GRCC 97

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION
2040 S. PACHECO
SANTA FE, NEW MEXICO 87505
(505) 827-7131

February 28, 1997

CERTIFIED MAIL
RETURN RECEIPT NO. P-288-258-777

Ms. Dorinda Mancini
Environmental Manager
Giant Refining Co.
Route 3, Box 7
Gallup, NM 87301

RE: DISCHARGE PLAN MODIFICATION FOR WATER POLLUTION
CINIZA REFINERY
DISCHARGE PLAN GW-032
MCKINLEY COUNTY, NEW MEXICO

Dear Ms. Mancini:

The New Mexico Oil Conservation Division (OCD) met with Giant Refining Company (GRC) on February 20, 1997 to discuss the results of the recent GRC Ciniza Refinery soil and ground water investigations as contained in the following document:

- November 25, 1996 "UPDATE ON TANK 569 / SWMU 6 INVESTIGATION., CINIZA REFINERY, MCKINLEY COUNTY, NEW MEXICO".

As discussed in the above mentioned meeting and report, and other numerous investigations and work plans:

1. A number of current and past potential ground water contaminant source areas exist at the facility.

2. The delineation wells and borings in the above mentioned report show groundwater in what appears to be nested or perched in localized sand lens' above the Sonsela aquifer has been impacted.

Therefore, pursuant to WQCC regulation 3109.E, the OCD requires that GRC modify the facility discharge plan to abate water pollution. As an initial action the OCD requires that GRC submit a comprehensive facility investigation work plan to determine the extent of soil and ground water contamination related to GRC's activities. Please use the Stage 1 WQCC Abatement Regulations (20 NMAC 6.2.4106) in preparation of the investigation work plan. The OCD requires that the work plan be submitted to the OCD by May 28, 1997. Please submit the work plan to the OCD Santa Fe Office for approval and a copy to the OCD Aztec District Office.

All OCD rules, regulations, and guidelines are available on the Internet at the following website address: **www.emnrd.state.nm.us/ocd/**

If you have any questions, please contact Pat Sanchez of my staff at (505) 827-7156.

Sincerely,

Roger C. Anderson
Environmental Bureau Chief

RCA/pws

c: Mr. Frank Chavez, OCD Aztec - District Supervisor
Mr. Denny Foust, OCD Aztec - Geologist
Mr. Benito Garcia, NMED, HRMB - Bureau Chief

GIANT
REFINING CO.

CINIZA REFINERY

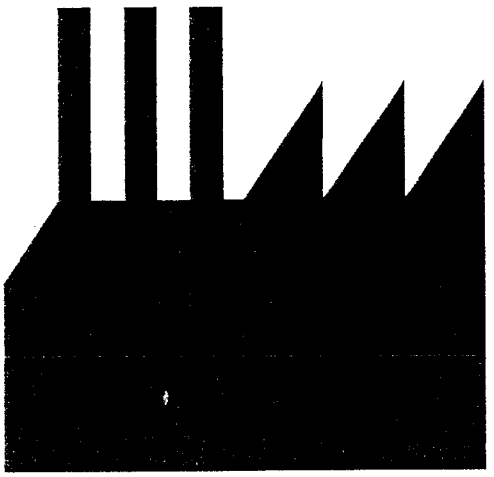
COMPREHENSIVE FACILITY INVESTIGATION WORK PLAN

SUBMITTED JUNE 30, 1997

TO

ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION



GIANT
REFINING CO.

Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

June 27, 1997

Mr. Roger Anderson
Environmental Bureau Chief
Oil Conservation District
2040 S. Pacheco
Santa Fe, New Mexico 87505

RE: Modification of Discharge Plan GW-32; Comprehensive Facility Investigation Work Plan

Dear. Mr. Anderson:

Enclosed is Ciniza Refinery's Comprehensive Facility Investigation Work Plan as required by your February 28, 1997 letter. The plan was prepared using the Stage 1 WQCC Abatement Regulations (20 NMAC 6.2.4106) and is designed to consolidate previous investigations and remedial activity into one coherent plan for the facility as a whole.

In the course of preparing this plan, it has become apparent that a number of the existing wells on site pose a significant risk of contamination to the Sonsela aquifer. We and our consultants feel it is urgent to plug and close these wells as soon as possible in order to minimize any further risk. Specific details on these wells are included both in the body of the plan and in Appendix A.

Following your review and approval, we anticipate that approximately 120 days will be needed to complete the activities identified in this plan. It is possible we could finish by mid-November, 1997. Once authorization from your office is received, we will begin the task of plugging and closing the at-risk wells.

If you have questions or comments regarding this correspondence, please contact me at (505) 722-0227.

Sincerely,

Dorinda Mancini
Environmental Manager, Ciniza Refinery

cc: Denny Foust, NMOCD - Farmington
Mr. Stuart Dinwiddie, NMED, HRMB
Dave Pavlich, HSE Manager, Giant Refining

Stage1 cover letter.doc

Comprehensive Facility Investigation Work Plan (Stage 1 Abatement Plan)

For

The Giant Refining Company Ciniza Refinery
McKinley County, New Mexico

June 30, 1997

Prepared by:

Thomas D. Atwood, P.E.
Practical Environmental Services, Inc.
1444 Wazee Street, Suite 225
Denver, Colorado 80202

William H. Kingsley, P.E.
Precision Engineering, Inc.
2001 Copper Avenue, Suite 1
Las Cruces, New Mexico 88004

Table of Contents

Plan Overview

Giant Refining Company (Giant) owns and operates a petroleum refinery (Ciniza) in McKinley County, New Mexico. The New Mexico Oil Conservation Division (OCD) administers water quality protection programs for this industry segment and regulates groundwater discharges from the Ciniza Refinery via Discharge Plan GW-032.

Giant has recently discovered shallow soil and groundwater contamination near its tank farm and loading areas. As a result, OCD has requested that Giant prepare a comprehensive facility investigation plan to define areas of contamination and develop the information needed to design abatement remedies.

This plan has been developed in compliance with WQCC Regulation 20 NMAC 6.2.4106, Stage 1 Abatement Plan requirements.

Facility History and Operations

The Ciniza Refinery was constructed in 1957 by the El Paso Natural Gas Company. In 1964, it was sold to the Shell Oil Company and then again in 1982 it was sold to the present owner, Giant Industries, Inc. In the mid 1980's, Giant expanded the refinery to accommodate EPA mandates for producing cleaner burning fuels and also constructed a new travel center adjacent to Interstate 40.

The refinery receives crude oil via pipeline and produces fuel products which are shipped out by tank truck, railcar, and a pipeline connection to the Giant Travel Center. Various hydrocarbon liquids are stored on-site in tanks and distributed throughout the refinery via an extensive piping system.

The most likely cause of an adverse environmental impact to groundwater is a release of hydrocarbons onto the ground. Migration of spilled material can potentially contaminate vadose zone soil, shallow groundwater in soil layer above the Chinle Formation, or, under worst case conditions, the Sonsela Aquifer.

In 1986, OCD approved and issued Discharge Plan GW-032 for the Giant Ciniza Refinery. This plan prescribes specific requirements for monitoring groundwater quality and detecting potential contamination.

Site Geology and Hydrogeology

The Ciniza Refinery is located on a layered geologic formation which slopes gently to the northwest. Surface soils consist of varied fluvial and alluvial deposits, clay, silt, sand, and imported fill. Below is the Chinle Formation which consists of very low permeability clays and shales, and effectively serves as a aquiclude. Inter-bedded within the Chinle is the Sonsela sandstone layer, which represents the uppermost potential aquifer in the region.

Groundwater flow in the Sonsela Aquifer follows the slope of the formation and is generally north by northwest. See Drawing No. 1.

Shallow groundwater flows along the upper contour of the Chinle Formation. The prevailing flow direction is to the north; however, a subsurface ridge has been discovered and is thought to deflect some flow in a northeasterly direction in the vicinity of the refinery tank farm. See Drawing No. 2.

Groundwater Monitoring and Protection

As per Discharge Plan GW-032, Giant performs regular groundwater sampling and analysis to monitor water quality and detect potential contamination. This monitoring program has two main components as follows.

- Shallow monitoring wells are installed in the soil layer above of the Chinle Formation and used to provide early detection of contamination.

- Deep monitoring wells are installed in the Sonsela sandstone layer and used to detect contamination in this uppermost potential water supply aquifer. This is the point of compliance for OCD Discharge Plan GW-032.

In addition to the above, Giant also performs regular groundwater sampling and analysis at wells installed as part of a RCRA Program administered by the New Mexico Environment Department (NMED). In general, these monitoring wells are associated with a former RCRA Land Treatment Unit.

Both the OCD and NMED programs mandate State notification in the event that groundwater monitoring reveals potential contamination.

Previous Soil and Groundwater Investigations

In 1987, the EPA conducted a RCRA facility assessment at the Ciniza Refinery. This investigation identified 13 areas of suspected environmental contamination. As a result, Giant has conducted detailed investigations at each of these sites. The current status is as follows.

- A no further action (NFA) determination has been approved for the Aeration Lagoon, Evaporation Ponds, Empty Container Storage Area, and Drainage Ditch sites.

- A voluntary Corrective Action Plan (CAP) has been approved and is being implemented at the Landfill Areas. A clay cap will be installed later this year.

- A voluntary CAP is being implemented at the Railroad Rack Lagoon. Petroleum contaminated surface soils will be treated in-situ using bioremediation methods.

- A supplementary investigation at the Tank Farm Area has revealed the presence of hydrocarbons in soil and groundwater adjacent to Tank 569. A recovery well has been installed and is currently being used in a pump & treat remediation system.

- Other areas have been recommended for no further action and are currently being monitored.

In 1989, a hydrocarbon layer was discovered in Observation Well 17 (OW-17), which is located in the Tank Farm Area east of Tank 345. This site is currently undergoing investigation.

Refinery Contamination Sites

Groundwater monitoring data and investigative soil analyses have revealed hydrocarbon contamination at four locations within the refinery. These areas are located in the vicinity of storage tanks and loading areas as described below.

- Groundwater Impact Area #1 is located in the vicinity of Tank 569 on the eastern side of the tank farm. Inspection records indicate that a leaking seam in an adjacent tank was repaired in 1995 and this leak source is now thought to be corrected. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. A recovery well has been installed and a pump & treat remediation is currently in operation.

- Groundwater Impact Area #2 is located in the vicinity of Tank 345 on the northwestern side of the tank farm. Inspection records indicate that a leaking seam in an adjacent tank was repaired in 1996 and this leak source is now thought to be corrected. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. A pump & treat remediation system is recommended for this area.

- Groundwater Impact Area #3 is also located in the vicinity of Tank 345 on the northwestern side of the tank farm. The source of this contamination is thought to be prior spill events. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. Due to the low level of detection and ongoing biodegradation of the hydrocarbons, this area is remediating by natural attenuation.

- Groundwater Impact Area #4 is located in the vicinity of truck loading rack at the southeastern corner of the refinery. The source of this contamination is a hydrocarbon spill that occurred in the early 1980's. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. Due to the low level of detection and ongoing biodegradation of the hydrocarbons, this area is remediating by natural attenuation.

- Soil Impact Area #1 is located at the railcar loading rack at the north-eastern corner of the refinery. The source of this contamination is past loading related spills. Investigative soil sampling has been performed and the soil impact area has been delineated as shown on Drawing No. 3.

- Soil Impact Area #2 is located north of the tank farm at the northeastern corner of the refinery. The source of this contamination is runoff from the railcar loading rack. Investigative soil sampling has been performed and the soil impact area has been delineated as shown on Drawing No. 3.

Investigative and Abatement Work Plan

Investigation of potential groundwater contamination at the Ciniza Refinery consists of two main components as follows.

- Detecting contamination in the Sonsela Aquifer.

- Detecting, locating, and assessing sources of contamination.

Sonsela Aquifer

As the uppermost potential water supply underlying the refinery, the Sonsela Aquifer must be protected against potential contamination. The shales of the Chinle aquiclude, with a hydraulic conductivity of 10^{-9} centimeters per second, represent a formidable barrier to migration of contaminants. Nevertheless, contaminants released at the surface could potentially migrate through the aquiclude (very slow route) or short-circuit into the aquifer via an existing well which has been screened across the aquitard (potentially a very fast route). For this reason, monitoring wells in the Sonsela Aquifer must be properly installed.

Because many of the original observation wells were installed prior to a detailed understanding of the site's geology, some of these wells are inappropriately located and screened. To correct these deficiencies and eliminate the potential for short-circuiting, the following modifications to GW-032 are proposed.

1. Install a new background monitoring well upgradient of the refinery. The well screen shall be located solely within the Sonsela Aquifer and sealed above. After installation of the new well, plug and close the existing upgradient well (OW-11), which is improperly located and consistently fouled by mud infiltration. See Drawing No. 1 for location.

2. Install a new property boundary well downgradient of the refinery. The well screen shall be located solely within the Sonsela Aquifer and sealed above. After installation of the new well, plug and close the existing downgradient wells (OW-2, 3, 4, & 24), which are improperly installed and consequently can allow short-circuiting of contamination into the Sonsela Aquifer. See Drawing No. 1 for location.

3. Continue the use of OW-1 as a cross-gradient monitoring well on the western property boundary. Boring log data suggest that this well is properly installed; however, this free-flowing well should be capped when not in use for sampling.

4. Begin the use of OW-12 as a plant boundary monitoring well located immediately downgradient of the refinery tank farm. Boring log data suggest that this well is properly installed.

5. Utilize OW-13 as a secondary plant boundary monitoring well located immediately downgradient of the refinery tank farm. This well will only be sampled and analyzed in the event of a contaminant detection in OW-12, and the results then used for confirmatory purposes. Boring log data suggest that this well is properly installed.

6. The four wells referenced in Items 1 through 4 above shall be sampled and analyzed annually for BTEX. Due to its preponderance within the refinery and high mobility, BTEX is the best early warning indicator of contamination in the Sonsela Aquifer.

7. Plug and close OW-7, 9, 10, 16, 17, 20, 25, 26, and 28. These wells are improperly installed and consequently can allow short-circuiting of contamination into the Sonsela Aquifer.

Contamination Sources

Environmental contamination can arise from many sources within the refinery, such as a leaking storage tank or loading related spill. When a release occurs, contaminants first impact surrounding surface soil and may be initially detected via odor, visual staining, or a rainbow sheen on standing water. If a release is of sufficient magnitude and duration, a migration plume will develop and the contaminants will spread out horizontally and vertically from the point of origin. As such, various scenarios may arise as follows.

- The plume can remain small and confined to nearby vadose zone soils. Soil Impact Areas #1 and #2 are examples of this type of release.

- The plume can migrate downward until it encounters the Chinle Formation. It may then flow downgradient along the surface contour of the Chinle or pool in a local depression on the aquiclude. Groundwater Impact Areas #1 through #4 are examples of this type of release.

- The plume can migrate more quickly in some areas via entry into localized sand or gravel layers. This effect can result in differential plume expansion.

- The plume can migrate into the Sonsela Aquifer by short-circuiting through the aquiclude via an improperly installed monitoring well. This effect is resisted by strong artesian head in the aquifer.

Release detection at the Ciniza Refinery is composed of two elements as follows.

- Routine surveillance of process equipment and grounds is used to spot leaks and detect releases. All leaks and spills are immediately reported to the Refinery Environmental Department. Tanks, vessels, and piping are regularly inspected for mechanical integrity and repaired when necessary. When hydrocarbon storage tanks are taken out of service and inspected, any indication of past leakage is immediately reported to the Refinery Environmental Department.

- Shallow monitoring wells are installed at various locations throughout the refinery to detect potential groundwater contamination in the soil layer above the Chinle Formation. Any detection of contamination initiates a release investigation.

Known areas of contamination are associated with storage tank leaks or loading related spills. In each case, investigative soil borings have been performed and the extent of each contaminant plume has been delineated. The status of these areas is as follows.

Groundwater Impact Area #1 is in active remediation at this time using a pump & treat contaminant recovery system. This system should continue operation.

Groundwater Impact Area #2 has been investigated and a pump & treat contaminant recovery system is recommended. The following modifications to GW-032 are proposed.

1. Install a new contaminant recovery well adjacent to and downgradient from Tank 345. This well shall be carefully drilled so as not to penetrate the Sonsela Aquifer and shall be screened in the soil layer above the Chinle Formation at a depth allowing for the recovery of the hydrocarbon layer located under the tank.

2. Install a groundwater recovery pump.

3. Operate the contaminant recovery system to extract the hydrocarbons and groundwater. Recovered material shall be processed through the API separator to reclaim the hydrocarbons.

4. Shallow groundwater monitoring wells OW-29 and OW-30 are located downgradient from the refinery tank farm and shall be sampled and analyzed annually for BTEX.

Groundwater Impact Areas #3 and #4 have been investigated and classified as an old spill sites. Residual hydrocarbons are present at very low levels and declining through natural biodegradation. These sites should continue passive remediation by natural attenuation.

Schedule

If OCD approves this modification by the end of July, it is anticipated that all tasks may be completed by November 1, 1997.

SPECIAL NOTE: Because several of the existing Observation Wells are improperly installed and may allow short-circuiting of contamination into the Sonsela Aquifer, expedited approval to plug and close these wells is warranted.

Attachments

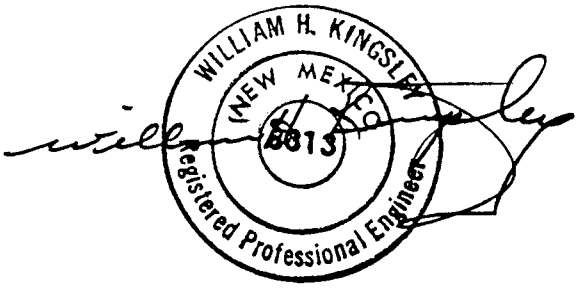
A summary of existing monitoring wells and recommended actions is presented in Appendix A.

Referenced drawings are presented in Appendix B.

Professional Engineers Certification

This plan has been prepared and approved by:

Thomas D. Atwood, P.E.
Practical Environmental Services, Inc.



William H. Kingsley, P.E.
Precision Engineering, Inc.

APPENDIX

"A"

APPENDIX A

WELL CLOSEOUT RECOMMENDATIONS - CINIZA REFINERY

WELL I.D.	(YES/NO)	RATIONALE
OW-1	NO	Well monitors the Sonsela at the western edge of the property. Well is artesian flowing. Recommend adding pressure cap.
OW-2	**YES**	Well drilled to the Sonsela (143'), backfilled with cuttings, gravel packed and screened from 43'-68'. Potential for communication between upper water bearing zone and Sonsela considered high. Log questionable; location of upper water bearing zone not known.
OW-3	**YES**	Suspect poor logging. Location of water bearing zone not known. Well screened and gravel packed from 36'-67'. Believe water bearing interval is a very thin zone at approximately 67' based on recent data. This zone may add water to otherwise dry sandy zones above.
OW-4	**YES**	Located in the center of the land treatment unit. Logs indicate that the well is screened in the Sonsela and likely is gravel packed across other water bearing units above, creating the potential for cross contamination. Logging questionable.
OW-5	**CLOSED**	This well was closed in 1996 after it was observed screen used in construction of the well was exposed at the ground surface.
OW-7	**YES**	Water producing zone is not known. Screen and gravel pack extends 25'. It is believed that the well produces from zone on Chinle plus sands above - 2 distinct zones. Zones should not be allowed to intermix. Located in a low water area and floods during rainy season.
OW-9	**YES**	This well is located in the Sonsela. Gravel extends into the alluvial material above the sandstone. Potentially cross contamination can occur between Sonsela water and water in the alluvial materials above. The well is also located in a standing water area and is subject to flooding.
OW-10	**YES**	Well appears to be sound but is located in area subject to surface flooding.
OW-11	**YES**	Used as the up gradient well for monitoring water coming into the facility. The location of the well is not truly up gradient of the facility. Recommend replacing this well with a well that is up gradient of the facility. Well is screened below the producing zone. Well was originally drilled to 150+feet, backfilled with cuttings then screened. Water producing zone can be cross contaminated with material below the actual production zone.

Continue

WELL I.D.	(YES/NO)	RATIONALE
OW-12	NO	Apparently well constructed. Well screened in the Sonsela down gradient of the facility. Recommend keep as an intermediate monitoring point.
OW-13	NO	Apparently well constructed. Well screened in the Sonsela down gradient of the facility. Recommend keep as an intermediate monitoring backup well.
OW-14	NO	Well is known to be contaminated. Used to track contaminant migrating on top of the Chinle shale in Area 1 (see plume sheet).
OW-16	**YES**	Sonsela well within the tank farm berms. Well provides a direct pathway to the Sonsela if a tank is compromised.
OW-17(RW-4)	**YES**	This well connects the Sonsela and the zone on top of the Chinle shale directly. The zone on the Chinle shale is contaminated. Cross contamination is imminent if this well is not closed. Sonsela does not appear to be impacted as yet because of its artesian potential. This well should be closed immediately.
OW-18	**CLOSED**	This well was destroyed during construction activities.
OW-20	**YES**	Well drilled into the Sonsela but screened above in a "mudstone" zone. Unknown how the well was backfilled to the screened interval. Suspect cross contamination may occur with water on top of the Chinle Formation. This well has been damaged twice and repaired because of site construction. Well up gradient from tank farm, but, down gradient of the facility. Water producing zone cannot be clearly identified from the logs.
OW-24	**YES**	Well was gravel packed from 28'-61'. The zone lying on top of the Chinle Formation is in direct contact with the sandy stringers above allowing immediate communication between the zones. The potential for cross contamination, should one or the other of the zones become contaminated, is high.
OW-25(RW-3)	**YES**	The well is screened in an upper part of the Sonsela and the zone lying on top of the Chinle shale. The zone on the shale is contaminated and cross contamination will occur. Sonsela appears to not have been impacted, as yet. Sonsela has likely not been impacted because of its artesian properties. Closure of this well should be a priority or cross contamination will occur.
OW-26	**YES**	This well is screened in the Sonsela. It is located within a tank farm berm area. Loss of integrity of the tanks will inject product directly into the Sonsela. Recommend priority closure.
BG4(OW-27)(RW1)	NO	Currently a recovery well in Area 1 plume. Well is screened in the zone on top of the Chinle shale.
B-1(OW-28)(RW-2)	**YES**	Originally converted from a boring to a well because of the discovery of product on the water surface of the zone lying on top of the Chinle shale. No product has been observed in the well since the original discovery. Recommend Closure since this well is inside a tank berm area and can potentially inject product to the top of the Chinle if tank integrity is lost.
OW-29	NO	Screened across the zone on top of the Chinle shale. Currently used to monitor for contaminant constituents for the Area 1 plume.
OW-30	NO	Screened across the zone on top of the Chinle shale. Currently used to monitor for contaminant constituents for the Area 1 plume.

Continue

WELL I.D.	(YES/NO)	RATIONALE
MW-1	NO	Well logged, documented installation in the Sonsela.
MW-2	NO	Well logged, documented installation in the Sonsela.
MW-3	NO	Well logged, documented installation in the Sonsela.
MW-4	NO	Well logged, documented installation in the Sonsela.
MW-5	NO	Well logged, documented installation in the Sonsela.
SMW-1	**YES**	Well is no longer monitored. Connects fluvial sands with zone on top of Chinle shale.
SMW-2	**YES**	Well is no longer monitored. Connects fluvial sands with zone on top of Chinle shale.
SMW-3	**YES**	Connects fluvial sands with zone on top of Chinle shale.
SMW-4	**YES**	Connects fluvial sands with zone on top of Chinle shale.
SMW-5	**YES**	Connects fluvial sands with zone on top of Chinle shale.
SMW-6	**YES**	Produces no water.

APPENDIX

"B"

TO VIEW THE MAP AND/OR MAPS WITH THIS DOCUMENT, PLEASE CALL THE HAZARDOUS WASTE BUREAU AT 505-476-6000 TO MAKE AN APPOINTMENT