GTHT - ___1___

INSPECTIONS

State of New Mexico
Energy, Minerals and Natural Resources Department

DECEMBER 10, 2013

Mr. Chuck Smiley, Site Manager
Lightning Dock Geothermal HI-01, LLC
P.O. Box 86
Animas, New Mexico 88020

RE: Lightning Dock Geothermal Project (GTHT-001): "OCD Facility Inspection of November 19, 2013" Lightning Dock Geothermal HI-01, LLC, Hidalgo County, New Mexico

Dear Mr. Smiley:

The Oil Conservation Division (OCD) is in receipt of your letter dated November 19, 2013 on the day of the inspection. OCD indicated at the conclusion of the Facility Inspection (inspection) that it would submit a letter to Lightning Dock Geothermal HI-01, LLC (operator) to document the results of the inspection. Please find below the inspection items identified by OCD with facility photos for your review and where required, implementation before system startup and/or afterward, if approved by OCD in advance of startup.

Introduction:

1) A Safety Meeting was conducted from 8:30 to 9:30 a.m. and a power plant engineering meeting was conducted from 9:30 to 10:30 a.m. The operator indicated no accidents have occurred since Labor Day (start of construction). The facility inspection was conducted from 10:45 to Noon. The construction completion date for the project is expected on or before December 31, 2013.

2) The OCD geothermal inspection focused on: 1) 19.14.22 NMAC (Sign on Wells); 2) 19.14.31 NMAC (Noise Abatement); 3) 19.14.32 NMAC (Safety Regulations); 4) 19.14.33 NMAC (Well Heads & Production Equipment); 5) 19.14.34 NMAC (Corrosion); and 6) 19.14.35 NMAC (Disposal of Produced Waters).

3) The OCD Water Quality Control Commission (WQCC) regulations aspect of the inspection focused on: 1) OCD WQCC Order issued on 5/29/2009 with Discharge Permit (GTHT-001) issued on July 1, 2009; and 2) OCC Geothermal Order issued on 5/9/2013.

Observations:

1) All air-based cooling tower (CT) units sit on top of 7 ft. tall piers in each of the 4 Blocks and all power plant piping sets above ground. There are 10 CT units per Block.

2) Stormwater surface drainage is generally from East to West across the facility. Some berm and liner damage from stormwater and other causes was observed at pits and the centralized pond, which need to be repaired and/or pits and ponds require decommissioning or closure.

3) Four new Kaishan Turbine Screw Expanders- KTSE- China (1.2 MW each) have replaced the 50 Binary Cycle Turbine Power Generation Units. The operator indicated that 1 MW could be generated from an ~ 700 gpm production well flow rate.

4) Each KTSE represents a one of four power plant "Blocks" with associated infrastructure, i.e., air-based cooling tower system, coolant and produced water piping, etc. into each Block. At the time of inspection, ~ 1.5 Blocks had been constructed with pipe leak testing underway at one of the nearly completed Blocks.

5) Power Block 1 of 4 was constructed and Block 2 of 4 was half way through construction. Power Blocks 3 and 4 are expected to be completed on or before 12/26.

6) Air-based cooling tower units have replaced the water-based cooling tower units; thus, eliminating about 350 gpm of fresh make-up water from water supply wells. The evaporation loss of the ground water resource would have ranged from ~ 4 – 10 % of this flow rate depending on the season.

7) New "As Built" Engineering Drawings are required that reflect the current construction at the plant. The original facility power plant engineering drawings have changed due to the changes identified in the "Introduction" section herein.

8) Stormwater concerns were apparent as flooding eroded berms of several pits and/or the centralized pond photographed on site. However, the operator had submitted a pit closure plan for OCD review and approval at the time of inspection. Therefore, the remaining pits/ponds will require repair to the berms and repair or replacement of the liners.

9) The geothermal power plant will have real-time monitors to monitor temperatures, pressures, etc. and may make typical annual well flow tests unnecessary, which will help to reduce flashing and evaporation during testing and fluid management at surface.

10) The geothermal system is designed to maintain pressure of thermal fluids in surface pipes to prevent pressure changes and precipitation of metals and cations.

Pits/Ponds:

1) New blowdown pits and a storm water run-off pond have been constructed at the facility and need to comply with Geothermal Regulations and be represented on a site map to scale.

2) A pit/pond closure plan was submitted to the OCD at the time of the inspection and is currently under review by the OCD. OCD is concerned about closing pits/ponds prematurely as containment areas have proven to be scarce at the facility. In addition, well tests and/or aquifer pump testing may be required at a later date. In addition, the centralized pond is currently the only discharge permit designated fluid waste disposition location at the facility.

Miscellaneous:

1) NMED- Liquid Waste (Septic Tank) Program: The plan to use portable bathrooms has changed, and the operator indicated that septic tanks were installed for facility bathrooms. The operator indicated that septic tank permits were obtained from the NMED. Ensure that septic system is properly permitted through NMED.

2) NMED- SWQB: The operator should evaluate stormwater areas at the facility and keep stormwater drainage areas separated from process units, areas, etc. The operator provided the Stormwater Pollution Prevention Plan drainage map with drainage from East to West. Stormwater areas were observed to be comingled with process areas, i.e, direct drainage into pits/ponds during precipitation events. OCD observed a one silt-fence or curtain on the run-off pond located at the southwest side of the plant. More may be needed.

3) NMED- SWB: The operator should initiate contact with the Deming Butterfield RCRA Landfill Disposal Facility and any nearby waste facilities to determine if they will accept geothermal exempt waste, i.e., "Special Wastes" designation (see msg. below). If not, the operator should make arrangements to ensure the disposition of certain waste streams are handled in accordance with all applicable state and/or federal regulations.

Sent: Friday, November 21, 2008 1:22 PM
To: Chavez, Carl J, EMNRD
Subject: RE: Lightning Dock Geothermal Power Project (Hidalgo Co.) Waste Streams

Carl: I reviewed the Solid Waste Rules on geothermal waste and it does come under the regulatory authority of OCD. As a result the waste must be taken to a solid waste facility permitted to accept OCD waste. Currently the only landfills permitted to accept OCD waste are the San Juan Regional Landfill near Aztec, NM, the Rio Rancho Landfill in Rio Rancho, NM and the Valencia Regional Landfill -15 miles west of Los Lunas, NM all operated by Waste Management of New Mexico. It is possible that the Red Rocks Landfill near Thoreau, NM may have a permit for OCD by May of 2009. At this time those are the only facilities permitted to accept OCD waste.

Terry Nelson
Permit Section Manager
NMED-SWB
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4) RLD- CID: The operator indicated that construction permits are approved and inspections are in progress with no problems at the time of inspection. The operator was hooking up to the Columbus Electric Coop grid system trending north from the facility power plant toward Lordsburg where the connection with the PNM grid system is located with a 20-year life power agreement.

Requirements before system startup:

1) In order to prevent waste of energy from heat loss, insulation shall be installed around power plant pipelines, i.e., process units, pipeline transects from production wells to injection wells. The operator indicated that insulation would be installed.

2) All environmental Analytical Laboratories used by the operator from now on shall be NELAC Certified. In conformance with the facility Water Quality Monitoring Program Work Plan, all environmental sampling and laboratory testing shall comply with standard EPA Quality Assurance/Quality Control (QA/QC) and Data Quality Objectives (DQOs).

3) A process flow diagram(s) for produced and injected water running through all surface pipelines and surface management units including wells is required to understand flow directions and the process units handling flow at surface.

   OCD observed how a refrigerant comingling release could occur and be recognized by a calculation by the operator at the oil separator coolant side of each Power Block. OCD recommends that a direct reading device with O&M record of any refrigerant additions to the system for each Block (i.e., date and time refrigerant is added with volume specification) be maintained. A significant loss may be about +/- 1% of the total refrigerant volume per Block and/or frequent fill-ups per Block. A C-141 release report per the OCD Permit with corrective action should be implemented immediately including shut-down of the Power Block until the situation is corrected. This is to prevent the injection of comingled refrigerant into the fresh ground water or Underground Source of Drinking Water (USDW) or thermal reservoir system.

4) New facility power plant engineering drawing(s) to scale shall be provided that reflects the actual "as-built" design of the geothermal power facility. In addition, a new facility site map(s) to scale displaying all surface features, i.e., pits, ponds, monitor wells, production/ injection wells, process units, etc. is required. The original facility geothermal power plant engineering drawings are no longer valid based on engineering modifications by the operator.

5) Former Production Well LDG 47-7 shall be removed from the geothermal power project well map and added as a MW 47-7 to the Monitor Well network map(s) for the project. The operator converted the production well to a monitor well (LDG 47-7 to MW 47-7) by Sundry Notice in November of 2013. LDG 47-7 now serves as a deep monitor well adjacent to shallow MW-6.

6) Pit liners shall be repaired and/or replaced and berms reconstructed with anchor trenches to keep liners entrenched along the perimeter of pits. Grade surface to prevent run-on and run-off into process areas, i.e., pits/ponds, blowdown pits, etc. during precipitation events. Keep stormwater areas separated from process areas to minimize waste generation at the facility.

7) Seal all wells from atmosphere at the facility. Injection Wells: LDG 55-7 and LDG 63-7 were observed to be open to atmosphere and are not sealed at surface. The sign at "TFD 55-7" may require replacement because it is labeled "TFD" 55-7 instead of "LDG". No BOPE was observed on Production Well 45-7. The pump should sit on top of BOPE.

   MW protection covers are needed with bright color paint to prevent them from damage by allowing operators to visually see them. MW sign label and covers and/or poles shall be placed around MWs to protect them from trespass and damage. Ground surrounding wells shall be graded to allow drainage away from wells.

8) Provide a list of chemicals with MSDSs for stored chemicals at the facility and location(s) of storage. Include chemical storage areas on any surface maps of the facility. Ensure that storage areas protect containers from weather conditions and flooding, etc.

   OCD requires submittal of an MSDS for the refrigerant (R245-FA) and oil used in the closed-loop system. The operator shall implement a monitoring program for tracking refrigerant and oil levels with addition volumes to the system on the coolant side of each power generation Block in order to detect any breakthrough communication or commingling within each of the 4 power generation Blocks. OCD shall be notified of significant losses of coolant or any commingled scenarios that may harm the environment.

9) Provide an environmental waste byproduct list from operations, i.e., filters, petroleum contaminated soils, air emissions- hydrogen gas units (explosive vapors), lead batteries, spent coolant, etc. from operations. The operator shall comply with applicable federal, state and/or local environmental regulations and disposition thereof. Provide a list of OCD and non-OCD Waste Facilities that will accept the wastes. OCD is concerned that the nearby Deming Butterfield RCRA Disposal Facility cannot accept geothermal exempt wastes and there are no OCD permitted surface waste management facilities proximal to the facility. Non-OCD waste facility must have a "special waste" designation in order to accept OCD derived wastes and the Butterfield Solid Waste Facility in Deming may not have the designation.

10) 19.14.32.8 (Safety Regulations) requires that debris be kept clear of well site around any drilling or producing wells that may constitute a fire hazard. Debris was observed near production well LDG 45-7 and LDG 55-7 areas.

11) Ensure that the OCD G-Form applicable to sale of geothermal power is properly completed and submitted to OCD.

12) Ensure that containment, i.e., liner, cement, etc. exists beneath fuel storage tanks, chemical storage area(s) at the facility in the event of a release.

13) OCD observes the use of a Water or Oil-Lubricated Line Shaft Pump (400 HP) at Production Well LDG 45-7? The operator must assert that the use of this pump will not contaminate the USDW and/or fresh ground water if the pump uses lubricant in a high temperature environment. The lubricant used in these systems must be EPA approved. These oils can be either vegetable or mineral based. If the pump is in fact oil-based, please specify the type of lubricant used and the frequency and estimated volume(s) added to the pump? Also, how the operator will determine when leakage is occurring to be reported to the OCD for pump repair?

Conclusions:

1) The geothermal power plant appears to be a state-of the art plant with injection/ production wells nearby to each other facilitating a "water balance" scenario for extraction and injection that will minimize drawdown to nearby shallow water supply wells and help to offset seismicity concerns within the regionally extensive reservoir system.

2) The facility real-time monitoring system appears to minimize fluid management at surface and prevents future production well testing into ambient air from occurring, which appears to reduce the evaporative losses of the fresh thermal water resource that would otherwise be managed at surface.

3) There may be some regulatory issues identified under the "Miscellaneous" section herein that the operator may need to address.

4) The operator should consider implementation of pollution prevention and waste minimization initiatives and operational processes that reduce, reuse and/or recycle materials, etc., to minimize waste generation and reduce operating costs while protecting the environment when and where possible.

5) The project appears to be proceeding according to schedule and geothermal power should be online on/or before December 31, 2013. OCD expects to complete all program document reviews, i.e., Water Quality Monitoring Program Work Plan; G-Form Package Reviews for Project Wells; Pit/Pond Closure Requests; etc. associated with the geothermal power project completed on/or before COB on December 20, 2013.

6) Under the New Mexico Underground Injection Control (UIC) Program, the operator shall not contaminate the USDW at the project location.

If you have any questions, or need to request an extension on any required items above, please contact Carl Chavez of my staff at (505) 476-3490, mail at the address below, or email at CarlJ.Chavez@state.nm.us. Thank you for your cooperation.

Sincerely,

Scott Dawson
Deputy Director

SD/cjc

cc: Mr. Bill Brancard, OCD Santa Fe
Mr. Daniel Sanchez, OCD Santa Fe
Mr. Glenn von Gonten, OCD Santa Fe
OCD Artesia Office

OCD INSPECTION (November 19, 2013 at 8:30 a.m.)
Weather: Sunny ~ 65˚F with Wind Southerly at ~ 8 mph
OCD Inspectors: Carl Chávez, Scott Dawson & Glenn von Gonten

Facility sign W of Hwy. 338 about 2.5 miles due west of power plant was vandalized


Looking E from CR 96 Toward Pyramid Mtns and Geothermal Power Plant


Looking SW at sign located just W of Hwy 338 at CR 96 exit toward facility


Looking E from CR 96 Toward Pyramid Mtns and Geothermal Power Plant


Looking E-SE from CR 96 at Power Plant Construction Location

Looking E at construction site office

Looking E away from power plant at cooling towers for blocks under construction

Looking SW at power plant and air-based cooling towers in first of four constructed blocks (Ea. ~ 1.2 MW)

Looking W at Pipelines: Power Plant Input & Return Pipeline to Injection Wells

Looking W-SW toward power plant construction area

Looking SE at pipeline split between Production Well LDG 45-7 and Return Pipeline to Injection Well: LDG 55-7

Looking S across facility at pipe storage area

Looking W toward Power Plant

Looking W at Columbus Electric Coop power line grid in far background trending N away from Power Plant toward Lordsburg and the PNM Power Grid Connection.

Looking SE at elevated pipeline trending toward Production Well LDG 45-7

Looking W-SW at pipeline running from Power Plant toward Production Well LDG 45-7 and Injection Well LDG 55-7

16-inch diameter pipeline

Production Well LDG 45-7

Production Well LDG 45-7 Sign

Production Well LDG 45-7 Well Head with 400 HP Pump

LDG 45-7 Top Mounted Water or Oil-Lubricated? Line Shaft Pump (400 HP)

Production Well LDG 45-7 Control Room in background

Looking N-NE at pipeline split between Production Well LDG 45-7 and Injection Well LDG 55-7

Production Well LDG 45-7 Flexible Poly Pipe connection to Injection Well LDG 53-7

LDG 45-7 ASTM Barrel Bath with Internal Coil Sample Tubing

LDG 45-7 ASTM Sample Cooler Near Pipeline Sample Port

Above ground pipelines: Inlet & Return

LDG 45-7 ASTM Sample Cooler near sample port location on Pipeline

Oil separator for refrigerant side of power Block for oil separation from refrigerant.

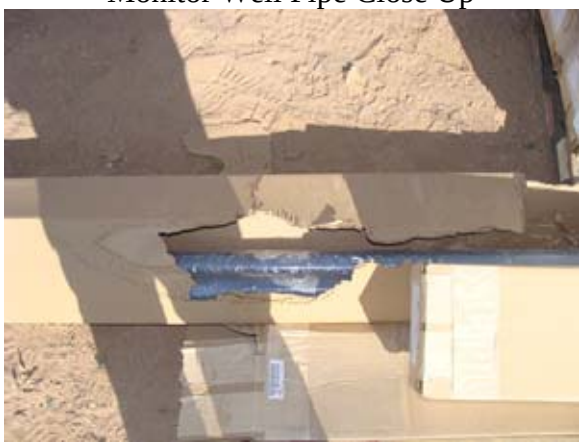
Air-based Cooling Tower Unit

Monitor Well Pipe

Looking W-SW toward two Power Plant Blocks under construction

Monitor Well Pipe Close Up

Monitor Well Pipe



Monitor Well Screen 40 Slot

Looking E toward pipeline transect N toward Injection Well LDG 55-7

Looking S at flexible pipeline run to Injection Wells: LDG 53-7 and LDG 63-7

Elevated pipeline (uninsulated)

Pipeline Construction

Welder at Pipe Joint

Preparing pipeline joints for welded connection

Looking SW with pipeline transect toward Injection Wells from Production Well LDG 45-7

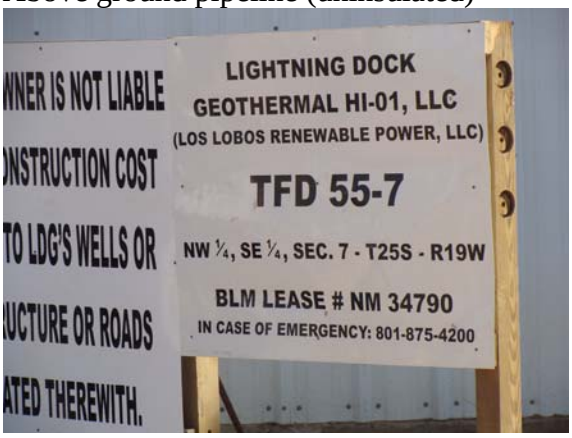
Looking SE across facility

Columbus Coop power grid in background

Looking SE across facility at cooling tower storage area and construction in background

Looking West at oil separators (1 unit per Block) for refrigerant side of each Power Block

Above ground pipeline (uninsulated)



Main Injection Well LDG 55-7 Sign displaying “TFD” instead of “LDG”

Looking W at pipeline transect (uninsulated)

Injection Well LDG 55-7

Main Injection Well LDG 55-7 open to environment (uninsulated)

Looking into LDG 55-7

Azimuth Angle View Down LDG 55-7

Stockpiled Debris Near LDG 55-7

Looking W at Central Evaporation Pond Stormwater Damage Along Berms Evident with Torn Liner

Looking S-SW at Central Evaporation Pond

Looking S-SE at Central Evaporation Pond Liner Tears along E and SE berm areas

Looking SW across Central Evaporation Pond

45-mil Polypropylene Liner Tear

Looking S-SW across Central Evaporation Pond

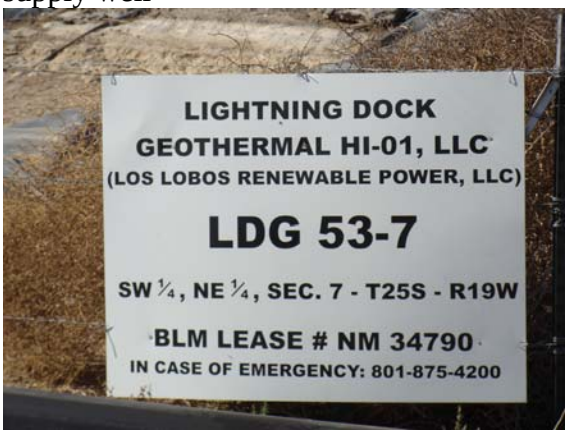
Same as above

INW-1 Intermediate Nested Monitor Well between LDG 45-7 and LDG 55-7

INW-1 (Intermediate Nested Well ~ 600 Ft. Deep) Located Between LDG 45-7 & LDG 55-7

Cement truck for MW cement completions

Looking W at water truck for construction activity obtaining fresh water from water supply well



Injection Well LDG 53-7 Sign

Flexible pipeline from Injection Wells: LDG 53-7 to LDG 63-7 with LDG 53-7 Drill Pit in Background

Injection Well LDG 53-7

LDG 53-7 Surface Pressure Gauge

LDG 53-7 Well Head with BOPE

MW-2 Near LDG 53-7 Construction w/ Surface Drainage Depression Surrounding Well

Monitor Well No. 2 (MW-2)

Burgett Property Owner Liability Sign in Vicinity of LDG 63-7

Injection Well LDG 63-7 Sign

LDG 63-7 Drill Pit with Stormwater Sediments running into pit from berm with vegetation growth inside pit

Looking S at Injection Well LDG 63-7

Looking N LDG 63-7

LDG 63-7 with BOPE

Looking SE from LDG 63-7

Looking SW at LDG 63-7 Drill Pit with Stormwater Run-on into Pit on E side of Pit

Looking NW at LDG 63-7 Drill Pit with Sediments & Vegetation Inside NE End of Pit

LDG 63-7 Drill Pit and Stormwater Sediments Deposited Inside Pit

Monitor Well No. 3 (MW-3) Near Injection Well LDG 63-7 with Surface Depression Surrounding Well

Looking N-NW at MW-3

Recently Constructed Run-Off Pond at SW Area of Property with Silt Fence Along W & S Perimeter of Pond Controlling Stormwater Drainage Across Facility from E to W

Looking S at Run-Off Pond

New Blowdown Pit Depression Located Near Each Production/Injection Well for Workovers, etc

Looking E on CR 96 Toward Facility (Pyramid Mtns. in background)

Looking N at Facility from MW-47-7

Looking E on CR 96 at Facility with Pyramid Mtns. in Background

Looking N at Power Plant Blocks 1 & 2 of 4

Debris Stockpiled on S Side of Facility

Looking S at LDG 47-7 Sign and Pit with Stormwater Run-on and Vegetation Inside Pit

MW-47-7 (Formerly LDG 47-7)

LDG 47-7 Drill Pit with Stormwater Sediments & Rocks Inside Pit

LDG 47-7 Sign (Recently Converted to MW-47-7 by Sundry Notice in November 2013)

Drill Crew Steam Cleaning MW Drill Augers Inside LDG 47-7 Drill Pit

Looking N-NE at LDG 47-7 Drill Pit

Deep MW-47-7 (Formerly LDG 47-7)

Bone Yard

Power Block 1 of 4 Radial Process Lines Extending from Cooling Tower Units to Collector Unit Below

Collector Unit Below Radial Process Lines

Collector Unit Below Radial Process Lines

Power Block 1 of 4 Soap & Water Leak Testing Process Lines

Block 1 Cooling Tower Units


Cooling Tower Units Sit On 7 Ft. Tall Piers


Block 1 of 4 Oil Separator Refrigerant Side


Block 1 of 4 Oil Separator Refrigerant Level Indicator


Block 1 of 4 Oil Separator Refrigerant Side


Evaporator Unit

Block 1 Compressor Unit Line Pressure Control

Evaporator Side of Expander Unit

Block 1 of 4 Kaishan Turbine Screw Expander Unit (1.2 MW)

Close Up of Evaporation Side of Expander Unit

Turbine Screw Turns Electric Generator on Expander Unit

Process Lines Feed into Top of Expander Unit

Expander Unit Interior Electric Control Circuit Panel 1250 V

Expander Unit Electric Control Circuit Panel Exterior

Expander Unit Process Lines

Block 1 of 4 Air-Based Cooling Tower Units

Power Plant Block Cooling Tower Units

Cooling Tower Close Up

Evaporator Side of Expander Unit

Cooling Tower Piping To Be Leak Tested

Evaporator Side of Expander Unit

Cooling Tower Soldered Pipe

Expander Unit

Block 1 of 4 Oil Separator Refrigerant Side of Expander Unit

Expander Unit

Expander Unit Electric Control Panel

Looking W at Produced Fluid Pipelines: Intake Pipeline from Production Well LDG 45-7 Tie-In to Block 1 and all 4 Power Plant Blocks under Construction with Return Pipeline (Eastward) back to Injection Wells

Looking SW Pipelines (Intake & Return) from Production Well LDG 45-7 Feeding into all 4 Power Plant Blocks with Block 2 of 4 Under Construction

Power Plant Block 2 of 4 Expander Unit under Construction

High Press Pipeline Flanges

Looking NW at Electric Ground Panels Located E of the Electric Poles

Looking E at Pipelines Extending From Facility Wells toward Power Plant Blocks

Looking NW at Electric Utility Poles and Workers

Looking NW at New Power Plant Electric Pole Lines Extending N away from Power Plant Blocks toward the Columbus Electric Coop Power Grid Poles Leading into Lordsburg for Connection to the PNM Power Grid for Sale Under a 20-Yr. Electric Power Generation Agreement

Looking W-SW at Blocks 1 & 2 Cooling Towers Unit

Looking W between Power Plant and Control Room Station Where an Employee will be Stationed 24/7

Looking N-NW at Elevated Pipeline and Power Plant Control Room in Background

Cooling Tower Units at Block 2 of 4 Under Construction

Power Plant Control Room

Inside Power Plant Control Room

Inside Power Plant Control Room

Inside Power Plant Control Room

Above Ground Fuel Storage Saddle Tanks without Secondary Containment

Temporary Chemical Storage Containment Area

Looking SW at Block 1 of 4 power plant with air-based cooling tower system placed on top of 7 foot piers

XRT 145-68 Synthetic Compressor Lubricant (55 Gal/208 L) Barrels

Looking W at Power Blocks 1 and 2

Looking NW at Power Plant Blocks 1 & 2 of 4

Transection Between LDG 45-7 and LDG 55-7

Looking SE at Power Plant

Cooling Tower Staging Area

Looking W-SW at Power Plant

Pipeline W-E Transect from Power Plant Over N-S Trending Arroyo located just E of Power Plant into Project Well Locations

Looking W toward power plant at Pipeline Construction (Peloncillo Mtns. in background)