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Western Refining
GALLUP

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AUG 2011

New Mexico Energy, Minerals and Natural Resources Department

Oil Conservation Division (OCD)
Attn: Carl Chavez
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Request for a Minor Modification to the OCD Discharge Permit (GW-032)
Western Refining Southwest, Inc. - Gallup Refinery
Jamestown, NM

Dear Mr. Chavez,

Western Refining Southwest, Inc. Gallup Refinery, former known as Giant industries Arizona, Inc. and formerly doing business as Giant Refining Company Ciniza Refinery is requesting final approval of construction and operation of Sanitary Treatment Pond #1 (STP-1). This modification was conceptually approved in an OCD email dated October 14, 2010.

Introduction

The Gallup Refinery entered into a Complaint and Consent Agreement and Final Order (CAFO), Docket No. RCRA-06-2009-0936 dated August 26, 2009 and modified on September 1, 2010. The CAFO requires construction of an industrial waste water treatment facility and subsequent closure of the Aeration Lagoons. The CAFO does not allow the sanitary waste water from the refinery and nearby Pilot Truck Stop to be commingled with Refinery waste water effluent prior to industrial waste treatment. The proposed STP-1 will receive both sanitary waste water and effluent from the new industrial waste water treatment plant (WWTP). While in STP-1 the waste water will be undergo aeration treatment. The treated effluent form STP-1 will be discharged into Evaporation Pond #2 (EP-2). Figure 1 depicts the location of STP-1.

Purpose

STP-1 will serve two purposes. The first is to treat the sanitary waste water through aeration. The treatment biochemically converts the dissolved carbonaceous organics to carbon dioxide and water. Nitrogenous biochemical oxygen demand (BOD) will be converted to oxidized forms of nitrogen (e.g. nitrite or nitrate). This will prevent the downstream evaporation ponds from undergoing septic conditions due to the lack of dissolved oxygen and the exertion of BOD, primarily from the organic load contributed by the sanitary wastewater. The second purpose is to transport the waste water to EP-2. Figure 2 depicts the general layout of STP-1.

Design Basis

- The STP-1 effluent discharges to the Evaporation Ponds. The treatment objective of STP-1 is to provide sufficient organic removal to prevent an organic loading to the Evaporation Ponds that cause the ponds to become anoxic resulting in the conversion of sulfates to H2S, and a potential odor problem.
- The design flow rates for the individual wastewater sources are summarized in Table 1.
- The STP-1 requires a hydraulic retention time (HRT) sufficient to metabolize the sanitary wastewater. The sanitary wastewater is pretreated through the removal of settleable solids in the new pump station prior to being pumped to STP-1.
- The sludge age is to be "infinite". There is no planned sludge wasting. Therefore a dynamic balance will be maintained between the biomass under aeration and the influent organic load. The influent organic load is to be entirely metabolized to CO2 and water. The downstream portion of STP-1 is quiescent to allow any suspended solids to settle prior to passing under an underflow baffle and over a V-notch weir, and then by gravity to the Evaporation Ponds. The solids that settle to the bottom of the quiescent portion will be removed on an infrequent basis using e.g. a pontoon mounted suction pump to pull settled solids off the bottom.
- STP-1 is divided longitudinally by a concrete wall which allows one side of the pond to be dewatered for inspection and maintenance when necessary, while maintaining the other side in operation. The liners are attached to the concrete wall and the concrete effluent structure using a water tight seal.

Design Criteria

The STP-1 has a double layer of impermeable liner material with provisions for leak detection and collection. A plan view of the STP-1 aerated pond is shown in Figure 2. Design criteria for the liner are:

- The sub-base will consist of indigenous material that has been smoothed and compacted, with stones removed. The thickness of a compacted sub-base shall be a minimum of 2 feet as measured normal to the surface of the layer.
- A geosynthetic clay liner (GCL) will be placed on the prepared subgrade. The GCL will serve to cushion the secondary liner as well as provide a barrier in the event of leakage through the primary and secondary liners.
- The secondary liner material will be placed on the GCL, and will be of high density polyethylene (HDPE) having a minimum 60 mil thickness. This geomembrane liner shall be impervious and resistant to petroleum hydrocarbons, salts and acidic and alkaline solutions. The synthetic material shall also be resistant to ultraviolet light.
- An underdrain system of "geomat" plastic material will be installed above the secondary liner and used for leak detection and liquid recovery in the event of a rupture in the top liner. This "geomat" will have a hydraulic conductivity of at least 1×10^{-5} cm/sec to facilitate drainage. The specification sheet is attached. The secondary liner will have a 2% slope leading to four leak detection and collection sumps. Each sump will have a transducer that will detect the presence of water and actuate a signal light at the surface, and an alarm at the DCS.
- The primary (top) liner shall be an HDPE geosynthetic liner having a minimum thickness of 60 mil. This primary liner shall also be resistant to petroleum hydrocarbons, salts and acidic and

alkaline solutions. The synthetic material shall also be resistant to ultraviolet light.

- ☐ The sides of the STP-1 shall have a slope no greater than 3:1.

- ☐ The STP-1 is longitudinally partitioned to allow one side to be taken out of service while the other side remains operational. The mechanical surface aerators are located within the influent half of the pond to promote biological activity since the effluent end of the pond is quiescent to allow the treated effluent to be clarified before flowing to the existing evaporation ponds. The water depth of STP-1 is 10 feet. Midway along the length of STP-1 is a 5 ft high transverse partition that promotes the retention of heavier, biologically active solids in the aerated half of the pond.

- ☐ Adjustable V-notch weirs are located at the effluent of each side of the pond to balance the flow between the north and south sides of STP-1.

- ☐ Currently, there are five 15-HP surface aerators that provide aeration and mixing of the two existing Aeration Lagoons. These aerators will be relocated to the new STP-1 along with five additional aerators, for a total of 10 aerators.

- ☐ The installer shall use factory welded seams where possible and minimize liner field seams. Seams shall be oriented up and down, rather than across the slope. The installer shall overlap liners four to six inches prior to welding seams. Qualified personnel shall perform field seaming.

- ☐ The installer shall anchor the edges of all liners in the bottom of a compacted earth-filled trench. The anchor trench shall be at least 24 inches deep.

- ☐ The installer shall ensure that the liner is protected from any fluid force, mechanical damage, or erosion from the scour caused by the surface aerators or fluid velocities from the influent discharge piping.

- ☐ The ground in the vicinity of shall be contoured and graded to direct clean surface runoff water around STP-1 to reconnect to the natural water course in such a way as to prevent ponding or flooding, or the imposition of hydrostatic loads to the liners of STP-1.

Plans and Specifications

The design plans and specifications for STP-1 are attached. The total volume of STP-1 is approximately 1.4 million gallons. The first half is aerated zone and the second half is quiescent zone. The overall hydraulic residence time is approximately 40 hours with 18 hours in the aerated zone at the maximum flow rate. At the average flow rate, the overall residence time is 71 hours with 32 hours in the aerated zone. At maximum flow rate and BOD loading, seven- 15 HP aerators are required to provide sufficient dissolve oxygen transfer to satisfy the biochemical oxygen demand.

Thank you for your review of this modification. Your timely review and approval will allow us to meet the CAFO deadlines.

Sincerely,

Ed Riege
Environmental Manager

Table 1: STP-1 Design Basis Flow Rates		
Parameter	**Average**	**Maximum**
Sanitary Wastewater [1]		
Flow [gpm]	50	75
BOD_5 [mg/l]	250	300
COD [mg/l]	550	1,750
pH	6 - 9	9
TSS [mg/l]	100	420
O&G [mg/l]	20	120
TKN [mg/l]	75	250
Phosphorus [mg/l]	8	30
TDS [mg/l]	1,400	1,700
MPPE Effluent		
Flow [gpm]	275	500
BOD_5 [mg/l]	160	810
COD [mg/l]	900 [2]	4,500
TSS [mg/l]	20	50
TDS [mg/l]	1,500	2,000
Benzene [mg/l]	<0.5	0.5
Composite STP-1 Influent		
Flow [gpm]	325	575
BOD_5 [mg/l]	150	720
COD [mg/l]	725	4,500
TSS [mg/l]	35	90
TKN [mg/l]	265	800
Phosphorus [mg/l]	1	30
TDS [mg/liter]	1,485	1,900
Effluent (To Evaporation Ponds)		
Flow [gpm]	325	575
BOD_5 [mg/l]	50	100
COD [mg/l]	240	3,900
pH [su]	6.5 –8.5	9.0
TSS [mg/l]	35	90
TDS [mg/l]	1,485	1950
Design Features		
Liner	Double liner with leak detection/collection.	
Hydraulic Retention Time	3.5 days [avg.]	
Aeration	10 Aqua-Jet Floating Surface Aerators (15 HP ea)	

[1] From Brown & Caldwell draft report of 23 March 2009.
[2] Avg. values assume 80% COD removal in MPPE; maximum values assume MPPE is bypassed.

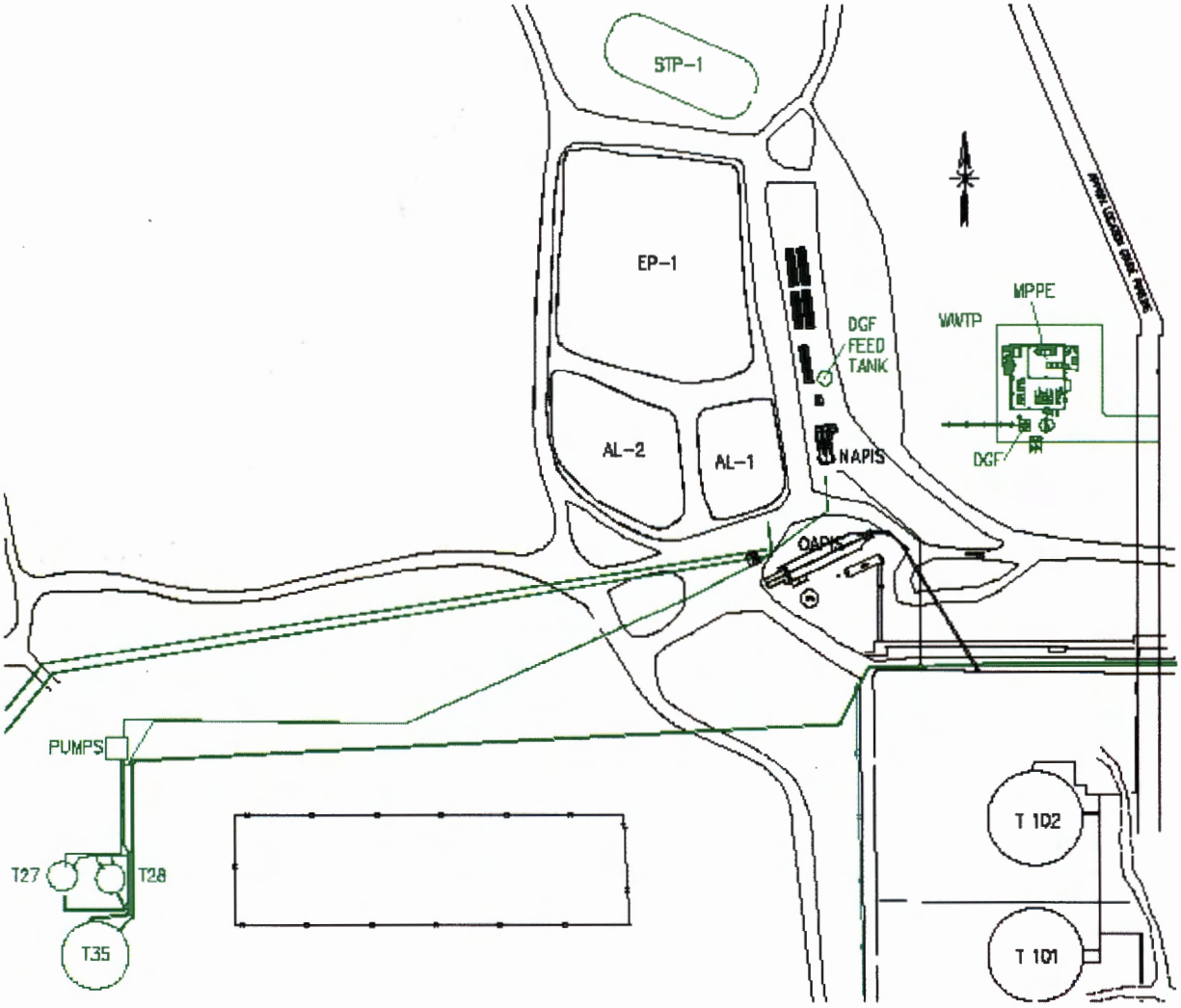
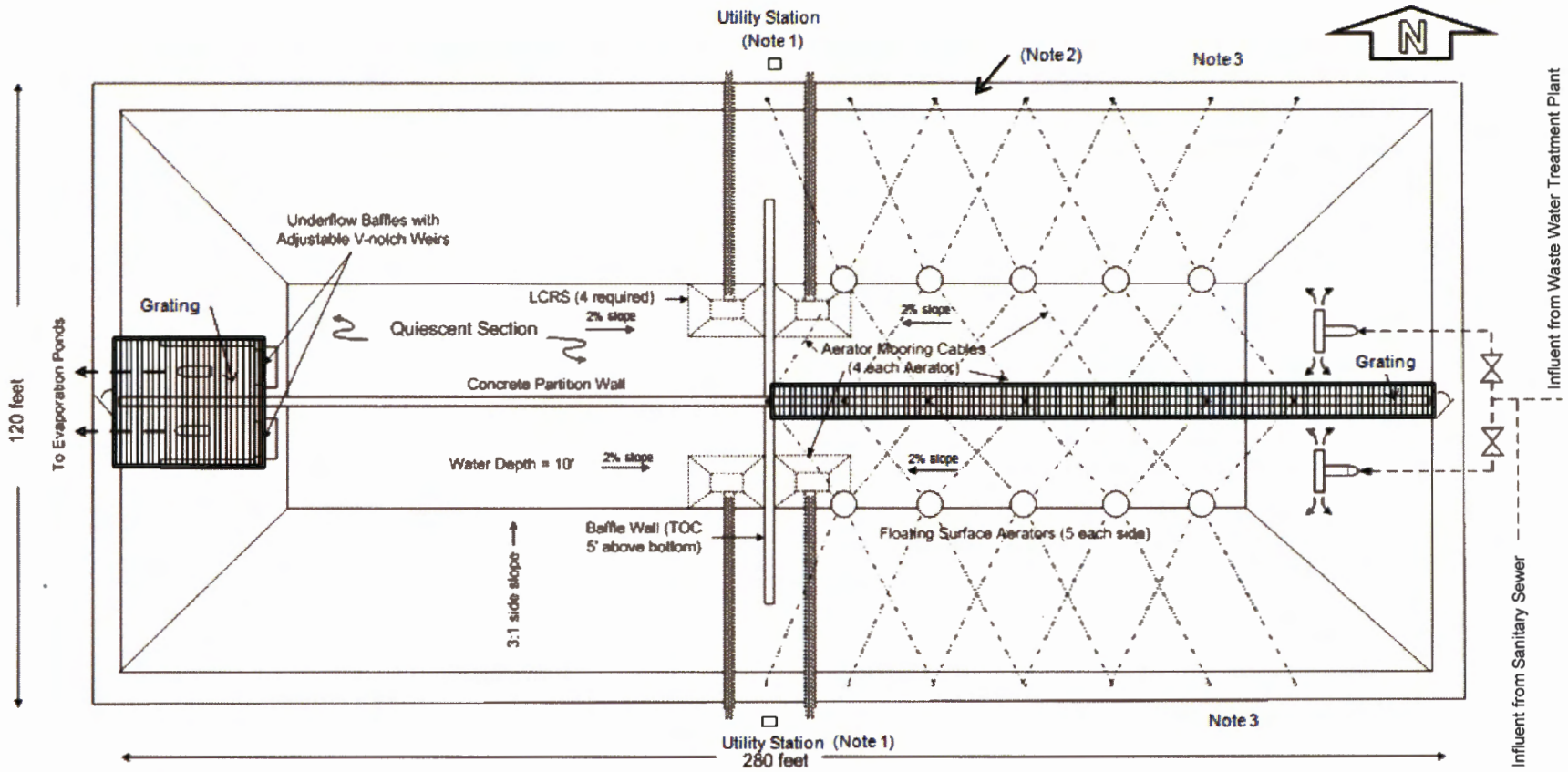


Figure 1 - Site Plot Plan



LCRS = Leak Collection and Recovery System

Notes:

1) Utility Station to have 230 V/120 V 1Ø receptacles. Also to have switch to cut power to the five aerators on the respective side of STP-1 in an emergency.

2) Install layer of textured (60 mil, non-slip) HDPE liner around edge of aerated portion of STP-1 pond. This layer to be welded to primary liner.

3) Safety equipment to include a row boat, oars, and safety pole on north & south sides of STP-1. Life saver rings to be located at intervals around STP-1 and on grated walkways at intervals not to exceed 50 feet.

FIGURE 2 Sanitary Treatment Pond 1 - General Layout

GSE

GSE STANDARD PRODUCTS

Product Data Sheet

GSE HyperNet Geonets

GSE HyperNet geonets are synthetic drainage materials manufactured from a premium grade high density polyethylene (HDPE) resin. The structure of the HyperNet geonet is formed specifically to transmit fluids uniformly under a variety of field conditions. HDPE resins are inert to chemicals encountered in most of the civil and environmental applications where these materials are used. GSE geonets are formulated to be resistant to ultraviolet light for time periods necessary to complete installation. GSE HyperNet geonets are available in standard, HF, HS, and UF varieties.

The table below provides index physical, mechanical and hydraulic characteristics of GSE geonets. Contact GSE for information regarding performance of these products under site-specific load, gradient, and boundary conditions.

Product Specifications

TESTED PROPERTY	TEST METHOD	FREQUENCY	MINIMUM AVERAGE ROLL VALUE[c,d]			
			HyperNet	HyperNet HF	HyperNet HS	HyperNet UF
Product Code			XL4000N004	XL5000N004	XL7000N004	XL8000N004
Transmissivity[a], gal/min/ft (m^2/sec)	ASTM D 4716-00	1/540,000 ft^2	9.66 (2×10^{-7})	14.49 (3×10^{-6})	28.98 (6×10^{-6})	38.64 (8×10^{-6})
Thickness, mil (mm)	ASTM D 5199	1/50,000 ft^2	200 (5)	250 (6.3)	275 (7)	300 (7.6)
Density, g/cm^3	ASTM D 1505	1/50,000 ft^2	0.94	0.94	0.94	0.94
Tensile Strength (MD), lb/in (N/mm)	ASTM D 5035	1/50,000 ft^2	45 (7.9)	55 (9.6)	65 (11.5)	75 (13.3)
Carbon Black Content, %	ASTM D 1603, modified	1/50,000 ft^2	2.0	2.0	2.0	2.0
Roll Width, ft (m)			15 (4.6)	15 (4.6)	15 (4.6)	15 (4.6)
Roll Length, ft (m)[b]			300 (91)	250 (76)	220 (67)	200 (60)
Roll Area, ft^2 (m^2)			4,500 (418)	3,750 (348)	3,300 (305)	3,000 (278)

NOTES:

- [a]Gradient of 0.1, normal load of 10,000 psf, water at 70° F (20° C), between steel plates for 15 minutes.
- [b]Please check with GSE for other available roll lengths.
- [c]These are MARV values that are based on the cumulative results of specimens tested by GSE.

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This product data sheet is also available on our website at:

www.gseworld.com