GW - 32

2/3/86

PERMITS, RENEWALS, & MODS

Application

RESPONSE TO JANUARY 24, 1986 NMOCD COMMENTS DISCHARGE PLAN (GW-32) FOR GIANT REFINING COMPANY CINIZA REFINERY

February 3, 1986

Submitted to:

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Prepared for:

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A. GENERAL COMMENTS

1. Giant is providing sufficient information to allow NMOCD to approve GW-32. In addition to the discharge plan, we have included data gathered under other regulatory programs (e.g. RCRA ground water monitoring). This document should provide all additional necessary information and specifically addresses each and every comment in NMOCD's 1/24/86 letter. Three copies of all original typed material, plates and blueprints are being provided as per your request.

2. Using available data from all investigations, we have prepared 4 geologic cross-sections of the refinery site. These sections are located on Plate 6 and shown on Plate 7 (Attachment A-1). These simplified sections are based on detailed lithologic logs of borings. Logs of SMW and SMX wells are provided in Appendix A of the original Discharge Plan Application. Logs of MW and OW wells are contained in the enclosed Dames and Moore reports. The cross-sections are referenced to elevation above mean sea level (MSL). Sand units are stippled, clays and shales are left blank.

   Cross-section A-A' shows the discontinuous nature of sand units encountered in wells OW-18, OW-12 and SMW-4. In wells SMW-2 and SMW-3, two sand units above the Ciniza Sand are correlated; the units do not appear in adjacent wells. The <u>only</u> sand units which are seen in more than 2 wells are the Ciniza Sand the Sonsela Sandstone. The Ciniza Sand is <u>not</u> seen in any wells (OW-24, OW-3 and OW-2) to the Northwest of the SMW wells 4, 5 and 6. This was the basis for showing the "pinch-out" of the Ciniza Sand in Plates 1, 2 and 3 of the discharge plan application.

   Cross-section B-B' shows that the Ciniza Sand is present only in wells SMX-2 and SMX-4; it is absent in SP-4 (a dry piezometer) and also absent in wells OW-4 and OW-7. The sand at 6876' to 6872' in OW-12 might <u>possibly</u> correlate with the Ciniza, but the Dames & Moore logs give no indication of water saturation in this unit. Also note

that sand units above and below the Ciniza, seen in SMX-4, are absent in SMX-2.

Cross-section C-C' shows numerous discontinuous sand units. In particular, SMX-7 shows 6 sand lenses, none of which correlate with any units in adjacent wells. The Ciniza Sand is present in SMX-1, MW-1 and MW-2 but is not present in SMX-7.

Cross-section D-D' shows that the Ciniza Sand extends from SMX-1 through SMW-5 and SMW-6. The thin sands seen above the Ciniza might possibly correlate as shown, but were dry in all cores. The additional water sand 11 feet below the Ciniza Sand in SMX-1 is not seen in any other borehole.

3. With the exception of the railroad lagoon, asphalt pit and sewage lagoons, all pits, drains and sumps are lined with concrete and/or steel pans. The unlined ditches for stormwater and neutralization-tank effluent are identified on Plates 4 and 5 (included as Attachment A-2). There are 2 underground storage tanks near the railroad rack (see attached Plates 4 and 5) which are empty and no longer used. No other underground tanks are known to exist on the site.

4. Captions for Figures 4-6 and 4-7 were labeled erroneously in the discharge plan copy sent to NMOCD. Those figures have been corrected and are included as Attachment A-3. Figure 4-6 is a Structure Contour Map showing the elevation of the top of the Sonsela Aquifer. A Potentiometric Surface Map showing the elevation of the water levels in wells completed in the Sonsela replaces the original Figure 4-7. The difference in elevation between the top of the Sonsela and the potentiometric surface is shown as Figure 48 (Artesian head in the Sonsela Aquifer).

B. PHYSICAL ENVIRONMENT

1. Copies of both Dames and Moore reports are enclosed (Attachments B-1, B-2). In addition, we are supplying copies of our responses to USEPA's questions regarding certain data in these reports. These responses summarize data and interpretations regarding our previous work which shows that:

    - o No water-table "aquifer" exists in the shales above the Sonsela aquifer,
    - o Elevated levels of metals from OW wells are the result of naturally high levels of lead and other metals in the Chinle shales, and
    - o Elevated TOX levels in the MW-wells are the result of solvent-welded PVC used to case these wells; TOX in all MW wells has sharply decreased with time and has been below detection in the last 2 samplings.

    GCL submissions include:

    a) Reply to EPA Region VI Comments On Observed TOX and Metals Levels in Ground Water, Ciniza Refinery, Gallup, New Mexico, (February 14, 1985), see Attachment B-3.

    b) Response to Items 3 and 4 of December 4, 1984 EPA Letter, RE: Ground Water Monitoring Compliance, Definition of Uppermost Aquifer, Unsaturated Zone Monitoring, Giant Industries, Inc. Ciniza Refinery, Gallup, New Mexico, (February 28, 1985), see Attachment B-4.

    c) "Inventory of Solid Waste Management Units," (June 14, 1985), see Attachment B-5.

2. Refer to response A.5 regarding mislabeling of Figures 4-6 and 4-7; the Sonsela is 65 to 145 feet beneath the land surface at Ciniza.

3. Please refer to response A.2, cross-sections (Plate 7) illustrate that the Ciniza Sand is absent in wells OW-24, OW-3 and OW-2, all northwest of wells SMX-1 and SMW-4.

4. All water-quality data on the SMW-wells and MW-wells are included in the attached document "Wastewater and Ground Water Monitoring Data" (Attachment B-6). Completion diagrams of these SMW wells are also included in the above referenced document.

5. No item 5 is given in your letter.

6. Locations of all wells, boreholes and piezometers are shown on Plate 6 (Attachment A-1); data on piezometer depth, construction, dates of installation and water levels (if any) are included as Table B-1.

7. The location of MW-1 is shown on Plate 6 (Attachment A-1).

8. An evaluation of flood protection measures necessary to protect Pond 9 will be completed by March 15, 1986. Appropriate design drawings will accompany the engineering evaluation. Specific flood protection measures will be selected and submitted to OCD for review and comment by April 1, 1986. Upon receipt of OCD comments, construction will take place in a timely manner, not to exceed completion by September 31, 1986.

9. A map (Attachment B-7) is included which shows the locations and boundaries of properties adjacent to the refinery. Besides the AT & SF railroad and the Interstate 40 (I-40) right-of-way, there are four property owners surrounding the Giant Ciniza Refinery. They are the State of New Mexico; Cooper and Myers; Thomas and Mariano Steele; and Whispering Cedars, Incorporated. The Ciniza Refinery is located in, and Giant Refining Company owns, Section 33. Additionally, Giant owns the southern 1/4 of Section 28 north of Section 33 and the northern portion of Section 4 between I-40 and Section 33. The State of New Mexico owns the remaining portion of Section 28 (north of the AT & SF railroad), all of Section 32 (east of Section 33) and the eastern and southern 3/4 of Section 34 (west of Section 33). Cooper and Myers own the following property surrounding Giant: the northwestern 1/4 of Section 34; all of Section 27 (northeast of Section 33); all of

Section 3 (except for the I-40 right-of-way) located southeast of Section 33; all of Section 4 south of I-40 (Section 4 is directly west of Section 3); and the southern portion of Section 29, between the AT&SF railroad and Section 32. Thomas and Mariano Steele own the remaining, northern portion of Section 29. Whispering Cedars, Incorporated owns all of Section 5 (except that portion taken by the I-40 right-of-way). Section 5 is located southwest of Section 33.

TABLE B-1

DATA ON SHALLOW PIEZOMETERS (SP-SERIES)

Date	Number	Total Depth	Ciniza Sand Depth	Screen Depth	Water Depth
7/20/85	SP-1	54.0'	Not Penetrated	50' - 54'	Dry
7/20/85	SP-2	36.0'	Not Penetrated	32' - 34'	*29'
7-20-85	SP-3	34.5'	28' - 34.5'	30.5 - 34.5	29.5'
7/20/85	SP-4	54.0'	Not Encountered	50' - 54'	Dry

Not Penetrated: Well was not drilled to expected depth of Ciniza Sand

Not Encountered: Well was drilled beyond expected depth of Ciniza Sand

*Water level represents saturation in "stray" sand above the expected depth of the Ciniza.

C. PROCESS DESCRIPTION

1. Plates 4 and 5 are revised to show locations of all processes described in Sections 5.2 through 5.4 (see Attachment A-2). All underground pipes flow by gravity. All sumps and collection points for refinery wastes are concrete-lined or equipped with steel pans. With the exception of the trench leading from the neutralization tank to the underground line to Pond #3 and the stormwater ditches, all other conveyances are lined. The two inactive, empty underground tanks are identified on Plates 4 and 5.

2. All available wastewater analyses are included in the document "Wastewater and Ground Water Monitoring Data" (Attachment B-6). A table in that document identified the effluent sources and the conveyances which carry the wastes to their ultimate disposal are also identified in the document.

3. We assume that "stream condensate" refers to steam condensate. No condensate is produced or discharged by the flare system. No "flare pit" exists or has one ever existed throughout the facility's history.

D. WASTE MANAGEMENT SYSTEM

1. All underdrains between the evaporation settling ponds are now located and shown on the revised Plates 4 and 5 (Attachment A-2).

2. The neutralization tank does not discharge through a weir to pond 3. The flow is estimated by filling a five gallon bucket and measuring elapsed time with a stop watch. There are two 90^{0} V-notch weirs located in the evaporation settling pond system--one in the API separator and the other between the outlet from pond 2 and the inlet to pond 12A.

3. We have recalculated the water balance for the evaporation ponds, using lake evaporation as opposed to pan evaporation. The USSCS map for lake evaporation is included as Attachment C-1. Results are attached as Table D-1. This shows a net evaporative capacity of 428.96 acre-feet per year, or 228% of the 180.36 acre-feet per year input. Pan evaporation was chosen for the initial calculation because it yields a more conservative capacity (127% of effluent input). A copy of the USSCS (1978) Lake Evaporation Map is provided.

   Table D-2 shows a "worst case" scenario for potential overtopping. A net gain in pond content (loss of free board) is expected in November, December, January, February, and March, when input exceeds evaporative capacity. Starting with 2.0 feet of freeboard on November 1, the freeboard is reduced to 1.47 feet by the end of March. Freeboard returns to 2.0 feet or more by early June, and increases to 3.96 feet by the following October. Based on this analysis, we do not anticipate any threat of overtopping under any observed or predicted weather or operating conditions.

4. The decision has been made to construct a 3-celled aerated lagoon. Construction is anticipated for the summer/fall of 1986.

TABLE D-1
LOCAL WEATHER DATA

Station Gallup 5E County McKinley Index No. 3420
Latitude 35°F Longitude 108°32' Elevation 6600 ft

	PRECIPITATION		TEMPERATURE		EVAPORATION		
	YEARS OF RECORD	MEAN (INCHES)	YEARS OF RECORD	MEAN °F	LAKE EVAP FROM USDA	LAKE SURPLUS	LAKE DEFICIT
JAN	30	.56	29	28.6	.59		.03
FEB	28	.50	30	33.0	.78		.28
MAR	29	.61	27	36.6	1.31		.70
APR	30	.43	28	46.8	3.19		2.76
MAY	32	.43	29	55.6	5.94		5.51
JUN	28	.52	28	64.8	9.03		8.51
JUL	32	1.83	29	70.7	11.06		9.23
AUG	32	1.65	29	68.4	9.20		7.55
SEP	35	.99	33	61.8	6.05		5.06
OCT	34	1.17	31	50.6	3.16		1.99
NOV	33	.62	33	37.9	1.09		.47
DEC	33	.68	33	29.4	.60	.08	
ANNUAL	24	9.99	18	48.7	52.00		42.01

Data from United States Weather Service, Gallup Station 5E.
and USDA Annual Lake Evaporation Map - (USSCS, 1978)

("Annual" refers to a 12 month, consecutive data reporting, whereas many years have only data for specific months.)

TABLE D-2
WATER-LEVEL CHANGES IN EVAPORATION PONDS

MONTH	NET POND EVAPORATION (acre-ft)	REFINERY INFLUX (acre-ft)	POND GAIN/LOSS (acre-ft)	LEVEL CHANGE (ft)	AVERAGE FREE-BOARD (ft)
Oct	19.42	15.03	-4.39	-.038	2.0
Nov	4.56	15.03	+10.47	+.090	1.91
Dec	-.819	15.03	+15.85	+.135	1.78
Jan	.292	15.03	+14.74	+.126	1.65
Feb	2.73	15.03	+12.30	+.105	1.54
Mar	6.825	15.03	+8.21	+.07	1.47
April	26.91	15.03	-11.88	-.102	1.58
May	53.72	15.03	-38.69	-.331	1.91
June	82.97	15.03	-07.94	-.581	2.49
July	89.99	15.03	-74.96	-.641	3.13
August	73.61	15.03	-58.58	-.501	3.63
Sept	49.34	15.03	-34.31	-.293	3.92
Oct	19.42	15.03	-4.39	-.038	3.96

E. MONITORING AND REPORTING PLAN

1. Information concerning the construction and completion of the MW-Series wells is found in the November 1981 Dames & Moore Report (Attachment B-2). Locations of the MW-Series monitoring wells are plotted on Plate 6 (Attachment A-1).

2. MW-Series analyses of RCRA ground water monitoring for the MW-Series wells can be found in the enclosed document Wastewater and Ground Water Monitoring Data (Attachment B-6).

3. The API separator effluent will be measured quarterly at the two weir locations designated on Plates 4 and 5. The quarterly grab samples will be taken in January, April, July and October. The 90^{o} V-notch weirs will be measured according to standard procedures. The neutralization wastewater stream will also be measured on the same quarterly time schedule using a graduated bucket and stop watch to calculate flows.

4. The RCRA sampling schedules for the MW-Series wells are presented in Table E-1. The monitoring schedule for the SMW-Series is also presented in Table E-1.

TABLE E-1
ANNUAL SAMPLING SCHEDULE

	January	April	July	October
MW-Series	x		x	
SMW-Series[1]	x	x	x	x

[1]After the completion of four quarters of sampling, the SMW-Series wells will then be sampled once every six months.

5. Information regarding spills and releases is presented in the enclosed document, "Inventory of Solid Waste Management Units" (Attachment B-5). No major product or feedstock spills are indicated in Giant Documents.

A minor release of tank sludge occurred in August 1985. This was reported to NMEID, and a copy of the report is enclosed (Attachment D).

F. CONTINGENCY PLANS

1. A copy of the RCRA Part B permit application Contingency Plan (Attachment E) is included.

2. Figure F-1 is a monthly inspection form. Ponds and berms are inspected informally on a daily basis for water levels and for signs of blockage in conveyances and underdrains. More formal inspection is performed monthly or as soon as possible following a major storm. Monthly inspections include reading of staff gauges, inspection of all roads and berms, and notation of problem areas on the attached map. Areas showing damage or erosion will be promptly repaired.

3. All spills will also be reported to NMOCD. A sludge spill which occurred in August, 1985 was reported to NMEID. A copy of that report is attached (Attachment D).

FIGURE F-1

GIANT REFINING COMPANY

MONTHLY EVAPORATION-POND INSPECTION

Inspected by:_____Date _____Time _____

Water Levels (Staff Gauge)

Pond #1 _____ 2 _____ 3 _____ 4 _____ 5 _____

6 _____ 7 _____ 8 _____ 9 _____ 10 _____

11 _____ 12 _____

Weir Information: API: Level _____ Condition _____

Pond #2: Level _____ Condition _____

Line Inspection (note location of problems on map) _____

_____

_____

Berm Inspection (note location of problems on map) _____

_____

_____

Road Inspection (note location of problems on map) _____

_____

_____

Drains and Valves (note location of problems on map) _____

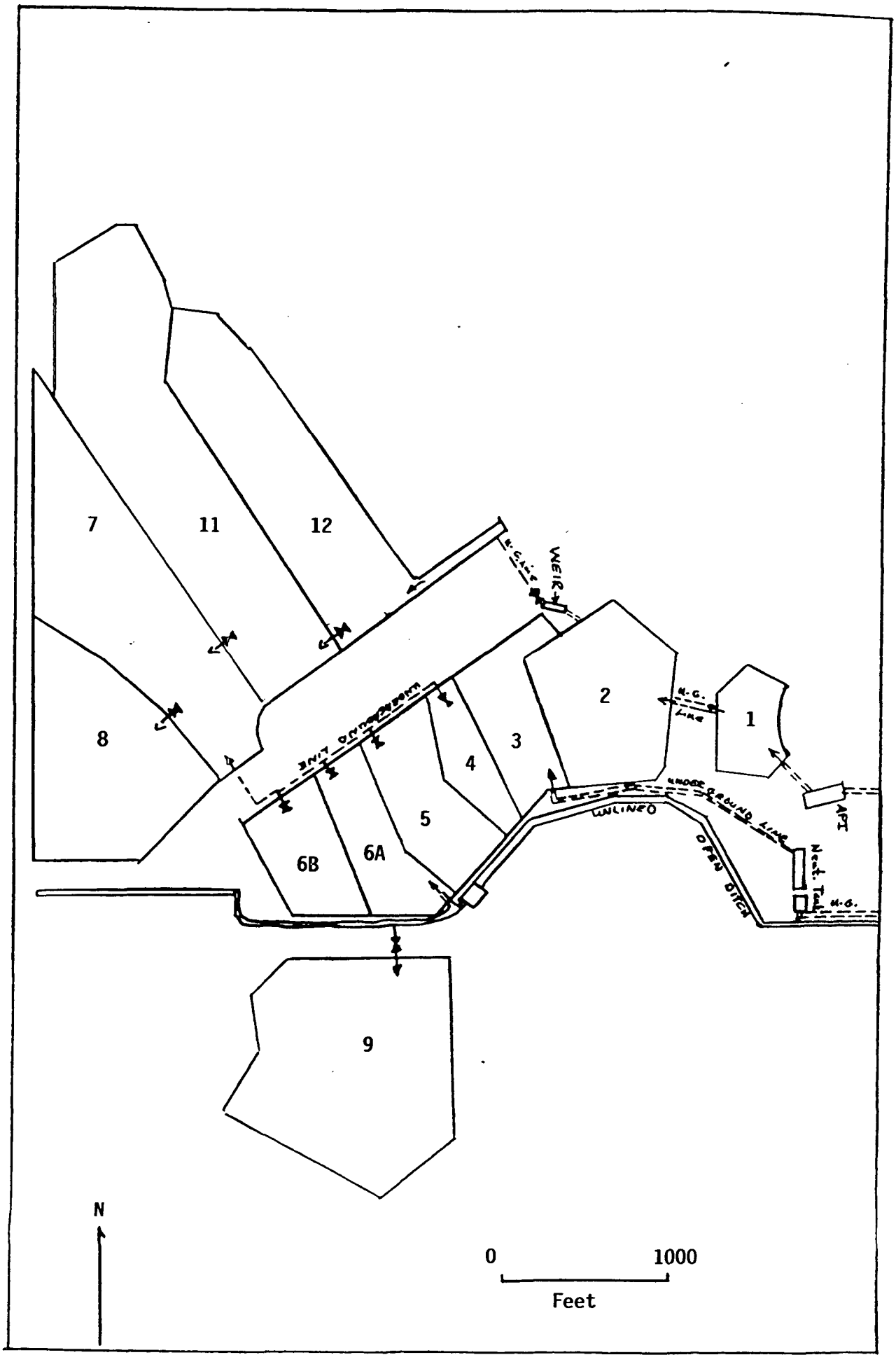
_____

_____

Remarks _____

_____

_____


7
11
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G. BASIS FOR APPROVAL

Based upon the hydrogeologic conditions at Giant's Ciniza Refinery and the design and operation of the waste management system, the discharge of refinery wastewater will not result in any "Hazard to Public Health" (see WQCC Regulation 3-109.C). Numerous facts presented in the original discharge plan submission and in this document demonstrate this point:

- The documented low vertical permeability of the underlying shales of the Petrified Forest Member of the Chinle Formation prevents wastewater from directly entering usable ground water in the Sonsela aquifer or other water-bearing units that contain ground water with a foreseeable future use.

- The artesian head of the uppermost aquifer (Sonsela Sandstone) prevents contaminants from directly entering ground water in the Sonsela sandstone aquifer.

- Thin, discontinuous beds of fine-grained, low transmissivity sandstones enclosed in impermeable Chinle shales underlying the facility cannot act as conduits between wastewater management units and ground water in the Sonsela with foreseeable future use. The documented discontinuity of these sandstones, the lateral limits of these units (confined to the refinery site), the low permeability of the surrounding shales and the artesian head of the Sonsela aquifer combine to prevent any potential pond leakage from moving directly into Sonsela ground water with a potential for foreseeable future use.

- The fine-grained nature of the underlying shales results in a large sorption capacity for metals; metals in seepage will tend to sorb onto shales and will not move directly into ground water.

- The extremely low vertical permeability of the shales results in a very long residence time for any wastewater seepage allowing extensive biodegradation of organic compounds. Indirect movement by diffusion of organic compounds into ground water is mitigated by biodegradation.

Potential pond leakage or leachate can potentially move directly or indirectly only into the discontinuous sandstones and/or the continuous shales of the Petrified Forest Member of the Chinle Formation. The discontinuous sandstones are of limited aerial extent and cannot

yield usable quantities of ground water and, therefore, cannot be considered to contain ground water with a present or foreseeable future use. The thin discontinuous sandstones contain very small amounts of extractable water (low storativity). Those sandstone units potentially affected by any discharges do not extend beyond the refinery site. Therefore, ground water in these discontinuous sandstone units cannot be of any present or foreseeable future use either onsite or offsite.

There are no known water wells completed in the Ciniza Sand, with the exception of Giant's SMW-series monitor wells. The Chinle shales which separate the Ciniza Sand from evaporation-pond fluids do not exceed the NMWQCC maximum permeability of 1.6×10^{-8} ft/sec.

The proposed aerated-lagoon system should achieve a minimum 60% reduction in BOD for the API effluent, further reducing any potential hazard to human health from that effluent source.

To insure that effluent or leachate will not move directly or indirectly into ground water, Giant has proposed to monitor the uppermost water bearing zone (Ciniza Sand) according to the schedule presented in response E.4. in this document. Reports on the monitoring shall be submitted to NMOCD to demonstrate the integrity of the plan.

Pursuant to section 3-108 of the WQCC regulations, the director of the NMOCD shall notify the public of the November 1, 1985 submission of the discharge plan. Assuming that a public hearing is not held, the director may approve this discharge plan according to 3-109, C.2 or 3-109.C.3.b (1).

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