inches) to protect the geonet from standing water.

8.5 Guarantee

1. The Contractor shall guarantee the HDPE geonet against defects in installation and workmanship for the period of two years commencing with the date of final acceptance by the Owner. The guarantee shall include the services of qualified service technicians and materials required for the repairs at no expense to the Owner.

8.6 Geonet Installation

8.6.1 Geonet Placement

a. As each roll is moved from the storage area by the Installer, the labels shall be removed by the Installer and submitted to the Site CQA Manager. The rolls of geonet shall be brought to the area to be lined with a front-end loader and support pipes set up such that the geonet roll is fully supported across its length. A spreader bar or similar device shall be used to prevent the lifting chains or slings from damaging the edges.
b. Care shall be taken to keep the geonet clean and free from debris prior to installation. If the geonet is not clean, it should be washed using a high-pressured hose prior to installation.

c. Each panel of the geonet shall be rolled out and installed in accordance with the approved shop drawings prepared by the Installer. The layout shall be designed to keep field joining of the geonet to a minimum and consistent with proper methods of geonet installation.
d. On slopes, the geonet shall be secured and rolled down the slope in such a manner as to continually keep the geonet panel in tension. If necessary, the geonet shall be positioned by hand after being unrolled to minimize wrinkles.
e. In areas where wind is prevalent, geonet installation should be started at the upwind side of the project and proceed downwind. The leading edge of the geonet shall be secured at times with sandbags or other means sufficient to hold it down during windy conditions.
f. The geonet shall not be welded to the geomembrane.
g. The geonet shall only be cut using scissors or other cutting tools approved by the Manufacturer that will not damage the underlying geosynthetics. Care shall be taken not to leave tools on the geonet.
h. Necessary precautions shall be taken to prevent damage to underlying layers during placement of the geonet.
i. During placement of geonet, care shall be taken not to entrap dirt or excessive dust within the geonet that could cause clogging of the drainage system and/or stones that could damage the adjacent geomembrane. If dirt or excessive dust is entrapped in the geonet, it should be hosed clean prior to placement of the next material on top of it. In this regard, care shall be taken in handling the sandbags to prevent rupture or damage of the sandbag.
j. Once the geonet is removed from the storage area by the Installer, it becomes the responsibility of the Installer.

8.6.2 Field Seams

The following requirements shall be met during installation of the geonet:

a. Adjacent rolls shall be overlapped by a minimum of 4 inches.
b. Overlaps shall be secured by tying. Tying can be achieved by HDPE fasteners or polymer braids. Tying devices shall be white or yellow for easy inspection. Metallic devices will not be permitted.
c. Tying shall be every 5 feet along the slope and base, every 6 inches in the anchor trench, and every 6 inches along end-to-end seams on the floor of the landfill and pond.
d. No horizontal seams shall be allowed on side slopes.
e. In the corners of the side slopes where overlaps between perpendicular geonet panels are required, an extra layer of geonet shall be unrolled along the slope, on top of the previously installed geonet from top to bottom of the slope.
f. When more than one layer of geonet is installed, joints shall be staggered.

8.7 Field Quality Control

1. The Installer shall provide the Site CQA Manager with Daily Summary Reports addressing the following:
    - Underlying geomembrane approval for areas anticipated to be covered by geonet
    - The total number and location of panels placed
    - Location of repairs
2. The Field Installation Team Manager and the Site CQA Manager shall provide 100% inspection of the installation to ensure compliance with these technical specifications and Manufacturer recommended procedures.
    a. The surface of the geonet shall be clean and free of debris at the time of inspection.
    b. The Field Installation Manager shall record each roll number and lot number as panels are deployed, and a general description of the location of each panel.
    c. The Field Installation Manager and the Site CQA Manager shall inspect the overlap for each panel.
    d. The Field Installation Manager and the Site CQA Manager shall inspect the anchoring of the geonet.
    e. The Field Installation Manager and the Site CQA Manager shall inspect the geonet for any signs of defects or holes. Any areas requiring repair shall be marked and subsequently repaired in accordance with the Repair Procedures listed in these specifications.
    f. The Field Installation Manager and the Site CQA Manager shall reinspect, verify, and approve repairs and patches.
3. Repair Procedures
    a. Seams and non-seam areas of the geonet shall be inspected for defects, holes, and any sign of contamination by foreign matter in accordance with the Field Quality Control procedures listed in these specifications.
    b. Any defects shall be repaired by the Installer by placing a geonet patch with a minimum 12-inch overlap in all directions.
    c. The patch shall be secured to the original geonet panel by placing HDPE fasteners or polymer braids every 6 inches along the perimeter of the patch.
    d. For any repair method, surfaces shall be clean and dry at the time of the repair.
    e. Each completed repair shall be inspected and approved in accordance with the Field Quality Control procedures listed in this CQA Plan.

9.0 PROTECTIVE SOIL LAYER AND SELECT AGGREGATE

9.1 Protective Soil Layer

1. Protective soil layer material shall be comprised of readily available on-site materials free from organic substance and other deleterious matter typically comprised of materials from the unconsolidated formation at the surface of the site (sometimes referred to as “OAG”).
2. Protective soil layer material will be in direct contact with the geocomposite and shall have rounded particle shapes to avoid potential for damage.

9.2 Select Aggregate

Leachate Collection System Bedding Layer and Sumps

1. Washed select aggregate, shall be used for bedding material around the leachate collection pipes. The select aggregate shall be durable, resistant to weathering and shall be free organic material, and fines < 2% by dry weight.
2. The bedding aggregate shall have particle sizes that range from ¾ inch minimum diameter to 2.0 inch maximum diameter in accordance with ASTM C136.
3 The select aggregate shall have particle shapes that will not damage the HDPE liner with the use of a 10 oz/yd^2 non-woven geotextile cushion layer. The select aggregate shall be approved by the Engineer.

9.3 Conformance Testing

Protective Soil Layer

1. Conformance testing shall be performed on samples from each source of protective soil layer to assure compliance with the specifications. The following tests shall be performed on the samples:
   a. Permeability (ASTM D2434 or Falling Head) [min. 1 test per 2 acres]
   b. Total Thickness Test (survey or direct test) [min. 5 per acre]

Select Aggregate.

1. Gradation analysis shall be performed on samples from each source of the select aggregate to assure compliance with the project specifications.

9.4 Delivery, Storage and Handling

If protective soil/select aggregate materials are delivered to the site prior to approval, materials shall be stockpiled on-site in areas as dictated by the Owner to facilite approval by the Engineer. Provision shall be implemented to minimize surface water or dust impacts on the stockpile. Removal and placement of the materials shall be conducted in a manner to minimize intrusion of soils adjacent to and beneath the stockpile.

9.5 Protective Soil Layer Placement

1. After the completion of installation and acceptance of the liner system and related work activities, placement of the minimum 24 inch thick protective soil layer will be initiated following approval by the Engineer.
2. During the placement of the protective soil layer material, no construction equipment shall be allowed directly on the geocomposite and any damage shall be repaired immediately by the Contractor in accordance with this CQA Plan.
3. Care shall be taken to protect the liner system. Ramps shall be provided at down slopes and in other heavily traveled areas. Heavily traveled areas shall have a minimum of 3 feet of select material above the liner system.
4. Protective soil layer shall not be placed over folds in the geocompsoite.

5. Protective soil material shall be placed on the side slopes starting at the toe of the slope and working toward the top of the slope/berm.
6. The protective soil layer should be spread when the geocomposite is taut or stretched evenly over the base of the landfill. The protective soil layer material shall not be spread when the geocomposite is elongated due to higher daytime temperatures and/or exposure to sun.
7. Protective soil layer shall not be placed while the soil is frozen or thawing, or during unfavorable weather conditions.

9.6 Select Aggregate Placement

Leachate Collection System Bedding Layer and Sump Select Aggregate

After geosynthetic placement has been approved, placement of non-woven geotextile in the floor of the leachate collection system trench, leachate collection sump and leak detection sump will ensure protection of the geosynthetics from the overlying select aggregate layer.

A. Leachate Collection System Bedding Layer
   1. Placement of a 3 inch bedding layer in the bottom of the trench and on top of the geotextile consisting of select aggregate, 0.75 inch minimum diameter to 2.0 inch maximum diameter (maximum 2% fines by dry wright).
   2. Backfilling of the leachate pipe will be allowed only after placement and workmanship have been approved by the Site CQA Manager.
   3. Backfilling around the leachate pipe will be with the select aggregate to the depth and width shown on the construction drawings.
   4. Haunching of the select aggregate will provide stability to the pipe from the sides and from underneath.
   5. Placement of the select aggregate should be in gradual 4 inch to 6 inch lifts and tamped simultaneously with a blunt tamping tool to ensure the material is well consolidated under and around the pipe.
   6. Backfilling, with the select aggregate, should be brought up to a height of a minimum of 12 inches above the top of the pipe.

B. Leachate Collection Sump and Leachate Detection Sump Select Aggregate Placement
   1. Placement of a 2 foot layer in the sumps and on top of the geotextile consisting of select aggregate, 0.75 inch minimum diameter to 2.0 inch maximum diameter (maximum 2% fines by dry weight).
   2. Backfilling of the leachate collection and riser pipes will be allowed only after placement and workmanship have been approved by the Site CQA Manager.
   3. Backfill around the leachate collection and riser pipes will be with the select aggregate to the depth and width shown on the construction drawings.
   4. Placement of the select aggregate should be in gradual 4 inch to 6 inch lifts and teamped simultaneously with a blunt tamping tool to ensure the aggregrate is well consolidated under the sides of the pipes as well as around it.
   5. Care shall be taken during backfilling such that damage to the leachate collection and riser pipes is avoided.

9.7 Field Quality Control

A. The protective soil layer thickness shall be verified by survey on a minimum frequency of 5 survey points per acre.
B. The protective soil layer thickness may be measured periodically throughout the day during construction to confirm that the thickness of the installed material is in accordance with the Engineering Drawings.
    1. Protective Soil Layer Thickness (i.e., Survey 5/acre, Test Probe, Calibrated cones).

9.8 Protective Soil Layer - Thickness Confirmation Procedure

Due to the effects of wind and stormwater, the protective soil may not maintain a full 24 inch thickness at locations over time. The following procedure (**Table II.7.10**) has proven effective at confirming protective layer thickness at the most important point in time when the protective soil layer is being covered with waste.

TABLE II.7.10
Protective Soil Layer – Supplemental Thickness Confirmation Procedure

1. Prior to advancing the fill face over new sections of the liner, the protective soil cover in these areas may be tested to confirm a thickness not less than 24 inches.
2. The area that may be tested will include the footprint where the next lift of waste will be placed over the protective cover; plus a buffer zone at least 50 feet ahead of the advancing fill face.
3. Add select protective soil material from the designated stockpile in the area to be tested if additional thickness is required.
4. Perform protective cover depth probe by field survey, with a blunt instrument or construction cones (i.e., no shovels) on a spacing not to exceed 100 feet. The instrument shall have a smooth rounded or flat tip, and it shall be advanced carefully until contact with the geosynthetic surface is confirmed. Care must be taken not to damage the geosynthetic surface.
5. The probes or traffic cones shall be calibrated such that the 24 inch length is visible and prominently marked. Record probe test results (both passing and failing) in the Site Log Book and/or on forms provided specifically for this purpose.
6. In sections where the protective cover is less than 24 inches thick, add additional protective soil to the area and retest. Continue this procedure until test locations meet the 24 inch thickness criterion, and the intervening protective cover layer surface appears level and smooth.
7. Record any retest data results in the Site Log Book and/or on forms provided specifically for that purpose (example included in appendix). The information recorded shall include, at a minimum;
    - Testing Date
    - Testing Personnel
    - Probe Identification
    - Approximate Probe Locations
    - Probe Test Results
    - Probe Retest Results
8. Maintain records regarding the protective soil layer on-site at all times for review by OCD inspectors, and by landfill management and engineering personnel.

10.0 GEOTEXTILE

10.1 Geotextile Properties

1. The 10 oz/yd^2 non-woven geotextile shall meet the specifications provided in **Table II.7.11**.
2. The minimum roll width shall be 15 feet, and the maximum roll length shall be 300 feet.

10.2 Manufacturer's Quality Control Documentation

Prior to installation commencement of any geonet composite material, the Contractor shall provide to the Site CQA Manager the following information certified by the manufacturer for the delivered geotextile.

1. Each roll delivered to the project site shall have the following identification information:
    - Manufacturer's name
    - Product identification
    - Thickness
    - Roll number
    - Roll dimensions
2. Quality control certificates, signed by the manufacturer's quality assurance manager. Each certificate shall have roll identification number, sampling procedures, frequency, and test results. At a minimum, the following test results shall be provided in accordance with applicable test requirements specified in **Table II.7.11**:
    - Thickness (ASTM D5199)
    - Weight (ASTM D5261)
    - Tensile strength (ASTM D4632)
    - Elongation (ASTM D4632)
    - Puncture strength (ASTM D4833)
    - Mullen burst strength (ASTM D3786)
    - Trapezoidal tear strength (ASTM D4533)
    - Coefficient of permeability (ASTM D4491)
    - Permittivity (ASTM D4491)
    - Flow rate (ASTM D4491)
    - UV resistance (ASTM D4355)
    - Apparent opening size (ASTM D4751)

10.3 Conformance Testing

1. Conformance testing shall be performed by an independent Quality Assurance Laboratory approved by the Engineer at a minimum of one (1) per 100,000 ft^2. The Site CQA Manager or Installer shall obtain the samples from the roll, mark the machine direction and identification number. The number of lots and samples will be determined in accordance with ASTM D4354. The following conformance tests shall be conducted at the independent laboratory:
    - Weight (ASTM D5261)
    - Tensile strength (ASTM D4632)
    - Puncture strength (ASTM D4833)
    - Mullen burst strength (ASTM D3786)
    - Trapezoidal tear strength (ASTM D4533)
    - Apparent opening size (ASTM D4751)

TABLE II.7.11
Technical Specifications
Non-Woven Geotextile[1]

PHYSICAL PROPERTIES (MARV[2])				
PROPERTY	**QUALIFIER**	**10 oz/yd² UNIT**	**VALUE**	**TEST METHOD[4]**
Weight	MARV	10.0	oz/yd²	ASTM D5261
Thickness	MARV	105	Mils	ASTM D5199
Tensile Strength	MARV	270	Lbs	ASTM D4632
Elongation	MARV	50	%	ASTM D4632
Puncture Strength	MARV	180	Lbs	ASTM D4833
Mullen Burst Strength	MARV	520	psi	ASTM D3786
Tapezoidal Tear Strength	MARV	105	lbs	ASTM D4533
Apparent Opening Size (AOS)	Max ARV[3]	100	US Sieve	ASTM D4751
Coefficient of Permeability	MARV	0.30	cm/sec	ASTM D4491
Permittivity	MARV	1.20	sec^{-1}	ASTM D4491
Flow Rate	MARV	85	gpm/ft²	ASTM D4491
UV Resistance	MARV	70	% Retained @ 500 hrs	ASTM D4355
Roll Width (Nominal)	Measured	15	feet	n/a
Roll Length (Nominal)	Measured	300	feet	n/a

Notes:

1. *Values reported represent Propex Geosynthetics (formerly Synthetic Industries) 1071 Nonwoven.*
2. *Values shown are in weaker principal direction. Minimum average roll values (MARV) are calculated as the typical minus two standard deviations. Statistically, this yields a 97.7% degree of confidence that any samples from quality assurance testing will be in compliance with the target values.*
3. *Maximum Average Roll Values (Max ARV) represent typical plus two standard deriations.*
4. *Geotextiles with greater or equivalent properties may be used for select application.*
5. *Standard test methods will be updated to reflect the most current industry standards.*

2. These conformance tests shall be performed in accordance with **Table II.7.11.**
3. Conformance test results shall be reviewed by the Site CQA Officer, and lots shall be accepted or rejected prior to the placement of the geotextile. Test results shall meet, or exceed, the property values listed in **Tables II.7.11.** If the sampling results do not meet property values for any individual lot sample, the lot shall be resampled and retested. This retesting shall be paid for by the manufacturer or installer. If the test values from the resamples pass the acceptable specification values listed in **Table II.7.11,** the lot shall be accepted.

10.4 Installation

1. Leachate Trench/Sump Preparation
   a. Before the geotextile is placed into position in the leachate collection pipe trench, leachate collection sumps, and leak detection sumps, the following procedures will be completed.
      (1) The subgrade at the bottom and sides of the trench and sumps shall be carefully prepared in accordance with this CQA Plan.
      (2) Underlying geosynthetics have been installed in accordance with this CQA Plan.
2. Geotextile Installation
   a. After geosynthetic placement has been approved by the Site CQA Manager, the Geotextile Installer shall place the non-woven geotextile in the bottom of the trench, leachate collection and leachate detection sumps to ensure protection of the underlying geosynthetics from the overlying select aggregate layer.
      (1) Exposure of the geotextiles to the elements between lay down and cover shall be a maximum of 14 days.
      (2) The 10 oz/yd^2 non-woven geotextile shall be placed atop the underlying geosynthetics in the trenches, leak detection sump and leachate collection sump. The geotextile shall be placed such that the centerline of the geotextile lines up with the centerline of the trench. The geotextile shall be joined by overlapping and sewing. Overlapped seams shall have a minimum overlap of 6 inches.
      (3) The Installer shall take care not to damage the underlying geosynthetic materials. The Installer is responsible for any damage to the geotextile and underlying geosynthetics caused during geotextile installation.
3. Field Quality Control
   a. The Site CQA Manager shall inspect the installation for proper placement, sufficient overlap and damaged material. Damaged areas will be repaired in accordance with the Repair Procedures of this CQA Plan.
4. Repair Procedures
   a. A geotextile patch shall be placed over the damaged area and extend three feet beyond the perimeter of the tear or damage.
   b. The Site CQA Manager shall verify repairs.
5. Select Aggregrate Installation
   a. Placement of a 3 inch bedding layer in the bottom of the leachate collection pipe trench and on top of the geotextile will be performed by the Contractor.

b. Placeement of the 2 feet of select aggregrate in the leachate collection and leak detection sumps shall be performed by the Contractor.

6. Leachate Pipe Installation
   a. Installation of the slotted or perforated Sch 80 PVC or SDR 11 HDPE leachate collection pipe onto the bedding layer will be performed in accordance with the Leachate Pipe Specifications.
   b. Installation of the Sch 80 PVC or SDR 11 HDPE sump riser pipes will be performed in accordance with the Geopipe Specifications.
7. Select Aggregate Backfill
   a. Backfill of completed sections of the leachate trench shall be completed only after placement and workmanship have been approved by the Site CQA Manager and the top of leachate pipe has been surveyed to verify grade.
   b. Backfill of the leachate collection and leak detection sumps shall be completed only after placement and workmanship of the riser pipes has been approved by the Site CQA Manager.

11.0 GEOPIPE

11.1 General

The design of the evaporation ponds and landfill cells employ a leak detection system with sumps atop of the secondary liner that are monitored with piping to allow for the removal of liquids that may collect in the detection sump.

The landfill design employs a leachate collection system atop the primary composite liner that includes leachate collection piping and leachate extraction piping. The leachate collection system is comprised of slotted or perforated geopipes which collect leachate seepage through the drainage layer directing it to the permanent or temporary leachate collection sumps where leachate extraction piping is installed. These geopipes are placed within select aggregate and wrapped with a non-woven geotextile material and covered by the granular drainage layer. At the end of each slotted or perforated permanent leachate collection geopipe, a solid geopipe is attached which rises up along the landfill sideslope to allow cleanout of the pipe. The sump extraction geopipes rise along the landfill and pond sideslope to allow extraction of liquid from the leachate collection and leak detection sumps. Leachate collection and leak detection piping design is shown on Engineering Drawings.

11.2 HDPE Geopipe Material Properties

1. High Density Polyethylene (HDPE) Pipe utilized for the leachate collection pipe and leachate extraction pipe will be manufactured in accordance with ASTM D714 and have the following physical characteristics:
   a) Perforated 6-inch diameter HDPE Driscopipe as manufactured by Phillips 66, or approved equal, with a standard dimension ratio (SDR) of 11 as shown on the Engineering Drawings.

b) Solid wall 12-inch diameter HDPE Driscopipe as manufactured by Phillips 66, or approved equal, with a standard dimension ratio (SDR) of 11 as shown on the Engineering Drawings.
c) Solid wall 4-inch diameter HDPE Discopipe as manufactured by Phillips 66, or approved equal, with a standard dimension ratio (SDR) of 11 as shown on the Engineering Drawings.
d) HDPE pipe shall meet the requirements of cell classification PE 345464C or higher cell classification in accordance with ASTM D3350.
e) The slots or perforations must conform with the Engineering Drawings.
f) The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
g) Apart from structural voids and hollows associated with some profile wall designs, the pipe fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions or other defects.

2. HDPE Pipe Fittings
   a) HDPE fittings shall be manufactured in accordance with the requirements of ASTM E714.
   b) End caps for the clean-out risers will be of low pressure type HDPE, or similar.

11.3 Polyvinyl Chloride (PVC) Geopipe Material Properties

If Polyvinyl Chloride (PVC) Pipe is utilized for the leak extraction or leachate collection pipe, the material will be manufactured in accordance with ASTM D1784 and have the following physical characteristics:

a) PVC pipe will be Schedule 80 or as indicated on the Drawings. The pipes will conform to the requirements of ASTM D1785 and will have the nominal dimensions shown on the Engineering Drawings.
b) Pipe and fitting will be manufactured from a PVC compound which meets the requirements of Type 1, Grade 1, Polyvinyl chloride (PVC) as outlined in ASTM D1784. A Type1, Grade 1 compound is characterized as having the highest requirements for mechanical properties and chemical resistance.
c) Pipe will be furnished in standard laying lengths not exceeding twenty (20) feet.
d) Fittings will conform to the requirements of ASTM D2467 for socket type joints.
e) Slotted or perforated 6- inch diameter PVC leachate collection pipe as shown on the Engineering Drawings.
f) Solid wall 12-inch diameter PVC leachate extraction pipe as shown on the Engineering Drawings.
g) Solid wall leak detection pipe as shown on the Engineering Drawings.
h) The pipe will be solvent welded according to manufacture specifications

11.4 Manufacturer's Quality Control Documentation

Prior to installation of the geopipe, the Contractor shall provide the following information certified by the manufacturer for the delivered geopipe:

1. Manufacturer's certification verifying that the quality of the raw materials used to manufacture the geopipe meets the Manufacturer specifications.
2. Each geopipe length delivered to the project site shall have the following identification information:
   - Manufacturer's name
   - Pipe size
   - Ring stiffness constant classification or SDR number
   - Production code designating plant location, machine, and date of manufacture.

11.5 Delivery, Storage and Handling

1. Off-loading and storage of the geopipe shall be performed by the Contractor.
2. Storage of the geopipe shall not exceed 17 rows high, as per Manufacturer's recommendation.
3. The Contractor shall be responsible for moving the pipes and fittings from the storage area to the area of pipe installation. The Contractor shall be responsible for replacing any material damaged during transport or installation.

11.6 Quality Assurance

1. Finished Product Evaluation
   A. Each length of pipe produced shall be checked by production staff for the items listed below. The results of measurements shall be recorded on production sheets which become part of the Manufacturer's permanent records.
      1) Pipe in process shall be checked visually, inside and out for cosmetic defects (grooves, pits, hollows, etc.).
      2) Pipe outside diameter shall be measured using a suitable periphery tape to ensure conformance with ASTM D1785.
      3) Pipe wall thickness shall be measured at 12 equally spaced locations around the circumference at both ends of the pipe to ensure conformance with the Manufacturer's specifications.
      4) Pipe length shall be measured.
      5) Pipe marking shall be examined and checked for accuracy.
      6) Pipe ends shall be checked to ensure they are cut square and clean.

11.7 Installation

11.7.1 Leachate Collection Pipe

1. Leachate Collection Trench Preparation
   A. Before the geopipe is placed into position in the trench, the following procedures will be completed:

1) The subgrade at the bottom and sides of the trench shall be carefully prepared as shown on the Engineering Drawings by the Contractor.
2) The subgrade will be covered by a composite liner by the Liner Installer according to the Engineering Drawings.

2. Geotextile Installation
   A. After composite liner placement has been approved, the Liner Installer shall place the non-woven geotextile in the bottom of the leachate trench to ensure protection of the composite liner from the overlying select aggregate layer in accordance with the Geotextile Cushioning Fabric specifications.
3. Bedding Layer Installation
   A. Placement of a three 3-inch bedding layer in the V-notch trench and above the geotextile consisting of select aggregate, 0.75 inch minimum diameter to 2.0 inch maximum diameter (maximum 2% fines by dry weight) will be performed.
      1) "Spading" with shovels or any other activities which could jeopardize the underlying liner's integrity will not be allowed.
      2) The three (3) inch bedding layer is discussed in more detail under Protective Soil Layer and Select Aggregate (Section 9.0).
4. Leachate Collection Pipe Installation
   A. Polyvinyl Chloride (PVC) Leachate Collection Pipe Installation.
      1) Installation of the 6-inch diameter perforated SCH 80 PVC pipe onto the bedding layer will be performed in such a manner as not to jeopardize the integrity of the pipe.
      2) Each pipe section shall be accurately placed to the line and grade called for on the Engineering Drawings.
      3) Pipe and fittings shall be inspected before being placed and no defective pipe shall be laid. Installation practices shall conform with ASTM D2321 and specific Manufacturer's recommendations.
      4) Trenches shall be kept free from water during pipe laying, jointing or before sufficient backfill has been placed to prevent flotation of the pipe. The Pipe Contractor shall provide ample means and devices to remove and dispose of water promptly from any source entering the construction area of pipe laying.
      5) No connection shall be made where joint surfaces and joint materials have been soiled by earth handling until such surfaces are thoroughly cleaned.
      6) As the work progresses, the interior of pipes shall be kept clean by the Contractor. After each line of pipe has been laid, it shall be carefully inspected and earth, trash, rags, and other foreign matter removed from the interior.
      7) Slots/perforations on adjoining sections of pipe shall remain in alignment after fusion welding.
      8) Two sets of pipe slots/perforations shall be facing vertically down after pipe placement in the trench.
   B. High Density Polyethylene (HDPE) Leachate Collection Pipe Installation
      1) Installation of the 6-inch diameter perforated SDR 11 HDPE pipe onto the bedding layer will be performed in such a manner as not to jeopardize the integrity of the pipe.

2) Trenches shall be kept free from any deleterious material, water or backfill to prevent damage to the pipe. The Contractor shall provide means and devices to remove promptly and dispose of any deleterious material, or water entering the area of pipe laying.
3) Installation practices shall conform with ASTM D2321 and any specific manufacturer's recommendations.
4) HDPE pipe joints shall be butt fused in the field in accordance with the manufacturer's instructions. Fused joints, when tested for tension and pressure, shall be stronger than the pipe itself.
5) As many sections of pipe as practical shall be fused together outside of the lined landfill cell to minimize damage to the liner system during pipe fusion.
6) No connection shall be made where joint surfaces and joint materials have been soiled until such surfaces are thoroughly cleaned.
7) As the work progresses, the interior of pipes shall be kept clean. After each line of pipe has been laid, it shall be carefully inspected and earth, trash, rags, and other foreign matter removed from the interior.
8) Slots/perforations on adjoining sections of pipe shall remain in alignment after fusion welding.
9) Two sets of pipe slots/perforations shall be facing vertically down after pipe placement in the trench.

5. Field Quality Control
   a) After completion of any section of geopipe; the grades, joints, and alignment shall be true to line and grade.
   b) The leachate collection pipe grade shall be surveyed on maximum 50 foot centers for compliance with the approved design.
   c) The Site CQA Manager shall inspect the installation. The pipe shall be completely free from any cracks and from protruding joint materials, deposits of sand, mortar, dirt, debris or other materials on the inside.
6. Leachate Trench Backfill
   1) The Contractor shall backfill completed sections of pipe trench with additional select aggregate (0.75 inch to 2.0 inch diameter) around and above the pipe to a minimum thickness of 12 inches above the pipe as shown on the Engineering Drawings. Backfilling over the pipe trench will be allowed only after placement and workmanship have been approved by the Site CQA Manager.
   2) Placement of a geotextile layer will be completed as shown on the Engineering Drawings.

11.7.2 Leachate Collection and Leak Detection Sumps

1. Leachate Collection and Leak Detection Sump Preparation
   A. Before the leachate collection and leak detection riser geopipe is placed into position in the sumps, the following procedures will be completed:
      1) The subgrade at the bottom and sides of the sumps shall be carefully prepared as shown on the Engineering Drawings by the Contractor.
      2) The subgrade will be covered by a composite liner by the Liner Installer according to the Engineering Drawings.

2. Geotextile Installation
   A. After composite liner placement has been approved, the Installer shall place the non-woven geotextile in the bottom of the leachate collection and leak detection sumps to ensure protection of the composite liner from the overlying select aggregate layer in accordance with the Geotextile Cushioning Fabric specifications.
3. Select Aggregate Installation
   A. Placement of 2 feet of select aggregate in the sumps and above the geotextile consisting of 0.75 inch minimum diameter to 2.0 inch maximum diameter (min 2% fines by dry weight) will be performed."Spading" with shovels or any other activities which could jeopardize the underlying composite liner's integrity will not be allowed.
4. Leachate Extraction and Leak Detection Pipe Installation
   A. Polyvinyl Chloride (PVC) Leachate Extraction and Leak Detection Pipe Installation.
      1) Installation of the 12-inch pipe in the leachate collection and leak detection sumps will be performed in such a manner as not to jeopardize the integrity of the pipe.
      2) Each pipe section shall be accurately placed to the line and alignment called for on the Engineering Drawings.
      3) Pipe and fittings shall be inspected before being placed and no defective pipe shall be laid. Installation practices shall conform with ASTM D2321 and specific Manufacturer's recommendations.
      4) Sumps shall be kept free from water during extraction pipe installation, jointing or before sufficient select aggregate backfill has been placed to prevent flotation of the pipe. The Pipe Contractor shall provide ample means and devices to remove and dispose of water promptly from any source entering the construction area of pipe laying.
      5) No connection shall be made where joint surfaces and joint materials have been soiled by earth handling until such surfaces are thoroughly cleaned.
      6) As the work progresses, the interior of pipes shall be kept clean by the Contractor. After each extraction pipe has been laid along the side slope, it shall be carefully inspected and earth, trash, rags, and other foreign matter removed from the interior.
      7) Slots/perforations on the bottom 6 feet of the leachate extraction and leak detection riser pipes shall be as shown on the Engineering Drawings.
   B. High Density Polyethylene (HDPE) Leachate Collection and Leak Detection Pipe Installation
      1) Installation of the 12-inch or 4-inch diameter SDR 11 HDPE pipe in the leachate collection and leak detection sumps will be performed in such a manner as not to jeopardize the integrity of the pipe.
      2) Each pipe section shall be accurately placed to the line and alignment called for on the Engineering Drawings.
      3) The leachate collection and leak detection sumps shall be kept free from any deleterious material, water or backfill to prevent damage to the pipe. The Contractor shall provide means and devices to remove promptly and dispose of any deleterious material, or water entering the area of pipe laying.
      4) Installation practices shall conform with ASTM D2321 and any specific manufacturer's recommendations.

5) HDPE pipe joints shall be butt fused in the field in accordance with the manufacturer's instructions. Fused joints, when tested for tension and pressure, shall be stronger than the pipe itself.
6) As many sections of pipe as practical shall be fused together outside of the composite lined area to minimize damage to the composite liner during pipe fusion.
7) No connection shall be made where joint surfaces and joint materials have been soiled until such surfaces are thoroughly cleaned.
8) As the work progresses, the interior of pipes shall be kept clean. After each line of pipe has been laid along the side slope, it shall be carefully inspected and earth, trash, rags, and other foreign matter removed from the interior.
9) Slots/perforations on the bottom 6 feet of the leachate extraction and leak detection riser pipes shall be as shown on the Engineering Drawings.

5. Field Quality Control
   a) After completion of any section of the leachate collection and leak detection geopipe; the joints and alignment along the side slopes shall be true to line and alignment.
   b) The Site CQA Manager shall inspect the installation. The pipe shall be completely free from any cracks and from protruding joint materials, deposits of sand, mortar, dirt, debris or other materials on the inside.
   c) Placement of a geotextile layer will be completed as shown on the Engineering Drawings.

12.0 ENGINEERING CERTIFICATION

An Engineering Certification Report, incorporating the laboratory and field data, shall be submitted by Engineer to the New Mexico Energy, Minerals and Natural Resources Department, Oil Conservation Division confirming that the subgrade, liner, leak detection system and leachate collection system have been installed in compliance with the project specifications and the CQA Plan. The Engineering Certification Report shall be sealed by a Professional Engineer registered in good standing with New Mexico; and who has applicable expertise in landfill liner engineering.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.A

LINER QUALITY CONTROL PROJECT SPECIFICATIONS

Liner Quality Control Project Specifications
DNCS Environmental Solutions

---

1. Project Data

Site Name: _____ Date Prepared _____

Project/Cell: _____

Project Number _____ Project Start Date _____

Project Size _____ Acres or ft^2

Location _____

_____

Client Contact: _____

Phone: _____

Site Phone: _____

		Initials
I Project Manager	_____	_____
CQA Officer	_____	_____
CQA Technicians	_____	_____
	_____	_____
	_____	_____

Project Documentation Available

CQA Plan _____ Construction Drawings _____ Health and Safety Plan _____

Other: _____

Comments: _____

_____

_____

2. Subgrade/Soil Liner

2.1 Grade Control (Survey) Area: _____ Acres or ft^2

Performed By: _____ Date Performed: _____

Tolerance (vert) _____ feet or inches As-Built Drawing(s) Available? Y or N

_____

Thickness _____ feet or inches **NMED Standard = 1 per acre**

2.2 Compaction

		Sample ID	Maximum Density	Optimum Moisture
Reference Proctor(s)	_____ lb/ft^3	_____		
Standard (ASTM D698)	_____ lb/ft^3	_____		
Modified (ASTM D1557)	_____ lb/ft^3	_____		

Specifications

Density _____ % of Optimum Moisture _____ lb/ft^3

_____ lb/ft^3

Number of Lifts: _____ Lift Thickness (inches):

Loose: _____ Compacted: _____

Field Test Frequency: _____ per: acre/lift yd^3 other units: _____

Compaction Test Method: Nuclear Density Meter or Other: _____

Total Number of Density Tests Required _____ **NMED Standard = 4/acre/lift**

Field Permeability Tests required? Y or N Perm Test Method _____

2.3 Soil Classification Standards

Acceptable USCS: (circle or box)

GW	SW	ML	MH
GP	SP	CL	CH
GM	SM	OL	OH
GC	SC		

Subgrade/Liner Material Testing:

in situ _____ borrow source: _____

Testing Frequency		Quality Requirements	
Project	NMED	Project	NMED

Grain Size:

#200 Sieve _____ (percent passing)

C_u (D_{60}/D_{10}) _____

Other _____

Atterberg Limits: P.I.

Liquid Limit _____

Plastic Limit _____

Other _____

Laboratory Permeability: _____

2.4 Surface Preparation Y or N

_____ smooth surface

_____ remove angular material

_____ remove organic material

_____ remove rocks greater than _____ inches

3.0 Geosynthetics **Conformance Tests**

3.1 GCL

Area: _____ Acres or ft^2

Specifications:

collected by _____
performed by _____
frequency _____
total number _____

3.2 FML

Specifications: _____ 60 mil
_____ other

collected by _____
performed by _____
frequency _____
total number _____

HDPE Smooth Area: _____ Acres or ft^2

HDPE Textured Area: _____ Acres or ft^2

Other _____ Area: _____ Acres or ft^2

3.3 Geotextile (not including leachate system)

Specifications: oz
Woven or Nonwoven

Area: _____ Acres or ft^2

collected by _____
performed by _____
frequency _____
total number _____

3.4 Geonet

Area: _____ Acres or ft^2

Specifications: _____ thickness

collected by _____
performed by _____
frequency _____
total number _____

with Geotextile:
upper _____ lower _____

4.0 Leachate Collection System

Conformance Tests

4.1 Piping

Collection System — Specifications: _____
Linear Quantity — Material _____
Diameter _____
_____

Risers — Specifications: _____
Linear Quantity — Material _____
Diameter _____

4.2 Aggregate

Specifications:
greater than
smaller than

collected by _____
performed by _____
frequency _____
total number _____

4.3 Geotextile

Specifications: oz
Woven or Nonwoven

Area: _____ Acres or ft^2

collected by _____
performed by _____
frequency _____
total number _____

4.4 Sump

Design volume _____ yd^3 or gallons
Double Lined? Y or N
Area of double liner _____ ft^2

5.0 Protective Soil Layer

Conformance Tests

Area: _____ Acres or ft^2

Thickness (inches): _____

Volume _____ yd^3

performed by _____
frequency _____
total number _____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.B

APPROVAL/AUTHORIZATION TO PROCEED FORM

APPROVAL/AUTHORIZATION TO PROCEED FORM

THE FOLLOWING LINER SYSTEM SURFACE IS DEEMED ACCEPTABLE ON A VISUAL INSPECTION BY LINER CONTRACT REPRESENTATIVE:

PROJECT: _____

LAYER:
1. SUBGRADE _____
2. GEOSYNTHETIC CLAY LINER (GCL) _____
3. HDPE GEOMEMBRANE (FML) _____
4. GEONET _____

LOCATION: _____ TO _____

_____ TO _____

REMARKS: _____

_____

_____

_____

_____

_____

THE ABOVE NOTED LAYER IS NOW ACCEPTABLE FOR COVERING BY THE NEXT LAYER.

AUTHORIZATION BY:

LINER CONTRACTOR REPRESENTATIVE

_____ _____
SIGNATURE DATE

_____
PRINT NAME

SUBMITTED TO:

CQA REPRESENTATIVE

_____ _____
SIGNATURE DATE

_____
PRINT NAME

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.C

DAILY SUMMARY REPORT

DAILY SUMMARY REPORT

Project:		**Project No.:**	
Owner:		**Date:**	
Project Location:		**Report No.:**	
Weather:	A.M: ˚F,		
	P.M.: ˚F,		

Contractor(s)

Summary of Daily Construction Progress and Inspections:

Summary of Problems and Resolutions:

Equipment:

Summary of Meeting Held and Attendees:

Site CQA Technician	GEI CQA Officer
_____	_____
Signture	Signture
_____	_____
Print Name	Print Name

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.D

FIELD COMPACTION TESTING FORM

FIELD COMPACTION TESTING FORM

PROJECT INFORMATION	
PROJECT NAME:	PROJECT NO.:
OWNER:	DATE:
PROJECT LOCATION:	PAGE NO.:
TESTING INSTRUMENT	TECHNICIAN:
REFERENCE STANDARD PROCTOR (RSP):	REFERENCE MOISTURE (%):

TEST NUMBER	DRY DENSITY (PCF)	% RSP	% MOISTURE

TEST NUMBER	DRY DENSITY (PCF)	% RSP	% MOISTURE

REVIEWED BY: ______________________ **DATE:** ______________________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.E

GCL INVENTORY CONTROL LOG

GCL INVENTORY CONTROL LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION _____ **SHEET NUMBER:** _____

MATERIAL TYPE: _____ **DATE OF INVENTORY:** _____
MATERIAL IDENTIFICATION: _____ **INVENTORY MONITOR:** _____
MATERIAL MANUFACTURER: _____ **UNLOADING METHOD:** _____

	ROLL NUMBER	BATCH OR LOT NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	REMARKS
			LENGTH (FT)	WIDTH (FT)	AREA (FT^2)			
1								
2								
3								
4								
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REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.F

FML INVENTORY CONTROL LOG

FML INVENTORY CONTROL LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION _____ **SHEET NUMBER:** _____

MATERIAL TYPE: _____ **DATE OF INVENTORY:** _____
MATERIAL IDENTIFICATION: _____ **INVENTORY MONITOR:** _____
MATERIAL MANUFACTURER: _____ **UNLOADING METHOD:** _____

	ROLL NUMBER	BATCH OR LOT NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	REMARKS
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1								
2								
3								
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REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.G

GEONET INVENTORY CONTROL LOG

GEONET INVENTORY CONTROL LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION _____ **SHEET NUMBER:** _____

MATERIAL TYPE: _____ **DATE OF INVENTORY:** _____
MATERIAL IDENTIFICATION: _____ **INVENTORY MONITOR:** _____
MATERIAL MANUFACTURER: _____ **UNLOADING METHOD:** _____

	ROLL NUMBER	BATCH OR LOT NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	REMARKS
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1								
2								
3								
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REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.H

GEOTEXTILE INVENTORY CONTROL LOG

GEOTEXTILE INVENTORY CONTROL LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION _____ **SHEET NUMBER:** _____

MATERIAL TYPE: _____ **DATE OF INVENTORY:** _____
MATERIAL IDENTIFICATION: _____ **INVENTORY MONITOR:** _____
MATERIAL MANUFACTURER: _____ **UNLOADING METHOD:** _____

	ROLL NUMBER	BATCH OR LOT NO.	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	CONFORMANCE SAMPLE (Y/N)	REMARKS
			LENGTH (FT)	WIDTH (FT)	THICKNESS OR WEIGHT			
1								
2								
3								
4								
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7								
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REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.I

LEACHATE COLLECTION AND EXTRACTION PIPE INVENTORY CONTROL LOG

LEACHATE COLLECTION AND EXTRACTION PIPE INVENTORY CONTROL LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION: _____ **SHEET NUMBER:** _____

MATERIAL TYPE: _____ **DATE OF INVENTORY:** _____
MATERIAL IDENTIFICATION: _____ **INVENTORY MONITOR:** _____
MATERIAL MANUFACTURER: _____ **UNLOADING METHOD:** _____

	TYPE	QUANTITY	MATERIAL DIMENSIONS			MANUF. QC CERT. (Y/N)	TOTAL LENGTH (FT)	DATE INVENTORIED
			LENGTH (FT)	DIA. (IN)	PIPE SDR			
1								
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REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.J

GCL DEPLOYMENT LOG

GCL DEPLOYMENT LOG

PROJECT NAME: ______________________ **PROJECT NUMBER:** ____________
OWNER: ______________________ **CONTRACTOR:** ____________
PROJECT LOCATION: ______________________ **SHEET NUMBER:** ____________

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
			TOTAL LINER PLACED (FT^2):		

REVIEWED BY: ____________________ **DATE:** ______________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.K

FML DEPLOYMENT LOG

FML DEPLOYMENT LOG

PROJECT NAME: ______________________ **PROJECT NUMBER:** ____________
OWNER: ______________________ **CONTRACTOR:** ____________
PROJECT LOCATION: ______________________ **SHEET NUMBER:** ____________

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
TOTAL LINER PLACED (FT^2):					

REVIEWED BY: ______________ **DATE:** ____________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.L

FML TRIAL SEAMING TEST LOG

FML TRIAL SEAMING TEST LOG

PROJECT INFORMATION		PROJECT SPECIFICATIONS					
PROJECT NAME:	PROJECT NUMBER:	FUSION	TEXTURED:	PEEL	98 lbs/in	SHEAR	121 lbs/in
OWNER:	CONTRACTOR:		SMOOTH:	PEEL	98 lbs/in	SHEAR	121 lbs/in
PROJECT LOCATION:	SHEET NUMBER:	EXTRUSION	TEXTURED:	PEEL	78 lbs/in	SHEAR	121 lbs/in
			SMOOTH:	PEEL	78 lbs/in	SHEAR	121 lbs/in

DATE	TIME	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION WELDS		PULL	FIELD TEST RESULTS				
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5
									P					
									P					
									S					
									P					
									P					
									S					
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REVIEWED BY: ______________________ **DATE:** ______________________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.M

FML SEAMING LOG

FML SEAMING LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION: _____ **SHEET NUMBER:** _____

	DATE	PANEL #/PANEL #	APPROX. LENGTH WELDED	START TIME	SEAMER INITIALS	MACHINE #	TEMP SETTING	SPEED SETTING	DESTRUCTIVE TEST	MONITORED BY
1										
2										
3										
4										
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25										

REVIEWED BY: _____ **DATE:** _____

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.N

FML SEAM PRESSURE TEST LOG

FML SEAM PRESSURE TEST LOG

PROJECT INFORMATION			PROJECT SPECIFICATIONS
PROJECT NAME:	PROJECT NUMBER:		MIN START PSI:
OWNER:	CONTRACTOR:		TEST DURATION:
PROJECT LOCATION	SHEET NUMBER:		MAX PSI DROP:

	DATE	PANEL #/PANEL #	TESTER	TIME		PRESSURE		MONITORED BY	PASS/FAIL
				START	FINISH	INITIAL	FINAL		
1									
2									
3									
4									
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REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.O

FML DESTRUCTIVE FIELD TEST RECORD

FML DESTRUCTIVE FIELD TEST RECORD

PROJECT INFORMATION		PROJECT SPECIFICATIONS					
PROJECT NAME:	**PROJECT NUMBER:**	**FUSION**	TEXTURED:	PEEL	98 lbs/in	SHEAR	121 lbs/in
OWNER:	**CONTRACTOR:**		SMOOTH:	PEEL	98 lbs/in	SHEAR	121 lbs/in
PROJECT LOCATION:	**SHEET NUMBER:**	**EXTRUSION**	TEXTURED:	PEEL	78 lbs/in	SHEAR	121 lbs/in
			SMOOTH:	PEEL	78 lbs/in	SHEAR	121 lbs/in

DATE	DT #	QC INITIALS	WELDER'S INITIALS	MACHINE NUMBER	WEDGE WELDS		EXTRUSION		PULL	FIELD TEST RESULTS					COMMENTS
					Temperature	Speed	Barrel Temp	Pre-Heat Temp		Test #1	Test #2	Test #3	Test #4	Test #5	
									P						
									P						
									S						
									P						
									P						
									S						
									P						
									P						
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REVIEWED BY: ________________________ **DATE:** __________________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.P

FML SEAM VACUUM TEST/REPAIR LOG

FML SEAM VACUUM TEST/REPAIR LOG

PROJECT NAME: _____ **PROJECT NUMBER:** _____
OWNER: _____ **CONTRACTOR:** _____
PROJECT LOCATION: _____ **SHEET NUMBER:** _____

	REPAIR DATE	PANEL	TYPE OF REPAIR	REPAIR TECH	NUMBER OF LEAKS	TESTING TECH ID	DATE ACCEPTED	COMMENTS
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
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31								
32								
33								
34								
35								
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

REVIEWED BY: _____ **DATE:** _____

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.Q

GEONET DEPLOYMENT LOG

GEONET DEPLOYMENT LOG

PROJECT NAME: ______________________ **PROJECT NUMBER:** ____________
OWNER: ______________________ **CONTRACTOR:** ____________
PROJECT LOCATION: ______________________ **SHEET NUMBER:** ____________

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
TOTAL LINER PLACED (FT^2):					

REVIEWED BY: ______________________ **DATE:** ____________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 7: LINER CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

ATTACHMENT II.7.R

GEOTEXTILE DEPLOYMENT LOG

GEOTEXTILE DEPLOYMENT LOG

PROJECT NAME: ____________________ **PROJECT NUMBER:** ____________
OWNER: ____________________ **CONTRACTOR:** ____________
PROJECT LOCATION: ____________________ **SHEET NUMBER:** ____________

PANEL NUMBER	ROLL NUMBER	APPROXIMATE LENGTH (FT)	APPROXIMATE WIDTH (FT)	APPROXIMATE AREA (FT^2)	DATE INSTALLED
TOTAL LINER PLACED (FT^2):					

REVIEWED BY: ____________________ **DATE:** ____________

GORDON ENVIRONMENTAL, INC.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 8: VADOSE ZONE MONITORING PLAN

Table of Contents

List of Figures

List of Tables

List of Attachments

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 8: VADOSE ZONE MONITORING PLAN

1.0 INTRODUCTION

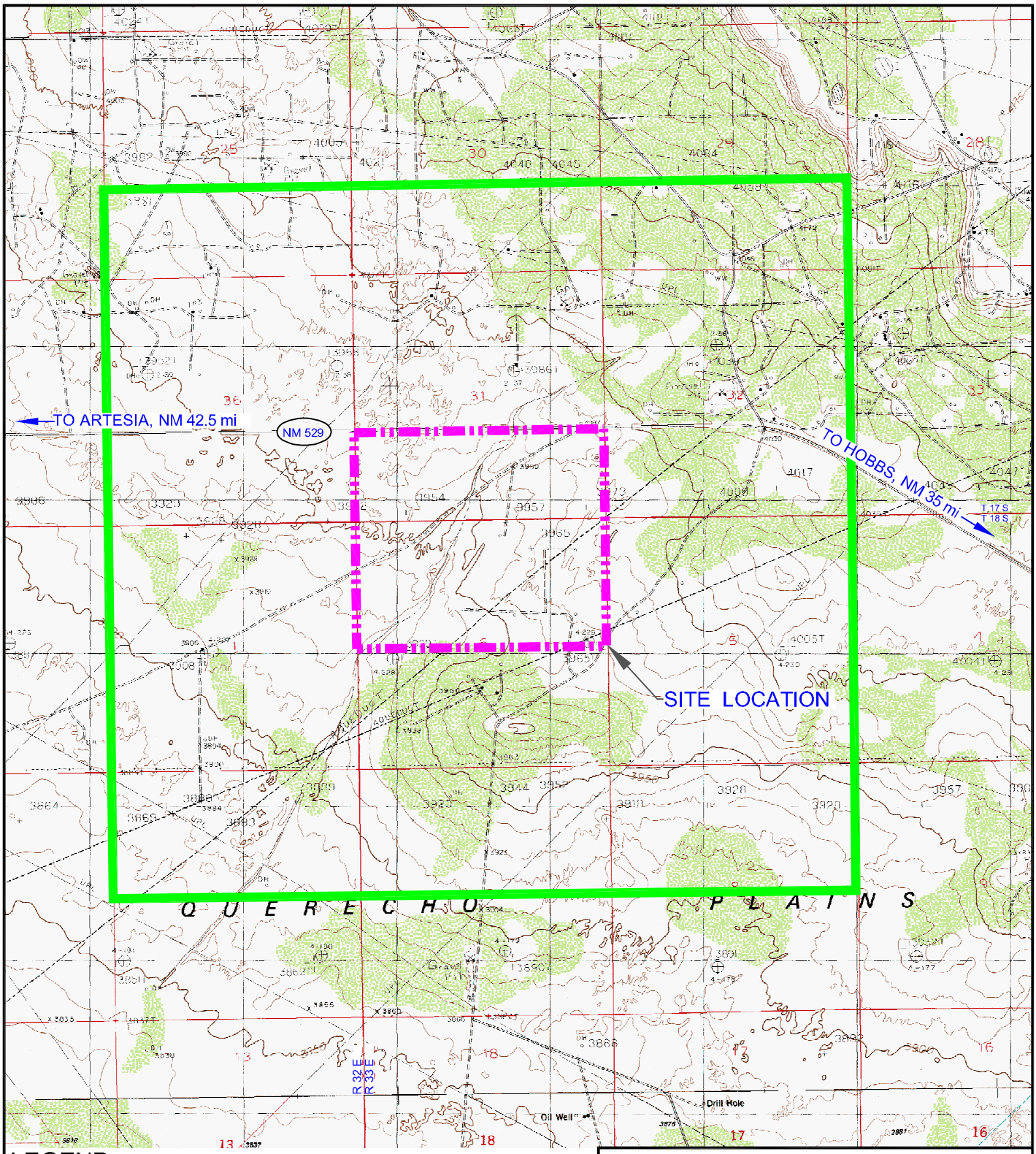
DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Purpose

The purpose of this Vadose Zone Monitoring Plan (the Plan) is to provide DNCS plans for the monitoring, recordkeeping, and reporting procedures for the site's vadose zone monitoring system. The Plan, as presented herein, is based, in part, on the OCD-approved "Proposal for Vadose Zone Monitoring" provided as **Attachment II.8.A**. The Plan identifies the locations of up to ten 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 DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of a 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM (**Figure II.1.1**). Site access will be provided via the south side of NM 529.



LEGEND

SITE BOUNDARY

1 MILE OFFSET FROM SITE

MAP REFERENCE:
LAGUNA GATUNA NW 1984,
MALJAMAR 1985 PROVISIONAL EDITION,
GREENWOOD LAKE 1985 PROVISIONAL EDITION, AND
DOG LAKE 1985 PROVISIONAL EDITION,
USGS 1:24000, 7.5 MINUTE SERIES, TOPOGRAPHIC MAPS

NORTH

0 1500' 3000'

SITE LOCATION MAP

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/03/2014	CAD: SITE LOC MAP.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: DRT	FIGURE II.8.1
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\RAI 1\SITE LOC MAP.dwg
Date/Time:Jun. 12, 2014-12:59:32 ; LAYOUT: A (P)

1.3 Facility Description

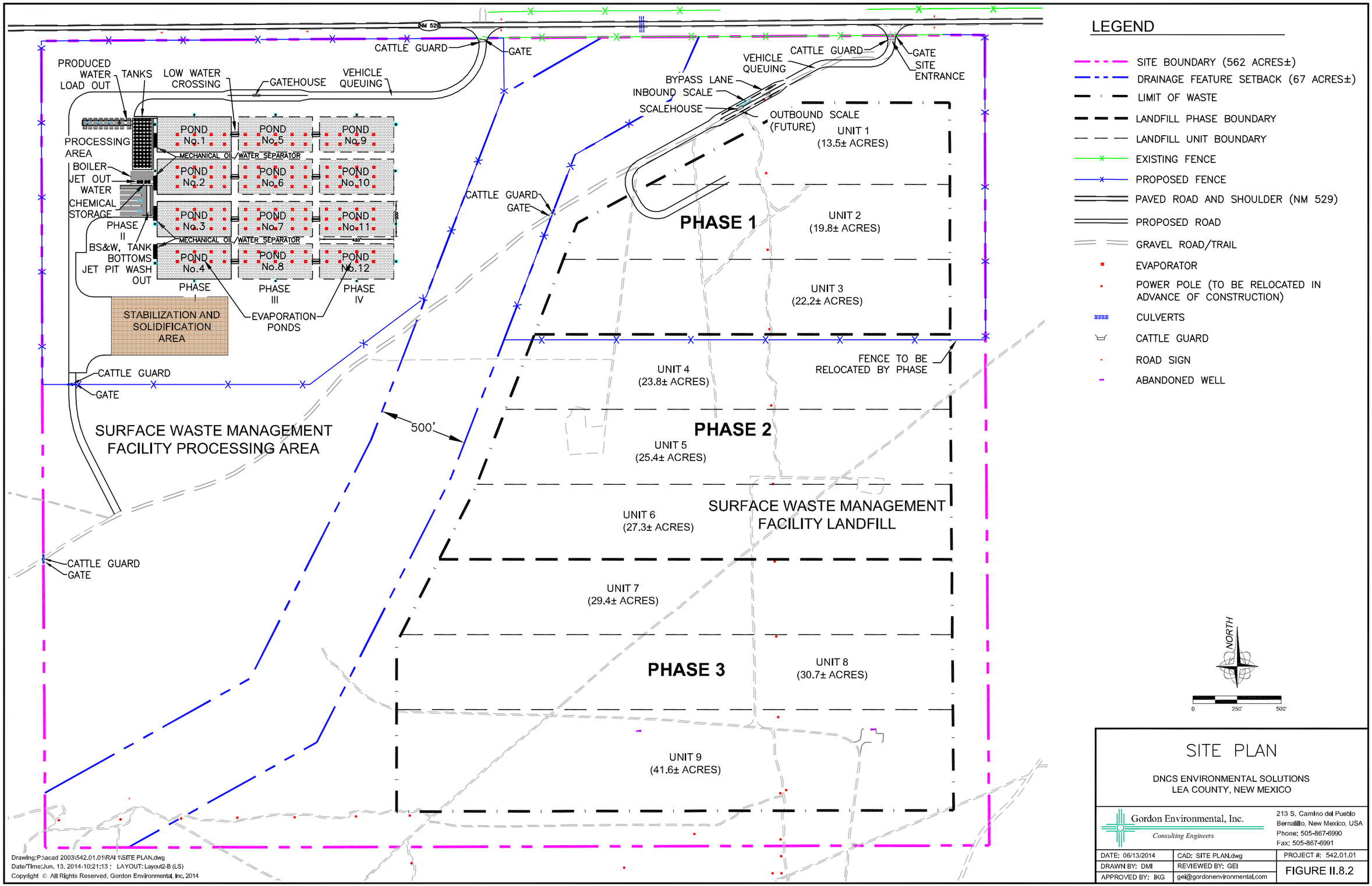
The 562-acre tract is intersected by a drainage feature that will be excluded from development, which includes minimum 250 foot (ft) from the centerline setbacks and totals 67 acres ±. The DNCS Facility will include two main components; a liquid oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±); totaling 495 acres ±. Oil field wastes are anticipated to be delivered to the DNCS Facility from oil and gas exploration and production operations in southeastern NM and west Texas. The Site Plan provided as **Figure II.8.2** identifies the locations of the Processing Area and Landfill facilities. The proposed facilities will be developed in four primary phases; which are described in the Operations, Inspection, and Maintenance Plan (**Volume II.1**).

2.0 VADOSE ZONE MONITORING NETWORK

The proposed vadose zone monitoring system for the DNCS Facility is designed to provide for earliest possible detection of potential fluid releases from the Landfill. The hydrogeologic setting described in **Attachment II.8.A** provides the detailed rationale for establishing the vadose zone monitoring network for the site. In summary, the vadose zone monitoring wells (VWs) will be positioned such that downgradient wells are located downslope on the mapped upper redbed surface (i.e., Triassic Chinle) to the west of the Facility, and upgradient wells will be placed upslope on the redbed surface near the southeast corner and along the east boundary of the Facility (**Figure II.8.2**). The redbed structure map provided as **Figure II.8.3** 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 VWs are positioned directly downslope from the proposed waste disposal area in the zone most appropriate for detection of a potential release.

2.1 Monitoring Well Locations

Figure II.8.4 depicts the location of the proposed vadose zone monitoring network designed specifically to address both the known slope of the redbed surface, and the locations of the planned leachate collection sumps for the Landfill. The leachate collection sumps represent the most downgradient termini of the leachate collection system; are the deepest penetrations of the surface deposits; and are vertically most proximate to the redbed surface (e.g., 15 – 30 ft). In addition, the individual disposal cell sumps are the locations with the greatest potential for leachate head development due to their downgradient positions.

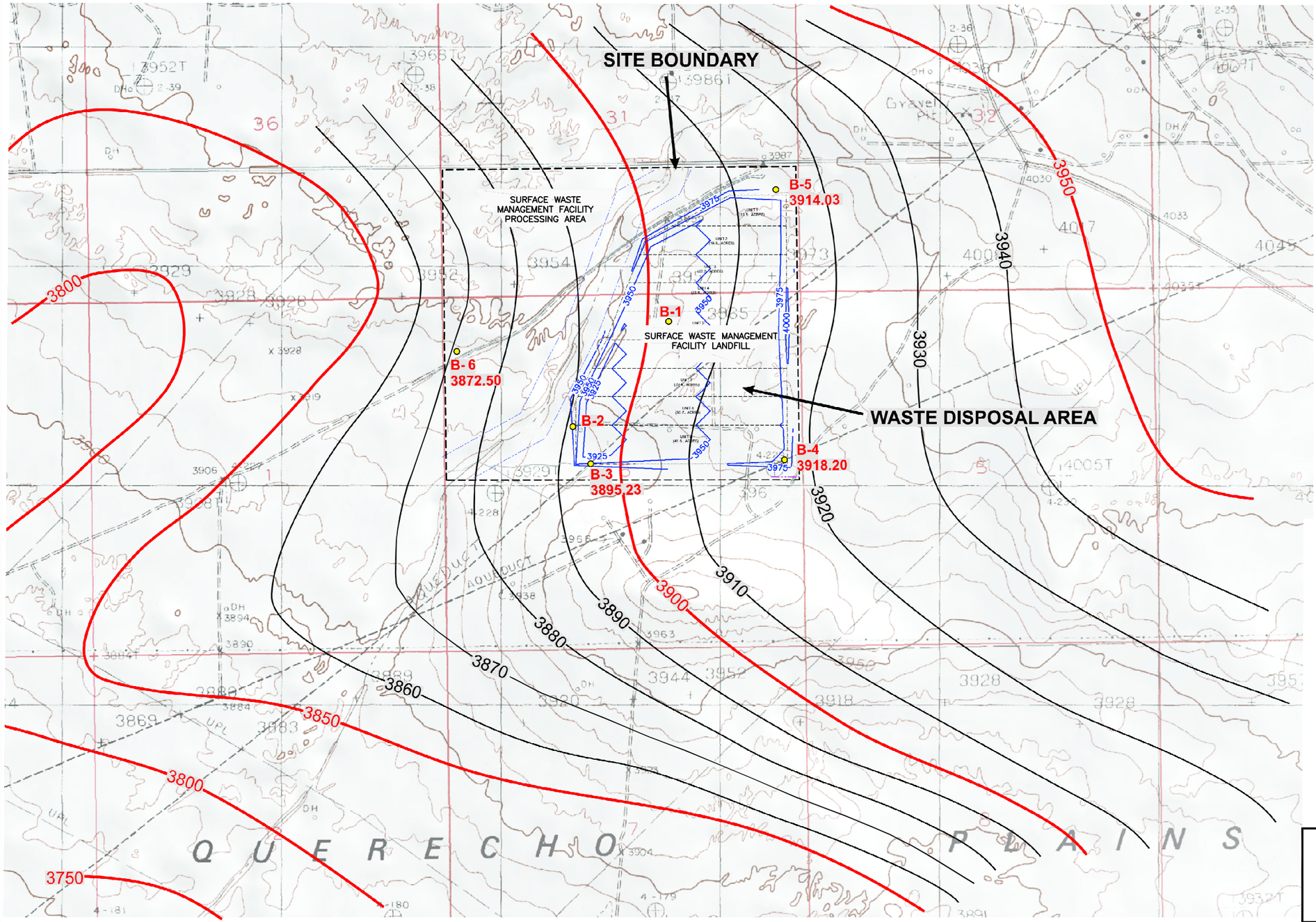


SITE PLAN

DNCS ENVIRONMENTAL SOLUTIONS
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: 06/13/2014	CAD: SITE PLAN.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.8.2
APPROVED BY: IKG	gei@gordonenvironmental.com	



B-5 3914.03 — Location of site geotechnical boring showing designation and elevation of top of redbeds (feet above MSL)

3950 — Isopleth on top of redbeds by Nicholson and Clebsch (1961)

3910 — Interpolated Isopleth on upper redbed surface using site boring data and 10-ft contour interval (feet above MSL)

3950 Landfill Base Grades

NORTH

NOMINAL SCALE 1'=1500'

TRIASSIC REDBED SURFACE

DNCS ENVIRONMENTAL SOLUTIONS
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: 10/18/2013	CAD: REDBED.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.8.3
APPROVED BY: IKG	gei@gordonenvironmental.com	

Drawing:P:\acad 2003\542.01.01\PERMIT FIGURES\REDBED.dwg
Date/Time:Oct. 18, 2013-14:00:08 ; LAYOUT: B (LS)

SURFACE WASTE MANAGEMENT FACILITY PROCESSING AREA (±177 ACRES) WEST TRACT

VW-1
VW-2
VW-3
VW-4
VW-5
VW-6
VW-7
VW-8
VW-9
VW-10

SUMP 1
SUMP 2
SUMP 3
SUMP 4
SUMP 5
SUMP 6
SUMP 7

PHASE 1
UNIT 1 (13.5± ACRES)
UNIT 2 (19.8± ACRES)
UNIT 3 (22.2± ACRES)

PHASE 2
UNIT 4 (23.8± ACRES)
UNIT 5 (25.4± ACRES)
UNIT 6 (27.3± ACRES)
UNIT 7 (29.4± ACRES)

SURFACE WASTE MANAGEMENT FACILITY LANDFILL (318± ACRES) EAST TRACT

PHASE 3
UNIT 8 (30.7± ACRES)
UNIT 9 (41.6± ACRES)

500'

LEGEND

- EXISTING 5' CONTOUR
- 3975 EXISTING 25' CONTOUR
- 3975 25' DESIGN CONTOUR
- TOE OF SLOPE
- SUMP 1 RISER/SUMP AND ID
- SITE BOUNDARY
- WASTE BOUNDARY
- UNIT BOUNDARY
- PHASE 1–3 BOUNDARY
- PROPOSED UPGRADIENT VADOSE MONITORING WELL
- PROPOSED DOWNGRADIENT VADOSE MONITORING WELL
- PROPOSED SUPPLEMENTAL DOWNGRADIENT VADOSE MONITORING WELL
- REDBED SURFACE GRADIENT
- 28 3971.91 CONTROL POINT
- N 650,000 SITE GRID

NORTH

0 250 500

VADOSE ZONE MONITORING NETWORK

DNCS ENVIRONMENTAL SOLUTIONS
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: 10/18/2013	CAD: VADOSE WELL LOC.dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: GEI	FIGURE II.8.4
APPROVED BY: IKG	gei@gordonenvironmental.com	

The monitoring network strategy consists of the following elements, which are designed to correlate with the Landfill site development sequence shown in **Figure II.8.4**:

1. Following permitting, and prior to Landfill development, wells VW-1, VW-2, and VW-3 will be installed to evaluate ambient conditions; and will be constructed in accordance with the specifications listed in Section 2.2. Well VW-1 will serve as the upgradient monitoring point for Phase 1 operations; and the northern portion of Phase 2 operations. Wells VW-2 and VW-3 will be positioned as "sentinel" downgradient wells for Phase 1 (i.e., Units 1-3), and are specifically located adjacent to Sumps 1 and 3 based on the logic discussed above.
2. Downgradient well VW-4 will be installed prior to the development of Phase 2 (i.e., Units 4-6) in order to evaluate pre-construction conditions; and is deliberately positioned adjacent to Sump 5 for central Unit 5. Well VW-5 will be installed prior to the development of Phase 3, and will serve as the general upgradient monitoring point for all future Landfill development. Well VW-6 is the downgradient sentinel well for Phase 3, and will be installed prior to development of disposal Units 7-9.
3. Shown on **Figure II.8.4** are four additional downgradient monitoring points (i.e., wells VW-7 through VW-10) that may be added incrementally dependent upon monitoring results from the primary network (i.e., wells VW-1 through VW-6). These future wells will be installed to the same specifications prescribed in Section 2.2; and the well locations may be adjusted in consultation with OCD.

2.2 Well Drilling and Completion

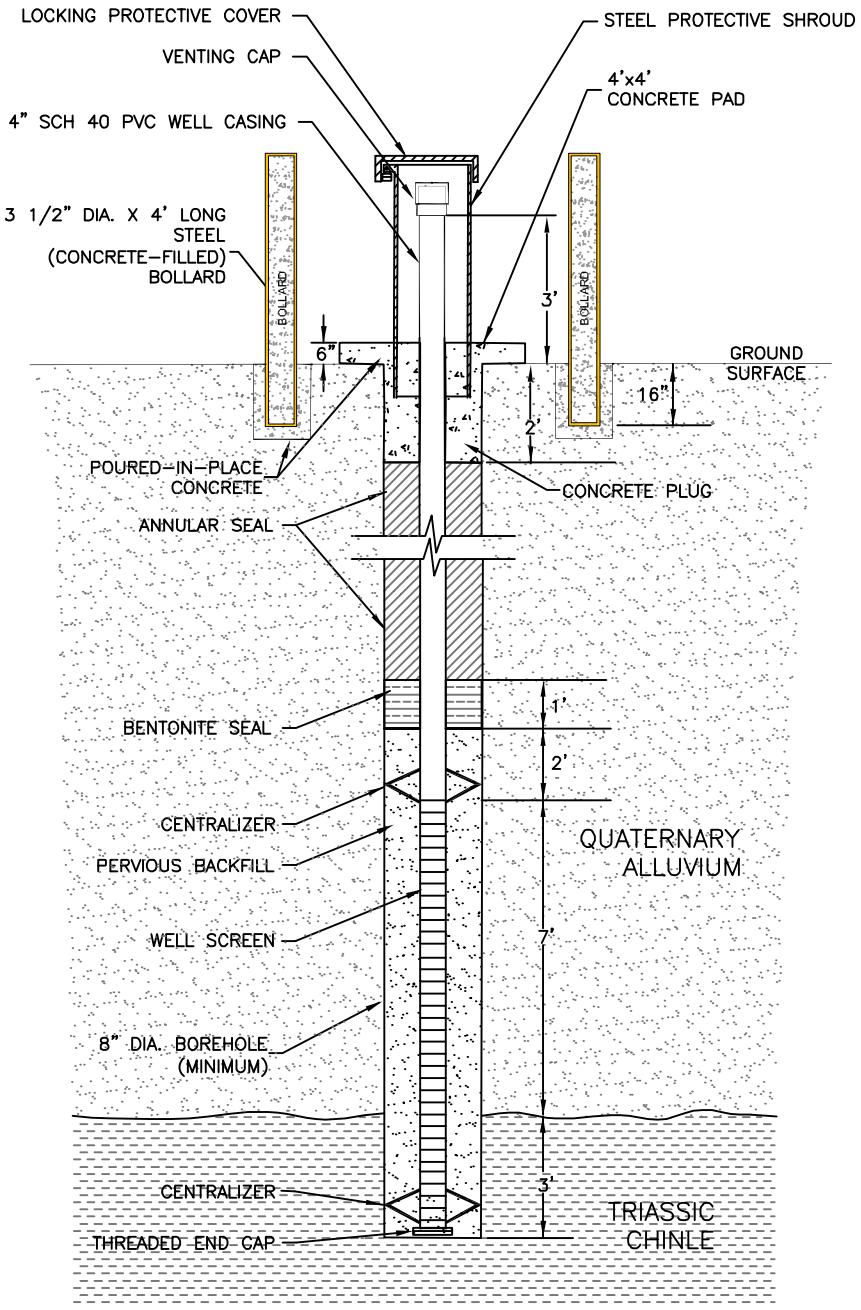
Prior to installation of the vadose zone monitoring wells, drilling permits will be obtained from the New Mexico Office of the State Engineer (NMOSE). The vadose zone monitoring wells will be installed using hollow-stem auger drilling methods; and no fluids will be introduced into the borings during 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 II.8.1**, and the well detail sheet provided as **Figure II.8.5**:

TABLE II.8.1
Vadose Zone Monitoring Well Installation Specifications
DNCS Environmental Solutions

- 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 Triassic 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 II.8.5**.
- 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.

VADOSE ZONE MONITORING WELL CONSTRUCTION DETAIL

DNCS ENVIRONMENTAL SOLUTIONS
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: 10/18/2013	CAD: VADOSE MW .dwg	PROJECT #: 542.01.01
DRAWN BY: DMI	REVIEWED BY: MJC	FIGURE II.8.5
APPROVED BY: IKG	gei@gordonenvironmental.com	

3.0 VADOSE ZONE MONITORING PROGRAM

Evidence of fluids in the VWs 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, and 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 DNCS 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 in advance of the applicable disposal area construction. After the initial inspection, each VW will be monitored for the presence of free liquids on a monthly basis for a period of 12 months. If the monthly monitoring results continually indicate the absence of fluid, the subject wells will be transitioned to quarterly monitoring. The continued lack of fluids in the VWs may be the subject of future specific approvals by OCD for a reduced monitoring frequency (i.e., semi-annual or annual).

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. **Attachment II.8.B** 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. If a 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 II.8.2**. 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 Landfill. These data will be considered "background values".

If the initial analyses indicate that no impact from the Landfill is evident, then routine monitoring of field parameters will continue on either a monthly or quarterly basis, as applicable for wells with a measureable water column. If subsequent monitoring indicates elevated measurements of the field parameters relative to the initial measurements (i.e., greater than 5 times background values), 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 Landfill is possible.

3.3 Monitoring Data Evaluation

If the field parameter measurements indicate that a well shows evidence of non-natural constituents, OCD will be notified within 48 hours and verification re-sampling (VRS) for the parameters listed in **Table II.8.2** will be conducted within 2-weeks. If the VRS analytical results indicate that a potential Landfill release may have occurred, within 90 days of the finding, fluid samples from each active Landfill sump will collected and analyzed for the parameters listed in **Table II.8.2** for comparative evaluation with the VRS results. This data evaluation process is fundamental in determining if the potential source of an identified change is from the monitored Facility, an alternative on-site or off-site source, natural variability, an error in the sampling and analysis process, etc. The DNCS Facility will work with OCD to devise an appropriate scope of work for assessing water quality changes.

If the comparative evaluation indicates that the well may contain non-naturally occuring fluids, the DNCS Facility will submit an Action Plan to OCD within 30-days of the finding detailing the course of action to investigate further the potential release; and/or complete any mitigation measures as appropriate. If the comparative evaluation results indicate that 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 II.8.2
Vadose Zone Monitoring Parameters
DNCS Environmental Solutions

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)

Concurrent with each vadose zone monitoring event, methane monitoring will be performed in each active well using an electronic, intrinsically safe portable gas analyzer, or equivalent instrument. Methane concentrations will be expressed either as percent by volume in air or as a percent of the lower explosive limit (LEL) for methane; and will be recorded on the form provided as **Attachment II.8.B**. In the event that methane concentrations exceed regulatory limits, the DNCS Facility will work with OCD to devise an appropriate scope of work for assessing the methane monitoring results.

APPLICATION FOR PERMIT
DNCS ENVIRONMENTAL SOLUTIONS

VOLUME II: FACILITY MANAGEMENT PLANS
SECTION 8: VADOSE ZONE MONITORING PLAN

ATTACHMENT II.8.A

PROPOSAL FOR VADOSE ZONE MONITORING

ATTACHMENT II.8.A

Proposal for Vadose Zone Monitoring

DNCS Environmental Solutions

Lea County, New Mexico

August 2013

Updated November 2013

Prepared By:

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E-mail: ckilmer@golder.com

Prepared With:

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213 S. Camino del Pueblo
Bernalillo, NM 87004
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Submitted To:

Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505
Contacts: Mr. Brad Jones and Mr. Glenn von Gonten
E-mails: brad.a.jones@state.nm.us
Glenn.vongonten@state.nm.us

ATTACHMENT II.8.A
Proposal for Vadose Zone Monitoring
DNCS Environmental Solutions
Lea County, New Mexico

Table of Contents

List of Figures

List of Tables

List of Attachments

Proposal for Vadose Zone Monitoring
DNCS Environmental Solutions
Lea County, New Mexico

1.0 INTRODUCTION

DNCS Environmental Solutions (DNCS Facility) is a proposed Surface Waste Management Facility for oil field waste processing and disposal services. The proposed DNCS Facility is subject to regulation under the New Mexico Oil and Gas Rules, specifically 19.15.36 NMAC, administered by the Oil Conservation Division (OCD). The Facility is designed in compliance with 19.15.36 NMAC, and will be constructed and operated in compliance with a Surface Waste Management Facility Permit issued by the OCD. The Facility is owned by, and will be constructed and operated by, DNCS Properties, LLC.

1.1 Site Location

The DNCS site is located approximately 10.5 miles east of the US 82/NM 529 intersection and 6.3 miles southeast of Maljamar in unincorporated Lea County, New Mexico (NM). The DNCS site is comprised of 562-acre ± tract of land located south of NM 529 in portions of Section 31, Township 17 South, Range 33 East; and in the northern half of Section 6, Township 18 South, Range 33 East, Lea County, NM. Site access will be provided via the south side of NM 529. A portion of the 562-acre tract is a drainage feature that will be excluded from development. The drainage feature includes a 500-ft buffer zone which totals 67 acres ±. The DNCS Facility will include two main components; an oil field waste Processing Area (177 acres ±), and an oil field waste Landfill (318 acres ±); totaling 495 acres ±.

1.2 Purpose

Siting criteria for Surface Waste Management Facilities per 19.15.36.13.A(1) NMAC require that the minimum depth to groundwater below the lower limit of waste is ≥ 100 feet (ft).

The Oil and Gas Rules include requirements for groundwater monitoring at facilities where "fresh groundwater" exists, unless "otherwise approved by the division" (19.15.36.14.B NMAC). Fresh groundwater is defined as groundwater that contains less than 10,000 milligrams per liter (mg/L) of total dissolved solids (TDS).

The DNCS site is located in an area where few shallow groundwater resources are known to exist. Information obtained from six borings that were recently advanced on the tract provide adequate demonstration that the minimum depth to the shallowest groundwater bearing zone on the property exceeds 150 ft below land surface; and is more than 100 ft below projected Landfill base grade levels. The northwest portion of the site is planned for oil field waste processing, which has been specifically demonstrated to possess in excess of the required 50-ft vertical setback to groundwater. Based upon projected data from wells in the vicinity, it is anticipated that the shallowest water bearing zones on the DNCS tract are on the order of six hundred ft below projected waste cell base grades, and are vertically separated from the proposed Facility by more than five hundred ft of dense non water-bearing shale.

The proposed Facility design includes double HDPE lining of Landfill waste cells with an intervening protective geonet leak detection layer, as well as installation of equipment and operational provisions for leachate monitoring and collection. Based upon the well documented shallow stratigraphy in the vicinity of the proposed Facility, it is anticipated that if leakage were to occur at the Facility, the leachate would migrate vertically through unconsolidated alluvium and would potentially pool on the upper surface of laterally extensive dense shale redbeds (i.e., Triassic Chinle) that are demonstrated to be present at approximately 50 ft below grade at the site. Available subsurface stratigraphic information for the site and surrounding area indicates that any potential leakage would migrate downslope above the alluvium-shale interface to the west or northwest.

As the proposed Facility design includes double HDPE lined waste cells and provisions for leak detection and leachate extraction, and since the Facility is underlain by laterally extensive dense shale and projected depth to groundwater is great, vadose zone monitoring at the shale-alluvium interface is proposed as the most effective mechanism for detection monitoring for the site. Due to the exceptional anticipated depth to groundwater at the site, as well as the low hydraulic conductance of the shale bedrock, it is anticipated that properly positioned and

completed vadose zone monitoring wells (VWs) at the site would detect leakage from the Facility long before groundwater monitoring wells at great depth (i.e., > 500 ft) could; and thus, would provide a greater level of protection to any groundwater resources present at the Facility. **Table 1** provides the results of site-specific soils laboratory testing, which demonstrate the dramatic change in soils characteristics between the near-surface (i.e., 0-50 ft) coarse-grained deposits; and the thick and dense impermeable redbed deposits below. This site-specific characterization of the onsite soils is entirely consistent with other focused site studies in the area; as well as the documented regional database.

Similar strategies have been deployed nationally where groundwater exists at great depth, and there are intervening zones of dense and impermeable soils. In New Mexico, this technology, which consists of a two-phase vadose zone monitoring approach (i.e., double-liner with leak detection coupled with sentinel (wells) has been effectively implemented at a minimum of three Subtitle D Municipal Solid Waste Landfills approved by the New Mexico Environment Department, including one in Lea County.

The following sections of this submittal provide specific descriptions of the subsurface stratigraphy and water-bearing zones in the vicinity of the proposed Facility, as well as proposed design, installation methods and operational strategy for vadose zone monitoring at the site.

2.0 HYDROGEOLOGIC SETTING

Details regarding the hydrogeology of the DNCS site and region will be included as Volume IV.2 of the DNCS Application for Permit. The DNCS site is located in western Lea County, and is situated in the Upper Pecos-Black watershed (United States Geological Survey [USGS] cataloging Unit 1306001), near the western boundary of the Monument-Seminole Draws watershed (USGS cataloging unit 12080003). The physiography and hydrogeology of the area are described by Nicholson and Clebsch (1961) and the physiography of southern Lea County and eastern Eddy County are shown in **Figure 1** (Nicholson and Clebsch, 1961 and Kelly, 1979). The boundary between the Upper Pecos-Black and Monument-Seminole

TABLE 1
Soils Laboratory Analyses Summary
DNCS Environmental Solutions

Sample Number[1]	Sample Depth (ft bgs)	USCS Class[2]	Grain Size Distribution			Atterberg Limits[3]	Natural Dry Density (PCF)	Natural Moisture[4] (%)	Standard Proctor		Permeability (cm/sec)	Porosity (%)
			Pass #4 (%)	Pass #40 (%)	Pass #200 (%)	LL - PI			Max. Dry Density (PCF)	Optimum Moisture (%)		
B3-5	5-6.5	SP-SC	100	98	9.0			2.8				
B3-20	20-21.5	SC	100	93	13.0			4.7				
B3-35SS	35-36.5	SC	100	97	14.0			4.6				
B3-35CC	35-40	SP-SC	99	95	11.0			2.2	121.1	11.7		
B3-50.25BR	50.25-50.75	SC	100	94	47.1	32-18	112.3	7.6			9.72E-07	32.1
B3-65	65-66	SC	100	77	18.0			11.6				
B3-85	85-90	CL	100	88	82.1	38-24	112.3	3.3			1.01E-07	32.1
B3-115	115-120	SC	100	66	21.0			12.8				
B3-130	130-135	SC	100	62	20.0			8.7				
B3-145	145-150	SC	100	75	31.0			7.4				
B4-0	0-5	SP-SC	99	92	8.0			11.4				
B4-15	15-20	SP-SC	100	98	7.3			6.8				
B4-30CC	30-35	SP-SC	100	98	7.9			4.8	119.9	12.1		
B4-30SS	30-31.5	SP-SC	100	98	8.9			4.9				
B4-55BR	55-55.75	CL	100	88	85.0	42-19	100.8	9.7			7.89E-07	39.1
B4-80	80-85	SC	100	80	27.0			13.9				
B4-100	100-105	SC	100	83	34.0			13.8				
B4-120	120-125	CL	100	95	93.7	38-23	100.9	2.9				39.0
B4-145	145-150	SC	100	83	34.0			7.9				

Notes:

Blank field indicates test not conducted

[1] *See* ***Figure 5*** *for locations of borings and* ***Attachment A-1*** *for boring logs.*

[2] *Unified Soil Classification System: SM = silty sand; SP = poorly graded sand; SC = clayey sand; ML = low-plasticity silt; CL = low-plasticity clay; CH = high-plasticity clay*

[3] *LL = liquid limit; PI = plasticity index; NV = non viscous; NP = non plastic*

[4] *Gravimetric basis*

R = remolded sample; I = in-situ sample; (DS) = direct shear test on sample X

Combined Samples used for Standard Proctor on Boreholes 3,4,5

For Porosity a Specific Gravity of 165.4 PCF was used; where Porosity = 1 - (Natural Dry Density / Specific Gravity)

TABLE 1
Soils Laboratory Analyses Summary
DNCS Environmental Solutions

Sample Number[1]	Sample Depth (ft bgs)	USCS Class[2]	Grain Size Distribution			Atterberg Limits[3]	Natural Dry Density (PCF)	Natural Moisture[4] (%)	Standard Proctor		Permeability (cm/sec)	Porosity (%)
			Pass #4 (%)	Pass #40 (%)	Pass #200 (%)	LL - PI			Max. Dry Density (PCF)	Optimum Moisture (%)		
B5-10	10-15'	SC	98	87	13.0			4.2				
B5-25	25-30	SP-SC	98	92	11.0			0.7				
B5-30CC	30-35	SP-SC	100	97	8.8			4.3	123.3	9.9		
B5-30SS	30-31.5	SP-SC	99	88	11.0			4.8				
B5-45	45-50	SP-SC	100	85	7.2			6.1				
B5-70SS	70-70.5	CL	100	93	84.4	41-22	90.6	13.1				45.2
B5-80	80-85	SC	100	66	19.0			12.2				
B5-90	90-95	SC	100	69	22.0			12.5				
B5-105	105	SC	100	67	21.0			14.4				
B5-125	125-130	SC	100	59	27.0			6.6				
B5-145	145-150	CL	100	90	85.5	36-21	107.2	8.4			7.54E-07	35.2
B6-0	0-5	SP	100	99	3.7			2.1				
B6-7	07-13'	SC	100	93	15.0			7.0				
B6-13	13-27	SC	88	70	21.0			3.5				
B6-20	20-40	SC	95	83	14.0			4.1	118.2	11.0		
B6-27	27-48	SC	97	86	16.0			4.0				
B6-60	60-75	SC	100	90	32.9	25-11	106.2	3.1			1.13E-05	35.1

Notes:

Blank field indicates test not conducted

[1] *See* ***Figure 5*** *for locations of borings and* ***Attachment A-1*** *for boring logs.*

[2] *Unified Soil Classification System: SM = silty sand; SP = poorly graded sand; SC = clayey sand; ML = low-plasticity silt; CL = low-plasticity clay; CH = high-plasticity clay*

[3] *LL = liquid limit; PI = plasticity index; NV = non viscous; NP = non plastic*

[4] *Gravimetric basis*

R = remolded sample; I = in-situ sample; (DS) = direct shear test on sample X

Combined Samples used for Standard Proctor on Boreholes 3,4,5

For Porosity a Specific Gravity of 165.4 PCF was used; where Porosity = 1 - (Natural Dry Density / Specific Gravity)

Draws is formed by the Mescalero Ridge (alternately called "the Caprock"), which trends north-south along the Chaves and Lea County line from northwest Lea County approximately to Maljamar, where it turns southeast, passing approximately 1.75 miles east of the DNCS site, continuing southeast past the Texas state line east of Eunice. The Mescalero Ridge is also the boundary between the High Plains province to the east and the Querecho Plains province to the west.

The Mescalero Ridge is the western terminus of the Tertiary Ogallala Formation, which is a thick sequence of unconsolidated to semiconsolidated sand, silt and gravel; which were deposited on an erosional surface incised into Triassic Chinle shale in much of southeastern New Mexico. The Ogallala has been removed by erosion west of Mescalero Ridge and a veneer (generally less than 100 ft) of Quaternary age unconsolidated Ogallala detritus and aeolian sands mantle the Triassic Chinle in this area. Well-cemented sections (i.e., caliche) of the Ogallala Formation are the ledge-forming units of the Caprock bluffs.

The DNCS site is located approximately 1.75 miles west of Mescalero Ridge in the eastern portion of the Querecho Plains. The location of the DNCS site, as well as the Mescalero Ridge and the Querecho Plains, are shown in the vicinity map provided as **Figure 2**. Shallow subsurface geologic units at the DNCS site include approximately 50 ft of unconsolidated Quaternary sand, silt, gravel and cacliche above Triassic shale bedrock of the Chinle Formation (redbeds), as demonstrated by the site-specific drilling and testing results.

2.1 Groundwater Occurrence and Site Conditions

Water-bearing geologic units in the vicinity of the DNCS site include the Tertiary Ogallala Aquifer, shallow Quaternary alluvial aquifers, and the Santa Rosa Sandstone in the lower portion of the Triassic Chinle shale. The Ogallala Aquifer can be a prolific water-bearing unit in the region east of Mescalero Ridge, but it is absent west of Mescalero Ridge in the area of the DNCS site. In the Querecho Plains area, thin and laterally discontinuous groundwater saturations are occasionally present in the basal alluvium overlying the Triassic Chinle. The Santa Rosa Sandstone is present at depth throughout much of southern Lea County, and this unit can locally produce modest quantities of groundwater.

Configuration of the top of the Chinle shale (redbeds) is an important control on water availability in the Ogallala Aquifer, as well as in the alluvial aquifers in the area. The Chinle shale redbeds were exposed and dissected by erosion throughout the region prior to deposition of the Ogallala. The most prolific Ogallala production occurs in areas where stream channels were cut into the Chinle shale and subsequently filled with coarse fluvial Ogallala detritus. The resulting buried paleochannels are areas where saturated aquifer thickness is greatest, and the best water-bearing properties are present.

In the Querecho Plains area, the Ogallala was removed by erosion and the Chinle shale section was reexposed and dissected by drainages associated with the Pecos River catchment to the southwest. Shallow groundwater in this region is generally restricted to paleochannels and other low-lying areas that were incised into the Triassic redbeds bedrock prior to deposition of the Quaternary alluvium over the shale bedrock. Configuration of the top of the Chinle redbeds is an important control on groundwater availability that was recognized by Nicholson and Clebsch. They utilized data for the Chinle shale formation obtained from oil exploration seismic shot holes to prepare a structure contour map of the top of the Chinle Shale redbeds covering southern Lea County (Nicholson and Clebsch, 1961, Plate 1). The Nicholson and Clebsch structure contour data was projected on the project vicinity map in **Figure 2** (red isopleths).

The geometry of land surface and underlying geologic units, as well as groundwater saturations in the vicinity of the DNCS site are depicted in the hydrogeologic cross-section shown on **Figure 3**. This diagram indicates that no shallow alluvial groundwater is present at the DNCS site, consistent with site-specific drilling results. Based upon information projected from nearby petroleum wells, the shallowest potential water-bearing zone is the Santa Rosa Sandstone (lower Triassic Chinle), which is approximately 600 ft below grade at the DNCS site.

Table 2 provides a summary of information from water wells and other oil wells and/or borings within two miles of the DNCS site. A more extensive table of the wells and borings in the vicinity of the site is included in **Attachment A-3**. Data included in these **Tables** were obtained from the following sources:

TABLE 2
Records of Wells within 2 miles of the DNCS Site
DNCS Environmental Solutions

Owner or OCD Designation	OSE Permit Number	Location PLS	Location Lat D.dddd	Location Long D.dddd	Use	LS Elev.	TD	WL	WL Elev.	Date	WBZ	Top WBZ	Bottom WBZ	WBZ Thickness	Trc Top	Trc Elev.	Comments or Source
Conoco Oil MCA Battery 4 #189		17.32.26.41000	32.803679	103.735041	OCD	3965	1024 Log, cased to 1062				Trc	710	850	0	80	3885	OCD Record 5/11/78
Continental Oil Pearsall BX #2		17.32.34.241111			OCD	3952	casing to 3515, redbeds to 792								64	3888	OCD Record
El Paso Natural Gas Co	L 00058-2 misc	17.33.29.222221	32.811945	103.682131	Ind-Dom	4188	244	204	3984	7/22/1958	To/Qal	185	228	40	244	3944	OSE Well Record
								201.35		3/14/1961							GAI BLM 1978
Oil Test		17.33.29.34411			Oil Test	4044		61.43	3982.57	2/16/1971	To/Qal						GAI BLM 1978
Conoco MCA Unit Battery 4 #133		17.33.30.11000	32.801966	103.709129	OCD	4033	casing to 3913, redbeds to 515, anhydrite 515-533								28	4005	OCD Record 5/11/78
Conoco MCA Unit Battery 4 #134		17.33.30.12000			OCD	4057	casing to 1185, redbeds to 1145								45	4012	OCD Record 5/11/78
Conoco MCA Unit Battery 4 #135		17.33.30.14000			OCD	4062	casing to 20								85	3977	OCD Record 5/11/78
Conoco MCA Unit Battery 4 #197		17.33.30.31111	32.80457	103.710241	OCD	4037	casing to 3963, redbeds to 791, sandstone 628-650								96	3941	OCD Record 5/11/78
Walter Williams stock well		17.33.30.124	32.810128	103.703623		4045		70	3975	7/29/1954							Nicholson & Clebsch
		17.33.30.12432				4053		69.14		2/16/1971							GAI BLM 1978
Cities Svc SMGSA Unit Tract 1 #2		17.33.30.42000	32.803774	103.696154	OCD	4055	casing to 1199								145	3910	OCD Record 5/11/78
DNCS Properties LLC Boring 5		17.33.31.	32.78815	103.69491		3979.03	150	dry						0	65	3914.03	DNCS Site Boring Log
DNCS Properties LLC Boring 6			32d46m54.1s	103d42m27.1s		3939.5	75	dry						0	67	3872.5	DNCS Site Boring Log
OXY USA Inc.	CP 758	18.33.4.34233	32.771967	103.669204	exp	3989	250	dry		5/10/1991	--	--	--		65	3924	OSE Well Record
DNCS Properties LLC Boring 3			32.77692	103.70411	exp	3940.23	150	dry		2/6/2013					45	3895.23	DNCS Site Boring Log
DNCS Properties LLC Boring 4			32.777	103.69465	exp	3968.20	150	dry		2/9/2013					50	3918.2	DNCS Site Boring Log
BJ Wooley	CP 546	18.33.9.42241	32.76111	103.660559	Com	3978	90	70	3908	6/3/1975	To/Qal	70	85	20	85	3893	OSE Well Record
	L 6131	18.33.8.213	32.766525	103.68429			194	100				130	193	63			OSE Waters POD summary

- Logs from geotechnical borings at the DNCS tract (**Attachment A-1**)
- Well and water level data from Geohydrology Associates Inc. (1978) (**Attachment A-2**)
- Water well data from Nicholson and Clebsch (1961)
- New Mexico Office of the State Engineer (NMOSE) Well Records (**Attachment A-3**)
- Summary oil well data on shallow stratigraphy and water-bearing units derived from New Mexico OCD records and recorded in NMOSE Well Record files (**Attachment A-3**)

Copies of information from these sources are included with this submittal in the above-referenced sections of **Attachment A**.

Wells and borings in the vicinity of the DNCS site that yielded data of significance with regard to groundwater occurrence or potential are plotted on the map provided as **Figure 2**. Few water wells are present in the Querecho Plains area in the vicinity of the DNCS site. Soil borings advanced on the DNCS tract found dry alluvium on top of the redbeds and no saturation in approximately the upper 100 ft of the redbeds at the site (copies of the logs from these borings are included in **Attachment A-1)**.

A few shallow alluvial wells are present in close proximity to Mescalero Ridge, including the Williams stock well, which is located approximately 7,600 ft north of the DNCS site (Nicholson and Clebsch, 1961). Based upon water levels reported by Geohydrology Associates (1978; **Attachment A-2**), an oil test well located approximately 4,400 ft northeast of the DNCS site, and open cased holes located 10,200 ft and 12,400 ft east of the DNCS site, apparently penetrated thin saturations in the alluvium. Based upon information from NMOSE Well Records (Well RA 10175 and Well L 3454; **Attachment A-3**), a well located approximately four miles west of the DNCS site, and another well located 3.5 miles south of the DNCS site, produce limited quantities of water from the alluvium.

Based upon notes taken from OCD records and posted on NMOSE Well Records, thirteen oil wells in the vicinity of the DNCS site penetrated water-bearing zones, or significant sandstones in the Triassic redbeds. Locations of these wells are shown on **Figure 2** and

details of the zone descriptions, as well as summary information are included on the well logs provided in **Attachment A-3**. One of these wells (Conoco, B-4-197), located approximately 5,800 ft north of the DNCS site, penetrated sandstone between 628 ft and 650 ft below land surface; another well (B-4-189), located about 9,000 ft northwest of the DNCS site penetrated a "water sand" between 710 ft and 810 ft below land surface.

Several wells to the south and "downgradient" of the DNCS site appear to produce from water-bearing zones in the Triassic bedrock unit. One of these wells (NMOSE Well Record, CP-677, **Attachment A-3**), located approximately 5.7 miles southwest of the DNCS site, is completed in a sandstone that is between 498 and 510 ft below grade; and the water level in this well was measured at 460 ft below grade, indicating artesian conditions. Another well drilled under the same permit a short distance away found similar conditions. Geohydrology Associates, Inc., (1978, **Appendix A-2**) reported a water level of 434.41 ft below land surface in an oil test well located approximately four miles southwest of the DNCS site. No water-bearing zone interval was identified in this record; however another well located approximately one mile southeast of this well penetrated several sandstones below a depth of 500 ft. The projected geometry of sandstones and associated potentiometric surface of these wells is depicted in the hydrogeologic cross section in **Figure 3**.

3.0 PROPOSED VADOSE ZONE MONITORING PROGRAM

Due to the anticipated great depth to the shallowest water-bearing units, as well as high impedance to vertical water flow posed by the Triassic redbeds at the DNCS site, vadose zone monitoring is proposed as the preferred alternative for the site. The proposed vadose zone monitoring wells would be positioned such that downgradient wells would be located downslope on the mapped upper redbed surface to the west of the Facility, and upgradient wells would be placed upslope on the redbed surface near the southeast corner and along the east boundary of the Facility. Equally important is the planned installation of a double HDPE-lined leak detection system that underlies the entire waste disposal footprint, which will provide for potential fluid capture beneath the primary liner.

3.1 Proposed Monitoring Well Locations

The location of the proposed Facility, as well as the site geotechnical borings and interpreted terrain on the top of the redbed surface are shown on the map provided as **Figure 4.** This diagram projects the isopleths on the upper redbed surface prepared by Nicholson and Clebsch (1961), as well as interpolated isopleths that comport with new redbed surface elevation data obtained from site-specific geotechnical borings on the DNCS site. It should be noted that no adjustment of the Nicholson and Clebsch isopleths was necessary to honor the new data points, confirming both datasets. The resulting structure map presents a detailed depiction of the terrain on the redbed surface at the proposed Facility, and a high confidence level that the proposed VWs are positioned directly downslope from the proposed waste disposal area in the zone most appropriate for detection of a potential release.

Figure 5 depicts the proposed location of the proposed vadose zone monitoring network designed specifically to address both the known slope of the redbed surface, and the locations of the planned leachate collection sumps. The leachate collection sumps represent the most downgradient termini of the leachate collection system; are the deepest penetrations of the surface deposits; and are vertically most proximate to the redbed surface (e.g., 15 – 30 ft). In addition, the individual cell sumps are designed as the locations with the greatest potential for leachate head development.

The planned strategy consists of the following elements, designed to correlate with the Landfill site development sequence (**Figure 5**):

1. Following permitting, and prior to Landfill development; VW-1, VW-2, and VW-3 will be installed to evaluate ambient conditions. These wells will be constructed in accordance with the specifications listed in Section 3.2; and will be sounded for the potential presence of water on the redbed surface. VW-1 will serve as an upgradient monitoring point for Phase 1 operations; and the northern portion of Phase 2 operations. VW-2 and VW-3 will be positioned as "sentinel" downgradient wells for Phase 1 (i.e., Units 1-3), and are specifically located adjacent to Sumps 1 and 3 based on the logic discussed above.
2. Downgradient Well VW-4 will be installed prior to the development of Phase 2 (i.e., Units 4-6) before cell construction in order to evaluate pre-construction conditions. It is deliberately positioned adjacent to the sump for central Unit 5. Well VW-5 will be installed prior to the development of Phase 3, and will serve as the general upgradient monitoring point for all of the Landfill development. Well VW-6 is the downgradient sentinel well for Phase 3, and will be installed prior to development of disposal Units 7-9.

3. Shown on **Figure 5** are four additional potential downgradient monitoring points (i.e., VW-7 through VW-10) that may be added incrementally dependent upon monitoring results from the primary network (i.e., VW-1 through VW-6). These future VWs would be installed to the same specifications prescribed in Section 3.2; and well locations may be adjusted in consultation with OCD.

Evidence of groundwater in the VWs should not necessarily be attributed to Landfill impacts, as reconfiguration of surface stormwater controls may alter recharge. Testing of water samples from the VWs will confirm if any water encountered is the result of surface water infiltration; or potential impacts from the disposal Facility. Details regarding sampling and analysis will be included in the Vadose Zone Monitoring Plan (**Volume II.8** of the Application for Permit).

3.2 Proposed Well Drilling and Completion

Prior to installation, drilling permits will be obtained from the NMOSE. Proposed VWs will be installed using hollow-stem auger drilling methods; and no fluids would be introduced into the borings during drilling. Undisturbed, depth-referenced samples of penetrated sediments will be collected on 5-ft intervals using split-spoon sampling equipment. Drive blow counts will be logged during each sampling event to allow precise determination of the upper redbed surface in each boring. A qualified hydrogeologist will be present on location during drilling, and will prepare detailed descriptions of the lithology, texture, sorting, rounding, color, degree of lithification and moisture content of each sample and stratigraphic unit that is penetrated.

Each boring will be advanced approximately 3 ft into indurated Triassic redbeds. 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 rig would be placed on standby for at least two hours, during which time soundings will be made inside the augers to check the potential of accumulating fluid.

VWs will be completed in accordance with specifications set forth on the well detail sheet provided as **Figure 6**. Each well will be completed using 4-inch schedule 40 flush joint casing to allow for sample extraction. Each well will be completed with a 10-ft length of 0.010-inch slotted well screen, positioned with the lowermost end extending approximately 3 ft below the detected upper redbed surface and the upper end extending approximately 7 ft into the overlying alluvium. The well annulus will be backfilled with a 10/20 grade silica sand pack

extending 2 ft above the screen, a bentonite seal extending 1 ft above the sand pack, and an annular seal consisting of bentonite grout or equivalent extending to land surface. Each well will be equipped with a radially sloped concrete surface pad with locking steel shroud extending approximately 3 ft above grade and marked.

3.3 Proposed Monitoring Program

The proposed vadose zone monitoring program will initially include inspection of each well for the presence of fluid in advance of disposal area construction. Results of fluid detection measurements will be submitted with related leachate monitoring results in routine Facility operations reporting to OCD. If fluids are noted in any of the VMs or leak detection system, the fluid will be sampled and tested in accordance with the Vadose Zone Monitoring Plan, which will be provided as **Volume II.8** in the Application for Permit. The continued lack of fluids in the leak detection system and vadose monitoring wells may be the subject of specific approvals by OCD for a reduced monitoring frequency and/or analyte list.

4.0 LIST OF REFERENCES

Geohydrology Associates, Inc., 1978, Collection of hydrologic data, eastside Roswell Range EIS area: Open-File Consultant Report to Bureau of Land Management, Denver, Colorado, Contract No. YA-512-CT-7-217, Table 4.

Golder Associates Inc. and Gordon Environmental, Inc., 2013, Hydrogeology (Volume IV.2), Application for Permit, DNCS Environmental Solutions, Surface Waste Management Facility

Golder Associates Inc. and Gordon Environmental, Inc., 2013, Vadose Zone Monitoring Plan (Volume II.8), Application for Permit, DNCS Environmental Solutions, Surface Waste Management Facility

Kelly, T.E., Geohydrology Associates, Inc., 1984, Hydrologic assessment of the Salt Lakes area, western Lea County, New Mexico, Consultant report to Pollution Control, Inc., Lovington, New Mexico, Figure 1.

Nicholson, A., and Clebsch, A., 1961, Geology and ground-water conditions in southern Lea County, New Mexico: New Mexico Bureau of Mines and Mineral Resources Groundwater Report 6.

Office of the New Mexico State Engineer, 2013, Electronic image well log files for Lea County, http://www.ose.state.nm.us/water_info_rights_dist2_LeaCountyWellLogs.html