GRCC 06

Monzeglio, Hope, NMENV

From: Ed Riege [eriege@giant.com]
Sent: Thursday, February 02, 2006 8:38 AM
To: Chavez, Carl J, EMNRD
Cc: Monzeglio, Hope, NMENV; Price, Wayne, EMNRD; Foust, Denny, EMNRD; Steve Morris
Subject: Pilot Station Effluent Summary

_0117081617_001.pdf (668 KB)   RESPONSE LETTER OCD BOD jan06....

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February 2, 2006

Mr. Carl Chavez
NM Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Dear Mr. Chavez:

In response to your e-mail dated December 28, 2005, Giant Industries, Inc., Ciniza Refinery (Ciniza), has examined the contribution from the Pilot Station Effluent (PSE) to the aeration lagoon with respect to biological oxygen demand (BOD) and other constituents. As you may remember, the Pilot Station was previously known as the Travel Center and was owned and operated by Giant Industries.

In order to determine the anticipated loading from the PSE, we first looked at the history of the relationship between the refinery and the station and then at the discharges that were anticipated from the facility. The travel center was under construction in 1986 and on December 12, 1986, Bob McClenahan, the Environmental Coordinator for Giant, wrote to Richard Stamets, the Director of New Mexico Oil Conservation Division (NMOCD), to notify him of the construction and the additional discharges to the aeration basin from the facility (see Attachment 1).

In 1986, the design flow from the Travel Center was 35 gallons per minute at a BOD_5 value of 200 mg/L. This amounted to about 85 pounds per day loading to the system. Also at that time, the refinery load was 700 mg/L BOD at about 82 gallons per minute, resulting in approximately 690 pounds of BOD per day.

The biokinetic data and subsequent calculations for refinery wastewaters in the 1986 letter stated that the BOD removal rate coefficient (K_e) was 0.0004 to 0.0009 L/mg-hr, the sludge synthesis coefficient (Y) was 0.35 to 0.46 pounds sludge per pound BOD_r, the O_2 demand for synthesis (a') was 0.91 to 1.06, and the O_2 demand for endogenous respiration (b) was 0.16 to 0.21. Based on these numbers and an average lagoon temperature in summer of 24°C, the following numbers were calculated:

	Cell #1	Cell #2
Volume (Mgal)	0.51	0.85
BOD removal summer (Lbs)	1353	135
O_2 demand (lbs/hr)	70	24

As you are aware, current conditions are slightly different – the contribution to the aeration lagoons from the Pilot Station is much less in volume but higher in concentration. The average flow to the aeration lagoon from the Pilot Station is approximately 5 gallons per minute and BOD samples ranged from 504 mg/L to 10,500 mg/L during 2005. This has resulted in a BOD loading ranging from 30 to 630 pounds per day.

If the refinery load is approximately 700 mg/L at an average flow of 105 gpm, the loading would be 882 pounds per day. This would mean the total loading could be as high as 1,330 pounds per day from sources, the refinery and the PSE. This number is almost the exact loading calculated in 1986.

Samples taken at the inlet to aeration lagoon (AL) 2 on January 6, 2006 had a BOD concentration of 369 mg/l, which is 300 mg/L higher than the calculations in 1986. The flows from AL 1 to AL 2 will be dependent upon evaporation from AL 1 and any additional flows to either the new API unit or the oil-water separator to AL 1. Because of this, calculations to determine loading and BOD removal rates at AL 1 are incomplete. However, it does appear that the loading to AL 1 is no greater than that initially predicted in 1986.

Because there is a unique relationship between Ciniza and the Pilot Station, we would like to take some time to determine if there actually is an issue, since the total BOD loading for the facility is within the original anticipated design for the existing number of aeration units and lagoons. In order to close the loop Giant would like to fill in some of the data gaps and obtain the following information:

- BOD going into aeration lagoon 1 (per stream or an aggregate number);
- BOD exiting aeration lagoon 2;
- Flow rate between aeration lagoon 1 and aeration lagoon 2; and
- Total water reporting to aeration lagoon 1 – including the API and stormwater separator units.
- Work with operations and engineering to determine what the anticipated increase in flow rate will be due to increase in production.

We have also followed through with the sampling requested in your e-mail on November 30, 2005 and found that the effluent from the travel center does not exceed the RCRA toxicity standards as the quarterly sampling also indicates.

We propose to continue our investigation and, if we determine that the load placed on our AL by the PSE is too great, we would like the opportunity to work with our neighbor to find a cost-effective and acceptable solution for both of us. Since the winter months actually require the greater amount of oxygen, and we are more than half way through the winter, we request additional time to work on this problem and come to a mutually acceptable resolution within a nine-month period. In July 2006 we propose to send you documentation of our findings and any plans to remedy the loading, as appropriate and necessary.

Please let me know your thoughts on the data presented and our proposal.

Sincerely,

Ed Riege

GIANT
REFINING COMPANY
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December 12, 1986

Richard L. Stamets
Director
NMOCD
P.O. Box 2088
Land Office Building
Santa Fe, NM 87501

RE: Addition to Giant's Ciniza Refinery Discharge Plan, GW-32

Dear Mr. Stamets:

As your staff is aware, Giant is building a new Travel Center near our Refinery. We would like to use the new Aeration Basin for biological treatment of the waste water generated from that facility. Enclosed are some pertinent data related to this proposed addition.

The facility is scheduled to commence operations in May of 1987. Waste streams will be generated at four general locations: the truck service area, the truck fuel center, the R.V. dump station, and the main building, which houses restaurants, showers and restroom facilities. Each of these sources will run through at least one 2,000 gallon septic tank for solids and grease removal, in addition to some biological treatment. The waste water will gravity flow from the septic tanks to a lift station. The lift station is designed to pump the water to the Parchell flume at the inlet of the aeration basin (pond #1). The system is designed to gravity flow to pond #9, in case of mechanical problems. (See attached sewer layout for details).

The designed flow from the Travel Center is 35 GPM (50,400 GPD), at a BOD_5 value of 200 mg/l. This will result in 85 pounds per day of BOD being treated. The refinery organic load was calculated to be 700 mg/l BOD at 117,800 GPD, or 690 #/day BOD. The total anticipated load to the basin therefore is 775 #/day at 168,200 GPD. The aeration equipment (See Appendix A attached) is designed to provide oxygen for up to 1500 #/day of BOD and result in an annualize average evaporation rate of 16,300 GPD (11.3 GPM). The net increase in water to our evaporation ponds would be 34,100 GPD. Utilizing the equations from Table 6-1 (enclosed) of our Discharge plan application report, the total yearly discharge would increase by 12.4 million gallons (MG), for a total of

71.2 MG/yr (218.6 AF/yr). Using the calculated pond evaporation capacity of 228.6 AF/yr, results in a conservative pan evaporation rate capacity of 105%. It should be noted that by lake evaporation rates, the pond's capacity is calculated to be 156%. However, due to the marginal amount of calculated excess capacity, several water conservation projects are being considered.

I hope this provides you with adequate information on this proposed change. If you have any questions, please don't hesitate to call me.

Sincerely,

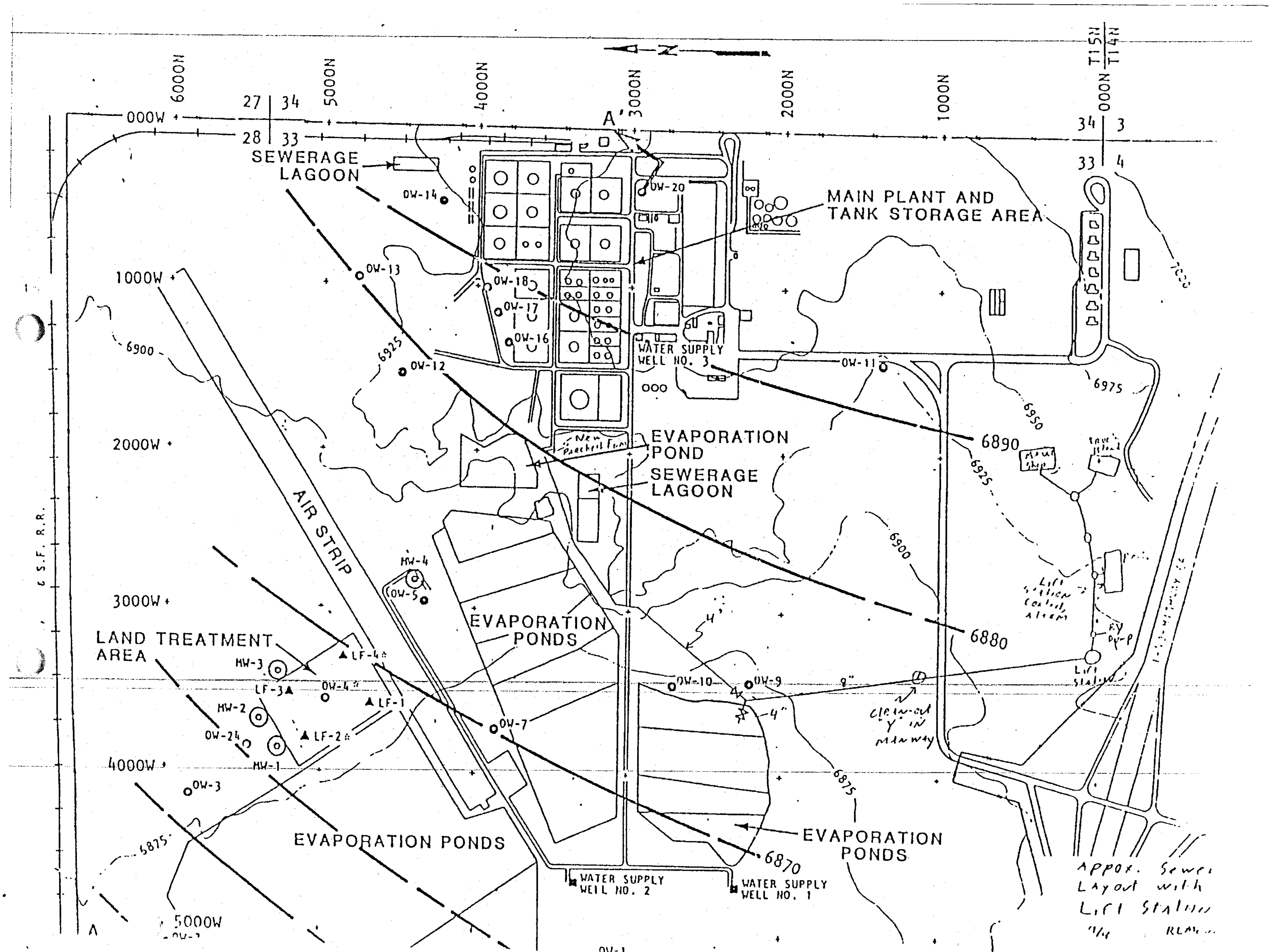
Bob McClenahan, Jr.

Bob McClenahan, Jr.
Environmental Coordinator
Giant Refining Company

RLM:ds

Enclosures

cc: Carl Shook
Trent Thomas, Geoscience Consultants, Ltd.
Carlos Guerra, Giant Industries
Frank Chavez, OCD, Aztec, NM



SEWERAGE LAGOON
MAIN PLANT AND TANK STORAGE AREA
EVAPORATION POND
SEWERAGE LAGOON
EVAPORATION PONDS
EVAPORATION PONDS
EVAPORATION PONDS
LAND TREATMENT AREA
AIR STRIP
WATER SUPPLY WELL NO. 1
WATER SUPPLY WELL NO. 2
WATER SUPPLY WELL NO. 3
6000N
5000N
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T15N
T14N
000W
1000W
2000W
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OW-14
OW-16
OW-17
OW-18
OW-20
OW-24
MW-1
MW-2
MW-3
MW-4
LF-1
LF-2
LF-3
LF-4
6870
6875
6880
6890
6900
6925
6950
6975
Clean-out "Y" in Manway
Lift Station
Approx. Sewer Layout with Lift Station

TABLE 6-1

WATER BALANCE FOR EVAPORATION PONDS

MONTH	PRECIP. (IN.)	PAN EVAP. (IN.)	DIFFERENCE (IN.)
Jan	.56	.38	+.18
Feb	.50	.50	0.00
Mar	.61	.84	-.23
Apr	.43	2.05	-1.62
May	.43	3.82	-3.39
June	.52	5.81	-5.29
July	1.83	7.11	-5.28
Aug	1.65	5.92	-4.27
Sep	.99	3.89	-2.90
Oct	1.17	2.03	-.86
Nov	.62	.70	-.08
Dec	.68	.39	+.29
	9.99	33.44	-23.45

Average discharge = 161,000 gallons/day

Yearly Discharge = 365 days x 161,000 gallons/day = 58,765,000 gallons/year

58,765,000 gallons/year x 1 Acre-Foot/325,742 gallons = 180.4 AF/year

Net Pond Evaporation = 23.45 in/year = 1.954 ft/year

Pond Evaporative Capacity = 117 Acres x 1.954 ft/year = 228.6 AF/year

Relative Capacity = $\frac{228.6 \text{ AF/year}}{180.4 \text{ AF/year}}$ = 127%

RECEIVED AUG 1 4 1986

SIDESLOPES = 2:1
TOP OF DIKE = 10'

SLUDGE POND VOLUMETRICS
TRIAL #3
JULY 18 1986

Appendix A

CELL	DRAIN POINT ELEV	BOTTOM ELEV	SPILL ELEV	BOTTOM ELEV AREA (SF)	TOP OF POND CONTOUR AREA (SF)	TOP OF FREEBOARD CONTOUR AREA (SF)	POND VOLUME (CF)	FREEBOARD VOLUME (CF)	TOTAL CELL VOLUME (CF)
1	92.0	93.0	100.0	10,521	14,694	16,770	68,297 (0.51MG)	31,464	99,761
2	86.0	87.0	96.0	12,141	18,410	20,754	112,998 (0.85MG)	39,164	152,162
3	85.0	86.0	96.0	34,402	48,631	51,753	349,933	100,384	450,317
					VOLUME TOTALS:		531,228	171,012	702,240

The following biokinetic data for refinery wastewaters are taken from Reference #1:

a. BOD Removal Rate Coefficient, (K_e) = 0.0004 to 0.0009 L/mg-hr

b. Sludge Synthesis Coefficient, (Y) = 0.35-0.46 lbs. Sludge/lb. BOD_r

c. O_2 Demand for Synthesis, (a') = 0.91-1.06

d. O_2 Demand for Endogenous Respiration, (b') = 0.16-0.21

Since the above data are based on a bench scale experimental study in th laboratory, 20°C (68°F) temperature will be assumed.

<u>Cell #1:</u> Lagoon Temperature: 24°C* (Summer)

Lagoon Temperature: 13.5°C* (Winter)

*REFER TO COMPUTER PRINTOUT FOR COOLING CALCULATIONS.

Correct BOD Removal Rate Coefficient, K_e for temperature,

$$K_{e_{T°C}} = K_{e_{20°C}} \times 1.04^{(T-20°C)}$$

$$= 0.00065 \text{ L/mg-hr (Avg.)} \times 1.04^{25-20}$$

$$= 0.0008 \text{ L/mg-hr (Summer)}$$

$$= 0.019 \text{ L/mg-day}$$

$$K_{e_{winter}} = 0.00065 \text{ L/mg-hr} \times 1.04^{13.5-20}$$

$$= 0.0005 \text{ L/mg-day}$$

$$= 0.012 \text{ L/mg-day}$$

Basin Volume = 0.51 MG

REFER TO COMPUTER PRINTOUT TRIAL ERROR MLVSS v BODr
NOTE: Summer conditions control.

BOD_5 removal = 714 mg/l - 70 mg/l = 644 mg/l

lbs BOD_5 removed = 644 mg/l (8.34) 0.252 MGD

$= 1353 \frac{lbs}{day}$

Maximum O_2 Demand = a' (BOD removal) + b' (lbs MLVSS)

lbs MLVSS = 245 mg/l x 0.5 MG x 8.34

= 1022 lbs MLVSS

$$\text{lbs } O_2 = 1.06 \frac{\text{lbs } O_2}{\text{lb } BOD_r} \left(1353 \text{ lbs } \frac{BOD}{day}\right) + 0.21 \frac{1}{day} (1022 \text{ lbs})$$

$= 1649 \text{ lbs } \frac{O_2}{day}$

= 70 lbs/hr

REFER TO COMPUTER PRINTOUT FOR FIELD O_2 TRANSFER RATE CALCULATIONS.

Three (3) - 15HP Aqua Jet aerators with anti-erosion assemblies in Cell are recommended.

<u>Cell #2:</u>

Lagoon Temperature = 22.3°C* (Summer)

Lagoon Temperature = 4.9°C* (Winter)

*REFER TO COMPUTER PRINTOUT FOR COOLING CALCULATIONS

Basin Volume = 0.85 MG

Summer:

REFER TO COMPUTER PRINTOUT TRIAL ERROR MLVSS vs BOD_r.

BOD_5 removal = 70 mg/l - 6 mg/l = 64 mg/l

lbs BOD_5 removed = 64 mg/l (8.34) 0.252 MGD

= 135 lbs/day

Winter:

BOD_5 removal = 109 mg/l - 12 mg/l = 97 mg/l

lbs BOD_5 removed = 97 mg/l (8.34) 0.252 MGD

= 204 lbs/day

Winter removal requires largest oxygen supply.

lbs MLVSS = 248 mg/l x 0.85 MG x 8.34

= 1758 lbs MLVSS

$$\text{lbs } O_2 = 1.06 \frac{\text{lbs } O_2}{\text{lb } BOD_5} \left(204 \frac{\text{lbs}}{\text{day}}\right) + 0.21 \frac{1}{\text{day}} \left(1758 \frac{\text{lbs}}{\text{day}}\right)$$

$$= 585 \frac{\text{lbs } O_2}{\text{day}}$$

$$= 24 \frac{\text{lbs } O_2}{\text{hr}}$$

REFER TO COMPUTER PRINTOUT FOR FTR CALCULATIONS.

Two (2) - 15 HP Aqua-Jet aerators with anti-erosion assemblies in Cell #2 are recommended.

NOTE: An effluent TSS level of = 300 mg/l should be expected. If th level of discharge is not acceptable, a settling pond (2-3 day will be required.

Also using two - 15 HP aerators in Cell #2 should produce an effluent D.O. level of about 5 mg/l based on the information given. Refer to computer printout.

Reference:

1. Ronald L. Dickenson; John T. Giboney; "Stabilization of Refinery Wastewaters with the Activated Sludge Process: Determination of Design Parameters"; A paper presented at 25th Industrial Waste Conference at the Purdue University, Lafayette, Indiana, May 1970.

SEC/sp
10/22/86