



DISCHARGE PLAN NAVAJO REFINING COMPANY ARTESIA, NEW MEXICO REFINERY

· . ·

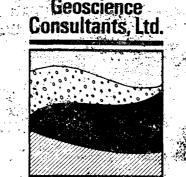
July 31, 1985

Prepared for:

David Griffin Navajo Refining Company P.O. Drawer 159 Artesia, New Mexico 88210

Prepared by:

Geoscience Consultants, Ltd. 500 Copper Ave N.W. Suite 325 Albuquerque, New Mexico 87102



July 31, 1985

Mr. Richard Stamets

OIL CONSERVATION DIVISION

AUG

at the first

8 1985

Energy and Minerals Department

Oil Conservation Division

P.O. 2088

Sante Fe, New Mexico 87501

RE: Discharge Plan Application For Navajo Refining Company Artesia New Mexico Facility

Dear Mr. Stamets:

On behalf of Navajo Refining Company, Geoscience Consultants, Ltd. is pleased to submit the Discharge Plan Application for Navajo's Artesia New Mexico facility. A substantial change in the regulation of the surface impoundments under The Resource Conservation and Recovery Act (RCRA) has necessitated a corresponding change in the proposed methods for wastewater management. Section 7.0 of this document addresses the effect of these proposed regulations on the discharge plan.

A second substantial development has also occurred in the past few weeks. Chemical anaylses conducted by the New Mexico Environmental Improvement Division has resulted in NMEID classifying Pond Evaporation Lagoon #1 as a hazardous waste surface impoundment of It is not economically realistic for Navajo to maintain Pond #1 as a hazardous waste surface impoundment; therefore, Navajo has elected to close this surface impoundment pursuant to RCRA. To address both these issues, biological treatment of waste-waters generated at the facility will be implemented prior to 1988. Biological treatment will substantially improve the character of the effluent discharged at Navajo.

Section 7.0 outlines the options that Navajo will be pursuing toward biological treatment of wastewaters. We anticipate that technical staff from NMOCD, NMEID and the Navajo wilf be working closely together within the next few months to determine a schedule for the implementation of wastewater treatment at Navajo's Artesia facility as well as closure plans for Pond #1. We would like to meet with NMOCD and NMEID in September concerning this matter.

Headquarters 500 Copper Avenue N.W.; Suite 325 Albuquerque, New Mexico 87102 (505) 842-0001

Washington Area Office 5513 Twin Knolls Rd., Suite 216 Columbia, Maryland 21045 (301) 596-3760

Please note that Figures 4-7 and 4-9 have been revised and are submitted with this document; other figures submitted with the original submission remain unchanged. If you should have any questions regarding this submission or require more information please contact me.

Very Truly Yours, GEOSCIENCE CONSULTANTS, LTD.

1 jmil

3

Randall T. Hicks Vice President

RTH/pe/STAME001.LTR Enclosures cc: Mr. David Griffin, Navajo Refining Company Peter Pache, NMEID





TABLE OF CONTENTS

P

1.0	EXECUTIVE SUMMARY	1-1
2.0	EXECUTIVE SUMMARY LOCATION AND PHYSIOGRAPHY 2.1 LOCATION 2.2 PHYSIOLOGY	2-1 2-1 2-1
	BRIEF HISTORY OF OPERATION	3-1
4.0	DESCRIPTION OF PHYSICAL ENVIRONMENT AT SITE 4.1 GEOLOGY 4.2 GEOMORPHOLOGY AND SOILS 4.3 REGIONAL GEOHYDROLOGY 4.4 GROUND WATER HYDROGEOLOGY 4.5 SURFACE WATER HYDROGEOLOGY AND FLOODING POTENTIAL 4.6 GROUND WATER QUALITY	4-6
5.0	PROCESS DESCRIPTION AND WASTEWATER CHARACTERISTICS 5.1 OVERVIEW 5.2 MAIN PROCESS UNIT DESCRIPTIONS AND WASTEWATER	5_1
	 5.2 MAIN PROCESS UNIT DESCRIPTIONS AND WASTEWATER CHARACTERISTICS 5.2.1 CRUDE OIL FRACTIONATION 5.2.2 CATALYTIC CRACKING 5.2.3 ALKYLATION 5.2.4 REFORMING 5.2.5 DESULFURIZERS 5.3 AUXILIARY PROCESS UNIT DESCRIPTIONS AND WASTEWATER CHARACTERISTICS 	0 10
	CHARACTERISTICS 5.3.1 BOILERS 5.3.2 COOLING TOWERS 5.3.3 WATER PURIFICATION SYSTEM 5.3.4 DESALTERS 5.3.5 WASHDOWN AND STORMWATER 5.3.6 STORAGE TANKS 5.3.7 PRODUCED WATER FROM OIL RECOVERY SYSTEM	5-11 5-11 5-11 5-12 5-12 5-12 5-12 5-12
6.0	PRESENT WASTE MANAGEMENT SYSTEM 6.1 OIL/WATER SEPARATORS 6.2 CONVEYANCE DITCH 6.3 EVAPORATION PONDS	6-1 6-1 6-2 6-2
7.0	FUTURE WASTEWATER MANAGEMENT 7.1 WASTEWATER MANAGEMENT OPTIONS FOR WASTEWATERS DISCHARGED TO THE OIL WATER SEPARATORS 7.1.1 OPTION 1: DISCHARGE OF TREATED EFFLUENT TO ARTESIA POTW 7.1.2 OPTION 2: BIOLOGICAL TREATMENT AND DISCHARGE	7-1 7-1 7-1 T0
	PECOS RIVER OF EVAPORATION PONDS 7.2 BOILER BLOWDOWN WASTEWATER MANAGEMENT 7.3 WATER SOFTENER MANAGEMENT	7-2 7-2 7-2

8.0 MONITORING AND REPORTING	8-1
9.0 BASIS FOR DISCHARGE PLAN APPROVAL	9-1
10.0 REFERENCES CITED	10-1

b

LIST OF FIGURES

2-1 TOPOGRAPHIC MAP OF ARTESIA AREA	2-2
4-1 GEOLOGIC MAP OF ARTESIA AREA	4-3
4-2 SOILS MAP OF ARTESIA AREA	4 - 4
4-3 CROSS SECTION OF NAVAJO REFINING COMPANY AND ARTESIA AREA	(IN POCKET)
4-4 POTENTIOMETRIC SURFACE MAP OF DEEP AQUIFER	4-7
4-5 POTENTIOMETRIC SURFACE MAP OF SHALLOW AQUIFER	4-8
4-6 HYDROGEOLOGIC CROSS SECTION OF REFINERY SITE AREA	(IN POCKET)
4-7 POTENTIOMETRIC SURFACE SHALLOW PERCHED AQUIFER	(IN POCKET)
4-8 POTENTIAL SURFACE OF VALLEY FILL AQUIFER	4-11
4-9 POTENTIOMETRIC SURFACE OF VALLEY FILL AQUIFER EVAPORATION POND AREA	(IN POCKET)
4-10 DISCHARGE OF PECOS RIVER	4-12
5-1 LOCATION OF PROCESS UNITS AND DISCHARGE POINTS AT REFINERY	(IN POCKET)
5-2 PROCESS FLOW DIAGRAM OF NAVAJO REFINERY	(IN POCKET)

LIST OF TABLES

5-1	PROCESS U DISPOSAL		WASTEWATER	TREATMENT/	5-3
5-2	CHEMICAL	ANALYSES	OF SELECTER	D WASTE STREAMS	5-6

APPENDICES

APPENDIX A	WELL LUGS
APPENDIX B	WATER QUALITY
APPENDIX C	PROPOSED CHANGE IN RCRA REGULATIONS
APPENDIX D	FEBRUARY 18, 1984 SUBMISSION TO NMOCD

A D D C N D T V

b

.....

REGULATORY INDEX

WQCC REGULATION REQUIRED IN DISCHARGE PLAN	SECTION IN DISCHARGE PLAN
1–201	1.0
1-202	To be submitted
3-105.F	7.1.1
3-106.C.1	5.3, Appendix D
3-106.C.2	6.0, 7.0, 8.0
3-106.C.3	4.3, 4.4
3-106.C.4	4.5
3-106.C.5	Figure 5.1
3-106.C.6	4.1, 4.2, 4.3
3-106.C.7	9.0
3-106.C.8	Not Applicable
3–107	8.0
3.108.B	1.0
3.108.B.3	5.2

1.0 EXECUTIVE SUMMARY

Navajo Refining Company, P.O. Drawer 159, Artesia, New Mexico, 88210 proposes to implement biological treatment of wastewater at the Artesia Refinery and discharge approximately 405,200 gallons per day of oil refinery wastewater to the Pecos River. The refinery is located in Section 9,T. 17S. R. 26 E. and the 85 acre evaporation ponds are located in Section 12, T.17 S, R. 26 E. Wastewater from the process units flows through an oil/water separator to remove hydrocarbons discharged with the wastewater. The refinery's effluent has a total dissolved solids content of 2000-4000 mg/l. The ground water near the evaporation ponds is at a depth of 8 feet with a background total dissolved solids content of about 15,000 mg/l. In the refinery area the "shallow aquifer" (upper Queen Formation), which is at a depth of 150 to 250 feet below land surface, exhibits nearly 100 feet of artesian head. The total dissolved solids content of the ground water in this aguifer is about 500-1000 mg/l. About 15 feet below land surface a 2 to 5 foot thick water-bearing unit is present in the Refinery area. This unit exhibits some artesian pressure and has a total dissolved solids content of about 1500 mg/l. Biological treatment of wastewater will substantially improve the quality of wastewater at the facility.

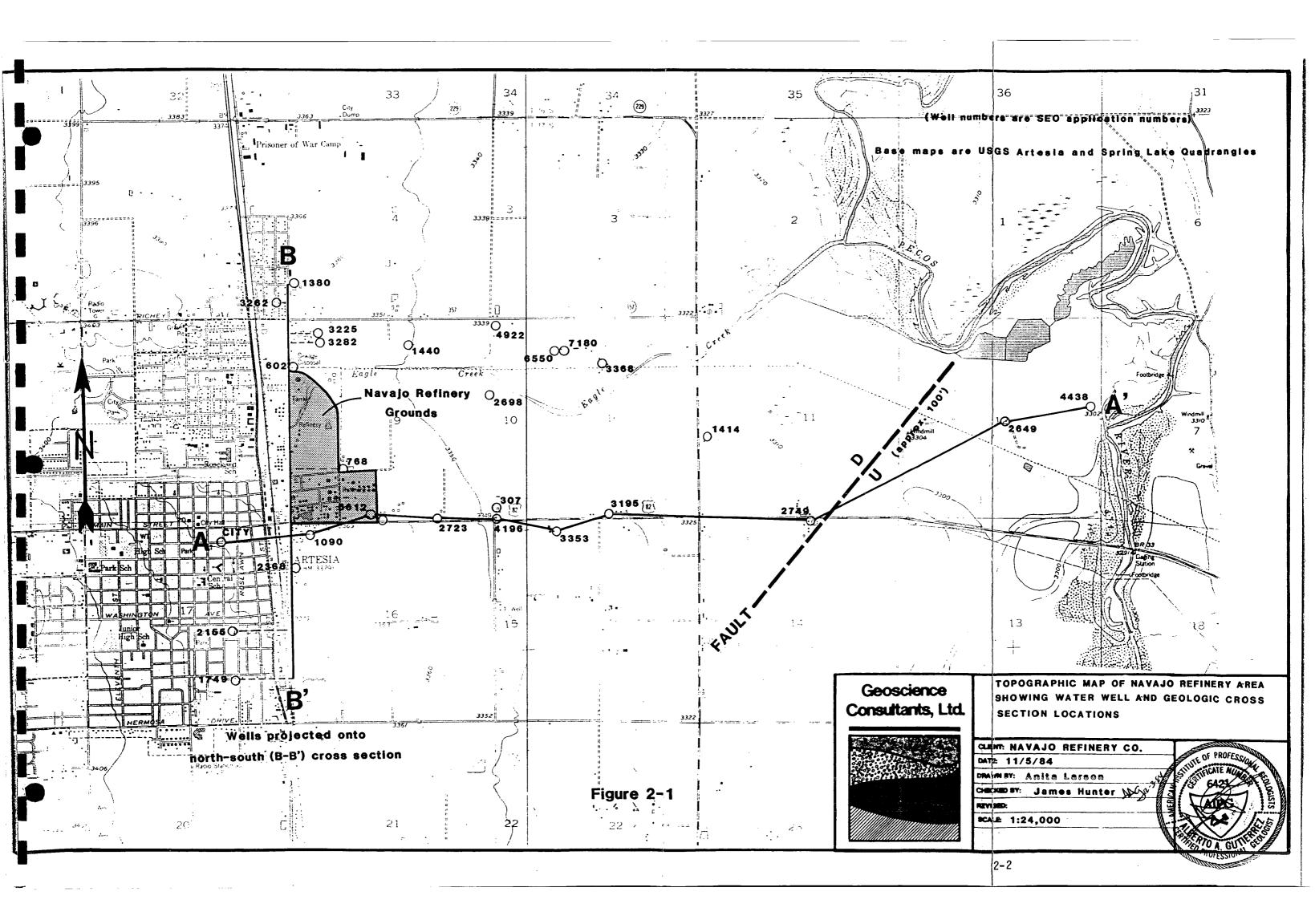
2.0 LOCATION AND PHYSIOGRAPHY

2.1 LOCATION

The Navajo Refining Company's plant facilities and wastewater management system are located in and near the town of Artesia, in Eddy County, New Mexico. The refinery's processing plant and much of the waste management system is located within the city limits, in the west 1/2 of Section 9, T. 17 S., R. 26 E. The associated wastewater evaporation facilities are located in Sections 1, 2, 9, 10, 11, and 12 of T. 16 S., R. 26 E., and in part of the west 1/2 of Section 6, T. 16 S., R. 27.E. (Figure 2-1).

2.2 PHYSIOGRAPHY

Artesia lies in the Eastern Plains of New Mexico; a broad, flat plateau with a local elevation of 3300 to 3400 feet above sea level. Topography in the Artesia area slopes gently (15 to 20 feet per mile) to the east, and is drained by the nearby Pecos River (Figure 2-1). The region is semiarid, with rainfall averaging less that 11 inches per year. Soils are typically of the Arno, Harkley, Pima and Karro associations, developed by deep weathering of bedrock or old alluvium (USSCS, 1971).



3.0 BRIEF HISTORY OF OPERATION

The refinery began operations in the 1920's. The technology, size and ownership of the facility have changed numerous times since commencement of crude processing. Until 1969, the North Division and the South Division were operated by Conoco. Navajo then purchased both units and began to further integrate the operation into a single refinery capable of processing New Mexico sour crude (an asphalt-based crude with a high sulfur content) in the South Division and New Mexico intermediate crude (a paraffinbased crude produced mainly from the Abo Formation) in the smaller North Division.

Since the 1970's Navajo has constructed over 50 monitor wells and product-recovery wells to address the environmental concerns at the facility. The installation of four product-recovery trenches has resulted in a significant reduction in the total amount of hydrocarbons which exist in soil. Hydrocarbon product recovery will continue and, if necessary, be expanded to insure environmental protection.

Ground-water monitor wells are also in place throughout the refinery to assist in delineating soil contamination by hydrocarbons, for RCRA monitoring of landfarms and other RCRA disposal facilities, and to monitor the integrity of the waste conveyance and evaporation facilities. In addition to ground water monitoring, Navajo maintains a strict manifest and record-keeping system. This system helps to insure that all waste is handled and disposed of properly. This system is in compliance with all applicable RCRA regulations.

4.0 DESCRIPTION OF PHYSICAL ENVIRONMENT AT SITE

Four water-bearing units are present beneath the Navajo Refining Company facility:

- o The San Andres Formation
- o The upper Queen Formation
- o Alluvium in the Pecos River Valley
- o Small, discontinuous perched-water aquifers in the Seven Rivers Formation

The San Andres and upper Queen formations are the principal aquifers of the Artesia area (Welder, 1983). The San Andres, locally called the deep or artesian aquifer, has been extensively developed for industrial, municipal and agricultural purposes. This unit is under considerable artesian pressure. The upper Queen in the Artesia area is principally used for individual domestic wells, but some larger capacity wells completed in this unit are employed for irrigation. Unlike the "shallow" aquifer in the Roswell area, water-bearing sand units in the upper Queen exhibit artesian head. Adjacent to the Pecos River a third water-bearing unit is present: the Pecos River Valley alluvium. This unit is not currently utilized in this area for any purpose because of its poor water quality. Within the Seven Rivers Formation isolated permeable sands and fractured evaporites will produce small quantities of poor quality water. These isolated units may show a few feet of artesian head. One such unit is present about 15 feet below the Refinery. The evaporation ponds and portions of the conveyance ditch lie on the flood plain of the Pecos River and Eagle Draw. However, numerous flood control structures upstream from Navajo have eliminated most of the flooding potential of the facility.

4.1 GEOLOGY

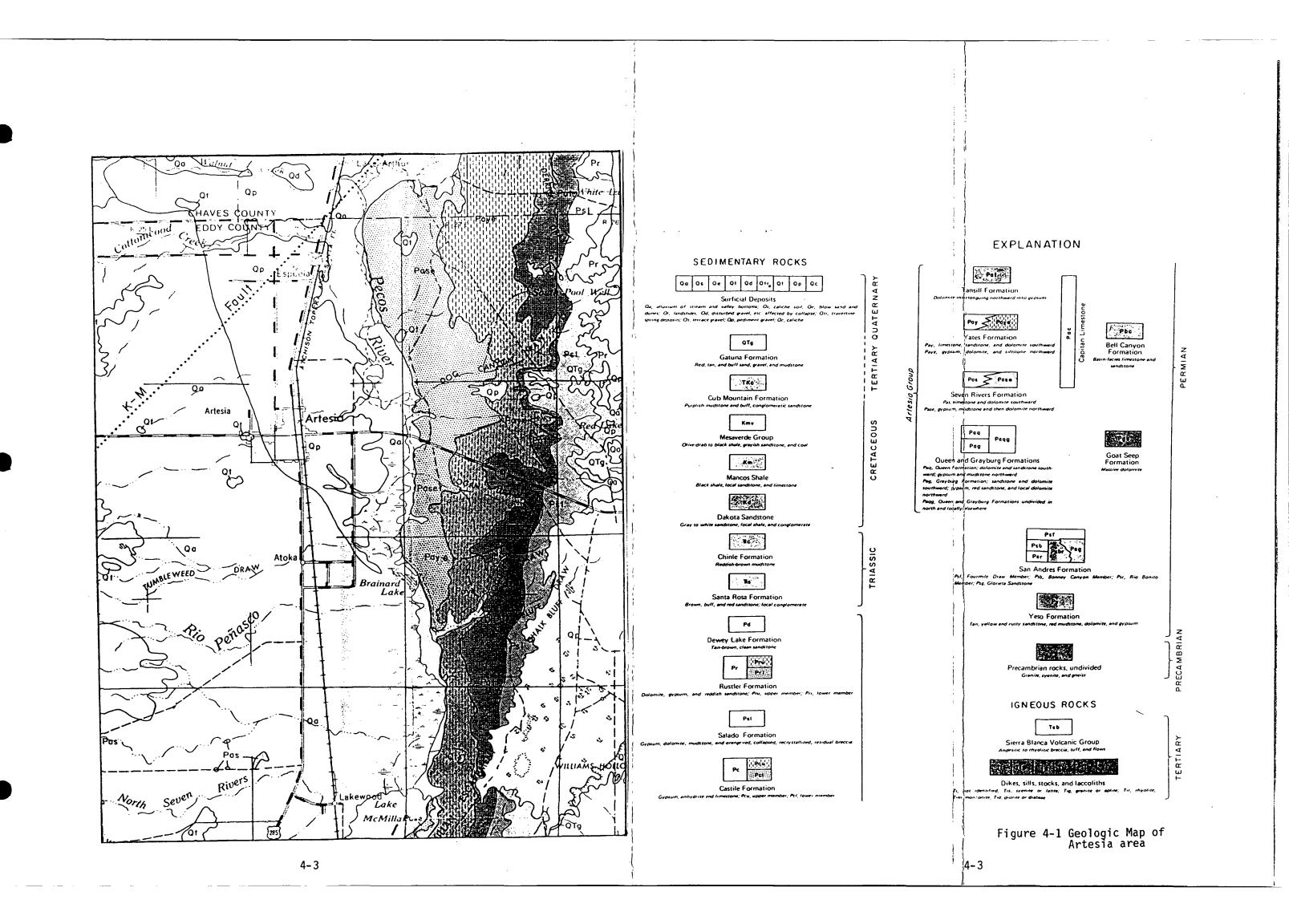
The town of Artesia and the Navajo site are underlain by thin (20 feet or less) layer of soils, alluvium and weathered bedrock, which generally conceals subcrops of the Artesia Group (Permian). As seen in the explanation of Figure 4-1, the Artesia Group consists of carbonates, evaporites and shales deposited in a backreef environment. The Artesia area is located on the northwestern shelf of the Permian Basin and basinward (southeasterly) stratigraphic dips of 1 to 3 degrees are typical.

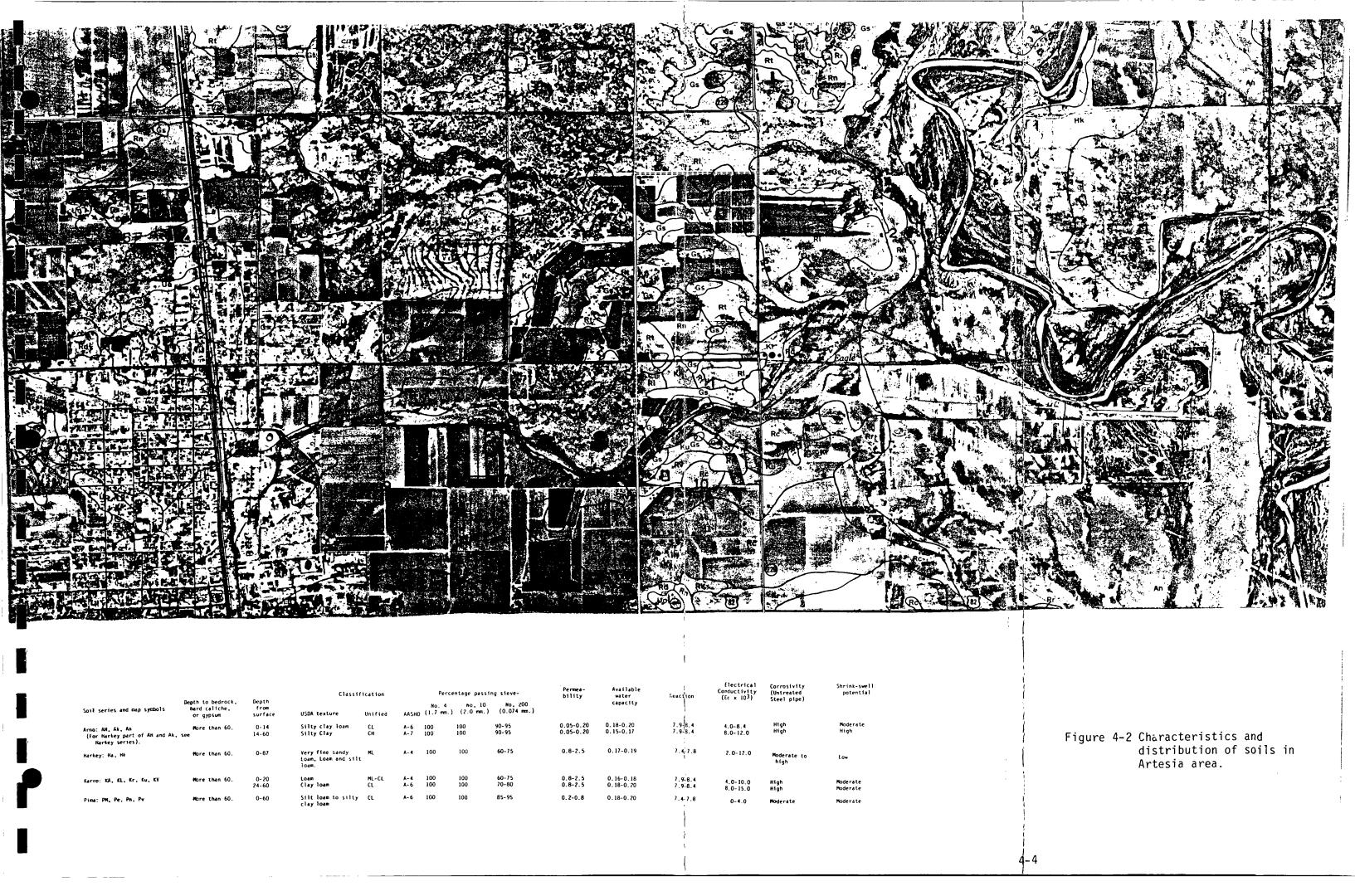
Structure in the Artesia area is expressed as gentle (1-3 degree) southeasterly dips, with few other features. One fault (inferred from subsurface data) is mapped in the area. This fault trends about N. 40 E. through sections 11, 12 and 14 (Figure 4-1), and is apparently a normal fault with the northwest block downthrown. This structure parallels the other major structural elements of this area, such as the Y-O and K-M "buckles" or fault zones (Kelley, 1971).

In Section 12, the fault appears to pass beneath the Navajo Refining Company's evaporation ponds near the Pecos River. Although the fault may cut across all known and potential aquifers, there are several reasons why the fault is not a potential conduit for ground water contamination. First, faults in evaporites (Queen, Seven Rivers) typically "heal" or self-seal by flowage and recrystallization of gypsum and anhydrite. Second, the net hydrostatic head of the shallow and deep artesian aquifers is upward and would prevent any downward flow.

4.2 GEOMORPHOLOGY AND SOILS

The Artesia region is located on a broad, gently sloping plateau which has developed as a result of <u>in-situ</u> weathering of flat-lying carbonate and evaporitic bedrock. Localized areas of valley fill (Pecos River Valley and major arroyos) form the only other significant substrate for soil formation. Within soil series formed on a particular substrate, soil properties vary as a result of differing grain size, land slope and available moisture. Figure 4-2 shows the distribution and properties of soil types in the Artesia area. The Navajo plant site is located





			Classif	ication		Perce	entage passi	ng sieve-	Permea- bility	Avaílable water	leaction	Electrical Conductivity (Ec x 103)	Corrosivity (Untreated Steel pipe)	Shrink-swell potential
Soil series and map symbols	Depth to bedrock, hard caliche, or gypsum	Depth from surface	USDA texture	Unified	AASHO	No. 4 (1.7 mm.)	NO, 10 (2.0 mm.)	No, 200 (0.074 mm.)		capacity		(steer pipe/	
Arno: AH, Ak, An {For Harkey part of AH and Ak, Harkey series}.	Nore than 60. S ee	0-14 14-60	Silty clay loam Silty Clay	CL CH	A-6 A-7	100 100	100 100	90-95 90-95	0.05-0.20 0.05-0.20	0.18-0.20 0.15-0.17	7.9-8.4 7.9-8.4	4.0-8.4 8.0-12.0	H1gh H1gh	Moderate High
Harkey: Ha. He	More than 60.	0-87	Very fine sandy Loam, Loam and silt loam.	ML	A-4	100	100	60-75	0.8-2.5	0.17-0.19	7.4 <mark>1</mark> 7.8	2.0-12.0	Moderate to high	Low
Karro: KA, KL, Kr, Ku, KY	More than 60.	0-20 24-60	Loam Clay loam	ML-CL CL	A-4 A-6	100 100	100 100	60-75 70-80	0.8-2.5 0.8-2.5	0.16-0.18 0.18-0.20	7.9.8.4 7.9-8.4	4.0-10.0 8.0-15.0	High High	Moderate Moderate
Pine: PM, Pe, Pn, Pv	More than 60.	0-60	Silt loam to silty clay loam	CL	A-6	100	100	85-95	0.2-0.8	0.18-0.20	7.4.7.8	0-4.0	Moderate	Moderate

in an area of Karro Loams (USSCS, 1971). These soils are developed on deeply weathered calcareous rocks, and are moderately permeable. Much of the refinery site area has been filled, graded and leveled, leaving little natural soil in place.

The effluent ditch (Figure 2-1) parallels Eagle Creek, and is constructed in soils of the Pima Series. These dark, calcareous loams develop on carbonate bedrock and carbonate-rich alluvial material. They are moderately permeable and have a high water-holding capacity.

The evaporation ponds are built on soils of the Arno Series which develop on fine, silty alluvium in the Pecos River Valley. These soils have low permeability and high waterholding capacity.

4.3 REGIONAL GEOHYDROLOGY

The Artesia area is located in the Roswell-Artesia artesian water basin (Welder, 1983). The two principal ground water reservoirs are the artesian San Andres aguifer, and two shallow aguifers (Queen Formation and valley alluvium). Local, perched water-bearing units with small storage capacity also occur in isolated stratigraphic traps. With the exception of some wells located in valley alluvium immediately adjacent to the Pecos River, all wells in the Artesia area exhibit some degree of artesian head. Deep (800-1200 feet) artesian wells are completed in the Grayburg-San Andres formations, and have static water levels 50 to 80 feet below ground level. The deep aquifer is confined by shales and evaporites of the lower Queen Formation. Shallow aquifer wells (150-250 feet) produce from the upper sands of the Queen Formation, and are confined by aquitards of anhydrite, gypsum and shale in the overlying Seven Rivers Formation (Figure 4-3). Water levels in shallow wells range from 40 to 60 feet below ground level.

Regionally, some wells tap the shallow, perched "gyp water" reservoirs in stratigraphic traps in the upper Seven Rivers Formation. These waters are effectively isolated from both major aquifers. Even in very shallow wells (20 feet) these perched zones exhibit 3 to 5 feet of artesian head.

4-5

The regional potentiometric surfaces of the deep and shallow aquifers are shown in Figures 4-4 and 4-5. The two potentiometric surfaces have very similar elevations (about 3300' msl), with the deep artesian aquifer's surface slightly above the shallow aquifer's surface.

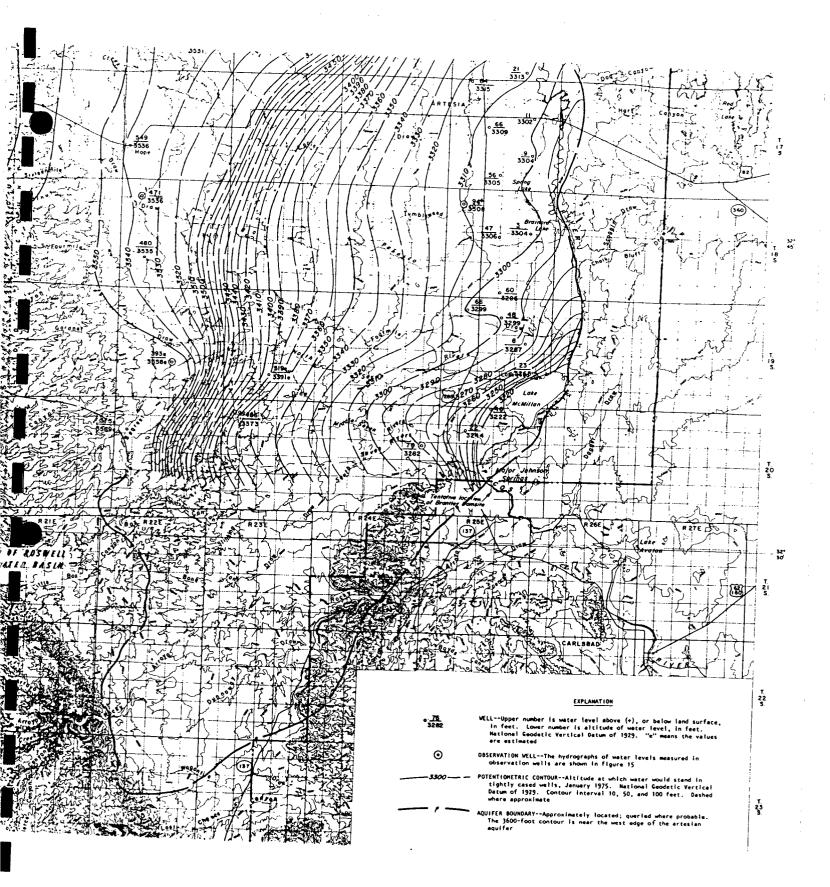
Both aquifers produce water for irrigation, industrial and domestic purposes. Water quality is variable from 500 to over 5000 ppm total dissolved solids, and in general the more saline waters are found at greater depths and/or to the east.

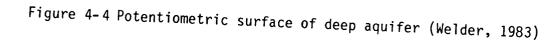
4.4 GROUND WATER HYDROGEOLOGY

The deep artesian aquifer is the major source of ground water in the Artesia area and supports most of the large local agricultural industry. Artesian water, of quality ranging from 500 to over 5000 ppm TDS, is found in the San Andres and Grayburg formations (Permian) at depths of 850 to 1250 feet below the surface (Kelley, 1971). This aquifer system is recharged along San Andres outcrops in the Sacramento Mountains west of Artesia. In the early 1900's many wells in this aquifer flowed 1000 to 3000 gallons per minute (gpm), but extensive withdrawals have lowered the head to about 50 to 80 feet below the land surface (Figure 4-4). The artesian aquifer is confined by the impermeable (or very slightly permeable) carbonates, shales and evaporites which comprise much of the overlying Queen and Seven Rivers formations (Figure 4-3). Its potentiometric surface is typically slightly above the shallow aquifer's upper surface (Welder, 1983).

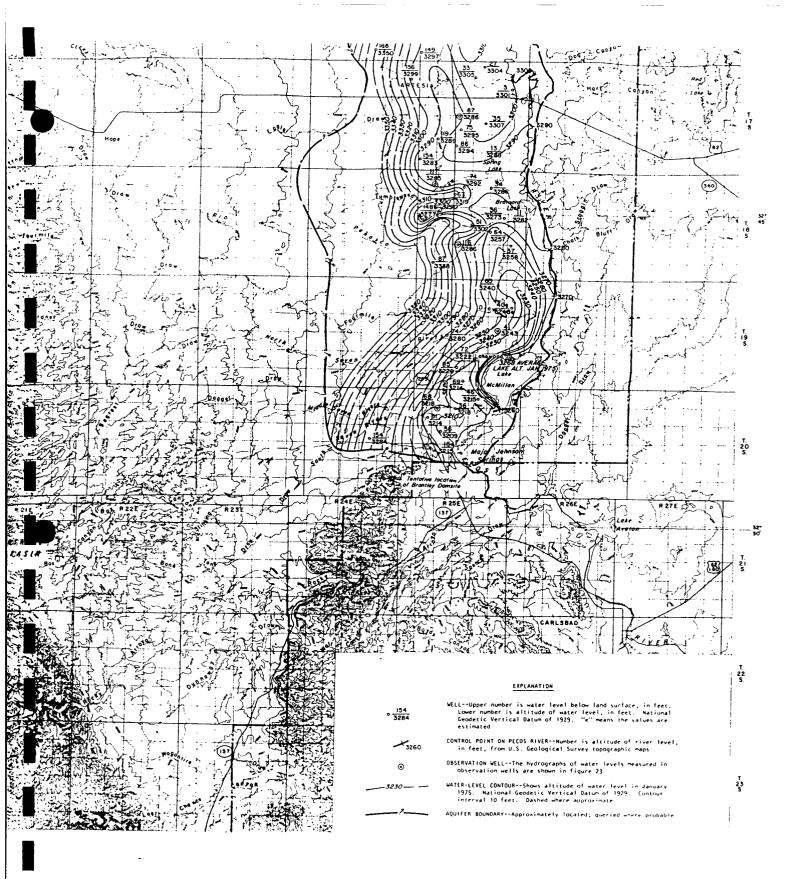
The shallow aquifer, which has been described as a "water table" aquifer, is in fact a second artesian aquifer. With the exception of wells drilled immediately adjacent to the Pecos River nearly all shallow aquifer wells exhibit 100 to 150 feet of artesian head. Shallow wells typically produce from sands in the upper Queen Formation at depths of 150 to 250 feet. These sands are confined by the thick anhydrites and shales (aquitards) of the overlying Seven Rivers Formation. Relatively impermeable shales and evaporites several hundred feet thick separate the upper Queen sands from the underlying San Andres.

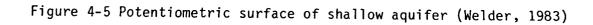
4-6





4-7





Analysis of driller's and geophysical logs (Appendix A) shows that the Navajo site is underlain by evaporites, carbonates and shales of the Seven Rivers Formation. These rocks are nearly impermeable, with the exception of local, isolated bodies of sand and fractured anhydrite. Only minor amounts of ground water is found in or produced from the Seven Rivers Formation. Cross sections illustrating the hydrogeologic relationships of the shallow aquifer are shown in Figure 4-3.

At depths of approximately 200 to 250 feet, the uppermost sands of the Queen Formation are encountered. These sands contain and produce usable amounts of ground water, and constitute most of the shallow aquifer in this area. These sands are 10 to 50 feet thick, and lie at the top of about 700 feet of relatively impermeable carbonates and evaporites which comprise the bulk of the Queen.

A map of the shallow-aquifer potentiometric surface (Figure 4-5) shows that it typically slopes gently to the east and southeast, and follows the regional stratigraphic dips. South of the Artesia area, where extensive agricultural development exists, the potentiometric surface forms a trough due to significant withdrawals from the shallow aquifer. The shallow-aquifer's potentiometric surface is generally slightly below the artesian aquifer's potentiometric surface, indicating that any interconnection (along faults or poorly completed wells) would cause flow upward from the deep to the shallow aquifer. The configuration of the shallow aquifer is locally complicated by large, seasonal irrigation withdrawals. Although considerable local variation is observed, the shallow aquifer generally provides water of quality adequate for domestic and irrigation use (500-1500 ppm TDS).

In some areas there is evidence for the existence of an isolated, discontinuous perched-water aquifer, which lies on top of clay or anhydrite lenses above the confined shallow aquifer. Very shallow (10-30 feet), low-production wells may have tapped this "gyp water" in the past and used the production for stock. Many of these wells have been abandoned for a variety of reasons including exhaustion of water or poor quality. These small, stratigraphically-trapped accumulations of ground

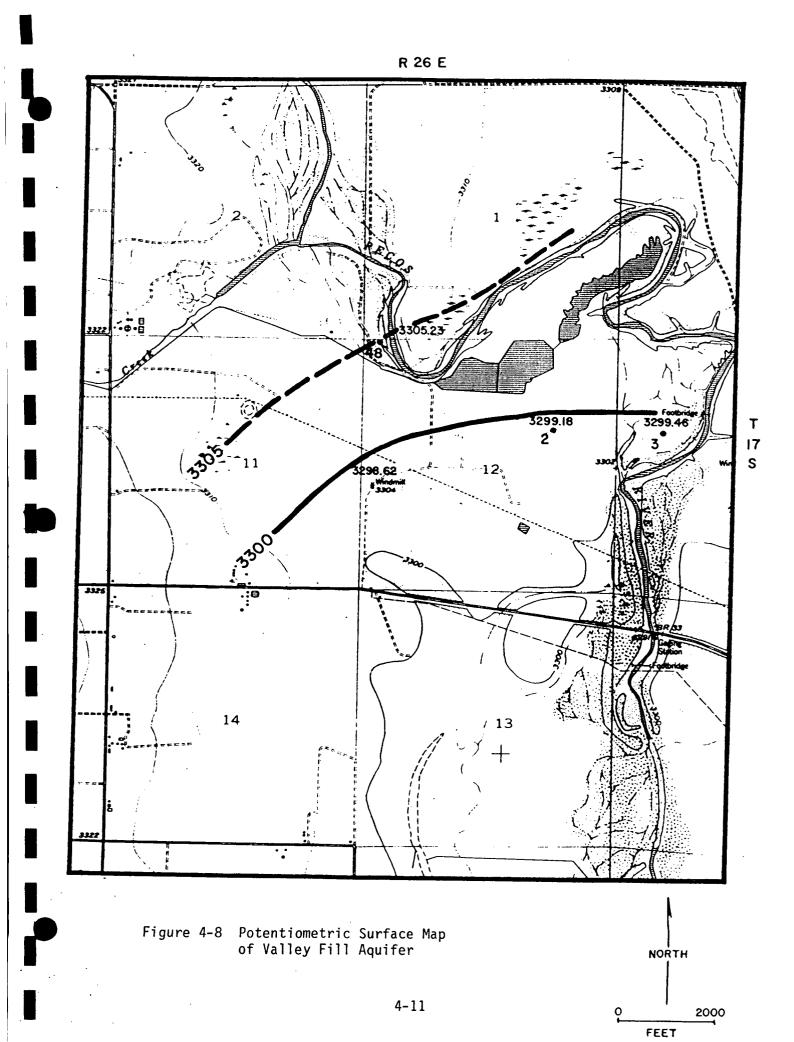
4~9

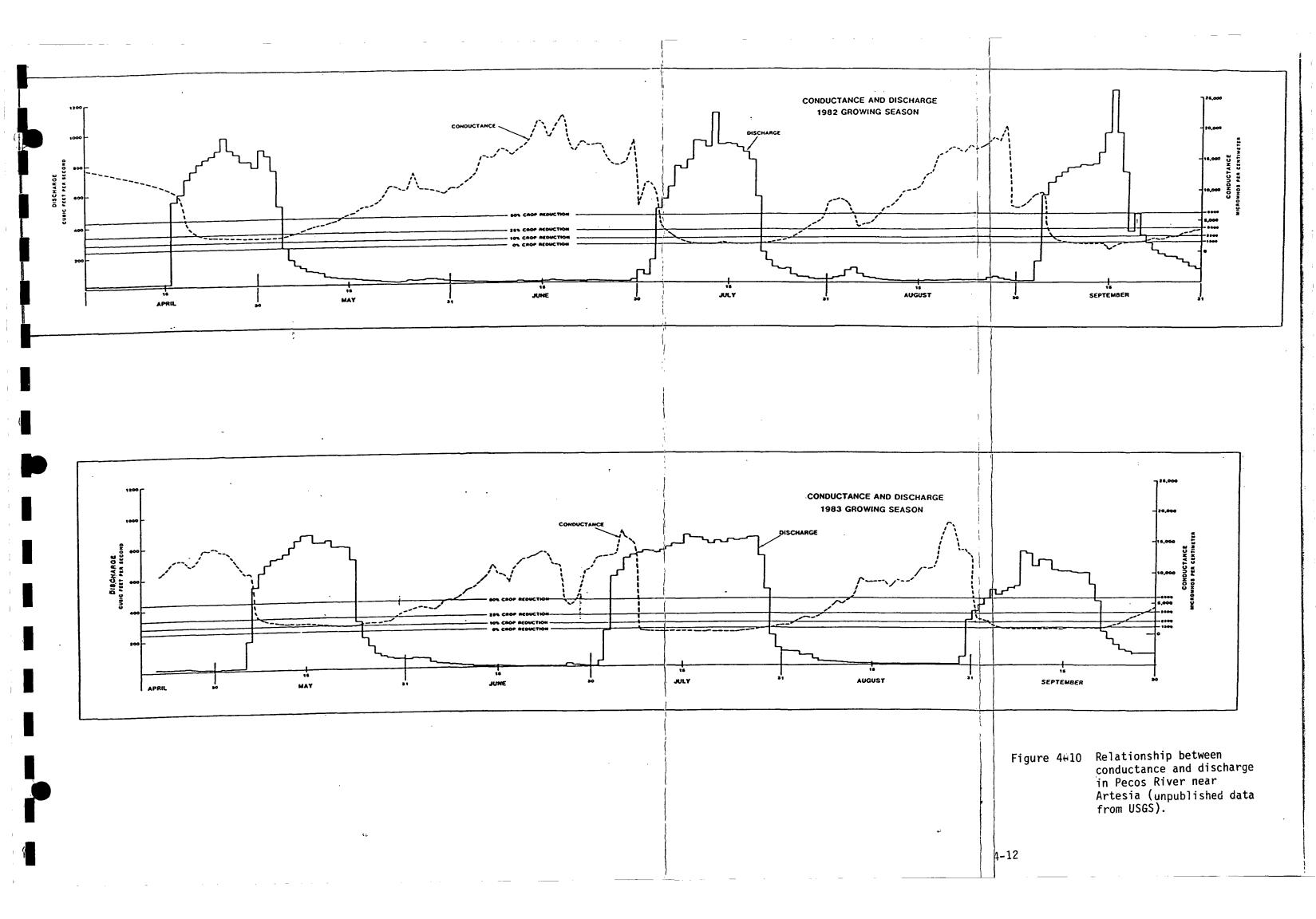
water are highly variable in areal extent, volume, saturated thickness and quality. One such confined body of water underlies part of the Navajo facilities.

The configuration of the perched-water unit under the Navajo site is revealed by over 40 monitor wells, installed by Navajo Refining Company. Lithologic drillers logs show that water is encountered in weathered and fractured anhydrite (so called gypsum sand) at depths of 15 to 30 feet, and typically rises to levels 3 to 5 feet above the saturated unit (Appendix A). This water-bearing unit is confined above by layers of gypsum, anhydrite and caliche, and below by a continuous layers of clay and anhydrite. Figures 4-6 and 4-7 illustrate the geometry and hydrology of the plant site area.

These Figures show that this perched gypsum/anhydrite/sand unit is comprised of several water-bearing zones at different depths. The water-bearing zones are generally less than 5 feet thick and are typically hydraulically connected. However, wells #19 and #34, and #29, #37, #39 and #40 show that anomalies in the potentiometric surface are present due to complex hydraulic connections in some areas of the plant.

Navajo Refining Company maintains 3 evaporation ponds near the Pecos River, which are connected to the plant site by a conveyance channel paralleling Eagle Creek (Figure 2-1). These ponds, and the portions of the conveyance channel in Sections 12, 11 and the E 1/2 of 10 are located in Pecos valley alluvium. Monitor wells installed by Navajo show that ground water in the valley alluvium is typically 6 to 12 feet below the Although the alluvium is generally silty sand, some 6 inch surface. monitor wells can maintain a pumping rate of 10-15 gpm indicating the presence of lenses of higher permeability material. Figures 4-8 and 4-9 show the configuration of the water surface in this unit. As expected, flow is sub-parallel to the Pecos River Valley, generally flowing toward the River. The water level in this unit should respond to the fluctuations of flow in the River (Figure 4-10). Therefore, during periods of high flow the hydraulic gradient is from the river to the





alluvium and the Pecos River loses water. During low flow periods the gradient is reversed.

4.5 SURFACE WATER HYDROGEOLOGY AND FLOODING POTENTIAL

Artesia lies in the eastern plains of New Mexico on a broad, mature plateau developed on flat-lying bedrock. The city is at an average elevation of 3380 feet (msl) on an essentially featureless plain which slopes eastward at about 3 feet per mile (0.35 degrees). Surface drainage is typically controlled by small, ephemeral creeks and arroyos which flow eastward into the Pecos River. These small drainages are subparallel and spaced at about 0.75 to 1.5 miles.

The major drainage in the immediate Artesia area is Eagle Creek which runs from west to east through the city, northeast through the Navajo Refinery and then eastward to the Pecos (Figure 2-1). Eagle Creek's channel has been rectified (artificially formed and straightened) from west of Artesia to the Pecos. Discussions with the City of Artesia Engineer (Mr. John Brown) indicate that there is no historical record of Eagle Creek overflowing its banks. However, such an overflow could occur in a 100 year event (5.0 inches of precipitation). To deal with this problem, the city is continuing its efforts at rectifying Eagle Creek and plans to construct a check dam several miles west of Artesia within 2 years. These measures will effectively remove Artesia and the Refinery from the 100-year floodplain.

The evaporation ponds and parts of the conveyance ditch lie in the geologic floodplain of the Pecos River. In the past, large releases from upstream reservoirs coupled with high rainfall events have resulted in minor damage to the conveyance ditch. The ponds are located on alluvial material next to the Pecos. Pond perimeters are 16 to 18 feet above the river channel, and the largest pond is protected by a 5-foot high dike. Analysis of historic records of Pecos floods (Patterson, 1965; USGS unpublished data 1946-1983) shows that a maximum stage height of 17.4 feet was reached on September 30, 1932. Is is unlikely that this level will ever be equalled, owing to the construction of several flood-control dams (Alamogordo, Los Esteros) on the upper Pecos. No discharge event since

1941 has exceeded the 13.76 foot stage (25,200 cfs on October 8, 1954) and no discharge since 1960 has exceeded 7000 cfs. Modern "floods" in the Pecos are now controlled releases of water for irrigation, and these discharges are deliberately controlled to prevent any actual or potential flooding of lands and structures adjacent to the Pecos. Any release or rainfall event large enough to flood the evaporation ponds would effectively dilute the effluent to a level far below stream or ground water standards.

4.6 GROUND WATER QUALITY

Four separate hydrogeologic units are present at the Navajo facility:

o the artesian aquifer (San Andres)

o the shallow aquifer (upper Queen)

- o the Pecos River Valley alluvium, and
- o the perched water in the terrace regolith and surficial deposits.

The well-defined pressure regime in the confined aquifers (San Andres and the upper Queen) demonstrates that these units cannot be degraded by surficial sources (Section 4.4). Therefore, water quality data for these units was not collected for this study. Published data on the water quality of these units are available (NMEID, 1980).

The water chemistry of the two surficial water-bearing units which have the potential of being affected by Navajo's operation is summarized in Appendix B. The water quality in the Pecos River Valley alluvial sand/silt aquifer is well defined near the evaporation ponds and is consistent with surface water quality data from the Pecos River (Figure 4-10). Comparison of ground water quality with water quality in the evaporation ponds reveals that, in terms of the major cations/anions and metals, the water quality in the lagoons is better than or equal to ground water quality (Appendix B). Both are unsuitable for use as irrigation, domestic or industrial purposes. Even though some monitor wells have an odor characteristic of hydrocarbons, in all wells sampled except for well #13 neither phenols, toluene nor benzene are present in concentrations above ground water standards.

Four monitoring well points were installed near the evaporation lagoons to further define the background water quality of the aquifer and to determine if any contamination was present downgradient from the impoundments. The results of the analyses are shown in Appendix B. These results are consistent with previous data which demonstrate that the water quality in the area of the evaporation lagoons is very poor and in some areas exceeds 10,000 mg/l TDS.

Directly downgradient from the impoundments several monitor wells exhibit water quality significantly better than 10,000 mg/l TDS. This change may be due to leakage of better quality pond fluid into the aquifer. No listed organic contaminants were detected in samples from the well points. However, alphatic hydrocarbons were detected by NMOCD in upgradient well and by Geoscience in well point #2. The source of these organic compounds is not known but is presumably a background condition.

These water quality data demonstrate that no degradation of ground water has occurred in the area of the evaporation ponds.

Water quality in the perched terrace/regolith water-bearing unit is also well defined (Appendix B). The water quality in this unit is better than the Pecos Valley alluvium. It should be noted that the ground water in this perched water-bearing zone under the refinery is under some artesian pressure. Direct contamination of this ground water is therefore unlikely. The lithologic logs of the monitor wells (Appendix A) indicate that the soil in the aquitards above the unit is locally contaminated from surficial spills. Therefore, the ground water in some wells may in fact be unaffected by spills and other discharges from the wastewater management system. High hydrocarbon or TDS content in samples from these wells could be a result of artesian water in the well bore coming into contact with contaminated soil. Many wells have been installed to identify zones of hydrocarbon contamination and four oil recovery systems have been installed to recover product and therefore, mitigate the hydrocarbon contamination (Figure 4-7).

This shallow, perched-water unit appears to be of limited areal extent, and does not seem to be utilized by any supply wells. It is not connected with any of the other aquifers, and it is very unlikely that any possible hydrocarbon contamination would affect any other ground water.

Ļ

5.0 PROCESS DESCRIPTION AND WASTEWATER CHARACTERISTICS

5.1 OVERVIEW

A petroleum refinery is a complex combination of interdependent operations engaged in separating crude molecular constituents, molecular cracking, molecular rebuilding, and solvent finishing to produce petroleum derived products. There are a number of distinct processes utilized by the industry for the refining crude petroleum and its fractionation products. An EPA survey of the petroleum refining industry, conducted during 1977, indentified over 150 separate processes being used and indentified many more process combinations that may be employed at any individual refinery.

Each process is itself a series of unit operations which cause chemical and/or physical changes in the feedstock or product. In the commercial synthesis of a single product from a single feedstock there are sections of the process associated with the preparation of the feedstock, the chemical reaction, the separation of reaction products, and the final purification of the desired product.

At the Navajo Refining Company Artesia, New Mexico facility the major refining processes are:

- 1) Crude Oil Fractionation (with vacuum fractionation)
- 2) Fluidized Catalytic cracking
- 3) Alkylation
- 4) Reforming
- 5) Desulferization

Associated with these processes are several auxiliary activities which do not directly result in conversion of crude oil to product nor result in complex chemical changes in the product but instead separate impurities from the feedstocks and products, or are required for other aspects of the operation and maintenance of refinery. These auxiliary units are:

- 1. Boilers
- 2. Cooling towers
- 3. Storage tanks
- 4. Water purification facilities
- 5. Desalting units
- 6. Drying and sweetening units

Figure 5-1 shows the location of these process and auxiliary units at the refinery. The North Division of the refinery processes New Mexico intermediate crude whereas the South Division processes sour crude. The Artesia facility can refine a total of about 36,000 barrels of crude per day with the South Division producing about five-sixths of the total. Figure 5-2 is a process diagram which shows the interrelationship between the two divisions and the location of discharge points.

Each process or auxiliary unit operation has different water usages associated with it and the nature and quantity of waste water produced by the units varies according to the process involved. The final aqueous effluent of the Artesia Refinery is a blend of 19 process and auxiliary waste streams (Table 5-1) as well as some additional wastewater produced during general cleanup at the facility. The relative flow volumes from the different units are:

Cooling Towers	60%
Boiler Blowdown	20%
Desalter	8%
Process Units and Water Softener	12%

Based upon four Wier measurements taken over the course of several days, the total effluent discharge is approximately 0.627 cfs or about 405,200 gallons per day.

A brief description of each process and its wastewater characteristics is given below.

TABLE 5-1 PROCESS UNITS AND WASTEWATER TREATMENT/DISPOSAL UNITS

- - - -

6

LOCATION	PROCESS UNIT	WASTE STREAM SOURCE NUMBER	DISPOSAL/ TREATMENT SYSTEM
South Division	Cooling Tower		South division Separator
South Division	Boilers	sys sto ove	fire control tem water rage ponds rflow directly o conveyance ch
South Division	Crude Unit Desalter (D-130)		South division separator
South Division	Crude Unit Overhead Accumulator (D-140)		South division separator
South Division	Crude Unit Stabilizer (D-202)		South division separator
South Division	Alkylation Unit Regenerator	zat Sou	alky neutrali- ion then to th division API arator
South Division TCC Unit	Cooling Tower an Vacuum Unit		South division separator
South Division	Crude Unit Strai Run Gasoline stabilizer (W-5	API	South Division separator
North Division	Crude Unit Desalters (D-1, D-2) oil	North division /water arator

North Division	Cooling Tower	10	To North division oil/water separator
North Division	Crude Unit Overhead Accumulator (D-5)	11	To North division oil/water separ- ator
North Division	Low Pressure Boiler	12	To North division oil/water separator
North Division	Crude Unit Overhead Accumulator (D-4)	13	To North division oil/water separator
North Division	Desulfurizers (D-15)	14	To North division oil/water separator
North Division	Fluidized Cat. Cracker Unit Cooling Tower	15	To North division oil/water separator
North Division	Sour Water Stripper Bottom	16	To desalters, excess to North division oil/water separator
North Division	High pressure Boilers	18	To North division oil/water separator
North Division	FCC overhead acc- umulator Unit (DA- 301)	17	To North division oil/water separator

5.2 MAIN PROCESS UNIT DESCRIPTIONS AND WASTEWATER CHARACTERISTICS 5.2.1. Crude Oil Fractionation

Fractionation serves as the basic refining process for the separation of crude petroleum into intermediate fractions of specific boilingpoint ranges. Fractionation is a thermal distillation process which, at the south crude unit, yields gas, straight run gasoline, naptha, kerosene, diesel, atmospheric gas oil and reduced crude (Figure 5-2). Reduced crude is transferred to the associated vacuum unit where it is further fractionated into asphalt and vacuum gas oil.

In the North Crude Unit, where New Mexico intermediate crude is refined, the product streams consist of gas, straight run gasoline, naptha, kerosene, diesel and topped crude. Wastewater produced from the crude units contains ammonia, sulfides, chlorides, oil, and phenols. The process description flow sheet (Figure 5-2) shows the location of all wastewater discharges for this and other units. Table 5-1 summarizes the type of effluent produced at each unit and shows the treatment units to which the streams are discharged. Six wastestreams originate in the crude units: the bleedstream from the overhead accumulators #4, #5, #8, #11 and #13 and the effluent from the vacuum distillation unit (co-mingled with blowdown from the TCC cooling tower, #7). Like all wastestreams that have contacted crude or product (contact wastewater) and contain oil, these streams are treated in the oil/water separators prior to release into the conveyance ditch and the evaporation ponds. A chemical characterization of wastestreams #4, #5, #8, #11 and #13 is shown in Table 5-2.

5.2.2. Catalytic cracking

Fluidized catalytic cracking process is employed at Navajo. Catalytic cracking involves at least four types of reactions:

- 1) Thermal decomposition
- 2) Primary catalytic reactions at the catalyst surface
- 3) Secondary catalytic reactions between the primary products
- 4) Removal of products which may be polymerized from further reactions by adsorption onto the surface of a fluidized bed of catalyst as coke.

TABLE 5-2 CHEMICAL ANALYSES OF SELECTED WASTE STREAMS AT NAVAJD REFINERY (AFTER BRANVOLD, 1984) (VALUES IN MG/L EXCEPT WHERE NOTED)

L

•

WQCC 3-103 Standards	CRUDE UNIT PROCESS (#4, #11, #13)	CAT. CRACKER PROCESS BEFORE SOUR WATER STRIPPER	SOUR WATER STRIPPER EFFLUENT (#17)	ALKY. NEUTRALIZING Sewer (#6)	ND & SD DESALTERS (#3, #9)
As					
Ba					
Cd					
Cr	<0.1	<0.1	<0.1		
CN	<0.1	<0.1	<0.1	7.8	
			10.1	<0.1	<1.0
F	1.3	0.5	0.4		
Рb			. 0.4	10.8	
Hg					
NO ₃					
Se					
Ag					
U					
C1					
Cu					
Fe	<0.1	3.9	17.0	7.0	
Kn				7.8	
S04					
TDS	805	2160	560	2072	
Zn	<0.1	<0.1	0.12	2872	2524
рH	6.3	5.0	9.5	18.8	
A1				3.6	
B					
Co					
No					
Ni					
Phenols	9.9	710	250	0.26	
TSS				V• 20	
Cond.					
COD	1202	8379	1702	8870	100
NH4	78	2320	256	<1	600 5-0
S	64	180	7.7	1.4	5.0
					<1.0

Table 5-2 (continued)

6

Î

BOILERS

WQCC 3-103	S.D.	N.D.	N.D.
PARAMETERS	BOILER BLONDOWN	HIGH PRESSURE	LOW PRESSURE
	(#2)	BOILER (#18)	BOILER (#12)

As	.004	.005	.003
Ba	(.1	<.1	<.1
Cd	<.01	<.01	<.01
Cr	< .05	<.05	<.05
CN	•		1.03
F	3.1	2.2	1.5
fb	.18	.14	.05
Hg			
NO ₃	.2	.1	.05
Se		••	•••
Ag	<.05	<.05	<.05
ប	<.05	<.05	<.05
C1	127	73	44
Cu	<.03	<.03	<.03
Fe	1.9	0.65	0.25
Kn	.07	(.03	<.03
S0	1549	1242	693
TDS	4220	2873	1807
Zn	.06	<.01	
pH	11.6	11.6	<.01
Al	<1.0	<1.0	11.2
B		11.0	<1.0
Co	<.01	.02	.01
No	<.5	<.5	<.5
Ni	<.05	<.05	<.05
Phenols			(, v.)
TSS	20	0	0
Cond.	6000	5000	2800
COD	116	0	0
NHa		v	U
S			

5-7

Table 5-2 (continued)

COOLING TOWERS

NQCC 3-103 Standards	N.D. COOLING TOWER BLOWDOWN	S.D. Alky Cooling Tomer Blowdown	S.D. TCC COOLING Tower Blowdown	N.D. FCC COOLING TONER BLO¥DOWN
	(#10)	(#1)		(#16)
As	.004	<.001	.011	.001
Ba	<.1	۲.۱	<.1	<.1
Cd	<.01	<.01	<.01	<.01
Cr	.06	1.05	<.05	0.22
CN				
F	1.6	4,4	2.2	1.6
Pb	.05	. 05	<.05	.05
Hg		,		
N 03	.5	.75	.2	.3
Se				
Ag	<.05	<.05	<.05	<.05
ប	<.05	<.05	<.05	<.05
C1	48	53	44	47
Cu	<.03	<.03	<.03	<.03
Fe	.05	.5	<.05	<.05
Mn	<.03	.07	<.03	<.03
S0	1077	1461	1236	1067
TDS*	1906	2732	1694	1973
Zn	.48	28	<.01	.17
рН	7.6	6.9	7.7	8.0
A]	<1.0	<1.0	1.0	<1.0
B				
Co	<.01	.01	.02	.01
ño	<.5	<.5	<.5	<.5
Ni	<.05	<.07	<.05	<.05
Phenols		_		_
TSS	13	0	67	0
Cond.	0	0	108	1800
COD	1850			15
NH4	0			

The catalysts are in the form of powder for the fluidized unit. The catalyst is usually heated and lifted into the reactor area by the incoming oil feed which, in turn, is vaporized upon contact. Vapor from the reactor pass upward through cyclone separators which remove most of the entrained catalyst. These vapors then enter the fractionator, where the desired products are removed and heavier fractions recycled to the reactor.

The major wastewater constituents resulting from catalytic cracking operations are oil, sulfides, phenols, cyanides, and ammonia. These produce an alkaline wastewater with high BOD and COD concentrations. Sulfide and phenol concentrations in the wastewater can be significant.

The wastestreams produced by the FCC unit are #15 and #17. Both #8 wastestreams are contact wastewater and are sent directly to the oil/water separators as shown in Table 5-1. A characterization of the effluent from the catalytic cracking process before and after sour water stripping is displayed in Table 5-2.

5.2.3. Alkylation

Alkylation is the reaction of an isoparaffin (usually isobutane) and an olefin (butylenes) in the presence of hydroflouoric acid as a catalyst at carefully controlled temperatures and pressures to produce a high octane alkylate for use as a gasoline blending component. The reaction products are separated in a catalyst recovery unit, from which the catalyst is recycled.

The wastewater from the alkylation unit is an acidic solution containing some suspended solids, oil, dissolved solids, fluoride and phenols. The waste stream (#6) is discharged to the neutralizing sewer and is treated to raise the pH prior to discharge to the API oil/water separator (see Table 5-1). An analysis of this comingled wastestream is shown in Table 5-2.

5.2.4. Reforming

Reforming converts low octane naphtha, naphthene-rich stocks to highoctane gasoline blending stock, aromatics for petrochemical use, and isobutane. At Navajo the reformers do not produce a waste stream. Feed stocks are usually hydrotreated for the removal of sulfur and nitrogen compounds prior to charging to the reformer (see Section 5.3.6), since the extremely expensive platinum catalysts used in the unit are readily contaminated and ruined by the sulfur and nitrogen compounds. The predominant reaction during reforming is the dehydrogenation of naphthenes. Important secondary reactions are the isomerization, cyclization and cracking of paraffins. All reactions result in high octane products.

5.2.5 Desulfurizers

Desulfurizing is primarily used to remove sulfur compounds, and other impurities from gasoline, kerosene, jet fuels and diesel fuel. The wastewater typically consists of sulfides or phenolic compounds. This waste stream (#14) is routed to oil water separator.

5.3 AUXILIARY PROCESS UNIT DESCRIPTIONS AND WASTEWATER CHARACTERISTICS

5.3.1 Boilers

Steam is consumed throughout the refining process and is generated in boilers at the North and South Divisions. To assure proper operation of the boilers, a certain amount of boiler water must be discharged (blowdown) and treated water added as make-up. Boiler blowdown is used as a water source for the fire protection system (Table 5-1) prior to direct discharge into the conveyance ditch. Analyses of the boiler blowdown wastestreams (#2, #17 and #12) are shown in Table 5-2. A characterization of the fire water pond is also included in Appendix B.

5.3.2 Cooling Towers

Water used for cooling process streams throughout the facility is cooled by cooling towers located in both the North and South Divisions and comprises most of the water usage at the facility. A significant amount of water is lost by evaporation in the cooling towers resulting in an increased concentration of dissolved solids in the cooling water over time. To prevent scaling, corrosion and biological growth in the towers, inhibitors such as chromate are added to the cooling water. Blowdown from cooling towers pass through the oil water separator to permit contact of chromate with the oil in the separator. This precipitates much of the metal due to reduction of the metal. Analyses of cooling tower blowdown (#1, #10 and #15) is displayed in Table 5-2.

5.3.3 Water Purification System

Pure water must be supplied to several of the boiler units as well as some process systems. Backwash from the purification system contains dissolved solids removed from the water supply system. The water purification system is basically a water softener and produces a periodic waste stream enriched in dissolved solids. The waste is never in contact with product and is discharged directly into the conveyance ditch in the South Division and to the Oil Water separator in the North Division.

5.3.4 Desalters

All produced crude contains some formation (connate) water and suspended solids. Because South Eastern New Mexico crude is generally found in marine formations, this water is highly saline. Desalters remove the saline fluid and suspended solids from the crude by passing crude (with some added water) through an electrostatic field which acts to agglomerate the dispersed brine droplets.

Wastewater can contain high dissolved solids, phenols and (depending upon crude type) ammonia and sulfides. This contact waste water is discharged to the oil-water separator. This waste stream is a significant contributer to the total effluent volume. A characterization of desalter effluent (streams #3 and #9) is shown in Table 5-2.

5.3.5 Washdown and Stormwater

A certain amount of wash water is intermittently utilized for general clean-up of the facility. This activity occurs within the concrete lined process areas. In areas where the clean up may result in oil-contaminated water, the areas drain to the oil water separator sewer. At the heat-exchanger bundle cleaning area the concrete pad drains directly into a sump which is constructed similar to an oil water separator thence into the conveyance ditch and thence to the evaporation ponds.

5.3.6 Storage Tanks

Storage of crude and product typically permits some separation of any water or suspended solids entrained in the fluid. These wastes, removed from the tank bottoms, contain emulsified oil, phenols, iron, sulfide and other consituents which depend upon the nature of the material stored in a particular tank. This liquid is removed to the oil water separators by vacuum trucks. The volume of effluent from this unnumbered source is also small.

5.3.7 Produced Water from Oil Recovery System

The oil recovery system pumps water from below the oil-water interface in order to create a gradient toward the skimmer pump in the trench. This water is discharged directly into the conveyance ditch.

6.0 PRESENT WASTE MANAGEMENT SYSTEM

The Navajo Artesia Refinery generates, treats and disposes of liquid and solid wastes. RCRA solid wastes, which include oil-water separator sludges, heat exchanger bundle cleaning sludges, slop oil emulsion solids and, when produced, leaded tank bottoms are disposed of at the RCRA landfarms on the refinery site pursuant to U.S. EPA regulatory provisions. These waste treatment facilities are fully addressed in EPA permitting documents and are not discussed further in this discharge plan. The wastewater management system presently employed by Navajo is composed of four units: the evaporation ponds, the conveyance ditch, and the two oil-water separators. A general description of each unit is provided below.

6.1 OIL/WATER SEPARATORS

All wastewater delivered to the oil-water separators flow by gravity from the discharge points through subsurface pipelines. At the separators the flow velocity is reduced and the density difference between the water and entrained oil permits separation of the two phases. The oil is then skimmed from the water and pumped back to the processing units. Chromate and other metals which are discharged into the separator are removed from solution by the reducing effect of the hydrocarbons. The effluent is discharged to the conveyance ditch. The sludges are removed to the RCRA landfarm.

Periodically, blow sand and suspended solids in the effluent will enter the separator and oil droplets may adhere to the solid. This phenomenon results in a sand/oil particle which may have the same density as water. These oily particles can flow through the unit and into the conveyance ditch. Upsets in the plant can also result in a short-term oily discharge from the separators. Much of the oil and grease discharged into the ditch will settle into the soft, bottom sediments. Over time this oil, grease and sediment has formed a very fine-grained asphaltic "liner" for the ditch.

6.2 Conveyance Ditch

The conveyance ditch originates at the oil-water separators and terminates at the evaporation ponds in Section 1,6 and 12 (T. 17 S., R. 26 E.) approximately three miles east of the refinery. As Figure 2-1 shows, the ditch is sub-parallel to Eagle Creek until it nears the Pecos River, where the ditch then turns south toward the evaporation ponds. The ditch is generally about 3-4 feet wide and less than 1 foot deep. Throughout its course, it is bermed to prevent any influx of stormwater or excess irrigation water.

In the refinery area several wastestreams discharge directly into the ditch. These streams (eg. boiler blowdown) are not contact wastewater and, therefore, need not be routed to the oil/ water separators.

6.3 Evaporation Ponds

Originally, three ponds were built to evaporate the wastewater generated at the refinery. At the present time, the berm between the lower ponds (2 and 3) has been removed resulting in a two-pond system. The ponds cover an area of approximately 85 acres and are generally less than 3 feet deep. The ponds are bermed to prevent any storm water runoff from entering the impoundment.

All of the wastewater discharged by the refinery is disposed of in these ponds. The effluent in these ponds is a very good representation of the overall quality of the discharges from the facility. Upsets in the refinery and minor modifications of the operation could result in a variable quality of discharge. The ponds, however, have a long enough retention time to adequately homogenize the effluent. Analyses of the fluid in the ponds is shown in Appendix B.

7.0 FUTURE WASTEWATER MANAGEMENT

Recent NMEID chemical analyses of sludges from the wastewater conveyance ditch and Evaporation Pond #1 show concentrations of heavy metals which would classify this material as a hazardous waste. Evaporation Pond #1 is now considered a hazardous waste surface impoundment by the NMEID.

Managing the evaporation lagoons as hazardous waste surface impoundments is not economically realistic and Navajo intends to close Pond #1 pursuant to RCRA. After 1988 neither the conveyance ditch nor the evaporation ponds will be employed to manage wastewater discharged directly from the oil/water separators. If the conveyance or other evaporation ponds are utilized, the wastewater managed by these units will be biologically treated and be of significantly better quality than is presently being discharged. Biological treatment of wastewater is also consistent with proposed RCRA regulations (Appendix C).

7.1 WASTEWATER MANAGEMENT OPTIONS FOR WASTEWATERS DISCHARGED TO THE OIL WATER SEPARATORS

All waste streams which are presently discharged to the oil/water separators will be subject to biological treatment prior to discharge to the land surface (eg. evaporation ponds, land application of treated effluent, NPDES discharge to Pecos River). Two options for treatment are presented below. One of these options will be implemented prior to 1988.

7.1.1 OPTION 1: Discharge of Treated Effluent To Artesia POTW In addition to primary oil seperation provided by the existing oil water separators, an air floatation unit will be employed for additional treatment prior to discharge to the City of Artesia Publicly Owned Treatment Works. The pre-treated effluent will be further treated at the POTW to meet the City of Artesia's NPDES permit restrictions and their NMEID ground water discharge plan requirements.

Pipelines will be used to transfer effluent between generation points and treatment process units in the refinery area as well as between the

7-1

refinery and the POTW. No ground water monitoring is necessary nor proposed.

7.1.2 OPTION 2: Biological Treatment and Discharge to Pecos River In the unlikely event that discharge to Artesia's POTW is not possible, Navajo will design and construct a new wastewater management system which include a biological treatment unit for refinery wastes.

Prior to discharge to the biologic treatment unit the refinery waste will receive primary oil/water separation followed by secondary floatation treatment. Options for biological treatment include:

- o aerated lagoons
- o trickling filters
- o oxidation ditch
- o activated sludge
- o rotating biological contactors

Biologic treatment of waste will substantially alter the character of the final refinery effluent.

7.2 BOILER BLOWDOWN WASTEWATER MANAGEMENT

The existing fire water pond presently receives all boiler blowdown from the south division. The naturally-lined pond is located upgradient from the oil recovery trench RW-4. The area downgradient from the Fire Water Pond contains oil-contaminated soil and ground water under Artesian conditions.

If any leakage from the naturally-lined Fire Water ponds does occur:

- o It would generally improve the quality of the soil water
- o It could not affect the Artesian ground water in this area
 - All leakage will be captured by RW-4 recovery well/trench.

Future discharges from the Fire Water Pond will be co-mingled with the biologically-treated effluent and discharged with the treated effluent or discharged directly to the Artesia POTW.

7.3 WATER SOFTENER WASTEWATER MANAGEMENT

0

Discharges from the water softener will be co-mingled with the

biologically-treated effluent discharged to Navajo's wastewater management system or discharged directly to the Artesia POTW.

8.0 MONITORING AND REPORTING

Ground water analyses show that utilization of the evaporation lagoons and conveyance ditch has not resulted in significant degradation of ground water (Appendix C and Section 4.7). Continued use of the impoundments and ditch prior to biological wastewater treatment in 1988, will not affect ground water which is presently being used. Therefore, no ground water monitoring is planned. However, additional monitoring may occur as a result of closure activities for Evaporation Pond #1.

9.0 BASIS FOR DISCHARGE PLAN APPROVAL

- o Ground water sampling and analyses performed to date show that ground water quality in the area of the conveyance ditch and evaporation ponds has not been significantly affected by over 20 years of discharges.
- o Discharges into the present wastewater management system for the next three years will not result in concentrations in excess of the Standards of Section 3-103 or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably fuseable future use.
- o By 1988 Navajo Refining Company will utilize biological treatment of effluent presently discharged from the oil water separators. This will significantly improve the quality of wastewater.
- o In the next few months Navajo, NMOCD, AND NMEID will be working together to develop a schedule for implementation of biological treatment of wastewater.

2DISCHS7.RPT

10.0 REFERENCES CITED

- Kelley, V.C., 1971 Geology of the Pecos Country, Southeastern New Mexico: New Mexico Bureau of Mines and Mineral Resources, Memoir 24, Socorro, New Mexico, 77p. 7 maps.
- 2. New Mexico Environmental Improvement Division, 1980, Chemical Quality of New Mexico Community Water Supplies, 256 p.
- Patterson, J.L., 1965, Magnitude and Frequency of Floods in the United States, part 8: United States Geological Survey Water Supply Paper 1682, Washington, D.C., 506 p., 1 map.
- 4. United States Soil Conversation Service, 1971, Soil Survey of Eddy Area, New Mexico: United States Department of Agriculture, Washington, D.C. 82 p., 152 maps.
- 5. Welder, E.G., 1983, Geohydrologic Framework of the Roswell Ground-Water Basin, Chaves and Eddy Countries, New Mexico: New Mexico State Engineer's Technical Report 42, Santa Fe, New Mexico, 28 p, 28 maps.

APPENDICES FOR NAVAJO REFINING COMPANY ARTESIA, NEW MEXICO

July 31, 1985

Prepared for:

Dave Griffin Navajo Refining Company P.O. Drawer 159 Artesia, New Mexico 88210

Prepared by:

Geoscience Consultants, Ltd. 500 Copper Avenue, NW Suite 325 Albuquerque, New Mexico 87102

APPENDIX A WELL LOGS

.....

1

.

PREVIOUSLY SUBMITTED

APPENDIX B WATER QUALITY ANALYSES

ſ

WATER QUALITY OF MONITOR WELLS NEAR EVAPORATION PONDS

.....

þ

Δ	$\nabla \nabla \Lambda$		
77	DD		
	ANALYTICAL LABO	RATORIES, INC.	

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

DATE: 8 November 1984 1080, 1040

ANALYTE	SAMPLE I	D/ANALYTICAL RESU	JLTS
	11184 1330 Well 28	103184 1432 Well 45	103184 1240 Well 46
Benzene Toluene Ethylbenzene	<0.005 mg/l <0.005 mg/l <0.005 mg/l	<0.005 mg/1 <0.005 mg/1	<0.005 mg/1 <0.005 mg/1
Xylenes	<0.005 mg/l	<0.005 mg/1 <0.005 mg/1	<0.005 mg/1 <0.005 mg/1
	103184 1520 Well 47	103184 1550 Fire Pond	
enzene Toluene Echylbenzene Xylenes	<0.005 mg/l <0.005 mg/l <0.005 mg/l <0.005 mg/l	<0.005 mg/l <0.005 mg/l <0.005 mg/l <0.005 mg/l	
-	Well 3	Well 5	Well 12
NO 3 as N NH 4 CN Benzene Toluene Xylenes Echylbenzene	<0.01 mg/l 1.16 mg/l <0.01 mg/l <0.005 mg/l <0.005 mg/l <0.005 mg/l <0.005 mg/l	<0.01 mg/1 2.5 mg/1 <0.01 mg/1 <0.005 mg/1 <0.005 mg/1 <0.005 mg/1 <0.005 mg/1	<0.01 mg/1 0.25 mg/1 <0.01 mg/1 <0.005 mg/1 <0.005 mg/1 <0.005 mg/1 <0.005 mg/1
	Well 13	Pond 1	Pond 3
NO 3 as N NH 4 CN Benzene Toluene Xylenes Echylbenzene	<0.01 mg/1 5.6 mg/1 0.09 mg/1 0.254 mg/1 0.345 mg/1 0.389 mg/1 <0.100 mg/1	<0.01 mg/1 10.6 mg/1 0.4 mg/1 0.711 mg/1 0.588 mg/1 0.591 mg/1 0.240 mg/1	<0.01 mg/l 13.87 mg/l 0.2 mg/l 0.027 mg/l <0.005 mg/l <0.005 mg/l <0.005 mg/l

AMPLES RECEIVED 4/24/81 c	USTOMER ORDER NUMBER P.O. #20030	•
PE OF ANALYSIS Water		
Sample <u>Identification</u> Navajo Well #1	Type of <u>Analysis</u> Acidity Alkalinity, "P" (As CaCO ₃) < 1	<u>iter</u> 11/21/80
C) ED b	Barium0.1Biochemical Oxygen Demand44Cadmium0.05Chemical Oxygen Demand145	5800
	Chromium Chromium 6+ Copper Fluoride	2
169	Hardness (as CaCO ₃) 5760 Iron 0.05 Lead 0.006 Magnesium 850	5 -
	Nicke10.02pH Units7.8Phenols0.015Alkalinity , "M"700Solids, Total Dissolved19700Sulfate4920	_
	Sulfate Sulfide Zinc 4920 0.21 < 0.1	
Sample Analysis by: B.P. Date and Time of Analysis pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD pH: electrode	: BOD ₅ - 4/24/81 @ 1600 hrs.	
-		

Navajo Well # 3 Acidity 32 Alkalinity, "P" (as CaCO ₃) < 1.0 Barium < 0.1 Bochemical 0xygen Demand 0 Cadmium 0.009 Chiloride 2652 Chromium < 0.001 Chromium 6+ < 0.01 Copper < 0.001 Fluoride 1.6 9 Hardness (as CaCO ₃) 2760 Iron 250 2760 Iron 250 0.001 Maynesium 250 0.001 Magnesium 250 0.001 Mikalinity, "M" 356 501ds, Total Dissolved Solids, Total Dissolved 7730 7640 Sulfide 0.10 2720 Sulfide 0.10 0.10 Zinc < 0.10 1.6 Sample Analysis by: BP B Date and Time of Analysis: BOD5 - 5 day incubation 91 PH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD5 - 5 day incubation PH:electrode X X	ADDRESS Navajo Refining Color ADDRESS Drawer 159 CITY Artesia, NM 88210 TTENTION Ed Kinney OICE NO. 104223	y (REPORT (
TYPE OF ANALYSIS Water Sample Type of Identification Analysis Navajo Well # 3 Acidity Alkalinity, "P" (as CaCO ₃) < 1.0 Barium 20.1 Biochemical Oxygen Demand 0.0 Chioride 2652 Chromium < 0.001 Chromium 64 < 0.01 Copper < 0.001 Fluoride 1.6 Godd 250 Nickel < 0.01 PHenols 7.4 Phenols 7.4 Phenols 7.4 Phenols 7.4 Phenols 7.20 Sulfide 2700 Sulfide 0.10 Zinc < 0.11	AMPLES RECEIVED 4/24/81	CUSTOMER ORDER NUMBER P.0. # 2003	0		
IdentificationAnalysismg/literu/u / koNavajo Well # 3Acidity32Alkalinity, "P" (as CaCO3)1.0BariumGoodBiochemical Oxygen Demand0.009Chioride2652Chromium40Copper0.001Chormium40Copper0.001Fluoride1.6Fluoride250Nickel7.6PH Units7.4PH Units7.4Phenols30.001Alkalinity, "M"356Sulfate2720Sulfate0.10Zinc0.11Sample Analysis by: BP21Date and Time of Analysis: BOD5: 4/24/81 0 1600 hrs.PH: 4/30/81 0 1400 hrs.Method of Analysis; BOD5 - 5 day incubationPH:electrode		· · ·		· · ·	
Alkalinity, "P" (as CaCO ₃) < 1.0 Barium Sicchemical Oxygen Demand 40 Cadmium 0.009 Chemical Oxygen Demand 73 Chloride 2652 2200 Chromium 64 0.001 Copper <0.001 Fluoride 1.6 5.0 Hardness (as CaCO ₃) 2760 Iron 2760 Iron 250 Nickel 0.001 Magnesium 250 Nickel 0.001 Alkalinity, "M" 356 Solids, Total Dissolved 7730 7640 Sulfate 2720 Sulfate 2720 Sulfide 0.10 Zinc 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH:electrode			mg/liter	11/21/80	14]_
Cadmium 0.009 Chemical Oxygen Demand 73 Chloride 2652 2200 Chromium < 0.001	Navajo Well # 3	Alkalinity, "P" (as CaCO ₃) Barium	< 1.0 < 0.1		
Copper < 0.001 Filuoride 1.6 90 Hardness (as CaCO ₃) 2760 Iron 0.01 Lead < 0.001 Magnesium 250 Nickel < 0.01 pH Units 7.4 Phenols < 0.001 Alkalinity, "M" 356 Solids, Total Dissolved 7730 7640 Sulfate 2720 Sulfide 20.10 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH:electrode		Cadmium Chemical Oxygen Demand Chloride Chromium	0.009 73 2652 < 0.001	2200	//
Ničkel < 0.01 pH Units 7.4 Phenols < 0.001 Alkalinity, "M" 356 Solids, Total Dissolved 7730 7640 Sulfate 2720 Sulfide 0.10 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH:electrode	,98	Copper Fluoride Hardness (as CaCO ₃) Iron	<pre>< 0.001 1.6 2760 0.01</pre>	ن ، ت و	3.
Solids, Total Dissolved 7730 7640 Sulfate 2720 Sulfate 0.10 Zinc 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH:electrode		Magnesium Nickel pH Units Phenols	250 < 0.01 7.4 < 0.001		
Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH:electrode		Solids, Total Dissolved Sulfate Sulfide	7730 2720	7640	67
Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH:electrode	Sample Analysis by: B	,P		• •	
pH:electrode	Date and Time of Analy	5			\$
		D ₅ - 5 day incubation	نې ۲.	je se	
APPROVED BY	•	۰ ۲	- - :		
APPROVED BY					
		APPROVED BY			

CUSIOMER Navajo Refining Con ADDRESS Drawer 159 CITY Artesia, NM 88210 ATTENTION Ed Kinney OCCE NO. 104223	۱ y	REPORT OF AMALYSIS
SAMPLES RECEIVED 4/24/81	CUSTOMER ORDER NUMBER P.0. # 20030	
TYPE OF ANALYSIS Water		
Sample <u>Identification</u> Navajo Well # 5	Acidity	<u>mg/liter</u> 11/21/80 19/8/9
	Alkalinity, "P" (as CaCO ₃) < Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand	1.0 0.1 24 0.05 176
163	Chromium Chromium 6+ < Copper Fluoride Hardness (as CaCO ₃)	7089 8600 916. 0.002 0.01 0.001 0.44 0.96 p.4 4660 0.04
	Lead Magnesium Nickel < pH Units Phenols < Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfate	0.007 650 0.01 7.7 0.001 506 16,800 21.100 736 4290 0.13 0.1
Sample Analysis by: B Date and Time of Analy	P sis: BOD ₅ : 4/24/81 @ 1600 hrs.	
pH: 4/30/81 @ 1400 hr Method of Analysis: BO pH:electrode	S.	
	۲ ۰	-
	APPROVED BY Elmer D. Martinez, Director 4/30/81 PAGE 7 OF	of Quality Assurance
Controls for Environmental Pc P.O. Box 5351 • 1925 Rosina • Santa Fe, New	ollution, Inc.	- PAGE

CITY Art	ajo Refining Co wer 159 esia, NM 88210 Kinney 223	ny		
SAMPLES RECEIVED	4/24/81	CUSTOMER ORDER NUMBER P.0. # 200	30	
TYPE OF ANALYSIS	Water			
Sam Ide	ple ntification	Type of Analysis	mg/lite	<u>r</u> 11/21/80 101
Na v	ajo Well # 7 ,6~	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron	36 < 1.0 < 0.1 38 0.04 136 3570 0.002 < 0.01 0.004 0.3 3160 0.05	3400 80 0.92 0.
		Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	0.05 0.001 370 < 0.01 8.0 < 0.001 596 14,200 5600 0.05 < 0.1	21,500 28,
Samj	ole Analysis by:	BP		
pH: Metl	4/30/81 @ 1400	lysis: BOD ₅ : 4/24/81 @ 1600 hrs. hrs. BOD ₅ - 5 day incubation		
		٦ -		
		APPROVED BY Elmer D. Martinez, Dire 4/30/81 PAGE 8	ctor of Qual	

CUSTOMER Navajo Refining Corny ADDRESS Drawer 159 CITY Artesia, NM 88210 ATTENTION Ed Kinney VOICE NO. 104223			REPORT	
		······		
SAMPLES RECEIVED 4/24/81 CUST	CMER ORDER NUMBER P.0. # 2003	30		
TYPE OF ANALYSIS Water			•	
	· ·	<u>, , , , , , , , , , , , , , , , , , , </u>		
Sample Identification	Type of <u>Analysis</u>	mg/liter	11/21/80	
Navajo Well # 9	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron	36 < 1.0 < 0.1 36 0.01 88 2703 0.002 < 0.01 0.006 0.7 3120 0.01	2 200	
	Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	$\begin{array}{r} 0.001 \\ 370 \\ < 0.01 \\ 7.7 \\ < 0.001 \\ 322 \\ 10,400 \\ 4160 \\ 0.03 \\ < 0.1 \end{array}$	9820	
Sample Analysis by: BP				
Date and Time of Analysis: pH: 4/30/81 @ 1400 hrs.	BOD ₅ : 4/24/81 @ 1600 hrs.	~		
Method of Analysis: BOD ₅ - pH:electrode	5 day incubation		:	
	5			
	-			
	APPROVED BY Elmer D. Martinez, Dire 4/30/81 PAGE 9	ctor of Qual OF 13 PAGE		ance
ontrols for Environmental Pollutic	on, inc.	- 13 i Adi		

ADDRESS Drawer 159 CITY Artesia, NM 88210 ATTENTION Ed Kinney VOICE NO. 104223			ANALYSIS
SAMPLES RECEIVED 4/24/81 CUSTO	MER ORDER NUMBER P.O. # 20030	· · · · · · · · · · · · · · · · · · ·	•
TYPE OF ANALYSIS Water			
Sample <u>Identification</u> Navaio Well # 12	Type of Analysis	mg/liter	11/21/80 10/21
Navajo Well # 12 ,70	Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide	55 1.0 0.1 38 0.07 256 8058 0.002 0.01 0.002 0.9 8920 0.04 0.007 1330 0.02 7.6 *<0.001 545 28,900 11,500 0.05 < 0.1	6700 730 2.5 1:44 29.000 298
* Data will follow on 5/6/81 Sample Analysis by: BP			-
Date and Time of Analysis: B	00 ₅ : 4/24/81 @ 1600 hrs.	~	
<pre>pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD₅ - 5 pH:electrode</pre>	day incubation		
	· .		
	APPROVED BY Elmer D. Martinez, Direct 4/30/81 PAGE 10	or of Quali OF 13 PAG	ty Assurance

CUSTOMER Navajo Refining Cor ny ADDRESS Drawer 159 CITY Artesia, NM 88210 ATTENTION Ed Kinney VOICE NO 104223	/ . ·		REPORT G	
SAMPLES RECEIVED 4/24/81 CUST	CMER ORDER NUMBER P.0. # 2003	30		
TYPE OF ANALYSIS Water				
			<u> </u>	
Sample Identification	Type of Analysis	mg/liter	- 11/21/80 10	;/\$/7;
Navajo Well # 13	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium	11 < 1.0 0.1 22 0.002		
	Chemical Oxygen Demand Chloride Chromium Chromium 6+	48 357 0.002 < 0.01	390 1	123
10	Copper Fluoride Hardness (as CaCO ₃) Iron	0.001 1.2 1570 0.02	3.5	1.47
,20	Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved	0.003 79 < 0.01 7.4 < 0.001 146 3200	3060 2	53
	Sulfate Sulfide Zinc	1810 0.04 < 0.1		
Sample Analysis by: BP			-	
	BOD ₅ : 4/24/81 @ 1600 hrs.			
Method of Analysis: BOD ₅ -	5 day incubation		<u>.</u> .	
pH:electrode				
	-			
		ector of Qual 1 OF 13 PAG	ity Assurance	
Controls for Environmental Polluti P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexic Telephone 505/982-9841	1	and a second s		

			AMALYSI
AMPLES RECEIVED 4/24/81	ISTOMER ORDER NUMBER P.0. # 20030		
YPE OF ANALYSIS Water			
Sample <u>Identification</u> Navajo Well # 16	Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium	<pre>mg/lites 13 1.0 0.1 44 0.002 152 1173 0.001 0.01 0.01 0.01 0.02 140 0.01 7.7 0.016 425</pre>	<u>r</u>
	Solids, Total Dissolved Sulfate Sulfide Zinc	4,770 1,890 0.10 0.1	- - <i>i .</i>
Sample Analysis by: BP			
	: BOD ₅ : 4/24/81 @ 1600 hrs.	<u> </u>	
pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ pH:electrode	- 5 day incubation		
	5		
ontrols for Environmental Pollu	APPROVED BY Elmer D. Martinez, Direct 4/30/81 PAGE 12 tion.Inc.	or of Qual OF 13 PAG	ity Assurance

- 46

1

	AMALYS
4/24/81 CUSTOMER ORDER NUMBER P.0. # 20030	
Water	v
le Type of tification Analysis mg/liter	
jo Well # 17 Acidity $ P ' $ (as $CaCO_3$) < 1.0 Barium 0.1 Biochemical Oxygen Demand 42 Cadmium 0.03 Chemical Oxygen Demand 88 Chloride 4692 Chromium 6+ < 0.01 Copper < 0.001 Fluoride 0.3 Hardness (as $CaCO_3$) 4470 Iron 0.03 Lead 0.005 Magnesium 470 Nickel 0.01 Phenols 7.6 Phenols < 0.001 Alkalinity, "M" 198 Solids, Total Dissolved 11,200 Sulfate 2,930 Sulfide 0.03 Zinc 0.1	
e Analysis by: BP and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs.	
4/30/81 @ 1400 hrs. d of Analysis: BOD ₅ - 5 day incubation ectrode	
APPROVED BY	

ţ

かない ちょう

Sec. Sec. Sec.

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

. T

i

i

CITY ATTENTION OICE NO	Artesia, NM 8821 Ed Kinney 104223	,	MAY 6 1961		
			AVAJO REFINING CO.		
SAMPLES RE			MER ORDER NUMBER P.O. # 200	30	
TYPE OF AN	ALYSIS MALEI				
	Sample Identification		Type of Analysis	mg/liter	10/1
	Well Water	058	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols	13 < 1 < 0.1 38 0.002 88 1632 0.002 < 0.01 0.004 0.25 2400 0.06 0.005 310 < 0.01 7.8 0.022 205	,,,. Q.
			Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	205 6860 2830 0.03 0.2	G
	Sample Analysis by Date and Time of / pH: 4/30/81 @ 140	Analysis:	BOD ₅ : 4/24/81 @ 1600 hrs.	~	
· · ·	Method of Analysis pH:electrode		5 day incubation		
			-		
			APPROVED BY		

ADDRESS CITY ATTENTION NVOICE NO.	Drawer 159 Artesia, NM 88210 Ed Kinney 10422 3			REPORT O ANALYSIS
SAMPLES RE	ECEIVED 4/24/81	CUSTOMER ORDER	NUMBER P.O. #20030	· · · · · · · · · · · · · · · · · · ·
TYPE OF AN	IALYSIS Water			
	Sample Identification	Type of Analysis	mg/liter	
	Navajo Well #12	Pheno1s	< 0.001	
			~	24
				fill
		4/3	0/81 APRENIEP By Marth	nez, Director of Quality Assuran

WATER QUALITY OF MONITOR WELLS IN REFINERY AREA

 V22		
IDDIT.		
ANALYTICAL LAB	ORATORIES, INC.	

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

ANALYTE

DATE: 8 November 1984 1080, 1040

SAMPLE ID/ANALYTICAL RESULTS

	11184 1330 Well 28	103184 1432 Well 45	103184 1240 Well 46
Benzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Ethylbenzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
	103184	103184	
	1520	1550	
	Well 47	Fire Pond	
enzene	<0.005 mg/1	<0.005 mg/1	
Toluene	<0.005 mg/1	<0.005 mg/1	
Ethylbenzene	<0.005 mg/1	<0.005 mg/1	
Xylenes	<0.005 mg/1	<0.005 mg/1	
	Well 3	Well 5	Well 12
NO 3 as N	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
NH 4	1.16 mg/1	2.5 mg/1	0.25 mg/1
CN	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
Benzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/l	<0.005 mg/1
Echylbenzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
	Well 13	Pond 1	Pond 3
NO 3 as N	<0.01 mg/l	<0.01 mg/1	<0.01 mg/1
NH 4	5.6 mg/1	10.6 mg/1	13.87 mg/1
CN	0.09 mg/l	0.4 mg/1	0.2 mg/1
Benzene	0.254 mg/1	0.711 mg/1	0.027 mg/1
Toluene Xylenes	0.345 mg/l	0.588 mg/1	<0.005 mg/l
•	0.389 mg/1 <0.100 mg/1	0.591 mg/1	<0.005 mg/l
Ethylbenzene		0.240 mg/l	<0.005 mg/l

ANALYTICAL LABORATORIES, INC.						
TO: Geo Sĉienĉe			'n	ATE:	3 Deĉember	- 198
Attn: Randy Hicks				111	5 50000001	170
500 Copper N.W.						
Albuquerque, NM 87	105					
ANALYTE	SAMPLE	IDENT	IFICATION	/ANAL	YTICAL RESU	LTS
	Fire		Well	47	Well	28
	10/31	/83	10/3	1/84	11/1	
	1550		1520		1330	
Phenols	20.0	ug/l	33.0	ug/l	20.0	ug/
C1	134.0		122.0	mg/l	101.0	
\$0	1800.0		1400.0	mg/1	2150.0	
TD S T S S	3664.0		2728.0		5192.0	mg/
NO		mg/1	13588.0	-	720.0	
NH		mg/1		mg/1	1.63	
Cr		mg/1		mg/1		mg/
CN	<0.01 <0.01		<0.01		<0.01	
	10.01	шд/т	<0.01	mg/1	<0.01	mg/
	Well 4		Well			
	10/31/	84	10/3	1/84	NOMINAL DE	TECT
	1432	•	1240		LIMIT	
Phenols	16.0	ug/l	13.0	ug/l	0.01	110/
C1	495.0 1	mg/l	446.0			mg/i
50	1650.0		2100.0			mg/i
TDS	3836.0 1	-	3988.0			mg/1
TSS	2004.0 1		4084.0	mg/l		mg/]
NO	0.10 п	•	0.80			mg/]
NH C-	11.6 1			mg/l		mg/]
Cr CN	<0.01 r <0.01 r		<0.01	mg/1 mg/1	0.01	

Examination of Water and Wastewater", 15th Edition, APHA, N.Y., 1980.

An invoiĉe for serviĉes is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely, Jennifer V. Smith, Ph.D. Laboratory Director

TEL Weathering Area

Geraghty 8	& Miller	Jpgradient Well		Downgradient Wells	
	-	35	36	37	38
рН		7.28	7.27	7.57	7.37
Spec Cond		3942	9462	9462	7899
тос	(*)				
TOX Ug/1		318	125	223	170
Chloride	(*)				
Iron		4.6	0.89	0.14	0.73
Manganese		1.34	1.34	1.26	0.789
Phenols		0.001	0.001	0.001	0.001
Sodium	(*)				
Sulfate	(*)				
Arsenic		0.07	0.03	0.02	0.02
Barium		0.1	0.1	0.1	0.1
Cadmium		0.001	0.001	0.001	0.001
Chromium		0.003	0.002	0.001	0.001
Fluoride		1.45	1.34	2.05	1.60
Lead		0.001	0.001	0.001	0.001
Mercury		0.0004	0.0004	0.0004	0.0004
Nitrate		0.1	0.1	0.1	0.1
Selenium		0.01	0.01	0.01	0.01
Silver		0.01	0.01	0.01	0.01
Pest & Hert	b	-	-	-	-
Radio	(**)	-	-	-	-
Coliform		1	1	2700	1

* Results pending, re-analysis by laboratory. ** Radioactivity activity results were omitted due to high TDS.

Chemical data from TEL Weathering area monitoring wells taken 12-1-82. Table 5.

Colony Landfarm

Geraghty &	Mill	er, Inc. Upgradient		Downgradient	
		Well 31	32	Wells 33	34
рН		7.31	7.41	7.41	7.30
Spec Cond.		-25544.5-	2693	3590	2563
TOC mg/1	(*)	2489			
TOX ug/1		41.5	102.3	64.5	26
Chloride	(*)				
Iron		0.06	0.01	0.01	1.81
Manganese		1.08	0.311	0.521	0.567
Phenols		0.001	0.001	0.001	0.001
Sodiu		100	35.4	44.4	88.5
Sulfate	(*)				
Arsenic		0.01	0.01	0.01	0.01
Barium		0.1	0.1	0.1	0.1
Cadmium		0.001	0.001	0.001	0.001
Chromium		0.001	0.001	0.001	0.004
Fluoride		1.15	1.28	2.70	1.28
Lead		0.002	0.001	0.001	0.005
Mercury		0.0004	0.0004	0.0004	0.0004
Nitrate		0.1	0.1	0.1	0.1
Selenium		0.01	0.01	0.01	0.01
Silver		0.01	0.01	0.01	0.01
Pest & Herb)	ND	ND	ND	ND
Radio	(**)	-	· _	-	-
Coliform	(*)				

* Results pending, re-analysis by laboratory. ** Radioactivity results were omitted due to high TDS.

Table 4. Chemical data from the Colony Landfarm monitoring wells taken 12-2-82.

QUALITY OF WATER IN EVAPORATION PONDS

L ASSAI	
ANALYTICAL LABOR	ATORIES, INC.

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

ANALYTE

DATE: 8 November 1984 1080, 1040

SAMPLE ID/ANALYTICAL RESULTS

	11184 1330 Well 28	103184 1432 Well 45	103184 1240 Well 46
Benzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/l
Ethylbenzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
	103184	103184	
	1520	1550	
_	Well 47	Fire Pond	
enzene	<0.005 mg/l	<0.005 mg/l	
foluene	<0.005 mg/l	<0.005 mg/1	ę
Ethylbenzene	<0.005 mg/l	<0.005 mg/1	
Xylenes	<0.005 mg/1	<0.005 mg/l	
-	Well 3	Well 5	Well 12
NO 3 as N	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
- NH 4	1.16 mg/1	2.5 mg/1	0.25 mg/1
CN	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
Benzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Ethylbenzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
-	Well 13	Pond 1	Pond 3
NO 3 as N	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
	5.6 mg/1	10.6 mg/l	13.87 mg/1
CN ^T	0.09 mg/1	0.4 mg/l	0.2 mg/l
Benzene	0.254 mg/1	0.711 mg/1	0.027 mg/l
Toluene	0.345 mg/l	0.588 mg/l	<0.005 mg/1
Xylenes	0.389 mg/1	0.591 mg/1	<0.005 mg/1
Ethylbenzene	<0.100 mg/1	0.240 mg/1	<0.005 mg/1

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

- ---- -----

DATE: 8 November 1984 1080, 1040 Page 2 of 2 í.

ANALYTE

.

SAMPLE ID/ANALYTICAL RESULTS

l	Pond ∦į floating film	NOMINAL DETECTION LIMIT
NO as N NH 3 CN Benzene Toluene Xylenes Ethylbenzene	0.617 mg/1 0.467 mg/1 0.463 mg/1 0.201 mg/1	0.01 mg/1 0.1 mg/1 0.01 mg/1 0.005 mg/1 0.005 mg/1 0.005 mg/1 0.005 mg/1

EFERENCE: "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, N.Y., 1980.

An invoice for services is enclosed. Thank you for contacting Assaigai

Sincerely,

Vin

Jennifer V. Smith, Ph.D. Laboratory Director

SAMPLES RECEIVED 4/24/81 CUSTOMER ORDER NUMBER P.O. # 20030 TYPE OF AMALYSIS Water Sample Type of Identification Acidity Navajo East Pond Acidity Acidity 10 Alkalinity, "P" (as CaCO ₃) 1 Barium 0.1 Barium 0.002 Chemical Oxygen Demand 0.002 Chemical Oxygen Demand 0.002 Choromium 0.1 Chromium 6+ 0.01 Copper 0.002 Fluoride 5.8 Hardness (as CaCO ₃) 1160 Iron 0.1 Lead <0.01 Magnesium 110 Nickel <0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfide 0.36 Zinc 0.1 Sample Analysis by: BP E Date and Time of Analysis: BOD ₅ : 4/24/81 0 1600 hrs. pH: 4/30/81 0 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation pH: electrode
Sample IdentificationType of Analysismg/literNavajo East PondAcidity Alkalinity, "P" (as CaCO3) Barium1 < 0.1 < 0.1 Biochemical Oxygen Demand Chloride0.002 < 25 Chromium $Navajo East PondAcidityBarium0.002< 0.002Chemical Oxygen Demand72< 0.002Chemical Oxygen DemandNavajo East Pond0.002< 0.002Chemical Oxygen Demand0.002< 0.002ChomiumNavajo East Pond0.1< 0.002Chemical Oxygen Demand0.1< 0.002ChomiumNavajo East Pond0.1< 0.002Chomium0.1< 0.002< 0.002FluorideNavajo East Pond0.1< 0.01Copper< 0.002Fluoride0.01< 0.002< 0.001< 0.011< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.011< 0.001< 0.001< 0.011< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.01< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.001< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01< 0.01$
Sample IdentificationType of Analysismg/literNavajo East PondAcidity Alkalinity, "P" (as CaCO3) Barium < 1 < 0.1 < 0.1 Biochemical Oxygen Demand Cadmium < 0.002 Chemical Oxygen Demand Choride < 0.1 < 0.002 Chemical Oxygen Demand < 0.1 Chromium < 0.1 Chromium 64 < 0.01 Copper Fluoride 0.1 < 0.002 FluorideMathematical Oxygen Demand Chromium 64 Lead Magnesium Nickel < 0.001 Hardness (as CaCO3) < 1160 Iron < 0.1 < 0.001 < 0.102 Fluoride 0.1 < 0.002 < 0.002 < 0.002 < 0.002 < 0.002 < 0.002 < 0.002 < 0.002 < 0.002 < 0.001 $< $
IdentificationAnalysismg/literNavajo East PondAcidity10Alkalinity, "P" (as $CaCO_3$)< 1
Alkalinity, "P" (as $CaCO_3$) < 1 Barium < 0.1 Biochemical Oxygen Demand 72 Cadmium 0.002 Chemical Oxygen Demand 225 Chloride 1632 Chromium 0.1 Chromium 6+ < 0.01 Copper 0.002 Fluoride 5.8 Hardness (as $CaCO_3$) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Alkalinity, "P" (as $CaCO_3$) < 1 Barium < 0.1 Biochemical Oxygen Demand 72 Cadmium 0.002 Chemical Oxygen Demand 225 Chloride 1632 Chromium 6+ < 0.01 Copper 0.002 Fluoride 5.8 Hardness (as $CaCO_3$) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Barrum < 0.1 Biochemical Oxygen Demand 72 Cadmium 0.002 Chemical Oxygen Demand 225 Chloride 1632 Chromium 0.1 Chromium 6+ < 0.01 Copper 0.002 Fluoride 5.8 Hardness (as CaCO ₃) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 PHenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfate 1520 Sulfate < 0.36 Zinc < 0.1
$\begin{array}{ccccc} Cadmium & 0.002\\ Chemical Oxygen Demand & 225\\ Chloride & 1632\\ Chromium & 0.1\\ Chromium 6+ & < 0.01\\ Copper & 0.002\\ Fluoride & 5.8\\ Hardness (as CaCO_3) & 1160\\ Iron & 0.1\\ Lead & < 0.001\\ Magnesium & 110\\ Nickel & < 0.01\\ pH Units & 7.2\\ Phenols & < 0.001\\ Alkalinity, "M" & 214\\ Solids, Total Dissolved & 4920\\ Sulfate & 1520\\ Sulfate & 1520\\ Sulfate & 0.36\\ Zinc & < 0.1\\ \end{array}$
Chemical Oxygen Demand 225 Chloride 1632 Chromium 0.1 Chromium $6+$ < 0.01 Copper 0.002 Fluoride 5.8 Hardness (as CaCO ₃) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Chloride 1632 Chromium 0.1 Chromium 6+ 0.01 Copper 0.002 Fluoride 5.8 Hardness (as CaCO ₃) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
$\begin{array}{cccc} & & & & & & & & & & & & & & & & & $
$\begin{array}{cccc} & & & & & & & & & & & & & & & & & $
Fluoride 5.8 Hardness (as $CaCO_3$) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Hardness (as $CaCO_3$) 1160 Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Iron 0.1 Lead < 0.001 Magnesium 110 Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$
Nickel < 0.01 pH Units 7.2 Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD_5 : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: $BOD_5 - 5$ day incubation
pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Phenols < 0.001 Alkalinity, "M" 214 Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Solids, Total Dissolved 4920 Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Sulfate 1520 Sulfide 0.36 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Sulfide Zinc - 0.36 < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation
Method of Analysis: BOD ₅ - 5 day incubation
pH:electrode
-

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

*

SAMPLES REC	eived 4/24/81	CUSTO	MER ORDER NUMBER P.O. # 20)030		
TYPE OF ANA	LYSIS Water				_	
n en	Sample Identification		Type of Analysis		mg/liter	
	Navajo Middle Po	nd 1 ⁴⁶⁰	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc		29 1 0.1 116 0.002 363 1468 0.1 0.01 0.001 7.4 1060 0.06 0.001 96 0.01 7.4 0.027 349 4020 1050 13.4 0.1	
	Sample Analysis Date and Time of		0D ₅ : 4/24/81 @ 1600 hrs.			-
a na sara s	pH: 4/30/81 @ 14		5		~	
• • • • • • • •	Method of Analys	is: BOD ₅ - 5	day incubation			۰. <u>ب</u>
			-			r
	pH:electrode					

Controls for Environmental Pollution, Inc. P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

ADDRESS Drawer	159 a, NM 88210	l y		ALALVSIS
- SAMPLES RECEIVED	4/24/81	CUSTOMER ORDER NUMBER P.0. # 200	30	
TYPE OF ANALYSIS	Water	······································	JU	
Sample	fication	Type of Analysis	mg/liter	
Navajo	West Pond	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved	$ \begin{array}{r} 13 \\ < 1 \\ 0.2 \\ 116 \\ 0.003 \\ 102 \\ 918 \\ 0.04 \\ < 0.01 \\ < 0.001 \\ < 0.001 \\ < 0.001 \\ < 0.002 \\ 60 \\ 0.002 \\ 60 \\ 0.01 \\ 7.7 \\ 0.04 \\ 173 \\ 2930 \\ \end{array} $	
		Sulfate Sulfide Zinc	885 25.1 < 0.1	
Date an pH: 4/	30/81 @ 1400 hrs of Analysis: BOI	sis: BOD ₅ : 4/24/81 @ 1600 hrs.	· ~	
		APPROVED BY Elmer D. Martinez, Dire 4/30/81 PAGE	ctor of Quali 4 OF 13 PAGE	ty Assurance
P.O. Box 5351 • 1925 R		•		

CHEMICAL ANALYSES OF GROUND WATER AND SURFACE WATER NEAR THE EVAPORATION LAGOONS SAMPLES TAKEN 4/85

Ļ

ASSAK ANALY LABOR	SAI TICAL RATORIES		
TO: Geo Solence Attn: Randy Hi 500 Copper N.W Albuquerque, Ni	• Sulte 325	DATE: 2 May 1985 0441 REVISED	
	SAMPLE ID/ANALYTICAL Navajo Pt 75 مل 854110701	RESULTS Navajo 49 854110721	Pecos River 854100910
EC TDS Benzene	14000.0 umhos/&m 12564.0 mg/1 <0.001 mg/1	8300.0 umhos/ém 7620.0 mg/1 <0.001 mg/1	9000.0 umhos/dm 7314.0 mg/1 <0.001 mg/1
EC TDS Benzeners	Navajo Pr 442 ad 8504111037 4800.0 unhos/cm 3852.0 mg/l <0.001 mg/l	Navajo Pe¢os R1ver 854111120 10000.0 umhos/&m 8220.0 mg/1	Navajo Pe¢os R1ver 854111135 10000.0 umhos/¢m 8782.0 mg/1
NOMINAL DETECTION L1		<0.001 mg/1	<0.001 mg/1

0.1 unhos/on 1 mg/1 EC TDS Benzene 0.001 mg/1

"Standard Methods for the Examination of Water and Wastewater 15th Edition, APHA, N.Y., 1980. REFERENCE

servises is enclosed. Thank you for contacting Assaigai An 10V010e 0 Labora

Sinderely,

UV. Smith, Ph.D. Dir edtor

7300 Jefferson, N.E. • Albuquerque, New Mexico 87109 • (505) 345-8964





TO: GeoSolenge Attn: Randy Hicks 500 Copper N.W. Suite 325 Albuquerque, NM 87102

DATE: 23 July 1985 0441

Sample ID

Navajo Pr 2 854110701 No benzene or other hydrogarbons present Navajo 9 854110721 854100910

Navajo Pt 4 8504111037

Navajo Peços River 854111120

A.C. N. 1

公开的的第三人称单数 No benzene or other hydrogarbons present No benzene or other hydrogarbons present

No benzene, toluene or ethyl benzene present; Xylenes masked by presence of apliphatic nydrocarbons

No benzene or other hydrogarbons present

Navajo Pegos River 854111135 No benzene or other hydrogarbons present

Analysis of Chromatographs

An involve for services is enclosed. Thank you for contacting Assaigat Laboratories.

Sinderely.

enniter (V. Smith, Ph.D. Laboratory Director

7300 Jefferson; N.E. • Albuquerque; New Mexico 87109 • (505) 345-8964

eoscience Consultants, Ltd.	Sample Logation $Pf \stackrel{\#}{=} h$	CLIENI LAB ATE RECEIVED ATE ANALYZED QUALITY ANALYSIS PH 3 ON MAP Collected By Alfunt
	SAMPL	LING CONDITIONS
	Samp. Type Well Water Color <u>Class</u> Odor/Taste <u>None / Saline</u> Water Level <u>B' 2/4" BCT</u> Datum <u>CasingTop</u>	Elevation
		servation Bailed Z VOA's
	_too_small for reg.	baily
[] NO [] NH	EC 140,000 µm/cm(X 1 liter plastic cool to 4° C mg/1 [] HCO3 mg/1 mg/1 [] CO3 mg/1 mg/1 [] C1 mg/1 a mg/1 [] F mg/1 i mg/1 [] SO4 mg/1 OS 13,994 mg/1 [] TSS mg/1	ATER CHEMISTRY $ \begin{array}{c} 500 \text{ ml plastic HNO3 to pH 2} \\ \hline As mg/l [] Ag mg/l \\ \hline Ba mg/l [] Se mg/l \\ \hline Cd mg/l [] Fe mg/l \\ \hline Cd mg/l [] Fe mg/l \\ \hline Cr mg/l [] Mn mg/l \\ \hline Pb mg/l [] Hg mg/l \\ \hline Mn mg/l \\ \hline Mn mg/l \\ \hline Pb mg/l [] Hg mg/l \\ \hline Cr mg/l \\ \hline C$
		[] Gr Almg/l [] Gr Betmg/l
Remar	ks on Analyses:	
I her	CHAIN OF Ded or delivered to lab by Date reby certify that to the best o	Time Time of my knowledge water samples (amt/size
(Owned deliv Signat	ery to the laboratory.	nce with's re safely containerized and labeled for 's ECEIVING LABORATORY
Addres	SS	
Attn:	All Samples received in List samples missing or Received 4-15-85 Time 10	r damaged
, Dater	neceived - 10-05 time 10,	<u>· · · · · · · · · · · · · · · · · · · </u>

	· · · · · · · · · · · · · · · · · · ·	
Geoscience onsultants, Ltd.		CLIENI
		ANALYZED
	Sample Location $(Pt + 4) \sim 100$ Date $4/u/85$ Time 1037	Collected By Advanta
	SAMPLIN	IG CONDITIONS
8	Samp. Type <u>Well Water</u> Color <u>Furbid</u> Odor/Taste <u>Faint HC</u> Water Level <u>6'7.15"</u> Datum <u>Pige for</u> E	pH Cond <u>6600</u> Temp <u>75°C</u> Tow Rate
	Remarks on sampling and preser	vation
1		
	WATE WATE	R CHEMISTRY
[] Ca [] Mg [] K [] Na [] Si [] Si	gmg/l [] CO3mg/l [mg/l [] Clmg/l [amg/l [] Fmg/l [] Crmg/1 [] Mnmg/1] Pbmg/1 [] Hgmg/1
[] <u>NO</u> [] NH	500 ml plastic H2SO4 to pH 2 503mg/l [] TOCmg/l [] H4mg/l [] TKNmg/l	Z VOA bottles Benz AN mg/l [] Tolmg/l] Xylmg/l [] SCAN [] UREA FORMALDENYOE
(use	_250 ml glass TOX mg/l [6.25 mg N _a SO ₄ if free Cl is present)	250 ml glass H3PO4 CuSO4 <i>mg/e</i>]Pheno1mg/1
-]GrA1mg/1 []GrBetmg/1
Remar	rks on Analyses:	
	CHAIN OF CU	STODY
Shipp	bed or delivered to lab by	intre
📕 I her	reby certify that to the best of	Time my knowledge water samples (amt/size
(Owner deliv) were obtained to accordance (r) sampling and analysis plan and are very to the laboratory.	safely containerized and labeled for
		EIVING LABORATORY ASSAIGAT
Addres Attn:		
	All Samples received into List samples missing or o	Jamaged
Date F	Received 475-85 Time 10!	10 Am

eoscience onsultants, Ltd.:	500 Copper Avenue N.(CLIENI (Suite 220 LAB	
	Albuquerque, New Mexico 87102 DATE RECEIVED DATE ANALYZED	
	WATER QUALITY ANALYSIS	
	Sample Location $\underline{NAUAJO} \neq 49$ Date $\underline{4/n/85}$ Time $\underline{0221}$ Collected By $\underline{4Auntr}$	
	<i>,</i>	
	SAMPLING CONDITIONS	
	Samp. Type Woll Water pH <u>4.2</u> Color Cond <u>8300</u> Odor/Taste Temp <u>15°C</u> Water Level <u>11'10''</u> Flow Rate Datum <u>Guard Pipe Top</u> Elevation	
_	Remarks on sampling and preservation Bailed w/ cleaned	
	puc bailer	
	WATER CHEMISTRY	
[] Ca [] Mg [] K [] Na [] Si [] Si	Igmg/l [] CO3mg/l [] Bamg/l [] Semg/l [] mg/l [] Clmg/l [] Cdmg/l [] Femg/l Iamg/l [] Fmg/l [] Crmg/l [] Mnmg/l	
[] NC [] NH	500 ml plastic H ₂ SO ₄ to pH 2 X Benz <u>NO</u> mg/l [] Tolmg/l 103mg/l [] TOCmg/l [] Xylmg/l [] SCAN	EIMOE
	Cl is present)	
	[] Gr Almg/l [] Gr Betmg/l	
	rks on Analyses:	
	CHAIN OF CUSTODY	
Shipp	ped or delivered to lab by Alanta Date Time	
	ereby certify that to the best of my knowledge water samples (amt/size) were obtained to accordance with er) sampling and analysis plan and are safely containerized and labeled for	
(Owne deliv	er) sampling and analysis plan and are safely containerized and labeled for very to the laboratory.	
Signat Addres	ess	
	All Samples received intact.	
Date F	List samples missing or damaged Received <u>445-85</u> <u>Time</u> 10:00 AN	

eoscience onsultants, Ltd.	500 Copper Avenue N. CLIENI Suite 220 LAB Albuquerque, New Mexico 87102 DATE RECEIVED DATE ANALYZED
	WATER QUALITY ANALYSIS
	Sample Location <u>Percer River</u> Al of Pourds <u>A</u> Date <u>4/11/25</u> Time <u>1135</u> Collected By <u>Afrentic</u>
	SAMPLING CONDITIONS
	Samp. Type Rwer Water pH Color Turbid Cond Odor/Taste Temp Water Level Flow Rate Datum Elevation
	Remarks on sampling and preservation
•	
	WATER CHEMISTRY
[] NC [] NF	mg/l []Clmg/l []Cdmg/l []Femg/l amg/l []Fmg/l []Crmg/l []Mnmg/l
	[] Gr Almg/l [] Gr Betmg/l
Remar	rks on Analyses:
.	
	CHAIN OF CUSTODY
	bed or delivered to lab by <u></u> Date reby certify that to the best of my knowledge water samples (amt/size
(Owne) were obtained to accordance with''s er) sampling and analysis plan and are safely containerized and labeled for very to the laboratory.
Signa	
Addre Attn:	
	All Samples received intact. List samples missing or damaged
Date	Received A-15-51- Time O' TO And

Lieoscience Consultants, Ltd.	500 Copper Avenue N Suite 220	
		ATE RECEIVED
	WATER	QUALITY ANALYSIS
		ier @ Pipline Crossing
	Date 4/0/85 Time 0910	Collected By <u>ACAutu</u>
	SAMPL	ING CONDITIONS
	Samp. Type <u>Pinis water</u> Color <u>slightly Timbed</u> Odor/Taste Water Level Datum	pH Cond Temp Flow Rate Elevation
	Remarks on sampling and pres	ervation Collected sample from
	Pece Rine, 250' downstream f	, v
		F/
	WA	TER CHEMISTRY
	gmg/1 [] CO3mg/1 mg/1 [] C1mg/1	500 ml plastic HNO ₃ to pH 2 $\begin{bmatrix} As & mg/l & Ag & mg/l \\ Ba & mg/l & Be & mg/l \\ \end{bmatrix} Ba & mg/l & Be & mg/l \\ \begin{bmatrix} Cd & mg/l & Be & mg/l \\ mg/l & Be & mg/l \\ \end{bmatrix} Fe & mg/l & mg/l \\ \end{bmatrix} Fe & mg/l & mg/l \\ \end{bmatrix} Pb & mg/l & Be & mg/l \\ \end{bmatrix} Pb & mg/l & Be & mg/l \\ \end{bmatrix} Pb & mg/l & Be & mg/l \\ \end{bmatrix} Hg & mg/l \\ \end{bmatrix} Hg & mg/l \\ \end{bmatrix} Hg & mg/l \\ \end{bmatrix} Ba & mg/l \\ \end{bmatrix} Pb & mg/l & Be & Be & Be & Be \\ \end{bmatrix} Ba & mg/l \\ Ba & mg/l \\ \end{bmatrix} Ba & mg/l \\ \end{bmatrix} Ba & mg/l \\ Ba & mg/l \\ \end{bmatrix} Ba & mg/l \\ Ba & m$
	H4mg/1 [] TKNmg/1 250/## glass TOXmg/1 6.25 mg NaSO4 if free	Benz mg/1 [] To1 mg/1 [] Xy1 mg/1 [] SCAN [] UREA FORMALDENYDE 250 m] glass H2PO4 CUSO4
	Cl is present)	
		[] Gr A1mg/l [] Gr Betmg/l
Remar	rks on Analyses:	
- 14- 1	CHAIN OF	CUSTODY
- Shipp	ped or delivered to lab by	1 to
	Date/	Time
		of my knowledge water samples (amt/size nce with's re safely containerized and labeled for
deliv	very to the laboratory.	
Signa	ature R	ECEIVING LABORATORY ASSAIGA
Addre Attn:		
	All Samples received i List samples missing o	r <u>d</u> amaged
- Date	Received 4-15-85 Time 1	10 an

₹

eoscience Consultants, Ltd.	500 Copper Avenue N
	Suite 220 LAB Albuquerque, New Mexico 87102 DATE RECEIVED DATE ANALYZED
	WATER QUALITY ANALYSIS
	Sample Location <u>Accas River 200' downstream from EAGLE</u> DEAW Date <u>4/11/85</u> Time <u>1120</u> Collected By <u>Execution</u>
	SAMPLING CONDITIONS
	Samp. Type Ruer Water pH
	Color Cond Cond Cond Cond Cond Cond Cond Cond
	Water Level Flow Rate Datum Elevation
-	Remarks on sampling and preservation
	WATER CHEMISTRY
[] <u>NO</u> [] NH	mg/1 [] Cl mg/1 [] Cd mg/1 [] Fe mg/1 mg/1 [] F mg/1 [] Cr mg/1 [] Mn mg/1 mg/1 [] SO4 mg/1 [] Pb mg/1 [] Hg mg/1 S g220 mg/1 [] TSS mg/1 [] Pb mg/1 [] Hg mg/1 S g220 mg/1 [] TSS mg/1 [] TSS mg/1 S g220 mg/1 [] TSS mg/1 [] To1 mg/1
	[] Gr Almg/l [] Gr Betmg/l
■ Remar	ks on Analyses:
	CHAIN OF CUSTODY
– I her	ed or delivered to lab by <u></u> Date <u></u> reby certify that to the best of my knowledge water samples (amt/size) were obtained to accordance with's
(Owner delive) were obtained to accordance with''s r) sampling and analysis plan and are safely containerized and labeled for ery to the laboratory.
Signat Addres Attn:	
Date R	All Samples received intact. List samples missing or damaged Received 4-15-85 Time 10:00 AM

APPENDIX C PROPOSED CHANGES IN RCRA REGULATIONS

.

6

Federal Register / Voi. 50, No. 28 / Monday, February 11, 1985 / Proposed Rules

Dated: December 26, 1984 Valdas V. Adamkus, Regional Administrator. [FR Doc. 85–3330 Filed 2–8–85; 8:45 am] BILLING CODE 5550-50-M

40 CFR Part 261

[WH-FRL-2776-3]

Hazardous Waste Management System; Identification and Listing of Hazardous Waste

AGENCY: Environmental Protection Agency.

ACTION: Notice of availability of data and request for comment.

SUMMARY: On November 12, 1980, the **Environmental Protection Agency** proposed to amend the listings of two of the hazardous wastes generated by the petroleum refining industry which the Agency promulgated in final form in that same issue of the Federal Register. EPA has collected additional information on these wastes and is making these data available for public comment. EPA also is clarifying that any final listing would apply only to wastes from primary wastewater treatment processes, and pot to any wastes from secondary vastewater treatment such as sludges from biological oxidation. DATES: EPA will accept public comment

on this notice until March 13, 1985. **ADDRESSES:** Comments should be addressed to the Docket Clerk, Office of Solid Waste (WH-562), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C. 20460. Communications should identify the regulatory docket "Petroleum Refining--Section 3001." The public docket for this proposed rulemaking is located in Room S-212A, U.S. Environmental Protection Agency, 401 M Street, SW., Washington. D.C. 20460, and is available for viewing

from 9:00 a.m. to 4:00 p.m., Monday through Friday, except legal holidays. FOR FURTHER INFORMATION CONTACT:

RCRA Hotline, toll-free at (800) 424–9346 or at (202) 382–3000. For technical information contact Robert Scarberry, Office of Solid Waste (WH-562B), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, D.C., 20460, (202) 475–6725.

SUPPLEMENTARY INFORMATION: .

I. Background

On May 19, 1980, as part of its final and interim final regulations lementing Section 3001 of RCRA, and published (in interim final form) a list of hazardous wastes (Subpart D of 40 CFR Part 261), which included five wastes generated by the petroleum refining industry (§ 261.32, 45 FR 33123). Among the listed petroleum refining industry wastes were "Dissolved air flotation (DAF) float from the petroleum refining industry (K048)" and "API separator sludge from the petroleum refining industry (K051)." These wastes are generated as a result of primary treatment of wastewater from petroleum refineries. These particular listings were promulgated in final form in 45 FR 74884. November 12, 1980.

A rulemaking petition was submitted by Envirex, Inc.¹ which argued that any petroleum refining sludge resulting from primary or secondary oil/solids/water separation would be similar in composition regardless of the equipment or method used in the separation step. After evaluating the rulemaking petition, the Agency proposed that the K048 and K051 listings be amended to read: "Secondary (emulsified) oil/solids/ water separator sludge in the petroleum refining industry" and "Primary oil/ solids/water separation sludge in the petroleum refining industry". respectively.

II. Availability of Data

Since the close of the comment period for the proposed amendment, the Agency has obtained additional data characterizing sludges from API separators and DAF units as well as sludges from other methods of primary wastewater treatment. The supplemental data obtained consists of metal and organic analyses which were performed on primary treatment sludges from the following sources:

- Storm runoff ponds
- Primary settling ponds
- Flocculation tanks
- Sumps
- Emulsion tanks
- Induced air flotation tanks
- Evaporation ponds
- Equalization ponds
- Clarifiers
- Cleaning chemicals pits

• Ponds with an oil skimmer The sludges from these sources have levels of total chromium and lead similar to those levels which are characteristic of sludge from API separators and DAF units. In addition, the organic analyses on these primary wastewater treatment sludges, as well as organic analyses on the sludges from API separators and DAF units, indicate the presence of toxic organic constituents including benzene and toluene at maximum concentrations of 4600 and 11,000 ppm, respectively. Benzo(a)pyrene, chrysene, and pyrene also are present in these sludges at maximum concentrations ranging from 600 to 1700 ppm.

Copies of these new data are available for public inspection in the RCRA Docket, Room S212A. Comments are solicited only on the new data. These comments must be received by EPA on or before March 13, 1985 to ensure their consideration.

III. Clarification of Scope of Listing

As described above, the Agency proposed to amend the descriptions of the K048 and K051 listings in response to a rulemaking petition submitted by Envirex, Inc. (See 45 FR 74893, November 12, 1980). The petitioner argued that the May 19 listing descriptions were under-inclusive since they were specific to particular types of equipment, namely the DAF and API separator. According to the petitioner, any petroleum refining sludge resulting from primary and secondary oil/solids/ water separation will be comparably composed regardless of the type of equipment used in the separation step. The petitioner pointed out that other processes such as induced air flotation, parallel plate flotation separators, and dual media filtration separators, perform the same function as the DAF and form a similar solids residue. Likewise, the API separator is only one of the many equipment types which function as a primary oil/solids/water separator (other processes producing similar sludges include corrugated plate separators, inclined plate separators, storm equalization lagoons, and ballast waterholding tanks).

After reviewing and evaluating the rulemaking petition. the Agency concluded that the listings should be modified to reflect the hazardous character of the wastes themselves, rather than the type of equipment or process generating the waste. The Agency has agreed that the May 19 listing was too narrow in specifying API separator sludge and DAF float, thereby omitting other petroleum wastes with similar compositions generated from processes and equipment other than API separators and DAF units. In the November 12, 1980 notice, the Agency proposed to adjust the scope of the K048 and K051 listings by amending the listing descriptions to those recommended by the petitioner: "Secondary (emulsified) oil/solids/ water separator sludge in the petroleum refining industry" and "Primary oil/ solids/water separation sludge in the

¹ Envirex, Inc. is a manufacturer of sewage, water and waste treatment, and water conditioning equipment for many uses, including applications in the petroleum refining industry.

petroleum refining industry," respectively.

Among other things, the comments received on the November 12, 1980 proposed amendment expressed confusion regarding the scope of the K048 listing. In particular, the commenters were uncertain of the Agency's definition of "Secondary (emulsified) oil/solids/water separator sludge". In regard to the K048 listing, the background listing document * specifies the latter of two consecutive primary wastewater treatment methods as secondary treatment (e.g., API separator followed by DAF). This use of the term secondary treatment is confusing because biological oxidation of wastewaters is commonly referred to as secondary wastewater treatment, as compared to primary wastewater treatment consisting of physical processes such as sedimentation, flocculation, flotation, and filtration. No discussion of sludge from biological treatment of wastewaters (e.g., activated sludge, trickling filters, etc.) is present in either the background listing document or the Envirex petition. Furthermore, neither of these documents includes sludges from physical oil/solids/water separation processes which follow biological treatment of wastewaters in the K048 listing. To clarify the scope of the K048 and K051 listings, therefore, the Agency intends to consolidate the listings to read, "Sludge from primary wastewater treatment in the Petroleum Refining industry" in a final rule action.*

List of Subjects in 40 CFR Part 261

Hazardous materials, Waste treatment and disposal, Recycling. Dated: February 5, 1985.

Jack W. McGraw, Acting Assistant Administrator. [FR Doc. 85–3331 Filed 2–8–85; 8:45 am] BRLING CODE 5550–50–46

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

42 CFR Parts 4, 59a, 63 and 64

National Library of Medicine Programs

AGENCY: Public Health Service, HHS.

*The background listing document and the Envirex rulemaking petition are available in the public docket at the address cited abova.

^a The Agency also is concerned, however, with econdary sludges from biological treatment of efinery wastewaters. To this end, we are currently evaluating these wastes as part of the petroleum refining industry studies program to determine whether they also should be listed as hazardous.

ACTION: Notice of proposed rulemaking.

SUMMARY: The Public Health Service, HHS, proposes to revise the regulations for the programs of the National Library of Medicine. The proposed revisions would: (1) Permit the Regional Medical Libraries to recover part or all of the costs of providing photocopies of biomedical materials, (2) improve readability of the regulations, (3) update references to statutory authorities and uniform administrative requirements, and (4) revoke Part 63 (Trainceships) which is obsolete.

DATES: Written comments must be received on or before April 12, 1985. ADDRESS: Comments should be sent to: NIH Regulations Officer, National Institutes of Health, Building 31, Room 3B03, 9000 Rockville Pike, Bethesda, Maryland 20205. All comments received are available to the public at the above address from 9:00 a.m. to 5:00 p.m., Monday through Friday, except on Federal holidays.

FOR FURTHER INFORMATION CONTACT: Lowell D. Peart, at the above address or (301) 496-4606.

SUPPLEMENTARY INFORMATION: On November 21, 1979, the Public Health Service published a notice of intent to develop regulations in the Federal Register (44 FR 66852) covering 42 CFR Parts 4, 59a, 63, and 64. These regulations, which all concern, in whole or part, the National Library of Medicine, were proposed for revision as part of the Department's efforts to simplify and update its regulations.

The regulations would be clarified and condensed by eliminating regulatory provisions that are obsolete or are already set forth in the HHS uniform requirements for the administration of financial assistance in 45 CFR Part 74.

The following substantive changes would be made.

 Section 59a.16(b)(2) of the proposed rules would liberalize the current § 59a.37(b)(2) to permit the Regional Medical Libraries receiving NLM support to charge reasonable fees: (1) For copies to recover expenses and (2) for such other expenses (other than free loan services) as may be appropriate. The present regulations explicitly prohibit Regional Medical Libraries from recovering costs for photocopying. Other than eliminating this prohibition, we are proposing no other new provisions related to cost recovery in these proposed rules. The Department is currently studying the NLM's fee setting policy. However, since NLM fee setting policies are not established through regulations, any recommendations

arising from the Department's study will not require a change to these regulations.

• Part 63 would be revoked because NIH no longer has general traineeship authority and the only remaining NLM program is unfunded with no expectation of being funded.

 Part 64 would be revised to eliminate reference to National Institutes of Health Training Grants, as that authority has been superseded by National Research Service Awards, which are covered in 42 CFR Part 66. Also, provisions such as § 64.7 which cover matters now governed by 45 CFR Part 74 would be removed. The reference to review by an advisory council in former § 64.3 has been removed because the programs which require it are no longer in the regulations and section 393 of the Public Health Service Act, which authorizes NLM training grants, does not require it.

The following statements are provided for the information of the public:

1. These regulations revise existing regulations to improve readability. remove obsolete provisions, and permit certain fees to be recovered. The economic impact of this is expected to be minor. For these reasons, the Secretary has determined that this rule is not a "major rule" under Executive Order 12291, and a regulatory impact analysis is not required. Further, these regulations will not have a significant economic impact on a substantial number of small entities, and therefore do not require a regulatory flexibility analysis under the Regulatory Flexibility Act of 1980.

2. Catalog of Federal Domestic Assistance number program affected by this proposed rule is:

13.879 Medical Library Assistance

3. Sections 4.5, and 59a.4, 59a.14, 59a.16, 64.4, and 64.7 of these proposed rules contain information collection requirements. As required by Section 3504(h) of the Paperwork Reduction Act of 1980 [44 U.S.C. 3504(h)], we have submitted a copy of these proposed rules to the Office of Management and Budget for its review of these information collection requirements. Organizations and individuals desiring to submit comments on the information collection requirements should direct them to the agency official designated for this purpose whose name appears in this preamble, and to the Office of Information and Regulatory Affairs, OMB, New Executive Office Building (Room 3208), Washington, D.C. 20503, Attn: Desk Officer for HHS.

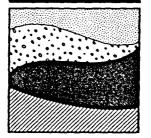
APPENDIX D

5

|

FEBRUARY 18, 1985 SUBMISSION TO NMOCD

Geoscience Consultants, Ltd.



February 18, 1985

Mr. Richard Stamets NMOCD P.O. Box 2088 Santa Fe, New Mexico 87501

{

Re: Effluent Flow and Chemical Characteristics of Waste Streams Regulated by Discharge Plan

Dear Mr. Stamets:

Navajo Refining Company, Inc. and Geoscience Consultants, Ltd. are pleased to submit our report on effluent characteristics. Our previous submission described the process at the Artesia Refinery and presented chemical data on many individual waste streams. Section 1.0-6.0 of the Discharge Plan also presented chemical analyses of the evaporation pond fluids which represent the best composite sample of the effluent streams.

In the initial meeting of September 17, 1984 it was decided that all waste streams which are disposed of in the evaporation ponds would be governed by this Discharge Plan. These streams are:

- o Effluent from the oil/water separator
- o Effluent from the water softener
- o Boiler blow down
- o Effluent from the oil recovery system
- o Liquid effluent from the heat exchanger bundle cleaning area
- o Other liquid effluent which may be periodically discharged into the conveyance ditch

The chemical data on these waste streams were presented in Sections 1.0-6.0 of the Discharge Plan and are presented with this submission. Note that samples from the evaporation ponds were analised for benzene, toluene, xylene and ethylbenzene. Analyses of individual waste streams were included for information only. Regulatory decisions should consider the quality of the final effluent as characterized by analyses of the effluent flowing to the evaporation ponds.

The flow data is shown in the Table. At the present time no data are available for flow rates at the downstream end of the ditch.

If you or your technical staff have any questions about this submission please contact me at our Albuquerque office.

1

Sincerely, GEOSCIENCE CONSULTANTS, LTD.

Randall T. Hicks Vice President

RTH/mg

cc: Mr. Dave Griffin, Navajo Mr. Joel Carson, Losee, Carson, Dickerson M. David Boyer, NMOCD (2 copies)

WATER USAGE

 \langle

Ę

	CITY	WELL	TOTAL
June, 1984	23,695 X 10 ³ gal	5,400x10 ³ gal	29,095,000 gal
July, 1984	19,799	5,015	24,814,000
August, 1984	24,073	5,400	29,473,000
Sept., 1984	20,509	6,170	26,679.000
Oct., 1984	15,936	10,030	25,966,000
Nov., 1984	12,042	17,745	29,787,000
Dec., 1984	12,213	20,445	32,658,000
Jan., 1985	13,887	14,659	28,546,000

EFFLUENT FLOW DATA

(

۰.

Ę

DATE	GPD	РН
6-6-84	342,720	12.0
6-7-84	361,440	12.5
6-8-84	361,440	11.0
6-9-84	361,440	13.0
6-11-84	361,440	12.0
6-12-84	Cleaning ditch north of the FCC	13.5
6-13-84	303, 384	11.0
6-14-84	342,720	13.0
6-15-84	342,720	13.5
6-18-84	342,720	9.5
6-20-83	361,440	9.0
6-21-84	342,720	9.0
6-22-84	342,720	10.0
6-23-84	381,440	9.5
6-25-84	361,440	8.5
6-26-84	342,720	9.0
6–27–84	419,040	9.5
6-28-84	380,160	10.5
6–29–84	361,440	11.0
6-30-84	380,160	11.5
7-2-84	342,720	12.5
7-3-84	342,720	10.0
7–5–84	342,720	9.5
7-6-84	380,160	9.5

/

<u>م.</u>

(

i.

(

DATE	GPD	РН
7-8-84	361,440	9.5
7-10-84	361,440	9.0
7-11-84	342,720	10.0
7-12-84	303,840	10.5
7-15-84	342,720	8.5
7-19-84	380,160	7.5
7-20-84	380,160	9.5
7-23-84	380,160	12.5
7–24–84	361,440	11.0
7–25–84	380,160	12.5
7–27–81	380,160	11.0
7-30-84	361,440	9.0
8-2-84	342,720	9.0
8-3-84	380,160	9.0
8-6-84	342,720	9.0
8-7-84	342,270	10.0
8-8-84	361,440	11.0
8-9-84	361,440	9.0
8–14–84	380,160	8.0
8–15–84	380,160	8.5
8-16-84	419,040	8.0
8-17-84	380,160	8.0
8–20–84	380,160	7.5
8-21-84	380,160	7.5
8–22–84	380,160	8.0

EFFLUENT FLOW DATA CONT.

- -----

2

DATE	GPD	РН
8-23-84	380,160	10.0
8-24-84	361,440	9.0
8-27-84	361,440	9.5
8-28-84 8-29-84	380,160 361,440	8.5 10.0
8-30-84	380,160	8.0
8-31-84	380,160	7.5
9-5-84	380,160	7.0
9-6-84	380,160	8.0
9-7-84	380,160	8.0
9-10-84	380,160	8.5
9–11–84	361,440	9.5
9-12-84	380,160	11.0
9–13–84	380,160	9.5
9–14–84	361,440	11.0
9–17–84	342,720	11.5
9–18–84	361,440	9.0
9–19–84	380,160	7.0
9-20-84	361,440	9.0
9-21-84	342,720	9.0
9–24–84	342,720	8.5
9–25–84	361,440	8.5
9–26–84	342,720	10.5
9–27–84	342,720	11.0
10-1-84	361,440	10.0
10-2-84	342,720	9.5

Ļ

(

EFFLUENF FLOW DATA CONT.

DATE	GPD	РН
10-3-84	361,440	10.5
10-4-84	342,720	11.0
10-5-84	342,720	10.0
10-8-84	361,440	8.0
10-9-84	342,720	9.5
10-11-84	342,720	10.5
10-12-84	342,720	10.0
10-15-84	361,440	11.5
10-16-84	419,040	7.5
10-17-84	398,880	8.5
10-18-84	398,880	7.5
10-19-84	419,040	7.5
10-22-84	398,880	10.5
10-23-84	419,040	8.5
10-24-84	419,040	7.0
10-25-84	398,880	9.0
10-26-84	398,880	11.0
10-29-84	419,040	8.0
10-30-84	398,880	9.5
10-31-84	398,880	9.0
11-1-84	398,880	6.0
11-2-84	342,720	8.0
11-5-84	380,160	5.5
11-6-84	303, 384	4.0
11-7-84	303, 384	7.5

(

(

-

DATE	GPD	РН
11-8-84	380,160	8.5
11-9-84	380,160	7.0
11-10-84	342,720	8.0
11-11-84	342,720	9.5
11-12-84	380,160	9.0
11-13-84	342,720	8.5
11-14-84	303,840	8.5
11-20-84	380,160	7.0
11-21-84	380,160	9.0
11-22-84	342,720	10.0
11-23-84	342,720	9.0
11-26-84	380,160	8.5
11-27-84	398,880	10.0
11-28-84	419,040	10.5
11-29-84	419,040	8.0
11-30-84	380,160	10.0
12-3-84	398,880	11.5
12-4-84	398, 880	10.5
12-5-84	380,160	13.0
12-6-84	419,040	9.0
12-7-84	398, 880	8.0
12-10-84	380,160	6.5
12-11-84	419,040	11.5
12-12-84	398,880	9.0
12-13-84	419,040	9.0

(

-1 ¶' (

١

DATE	GPD	РН
12-14-84	398,880	9.5
12-17-84	380,160	6.0
12-18-84	342,720	7.5
12-19-84	419,040	8.0
12-20-84	380,160	11.5
12-21-84	380,160	10.0
12-26-84	342,720	9.0
12-27-84	342,720	11.0
1–2–85	380,160	9.5
1-3-85	361,440	6.0
1-4-85	361,440	8.8
1-7-85	342,720	9.5
1-8-85	303,384	10.5
1-9-85	342,720	10.0
1–10–85	342,720	12.0
1–11–85	303, 384	9.0
1-14-85	342,720	10.0
1–15–85	303, 384	8.5
1-16-85	380,160	6.5
1-17-85	342,720	7.5
1–18–85	361,440	8.5
1-21-85	361,440	7.0
1-22-85	342,720	7.0
1-23-85	342,720	8.0
1-24-85	419,040	6.5

Ĺ

EFFLUENT FLOW DATA CONT.

(.

(

DATE	GPD	РН
1-25-85	361,440	7.5
1-28-85	380,160	7.0
1-29-85	380,160	7.0
1-30-85	361,440	6.0
1-31-85	342,720	7.5
2-1-85	361,440	8.5
2-4-85	342,720	7.0
2-5-85	242,720	9.0
2–6–85	361,440	9.5

TABLE 5-2 CHEMICAL ANALYSES OF SELECTED WASTE STREAMS AT NAVAJO REFINERY (AFTER BRANVOLD, 1984) (VALUES IN MG/L EXCEPT WHERE NOTED)

ĺ

WDCC 3-103 Standards	CRUDE UNIT PROCESS (#4, #11, #13)	CAT. CRACKER PROCESS Before Sour Water Stripper	SOUR KATER STRIFFER EFFLUENT (#17)	ALKY. NEUTRALIZING SEWER (#6)	ND ½ SD DESALTERS (#3, #9)
As			•		
Ea					
DJ					
Cr	<0.1	(0.1	(0.1		,
CN	<0.1	<0.1	<0.1 <0.1	7.8	ï
_				<0.1	(1.0
F	1.3	0.5	9.4		
fb		-		10.8	
Hg					
NO ₃					
Se					
Ag ป				۲	
C1					
Cu					
Fe					
Kn	<0.1	3.9	17.0	7.8	
S04					
TDS	Dar				
Zn	805	2160	560	2872	252.
pH	(0.1	<0.1	0.12	18.8	2524
Al	6.3	9.0	9.5	3.6	
F					
Cc					
ño					
Ni					** **
Phenols	9.9	710			,
TSS	•• •	710	250	0.26	
Cond.					
COD	1202	8379	1300		
NH.	78	2320	1702	8670	600
S	64	190	256	<1	5.0
		•••	7.7	1.4	(1.0

l

Table 5-2 (continued)

(

BOILERS

6

WQCC 3-103	S.D.	N.D.	N.D.
PARAMETERS	BOILER BLOWDOWN	HIGH PRESSURE	LOK
	(#2)	BOILER (#18)	BOILER (#12)

As	.004	.005	447
Ba	<.1	(.1	.003
۲Cd	<.01	<.01	(.1
Cr	<.05	<.05	<.01
CN		1.03	<.05
F	3. i	2.2	
fb	.18	.14	1.5
Hg		• 1 7	.05
NO3	.2	4	
Se	••	.1	.05
Ag	<.05	<.05	
U	(.05		<.05
C1	127	<.05	<.05
Cu	<.03	73	44
Fe	1.9	<.03	(.03
Kn	.07	0.65	0.25
SO	1549	<.03	<.03
TDS		1242	693
Zn	4220	2873	1807
pH	.06	<.01	(.01
AI	11.6	11.6	11.2
B	<1.0	<1.0	<1.0
Co	<i>.</i> . .		
fio	<.01	.02	.01
Ni	<.5	<.5	<.5
Fhenols	<.05	<.05	<.05
TSS			
	20	0	0
Cond. COD	6000	5000	2800
	116	0	0
NH4 S			-

S

Table 5-2 (continued)

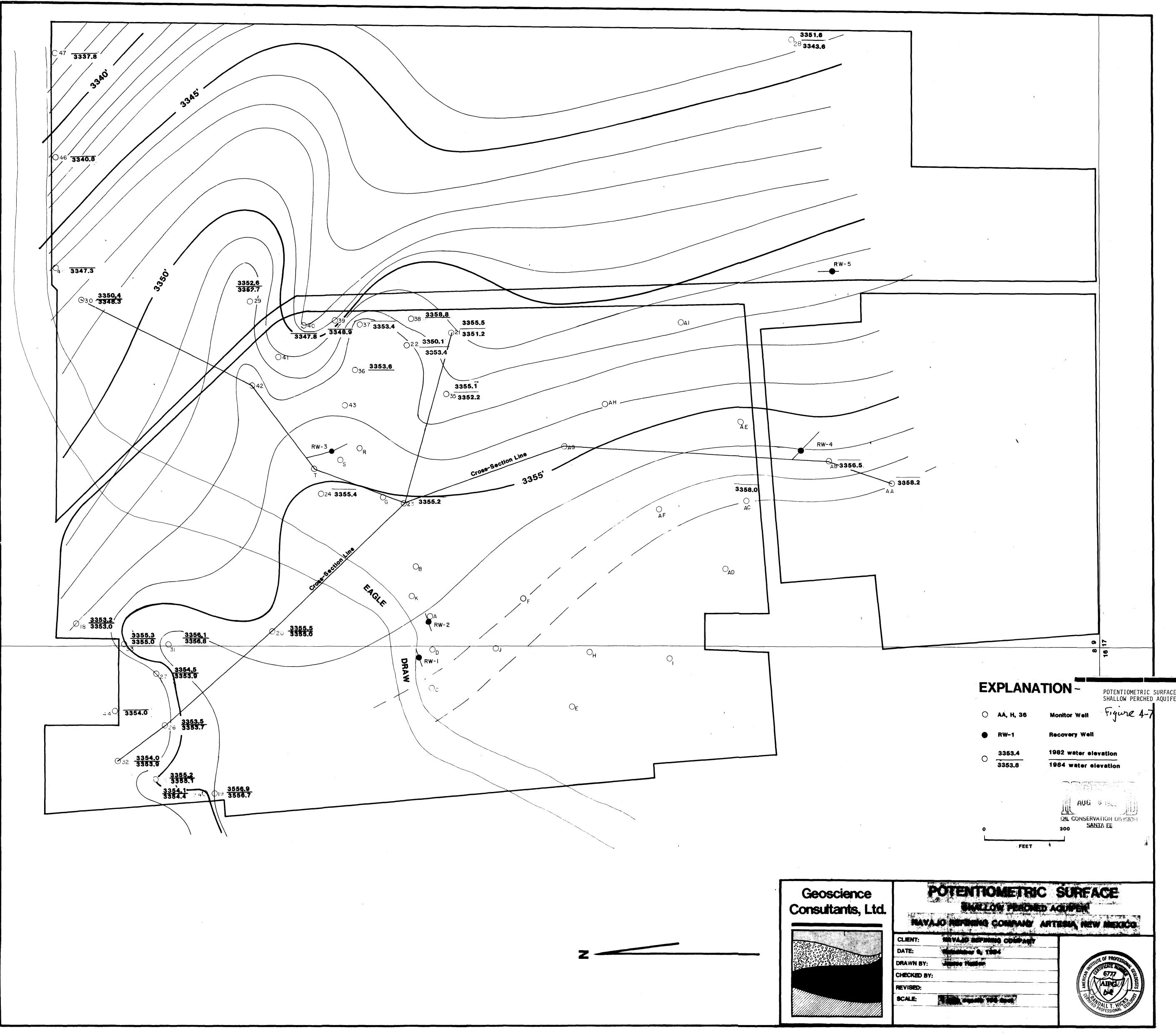
Ć

ſ

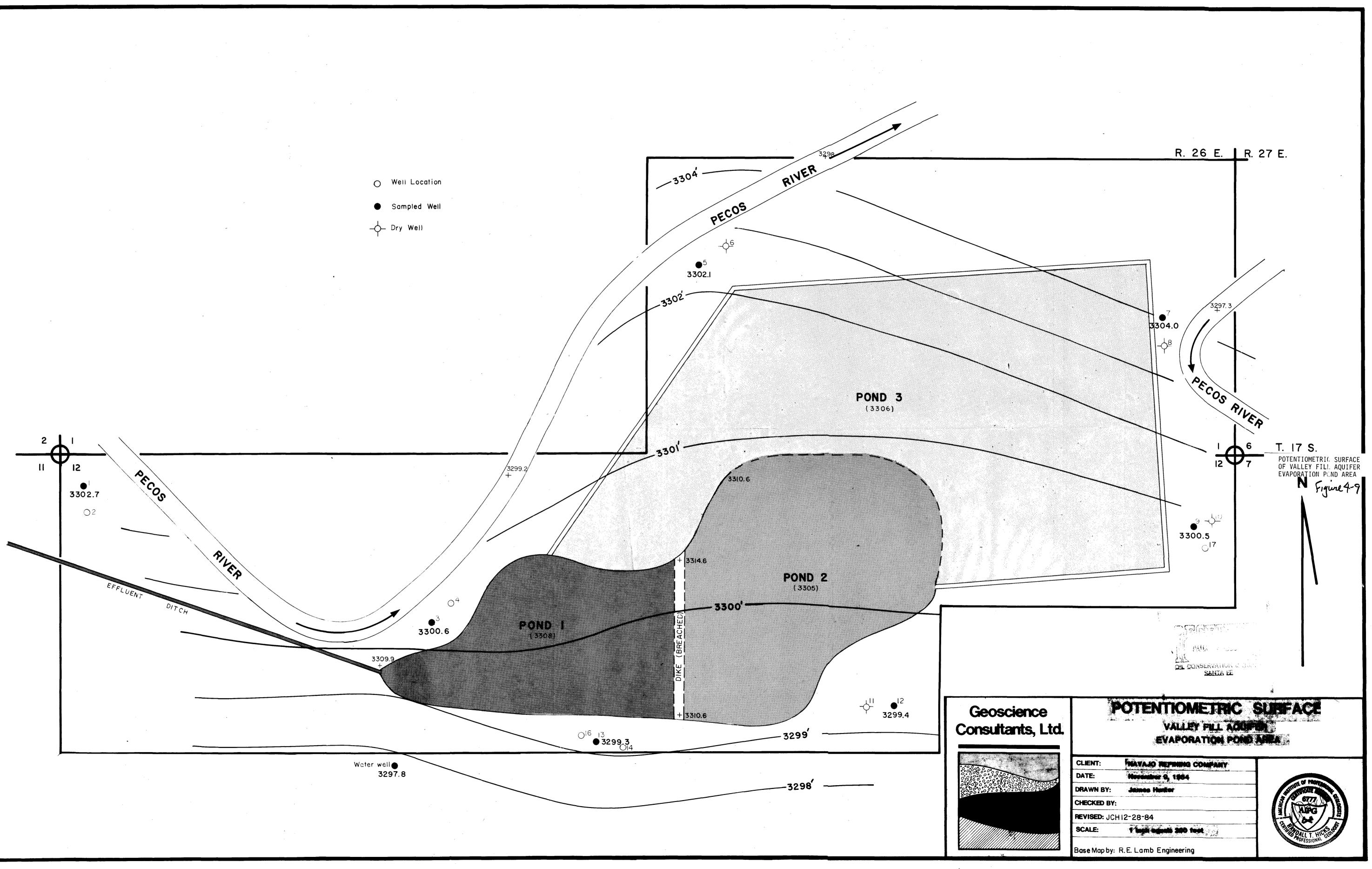
COOLING TOWERS

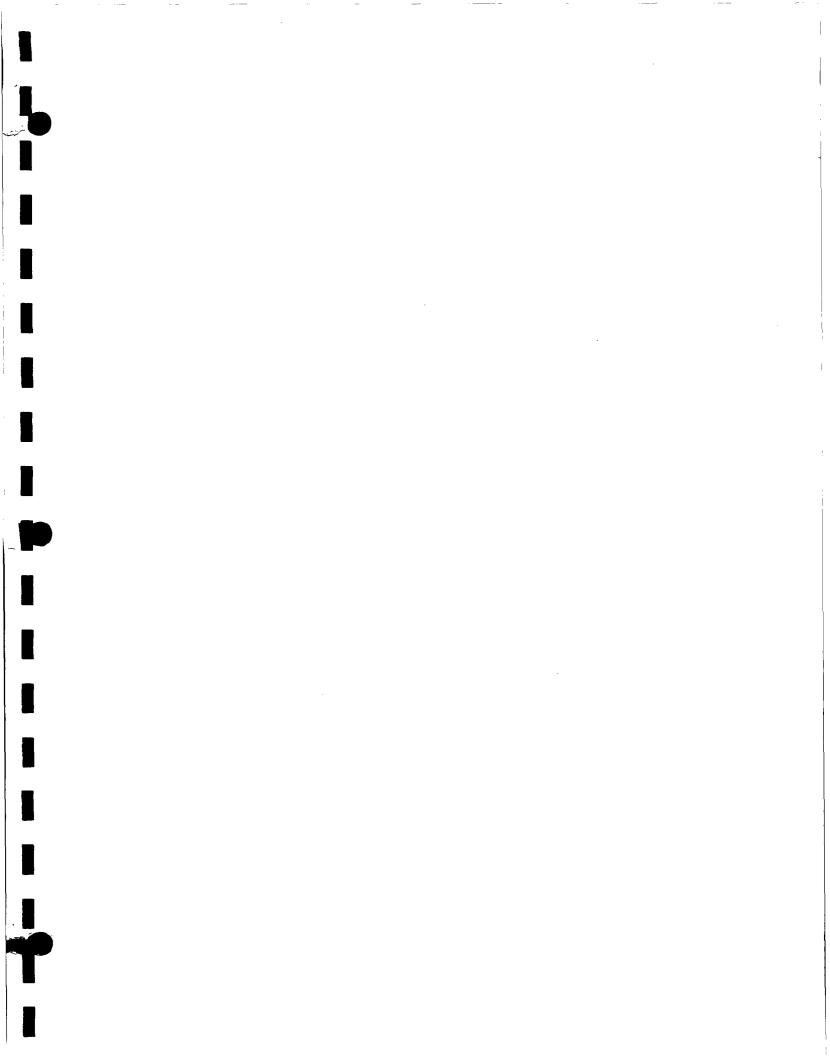
6.

WQCC 3-103 Standards	N.D. COOLING TOWER BLOWDOWN (#10)	S.D. ALKY COOLING TOWER BLOWDOWN (#1)	S.D. TCC COOLING TOKER BLOKDOKN	N.D. FCC COOLING TONER BLOWDOWN
				(#16)
As	.004			
Ea	(.1	<.001	.011	.001
Cd	<.01	<.1	<.1	<.1
Cr	.06	<.01	<.01	<.01
CN	• VO	1.05	<.05	0.22
F				
Pb	1.6	4.4	2.2	1.6
Hg	.05	.05	K.05	.05
N O ₃	c			
Se	.5	.75	.2	.3
Ag	1.45			
U	<.05	<.05	<.05	<.05
C1	<.05	<.05	<.05	<.05
Cu	48	53	44	47
fe	<.03	<.03	<.03	<.03
	.05	.5	<.05	<.05
Mn CO	<.03	.07	<.03	<.03
SO	1077	1461	1236	1067
TDS4	1906	2732	1694	
Zn	. 48	28	<.01	1973
pH	7.6	6.9	7.7	.17
A1	<1.0	(1.0	1.0	8.0
F			110	<1.0
Co	<.01	. 01	.02	
Ko	<.5	<.5	<.5	.01
Ki	<.05	<.07	<.05	< .5
Fhenols			1.03	<.05 🕌 🖓
TSS	13	0	67	
Cond.	0	ů	108	C
COD	1850	v	148	1800
NH_	0			15



Sampled Well - Dry Well







HAND DELIVERED

March 5, 1985

Dave Boyer NMOCD P.O. Box 2088 Santa Fe, New Mexico 87501

RE: Responses to Comments:

Dear Mr. Boyer:

Please find enclosed our responses to several of your comments. We would like to discuss some of your comments with you prior to our submission of the final response.

Our responses, which follow the same numbering as your comments, are presented below. The effluent data is summarized in the attached report

If you have any questions regarding these responses let me know.

Sincerely, GEOSCIENCE CONSULTANTS, LTD.

Randall T. Hicks Vice President

Enclosure RTH/pg



500 Copper Avenue N.W. Suite 220, Albuquerque, New Mexico 87102 (505) 842-0001

RESPONSE TO NMOCD FEBRUARY 7, 1985 COMMENTS

DISCHARGE PLAN ISSUES

- 1) The attached letter of agreement assures that Navajo will comply with Section 1-203.A. of the WQCC regulations. A spill protection plan for the refinery is scheduled for submission on June 17, 1985.
- 2) We concur that the WQCC Regulations do not specifically exempt discharges regulated by RCRA or the New Mexico Hazardous Waste Regulations. However, it was never the intention of Navajo Refining Company to cover the RCRA regulated discharges under this discharge plan or any discharge plan. Our September 13, 1984 letter to Mr. Ramey included a preliminary outline for the discharge plan which provided for a brief description of the waste management systems regulated under RCRA. This discharge plan addresses only the discharges which are disposed in the evaporation ponds.

Enclosed is a copy applicable portions of of Navajo's RCRA Part B Application. We urge NMOCD to carefully examine this document to determine if this application meets or exceeds WQCC regulatory standards for the RCRA facilities at Navajo. Only one copy of the RCRA Part B application is enclosed. It is submitted for your information only and should not be considered part of this discharge plan.

- 3 and 4) Enclosed is a plan to conduct further hydrogeologic studies at the refinery area to determine if:
 - a) The water quality of Pecos Valley sand/silt aquifer is greater than 10,000 mg/1
 - b) Any potential leakage from the evaporation ponds will affect ground water with a concentration less than 10,000 mg/l.
 - c) The conveyance ditch has integrity and is protecting ground water

HYDROGEOLOGY

- 1) yes
- 2 and 9) Enclosed are <u>legible</u> copies of water well logs provided to Geoscience by the Roswell State Engineer's Office for the one mile perimeter around the refinery. Some of illegible sections of the well logs were, in fact, our own notes. These notes are now reproduced in the copies.
 - 3) Examination of the enclosed well logs will show that no wells for domestic industrial or agricultural purposes (for which data exist) had been completed in either the

Pecos Valley sand/silt aquifer or the shallow perched confined water bearing unit within the area covered by the well logs.

- 4) Kelly, V.C., 1971. Sec References Cited of Sections 1.0-6.0.
- 5) Enclosed is a completed copy of the U.S. Soil Conservation Service Soil Survey of Eddy County from which Figure 4-2 was derived. It is available at most SCS offices. All soil data are derived from Table 4 of this publication.
- 6) The Queen Formation dips slightly to the east and the depth to the top of the Queen will vary. Figure 4-3 of the discharge plan shows the depth to the top of the Queen.
- 7) Noted
- 8) The Bower sand is locally identified by the oil industry as the bottom water sand within the Seven Rivers Formation. The sand is discontinuous and is identified only in the subsurface. The cross section in the discharge plan (Figure 4-3) show the extent in this sand. The wells completed in this sand demonstrate that the ground water in this unit is under artesian pressure.
- 10) Logs for these monitor wells do not exist. Details of the product recovery system will be provided in the plans and specifications to the discharge plan.
- 11) Enclosed
- 12) All of the wells drilled in the refinery area exhibit artesian conditions. This is demonstrated in the lithologic logs which identify the water-bearing units. There are not enough data to determine the source of the demonstrated artesian head in the unit.
- 13) The anomalies may be due to monitor wells tapping different water-bearing units under slightly different pressure conditions.
- 14) Reserved
- 15) Enclosed
- 16) See enclosed plan for hydrogeologic studies.
- 17) The correct pond level for Pond # 3 is 3305. Levels will vary seasonally.

18 and 19) Reserved

20) To be provided

- 21) To be provided
- 22) Revised figure 4-9 (hand delivered to NMOCD on January 25, 1984) shows the location of well 16 north and west of well # 13. A log for well #16 is in our copy of Appendix A. An additional copy of this well log is found in the enclosure.
- 23) Map will be provided. Contingencies will be presented in the final discharge plan.

WATER QUALITY

- These aquifers cannot be affected by the discharge due to the demonstrated artesian conditions in these units. We have provided detailed site specific water quality data on "ground water most likely to be affected by the discharge" (see 3-106.C.3, WQCC regulations). Regional water quality data for these artesian aquifers is available in several reports cited in the discharge plan.
- 2) See enclosed plan for further hydrogeologic studies
- 3) See enclosed plan for further hydrogeologic studies
- 4) "well water" should read "water well". It's location is given in figure 4-9. No completion data are available for this well.
- 5 and 6) Reserved
 - 7) Enclosed
 - 8) Addressed in February 25, 1985 submission

PLANT PROCESSES

- 1) No
- 2 and 4) Plans and specifications will be submitted to the NMOCD engineer (WQCC Regulations 1-202) after Discharge Plan Approval. Phosphates are used in the boilers. Steam generation should volatilize many organic species. All ground water quality data for the refinery area is given in the discharge plan.
 - 3) The TEL pond is not part of this discharge plan and is presently being closed under RCRA.
 - 5) To be provided
 - 6) Total chromium. The analyses for CN has not been repeated. The data is correct to the best of our knowledge.

7) Waste stream # 19 on Figure 5-2 should read #18. Unnumbered waste streams have not and will not be characterized.

8) No

DESCRIPTION OF HYDROGEOLOGIC STUDIES TO BE CONDUCTED AT NAVAJO REFINING COMPANY

EVAPORATION PONDS

In order to demonstrate that ground water with a TDS concentration of 10,000 mg/l or less will not be affected by potential leakage (discharges) from the unlined evaporation ponds, Navajo will demonstrate:

- That the observed high TDS levels near the evaporation ponds are not a manifestation of a localized body of poor quality water.
- That leakage will not result in exceedence of standards for any ground water in other areas or in other (lower) aquifers.
- That high TDS ground water is a natural condition and not due to past practices of Navajo Refining Company.
- 4) That stream standards for the Pecos River will not be exceeded.

In order to make this demonstration the following tasks will be completed:

- Two well points will be installed down gradient and one monitor well up gradient from the evaporation ponds. If required a third drivepoint will be installed down gradient from the ponds.
- 2) Water from these wells will be analyzed for specific conductance and TDS.
- 3) The water level in the wells will be measured and the flow regime determined
- 4) Water samples from the Pecos River (at low flow) will be analyzed

Figure 1 shows the proposed location of 1-1/4 inch well points, the 4" monitor well and the Pecos River sampling points for this demon-stration.

The existing wells in the area of the evaporation pond are fully adequate for monitoring the potential effects of the evaporation ponds on ground water. The new well shown in figure 1 will monitor the ground water up gradient from the ponds. This well program is consistent with the requirement for a demonstration under 3-109.C.1. The existing wells may not establish the precise direction of flow of ground water in the Pecos River Valley silt/sand aquifer because the heads could be affected by fluctuations of the river level. More widely-spaced well data are necessary to establish the regional flow directions. The flow direction will be established and are expected to demonstrate that ground water with less than 10,000 mg/1 TDS cannot be affected by any discharge from the ponds.

A one well, two well point program will be initiated in March. A fully penetrating well (30-35 feet deep) adjacent to the existing, up gradient wells is should demonstrate the existence of a confining layer below the sand/silt aquifer and confirm the poor water quality above and below the confining layer. This well will also replace the existing up gradient well. Two well points will be completed down gradient from the ponds to specifically determine the ground water flow regime.

Sampling of the Pecos River will also be conducted during a low flow period (January-April) to demonstrate that past practices have not caused, and potential future wastewater disposal practices will not result in, an exceedence of stream (surface water) standards. The flow direction in the sand/silt aquifer must be established in order to determine if and where the ground water which flows beneath the ponds discharges to surface water. It is at this ground water discharge point that surface water samples must be taken upgradient samples will also be analized.

The data from this task should corroborate the existing data and demonstrate that:

- The water quality in the Pecos River Valley silt/sand is greater than 10,000 mg/l TDS and
- 2) Stream standards will not be exceeded due to to the wastewater disposal practices of Navajo

FIRE WATER PONDS

A well down-gradient from the fire water ponds to monitor potential effects of seepage from the pond is not necessary. The existing monitor wells demonstrate artesian conditions and potential pond leakage should not affect the discharge plan approval process.

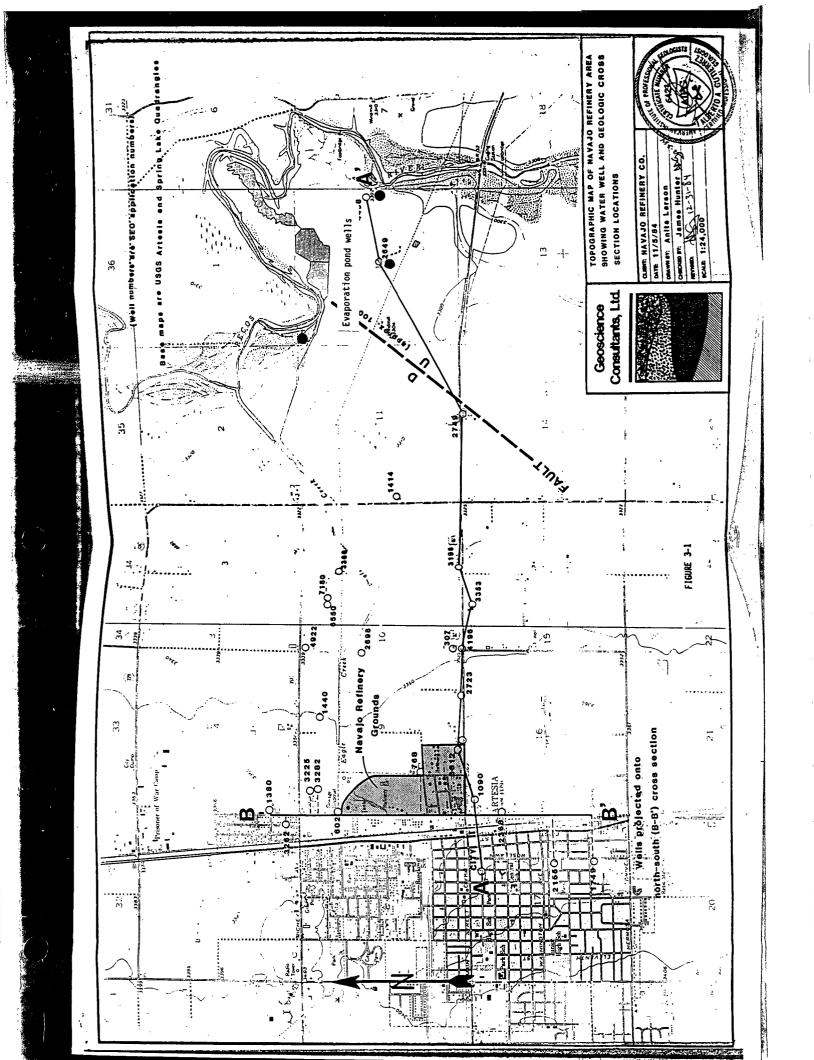


Table III-7 Sample Means for All Monitoring Parameters Through Fourth Quarter

Parameter Unit			We	ell Number	
		<u>31</u> upgradient	<u>32</u> downgradient	<u>33</u> downgradient	<u>34</u> downgradient
Indicator		opgradiem	downgi durenn	downgi dalem	downgradiem
pH	Std Units	7.39	7.29	7.37	7.31
Specific Conductance	umho/cm	2535	2753	3600	2143
Total Organic Carbon	mg/l	53	57	140	42
Total Organic Halogen	mg/l	0.048	0.100	0.288	0.112
Total Dissolved Solids	mg/l	1776	2529	2711	1614
	1119/1	1770	LJL/	2711	1014
Groundwater Quality					
Chloride	mg/l	119	160	179	157
Iron	mg/l	0.43	0.18	0.56	0.55
Manganese	mg/l	1.35	0.40	0.30	0.26
Phenols	mg/l	0.002	0.005	0.001	0.002
Sodium	mg/l	88	37	41	. 101
Sulfate	mg/l	~ 539	1034	1414	415
Primary Drinking Water		х. 			•
Arsenic	mg/l	0.005	0.005	0.005	0.009
Barium	mg/l	0.10	0.05	0.05	0.10
Cadmium	mg/1	0.0005	0.0005	0.0005	0.0005
Chromium	mg/l	0.0009	0.0014	0.0009	0.0015
Fluoride	mg/l	1.04	1.30	2.78	1.17
Lead	mg/l	0.0029	0.0030	0.0030	0.0036
Mercury	mg/l	0.06	0.06	0.06	0.11
Nitrate (as N)	mg/l	0.005	0.006	0.006	0.005
Selenium	mg/l	0.005	0.006	0.006	0.005
Silver	mg/l	0.005	0.005	0.005	0.005.
Endrin	mg/l	0.0001	0.0001	0.0001	0.0001
Lindane	mg/l	0.002	0.002	0.002	0.002
Methyoxychlor	mg/l	0.05	0.05	0.05	0.05
Toxaphene	mg/l	0.0025	0.0025	0.0025	0.0025
2,4-D	mg/l	0.05	0.05	0.05	0.05
2,4,5-TP Silvex	mg/l	0.005	0.005	0.005	0.005
Turbidity	Jackson Units	112	31	95	98
Coliform	col/100 ml	0.5	50	0.5	50,000

*Note:

When analytical result reported as less then detection limit, value assumed to be one half of detection limit.

Table III-3

North Colony Landfarm First Quarter Groundwater Monitoring Results (Sampled 11–1–82 and 12–1–82)

Parameter	Unit	Well Number								
	· .	<u>31</u> upgradient	<u>32</u> downgradient o	<u>33</u> downgradient	<u>34</u> downgradient					
Indicator		opgradiem	downgradienn		downgraaren					
pH	Std. Units	7.3I*	7.41	7.41	7.30					
Specific Conductance	umho/cm	2545*	2693	3590	2563*					
Totol Organic Carbon	mg/l	63 * (49)	240(8)	625(14)	25(64)					
Total Organic Halogen	mg/l	0.042*	0.102	0.065	0.026					
Total Dissolved Solids	mg/l	1434	2014	2812	1684					
Total Dissolved Jonds	ing/i	1454	2014	2012	1001					
Groundwater Quality										
Chloride	mg/l	89(105)	116(125)	163(170)	173(180)					
Iron	mg/l	0.06	<0.01	<0.01	1.81					
Manganese	mg/l	1.08	0.311	0.521	0.567					
Phenols	mg/l	<0.001	<0.001	<0.001	<0.001					
Sodium	mg/l	100(86)	35.4(36)	44.4(39)	88.5(92)					
Sulfate	mg/l	423(540)	1049(1120)	1428(1310)	613(430)					
Primary Drinking Water		,								
Arsenic	mg/l	<0.01	<0.01	<0.01	<0.01					
Barium	mg/l	0.1	<0.1	<0.1	0.1					
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001					
Chromium	mg/l	<0.001	<0.001	<0.001	0.004					
Fluoride	mg/l	1.15	1.28	2.70	1.28					
Lead	mg/l	0.002	0.001	100.0	0.005					
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004					
Nitrate (as N)	mg/l	0.1	0.1	<0.1	<0.1					
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01					
Silver	mg/l	<0.01	<0.01	<0.01	<0.01					
Pesticides & Herbicides		ND	ND	ND	ND					
Radioactivitý		samples no	ot analyzed due	to high TDS						
Turbidity	Jackson Units	75	40	30	190					
Coliform	col/100 ml	1	200	I	200,000					

* average of four replicates

values in parentheses are the results of resampling (12-1-82) and reanalysis.

III-1-12

Parameter	Unit		We	ell Number	
	·	<u>31</u> upgradient	<u>32</u> downgradient	33	<u>34</u> downgradient
Indicator		opgradiem	downgrddiem	downgi ddieni	downgradiem
pH	Std Units	7.0	6.7	6.8	7.1
Specific Conductance	umho/cm	2135*	2300	3030	1900
Total Organic Carbon	mg/l	88 *	10	20	20
Total Organic Halogen	mg/i	0.038*	0.037	0.017	0.043
Total Dissolved Solids	mg/l	1810	3290	2790	1510
ioidi Dissoived Solids	mgri	1010	5270	2770	1510
Groundwater Quality					
Chloride	mg/l	120	150	150	140
Iron	mg/1	0.88	0.09	0.30	0.03
Manganese	mg/I	1.5	0.439	0.234	0.260
Phenois	mg/I	- 0.006	<0.001	0.001	0.005
Sodium	mg/l	81	33	40	43
Sulfate	mg/l	690	990	1450	440
Primary Drinking Water					
Arsenic	mg/l	<0.01	<0.01	<0.01	<0.01
Barium	mg/l	0.2	<0.1	<0.1	0.1
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	0.002	0.004	0.002	0.001
Fluoride	mg/l	1.3	1.7	3.5	1.4
Lead	mg/l	<0.001	<0.001	<0.001	<0.001
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrate (as N)	mg/l	<0.1	<0.1	<0.1	<0.1
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01
Silver	mg/l	<0.01	<0.01	<0.01	<0.01
Pesticides & Herbicides	···	ND	ND	ND	ND
Radioactivity			t analyzed due		
Turbidity	Jackson Units	175	40	110	75
Coliform	col/100 ml	~1	1	1	:1
		•	-	•	•

Table III-4 North Colony Landfarm Second Quarter Groundwater Monitoring Results (Sampled 2-24-83)

average of four replicates

III-1-13

Table III-5 North Colony Landfarm Third Quarter Groundwater Monitoring Results (Sampled 7-14-83)

Parameter	Unit	•	W	ell Number	
<u>, , , , , , , , , , , , , , , , , , , </u>		<u>31</u> upgradient	32	33	<u>34</u> downgradient
Indicator		opgradiem	downgradiem	downgradient	downgradiem
pH	Std Units	.7.56*	7.59	7.46	7.47
Specific Conductance	umho/cm	3040*	3900	5100	2400
·		37*	14	21	2400
Total Organic Carbon	mg/l	<0.05*	0.184	0.748	0.336
Total Organic Halogen	mg/l				
Total Dissolved Solids	mg/l	2130	2730	3570	1680
Groundwater Quality					
Chloride	mg/l	130	200	200	140
Iron	mg/l	<0.01	0.32	0.74	0.09
Manganese	mg/I	0.814	0.335	0.165	0.085
Phenols	mg/l	- <0.001	<0.001	<0.001	<0.001
Sodium	mg/l	86	37	40	61
Sulfate	mg/l	520	1000	1480	330
Primary Drinking Water	,				
Arsenic	mg/l	<0.01	<0.01	<0.01	.0.01
Barium	mg/l	0.1	<0.1	<0.1	0.1
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	<0.001	<0.001	<0.001	<0.001
Fluoride	mg/l	0.82	1.1	2.5	1.0
Lead	mg/l	0.003	0.003	0.005	0.003
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrate (as N)	mg/l	<0.1	<0.1	0.1	0.3
Selenium	mg/l	<0.01	<0.01	<0.01	<0.01
Silver	mg/l	<0.01	<0.01	<0.0I	<0.01
Pesticides & Herbicides	-	ND	ND	ND	ND
Radioactivity		samples n	ot analyzed due	to high TDS	
Turbidity	Jackson Units	75	40	220	40
Coliform	col/100 ml	t	ŧ	r	1

average of four replicates

1

III-1-14

Table III-6 North Colony Landfarm Fourth Quarter Groundwater Monitoring Results (Sampled 10-3-83)

<u>Parameter</u>	Unit		W	ell Number	<u> </u>
		<u>31</u> upgradient	<u>32</u> downgradient	<u>33</u> downgradient	<u>34</u> downgradient
Indicator				j	g
pH	Std Units	7.40	7.44	7.82	7,36
Specific Conductance	umho/cm	2076	2120	2680	1710
Total Organic Carbon	mg/l	26*	12	20	75
Total Organic Halogen	mg/l	0.063*		0.321	0.044
Total Dissolved Solids	mg/l	1730	2050	1670	1580
Groundwater Quality					
Chloride	mg/l	150	210	210	150
Iron	mg/l	0.77	0.30	1.2	0.28
Manganese	mg/l	1.99	0.502	0.272	0.115
Phenols	mg/l	<0.001	<0.001	<0.001	<0.001
Sodium	mg/l	85	43	44	62
Sulfate	mg/l	520	1010	1400	260
Primary Drinking Water					
Arsenic	mg/l	<0.01	<0.01	<0.01	0.02
Barium	mg/l	<0.1	<0.1	<0.1	<0.1
Cadmium	mg/l	<0.001	<0.001	<0.001	<0.001
Chromium	mg/l	<0.001	<0.001	<0.001	<0.001
Fluoride	_mg/l	0.9	1.1	2.4	1.0
Lead	mg/l	0.006	0.006	0.007	0.006
Mercury	mg/l	<0.0004	<0.0004	<0.0004	<0.0004
Nitrate (as N)	mg/l	<0.1	<0.1	<0.1	<0.1
Selenium	mg/l	<0.01	0.01	0.01	<0.01
Silver	mg/l	<0.01	<0.01	<0.01	<0.01
Pesticides & Herbicides		ND	ND	ND /	ND
Radioactivity		samples no	ot analyzed due	to high TDS	
Turbidity	Jackson Units	123	26	19	88
Coliform	col/100 ml	1	I	1	1

average of four replicates



Water Resources Data New Mexico Water Year 1982

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT NM-82-1 Prepared in cooperation with the State of New Mexico and with other agencies

08396500 PECOS RIVER NEAR ARTESIA, NM (Surveillance program station)

LOCATION.--Lat 32°50°27", long 104°19'23", in NW1NW1 sec.18, T.17 S., R.27 E., Eddy County, Hydrologic Unit 13060007, on left bank 250 ft (76 m) upstream from bridge on State Highway 83, 4.3 mi (6.9 km) east of Artesia, 7.0 mi (11.3 km) upstream from Rio Penasco, 17 mi (27.4 km) upstream from McMillan Dam, and at mile 503.9 (810.8 km). Prior to Apr. 3, 1981, at site 250 ft (76 m) downstream.

DRAINAGE AREA.--15,300 mi² (39,630 km²), approximately (contributing area).

WATER-DISCHARGE RECORDS

- PERIOD OF RECORD. --September 1905 to June 1909, August 1909 to current yeas. Monthly discharge only for some periods, published in WSP 1312 and 1712. Records for Aug. 22-31, 1934, and October 1936 to April 1937, published in WSP 763 and 828, respectively are not reliable and should not be used. Prior to February 1936, published as "near Dayton."
- /ISED RECORDS.--WSP 1312 and 1512: 1913, 1915, 1917-18(M), 1920, 1923, 1931-36. WSP 1712: 1906(M), 1908-11(M), 1919, 1921-23(M), 1929, 1931-32(M), 1935-36(M), 1937, 1939(M), 1941(M). See also PERIOD OF RECORD. REVISED RECORDS .-
- GAGE.--Water-stage recorder. Datum of gage is 3,291.92 ft (1,003.376 m) National Geodetic Vertical Datum of 1929. See WSP 1923 or 2123 for history of changes prior to Apr. 5, 1941. Apr. 5, 1941 to Apr. 2, 1981, water-stage recorder at site 250 ft (76 m) downstream at same datum.
- REMARKS.--Water-discharge records fair. Flow regulated by Santa Rosa Lake (station 08382810) since Arpil 1980, by Lake Summer (station 08384000) since August 1937, and by Two Rivers Reservoir (station 08390600) since July 1963. Diversions and ground-water withdrawals for irrigation of about 154,000 acres (620 km²), 1959 determination, above station.

AVERAGE DISCHARGE.--46 years, 244 ft³/s (6.910 m³/s), 176,800 acre-ft/yr (218 hm³/yr).

÷. •.

- EXTREMES FOR PERIOD OF RECORD.--Maximum discharge probably occurred May 30, 1937, when a discharge of 51,500 ft³/s (1,460 m³/s) was measured by slope-area method at a point 15 mi (24.1 km) upstream, gage height, 14.7 ft (4.48 m), site and datum then in use; no flow at times in 1934, 1946-47, 1953-54, 1957, 1964-65.
- EXTREMES OUTSIDE PERIOD OF RECORD. --Greatest flood since at least 1893 occurred Oct. 2, 1904, discharge not
- determined; the peak inflow to Lake McMillan, which includes Rio Penasco and Fourmile Draw, was estimated at 82,000 ft³/s (2,320 m³/s). The second highest flood occurred July 25, 1905, discharge below Rio Penasco, 50,300 ft³/s (1,420 m³/s), based on gain in storage and spill from Lake McMillan. The floods in August 1893and October 1904 damaged McMillan Dam and washed out Avalon Dam.
- EXTREMES FOR CURRENT YEAR.-Maximum discharge, 2,070 ft³/s (58.6 m³/s) at 2230 hours Sept. 15, gage height, 10.15 ft (3.094 m) from floodmarks, no other peak above base of 2,000 ft³/s (57 m³/s); minimum, 1.3 ft³/s (0.037 m³/s) Sept. 2.

DISCHARGE, IN CUBIC FEET PER SECONC, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982 PEAN VALUES

DAY	° 667	NOV	DEC	JAN	F	E8	MAR		APR	***	JUN	JUL	ALG	SEP	
1 2	56	96	59	:3		58	. 49		23	885	.24	70	25	2.1	
2	53	95	62	53		57	49		24	845	19	55	30	1.3	
3	87	88	62	\$3		56	48		24	754	16	154	37	4.9	
4	57	63	62	53		56	42		25	517 -	13	423	57	129	
5	95	77	62	52		56	40		25	246	11	537	87	564	
6 7 8	117	52	62	51		56	39		24	177	10	620	56	654	
7	109	104	· 62	51		56	39		23	143	11	760	34	684	
8	269	93	62	51		56	40		24	117	٤.6	740	32	713	
5	182	83	61	51		55	41		24	1C.e	7.3	860	22	744	
10	104	71	23	30		56	40		22	58	7.7	930	18	750	1
11	168	67	6C	50		59	38		2é	21	6.4	920	15	758	
12	153	64	60	50		59	36		27	ćć	11	88C	2.3	755	
13	127	- 64-	éC	5C		59	39		25	58	7.5	1160	6.0	769	
14	107	64	-6C	50		58	41		28	50	5.5	90C	6.0	842	
15	95	65	÷¢C	115		58	39		2ŧ	51	5.3	911	5.0	973	
16	88	65	60	120		59	35		55C	50	5.7	900	6.0	1240	
17	- 78	64	59	126		59	35		662	48	13	878	4.5	966	
18	73	60	58	110		55	36		715	38	8.6	849	5.5	710	
19	71	55	58	62		51	35		752	25	5.2	798	6_C	324	
20	09	58	58	é4		49	34		805	35	£.1	549	4.0	454	
21	67	58	57	• 69		49	32		832	26	18.3	190	4.5	307	
22	67	59	56	77		49	31		35C	22	8.1	146	3.5	256	
23	72	56	55	-69		48	32		875	19	14	106	3.5	203	
24	60	54	55	fo		48	29		965	20	11	87	4.0	181	
25	ê 6	53	54	78		49	26		385	27	8.6	92	4.0	166	
26	97	53	54	74		49	25		502 1	25	6.9	55	7.0	165	
27	. 101	50	54	69		49	25		818	27	6.0	38	30 、	148	
28	94	52	54	E 5		49	26		812	32	£.9	39	35	128	
29	102	54	53	61			24		815	26	7.8	31	20	99	
30	103	56	53	éÖ			21		770	29	18	25	10 7.C	82	
31	93		53	58	-		20		***	25		22	7.0		
TCTAL	3180	2053	1865	2095	15		1036	1	2345	4685	305.5	14665	594.5	13772.3	
MEAN	103	t3.4	58.2	67.0	54		35.0		412	151	10.2	473	19.2	459	
MAX	269	104	62	150		59	49		965	885	24	1100	£7	1240	
MIN	53	50	53	50		48	20	_	22	19	5.3	22	3.5	1.3	
AC-FT	6310	· 407C	3580	41eC	30	10	2150	2	4490	925C	éûa	29090	1180	27320	
CAL YR			PEAN	90.6	MAX	726		3.0	AC-FT	65590					
WTR YR	1982 TC1	TAL 58104.3	MEAN	159	MAX	1240	MIN	1.3	AC-FT	115230					

· · · ·

.

.

	SPECIFIC	CONDUCT	NNCE (MICR	OMHOS/CM		C), V CE-DAILY	NATER YEAR	OCTOBER	1981 TO	September	1982	
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8650	6130	9810	9900	10200	11000	13700	2780	10600	11200	8220	7430
ž	8580	6400	10100	10000	10300	11100	14200	2830	11200	11100	8510	8100
3	8890	6610	10100	9960	10200	11200	14300	2820	11900	9080	7980	9270
Ă.	5750	6580	9350	10100	10300	11300	14000	3070	12800	3720	6550	9690
5	5780	7030	9270	10000	10200	11300	13800	3190	15600	3010	3940	3080
6	9220	6350	8840	10100	10200	11300		3510	15200	2410	4390	2020
7	9200	6320	9180	10200	10200	11100		3710	15400	1720	4650	1690
8	5300	6190	9170	10100	10100	11200		*4090	16900	1600	5780	1550
9	5260	6720	9440	10100	10100	11100		4370	16400	1370	6930	1520
10	5230	7150	9870	10200	9920	11100		4600	15800	1380	7030	1350
11	5210	7550	9850	10400	9870	11500		4790	16700	1310	7950	1270
12	4070	8000	9890	10100	10600	11700		5190	17300	1230	9500	1120
13	4060	8350	9900	10100	10200	11800		5340.	18700	1180	9810	1090
14	5360	8390	9940	9820	10100	11500		5930	21100	1400	9880	1030
15	6070	8700	9700	9830	10200	11600	-	6370	20600	1170	10500	350 .
16	6690	8880	9750	9850	9940	11500		6870	18700		12400	920
17	7090	8980	9620	11280	7090	12100		7760	20600	1100	12700	970
18	7080	8250	10000	11200	10000	12100		7630	22200	1100	15600	930
19	7720	9080	10000	9.240	10100	11800		8140	17600		15900	1260
20	8030	9070	10100	9 310	10100	12000		8910	16400	1230	16700	1380
21	8290	9280	10100	10900	10700	12200		10700	17900	1560	16400	1430
22	* 8320	9220	10105	10500	10.00	12100	فينف هد ه	10700	17200	1570	16000	2000
23	8330	9510	10200	3730	10800	12000		10200	17400	1770	17000	1920
24	8400	9480	10200		30200	12700		10200	17600		16400	1940
25	7680	9700	10100	-5-5		10200		13000	15000	2080	16700	2230
26	7140	9670	10100	ن ناند رو در	10800	12900		10400	14000		18200	2150
27	6430	9910	10400	9120	11000	12900	2840	10300	14100		19300	2730
28	6440	9900	10400	9150	10900	13100	2820	10100	14800		18700	2900
	5820		10300	9620		12900	2800	9930	18300		25200	3120
30	5800	9670	10400	10000		13400	2830	9680	7430		7460	3530
31	6090		10100	10200		13800		10700		7980	7180	
MEAN WTR YR	6840 1982	8230 MEAN	9880 8790	9880 Max	10300 25200	11900	7780 Min	7030 350	16200	3070	11700	2660

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG.* C), RECORDER MAXIMUM, MINIMUM, AND MEAN, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		PEBRUARY	•		MARCH			APRII	L .		MAY	
1							14800	13000	14000			
2							14800	12700	13400			
2							14400		· 13300	· · ·		
1 2 3 4					•		14400	12500	13400			
5							14300	12200	13200			
2							14300	12200	13200			
6 7 8 9							13100	12100	12500			
7							13400	12100	12700	•		
8							14000	11800	12700			
9							13500	11700	12400			
10							12700	10800	11700			
										•		
11							12100	10400	11200			
12							11400	10000	10800			
13							10700	2600	9710			
14							10100	2100	9400			
15							10700	2500	8920			
12							10/00	2000	8920			
16							9000	4370	5870			
17							4310	3790	4020			
18							3820	2850	3560			
19							2940	2700	2810			
20							2780	2690	2730			
				•							•	
21							2720	2580	2660			
22							2640	2560	2590			
23							2580	2550	2560			
24							2710	2540	2610			
25				•			2790	2570	2680			
							,					
26				•			2700	2580	2620			
27												
28					•							
29												
30					•							
31										•	•	
MONTH							14800	2100	8230			

. .

• • • •

. F .

•

· · . . .

.. .

••

371

: .

÷ -

-- iy

. •



U.S. GEOLOGICAL SURVEY WRD, LIBRARY 505 MARQUETTE NW, RM 720 ALBUQUERQUE, N.M. 87102

Water Resources Data New Mexico Water Year 1983

FOR REFERENCE ROOM USE ONLY

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT NM-83-1 Prepared in cooperation with the State of New Mexico and with other agencies

RIO GRANDE BASIN

08396500 PECOS RIVER NEAR ARTESIA, NH (Surveillance program station)

LOCATION.--Lat 32°50'27", long 104°19'23", in NUKNUK sec.18, T.17 S., R.27 E., Eddy County, Hydrologic Unit 13060007, on left bank 250 ft upstream from bridge on State Highway 83, 4.3 mi east of Artesia, 7.0 mi upstream from Rio Penasco, 17 mi upstream from McMillan Dam, and at mile 503.9.

DRAINAGE AREA. -- 15,300 mi², approximately (contributing area).

98 98

2

1

) 6

3 9 2

WATER-DISCHARGE RECORDS

- FERIOD OF RECORD.--September 1905 to June 1909, August 1909 to current year. Monthly discharge only for some periode, published in WSP 1312 and 1712. Records for Aug. 22-31, 1924, and October 1936 to April 1937, published in WSP 763 and 828, respectively are not reliable and should not be used. Prior to February 1936, published as "near Dayton."
- REVISED RECORDS.--WSP 1312 and 1512: 1913, 1915, 1917-18(M), 1920, 1923, 1931-36. WSP 1712: 1906(M), 1908-11(M), 1919, 1921-23(M), 1929, 1931-32(M), 1935-36(M), 1937, 1939(M), 1941(M). See also PERIOD OF RECORD.
- GAGE.--Water-Stage recorder. Datum of gage is 3,291.92 ft National Geodetic Vertical Datum of 1929. See WSP 1923 or 2123 for history of changes prior to Apr. 5, 1941. Apr. 5, 1941 to Apr. 2, 1981, water-stage recorder at site 250 ft downstream at same datum.

SEMARKS.--Records fair. Flow regulated by Santa Ross Lake (station 08382810) since April 1980, by Lake Summer (station 08384000) since August 1937, and by Two Rivers Reservoir (station 08390600) since July 1963. Diversions and ground-water withdrawals for irrigation of about 154,000 acres, 1959 determination, above station.

AVERAGE DISCHARGE.--47 years, (1937-83), 243 ft³/s, 176,100 acre-ft/yr.

- SITREMES FOR PERIOD OF RECORD. -- Maximum discharge probably occurred May 30, 1937, when a discharge of 51,500 ft³/s was measured by slope-ares method at a point 15 mi upstremm, gage height, 14.7 ft, site and datum then in ume; so flow at times in 1934, 1946-47, 1953-54, 1957, 1964-65.
- EITREMES OUTSIDE PERIOD OF RECORD. --Greatest flood since at least 1893 occurred Oct. 2, 1904, discharge not determined: the pesk inflow to Lake McMillan, which includes Rio Penasco and Pourmile Draw, was estimated at 82,000 ft /s. The second highest flood occurred July 25, 1905, discharge below Rio Penasco, 50,300 ft /s, based on gain in storage and spill from Lake McMillan. The floods in August 1893 and October 1904 damaged McMillan Dam and washed out Avalon Dam.
- EXTERMES FOR CURRENT YEAR. -- Haximum discharge, 895 ft³/s May 16, gage height, 6.59 ft, no peak above base of 2,000 ft³/s; minimum, 0.17 ft³/s Aug. 21.

DISCHARGE, IN CUBIC FEET PEP SECOND, WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983 MEAN VALUES

DAT	OCT	ROA	DEC	JAH	788	MAR	AFR	MAT	JUN	JUL	AUG	SEP
1	73	71	73	63	61	45	26	14	74	7.9	98	363
ž	20 2	66	68	62	60	48	22	20	77	50	96	405
3	645	62	69	59	59	47	24	21	75	24 2	92	440
4	429	59	66	65	58	46	29	24	68	591	90	492
5	231	51	62	64	- 60	42	32	23	45	630	76	458
6	193	58	56	64	62	38	33	189	38	716	56	487
7	157	57	57	64	68	40	44	544	34	730	33	518
8	129	61	55	65	68	37	47	637	31	740	26	521
,	113	55	56	68	66	. 35	53	685	28	760	26	746
10	97	49	61	68	63	34	64	721	26	750	19	727
11	88	49	62	69	62	34	69	7 2 9	22	742	13	656
12	74	51	73	69	61	34	68	750	16	760	10	690
13	69	53	73	69	60	34	58	~ 798	13	780	11	685
14	62	52	72	65	58	34	51	825	15	803	11	622
15	62.	51	74	62	57	34	50	872	18	792	10	614
16	- 78	46	74	61	56	31	58	873	17	860	12	614
17	77	44	58	- 60	51	27	56	822	15	843	8.0	607
18	77	46	67	59	48	28	39	816	14	837	5.8	595
19	78	47	64	58	46	27	31	839	12	819	5.7	600
20	81	47	62	58	46	27	23	794	11	806	5.4	5,27
21	81	47	60	61	45	27	- 20	802	11	818	4.7	4 24
22	78	47	58	64	43	29	19	796	15	802	5.3	219
23	74	45	58	65	45	25	21	715	11	832	5.5	166
24 25	72	44	58	69	45	23	21	313	9.0	815	4.7	135
43	70-	43	56	70	46	24	23	203	9.0	821	5.1	100
26 27	72	43	56	70	46	29	23	153	10	829	6.7	88
	75	50	59	70	44	32	15	109	20	839	8.1	76
	78	57	57	69	43	33	15	92	10	720	7.4	74
10	78	64	57	66	***	34	15	81	13	500	5.6	74
	73	77	65	63	****	31	12	71	10	20 2	65	75
	71		61	61	#==	30		69		119	30 2	
TAL TAL	38 37	1592	1959	2000	1531	1039	1061	14400	767.0	20555.9	1124.0	12798
*41	1.24	53.1	63.2	64.5	54.7	33.5	35.4	465	25.6	663	36.3	4 27
TIE .	645	77	74	70	68	48	69	873	17	860	302	746
4	62	43	55	58	43	23	12	- 14	9.0	7.9	4.7	74
	7610	3160	3890	3970	3040	2060	2100	28560	1520	40770	2230	25380
SAL YR	1982 TOTA		HEAR		1240	MIN 1.3	AC-FT	115900				
ATE TR	1983 TOLA	L 62663.9	HEAR	172 HAX	873	NIN 4.7	AC-PT	124 300				

٩;

SPECIFIC CONDUCTANCE (HICROMHOS/CH AT 25 DEG.* C), WATER YEAR OCTOBER 1982 TO SEPTEMBER 1983 ONCE-DAILY

WTR YR	1983	HEAN	7300	HAX	18500		NIN	960				
MEAN	4410	7410	7600	8320	9160	11500	10900	4870	9070	4220	8520	17
31	5670		8610	8430		11300		4570		1730	12900	-
30	5380	7120	8210	8330		10900	15100	4270	11400	1650	14200	43
29	5400	7620	8310	8240		10900	14600	3180	10900	1530	13800	36
28	5310	7540	8340	8140	9950	10900	14700	3080	6990	1470	18000	3
27	5280	7570	8360	8140	10000	12500	12800	2960	5640	1080	18500	3
26	5490	7800	8500	8050	9950	13200	12100	2850	6250	1010	15400	2
25	5500	8050	8460	8120	9820	13400	13100	2790	12200	1030	11100	2
24	5530	8180	8320	8430	10100	12700	13200	2740	11700	960	11000	1
23	5280	8280	8150	8430	9970	12100	12700	2430	13800	960	11200	1
22	5110	8370	7990	8300	9890	12100	11500	2400	14200	960	9730	1
21	4940	8360	7810	8740	9920	12700	10800	2420	13500	970	8860	1
20	5210	8320	7550	8870	9970	12400	9470	2430	13000	980	8950	ī
9	5220	7900	7300	8780	9840.	12400	9310	2450	12800	960	9160	ī
18	5280	7870	7080	8530	9770	12400	8620	2630	11700	1010	8110	ī
.6 17	5590 5380	7670 7790	6970 6940	7960 8350	9000 9490	11700 12100	8660 8270	2870 2690	10300 9260	1060 1170	9000 9020	1
					8800		. 8800				5660	1
5	5890	7670	7330	7940		11600		2940	10500	1060		
.3 .4	5480	7560	7450	8080	8790	11700	8440	2850	11900	1100	8820	
.2	4630 5280	7310	7480	7950	8580 8740	11400	8460	2920	8890 9920	1150 1130	9500	1
11	4060	7210 7380	7160 7460	8050 8050	8360	11300 11400	9710 9640	2920 2920	8160	1150	5970 6770	1
											-	
0	2740	6890	8230	8110	8410	11300	9890	3040	7950	1170	5140	ī
ğ	2710	6880	7540	8580	8430	11200	9470	3090	6960	1250	5660	ī
8	2270	6760	7330	8290	8280	10900	9120	3670	6470	1280	4680	ī
6 7	1860 1980	7190 7140	6 890 7200	8260 8410	8580 8550	10400	9950 10200	11000 4020	6070 6470	16600 15300	3180 3940	1
-												
š	1680	6800	6830	8450	8700	10400	10900	10700	4810	17600	2900	ī
i.	1530	6720	6900	8430	8700	10300	10900	11900	5060	13700	3070	ī
3	1940	6230	6830	8660	8720	9890	13200	13300	5330	13400	2720	2
1 2	3990	6070 6180	7160 6900	8520 8230	8540 8530	10200 10100	12300 12500	14500 14400	4830 5190	13200 13300	1890 2180	2
•	5000											
AT	OCT	NOA	DEC	JAN	723	HAR	APB	HAT	TOM	JUL	AUC	

TEMPERATURE WATER (DEG.* C), WATER TEAR OCTOBER 1982 TO SEPTEMBER 1983 ORCE-DAILT

								· •				
DAY	OCT	.NOV	DEC	JAN	783	MAR	APR	MAT	JUN	JUL	AUG	· 52P
1	25.0	17.5	10.0	.5	8.0	18.0	12.0	17.0	19.0	30.0	24.0	29.0
2	22.0	14.0	9.5	3.0	9.0	18.0	14.0	20.5	25.0	28.0	30.0	26.0
3	19.0	13.0	5.0	.0	9.5	18.5	19.5	15.0	25.0	30.5	30.5	26.0
· •	19.0	10.0	9.0	0	7.0	13.5	7.5	20.5	27.5	28.5	29.5	26.5
5	21.0	13.5	9.0	. 3 . 5	6.5	12.0	8.0	20.0	20.0	25.0	26.0	28.5
6	23.0	15.0	6.0	5.5	8.5	10.0	5.0	21.0	23.0	25.0	23.5	24.5
7	19.0	11.0	10.0	4.5 .	8.0	14.5	7.0	18.0	27.5	25.5	30.0	27.0
8	21.0	12.0	6.0	6.5	12.5	19.0	8.0	21.0	27.0	26.0	28.5	27.0
9	18.0	17.5	7.0	8.5	9.0	18.0	16.0	20.5	22.0	26.5	25.5	25.0
10	19.0	15.5	5.0	9.0	9.0	21.0	15.5	21.0	21.0	27.0	24.5	25.0
11	18.0	14.0	5.0	9.5	14.0	12.5	15.0	21.0	31.0	- 27.0	31.0	27.0
12	15.0	13.0	5.0	8.0	9.0	19.0	20.5	19.5	29.0	27.5	25.0	26.0
13	13.5	12.5	9.0	6.5	14.0	21.0	15.0	19.0	28.5	27.5	30.0	24.0
14	13.0	9.5	5.0	9.5	10.0	21.0	11.0	18.5	22.5	25.0	26.0	25.0
15	20.5	8.0	8.0	8.5	15.0	17.0	20.5	18.0	24.5	27.0	29.0	24.5
16	16.0	9.0	5.0	11.0	11.0	16.0	22.0	19.0	30.0	28.0	26.5	25.5
17	- 15.5	8.5	6.0	9.5	12.0	10.0	15.0	21.0	28.0	25.5	30.0	23.0
18	17.0	12.0	7.5	10.0	12.5	18.0	22.0	20.0	32.0	26.0	30.5	25.0
19	21.5	13.0	7.5	11.0	15.0	12.0	15.0	17.0	31.0	28.0	30.0	24.0
20	16.0	15.0	6.5	11.0	13.0	10.5	23.0	19.0	29.0	25.0	28.0	26.0
21	18.5	14.5	7.0	~9.0	13.0	11.0	15.5	18.0	27.0	27.0	29.0	22.0
22	13.0	12.5	7.5	7.0	10.0	17.0	15.0	18.5	27.5	28.0	26.5	20.0
23	18.0	7.5	7.0	9.0	13.0	14.5	15.0	20.5	24.0	26.0	25.0	17.5
24	16.0	8.5	10.5	5.5	13.0	12.0	23.5	24.0	23.0	26.5	25.0	22.0
25	15.5	7.0	6.5	11.0	12.0	14.5	18.0	21.0	21.5	27.5	- 31.0	20.0
26	15.0	5.0	9.0	9.0	10.5	16.0	18.0	24.5	27.0	25.5	27.0	25.0
27	17.0	Å.5	4.0	7.5	13.0	11.0	26.0	20.5	23.0	29.0	30.5	25.0
28	15.0	6.5	4.0	12.0	11.5	15.0	25.0	25.0	21.0	28.0	26.0	27.0
29	18.0	9.0	3.0	10.0		20.0	23.0	23.0	31.0	29.5	25.0	23.0
30	17.0	11.0	3.0	8.0		21.5	18.5	25.0	29.0	29.5	29.0	22.5
31	16.5		2.0	11.0		23.0		19.5	***	27.5	27.0	
NEAN	18.0	.11.5	6.5	7.5	11.0	16.0	16.5	20.0	26.0	27.0	27.5	24.3
VTR YR	1983	HEAN	17.5	HAX	32.0	ж	IN	.0				

·

320

· •,



Water Resources Data New Mexico Water Year 1982

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT NM-82-1 Prepared in cooperation with the State of New Mexico and with other regoncies



RIO GRANDE BASIN



08396500 PECOS RIVER NEAR ARTESIA, NM (Surveillance program station)

LOCATION.--Lat 32°50'27", long 104°19'23", in NW\NW\ sec.18, T.17 S., R.27 E., Eddy County, Hydrologic Unit 13060007, on left bank 250 ft (76 m) upstream from bridge on State Highway 83, 4.3 mi (6.9 km) east of Artesia, 7.0 mi (11.3 km) upstream from Rio Penasco, 17 mi (27.4 km) upstream from McMillan Dam, and at mile 503.9 (8J0.8 km). Prior to Apr. 3, 1981, at site 250 ft (76 m) downstream.

DRAINAGE AREA.--15,300 mi² (39,630 km²), approximately (contributing area).

WATER-DISCHARGE RECORDS

- PERIOD OF RECORD. -- September 1905 to June 1909, August 1909 to current year. Monthly discharge only for some periods, published in WSP 1312 and 1712. Records for Aug. 22-31, 1934, and October 1936 to April 1937, published in WSP 763 and 828, respectively are not reliable and should not be used. Prior to February 1936, published as "near Dayton."
- REVISED RECORDS.--WSP 1312 and 1512: 1913, 1915, 1917-18(M), 1920, 1923, 1931-36. WSP 1712: 1906(M), 1908-11(M), 1919, 1921-23(M), 1929, 1931-32(M), 1935-36(M), 1937, 1939(M), 1941(M). See also PERIOD OF RECORD.
- GAGE.--Water-stage recorder. Datum of gage is 3,291.92 ft (1,003.376 m) National Geodetic Vertical Datum of 1929. See WSP 1923 or 2123 for history of changes prior to Apr. 5, 1941. Apr. 5, 1941 to Apr. 2, 1981, water-stage recorder at site 250 ft (76 m) downstream at same datum.
- REMARKS.--Water-discharge records fair. Flow regulated by Santa Rosa Lake (station 08382810) since Arpil 1980, by Lake Summer (station 08384000) since August 1937, and by Two Rivers Reservoir (station 08390600) since July 1963. Diversions and ground-water withdrawals for irrigation of about 154,000 acres (620 km²), 1959 determination, above station.

AVERAGE DISCHARGE.--46 years, 244 ft 3 /s (6.910 m 3 /s), 176,800 acre-ft/yr (218 hm 3 /yr).

- EXTREMES FOR PERIOD OF RECORD.--Maximum discharge probably occurred May 30, 1937, when a discharge of 51,500 ft³/s (1,460 m³/s) was measured by slope-area method at a point 15 mi (24.1 km) upstream, gage height, 14.7 ft (4.48 m), site and datum then in use; no flow at times in 1934, 1946-47, 1953-54, 1957, 1964-65.
- EXTREMES OUTSIDE PERIOD OF RECORD.--Greatest flood since at least 1893 occurred Oct. 2, 1904, discharge not determined; the peak inflow to Lake McMillan, which includes Rio Penasco and Fourmile Draw, was estimated at 82,000 ft³/s (2,320 m³/s). The second highest flood occurred July 25, 1905, discharge below Rio Penasco, 50,300 ft³/s (1,420 m³/s), based on gain in storage and spill from Lake McMillan. The floods in August 1893and October 1904 damaged McMillan Dam and washed out Avalon Dam.
- EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,070 ft³/s (58.6 m³/s) at 2230 hours Sept. 15, gage height, 10.15 ft (3.094 m) from floodmarks, no other peak above base of 2,000 ft³/s (57 m³/s); minimum, 1.3 ft³/s (0.037 m³/s) Sept. 2.

DISCHARGE, IN CUBIC FEET PER SECONC, WATER YEAR OCTOBER 1981 TC SEPTEMBER 1982 MEAN VALUES

DAY	CCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	ALG	SEP
1	56	96	59	53	58	49	23	885	24	70	25	2.1
2	53	95	62	. 53	57	49	24	845	19	55	30	1.3
3	87	88	62	53	56	48	24	754	16	154	37	4.9
4	57	83	62	53	56	42	25	517	13	483	57	129
5	95	77	62	52	56	40	25	246	11	537	87	564
6	117	¥2	· 62	51	56	39	24	177	10	620	50	654
7	109	104	62	51	56	39	23	143	11	76C	34	684
8	269	93	62	51	56	40	24	117	8.6	740	32	713
ç	182	83	61	51	55	41	24	166	7.3	80C	22	744
10	104	71	60	50	56	40	22	58	7.7	930	18	750
11	168	67	60	50	59	38	26	81	6.4	920	15	758
12	153	64	6 C	50	59	36	27	é ó	11	283	2.3	755
13	127	64	éC	5 C	59	39	25	58	7.5	1100	6.0	769
14	107	64	6 C	50	58	41	28	50	5.5	90C	6.C	842
15	95	65	6C	115	58	39	26	51	5.3	911	5.0	973
10	88	65	6C	120	59	35	55C	50	5.7	900	6.C	1240
17	78	£4	59	126	59	35	662	48	13	878	6.5	966
18	73	60	58	110	55	36	715	38	8.6	849	5.5	710
19	71	55	58	62	51	35	752	35	5.2	798	6.C	324
20	69	58	58	64	49	34	805	32	٤.1	549	4.C	454
21	67	58	57	69	49	32	832	26	٤.3	190	4.5	307
22	67	59	56	77	49	31	85C	22	٤.1	146	3.5	256
23	72	56	55	89	48	32	875	19	14	106	3.5	203
24	80	54	55	80	48	29	965	20	11	87	4.C	181
25	ôć	53	54	78	49	26	888	27	٤.6	92	4.0	166
20	97	53	54	74	49	25	So2	25	6.9	55	7.C	165 、
27	101	50	54	69	49	25	818	27	٤.0	36	30	148
32	94	52	54	65	49	26	812	32	6.9	39	35	128
29	102	54	53	61		24	815	36	7.8	31	20	99
30	103	56	53	60		21	770	29	18	25	10	82
31	93		5,3	58		20		25		22	7.0	
TCTAL	3160	2053	1865	2095	1518	1086	12345	4685	305.5	14665	594.5	13772.3
MEAN	103	65.4	58.2	67.6	54.2	35.0	412	151	10.2	473	19.2	459
MAX	269	104	62	120	59	49	965	585	24	1100	87	1240
MIN	53	5 C	53	50	4 É	20	22	19	5.3	22	3.5	1.3
4C-FT	e310	4070	3580	41 e C	3010	2150	24490	9250	éÖe	29090	1180	27320
CAL YR			PEAN	90.6	MAX 788	MIN		65590				
NTE YE	1932 TCTAL	55104.3	MEAN	159	MAX 1240	MIN	1.3 AC-FT	115230				

PERIOD OF RECORD.--Water years 1937 to current year.

PERIOD OF DAILY RECORD .---SPECIFIC CONDUCTANCE: July 1937 to current year. WATER TEMPERATURES: April 1949 to current year. SUSPENDED SEDIMENT DISCHARGE: January 1949 to current year.

REMARKS .-- Continuous water-temperature and specific conductance recorder since July 1981.

EXTREMES FOR PERIOD OF DAILY RECORD.--SPECIFIC CONDUCTANCE: Maximum daily, 28,800 micromhos June 24, 1977; minimum daily, 111 micromhos Aug. 31, 1982. WATER TEMPERATURES: Maximum, 36.0°C July 27, 1966, July 25, 1969; minimum, 0.0°C on many days during winter months of most years.

SEDIMENT CONCENTRATIONS: Maximum daily, 21,300 mg/L Aug. 1, 1962; minimum daily, 0 mg/L on several days in December, 1982

SEDIMENT LOADS: Maximum daily, 193,000 tons (166,000 tonnes) Sept. 26, 1955; minimum daily, 0 tons (0 tonnes) on many days during July 1953, July and August 1954, July 1957, July to October 1964, December, 1982.

EXTREMES FOR CURRENT YEAR .---

SPECIFIC CONDUCTANCE: Maximum daily, 25,200 micromhos Aug. 29; minimum daily, 111 micromhos Aug. 31. WATER TEMPERATURES: Maximum, 35.5°C Sept. 1; minimum, 2.0°C Jan. 15. SEDIMENT CONCENTRATIONS: Maximum daily, 6,350 mg/L Apr. 17; minimum daily, 0 mg/L on several days in December. SEDIMENT LOADS: Maximum daily, 11,300 tons (10,300 tonnes) Apr. 17; minimum daily, 0 ton (0 tonne) on several days in December.

> • 5 111 ...

Ą

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

				SPE-						OXYGEN	
			SPE-	CIFIC						DEMAND,	
		STREAM-	CIFIC	CON-	DU	PH	ODWDDD		OVVCEN	CHEM-	HARD-
		FLOW, 1NSTAN-	CON- DUCT-	DUCT- ANCE	PH (STAND-	LAB (STAND-	TEMPER- ATURE,	TEMPER-	OXYGEN, DIS-	ICAL (HIGH	NESS (MG/L
	TIME	TANEOUS	ANCE	LAB	ARD	ARD	AIR	ATURE	SOLVED	LEVEL)	AS
DATE	1146	(CFS)	(UMHOS)	(UMHOS)	UNITS)	UNITS)	(DEG C)	(DEG C)	(MG/L)	(MG/L)	CACO3)
DATE		(00061)	(00095)	(90095)	(00400)	(00403)	(00020)	(00010)	(00300)	(00340)	(00900)
DEC		(00001)	(000)0)	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(,	(,	(***==*)	(00010)	(00000)	(00010)	(,
02	1300	60	10000	10300	8.2	7.7	13.0	8.5		< 94	2653
APR											
01	1100	22 .	14500	13400	8.0	7.1	21.0	14.0	8.3	250	3255
16	1600		10400								
26	1600	866	2870	2870	8.0	7.5	33.0	16.0	8.2	53	1599
AUG											1057
31	1215	7.3	-	- 7500	8.2	8.3	28.0	28.0		32	1957
	HARD-		MAGNE-		SODIUM	POTAS-	BICAR-	CAR-		CHLO-	FLUO-
	HARD- NESS,	CALCIUM	MAGNE- SIUM,	SODIUM,	SODIUM AD-	POTAS- SIUM,	BICAR- BONATE	CAR- BONATE	SULFATE	CHLO- RIDE,	FLUO- RIDE,
		CALCIUM DIS-		SODIUM, DIS-					SULFATE DIS~		
	NESS,		SIUM,		AD-	SIUM, DIS- SOLVED	BONATE ITFLD (MG/L	BONATE ITFLD (MG/L	DIS~ SOLVED	RIDE, DIS- SOLVED	RIDE, DIS- SOLVED
	NESS, NONCAR- BONATE (MG/L	DIS- SOLVED (MG/L	SIUM, DIS- SOLVED (MG/L	DIS- SOLVED (MG/L	AD- SORP-	SIUM, DIS- SOLVED (MG/L	BONATE ITFLD (MG/L AS	BONATE ITFLD (MG/L AS	DIS- SOLVED (MG/L	RIDE, DIS- SOLVED (MG/L	RIDE, DIS- SOLVED (MG/L
DATE	NESS, NONCAR- BONATE (MG/L CACO3)	DIS- SOLVED (MG/L AS CA)	SIUM, DIS- SOLVED (MG/L AS MG)	DIS- SOLVED (MG/L AS NA)	AD- SORP- TION RATIO	SIUM, DIS- SOLVED (MG/L AS K)	BONATE ITFLD (MG/L AS HCO3)	BONATE ITFLD (MG/L AS CO3)	DIS- SOLVED (MG/L AS SO4)	RIDE, DIS- SOLVED (MG/L AS CL)	RIDE, DIS- SOLVED (MG/L AS F)
	NESS, NONCAR- BONATE (MG/L	DIS- SOLVED (MG/L	SIUM, DIS- SOLVED (MG/L	DIS- SOLVED (MG/L	AD- SORP- TION	SIUM, DIS- SOLVED (MG/L	BONATE ITFLD (MG/L AS	BONATE ITFLD (MG/L AS	DIS- SOLVED (MG/L	RIDE, DIS- SOLVED (MG/L	RIDE, DIS- SOLVED (MG/L
DEC	NESS, NONCAR- BONATE (MG/L CACO3) (00902)	DIS- SOLVED (MG/L AS CA) (00915)	SIUM, DIS- SOLVED (MG/L AS MG) (00925)	DIS- SOLVED (MG/L AS NA) (00930)	AD- SORP- TION KATIO (00931)	SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE ITFLD (MG/L AS HCO3)	BONATE ITFLD (MG/L AS CO3) (99445)	DIS- SOLVED (MG/L AS SO4) (00945)	RIDE, DIS- SOLVED (MG/L AS CL) (00940)	RIDE, DIS- SOLVED (MG/L AS F) (00950)
DEC 02	NESS, NONCAR- BONATE (MG/L CACO3)	DIS- SOLVED (MG/L AS CA)	SIUM, DIS- SOLVED (MG/L AS MG)	DIS- SOLVED (MG/L AS NA)	AD- SORP- TION RATIO	SIUM, DIS- SOLVED (MG/L AS K)	BONATE ITFLD (MG/L AS HCO3)	BONATE ITFLD (MG/L AS CO3)	DIS- SOLVED (MG/L AS SO4)	RIDE, DIS- SOLVED (MG/L AS CL)	RIDE, DIS- SOLVED (MG/L AS F)
DEC 02 APR	NESS, NONCAR- BONATE (MG/L CACO3) (00902) 2483	DIS- SOLVED (MG/L AS CA) (00915) 650	SIUM, DIS- SOLVED (MG/L AS MG) (00925) 250	DIS- SOLVED (MG/L AS NA) (00930) 1300	AD- SORP- TION RATIO (00931) 11	SIUM, DIS- SOLVED (MG/L AS K) (00935) 10	BONATE ITFLD (MG/L AS HCO3) (99440)	BONATE ITFLD (MG/L AS CO3) (99445)	DIS- SOLVED (MG/L AS SO4) (00945) 2100	RIDE, DIS- SOLVED (MG/L AS CL) (00940) 2500	RIDE, DIS- SOLVED (MG/L AS F) (00950) .8
DEC 02 APR 01	NESS, NONCAR- BONATE (MG/L CACO3) (00902) 2483 3105	DIS- SOLVED (MG/L AS CA) (00915)	SIUM, DIS- SOLVED (MG/L AS MG) (00925)	DIS- SOLVED (MG/L AS NA) (00930)	AD- SORP- TION KATIO (00931)	SIUM, DIS- SOLVED (MG/L AS K) (00935)	BONATE ITFLD (MG/L AS HCO3)	BONATE ITFLD (MG/L AS CO3) (99445)	DIS- SOLVED (MG/L AS SO4) (00945)	RIDE, DIS- SOLVED (MG/L AS CL) (00940)	RIDE, DIS- SOLVED (MG/L AS F) (00950)
DEC 02 APR 01 16	NESS, NONCAR- BONATE (MG/L CACO3) (00902) 2483 3105	DIS- SOLVED (MG/L AS CA) (00915) 650 710	SIUM, DIS- SOLVED (MG/L AS MG) (00925) 250 360	DIS- SOLVED (MG/L AS NA) (00930) 1300 2200	AD- SORP- TION KATIO (00931) 11 17	SIUM, DIS- SOLVED (MG/L AS K) (00935) 10 18 	BONATE ITFLD (MG/L AS HCO3) (99440) 180	BONATE ITFLD (MG/L AS CO3) (99445) .00	DIS- SOLVED (MG/L AS SO4) (00945) 2100 2600	RIDE, DIS- SOLVED (MG/L AS CL) (00940) 2500 4000	RIDE, DIS- SOLVED (MG/L AS F) (00950) .8 .9
DEC 02 APR 01 16 26	NESS, NONCAR- BONATE (MG/L CACO3) (00902) 2483 3105	DIS- SOLVED (MG/L AS CA) (00915) 650	SIUM, DIS- SOLVED (MG/L AS MG) (00925) 250 360	DIS- SOLVED (MG/L AS NA) (00930) 1300 2200	AD- SORP- TION KATIO (00931) 11 17	SIUM, DIS- SOLVED (MG/L AS K) (00935) 10	BONATE ITFLD (MG/L AS HCO3) (99440)	BONATE ITFLD (MG/L AS CO3) (99445) 	DIS- SOLVED (MG/L AS SO4) (00945) 2100	RIDE, DIS- SOLVED (MG/L AS CL) (00940) 2500	RIDE, DIS- SOLVED (MG/L AS F) (00950) .8 .9
DEC 02 APR 01 16	NESS, NONCAR- BONATE (MG/L CACO3) (00902) 2483 3105	DIS- SOLVED (MG/L AS CA) (00915) 650 710	SIUM, DIS- SOLVED (MG/L AS MG) (00925) 250 360	DIS- SOLVED (MG/L AS NA) (00930) 1300 2200	AD- SORP- TION KATIO (00931) 11 17 	SIUM, DIS- SOLVED (MG/L AS K) (00935) 10 18 	BONATE ITFLD (MG/L AS HCO3) (99440) 180	BONATE ITFLD (MG/L AS CO3) (99445) .00	DIS- SOLVED (MG/L AS SO4) (00945) 2100 2600	RIDE, DIS- SOLVED (MG/L AS CL) (00940) 2500 4000	RIDE, DIS- SOLVED (MG/L AS F) (00950) .8 .9

		SOLIDS,		NITRO-					PHOS-	
	SILICA,	SUM OF	NITRO-	GEN,	NITRO-	NITRO-			PHORUS,	
	DIS-	CONSTI-	GEN,	NO2+NO3	GEN,	GEN,	NITRO-	PHOS-	ORTHO,	CARBON,
	SOLVED	TUENTS,	NO2+NO3	DIS-	AMMONIA	ORGANIC	GEN,	PHORUS,	DIS-	ORGANIC
	(MG/L	DIS-	TOTAL	SOLVED	TOTAL	TOTAL	TOTAL	TOTAL	SOLVED	TOTAL
	AS	SOLVED	(MG/L							
DATE	S102)	(MG/L)	AS N)	AS P)	AS P)	AS C)				
	(00955)	(70301)	(00630)	(00631)	(00610)	(00605)	(00600)	(00665)	(00671)	(00680)
DEC										
02	9.8	6930	1.1	1.1	.320	.98	2.4	.130	.060	3.9
APR		•								
01	8.0	9990	<.10	.15	.300	.21		.280	.090	8.8
16										
26	9.9	2510	.13	.16	.120	2.6	2.8		.030	13
AUG										
31	10	5460	.20	.12	.130	1.1	1.4	.090	.050	5.3

3

TEMPERATURE WATER (DEG.° C), RECORDER MAXIMUM, MINIMUM, AND MEAN, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MAX	MIN	MEAN	XAM	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
1 2 3 4 5		FEBRUARY			MARCH		17.5 20.5 17.5 22.5 22.0	APRIL 14.5 11.5 10.0 11.5 11.0	16.5 16.0 14.0 16.5 16.5		МАҮ	
6 7 8 9 10							18.5 18.5 21.5 20.0 22.0	11.5 12.5 11.5 13.5 13.5	15.0 15.5 16.5 17.0 18.0			
11 12 13 14 15							23.5 24.5 26.0 22.5 24.0	13.0 16.0 16.5 17.0 13.5	18.5 20.5 21.5 20.0 18.5			
16 17 18 19 20			·				20.0 17.5 17.5 16.5 16.5	15.5 15.5 10.0 15.0 15.5	18.0 16.5 15.5 16.0 16.0			
21 22 23 24 25							15.5 14.0 12.5 12.0 14.0	14.0 12.5 11.5 11.5 12.0	14.5 13.5 12.0 11.5 12.5			
26 27 28 29 30 31 MONTH							14.5 26.0	14.0 10.0	14.0 16.0			
DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	мах	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMB	ER
1 2 3 4 5							 			35.5 32.0 31.5	24.0 24.5 22.0	29.0 27.0 24.5
6 7 8 9 10									 			
11 12 13 14 15							 					
16 17 18 19 20		·								 		
21 22 23 24 25												
25 26 27 28 29 30												
31							33.5	28.0	31.0			

373

ļ

i

9650

RIO GRANDE BASIN 96500 PECOS RIVER NEAR ARTESIA, NM -- Continued WATER-QUALITY RECORDS

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN TRATION (MG/L)	LOADS (T/DAY)
1 . 2 3 4 5		CTOBER 3.3 3.1 9.2 8.9 16	NOV 31 27 43 42 38	VEMBER 8.0 6.9 10 9.4 7.9	DEC 6 21 12 7 3	CEMBER .96 3.5 2.0 1.2 .50	J. 5 7 9 6 7	ANUARY .72 1.0 1.3 .86 .98	FEE 4 3 3 2 2	00000000000000000000000000000000000000	7 5 6 13 4	MARCH .93 .66 .78 1.5 .43
6 7 8 9 10	65 68 470 417 1050	21 20 341 205 ⁻ 465	31 30 32 23 27	7.7 8.4 8.0 5.2 5.2	1 1 0 0 1	.17 .17 .00 .00 .16	4 6 9 7	.55 .83 .83 1.2 .95	8 5 4 2 3	1.2 .76 .60 .30 .45	4 4 7 6 7	.42 .42 .76 .66 .76
11 12 13 14 15	1150 2020 1560 453 254	522 834 535 131 65	26 30 18 15 15	4.7 5.2 3.1 2.6 2.6	1 3 2 0 0	.16 .49 .32 .00 .00	9 7 7 6 8	1.2 .95 .95 .81 2.5	5 6 4 5 5	.80 .96 .64 .78 .78	12 13 19 18 22	1.2 1.3 2.0 2.0 2.3
16 17 18 19 20	176 76 61 48 53	42 16 12 9.2 9.9	26 20 21 24 27	4.6 3.5 3.4 3.6 4.2	0 1 0 1 0	.00 .16 .00 .16 .00	7 8 9 11 10	2.3 2.6 2.7 1.8 1.7	6 9 5 4 5	.96 1.4 .74 .55 .66	32 14 14 21 18	3.0 1.3 1.4 2.0 1.7
21 22 23 24 25	53 50 47 49 66	9.6 9.0 9.1 11 15	14 12 10 13 9	2.2 1.9 1.5 1.9 1.3	2 4 5 9	.31 .60 .74 .74 1.3	9 12 13 9 8	1.7 2.5 3.1 2.1 1.7	3 4 8 5 5	.40 .53 1.0 .65 .66	14 21 24 13 12	1.2 1.8 2.1 1.0 .84
26 27 28 29 30 31 TOTAL	92 75 75 95 96 38	24 20 19 26 27 9.5 3447.8	10 9 10 8 8	1.4 1.2 1.4 1.2 1.2 1.2	7 3 7 5 2 1	1.0 .44 1.0 .72 .29 .14 17.23	8 6 7 10 7	1.6 1.1 1.2 1.2 1.6 1.1 45.63	4 2 5 	.53 .26 .66 18.41	11 11 13 31 28 16	.74 .74 .91 2.0 1.6 .86 39.31
	MEAN CONCEN-		MEAN CONCEN-		MEAN CONCEN		MEAN CONCEN-		MEAN CONCEN-		MEAN CONCEN-	
DAY	TRATION (MG/L)	LOADS (T/DAY)	TRATION	LOADS (T/DAY)	TRATION	(TY/DAY)	TRATION (MG/L)	LOADS (T/DAY)	TRATION	(77/1)/08/1	TRATION	LOADS (T/DAY)
DAY 1 2 3 4 5	(MG/L)	(T/DAY) APRIL	TRATION	LOADS (T/DAY) MAY 5540 4880 4190 1940 531	TRATION (MG/L)	(TY/DAY)	(MG/L)	(T/DAY)	TRATION	(77/1)/08/1	TRATION	(PC/DAV)
1 2 3 4	(MG/L) 19 25 24 40	(T/DAY) APRIL 1.2 1.6 1.6 2.7	TRATION (MG/L) 2320 2140 2060 1390	(T/DAY) MAY 5540 4880 4190 1940	TRATION (MG/L) 37 36 33 58 53 46	(T/DAY) JUNE 2.4 1.8 1.4 2.0 1.6 1.2	(MG/L)	(T/DAY)	TRATION (MG/L) 48 70 72 59 79 54	(77/1)/08/1	TRATION	(T/DAY) PTEMBER .12 .06 .20 693 6520 6410
1 2 3 4 5 6 7 8 9	(MG/L) 19 25 24 40 26 26 60 25 44	(T/DAY) APRJL 1.2 1.6 1.6 2.7 1.8 1.7 3.7 1.6 2.9	TRATION (MG/L) 2320 2140 2060 1390 800 550 454 279 234	(T/DAY) NAY 5540 4880 4190 1940 531 263 175 88 67	TRATION (MG/L) 37 36 33 58 53 46 31 31 22	(T/DAY) JUNE 2.4 1.8 1.4 2.0 1.6 1.2 .92 .72 .43	(MG/L) 22 39 363 5260 4550 3750 3220 2650 2650 2150	(T/DAY) JULY 4.2 5.8 368 6860 6600 6280 6610 5290 4640	TRATION (MG/L) 48 70 72 59 79 79 54 34 142 38	(T/DAY) GUST 3.2 5.7 7.2 9.1 19 8.2 3.1 12 2.3	TRATION (MG/L) SE: 22 17 15 664 4280 3630 2910 3330 4710	(T/DAY) PTEMBER .12 .06 .20 693 6520 6410 5370 6410 9460
1 2 3 4 5 6 7 8 9 10 11 12 13 14	(MG/L) 19 25 24 40 26 26 60 25 44 28 22 18 22 18 22 25	(T/DAY) APRJL 1.2 1.6 1.6 2.7 1.8 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 1.9	TRATION (MG/L) 2320 2140 2060 1390 800 550 454 279 234 155 82 48 39 34	(T/DAY) MAY 5540 4880 4190 1940 531 263 175 88 67 41 18 8.6 6.1 4.6	TRATION (MG/L) 37 36 33 58 53 46 31 31 22 39 53 38 21 21	(T/DAY) UNE 2.4 1.8 1.4 2.0 1.6 1.2 .92 .72 .43 .81 .92 1.1 .43 .31	(MG/L) 22 39 363 5260 4550 3750 3250 2150 2110 2660 3770 3790	(T/DAY) JULY 4.2 5.8 368 6860 6600 6280 6610 5290 4640 5300 6610 8960 6590 9210	TRATION (MG/L) AU 48 70 72 59 79 54 34 142 38 27 36 31 44 54	(T/DAY) GUST 3.2 5.7 7.2 9.1 19 8.2 3.1 12 2.3 1.3 1.5 .67 .71 .87	TRATION (MG/L) SE 22 17 15 664 4280 3630 2910 3330 4710 2820 2660 2580 2580 2580 2580	(T/DAY) PTEMBER .12 .06 .20 693 6520 6410 5370 6410 5370 6410 5370 5320 5500 5500 6340
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	(MG/L) 19 25 24 40 26 26 26 26 26 26 22 18 22 18 22 23 5800 6350 4270 3460	(T/DAY) APRJL 1.2 1.6 1.6 2.7 1.8 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 1.9 1.6 9780 11300 8240 7030	TRATION (MG/L) 2320 2140 2060 1390 800 550 454 279 234 155 82 48 39 34 40 38 35 37 29	(T/DAY) MAY 5540 4880 4190 1940 531 263 175 88 67 41 18 8.6 67 41 18 8.6 6.1 4.6 5.5 5.1 4.5 5.5 5.1 4.5 3.8 2.7	TRATION (MG/L) 37 36 33 33 58 53 46 31 31 31 22 39 53 38 21 21 22 23 27 38 26	(T/DAY) UNE 2.4 1.8 1.4 2.0 1.6 1.2 .92 .72 .43 .81 .92 1.1 .43 .31 .31 .35 .95 .88 .65	(MG/L) 22 39 363 5260 4550 3750 220 2650 2150 2110 2660 3770 2220 3790 3790 3790 3310 3090 3310	(T/DAY) JULY 4.2 5.8 368 6860 6600 6280 6610 5290 4640 5300 6610 8960 6590 9210 9590 8040 7330 5730 3560	TRATION (MG/L) AU 48 70 72 59 79 54 34 142 38 27 36 31 44 54 35 41 34 41 34 41 36	(T/DAY) GUST 3.2 5.7 7.2 9.1 19 8.2 3.1 12 2.3 1.3 1.5 .67 .71 .87 .47 .66 .60 .58	TRATION (MG/L) SE 22 17 15 664 4280 3630 2910 3330 4710 2820 2600 2580 2650 2790 2400 2450 2650 2210 1100	(T/DAY) PTEMBER .12 .06 .20 693 6520 6410 5370 6410 9460 5710 5320 5320 5320 5320 6340 6310 8200 6910 4240 962
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	(MG/L) 19 25 24 40 26 26 60 25 44 28 22 18 22 25 23 5800 6350 4270 3460 3240 3080 2700 2410 2130	(T/DAY) APRJL 1.2 1.6 1.6 2.7 1.8 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 0.6 2.9 1.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 3.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 1.6 2.9 1.7 1.5 1.3 1.7 7 3.0 7 1.6 2.9 1.5 1.5 1.3 1.7 7 3.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1	TRATION (MG/L) 2320 2140 2060 1390 800 550 454 279 234 155 82 ² 48 39 34 40 38 35 37 29 33 31 30 6 37	(T/DAY) MAY 5540 4880 4190 1940 531 263 175 88 67 41 18 8.6 6.1 4.6 5.5 5.1 4.5 3.8 2.7 2.9 2.2 1.8 1.8 2.0	TRATION (MG/L) 37 36 33 33 58 53 46 31 31 31 31 22 39 53 38 21 21 22 39 53 38 21 21 22 39 53 38 21 21 22 39 53 38 21 21 22 39 53 38 21 21 22 39 53 38 21 22 39 53 38 53 38 53 38 53 38 53 53 53 53 53 53 53 53 53 53 53 53 53	(T/DAY) UNE 2.4 1.8 1.4 2.0 1.6 1.2 .92 .72 .43 .81 .92 1.1 .43 .31 .31 .35 .95 .88 .65 .28 .31 .48 .50 .50	(MG/L) 22 39 363 5260 4550 2150 2150 2150 2110 2660 3770 2220 3790 3790 3790 3790 3900 3310 3090 2500 1650 1350 838 662 480 460	(T/DAY) JULY 4.2 5.8 368 6860 6600 6280 6610 5290 4640 5300 6610 8960 6610 8960 6590 9210 9590 8040 7330 5730 3560 2000 430 261 137 108	TRATION (MG/L) AU 48 70 72 59 79 54 34 142 38 27 36 31 44 54 35 41 34 41 35 41 34 41 36 37 43 66 63 53	(T/DAY) GUST 3.2 5.7 7.2 9.1 19 8.2 3.1 12 2.3 1.3 1.5 .67 .71 .87 .47 .66 .60 .61 .58 .40 .52 .62 .62 .62 .57	TRATION (MG/L) SE 22 17 15 664 4280 3630 2910 3330 4710 2820 2600 2580 2650 2790 2400 2450 2650 2210 1100 1220 871 1430 1640 1020	(T/DAY) PTEMBER .12 .06 .20 693 6520 6410 5370 6410 9460 5710 5320 5260 5260 5260 5500 6340 6310 8200 6910 4240 962 1500 722 988 899 498

i

7

RIO GRANDE BASIN ECOS RIVER NEAR ARTESIA, NM -- Continued WATER-QUALITY RECORDS



÷~**							,		-			
5												
	SPECIFI	C CONDUCI	ANCE (MICH	ROMHOS/CM			WATER YEAR	OCTOBER	1981 TO 5	SEPTEMBER	1982	
						E-DAILY						
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8650	6130	9810	9900	10200	11000	13700	2780	10600	11200	8220	7430
2	8580	6400	10100	10000	10300	11100	14200	2830	11200	11100	8510	8100
3	8890	6610	10100	9960	10200	11200	14300	2820	11900	9080	7980	9270
4	5750	6580	9350	10100	10300	11300	·14000	3070	12800	3720	6550	9690
5	5780	7030	9270	10000	10200	11300	13800	3190	15600	3010	3940	3080
6	9220	6350	8840	10100	10200	11300		3510	15200	2410	4390	2020
7	9200	6320	9180	10200	10200	11100		3710	15400	1720	4650	1690
8	5300	6190	9170	10100	10100	11200		4090	16900	1600	5780	1550
9	5260	6720	9440	10100	10100	11100		4370	16400	1370	6930	1520
10	5230	7150	9870	10200	9920	11100		4600	15800	1380	7030	1350
11	5210	7550	9850	10400	9870	11500		4790	16700	1310	7950	1270
12	4070	8000	9890	10100	10600	11700		5190	17300	1230	9500	1120
13	4060	8350	9900	10100	10200	11800		5340	18700	1180	9810	1090
14	5360	8390	9940	9820	10100	11500		5930	21100	1400	9880	1030
15	6070	8700	9700	9830	10200	11600		6370	20600	1170	10500	350
16	6690	8880	9750	9850	9940	11500		6870	18700	1120	12400	920
īž	7090	8980	9620	11200	9690	12100		7760	20600	1100	12700	970
18	7080	8250	10000	11200	10000	12100		7630	22200	1100	15600	930
19	7720	9080	10000	9240	10100	11800		8140	17600	1110	15900	1260
20	8030	9070	10100	9310	10100	12000		8910	16400	1230	16700	1380
~ ~ ~	0000		10105	10900	10300	12200		~10700	17900	1560	16400	1430
21	8290	9280	10100	10900	10300	12200		10700	17900	1560	16400	2000
22	8320	9220	10100		10300	12100		10200	17200	1370	17000	1820
23	8330	9510	·10200	9750				10200	17400	1770	16400	
24	8400	9480	10200	8340	10700	12700						1940
25	7680	9700	10100	8310	10800	12800		13000	15000	2080	16700	2230
26	7140	9670	10100	8730	10800	12900		10400	14000	2760	18200	2150
27	6430	9910	10400	9120	11000	12900	2840	10300	14100	3430	19300	2730
28	6440	9900	10400	9150	10900	13100	2820	10100	14800	4170	18700	2900
29	5820	9850	10300	9620		12900	2800	9930	18300	4480	25200	3120
30	. 5800	9670	10400	10000		13400	2830	9680	7430	5210	7460	3530
31	6090		10100	10200		13800		10700		7980	7180	
MEAN	6840	8230	• 9880	9880	10300	11900	7780	7030	16200	3070	11700	2660
WTR YR		MEAN	8790	MAX	25200		MIN	350				

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG.° C), RECORDER MAXIMUM, MINIMUM, AND MEAN, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY,	MAX	MIN	MEAN	MAX	MIN	MEAN	МАХ	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRII			MAY	
1							14800	13000	14000			
1 2 3							14800	12700	13400			
3							14400	12200	13300			
							14400	12500	13400			
4 5							14300	12200	13200			
2							14500	12200	15200			
6							13100	12100	12500			
7							13400	12100	12700			
8 .							14000	11800	12700			
8 · 9							13500	11700	12400			
10							12700	10800	11700	1 - 1		
							12,000	10000	11/00			
11							12100	10400	11200			
12							11400	10000	10800			
12 13							10700	2600	9710			
14							10100	2100	9400			-
15							10700	2500	8920			
13							10700	2500	0720			
16							9000	4370	5870			
17							4310	3790	4020			
18							3820	2850	3560			
19							2940	2700	2810			
20							2780	2690	2730			
			· · · ·									
21							2720	2580	2660			
22							2640	2560	2590			
23							2580	2550	2560			
24							2710	2540	2610			
25							2790	2570	2680			
26							2700	2580	2620			
27												
28												
29												
30												
31												
MONTH							14800	2100	8230			

371

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG.º C), RECORDER MAXIMUM, MINIMUM, AND MEAN, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DAY	мах	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMB	ER
1		0000			0001		·			7480	6880	7210
2										8530	7230	7930
3	•							*** *** ***		9630	7430	8920
4												
5												
5						•						
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
15												
16												
17												
18												
19												** -= **
20												
			•									
21												
22												
23												
24												
25												
26												
26 27												
28		•										
29												
30												
31							7180	6980	7120			
MONTH							7180	6980	7120	9630	6880	8020
		TEMP.	ERATURE WATH	ER (DEG.º	C). WATH	ER YEAR OC	TOBER 1981	TO SEPT	EMBER 1982	2		
				•		CE-DAILY						
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.0	11.5	11.0	10.5	5.5	9.0	17.0	17.0	27.5	29.0	29.0	33.0
2	20.5	15.5	10.5	10.0	6.0	12.0	18.5	17.0	27.0	24.5	25.0	25.0
3	23.0	15.0	11.0	11.0	5.0	15.5	17.0	17.5	24.0	31.0	31.0	29.5
4	23.0	14.0	9.0	8.5	5.5	18.0	19.5	20.0	25.5	25.5	27.0	28.0
5	23.5	12.0	10.0	6.0	4.0	10.0	20.0	18.0	24.0	26.0	30.5	30.5
-				- · ·								50.5

3	23.0	15.0	11.0	11.0	5.0	15.5	17.0	17.5	24.0	31.0	31.0	29.5
4	23.0	14.0	9.0	8.5	5.5	18.0	19.5	20.0	25.5	25.5	27.0	28.0
5	23.5	12.0	10.0	6.0	4.0	10.0	20.0	18.0	24.0	26.0	30.5	30.5
6	21.5	13.0	8.0	11.0	3.0	9.0	13.0	22.0	25.0	25.0	32.0	25.0
7	22.0	14.0	7.5	7.5	6.0	7.0		19.0	28.0	29.0	29.5	24.0
8	20.0	13.5	8.0	5.0	7.0	16.0		24.5	29.0	25.0	25.0	25.0
9	19.0	15.0	11.5	5.5	7.5	14.0		24.5	22.0	25.5	30.0	24.0
10	18.0	11.5	9.0	7.0	6.0	15.0		20.0	28.0	27.0	25.0	24.0
11	19.0	10.5	9.5	3.0	6.0	21.0		20.0	31.0	27.5	29.0	23.0
12	19.5	10.0	10.5	5.0	8.0	17.0		21.0	24.0	26.0	31.0	23.5
13	18.0	12.5	12.0	3.0	10.0	16.0		21.5	22.0	25.0	29.0	23.0
14	24.0	12.0	9.5	3.0	11.0	18.0		22.5	29.0	26.5	29.0	23.5
15	20.5	12.0	10.5	2.0	15.5	17.0		24.5	30.0	26.0	27.5	22.5
16	25.0	15.0	11.0	3.0	12.0	20.0		20.5	25.0	27.5	31.5	22.5
17	24.0	14.5	12.0	5.0	14.0	17.0		27.0	26.5	26.0	29.0	21.5
18	23.5	15.0	9.5	4.0	15.5	17.5		24.0	27.0	26.0	23.5	21.5
19	16.0	13.0	9.0	5.0	15.0	21.0		27.0	26.0	28.0	26.5	21.0
20	20.0	14.0	9.0	7.0	14.5	19.0		27.5	23.0	30.0	28.0	23.0
21	17.0	11.0	8.0	9.0	11.5	12.0		26.5	28.0	30.5	28.5	20.0
22	18.0	9.5	9.0	9.0	11.0	18.0		25.0	30.0	28.0	27.0	21.0
23	16.0	15.0	11.5	7.0	18.0	20.0		21.0	29.0	27.0	30.0	22.5
24	14.5	11.0	11.0	7.0	14.0	15.0		24.0	27.0	27.0	28.5	24.0
25	16.0	11.0	10.0	7.5	11.0	14.0		26.0	27.5	25.0	30.0	21.0
26	17.0	11.5	9.5	7.5	11.5	12.0		27.0	28.0	31.5	24.0	25.0
27	17.0	14.0	9.0	12.0	9.0	13.5	18.0	27.5	24.5	31.5	24.0	22.5
28	18.5	12.0	8.0	8.5	9.5	13.0	20.0	28.0	33.5	30.5	32.0	24.5
29	19.0	12.0	9.0	12.0		18.0	19.5	27.0	25.0	27.0	28.5	21.0
30	20.0	10.0	10.0	9.0		17.0	18.0	23.5	28.0	31.0	32.0	22.0
31	14.0		10.0	6.0		19.5		28.0		28.0	31.0	
MEAN	19.5	12.5	10.0	7.0	9.5	15.5	18.0	23.0	27.0	27.5	28.5	24.0
WTR YR	1982	MEAN	18.5	MAX	33.5		MIN	2.0				

,

TRACE ELEMENT ANALYSES, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

DATE DEC 02		-IME 300	ARSENI TOTAL (UG/L AS AS (01002	C 1 Se (1	SENIC DIS- OLVED UG/L S AS) 1000)	BORON, DIS- SOLVED (UG/L AS B) (01020) 560	TO RE ER (U	MIUM TAL COV- ABLE G/L CD) 027)		S- VED /L CD)		M, AL OV- BLE (/L CR)	(UG	JM, 5- LVED G/L CR)	TO RE ER (UC AS	PER, TAL COV- ABLE G/L CU) 042) S	COPPER, DIS- SOLVED (UG/L AS CU) (01040) 3
APR				•	•			•								2	
01 26		.100 .600		8	2	830 120		$\overline{\langle 1}$		$\overline{\langle 1}$		40		10		40	
AUG				•	-												•
31	1	215	-	-		580											
DA DEC	ATE	IRON DIS SOLV (UG, AS 1 (0104	N, 1 5- F 7ED E 7L (7E) A	EAD, COTAL ECOV- RABLE UG/L S PB) 1051)	LEAD DIS SOLV (UG/ AS P (0104	E REC ED ERA L (UG B) AS	TAL COV- ABLE G/L HG)	MERCI DI SOL (UG, AS (718)	S- VED /L HG)	SELI NIUN TOTA (UG, AS ((011-	AL AL /L SE)	SELE NIUM DIS SOLV (UG/ AS S (0114	4, 5- /ED /L SE)	ZIN TOTA REC ERA (UG, AS (010)	AL OV BLE /L ZN)	ZIN DI SOL (UG AS (010	S- VED /L ZN)
02	2	. 1	30	3		2	.1		•2		3		2		30		20
ADE 01	د ا۰۰۰		80														
26	5	!	540 ·	19		10	.1		•1		3		1		110		40
AUG 31			50														
			DADTO	OUEMT		IVERC I	75 00 00	¥03.0	00000		1001	mo cr			1000		
			RADIC	CHEMI	CAL ANA	LYSES, W	ATER	ILAR	0010	DER .	1901	10 51	SPICP	IDER .	1902		
	ATE .	TII	۹ . s (۱۴	ROSS LPHA, DIS- OLVED UG/L AS NNAT) 0030)	GROS ALPH SUSP TOTA (UG/ AS UNAT) (80040	A, BET DI L SOI L (PC) AS CS-1	TA, IS- IVED I/L 3 I37)	GRO BET SUS TOT (PCI, AS CS-1 (035)	A, P. AL /L 37)	GROS BETA DIS SOLY (PC) AS YT-9 (800	A, S- VED I/L SR/	GROS BETA SUSH TOTA (PCI AS S YT-9 (800	A, AL I/L SR/ 90)	RAD 22 DI SOLV RAD MET (PCI, (095)	6, S- ED, ON HOD /L)	URAN NATU DI SOL (UG AS U (22	RAL S- VED /L
API 26	? 5	160	00	53	110	<	25	8	n	< 24	4.	77	,		.07		4.7
20		100				-				-							
			PES	TICID	E ANALY	SES, WAT	TER Y	EAR O	CTOBE	R 19	31 TC	SEP1	PEMBE	ER 19	82		
	AU	DATE JG 31	TIME 1215	: T (U (3	CB, OTAL G/L) 9516) <.10	ALDRIN, TOTAL (UG/L) (39330) <.01	DA TO (UG (39	LOR- NE, TAL /L) 350) <.10	TOI (UG (393	5/L)	TOT (UC (393	G/L)	TO1 (UC (39)	DT, FAL G/L) 370)	AZ II TO (U	I- NON, FAL G/L) 570)	
						•		•				-	-	•			
AUC		DI- ELD) TOTA (UG, (393)	RIN SU AL 7 (L) (30) (3	NDO- ULFAN, OTAL UG/L) 9388)	ENDRI TOTA (UG/ (3939	L TOT (L) (UC 0) (393	FAL G/L) 398)	HEP CHL TOT (UG, (394)	OR, AL /L) 10)	HEP CHL EPOX TOT (UG, (394)	OR IDE AL /L) 20)	LIND/ TOT/ (UG/ (3934	AL /L) 40)	MAL THI TOT (UG, (395	ON, AL /L) 30)	MET OX CHL TOT (UG (394	Y OR, AL /L) 80)
3]	1	<	.01	<.01	<.	01 <	.01	<	.01	<	.01	<.	.01	<	.01	<	.01
	AL	DATE JG 31	METHY PARA- THION TOTAI (UG/I (39600) <.0	, T . T .) ()) (3		PARA- THION, TOTAL (UG/L) (39540) <.01	APH TC (U (39	OX- ENE, TAL G/L) 400) < 1	THI	RI- LON G/L) 786)	THA TOT (UC (390	TAL G/L)	LEN POI CHI TO: (UG) (39)	HA- NES, LY- LOR. FAL /L) 250)	т (U (39	REX, OTAL G/L) 755) <.01	

MICROBIOLOGICAL ANALYSES, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

	COLI- FORM, FECAL, 0.7 UMMF	STREP- TOCOCCI FECAL, KF AGAR (COLS.
DATE	(COLS./ 100 ML)	PER 100 ML)
DEC	(31625)	(31673)
02 APR	130	280
01	73	390
16		500
26	340	
AUG		
31	K35	K110

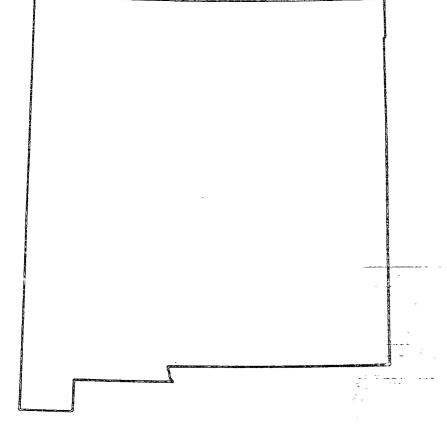
INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1981 TO SEPTEMBER 1982

10 1049 163 18.0 1120 493 12 1007 157 19.5 1950 827 57 75 AFR 01 1200 22 15.5 17 1.0 16 1022 648 18.0 6690 11700 46 65 18 1720 728 17.0 3860 7590 48 60 22 0836 860 12.0 2720 6320 40 53 24 1105 980 12.5 2090 5530 25 1737 600 20.0 1170 1900 36 56 04 1737 117 24.5 245 77 04 0930 13 25.0 2200 45 38 51 18 1104 8.6 26.0 2520 <th>DATE</th> <th>TIME</th> <th>STREAM- FLOW, INSTAN- TANEOUS .(CFS) (00061)</th> <th>TEMPER- ATURE (DEG C) (00010)</th> <th>SEDI- MENT, SUS- PENDED (MG/L) (80154)</th> <th>SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)</th> <th>SED. SUSP. FALL DIAM. & FINER THAN .002 MM (70337)</th> <th>SED. SUSP. FALL DIAM. & FINER THAN .004 MM (70338)</th>	DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS .(CFS) (00061)	TEMPER- ATURE (DEG C) (00010)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE, SUS- PENDED (T/DAY) (80155)	SED. SUSP. FALL DIAM. & FINER THAN .002 MM (70337)	SED. SUSP. FALL DIAM. & FINER THAN .004 MM (70338)
01 1200 22 15.5 17 1.0	10						57	 75
02 1543 830 17.0 2090 4680 30 38 04 1737 600 20.0 1170 1900 36 56 08 0930 13 25.5 5370 188 44 58 13 1033 7.5 25.0 2220 45 38 51 18 1104 8.6 26.0 2520 59 22 32 AUG 08 0915 31 25.0 294 25 07 1045 695 24.0 2760 5180 08 1700 735 25.0 299 5930 29 38 22 1831 225 21.0 1730 1050 25 0950 169 21.0 854 390 25 0950 169 21.0 854 390 25 0950 169 21.0 854 390 25 0950 169 21.0 854 390 01 5EP. SUSP. SUSP. SUSP. SUSP. SUSP. SUSP. FALL FALL FALL FALL FALL SIEVE SIEVE SIEVE DIAM. DIAM. DIAM. DIAM. DIAM. DIAM. DIAM. 01 016 MN 0.62 MN .125 MN .250 MN (70340) (70342) (70343) (70344) (70331) (70332) (70333) 0CT 10 99 100 12 95 99 100 12 95 99 100 12 95 99 100 14 87 97 100 16 87 99 100 17 10.6 MN 0.62 MN .125 MM .250 MM 0.62 MN .125 MN .062 MN .125 MN .250 MN 0.62 MN .125 MN .550 MC 0.1 99 100 14 89 99 100 14 89 99 100 16 87 99 100 17 95 99 100 18 89 99 100 18 89 99 100 19 91 91 100 24 62 88 98 100 04 77 99 100 18 89 99 100 24 62 88 99 100 99 100 18 80 99 100 24 61 88 99 100 99 100 18 50 86 100 99 100 18 50 86 100 95 95 95	01 16 18 22 24 26 30	1022 1720 0836 1105 1600	648 728 860 980 866	18.0 17.0 12.0 12.5 16.0	6690 3860 2720 2090 2520	11700 7590 6320 5530 5890	46 48 40 31	65 60 53 39
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	02 04 08	1737	600	20.0	1170	1900	36	56
SEP 07 1045 695 24.0 2760 5180 08 1700 735 25.0 2990 5930 29 38 22 1831 225 21.0 1730 1050 25 0950 169 21.0 854 390 25 0950 169 21.0 854 390 25 0950 169 21.0 854 390 25 0950 169 21.0 854 390 SUSP.	04 13 18	1033	7.5	25.0	2220	45	38	51
07 1045 695 24.0 2760 5180 08 1700 735 25.0 2990 5930 29 38 22 1831 225 21.0 1730 1050 25 0950 169 21.0 854 390 SUSP. SUSP. SUSP. SUSP. SUSP. SUSP. SUSP. FALL FALL FALL FALL FALL SIEVE SIEVE SIEVE DIAM. DIAM. DIAM. DIAM. DIAM. DIAM. DIAM. DIAM. & FINER & FINER & FINER & FINER & FINER & FINER THAN THAN THAN THAN THAN THAN THAN THAN (70340) (70342) (70343) (70344) (70331) (70332) (70333) OCT 10 99 100 APR 01 87 99 100 18 889 99 100 18 889 99 100 25 62 88 98 100 25 62 88 98 100 MAY 02 60 88 99 100 MAY 04 85 95 99 100 MAY 04 85 95 99 100 APR 01 50 86 100 JUL 04 85 95 99 100 APR 01 50 86 100 JUL 04 85 95 99 100 APR 01 50 86 100 APR 01 50 86 100 APR 01 50 9 91 100 APR 05 91 100 APR 07	08 SEP	0915	31	25.0	294	25		
SUSP. SUSP. <th< td=""><td>08 22</td><td>1700 1831</td><td>735 225</td><td>25.0 21.0</td><td>2990 1730</td><td>5930 1050</td><td>29</td><td>38</td></th<>	08 22	1700 1831	735 225	25.0 21.0	2990 1730	5930 1050	29	38
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	25	0950	169	21.0	854	390		
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	DATE	SED. SUSP. FALL DIAM. & FINER THAN .016 MM	SED. SUSP. FALL DIAM. & FINER THAN .062 MM	SED. SUSP. FALL DIAM. % FINER THAN .125 MM	SED. SUSP. FALL DIAM. % FINER THAN .250 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .125 MM	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM
MAY 02 60 88 99 100	DATE OCT 10 12	SED. SUSP. FALL DIAM. & FINER THAN .016 MM (70340)	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99	SED. SUSP. SIEVE DIAM. % FINER THAN .125 MM (70332)	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM (70333)
08 98 JUL 04 85 95 99 100 13 80 99 100 18 50 86 100 AUG 47 SEP 95 08 59 91 100 22 100	DATE OCT 10 12 APR 01 16 18 22 24	SED. SUSP. FALL DIAM. & FINER THAN .016 MM (70340) 95 87 89 80	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342)	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343)	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99 99 99 99 99 99 98 96 	SED. SUSP. SIEVE DIAM. % FINER THAN (70332) 100 100 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM (70333)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	DATE OCT 10 12 APR 01 16 18 22 26 30 MAY 02	SED. SUSP. FALL DIAM. * FINER THAN .016 MM (70340) 95 87 89 80 62 60	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342) 888 88	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343) 	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344) 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99 99 70 97 99 98 98 96 94	SED. SUSP. SIEVE DIAM. % FINER (70332) 100 100 100 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM (70333)
AUG 08 47 SEP 07 95 08 59 91 100 22 100	DATE OCT 10 12 APR 01 16 18 24 26 30 MAY 02 04 08 JUL	SED. SUSP. FALL DIAM. % FINER THAN .016 MM (70340) 95 87 89 80 62 60 77	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342) 	SED. SUSP. FALL DIAM. % FINER THAN (70343) 	SED. SUSP. FALL DIAM. % FINER THAN .250 MM (70344) 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99 99 70 97 99 98 96 94 94	SED. SUSP. SIEVE DIAM. & FINER THAN .125 MM (70332) 100 100 100 100 100 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN (70333)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	DATE OCT 10 12 APR 01 16 18 22 24 30 MAY 02 04 08 JUL 04 13	SED. SUSP. FALL DIAM. & FINER THAN .016 MM (70340) 95 95 87 89 80 62 62 62 85 80	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342) 	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343) 	SED. SUSP. FALL DIAM. * FINER THAN .250 MM (70344) 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99 99 99 99 99 99 98 96 96 94 94 98 95 99	SED. SUSP. SIEVE DIAM. % FINER THAN (70332) 100 100 100 100 100 100 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM (70333)
22 100	DATE OCT 10 12 APR 01 16 18 22 24 30 MAY 02 08 JUL 04 13 18 AUC 08	SED. SUSP. FALL DIAM. * FINER THAN .016 MM (70340) 95 87 89 80 62 62 60 777 85 85 80 50	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342) 888 888 888 886	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343) 	SED. SUSP. FALL DIAM. * FINER THAN .250 MM (70344) 100 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99 99 70 97 99 98 88 96 94 96 98 98 95 99 	SED. SUSP. SIEVE DIAM. & FINER (70332) 100 100 100 100 100 100 100 100 100	SED. SUSP. SIEVE DIAM. % FINER THAN .250 MM (70333)
	DATE OCT 10 12 APR 01 16 18 22 26 30 MAY 02 04 04 13 18 AUG 08 SEP 07	SED. SUSP. FALL DIAM. * FINER THAN .016 MM (70340) 95 87 89 80 62 62 60 777 85 85 80 50	SED. SUSP. FALL DIAM. & FINER THAN .062 MM (70342) 888 888 86 	SED. SUSP. FALL DIAM. % FINER THAN .125 MM (70343) 98 98 100	SED. SUSP. FALL DIAM. * FINER THAN .250 MM (70344) 100 100 100 	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM (70331) 99 99 70 97 99 98 86 94 96 98 98 95 99 99 47	SED. SUSP. SIEVE DIAM. & FINER (70332) 100 100 100 100 100 100 100 100 100	SED. SUSP. SIEVE DIAM. * FINER THAN (70333)

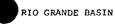




Water Resources Data New Mexico Water Year 1981



U.S. GEOLOGICAL SURVEY WATER-DATA REPORT NM-81-1 Prepared in cooperation with the State of New Mexico and with other agencies





08396500 PECOS RIVER NEAR ARTESIA, NM (Surveillance program station)

LOCATION.--Lat 32°50'27", long 104°19'23", in NWANWA sec.18, T.17 S., R.27 E., Eddy County, Hydrologic Unit 13060007, on left bank 250 ft (76 m) upstream from bridge on State Highway 83, 4.3 mi (6.9 km) east of Artesia, 7.0 mi (11.3 km) upstream from Rio Penasco, 17 mi (27.4 km) upstream from McMillan Dam, and at mile 503.9 (810.8 km). Prior to Apr. 3, 1981, at site 250 ft (76 m) downstream. DRAINAGE AREA.--15,300 mi² (39,630 km²), approximately (contributing area).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1905 to June 1909, August 1909 to current year. Monthly discharge only for some periods, published in WSP 1312 and 1712. Records for Aug. 22-31, 1934, and October 1936 to April 1937, published in WSP 763 and 828, respectively are not reliable and should not be used. Prior to February 1936, published as "near Dayton."
REVISED RECORDS.--WSP 1312 and 1512: 1913, 1915, 1917-18(M), 1920, 1923, 1931-36. WSP 1712: 1906(M), 1908-11(M), 1919, 1921-23(M), 1929, 1931-32(M), 1935-36(M), 1937, 1939(M), 1941(M). See also PERIOD OF RECORD.
GAGE.--Water-stage recorder. Datum of gage is 3,291.92 ft (1,003.376 m) National Geodetic Vertical Datum of 1929. See WSP 1923 or 2123 for history of changes prior to Apr. 5, 1941. Apr. 5, 1941 to Apr. 2, 1981, water-stage

recorder at site 250 ft (76 m) downstream at same datum. REMARKS.--Water-discharge records fair. Flow regulated by Santa Rosa Lake (station 08382810) since Arpil 1980, by

Lake Sumner (station 08384000) since August 1937, and by Two Rivers Reservoir (station 08390600) since July 1963. Diversions and ground-water withdrawals for irrigation of about 154,000 acres (620 km²), 1959

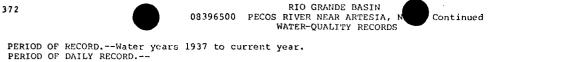
determination, above station.

determination, above station. AVERAGE DISCHARGE.--45 years, 246 ft³/s (6.967 m³/s), 178,200 acre-ft/yr (220 hm³/yr). EXTREMES FOR PERIOD OF RECORD.--Maximum discharge probably occurred May 30, 1937, when a discharge of 51,500 ft³/s (1.460 m³/s) was measured by slope-area method at a point 15 mi (24.1 km) upstream, gage height, 14.7 ft (4.48 m), site and datum then in use; no flow at times in 1934, 1946-47, 1953-54, 1957, 1964-65. EXTREMES OUTSIDE PERIOD OF RECORD.--Greatest flood since at least 1893 occurred Oct. 2, 1904, discharge not determined; the peak inflow to Lake McMillan, which includes Rio Penasco and Fourmile Draw, was estimated at 82,000 ft³/s (2.320 m³/s). The second highest flood occurred July 25, 1905, discharge below Rio Penasco, 50,300 ft³/s (1.420 m³/s), based on gain in storage and spill from Lake McMillan. The floods in August 1893and October 1904 damaged McMillan Dam.

October 1904 damaged McMillan Dam and washed out Avalon Dam. EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Aug. 13, gage height, 7.21 ft (2.198 m), no peak above base of 2,000 ft³/s (57 m³/s); minimum, 2.8 ft³/s (0.079 m³/s) July 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1.	149	77	66	42	45	18	9.3	13	712	36	38	26
2	132	81	65	39	43	19	12	11	733	75	18	79
	124	78	66	41	43	25	13	14	740	49	13	60
	103	82	64	42	44	31	10	107	742	113	13	44
	92	81	62	43	45	36	9.4	82	755	71	20	57
6	78	72	62	43	47	33	11	48	788	46	18	382
7	69	66	59	42	46	35	15	358	732	27	21	477
R	65	64	55	44	47	30	15	192	718	19	26	446
9	62	62	49	45	47	19	12	114	685	14	153	279
10	64	57	49	45	45	30	17	73	597	158	168	202
11	62	54	49	45	44	24	18	45	528	230	112	165
12	59	51	49	44	44	18	12	27	441	169	231	144
13	60	48	49	44	42	16	14	17	408	175	744	124
14	58	45	49	43	38	23	20	12	169	94	648	111
15	53	44	49	43	31	30	\$7	11	96	51	427	99
16	47	50	48	43	36	30	22	10	62	34	286	84
17	46	57	48	46	27	30	20	15	47	23	302	79
18	46	59	49	48	28	25	19	21	33	24	388	73
19	47	65	49	50	33	21	19	20	26	18	272	76
20	47	65	48	51	33	19	26	14	23	14	265	73
21	48	64	48	52	34	18	29	14	24	15	261	66
22	48	62	48	52	39	20	23	13	29	8.8	185	69
23	48	59	48	52	39	21	20	12	24	10	136	69
24	47	57	48	52	39	16		7.8	20	6,7	107	68
25	52	62	47	53	37	11	31	9.3	15	4.0	71	69
26	62	65	47	52	34	14	18	10	61	4.1	60	62
27	64	65	46	51	31	14	16	7.8	99	3,0	49	58
28	59	66	45	48	27	14	25	6.7	56	4.9	38	56
29	59	67	45	47		12		6.0	36	155	35	63
30	66	67	45	46		11		226	33	139	31	64
31	74		43	46		10		602		17	29	
TOTAL	2090	1892	1594	1434	1088	673	530.7	2118.6	9432	1867,5	5165	3723
MEAN	67.4	63,1	51.4	46.3	38.9	21.7	17.7	68.3	314	60.2	167	124
NAX	149	82	66	53	47	36		602	788			
AIN	46	44	43	. 39	27	10		6.0	15	230	744	477
AC-FT	4150	3750	3160	2840	2160	1330		4200	18710	3.0 3700	13 10240	26 7380
CAL YR	1980 TOTA	L 59053.5	MEAN	161	MAX 1070	MTN	4.1 AC-1	FT 117100				
TR YR	1981 TOTA		MEAN	86.6	HAX 788		3.0 AC-1					
			· · · · · · · · · · · · · · · · · · ·									



SPECIFIC CONDUCTANCE: July 1937 to current year. WATER TEMPERATURES: April 1949 to current year. SUSPENDED SEDIMENT DISCHARGE: January 1949 to current year. REMARKS.--Continuous water-temperature and specific conductance

recorder since July 1981. EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 28,800 micromhos June 24, 1977; minimum daily, 464 micromhos Sept. 23, 1974.

WATER TEMPERATURES: Maximum, 36.0°C July 27, 1966, July 25, 1969; minimum, 0.0°C on many days

WATER TENERATORES: Maximum, 30.0 C Suly 27, 1960, Buly 25, 1967, minimum, 0.0 C S. Many Sule during winter months of most years. SEDIMENT CONCENTRATIONS: Maximum daily, 21,300 mg/L Aug. 1, 1962; minimum daily, no flow on many days during July 1953, July and August 1954, July 1957, July to October 1964. SEDIMENT LOADS: Maximum daily, 183,000 tons (166,000 tonnes) Sept. 26, 1955; minimum daily, 0 tons (0 tonnes) on many days during July 1953, July and August 1954, July 1957, July to October 1964. EXTREMES FOR CURRENT YEAR .--

SPECIFIC CONDUCTANCE: Maximum daily, 18,800 micromhos Mar. 27; minimum daily, 600 micromhos July 29. WATER TEMPERATURES: Maximum, 35.5°C July 19, 20, 21, Aug. 2; minimum, 3.0°C Nov. 25, Dec. 22, Jan. 20. SEDIMENT CONCENTRATIONS: Maximum daily, 13,800 mg/L Aug. 13; minimum daily, 4 mg/L Dec. 17, Feb. 17. SEDIMENT LOADS: Maximum daily, 29,300 tons (26,600 tonnes) Aug. 13; minimum daily, 0.29 ton (0.26 tonne) Feb. 17.

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (UMHOS) (00095)	PH (UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE (DEG C) (00010)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN DEMAND, CHEM- ICAL (HIGH LEVEL) (MG/L) (00340)	HARD- NESS (MG/L AS CACO3) (00900)	HARD- NESS, NONCAR- BONATE (MG/L CACO3) (00902)	HARD- NESS NONCAR- BONATE (MG/L AS CACO3) (95902)
19 JAN	1100	65	9400	8.0	8.0	7.0	10.9	68	2400	2200	
30 MAR	1430	46	9500	8.5	14.0	8.0	11.8	66	2400	2200	
19 May	1400	30	13600	8.7	26.0	12.0	13.1	99	3500	• /-	3500
27 JUL	1225	19	15400	8.0	37.0	29.0	9.9	130	3300		3200
23 SEP	1330	9.3	11200	8.3	40.0	33.0	7.6	180	2500		2400
16	1400	86	6200	8.5	28.0	25.0		230	1700		1700

DATE	CALCIUM DIS- SOLVED (MG/L AS CA) (00915)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG) (00925)	SODIUM, DIS- SOLVED (MG/L AS NA) (00930)	SODIUM AD- SORP- TION RATIO (00931)	POTAS- SIUM, DIS- SOLVED (MG/L AS K) (00935)	ALKA- LINITY LAB (MG/L .AS CACO3) (90410)	SULFATE DIS- SOLVED (MG/L AS SO4) (00945)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL) (00940)	FLUO- RIDE, DIS- SOLVED (MG/L AS F) (00950)	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)
19	590	220	1200	11	13	180	1600	2200	,2	13	5950
JAN			_								
30 MAR	580	240	1500	13	11	190	2000	2500	1.2	45.	6990
19 MAY	300	680	2200	16	15	84	2600	3800	.8	1.8	9650
27	740	360	2500	19	1.3	120	2700	4300	.7	9.2	10700
JUL											
23 SEP	590	240	1600	14	20	83	2100	3000	•7	11	7610
16	430	160	780	8.2	8.2	75	1400	1300	.7	8.4	4130

	NITRO-	NITRO- GEN,	NITRO-	NITRO-			PHOS- PHORUS,			
	GEN,	NO2+NO3	GEN,	GEN,	NITRO-	PHOS-	ORTHO,	BORON,	IRON,	CARBON,
	NO2+NO3	DIS-	AMMONIA	ORGANIC	GEN,	PHORUS,	DIS-	DIS-	DIS-	ORGANIC
	TOTAL	SOLVED	TOTAL	TOTAL	TOTAL	TOTAL	SOLVED	SOLVED	SOLVED	TOTAL
	(MG/L	(MG/L	(MG/L	(MG/L	(MG/Ĺ	(MG/L	(MG/L	(UG/L	(UG/L	(MG/L
DATE	AS N)	AS N)	AS N)	AS N)	AS N)	AS P)	AS P)	AS B)	AS FE)	AS C)
	<u>(</u> 00630)	(00631)	(00610)	(00605)	(00600)	(00665)	(00671)	(01020)	(01046)	(00680)
NOV										
19	1.1	1.1	.690	1.1	2.9	.080	.070	440	50	5.1
JAN										
30	.53	.54	.490	1.2	2.2	.230	.040	600	70	16
MAR										
19	.00	.00	,220	1.5	1.7	.130	.000	800	70	15
MAY										
27	.02	.00	.100	1.3	1.4	.150	.070	1100	70	11
JUL										
23	<.10	<.10	.190	1.5	1.7	.190	<.010	880	50	7.4
SEP					_					
16		.16					<.010	390	70	8.4

08396500 PECOS RIVER NEAR ARTESIA, NM -- Continued WATER-QUALITY RECORDS

TRACE ELEMENT ANALYSES, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

_		INACL	SUSPE		0007 110			TODER 15	00 10 JAF	TENDER	1901	
DATE	TIME	ARSENIC TOTAL (UG/L AS AS) (01002)	50L (UG	IS- D LVED SO G/L (U AS) AS	RON, 7 DIS- H DLVED H IG/L (B) A	ADMIUM COTAL RECOV- ERABLE (UG/L AS CD))1027)	D SO (U AS	MIUM T IS~ R LVED E G/L (CD) A	OTAL M ECOV- L RABLE S UG/L (S CR) P	HRO- HIUM, MIS- SOLVED UG/L S CR) 1030)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU) (01042)	COPPER, DIS- SOLVED (UG/L AS CU) (01040)
NOV 19	1100	1		1	440	3		1	20	0	2	2
MAY		2				0		0	3	30	- 5	1
27	1225			2	1100	-		U	•			T
Date	IRO DI SOL (UG AS (010	N, TO S- RE VED ER /L (U FE) AS	AD, TAL COV- ABLE G/L PB) 051)	LEAD, DIS- SOLVED (UG/L AS PB) (01049)	MERCURY TOTAL RECOV; ERABLI (UG/L AS HG) (71900)	MERCI DIS SOLI (UG, AS 1	S- VED /L HG)	SELE- NIUM, TOTAL (UG/L AS SE) (01147)	SELE- NIUM, DIS- SOLVEE (UG/L AS SE) (01145)	(UG/ AS Z	AL ZIN NV- DI BLE SOL (L (UG N) AS	S- VED S/L ZN)
NOV												
19 MAY	•	50	6	4	.()	.0	2	2	2	30	40
27	•	70	4	2	• 2	2	.0	2	2	:	60	20
	CHEM	ICAL ANA	LYSES	OF BOTTO	M MATERI	IAL, WAS	TER 1	YEAR OCT	OBER 1980	TO SEP	TEMBER 1	981
	DATE	TIME	GF NO2+ TOT. BOT	EN, GEN HNO3 TC IN IN MAT M G/KG (MG N) AS	I,NH4 GH DTAL IN BOT. TO NAT. TH KG (N N) A	VITRO- EN, TOT N BOT- DM MA- ERIAL MG/KG AS N) D0603)	PHO TO IN M (MG, AS	RUS, T TAL IN BOT. TO AT. T /KG (' P) A	OTAL F BOT- FM M MA- TC ERIAL T UG/G (S AS) F		CHRO- MIUM, RECOV. FM BOT- TOM MA- TERIAL (UG/G) (01029)	
i	MAY 27	1225	3	15	4.1	65		170	0	0	1	
	DĄ	RE FM TOM TE (U TE AS	ALT, COV. BOT- MA- RIAL G/G CO) 038)	COPPER, RECOV. FM BOT- TOM MA- TERIAL (UG/G AS CU) (01043)	IRON, RECOV. FM BOT- TOM MA- TERIAI (UG/G AS FE) (01170)	FM BC TOM I TER (UG, AS	OV. OT- MA- IAL /G PB)	MANGA- NESE, RECOV. FM BOT- TOM MA- TERIAL (UG/G) (01053)	MERCURY RECOV. FM BOT- TOM MA- TERIAL (UG/G AS HG) (71921)	RECC FM BC TOM M TERI (UG/ AS 2	DV. DT- TA- G N)	
	MAY						-				•	
	21	• • •	0	3	430		5	250	.02		1	
		RADIO	CHEMIC	CAL ANALY	SES, WAL	PER YEA	R OC	TOBER 19	80 TO SEP	TEMBER	1981	
DATE	TI	AL D SO (U ME A U~	OSS PHA, IS- LVED G/L S NAT) 030)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT) (80040)	GROSS BETA, DIS- SOLVEN (PCI/L AS CS-137) (03515)	(PCI, AS CS-1	A, P. AL /L 37)	GROSS BETA, DIS- SOLVED (PCI/L AS SR/ YT-90) (80050)	GROSS BETA, SUSP. TOTAL (PCI/I AS SR/ YT-90) (80060)	METH	G, URAN G- NATU D, DI DN SOL HOD (UG (L) AS	IRAL S- VED VL U)
MAY												
27	. 12			1.8	<130		2.9	< 130	2.8			6.9
		PES	TICIDE	E ANALYSE	S, WATE	R YEAR	OCTO	BER 1980	TO SEPTH	MBER 19	81	
				DATE	TIME	2,4, TOT. (UG	AL	SILVEX, TOTAL (UG/L)				

DATE	TIME	2,4,5-T TOTAL (UG/L) (39740)	SILVEX, TOTAL (UG/L) (39760)
MAY 27	1225	.00	.00

373

1

1

đ

MICROBIOLOGICAL ANALYSES, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	Time	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML) (31625)	
NOV			
19	1100	7	380
JAN			
30	1430	4	32
MAR			
19	1400	1	260
MAY			
27	1225	21	10
JUL			
23	1330	0	18
SEP '		-	
16	1400	230	140
10	1400	250	140

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	TEMPER- ATURE (DEG C) (00010)	SEDI- MENT, SUS- PENDED (MG/L) (80154)	SEDI- MENT, DIS- CHARGE SUS- PENDE (T/DAY (80155	SUSP. FALL , DIAM. % FINER D THAN) .002 MM	SED. SUSP. FALL DIAM. % FINER THAN .004 MM (70338)	SED. SUSP. FALL DIAM. % FINER THAN .016 NM (70340)
NOV	1100							
19	1100	65	7.0	57	10			
MAR 19	1400	30	12.0	61	4.	۰		
31	1400	10	23.0	99	2.			
MAY	1410	10	23.0	25	2.	/		
07	1012	392	18.0	4990	5280	48	69	97
30	1536	430	23.0	3750	4350	35	50	84
31	0812	576	22.0	3800	5910	33	49	82
JUN	0012	570	22.0	3000	3710	55	47	Ų2
02	1114	748	23.0	3400	6870	41	55	85
06	1810	788	24.5	3130	6660	25	35	56
13	1057	408	26.0	1550	1710	29	42	67
14	0930	169	25.0	889	406	49	64	83
JUL								
10	1130	301	23.5	4630	3760	50	66	81
10	1851	219	28.5	7400	4380	57	77	96
30	1639	136	30.0	9170	3370	69	82	100
AUG								
14	1519	629	26.0	9400	16000	52	69	89
15	1510	369	26.5	6440	6420	60	78	93
SEP								
07	1838	487	21.0	3520	4630	45	61	84
10	1419	317	24.0	1860	1590	58	73	94
	SI	ED. SE	D. SE	D. SE	D.	SED. SE	D. SE	D.

	SED.							
	SUSP.							
	FALL	FALL	FALL	SIEVE	SIEVE	SIEVE	SIEVE	
	DIAM.							
	<pre>% FINER</pre>							
	THAN							
DATE	.062 MM	.125 MM	.250 MM	.062 MM	.125 MM	.250 MM	,500 MM	
	(70342)	(70343)	(70344)	(70331)	(70332)	(70333)	(70334)	
NOV	•	•	•	• •		•	•	
19				73	82	96	100	
MAR								
19				85				
31				70	75	96	100	
MAY								
07	100							
30				98	100			
31				98	100			
JUN								
02				98	100			
06	89	100						
13				89	99	100		
14				95	100			
JUL								
10	93	99	100					
10	100							
30	·							
AUG								
14	98	100						
15				98	100			
SEP								
07				95	100			
10				99.	100			

			083	96500	RIVE		TESIA, NM	- Contin	ued			375
	SPEC	IFIC COND	UCTANCE (M	ICROMHOS/	'CM AT 25		WATER YEAR	OCTOBER	1980 то	SEPTEMBER	1981	
DAY	OCT	NON	DEC	JAN	FEB	ONCE-DAIL MAR	APR	мау	JUN	JUL	AUG	SEP
1	4440	7820	9020	10100	10000	11700	16000	15400	4090	5770	4160	8350
2	4730	7480	8860	10200	10100	11800	16300	16000	3560	5800	4100	8360
3	4950	6580	8630	10200	10100	14700	16300	16500	3300	4060	6020	6160
4	5050	6670	8560	10200	10400	14700		16600	3300	3990	7950	6130
5	5200	6500	8630	10300	10500	13200	16100	3590	3260	3990	10200	5180
6	6150	6580	8710	10200	10600	13300	16100	4530	3210	4510	12900	5180
7	6930	7030	8710	10300	10500	12000	16100	4410	3000	4490	10600	2450
- 8	7220	6980	8780	10300	10500	11900	16400	4350	3070	4510	10600	2450
9	7760	7170	9090	10300	10700	11400	16400	4510	3020	5710	9530	2650
10	8250	7650	9620	10300	10600	11300	16100	4760	3070	4040	3900	3310
11	8170	7880	9710	10300	10900	11500	16200	5260	3090	2600	2860	4060
12	8170	8190	9900	10200	10900	11500	16000	6110	3130	3120	3340	4320
13	8310	8520	9710	10300	10800	13100	16100	8220	3150	2850	3340	4340
14	8310	8520	9530	10300	10800	13100	16000	8140	3130	3370	1940	4870
15	8370	8810	9440	10200	10700	14200	16100	9180	3510	3290	1680	5260
16	9040	8810	9520	10300	10800	14100	15900	9180	3840	3280	1740	61.10
17	9450	8970	9620	10300	11500	13000	16000	13800	4330	5430	2170	6540
18	9720	8150	9510	10100	11500	13000	15700	13800	4900	7210	2020	7230
19	9630	8290	9420	10100	12400	13200	15800	12100	6430	8560	2860	7670
20	9630	8970	9450	10000	12300	13200	16000	12400	6390	8210	2700	7820
21	9540	8000	9520	9900	11600	14000	16000	12400	8560	10000	2310	7950
22	9450	8000	9520	9900	11500	14000	15700	14800	8630	12700	2390	8350
23	9630	8120	9620	9900	11300	14000	15700	16400	8280	11200	2790	8350
24	9200	8120	9710	9810	11300	14000	15700	15500	8210	13400	3860	8230
25	9200	8060	10100	9450	11500	13600	15700	15600	9020	14700	4240	8230
26	8880	8060	10000	9450	11500	13600	15400	17300	4490	14700	4720	8160
27	8000	8460	10000	9280	11700	18800	15400	17300	4510	14900	6050	8430
28	7700	8460	10000	9450	11700	18600	15600	15500	4670	14600	6470	8430
29	7700	8970	10100	9630		16000	15600	15900	4670	1080	6820	9180
30	7760	9040	9980	9900		16000	16000	11400	4630	2940	10800	8630
31	7880		10000	10000		16000		11400		2870	10900	
MEAN WTR YR 1	7880 961	7960 MEAN	9450 9200	10000 MAX	11000 [.] 18800	13700	16000 MIN 10	11400 80	4680	6710	5380	6410
•	SPEC	IFIC COND	UCTANCE (N	11CROMHOS/	'CM AT 25	DEG.°C),	WATER YEAR	OCTOBER	1980 то	SEPTEMBER	1981	
DAY	МАХ	• MIN	MEAN	MAX	MIN	MEAN	мах	MIN	MEAN	мах	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEME	
1							4100	2800	3570	9300	8100	8580
2							4900	3100	4220	9300	7230	8430
3							3900	3200	3580	7040	5990	6450
4							5100	3900	4470	5930	4970	5330
5								5300		5050	4970	5010
6										5050	4780	4940
7								6100		4760	4170	4460
8								5200		4140	3660	3910
9				7500	7300	7410		2600		3630	3360	3520
10				9680	3640	6300	4500	3000	3330	3340	2910	3180
11		*		3390	2540	2790	3000	2600	2720	3070	2840	2950
12				3240	2990	3070	2900	1100	2030	3170	2930	3060
13				3310	2840	3080	2600	1100	1930	3420	3100	3250
14				2930	2750	2820	2300	2000	2120	3730	3380	3570
15				3730	2960	3330	2000	1800	1950	4210	3710	3990
16				4500	3710	4090	1900	1700	1760	4410	4160	4230
17				5600	4400	5000	1900	1600	1740			
18				7700	5600	6630	1900	800	1730			
19				8700	7800	8330	2700	800	2150			
20				8600	7600	8090	3000	2700	2880			

3230

2740

4780

2700

2300

3100

3700 4000

5100

8500

8500

2300

2100

2200 3100 3500

3800

4800 4800 6300

3400 7400

800

2520

2210

2670 3430

3730

4340

7870

3510

2840

4680

ł

--~

9300

4600

2900

9680

8400

600

2700

2600

600

MONTH YEAR NOTE:

ļ

9680 600 4160 NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR

WATER-QUALITY RECORDS

Ho.

. .

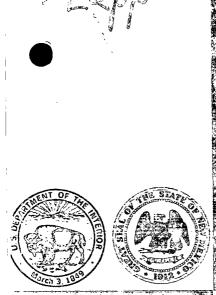
					WAT BK	QOVD111	RI.CORDIS						~
		TEM	PER ,	WATER (DE				1980	PTEMBER 1	981),	
DAY	OCT	NOV	DEC	JAN	FEB	NCE-DAIL MAR	APR	MAY	JUN	JUL	AUG	SEP	
1 2 3 4 5	21.0 25.5 21.0 25.0 19.0	14.5 13.0 15.0 12.5 13.5	7.0 11.5 9.0 8.5 12.5	8.0 8.0 9.0 8.5 9.0	6.5 6.5 5.0 9.0 7.0	15.0 15.5 16.5 11.5 15.0	22.0 16.5 16.0 19.0 18.5	27.0 22.5 20.5 21.0 23.5	21.0 23.0 24.0 24.5 24.0	30.5 25.5 30.5 29.5 30.0	29.5 25.5 26.0 27.0 25.0	29.0 28.5 23.5 24.0 24.5	
6 7 8 9 10	20.0 25.5 20.0 19.0 23.0	15.0 13.5 15.5 19.0 13.5	11.5 12.5 13.5 6.5 5.0	10.5 8.0 8.0 8.5 9.0	7.0 7.0 7.5 11.0 9.0	14.5 9.5 11.5 9.5 10.5	14.0 13.5 20.0 20.5 23.0	25.0 18.0 19.0 23.5 22.5	24.5 26.0 27.5 28.0 28.0	28.0 28.5 33.0 28.5 28.5	25.5 24.0 24.0 25.0 25.0	22.5 21.0 20.5 20.0 24.0	
11 12 13 14 15	22.0 23.0 22.5 23.0 18.0	14.5 15.0 14.0 15.0 14.5	9.5 8.5 7.5 6.0 12.0	8.5 8.0 7.0 5.0 6.5	11.0 5.5 5.0 11.5 7.5	12.5 11.0 16.0 15.5 12.5	18.0 23.0 25.0 18.0 16.0	19.5 27.0 25.0 26.0 22.5	29.0 26.5 26.0 25.0 22.5	29.0 25.0 27.5 31.0 28.0	25.5 24.0 23.5 26.0 26.5	25.0 25.0 24.5 24.0 23.5	
16 17 18 19 20	19.0 19.0 19.5 14.5 19.0	14.0 13.5 13.0 5.0 4.0	12.0 12.5 11.0 7.0 5.5	7.0 6.0 5.0 3.5 3.0	8.0 15.5 15.0 18.0 12.0	13.0 17.5 15.0 15.0 15.5	22.0 23.0 18.0 19.0 21.5	23.0 22.0 22.5 26.5 25.0	23.0 25.0 29.0 28.0 28.5	29.5 30.0 32.0 29.5 35.0	24.0 25.0 25.0 26.0 27.0	27.0 21.5 19.0 25.0 19.5	
21 22 23 24 25	19.0 15.0 18.5 16.5 17.0	9.0 4.0 4.0 5.5 3.0	5.0 3.0 5.0 6.0 8.0	4.5 6.5 5.0 8.5 7.0	7.5 9.0 11.0 10.5 13.0	15.0 11.0 16.5 18.0 19.0	21.5 22.0 22.5 23.0 26.0	25.5 27.0 27.5 26.5 27.0	33.0 34.0 28.0 28.5 29.0	29.0 27.0 33.5 31.0 29.0	27.0 25.5 23.5 28.5 30.0	20.0 21.5 21.0 21.0 21.5	
26 27 28 29 30 31	13.0 16.5 11.0 7.0 14.5 13.0	4.5 6.0 8.0 6.0 7.0	12.0 7.0 10.0 12.5 12.0 7.0	6.5 6.0 11.0 9.0 10.0 8.0	17.5 15.0 11.0	22.0 22.0 21.0 15.0 16.0 23.0	27.5 25.5 24.0 24.5 26.5	24.5 25.0 24.5 25.5 23.0 22.0	29.0 28.0 29.0 25.0 25.0	30.5 29.0 25.0 22.0 30.0 25.5	23.5 25.0 24.0 30.0 23.0 23.5	23.0 24.5 25.0 26.0 21.0	
MEAN WTR YR	18.5 1981	11.0 MEAN	9.0 18.5	7.5 MAX	10.0 35.0	15.0	21.0 MIN	24.0 3.0	26.5	29.0	25.5	23.0	
	WATER T	EMPERATUR	RE (DEG.°C), RECORDE	R MAXIMUM	, AND ME	AN, WATER	YEAR OCTO	BER 1980	IO SEPTEMB	ER 1981		
DAY	МАХ	MIN June	MEAN	МАХ	MIN JULY	MEAN	MAX	MIN AUGUST	MEAN	MAX	min Septeme	MEAN BER	
1 2 3 4 5							33.0 35.5 31.0 32.0 34.0	25.0 24.0 26.5 25.0 24.5	28.5 29.5 28.5 28.5 29.0	25.5 29.0 30.0 24.5 22.5	21.5 21.0 22.5 21.5 21.5	23.5 24.5 26.0 23.0 22.0	
6 7 8 9 10				29.5 28.0	25.5 22.5	27.5 25.5	34.0 26.5 30.0 28.0 28.5	24.5 23.0 21.5 22.5 24.0	29.0 25.0 25.5 25.5 26.5	23.5 23.0 21.5 20.5 22.0	20.5 21.5 20.5 20.0 20.0	22.0 22.5 21.0 20.5 21.0	
11 12 13 14 15				29.5 29.0 30.0 31.5 33.5	25.0 24.5 25.0 24.5 25.0	27.0 27.0 27.5 28.0 28.5	26.0 26.0 24.0 24.5 25.5	23.0 22.5 22.5 21.5 24.0	24.5 24.0 23.5 24.0 25.0	23.5 24.5 25.5 25.5 25.0	21.5 22.5 23.5 23.5 23.0	22.5 23.5 24.5 24.5 24.0	
16 17 18 19 20				32.5 32.5 34.5 35.5 35.5	24.0 24.0 24.0 24.5 24.5	28.0 27.5 29.0 29.5 30.0	27.0 27.5 27.0 27.5 27.5	23.5 24.0 24.5 24.0 23.5	25.0 25.5 25.5 26.0 25.5	23.5	22.0 	23.0	
21 22 23 24 25				35.5 34.5 34.5 34.5 34.0	24.5 22.5 23.0 23.0 21.5	29.5 28.0 27.5 27.5 27.0	27.5 28.0 29.0 29.5 31.0	23.5 23.0 22.5 23.0 22.5	25.5 25.5 26.0 26.0 26.5			 	
26 27 28 29 30 31				34.0 33.0 28.5 27.5 30.0 32.0	22.5 23.0 22.5 21.0 25.0 25.0	27.5 27.0 25.0 24.5 27.5 28.0	31.5 31.5 31.5 32.0 32.5 32.0	22.5 23.5 22.5 22.5 22.5 22.5 22.5	27.0 27.0 26.5 26.5 27.0 26.5			 	
MONTH YEAR NOTE:	35.5 NUMBER	20.0 OF MISSIN	26.0 IG DAYS OF	35.5 RECORD EX	21.0 CEEDED 20	27.5	35.5 R	21.5	26.5	30.0	20.0	23.0	

NOTE: NUMBER OF MISSING DAYS OF RECORD EXCEEDED 20% OF YEAR



SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

	MEAN		MEAN		MEAN		MEAN		MEAN		MEAN	
DAY	CONCEN- TRATION (MG/L)	LOADS (T/DAY)	CONCEN- TRATION (MG/L)	LOADS (T/DAY)	CONCEN- TRATION (MG/L)	LOADS (T/DAY)	CONCEN- TRATION (MG/L)	LOADS (T/DAY)	CONCEN- TRATION (MG/L)	LOADS (T/DAY)	CONCEN- TRATION (MG/L)	LOADS
1	OC 191	TOBER 77	NO 70	VEMBER 15	(MG/L) DE 18 15 11	CEMBER 3.3	(MG/L) J 17 . 24 21	ANUARY 1.9		BRUARY 4.5	12	ARCH
2 3	191 175	68 59	21 28	4.6 5.9	15 11	2.7 2.0	21	4.5		8.5 1.3	20 10	1.0
4 5	167 99	46 25	24 38	5.3 8.3	8 12	1.4 2.0	11 12	1.2 1.4	10 5	1.2 .61	10 14	.84 1.4
6 7	79 66	17 12	23 22	4.5 3.9	26 27	4.4 4.3	11 10	1.3 1,1	6 8	.76 .99	11 11	.98 1.0
8 9	27 22	4.7 3.6	22 26	3.8	33 10	4.9	10 10	1.2	10 5	1.3		.57
10	32	5.5	18	2.8	12	1.6	8	.97	6	.73	12	.97
11 12	34 32	5.7 5.1	18 13	2.6 1.8	20 15	2.6 2.0	49 15	6.0 1.8	10 20	1.2 2.4	6 8	.39 .39
13 14	40 40	6.5 6.3	16 46	2.1 5.6	15 14	2.0 1.9	35 12	4.2	17 23	1.9 2.4	14 18	.79 1.1
15 16	66 36	9.4	17	2.0	5	.66	32 10	3.7	7	.59	14 13	.95 .91
10 17 18	30 37 25	4.6 4.6 3.1	38 25 17	5.1 3.8 2.7	4 12	.65 .52 1.6	10 12 10	1.2 1.5 1.3	7 4 5	.68 .29 .38	13 18 16	1.4 1.2
19 20	20 22	2.5	35 31	6.1 5.4	23 24	3.0 3.1	80 20	11 2.8	11 12	.98 1.1	34 32	2.8
21	18	2.3	16	2.8	52	6.7	9	1.3	10	:92	107	6.1
22 23	17 20	2.2 2.6	41 17	6.8 2.7	129 32	17 4.1	8 12	1.1 1.7	9 12	,95 1,3	18 22	.97 1.2
24 25	14 27	1.8 3.8	46 16	7.1 2.7	23 22	3.0 2.8	11 10	1.5 1.4	10 10	$1.1 \\ 1.0$	19 20	1.0
26 27	14 23	2.3 4.0	14 17	2.5 3.0	30 24	3.8 3.0	10 15	1.4 2.1	10 9	.92	22 27	.83 .95
28 29	19 24	3.0 3.8	19 21	3.4 3.8	· 69 99	8.4 12	8 8 8	1.0	10	.73	28 27	1.1
29 30 31	20	3.6 4.2	48	8.8	26	3.2 1.5	12	1.5			57 93	1.7
TOTAL	21	4.2		139.2	13	111.43	10	65.17		40.11		39.09
	MEAN		MEAN		MEAN		MEAN		MEAN		MEAN	
	CONCEN- TRATION	LOADS	CONCEN- TRATION	LOADS	CONCEN- TRATION		CONCEN- TRATION	LOADS	CONCEN- TRATION	LOADS	CONCEN- TRATION	LOADS
DAY	CONCEN- TRATION (MG/L) A	LOADS (T/DAY) PRIL	CONCEN- TRATION (MG/L)	LOADS (T/DAY) MAY	CONCEN- TRATION (MG/L)	(T/DAY)	CONCEN- TRATION (MG/L)	(T/DAY)	CONCEN- TRATION (MG/L) A	(T/DAY) JGUST	CONCEN- TRATION (MG/L) SEI	(T/DAY) PTEMBER
1 2	CONCEN- TRATION (MG/L) A 44 22	LOADS (T/DAY) PRIL 1.1 .71	CONCEN- TRATION (MG/L) 29 25	LOADS (T/DAY) MAY 1.0 .74	CONCEN- TRATION (MG/L) 5750 3400	(T/DAY) JUNE 11100 6730	CONCEN- TRATION (MG/L) 144 187	(T/DAY) JULY 14 38	CONCEN- TRATION (MG/L) AU 2220 200	(T/DAY) JGUST 288 9.7	CONCEN- TRATION (MG/L) SE) 77 74	(T/DAY) PTEMBER 5.4 16
1 2 3 4	CONCEN- TRATION (MG/L) A 44 22 22 21	LOADS (T/DAY) PRIL 1.1 .71 .77 .57	CONCEN- TRATION (MG/L) 29 25 29 27	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8	CONCEN- TRATION (MG/L) 5750 3400 2860 3510	(T/DAY) JUNE 11100 6730 5710 7030	CONCEN- TRATION (MG/L) 144 187 1120 408	(T/DAY) JULY 14 38 348 124	CONCEN- TRATION (MG/L) 2220 200 128 127	(T/DAY) JGUST 288 9.7 4.5 4.5	CONCEN- TRATION {MG/L} SEI 77 74 29 290	(T/DAY) PTEMBER 5.4 16 4.7 34
1 2 3 4 5	CONCEN- TRATION (MG/L) A 44 22 22 21 19	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48	CONCEN- TRATION (MG/L) 29 25 29 27 20	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580	(T/DAY) JUNE 11100 6730 5710 7030 5260	CONCEN- TRATION (MG/L) 144 187 1120 408 372	(T/DAY) JULY 14 38 148 124 71	CONCEN- TRATION (MG/L) 2220 200 128 127 133	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2	CONCEN- TRATION (MG/L) SEI 77 74 29 290 450	(T/DAY) PTEMBER 5.4 16 4.7 34 69
1 2 3 4 5 6 7	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .73	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810	(T/DAY) JULY 14 38 148 124 71 226 132	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77	CONCEN- TRATION (MG/L) SEI 77 74 29 290 450 4000 4460	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740
1 2 3 4 5 6 7 8 9	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25	LOADS (T/DAY) PRIL 1.1 .77 .57 .48 .39 .73 .89 .81	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970	CONCEN- TRATION {MG/L} SEI 77 74 29 290 450 4000 4460 4140 2710	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990 2040
1 2 3 4 5 6 7 8	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .73 .89 .81 1.8 1.7	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155	(T/DAY) JULY 14 38 J48 124 71 226 132 66	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146	CONCEN- TRATION (MG/L) SEI 77 74 29 290 450 450 4000 4460 4140	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990
1 2 3 4 5 6 7 8 9 10 11 12 13	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 19	LOADS (T/DAY) PRIL 1.1 .71 .77 .48 .39 .73 .89 .81 1.8 1.7 .75 .72	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 1820 136 58	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 4650 6140	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900	CONCEN- TRATION (MG/L) (AC) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850	CONCEN- TRATION {MG/L} SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990 2040 1150
1 2 3 4 5 6 7 8 9 10 11 12	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23	LOADS (T/DAY) PRIL 1.1 .77 .57 .48 .39 .73 .89 .81 1.8 1.7 .75	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4990 3980 1820 632 136	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 1810 1280 155 4630 5430 4850	(T/DAY) JULY 14 38 148 124 71 226 132 6 5.9 1980 3370 2210	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050	CONCEN- TRATION {MG/L} SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990 2040 1150 672 451
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 39 18 23 19 18 17 42	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .81 1.8 1.7 .75 .81 1.8 1.7 .75 .77 .78 2.5	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 1820 632 136 632 58 60 30 30	LOADS (T//DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 1810 1280 155 4630 4650 6140 4850 6140 4950 2820 2860	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263	CONCEN- TRATION (MG/L) (AG/L) (2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300	(T/DAY) DGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090	CONCEN- TRATION {MG/L} SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990 2040 1150 672 451 345 206 128 24
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	CONCEN- TRATION (MG/L) A 44 22 21 19 13 18 22 25 39 35 23 19 18 17 42 34 26	LOADS (T/DAY) PRIL 1.1 .77 .57 .48 .39 .73 .89 .81 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 3980 1820 632 136 58 60 30 30 70 71	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299 514	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50 13 5,8	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 1810 1280 155 4630 5430 4850 6140 4850 6140 2820 2860 143 210	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 4180	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010	CONCEN- TRATION {MG/L} SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88 88 36 47	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 39 35 23 19 18 17 42 34	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .81 1.8 1.8 1.8 1.7 .75 .72 .97 .78 2.5 1.8	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 632 136 58 60 30 30 30 34 70	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299 99	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50 13	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 5430 4650 6140 4950 2820 2860 143	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 4180	(T/DAY) DGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990	CONCEN- TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88 836	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 19 18 17 42 34 26 26	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .81 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3 1.3 1.7 2.6 2.0	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 1820 1820 136 58 60 30 30 30 71 71 72	LOADS (T//DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 5.4	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299 99 99 65 43	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50 13 5.8 3.0 2.8 11 18	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 4850 6140 4950 2820 2860 143 210 186	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9	CONCEN- TRATION (MG/L) (MG/L) (2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 4180	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470	CONCEN- TRATION TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1920 1310 1920 525 347 88 366 47 44	(T/DAY) PTEMBER 5.4 16 4.7 34 69 • 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24	CONCEN- TRATION (MG/L) A 44 22 21 19 13 18 22 25 39 35 23 19 18 17 42 34 26 26 26 24 33 33 33 39 56	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .73 .89 .81 1.8 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3 1.3 1.3 1.7 2.6 2.0 2.1 3.6	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4990 4990 4990 3980 1820 632 136 58 60 30 34 71 72 67 63 73 73 73 73 111	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4.2 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 5.4 5.4 4.0 3.9 4.3 4.1 4.8	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 99 514 299 99 514 299 514 299 514 299 514 299 35	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50 13 5.8 3.0 2.8 11 18 2.5 1.9	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 1810 1280 155 4630 5430 4850 6140 4850 6140 2820 2860 143 210 186 97 97 96 80 00 83	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9 2.7 1.5	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 7180 5300 4180 4970 2000 2300 1650 902 536 383	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470 1650 1160 451 197 111	CONCEN- TRATION TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88 836 47 44 30 33 23 23 23 23 30	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0 5.9 5.9 4.3 4.8 5.5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 19 18 17 42 34 26 26 26 24 33 33 39 55	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .81 1.8 1.7 .75 .72 .72 .78 2.5 1.8 1.3 1.3 1.3 1.3 1.3 1.7 2.6 2.0 2.1 3.6 4.6	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 136 632 136 632 136 632 136 632 136 63 30 30 34 70 71 72 67 63 73 73 111 106	LOADS (T//DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4	CONCEN- TRATION (MG/L) 5750 3400 2860 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299 99 95 53 43 45 170 228 39 35 32	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 5.8 3.0 2.8 11 18 2.5 1.9 1.3	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 4850 6140 4850 6140 4950 2820 2860 143 210 186 186 80 100 83 119	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9 2.7 1.5 1.3	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 13800 10400 7180 5300 4180 4970 2000 2300 2300	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470 1650 1160 451 197 111 31	CONCEN- TRATION {MG/L} SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88 366 47 44 30 33 23 26 30 35	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0 5.9 4.3 4.8 5.5 6.4 4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 19 18 17 42 25 39 35 23 19 18 17 42 26 26 24 33 33 39 56 55 55 34 38	LOADS (T/DAY) PRIL 1.1 .77 .57 .48 .39 .73 .89 .81 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3 1.3 1.7 2.6 2.0 2.1 3.6 4.6 1.7 1.6	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 1820 632 136 58 60 30 30 34 470 71 72 67 63 73 73 73 111 106	LOADS (T//DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 5.4 4.0 3.9 4.3 4.1 4.8 5.4 6.6 5.6	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299 99 95 43 45 170 228 39 35 32 32	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50 13 53 50 13 53 50 13 53 8 3.0 2.8 11 18 2.5 1.9 1.3 68 104	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 1810 1280 1855 4630 5430 4850 6140 4850 6140 2820 2860 143 210 186 97 96 80 80 100 83 119	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9 2.7 1.5 1.3 1.2	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 13800 10400 7180 5300 2000 2300 2300 2300	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470 1650 1160 451 197 111 31	CONCEN- TRATION TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 4140 4140 1920 1310 1050 960 525 347 88 836 47 44 30 33 23 26 30 35 22 24	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0 5.9 4.3 4.8 5.5 6.4 3.7 3.8
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29	CONCEN- TRATION (MG/L) A 44 22 21 19 13 18 22 25 39 35 23 19 18 17 42 25 39 35 23 19 18 17 42 25 39 35 23 19 18 17 42 26 26 24 33 33 39 56 55 55 34 38 29 30	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .81 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3 1.3 1.3 1.3 1.7 2.6 2.0 2.1 3.6 4.6 1.7 1.6 2.0 1.5	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 632 136 58 60 30 34 70 71 72 67 63 37 3 31 11 106 116 110 64 54	LOADS (T/DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4 4.0 5.4 5.4 4.0 5.4 5.4 4.0 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 1790 1550 889 99 65 43 45 170 228 39 35 32 32 413 388 198 146	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 5.8 3.0 2.8 11 18 2.5 1.9 1.3 68 104 30 14	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 5430 4650 6140 2860 6140 2860 143 210 186 97 96 80 100 83 119 111 81 65 3900	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9 2.7 1.5 1.3 1.2 .66 .86 1630	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 13800 10400 7180 5300 2000 2300 2300 2300	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470 1650 1160 451 197 111 31	CONCEN- TRATION TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88 86 47 44 430 33 23 26 30 35 22 24 49 29 29	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0 5.9 4.3 4.8 5.5 6.4 3.7 3.8 4.4 4.9
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	CONCEN- TRATION (MG/L) A 44 22 22 21 19 13 18 22 25 39 35 23 19 18 17 42 34 26 26 26 24 33 33 39 56 55 55 34 38 29	LOADS (T/DAY) PRIL 1.1 .77 .57 .48 .39 .81 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3 1.3 1.7 2.6 2.0 2.1 3.6 4.6 1.7 1.6 2.0	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 1820 1820 1820 136 58 60 30 30 34 70 71 72 67 63 73 73 111 106 116 110 64	LOADS (T//DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4 4.0 3.9 4.3 4.1 4.8 5.4 5.4	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 514 299 99 95 65 43 45 170 228 39 35 32 32 31 388 198	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 50 13 50 13 50 13 5.8 3.0 2.8 11 18 2.5 1.9 1.3 68 104 30	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 4650 6140 4950 2820 2860 143 210 860 143 210 86 97 96 80 100 83 3119	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9 2.7 1.5 1.3 1.2 .66 .86	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7180 5300 13800 10400 7180 5300 2000 2300 2300 2300	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470 1650 1160 451 197 111	CONCEN- TRATION TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 1920 1310 1920 1310 1920 1310 1920 1310 1920 88 366 47 44 30 33 23 26 30 35 22 24 29	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0 5.9 4.3 4.8 5.5 6.4 3.7 3.8 4.4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 TOTAL	CONCEN- TRATION (MG/L) A 44 22 21 19 13 18 22 25 39 35 23 19 18 17 42 34 26 26 26 24 33 33 33 39 56 55 34 38 29 30 50	LOADS (T/DAY) PRIL 1.1 .71 .77 .57 .48 .39 .81 1.8 1.7 .75 .72 .97 .78 2.5 1.8 1.3 1.3 1.3 1.3 1.7 2.6 2.0 2.1 3.6 4.6 1.7 1.6 2.0 1.5 2.0 1.5 2.0 45.47	CONCEN- TRATION (MG/L) 29 25 29 27 20 14 4990 4960 3980 3980 1820 632 136 58 60 30 30 34 70 71 72 67 63 73 30 31 11 106 116 110 64 54 3750 3800	LOADS (T//DAY) MAY 1.0 .74 1.1 7.8 4.4 1.8 4820 2570 1230 359 77 9.9 3.0 2.3 1.1 1.2 3.8 5.4 5.4 4.0 3.9 4.3 4.1 4.8 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4 5.4	CONCEN- TRATION (MG/L) 5750 3400 2860 3510 2580 3130 2600 2390 2160 2090 1850 1790 1550 889 99 514 299 99 514 299 514 299 514 299 514 299 514 299 514 299 514 228 30 35 32 32 35 32 32 35 32 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 32 35 35 32 35 35 32 35 35 35 35 35 35 35 35 35 35 35 35 35	(T/DAY) JUNE 11100 6730 5710 7030 5260 6660 5140 4630 3990 3370 2640 2130 1710 406 133 5.8 3.0 2.8 11 18 2.5 1.9 1.3 68 104 30 14 24	CONCEN- TRATION (MG/L) 144 187 1120 408 372 1820 1810 1280 155 4630 4850 6140 4950 2820 2860 143 210 186 186 97 96 80 100 83 119 111 81 81 65 3900 9870 6360	(T/DAY) JULY 14 38 148 124 71 226 132 66 5.9 1980 3370 2210 2900 1260 388 263 8.9 14 9.0 3.7 3.9 1.9 2.7 1.5 1.3 1.2 .66 .86 1.3 1.2 .66 .86 .80 .80 .80 .80 .80 .80 .80 .80	CONCEN- TRATION (MG/L) 2220 200 128 127 133 56 1360 2080 5760 8490 7720 9630 13800 10400 7720 9630 13800 13800 13800 13800 2300 1480 4970 2000 2300 1650 902 5366 383 161 45 32 34 40 59 74	(T/DAY) JGUST 288 9.7 4.5 4.5 7.2 2.7 77 146 2970 3850 2330 6050 29300 18200 8280 4090 3990 6010 1470 1650 1160 451 197 111 31 7.3 4.2 3.5 3.8 4.9	CONCEN- TRATION TRATION (MG/L) SEI 77 74 29 290 450 4000 4460 4140 2710 1920 1310 1050 960 525 347 88 836 47 44 30 33 22 26 22 24 29 29 26	(T/DAY) PTEMBER 5.4 16 4.7 34 69 6100 5740 4990 2040 1150 672 451 345 206 128 24 7.7 9.3 9.0 5.9 4.3 4.8 5.5 6.4 3.7 3.8 4.4 4.5



Water Resources Data for New Mexico

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT NM-80-1 WATER YEAR 1980

Prepared in cooperation with the State of New Mexico and with other agencies

RIO GRANDE BASIN

08396500 PECOS RIVER NEAR ARTESIA, NM (Surveillance.program station)

LOCATION.--Lat 32°50'25", long 104°19'23", in NWANWA sec.18, T.17 S., R.27 E., Eddy County, Hydrologic Unit 13060007, near left bank on downstream end of bridge pier on State Highway 83, 4.3 mi (6.9 km) east of Artesia, 7.0 mi (11.3 km) upstream from Rio Penasco, 17 mi (27.4 km) upstream from McMillan Dam, and at mile 503.9 (810.8 km). DRAINAGE AREA.--15,300 mi² (39,630 km²), approximately (contributing area).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD. --September 1905 to June 1909, August 1909 to current year. Monthly discharge only for some periods, published in WSP 1312 and 1712. Records for Aug. 22-31, 1934, and October 1936 to April 1937, published in WSP 763 and 828, respectively are not reliable and should not be used. Prior to February 1936, published as "near Dayton."
REVISED RECORDS.--WSP 1312 and 1512: 1913, 1915, 1917-18(M), 1920, 1923, 1931-36. WSP 1712: 1906(M), 1908-11(M), 1919, 1921-23(M), 1929, 1931-32(M), 1935-36(M), 1937, 1939(M), 1941(M). See also PERIOD OF RECORD.
GAGE.--Water-stage recorder. Datum of gage is 3,291.92 ft (1,003.376 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 27, 1914, nonrecording gage and Aug. 27, 1914, to Feb. 20, 1936, water-stage recorder at site 6.5 mi (10.5 km) downstream at different datum. Feb. 21, 1936, to Apr. 4, 1941, water-stage recorder at site 600 ft

(183 m) downstream at different datum.
(183 m) downstream at different datum.
REMARKS.--Water-discharge records fair. Flow partly regulated by Lake Sumner (station 08384000) since August 1937.
Diversions and ground-water withdrawals for irrigation of about 154,000 acres (620 km²), 1959 determination, above station

.۱

station.
AVERAGE DISCHARGE.--44 years, 250 ft³/s (7.080 m³/s) 181,100 acre-ft/yr (223 hm³/yr).
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge probably occurred May 30, 1937, when a discharge of 51,500 ft³/s (1,460 m³/s) was measured by slope-area method at a point 15 mi (24.1 km) upstream, gage height, 14.7 ft (4.48 m), site and datum then in use; no flow at times in 1934, 1946-47, 1953-54, 1957, 1964-65.
EXTREMES OUTSIDE PERIOD OF RECORD.--Createst flood since at least 1893 occurred Oct. 2, 1904, discharge not determined; the peak inflow to Lake McMillan, which includes Rio Penasco and Fourmile Draw, was estimated at 82,000 ft³/s (2,320 m³/s). The second highest flood occurred July 25, 1905, discharge below Rio Penasco, 50,300 ft³/s (1,420 m³/s), based on gain in storage and spill from Lake McMillan. The floods in August 1893 and October 1904 damaged McMillan Dam and washed out Avalon Dam.
EXTREMES FOR CURRENT YEAR.--Maximum discharge 1,670 ft³/s (47.3 m³/s) Sept. 12, gage height, 9.00 ft (2.743 m) no peak above base of 2,000 ft³/s (57 m³/s); minimum, 3.4 ft³/s (0.096 m³/s) June 14.

DISCHARGE,	IN	CUBIC	FEET	PER	SECOND,	WATER	YEAR	OCTOBER	1979	τo	SEPTEMBER	1980
	MEAN VAL	LUES										

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	25	165	54	62	83	49	25	417	23	583	204	14
2	25	149	54	62	92	48	18	194	22	576	125	21
23	22	137	55	62	104	48	18	173	25	593	99	14
- 4	19	131	56	62	106	51	22	148	19	593	72	11
5	13	128	56	60	94	48	21	131	17	617	45	9,6
6	12	114	58	59	86	46	20	103	16	641	39	12
7	13	103	59	60	80	45	21	83	11	655	50	11
8	14	93	59	60	71	42	22	83	8.9	718	71	8,9
9	17	87	57	59	72	41	21	71	8.2	740	52	38
10	14	84	55	57	70	41	21	62	7.5	720	49	100
11	13	81	54	56	65	42	21	56	7.5	720	44	240
12	13	78	54	57	68	39	34	105	6.4	715	46	1070
13	13	- 76	57	57	70	39	468	84	4.9	720	50	497
14	15	75	64	57	72	38	638	51	5.2	715	55	537
15	15	70	62	58	72	37	619	44	16	698	44	564
16	15	69	69	57	72	37	619	53	17	705	217	668
17	15	67	72	56	75	36	641	54	7.5	720	107	415
18	411	66	74	51	75	36	680	64	4.7	718	49	216
19	739	64	70	50	74	34	670	132	4.7	715	27	169
20	780	62	66	50	72	30	672	98	4.7	710	31	140
21	444	59	68	53	74	28	692	64	4.1	725	25	114
22	185	59	68	59	69	25	690	53	4.1	730	35	93
23	314	59	66	74	64	22	718	39	57	750	33	82
24	760	59	66 -	75	61	19	718	31	419	710	19	68
25	828	57	66	87	58	17	732	30	487	690	12	75
								-				
26	873	57	64	84	55	16	808	29	524	700	11	125
27	905	56	64	83	52	14	795	28	540	690	14	248
28	877	55	64	83	51	15	715	27	547	685	12	359
29	393	54	64	83	51	17	735	24	571	730	9.6	235
30	230	55	62	82		16	738	24	595	649	11	173
31	174		62	82		17		27		534	11	
TOTAL	8186	2469	1919	1997	2108	1033	12612	2582	3984.4	21165	1668.6	6327.5
MEAN	264	82.3	61.9	64.4	72.7	33.3	420	83.3	133	683	53.8	211
MAX	905	165	74	87	106	51	808	417	595	750	217	1070
MIN	12	54	54.	50	51	14	18	24	4.1	534	9.6	8.9
AC-FT	16240	4900	3810	3960	4180	2050	25020	5120	7900	41980	3310	12550
CAL YR			MEAN	147 K	AX 1170	MIN 3.9	AC-FT	106400				
WTR YR	1980 TOTAL	66051.5	MEAN	180 N	AX 1070	MIN 4.1	AC-FT	131000				

347

• 1

N

1.1 ÷

「日日日になっている」」という

Ì

ŝ

1.

PERIOD OF RECORD.--Water years 1937 to current year. PERIOD OF DAILY RECORD.--SPECIFIC CONDUCTANCE: July 1937 to current year. WATER TEMPERATURES: April 1949 to current year. SUSPENDED SEDIMENT DISCHARGE: January 1949 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD .--

SPECIFIC CONDUCTANCE: Maximum daily, 28,800 micromhos June 24, 1977; minimum daily, 464 micromhos Sept. 23, 1974. WATER TEMPERATURES: Maximum, 36.0°C July 27, 1966, July 25, 1969; minimum, 0.0°C on many days during winter

WATER TEMPERATURES: Maximum, 36.0°C July 27, 1966, July 25, 1969; minimum, 0.0°C on many days during winter months of most years.
SEDIMENT CONCENTRATIONS: Maximum daily, 21,300 mg/L Aug. 1, 1962; minimum daily, no flow on many days during July 1953, July and August 1954, July 1957, July to October 1964.
SEDIMENT LOADS: Maximum daily, 183,000 tons (166,000 tonnes) Sept. 26, 1955; minimum daily, 0 tons (0 tonnes) on many days during July 1953, July and August 1954, July 1957, July to October 1964.
EXTREMES FOR CURRENT YEAR.--SPECIFIC CONDUCTANCE: Maximum daily, 26,000 micromhos Mar. 28; minimum daily, 1,160 micromhos July 24, 26.
WATER TEMPERATURES: Maximum, 33.0°C June 13, 23; minimum, 3.0°C Dec. 2, 16-17.
SEDIMENT CONCENTRATIONS: Maximum daily, 5,950 mg/L Sept. 17; minimum daily, 5 mg/L Mar. 15
SEDIMENT LOADS: Maximum daily, 9,380 tons (8,510 tonnes) Oct. 19; minimum daily, 0.20 ton (0.18 tonne) June 18.

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM- FLOW, INSTAN- TANEOUS (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	PH FIELD (UNITS) (00400)	TEMPER- ATURE, AIR (DEG C) (00020)	TEMPER- ATURE, WATER (DEG C) (00010)	TUR- BID- ITY (NTU) (00076)	OXYGEN, DIS- SOLVED (MG/L) (00300)	OXYGEN DEMAND, CHEM- ICAL (HIGH LEVEL) (MG/L) (00340)	HARD- NESS (MG/L AS CACO3) (00900)
12	0912	13	13800	8.1	24.5	15.5	12	9.0	59	3400
NOV	00.45	07	4050				<u> </u>			
09 DEC	0945	87	4050	8.5	15.5	10.5	63	10.2	35	1500
05 JAN	0845	56	7300	8.5	16.0	5.0	4.8		150	2000
18 FEB	1030	51.	8700	8.6	19.5	9.0	1.1	13.2	49	2100
26 MAR	1000	55	8770	8.4	23.0	11.0	2.8	14.4	72	2400
25 APR	0945	17	14900	8.3	23.5	15.0	5.9	11.6	3400	3300
30	0930	738	2170	8.1	31.0	19.0	560	7.0	2	1100
MAY 27	1030	28	6250	8.2	31.0	25.0	37	8.2	160	2100
JUN 24	1030	419	3600	7.9	39.0	25.5	4000	4.8	180	1600
JUL 22	1000	730	1200	8.2	32.0	25.0	420	3.2	32	580
AUG 26	1030	11	7200	8.3	34.5	27.0	17	7.2	41	1500
~SEP 29	1030	235	2800	8.1	23.0	20.0	460	7.4	64	1000
	HARD-		MAGNE-		SODIUM	POTAS-			CHLO-	FLUO-
<u>ر</u>	NESS,	CALCIUM	SIUM,	SODIUM,	AD-	SIUM,	ALKA-	SULFATE	RIDE,	RIDE,
	NONCAR-	DIS-	DIS-	DIS-	SORP-	DIS-	LINITY	DIS-	DIS-	DIS-
	BONATE	SOLVED	SOLVED	SOLVED	TION	SOLVED	(MG/L	SOLVED	SOLVED	SOLVED
DATE	(MG/L CACO3)	(MG/L AS CA)	(MG/L AS MG)	(MG/L AS NA)	RATIO	(MG/L AS K)	AS CACO3)	(MG/L AS SO4)	(MG/L AS CL)	(MG/L
DAID	(00902)	(00915)	(00925)	(00930)	(00931)	(00935)	(00410)	(00945)	(00940)	AS F) (00950)
OCT	•	-						•		
12 NOV	3300	500	520	2100	16	22	130	3200	3700	.8
09 DEC	1400	420	110	450	5.1	7.6	130	1100	770	.5
05 JAN	1900	430	230	1000	9.7	9.5	170	2600	860	.8
18 FEB	2000	480	220	1200	11	11	150	1800	2100	.9
26 MAR	2300	560	240	1200	. 11	11	100	1800	2100	.6
25 APR	3100	750	340	2400	18	21	190	2600	4200	.9
30 MAY	1000	370	49	110	1.4	4.2	96	970	150	.6
27 JUN	2000	540	190	1100	10	13	97	1600	1900	.5
24 JUL	1500	470	100	320	3.5	9.5	100	1500	480	.9
22 AUG	490	190	26	55	1.0	2.9	88	470	74	.7
26 SEP	1400	420	110	930	10	13	110	1300	1600	.5
29		280	76	380	5.2	9.5		720	650	.6

رد. ۴۰

į

ó

CHEMICAL ANALYSES, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE OCT	SILICA, DIS- SOLVED (MG/L AS SIO2) (00955)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L) (70300)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L) (70301)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L) (00530)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N) (00630)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N) (00631)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N) (00610)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N) (00608)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N) (00605)
12	9.0	9990	10100	35	.71	.73	.270	.260	.54
NOV 09 DEC	15	. 3200	2960	154	.83	.84	.170	.090	.44
05	16	5770	5260	17	1.6	1.6	.340	.260	1.5
JAN 18 FEB	11	6210	5920	12	.83	.83	.230	.260	1.8
26	14	6070	5990	7	.02	.06	.940	.120	1.2
MAR 25 APR	7.8	10700	10400	15	.04	.04	.180	.170	1.1
30	8.4	1810	1720	1250	.09	.10	.140	.110	1.5
MAY 27	12	5920	5410	81	•00	.00	.200	.220	1.3
JUN	12	5920	5410	61	•00	.00	.200	• 2 2 0	1.3
24	8.0	3090	2950	1670	.32	.19	.380	.400	2.3
JUL 22	7.1	945	879	224	.01	.05	.010	.000	2.6
AUG	/11	715	015		.01				
26	8.8	4730	4450	19	.00	.00	.350	.070	.75
SEP 29	12	2430	2130	748	.63	. 59	.120	.060	2.1
DATE	NITRO GEN, TOTAL (MG/L AS N)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	BORON, DIS- SOLVED (UG/L AS B)	IRON, DIS- SOLVED (UG/L AS FE)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	CARBON, ORGANIC TOTAL (MG/L AS C)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED (MG/L AS C)
	(00600)	(00665)	(00671)	(01020)	(01046)	(01056)	(00680)	(00681)	(00689)
ост 12 NOV	1.5	.070	.010	990	50		·	4.5	.9
09	1.4	.0 70	.010	280	20			4.8	.6
DEC	3.4	.100	.020	470	60	20	8.5	5.6	1.7

.100

.090

.280

.110

.870

.090

1.700

.670

.030

.590

3.4

2.8

2.1

1.3

1.7

1.5

3.0

2.6

1.1

2.8

DEC 05... JAN 18... FEB 26... MAR 25... APR 30

30...

MAY 27... JUN

JUN 24... JUL 22... AUG 26... SEP 29...

.020

.040

.000

.040

.000

.000

.000

.010

.000

.030

470

490

510

870

100

580

310

100

420

110

60

30

70

50

110

50

160

50

50

840

٨.

20

--

440

20

20

--

8.5

-- '

5.3

-~

-~

50

5.6

5.2

9.5

5.4

2.4

6.6

6.9

9.4

4.8

5.3

1.7

1.9

.5

1.6

.6

1.1

1.9

.6

22

349

- -

i C ŝ

Statute

me a second of the second second and

• 1000 ļ

.01

.

1 1

1

ż.

TRACE ELEMENT ANALYSES, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE DEC 05	TIME 0845	ARSENIC TOTAL (UG/L AS AS) (01002) 2	ARSE DI SOL (UG AS (010	NIC TO S- RE VED EF /L (U AS) AS	COV- ABLE G/L BA)	DIS SOLY (UC AS		D SO (U AS	RON, IS- LVED G/L B) 020) 470	REC ER/ (UC	AL COV- ABLE G/L CD)	D SO (U AS	MIUM IS- LVED G/L CD) 025) 0	REG Eri (UC As		CHRO- MIUM, DIS- SOLVED (UG/L AS CR) (01030) 10
25	0945	*-		1			200		870				1			20
APR 30	0930	3		1	800		400		100		1		0		30	10
JUN 24	1030	10		1 .	1000		100		310		0		1		50	10
				-							-		-			
DATE		AL COB DV- DI BLE SOL /L (U CO) AS	ALT, S- VED G/L CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPE DIS- SOLV (UG/ AS C	ΈD ΊL ΰ)	I ROM TOTA RECO ERAE (UG/ AS E	L DV- DLE (L PE)	IRON DIS SOLV (UG/ AS I	5- /ED /L ?E)	LEAD TOTA RECC ERAE (UG/ AS F	L)V- (LE (L)B)	LEAN DIS SOLV (UG) AS I	5- /ED /L PB)	(UG/ AS M	L L L L N)
DEC	(010	37) (01	035)	(01042)	(0104	0)	(0104	15)	(0104	16)	(0105	51)	(0104	19)	(0105	5)
05	•	3	0	1		2	3	00		60		6		2		40
MAR			•													
25 APR	•		0			1				50				1		
30	•	11	0	27		3	190	00	1	10		55		2	9	30
JUN 24		18	0	150		44	330	000	1	160		57		4	36	00
			-	200		••			-					-		
	MAN NES DI SOL (UG)	e, to 5- re Ved er	CURY TAL COV- ABLE G/L	MERCURY DIS- SOLVED (UG/L	SELE NIUM TOTA (UG/	l, L	SELE NIUM DIS SOLN (UG)	1, 5- /ED	SILVE TOTA RECO ERAI	AL DV BLE	SILVE DIS SOLV	¦≁ ∕ED	ZING TOT/ RECO ERAI	AL DV- BLE	ZINC DIS SOLV (UG/	ED
DATE			HG)	AS HG)	AS S		ASS		ASA		AS A		AS		AS Z	
DEC	(010	56) (71	900)	(71890)	(0114		(0114	15)	(010)	77)	(0107		(0109	2)	(0109	
05 MAR	•	20	.1	.0		2		. 4		0		0		40		60
25	•	440		.1				2				0				80
APR 30 JUN	•	20	.1	.0		0		1	•	0		0	· 1	150	1	.50
24	•	20	.1	.0		2		1		0		0	:	230		30
	CUENTC			BOTTOM	MATCORT	× T	WATE		ND 001	MAR	. 1070		CEDMI	MDDI	10.00	
	CHEMIC	AD ANADI	363 Vr	BUITON	MAIGAI	.K.,	WALLI	1 1 1	AR UC	10061	19/3	10	SCPII	SUDE	K 1900	
		T		ARSENIC TOTAL IN BOT- TOM MA- TERIAL (UG/G	CADMI RECO FM BO TOM M TERI (UG/	V. M- AL	CHRO MIUN RECO FM BO TOM N TERI	1, 2V. 2T- 4A-	COPPI RECO FM BO TOM N TER	DV. DT- IA- IAL	LEAD RECO FM BO TOM M TERI (UG/	VV. Vr- IA- IAL	MERCO RECO FM BO TOM N TER: (UG)	DV. DT- 1A- IAL		
	DA	re		AS AS)	ASC	(D)	(UG/	(G)	AS	ະບ)	ASE	B)	AS	HG)		
	SEP			(01003)	(0102	81	(0102	(A.)	(0104	13)	(0105	2]	(719)	21)		

SEP 29	1030	0	1	` 1	2	0	
		(01003)	(01028)	(01029)	(01043)	(01052)	(719
DATE			AS CD)				AS
	TIME		(UG/G				(UG
		TERIAL	TERIAL	TOM MA-	TERIAL	TERIAL	TER
		TOM MA-	TUM MA-	FM BOT-	TOM MA-	TOM MA-	TOM

350

. 1

1

÷.

PESTICIDE ANALYSES, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

				•					
				CHLOR-				DI-	DI-
		PCB	ALDRIN,	DANE,	DDD,	DDE,	DDT,	AZINON,	ELDRIN
	TIME	TOTAL							
DATE		(UG/L)							
		(39516)	(39330)	(39350)	(39360)	(39365)	(39370)	(39570)	(39380)
SEP									
29	1030	.00	.00	.0	.00	.00	.00	.01	•00
					HEPTA-			METH-	METHYL
	ENDO-			HEPTA-	CHLOR		MALA-	OXY-	PARA-
	SULFAN,	ENDRIN,	ETHION,	CHLOR,	EPOXIDE	LINDANE	THION,	CHLOR,	THION,
	TOTAL								
DATE	(UG/L)								
	(39388)	(39390)	(39398)	(39410)	(39420)	(39340)	(39530)	(39480)	(39600)
SEP			(,						
29	.00	.00	.00	.00	.00	.00	.00	.00	.00
								NAPH-	
							-	THA-	
	METHYL							LENES,	
	TRI-	PARA-	TOX~	TOTAL			PER-	POLY-	
	THION,	THION,	APHENE,	TRI-	2,4,5-T	SILVEX,	THANE	CHLOR.	MIREX,
	TOTAL	TOTAL	TOTAL	THION	TOTAL	TOTAL	TOTAL	TOTAL	TOTAL
DATE	(UG/L)								
	(39790)	(39540)	(39400)	(39786)	(39740)	(39760)	(39034)	(39250)	(39755)
SEP								_	
29	.00	.00	0	.00	.00	.00	.00	.0	.00
				_					

MICROBIOLOGICAL ANALYSES, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	COLI- FORM, FECAL, 0.7 UM~MF (COLS./ 100 ML) (31625)		
OCT 12 NOV	0912	53	460	
09 DEC	0945	20	85	
05 JAN	0845	1	25	
18 FEB	1030	54	58	
26 Mar	1000	160	800	
25 APR	0945	7	12	
30 May 27	0930	230 3	1600 12	
JUN 24	1030 1030	14	980	
JUL 22	1000	. 100	130	
AUG 26	1030	28	28	
SEP 29	1030	2000	5200	

at the shirt have

Print and State and an in struct in

INSTANTANEOUS SUSPENDED SEDIMENT AND PARTICLE SIZE, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

NSTANTA	NEOUS SUS	PENDED SE	DIMENT AN	D PARTICL	E SIZE, W	ATER YEAR	OCTOBER	1979 TO S	SEPTEMBER 1
				•	SEDI-	SED.	SED.	SED.	SED.
					MENT	SUSP.	SUSP.	SUSP.	SUSP.
		STREAM-		SEDI-	DIS-	FALL	FALL	FALL	FALL
		FLOW,	TEMPER-	MENT,	CHARGE,	DIAM.	DIAM.	DIAM.	DIAM.
		INSTAN-	ATURE,	SUS-	SUS-	<pre>% FINER</pre>	<pre>% FINER</pre>	<pre>% FINER</pre>	<pre>% FINER</pre>
	TIME	TANEOUS	WATER	PENDED	PENDED	THAN	THAN	THAN	THAN
DATE		(CFS)	(DEG C)	(MG/L)	(T/DAY)	.002 MM	.004 MM	.008 MM	.016 MM
000		(00061)	(00010)	(80154)	(80155)	(70337)	(70338)	(70339)	(70340)
ост 28	0810	877	14.0	2470	5850	37	43		61
DEC	0010	0//	14.0	2470	5850	37	. 43		01
05	0845	56	5.0	55	8.3	64	69	72	75
JAN	0015		5.0				•••		
18	1030	: 51	9.0	26	3.6				
FEB									
26	1000	° 55	11.0	29	4.3				
MAR									
25	0945	17	15.0	34	1.6				
APR	0910	638	10.0	2440	4200	33	43		66
14 27	0900	795	13.0	1830	3930	31	38		54
30	0930	738	19.0	1950	3890	24	33		43
MAY				2700					
27	1030	28	25.0	100	7.6				
JUN									
24	1030	419	25.5	4720	5340	38	49		73
26	1112	524	26.0	2470	3500	35	45		65
JUL 02	1000	676	27.0	1280	1000	39	49		67
22	1600 1000	576 730	27.0 25.0	1280	1990 3920	22	25		67 35
AUG	1000	750	25.0	1990	3920	22	25		33
16	1000	217	27.0	2040	1200	26	42		72
26	1030	ĩi	27.0	33	.98				
SEP									
12	1300	1070	24.0	2980	B610	35	44		57
18	1535	216	26.0	3900	2270	64	82		98
29	1030	235	20.0	945	600	42	51		71
	SED.								
	SUSP.								
	FALL	FALL	FALL	FALL	FALL	SIEVE	SIEVE	SIEVE	SIEVE
	DIAM.								
	<pre>% FINER</pre>								
	THAN								
DATE	.031 MM (70341)	.062 MM (70342)	.125 MM (70343)	.250 MM (70344)	.500 MM (70345)	.062 MM (70331)	.125 MM (70332)	.250 MM (70333)	.500 MM (70334)
OCT	(70341)	(70342)	(70343)	(70344)	(70345)	(70331)	(70332)	(10333)	(70334)
28						95	100		
DEC									
05	79	·	÷			85	90	100	
JAN									
18 FEB	·					35	64	97	100
26						41	63	94	100
MAR		•				41	05	54	100
25						39	72	96	100
APR			•						
14		95	100		·				
27		92	100					• •••	
30		84	95	100					
MAY 27						76	. 85	96	100
JUN						/0	65	50	100
24		90	96	100					
26		95	100						
JUL									
02						97	100		
22		71	87	96	100				
AUG							1		
16 26						99 85	100	100	
						60	92	100	
SEP									
SEP 12		82	96	100					
		82 100	96	100					
12									

352

والمصلحة فالجز ويشترها يلين المتعا متروض ترابي شروعه

-

10/20

2

5-2

Level - South States

	SPECIFIC	CONDUCTA	ANCE (MICRO	MHOS/CM 1	T 25 DEG.	C), WA	TER YEAR	OCTOBER 19	79 TO SEP	TEMBER 19	80	
DAY	OCT	NOV	DEC	JAN		DAILY	APR	МАУ	JUN	JUL	AUG	SEP
					8000	9450	15100	2200	10400	2330	1890	14900
1 2	11700 11800	2850 2830	7510 7740	7960 7790	7590	9450	12900	2470	11300	2310	2360	11700
3	11100	3000	7670	7960	7110	9720	13200	2700	12000	2280	2740	11600
4 5	10800 10800	3160 3400	7800 7830	7840 7960	6290 6070	9900 9810	14500 13600	2720 3240	11200 11700	2290 2290	3180 3300	10100 10200
5	10000	5400	7050	7900	0010	2010	13000					
6	10200	3470	7920	8070	6250	10100	13100	3420	13700	2290	3490	10900
7 8	11700 14800	3730 3980	7870 7830	8010 8070	6760 7240	9900 10300	13300 12600	3800 4170	13700 13400	2290 2320	3570 3960	11300 13700
ğ	14900	4030	7770	8130	7320	10400	12200	4520	13600	2300	4020	12400
10	14100	4270	7790	8060	7500	10500	12100	5050	13600	2290	4980	7230
11	13100	4400	7770	8200	7820	10400	12300	5470	14200	2300	5340	3850
12	13500	4510	7890	8260	7770	10500	12400	5530	16700	2290	5370	1460
13 14	15000 15100	4540 4910	7930 7670	8450 8450	7980 8860	10700 10700	12800 3050	4680 4940	14800 18300	2330 2280	5340 6080	1390 1480
15	15000	5210	7690	8320	8230	11100	2470	5120	21500	2270	5870	1900
16	14800	5300	7790	8320	7800	10900	2310	5220	13400	2170	5770	2280
17	14900	5370	7760	8320	7210	11100	2230	5530	12700	2020	2510	1920
18	9080	5960	8070	8520	7470	11700	2200	5830	11500	1860	2830	1870
19 20	2140 1580	6110 6340	7730 7420	8720 8780	7510 7610	11400 11700	2170 2150	6270 4520	11200 12400	1700 1530	3110 4700	2040 2640
21	1690	6470	7260	8790	7750	12100	2130 2100	4640 4820	14500 16200	1240 1260	6520 6600	3450 3810
22 23	1770 1960	6720 6740	7210 7460	7620 7840	8070 7850	12600 13500	2100	4820	18200	1180	5910	4270
24	1910	6980	7720	7960	7830	13900	2140	5560	3560	1160	5840	4900
25	1470	7210	7710	7680	8100	14800	2180	7160	2640	1170	5840	5540
26	1470	7190	7670	7730	8380	15300	2190	7620	2510	1160	6970	3330
27	1470	7320	7510	7900	8570	16400	2200	8080	2330	1280	7650	4540
28 29	1480 1640	7490 7530	7620 7890	7790 7790 ·	8910 8880	26000 15500	2210 2110	8510 9380	2320 2350	1260 1210	9620 11000	1940 3250
30	1930	7540	7970	7660		14900	2110	10300	2310	1350	10900	3370
31	2250		8080	7790		14000		10500	11200	1390	11200	
MEAN WTR YR	8230 1980	5290 MEAN	7730 7160	8090 MAX	7680 26000	12200	6940 MIN	5450 1160	11300	1850	5430	5780
		TEMPER	ATURE, WATE	R (DEG.		DAILY	TUBER 19	19 10 SEFT	SHEER 1900			
DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24.0	10.0	7.5	5.5	6.0	9.5	11.0	20.0	24.0	26.5	27.0	29.0
2	16.5	11.0	3.0	6.5	4.5	12.0	17.0	21.0	26.5	27.0	25.0	22.5 29.0
3 .4	24.5 27.5	13.0 10.0	6.0 7.0	6.5 5.5	7.5 9.5	7.0 10.0	18.0 19.0	19.0 19.5	29.0 24.0	27.0 27.5	30.0 29.0	26.0
5	23.5	10.5	6.0	5.0	9.0	10.5	17.0	24.0	31.0	26.0	24.5	27.0
6	16.0	11.5	9.0	7.0	9.0	13.0	22.0	24.0	29.5	26.5	28.0	24.5
7	25.0	11.0	5.0	5.5	10.5	12.0	18.0	25.5	29.0	27.5	23.5	26.0
8	18.5	11.0	10.0	5.0	8.0	12.0	20.0	26.0	26.0	27.0	30.0	27.0
9 10	15.0 14.5	14.0 11.5	9.5 10.0	8.0 5.0	4.5 3.5	15.0 15.0	12.5 20.0	23.5 23.0	26.0 25.0	27.5 27.5	29.0 28.0	24.0 20.0
											•	
11 12	22.0 16.0	13.5 11.5	11.5	8.0 9.0	4.5	15.0 13.0	23.0 21.5	22.0 22.0	25.0 28.0	26.5 27.0	26.5 24.5	21.0 21.5
13	15.0	12.5	7.5 7.0	10.5	6.0 5.0	18.0	20.0	20.0	33.0	27.5	23.0	24.5
14	15.5	11.5	5.0	10.0	8.5	10.0	10.0	19.0	30.0	28.0	26.0	23.0
15	22.0	11.0	4.0	12.5	12.0	14.0	13.0	21.0	28.5	27.5	25.0	24.0
16	24.5	10.0	3.0	9.0	12.0	15.0	15.0		29.5	28.0	27.0	24.5
17 18	17.0	7.5	3.0	9.0	6.5	13.5			29.0	28.0	25.0	23.0 26.0
19	17.0 16.5	13.0 12.0	3.5 5.5	10.0 11.5	13.0 11.0	13.0 17.0	19.0 16.5		31.5 29.0	27.5 26.0	25.5 26.0	22.5
20	16.5	10.0	9.0	7.0	11.5	15.0	19.0	28.0	30.0	25.5	25.0	23.0
21	17.0	13.5	7.0	7.5	11.0	16.0	18.0	24.5	28.0	26.5	23.5	27.0
22	13.5	6.5	9.5	6.5	13.0	16.0	18.0	27.0	26.0	26.5	24.5	21.0
23	12.5	5.0	9.0	5.0	11.5	10.0	20.5		33.0	27.0	28.5	20.5
24 25	12.5 13.0	8.0 11.0	11.5 9.0	5.0 7.0	10.5 10.0	13.5 18.0	17.5 16.0		28.0 27.0	28.5 26.5	27.0 27.0	22.5 22.0
26 27	15.0 15.5	8.0 11.0	6.5 8.0	4.0 5.0	10.5 11.0	20.0 18.0	15.0 13.0		26.0 26.0	27.0 25.0	25.5 23.0	18.0 18.0
28	14.0	7.0	7.5	5.5	12.0	17.0	19.0	23.5	26.5	26.5	30.5	17.5
29 30	14.0 13.5	4.0	4.5	5.0	13.0	12.0 16.0	18.0 20.0		27.0 27.5	28.0 26.0	27.0 29.5	18.5 21.5
31	13.5	5.5	5.0 5.0	5.0		12.0	20.0	27.5	27.5	28.0	31.5	21.5
		• • •							a a a			
MEAN WTR YR	17.5 1980	10.0 MEAN	7.0 17.5	7.0 Max	9.0 33.0	14.0	17.5 MIN	23.5 3.0	28.0	27.0	26.5	23.0
	-							-				

the time with a

in the second

A Part Sit an ins

The Martin Contraction of the State of the S

and the second states in the second

and interest states

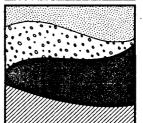
فأشتعهن

SUSPENDED-SEDIMENT DISCHARGE, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN- TRATION (MG/L)	LOADS (T/DAY)		LOADS (T/DAY)
1	58	CTOBER	NO1 398	VEMBER	DE	CEMBER 3.1	J <i>I</i> 207	ANUARY 35		BRUARY	i	
2 3 4 5	29 35 70 47	2.0 2.1 3.6 1.6	310 237 214 198	125 88 76 68	21 80 16 20 39	12 2.4 3.0 5.9	7 11 43 . 6	1.2 1.8 7.2 .97	106 50 76 70	26 14 22 18	13 10 8 7 10	1.3 1.0 .96 1.3
6 7	32 218	1.0	180 151	55 42	59 73	9.2 12	. 6 11	.96 1.8	66 72	15 16	9	1.1
8 9 10	22 26 19	.83 1.2 .72	98 125 117	25 29 27	38 26 18	6.1 4.0 2.7	7 9 6	1.1 1.4 .92	77	15 15 6.0	7 6 10	.79 .66 1.1
11 12 13 14 15	23 35 56 24 30	.81 1.2 2.0 .97 1.2	125 116 100 90 86	27 24 21 18 16	31 31 41 116 21	4.5 4.5 6.3 20 3.5	7 6 26 18 12	1.1 .92 4.0 2.8 1.9	51 25 23 25 46	9.0 4.6 4.3 4.9 8.9	9 8 8 6 5	1.0 .84 .84 .62 .50
16 17 18 19 20	36 23 4360 4700 2650	1.5 .93 6320 9380 5580	159 105 40 44 38	30 19 7.1 7.6 6.4	19 21 14 19 28	3.5 4.1 2.8 3.6 5.0	9 15 47 15 17	1.4 2.3 6.5 2.0 2.3	34 24 34 34 57	6.6 4.9 6.9 6.8 11	9 10 9 8 8	.90 .97 .87 .73 .65
21 22 23 24 25	2130 1510 1610 3130 3010	2550 754 1830 6420 6730	36 56 178 22 35	5.7 8.9 28 3.5 5.4	19 46 38 31 26	3.5 8.4 6.8 5.5 4.6	11 152 38 56 50	1.6 24 7.6 11 12	28 17 18 22 33	5.6 3.2 3.1 3.6 5.2	11 12 8 9 20	.83 .81 .48 .46 .92
26 27 28	2540	6550 6210 5520	30 115 34	4.6 17 5.0	15 27	2.6 4.7 1.6	97 70	22 16 16	24 18 22	3.6	15 15	.65 .57 .49
29 30 31	1360 855	1440 531 290	23 16	3.4	15 27 9 10 11 30	1.7 1.8 5.0	97 70 73 48 99 58	11 22 13	14	1.9	15 15 16 12 14	.73 .52 .64
TOTAL	MEAN	60138.26			MEAN		MEAN	233.77				25.66
	CONCEN-						MEMO		LIPHU		PLEAN	
DAY	TRATION (MG/L)		CONCEN- TRATION (MG/L)	LOADS (T/DAY) MAY		LOADS (T/DAY) JUNE	(MG/L)	LOADS	CONCEN- TRATION (MG/L)	LOADS (T/DAY)	MEAN CONCEN~ TRATION (MG/L) SE	LOADS (T/DAY) PTEMBER
DAY 1 2 3 4 5	(MG/L)	LOADS (T/DAY) APRIL 1.1 .92 .97 1.8	TRATION (MG/L) 1160 655 513 505	LOADS (T/DAY) MAY 1370 343 240 202	TRATION (MG/L)	LOADS (T/DAY) JUNE	TPATION (MG/L)	LOADS (T/DAY)	TRATION (MG/L)	LOADS (T/DAY)	TRATION (MG/L)	(T/DAY)
1 2 3 4	(MG/L) 16 19 20 31	LOADS (T/DAY) APRIL 1.1 .92 .97 1.8	TRATION (MG/L) 1160 655 513 505	LOADS (T/DAY) MAY 1370 343 240 202	TRATION (MG/L) 63 56 64 49 63	LOADS (T/DAY) JUNE 3.9 3.3 4.3 2.5	TPATION (MG/L) 1600 1300 1600 3950	LOADS (T/DAY) JULY 2520 2020 2560 6320	TRATION (MC/L) AI 553 248 130 125	LOADS (T/DAY) UGUST 305 84 35 24 4.7 .7.6	TRATION (MG/L) SE 40 30 39 25 21 -13	(T/DAY) PTEMBER 1.5 1.7 1.5 .74 .54 .42 .39 .41
1 2 3 4 5 6 7 8 9	(MG/L) 16 19 20 31 28 40 40 40 29	LOADS (T/DAY) APRIL 1.1 .92 .97 1.8	TRATION (MG/L) 1160 655 513 505	LOADS (T/DAY) MAY 1370 343 240 202	TRATION (MG/L) 63 56 64 49 63	LOADS (T/DAY) JUNE 3.9 3.3 4.3 2.5 2.9 3.1 1.8 .74 .80	TPATION (MG/L) 1600 1300 1600 3950 1690 2080 2950 1890 1700	LOADS (T/DAY) JULY 2520 2020 2560 6320 2820 3600 5220 3660 3400	TRATION (MG/L) 553 248 130 125 39	LOADS (T/DAY) UGUST 305 84 35 24 4.7 7.6	TRATION (MG/L) SE 40 30 39 25 21 -13	(T/DAY) PTEMBER 1.5 1.7 1.5 .74 .54 .42 .39 .41 75
1 2 3 4 5 6 7 8 9 10 11 12 13 14	(MG/L) 16 19 20 31 28 43 40 40 40 40 29 41 42 43 1300 2340	LOADS (T/DAY) APRIL 1.1 .92 .97 1.8 1.6 2.3 2.3 2.4 1.6 2.3 2.4 1.6 2.3 2.4 1.6 2.3 2.4 1.6 2.3 2.4 1.0 2.0 2.0 0 2.0 0 0 4030	TRATION (MG/L) 1160 655 513 505 612 271 45 32 19 35 35 93 56 36	LOADS (T/DAY) MAY 1370 343 240 202 216 75 10 75 10 7.2 3.6 5.9 5.3 26 13 3.0	TRATION (MG/L) 63 56 64 49 63 72 59 31 36 59 61 36 37 107	LOADS (T//DAY) JUNE 3.9 3.3 4.3 2.5 2.9 3.1 1.8 .74 .80 1.2 1.2 .62 .49 1.5	TPATION (MG/L) 1600 1300 1600 3950 1690 2080 2950 1890 1700 1700 1770 1900 1740	LOADS (T/DAY) JULY 2520 2020 2560 6320 2820 3660 3400 5150 3300 3420 3300 3420 3660 33600 3420 3690 3360	TRATION (MG/L) 253 248 130 125 39 72 125 99 77 46 46 51 62 42	LOADS (T/DAY) UGUST 305 84 35 24 4.7 .7.6 17 19 11 6.1 5.5 6.3 8.4 6.2	TRATION (MG/L) SE 40 30 39 25 21 13 13 13 13 13 17 447 694 395 2110 1580 1660	(T/DAY) PTEMBER 1.5 1.7 1.5 .74 .54 .42 .39 .41 75 187 256 6840 2080 2430
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19	(MG/L) 16 19 20 31 28 43 40 40 29 41 42 43 1300 2340 2010 2220 1960 2050 2010	LOADS (T/DAY) APRIL 1.1 .92 .97 1.8 1.6 2.3 2.4 1.6 2.3 2.4 1.6 2.3 2.4 1.6 2.3 2.4 1.6 2.3 3.9 2010 4030 3360 3710 3390 3760 3640	TRATION (MG/L) 1160 655 513 505 612 271 45 32 19 35 35 93 35 35 93 35 35 36 36 36 37 28 30 34 156	LOADS (T/DAY) MAY 1370 343 240 202 216 75 10 7.2 3.6 5.9 5.3 26 13 5.0 4.4 4.0 4.4 5.9 5.6	TRATION (MG/L) 63 56 64 49 63 72 59 31 36 59 61 36 59 61 36 37 107 58 23 20 16 22	LOADS (T//DAY) JUNE 3.9 3.3 4.3 2.5 2.9 3.1 1.8 .74 .80 1.2 1.2 .62 .62 .49 1.5 2.5 1.1 .41 .20 .28	TPATION (MG/L) 1600 3950 1690 2080 2950 1890 1700 1700 1770 1900 1740 1830 2940 2160 1690 1610	LOADS (T/DAY) JULY 2520 2560 3200 2820 3600 5220 3660 3400 5150 3300 3420 3690 3360 3450 5600 4200 5220 3690 3110	TRATION (MG/L) 253 248 130 125 39 72 125 99 77 46 46 51 62 42 55 1110 453 40 55	LOADS (T/DAY) UGUST 305 84 35 24 4.7 7.6 17 19 11 6.1 5.5 6.3 8.4 6.2 6.5 797 131 5.3 4.0	TRATION (MG/L) Sevent 30 39 25 21 13 13 13 17 447 694 395 2110 1580 1660 1810 3030 5950 4220 3310	(T/DAY) PTEMBER 1.5 1.7 1.5 .74 .54 .42 .39 .41 75 187 256 6840 2080 2430 2760 5680 6670 2460 1510

354





February 25, 1985

Mr. Richard Stamets NMOCD P.O. Box 2088 Santa Fe, New Mexico 87501

Re: Effluent Flow and Chemical Characteristics of Waste Streams Regulated by Discharge Plan

Dear Mr. Stamets:

Navajo Refining Company, Inc. and Geoscience Consultants, Ltd.

are pleased to submit our report on effluent characteristics. Our previous submission described the process at the Artesia Refinery and presented chemical data on many individual waste streams. Section 1.0-6.0 of the Discharge Plan also presented chemical analyses of the evaporation pond fluids which represent the best composite sample of the effluent streams.

In the initial meeting of September 17, 1984 it was decided that all waste streams which are disposed of in the evaporation ponds would be governed by this Discharge Plan. These streams are:

- o Effluent from the oil/water separator
- o Effluent from the water softener
- o Boiler blow down
- o Effluent from the oil recovery system
- o Liquid effluent from the heat exchanger bundle cleaning area
- o Other liquid effluent which may be periodically discharged into the conveyance ditch

The chemical data on these waste streams were presented in Sections 1.0-6.0 of the Discharge Plan and are presented with this submission. Note that samples from the evaporation ponds were analised for benzene, toluene, xylene and ethylbenzene. Analyses of individual waste streams were included for information only. Regulatory decisions should consider the quality of the final effluent as characterized by analyses of the effluent flowing to the evaporation ponds.

The flow data is shown in the Table. At the present time no data are available for flow rates at the downstream end of the ditch.

If you or your technical staff have any questions about this submission please contact me at our Albuquerque office.

Sincerely, GEOSCIENCE CONSULTANTS, LTD. Randall TO Hicks PJ Vice President

RTH/mg

cc: Mr. Dave Griffin, Navajo
Mr. Joel Carson, Losee, Carson, Dickerson
M. David Boyer, NMOCD (2 copies)

EFFLUENT FLOW DATA

DATE	GPD	РН
6-6-84	342,720	12.0
6-7-84	361,440	12.5
6-8-84	361,440	11.0
6-9-84	361,440	13.0
6-11-84	361,440	12.0
6-12-84	Cleaning ditch north of the FCC	13.5
6-13-84	303, 384	11.0
6-14-84	342,720	13.0
6-15-84	342,720	13.5
6-18-84	342,720	9.5
6–20–83	361,440	9.0
6-21-84	342,720	9.0
6-22-84	342,720	10.0
6-23-84	381,440	9.5
6-25-84	361,440	8.5
6-26-84	342,720	9.0
6-27-84	419,040	9.5
6-28-84	380,160	10.5
6-29-84	361,440	11.0
6-30-84	380,160	11.5
7-2-84	342,720	12.5
7-3-84	342,720	10.0
7-5-84	342,720	9.5
7-6-84	380,160	9.5

DATE	GPD	РН
7-8-84	361,440	9.5
7-10-84	361,440	9.0
7–11–84	342,720	10.0
7-12-84	303,840	10.5
7–15–84	342,720	8.5
7–19–84	380,160	7.5
7–20–84	380,160	9.5
7-23-84	380,160	12.5
7-24-84	361,440	11.0
7-25-84	380,160	12.5
7–27–81	380,160	11.0
7-30-84	361,440	9.0
8-2-84	342,720	9.0
8-3-84	380,160	9.0
8-6-84	342,720	9.0
8-7-84	342,270	10.0
8-8-84	361,440	11.0
8-9-84	361,440	9.0
8–14–84	380,160	8.0
8–15–84	380,160	8.5
8–16–84	419,040	8.0
8-17-84	380,160	8.0
8-20-84	380,160	7.5
8-21-84	380,160	7.5
8-22-84	380,160	8.0

. 3

.

I

DATE	GPD	PH
8-23-84	380,160	10.0
8-24-84	361,440	9.0
8-27-84	361,440	9.5
8–28–84 8–29–84	380,160 361,440	8.5 10.0
8-30-84	380,160	8.0
8-31-84	380,160	7.5
9-5-84	380,160	7.0
9-6-84	380,160	8.0
9-7-84	380,160	8.0
9-10-84	380,160	8.5
9–11–84	361,440	9.5
9–12–84	380,160	11.0
9-13-84	380,160	9.5
9–14–84	361,440	11.0
9–17–84	342,720	11.5
9–18–84	361,440	9.0
9-19-84	380,160	7.0
9–20–84	361,440	9.0
9-21-84	342,720	9.0
9-24-84	342,720	8.5
9-25-84	361,440	8.5
9-26-84	342,720	10.5
9-27-84	342,720	11.0
10-1-84	361,440	10.0
10-2-84	342,720	9.5

Į.

G

.

DATE	GPD	РН
10-3-84	361,440	10.5
10-4-84	342,720	11.0
10-5-84	342,720	10.0
10-8-84	361,440	8.0
10-9-84	342,720	9.5
10-11-84	342,720	10.5
10-12-84	342,720	10.0
10-15-84	361,440	11.5
10-16-84	419,040	7.5
10-17-84	398,880	8.5
10-18-84	398,880	7.5
10-19-84	419,040	7.5
10-22-84	398,880	10.5
10-23-84	419,040	8.5
10-24-84	419,040	7.0
10-25-84	398,880	9.0
10-26-84	398,880	11.0
10-29-84	419,040	8.0
10-30-84	398,880	9.5
10-31-84	398,880	9.0
11-1-84	398,880	6.0
11-2-84	342,720	8.0
11-5-84	380,160	5.5
11-6-84	303, 384	4.0
11-7-84	303, 384	7.5

DATE	GPD	РН
11-8-84	380,160	8.5
11-9-84	380,160	7.0
11-10-84	342,720	8.0
11-11-84	342,720	9.5
11-12-84	380,160	9.0
11–13–84	342,720	8.5
11-14-84	303,840	8.5
11-20-84	380,160	7.0
11-21-84	380,160	9.0
11-22-84	342,720	10.0
11-23-84	342,720	9.0
11-26-84	380,160	8.5
11-27-84	398,880	10.0
11-28-84	419,040	10.5
11-29-84	419,040	8.0
11-30-84	380,160	10.0
12-3-84	398,880	11.5
12-4-84	398,880	10.5
12-5-84	380,160	13.0
12-6-84	419,040	9.0
12-7-84	398,880	8.0
12-10-84	380,160	6.5
12-11-84	419,040	11.5
12-12-84	398,880	9.0
12-13-84	419,040	9.0

РН

GPD

DATE

		• • •
12-14-84	398,880	9.5
12-17-84	380,160	6.0
12-18-84	342,720	7.5
12-19-84	419,040	
12-20-84	380,160	11.5
12-21-84	380,160	10.0
12-26-84	342,720	9.0
12-27-84	342,720	11.0
1-2-85	380,160	9.5
1-3-85	361,440	6.0
1-4-85	361,440	8.8
1-7-85	342,720	9.5
1-8-85	303,384	10.5
1–9–85	342,720	10.0
1–10–85	342,720	12.0
1-11-85	303, 384	9.0
1-14-85	342,720	10.0
1-15-85	303, 384	8.5
1–16–85	380,160	6.5
1-17-85	342,720	7.5
1–18–85	361,440	8.5
1–21–85	361,440	7.0
1-22-85	342,720	7.0
1-23-85	342,720	8.0
1-24-85	419,040	6.5

DATE	GPD	РН
1-25-85	361,440	7.5
1-28-85	380,160	7.0
1-29-85	380,160	7.0
1-30-85	361,440	6.0
1-31-85	342,720	7.5
21-85	361,440	8.5
2-4-85	342,720	7.0
2-5-85	242,720	9.0
26-85	361,440	9.5

TABLE 5-2 CHEMICAL ANALYSES OF SELECTED WASTE STREAMS AT NAVAJO REFINERY (AFTER BRANVOLD, 1984) (VALUES IN MG/L EXCEPT WHERE NOTED)

WOCC 3-103 Standards	CRUDE UNIT PROCESS (44, 411, 413)	CAT. CRACKER PROCESS BEFORE SOUR WATER STRIPPER	SDUR KATER STRIFPER EFFLUENT (#17)	ALKY. NEUTRALIZING SEWER (46)	ND & SD DESALTERS (\$3, \$9)
A <i>z</i>					
As Ba					
Cđ					
Cr	<0.1	<0.1	<0.1	7.8	
CN	<0.1	<0.1	<0.1	<0.1	<1.0
-		·			
F	1.3	0.5	0.4	10.8	
fb Hg					
NO ₃					
Se					
Ag				``	
บ้					
C1					
Cu					
fe	<0.1	3.9	17.0	7.8	
Ka					
S04					
195	805	2160	560	2872	2524
Zn	(0.1	<0.1	0.12	18.8	
pH Al	6.3	%.0	9.5	3.6	
ß					
Co					
Ко					
Ki					
Phenols	9.9	710	250	9.26	
TSS					
Cond.					
COD	1202	B379	1702	8870	600
NH.	78	2320	256	<1	5.0
S	64	180	7.7	1.4	<1.0

Table 5-2 (continued)

ŧ

ż

<u>.</u>...

. •

1:

BOILERS

L

i

Į.

MBCC 3-103	S.D.	K.D.	N.D.
PARAMETERS	BOILER	HICH	LOK
	BLONDOWN	PRESSURE	PRESSURE
		BOILER	BOILER
	(#2)	(#18)	(\$12)

As	.004	.005	.003
Ba	(.1	(.1	(.1
Cd	<.01	<.01	<.01
Cr	<.05	<.05	<.05
CN	•		
F	3.1	2.2	1.5
fb	.18	.14	.05
Kg			
NOx	.2	.1	.05
Se			
Âg	<.05	<.05	<.05
U	<.05	<.05	(.05
C1	127	73	44
Cu	<.03	<.03	<.03
Fe	1.9	0.65	0.25
Kn	.07	<.03	<.03
SO	1549	1242	693
TDS	4220	2873	1807
Zn	.06	(.01	(.01
рH	11.6	11.6	11.2
AI	<1.0	<1.0	<1.0
B			
Co	<.01	.02	.01
ño	<.5	<.5	<.5
Ni	<.05	<.05	<.05
Fhenols			
TSS	20	0	0
Cand.	6000	5000	2800
COD	116	e	0
KH.			
^			

S

Table 5-2 (continued)

NOCC 7 143

COOLING TOWERS

NOCC 3- Standar:		G S.D. Alky Cooling Tower Blowdown (#1)	S.D. TCC COOLING TOKER BLOKDOWN	N.D. FCC COOLING TONER BLOWDOWN (#16)
As	.004	/ 64+		
Ba	<.1	<.001	.011	.001
DJ	<.01	<.1 < At	<.1	<.1
Cr	.06	<.01 1.65	<.01	<.01
CN	•••	1.05	<.05	0.22
F	1.6			
ԲԵ	.05	. 4.4	2.2	1.6
Kg		.05	<.05	.05
N O3	.5	76		
Se	••	.75	.2	.3
Ag	<.05	1 65		
U	<.05	<.05	<.05	<.05
C1	48	<.05	<.05	<.05
Cu	<.03	53	44	47
fe	.05	<.03	<.03	<.03
No	<.03	.5		<.05 ····
SO	1077	.07	<.03	<.03
TDS"	1906	1461	1236	1067
Zn	.48	2732	1694	1973
рH	7.6	28	<.01	.17
AI	<1.0	6.9	7.7	8.0
F	11.0	<1.0	1.0	<1.0
Co	<.01			
Ко	<.5	.01	.02	.01
Ki	<.05	<.5	(.5	<.5
Fhenols	(.03	<.07	<.05	<.05
TSS	13			
Cond.	0	0	67	c
COD	1850	Û	108	1800
NH.	0			15

QUALITY OF WATER IN EVAPORATION PONDS

P. .



(

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

DATE: 8 November 1984 1080, 1040

ź

ANALYTE

SAMPLE ID/ANALYTICAL RESULTS

Benzene Toluene Ethylbenzene	11184 1330 Well 28 <0.005 mg/1 <0.005 mg/1 <0.005 mg/1	103184 1432 Well 45 <0.005 mg/1 <0.005 mg/1 <0.005 mg/1	103184 1240 Well 46 <0.005 mg/1 <0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Benzene	103184 1520 Well 47	103184 1550 Fire Pond	<0.005 mg/1
Toluene	<0.005 mg/1	<0.005 mg/1	
Ethylbenzene	<0.005 mg/1	<0.005 mg/l	r
Xylenes	<0.005 mg/1	<0.005 mg/1	
•	<0.005 mg/1	<0.005 mg/l	
	Well 3	Well 5	Well 12
NO 3 ES N	<0.01 mg/1	<0.01 mg/1	
NH 4 CN	1.16 mg/1	2.5 mg/1	<0.01 mg/1
Benzene	<0.01 mg/1	<0.01 mg/1	0.25 mg/l
Toluene	<0.005 mg/1	<0.005 mg/1	<0.01 mg/1 <0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Ethylbenzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
,	<0.005 mg/1	<0.005 mg/l	<0.005 mg/l
	Well 13	Pond 1	Pond 3
NO 3 E S N NH 4 CN	<0.01 mg/1 5.6 mg/1	<0.01 mg/1 10.6 mg/1	<0.01 mg/1 13.87 mg/1
Benzene	0.09 mg/1	0.4 mg/l	0.2 mg/1
Toluene	0.254 mg/1	0.711 mg/1	0.027 mg/1
Xylenes	0.345 mg/1	0.588 mg/1	<0.005 mg/1
Echylbenzene	0.389 mg/1	0.591 mg/1	<0.005 mg/1
,	<0.100 mg/1	0.240 mg/1	<0.005 mg/1
			-

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

DATE: 8 November 1984 1080, 1040 Page 2 of 2

ANALYTE

÷.

SAMPLE ID/ANALYTICAL RESULTS

	Pond #1 floating film	NOMINAL DETECTION LIMIT
NO 3 ^{as} N NH 4 CN Benzene Toluene Xylenes Echylbenzene	0.617 mg/1 0.467 mg/1 0.463 mg/1 0.201 mg/1	0.01 mg/1 0.1 mg/1 0.01 mg/1 0.005 mg/1 0.005 mg/1 0.005 mg/1 0.005 mg/1

REFERENCE:"Scandard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, N.Y., 1980.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Smith

Jennifer V. Smith, Ph.D. Laboratory Director

-CUSIOMER	Navajo Refining Col	y۲.
ADDRESS	Drawer 159	-
CITY	Artesia, NM 88210	
ATTENTION	Ed Kinney	
INVOICE NO	104223	

1

TYPE OF ANALYSIS Water			
Sample Identification	Type of Analysis	mg/liter	·
Navajo West Pond	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	$ \begin{array}{r} 13 \\ < 1 \\ 0.2 \\ 116 \\ 0.003 \\ 102 \\ 918 \\ 0.04 \\ < 0.01 \\ < 0.001 \\ 6.6 \\ 760 \\ 0.002 \\ 60 \\ 0.002 \\ 60 \\ 0.002 \\ 60 \\ 0.001 \\ 7.7 \\ 0.04 \\ 173 \\ 2930 \\ 885 \\ 25.1 \\ < 0.1 \\ \end{array} $	
Sample Analysis by: BP Date and Time of Analysis: B	00 ₅ : 4/24/81 @ 1600 hrs.		•
pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 pH:electrode	day incubation	 •	•

Elmer D. Martinez, Director of Quality Assurance 4/30/81 PAGE 4 OF 13 PAGE

ALLEVSE

Controls for Environmental Pollution Inc.

SAMPLES RECEIVED 4/24/81 CUSTOMER ORDER NUMBER P.O. # 20030 TYPE OF ANALYSIS Martinity Mater Sample Identification Navajo Middle Pond Acidity 29 Alkalinity, "P" (as CaCO ₃) < 1 29 Barium 0.1 Biochemical Oxygen Demand 166 Cadmium 0.002 Chemical Oxygen Demand 363 Chloride 7.4 468 Chromium 64 0.01 Copper 40.001 KH Lead 0.001 Nagnesium 96 Nickel 7.4 41 4168 0.001 Hardness (as CaCO ₃) 1060 1001 0.06 Lead 0.001 Magnesium 96 0.001 Mickel <0.001 Magnesium 96 0.027 Alkalinity, "M" 349 Solids, Total Dissolved 4020 Sulfate 1050 Sulfate 1050 Sulfide 13.4 Zinc 0.1 50 Sample Analysis by: BP 5 day incu	CUUTONER ADDRESS CITY ATTENTION INVOICE NO	Navajo Refining Con y Drawer 159 Artesia, NM 88210 Ed Kinney 104223	:		REPULI ANALYS
Alkalinity, "P" (as $CaCO_3$) < 1 Barium < 0.1 Biochemical Oxygen Demand 116 Cadmium 0.002 Chemical Oxygen Demand 363 Chloride 1468 Chromium 0.1 Chromium 64 < 0.01 Copper < 0.001 Fluoride 7.4 Hardness (as $CaCO_3$) 1060 Iron 0.06 Lead < 0.001 Magnesium 96 Nickel < 0.01 pH Units 7.4 Phenols 0.027 Alkalinity, "M" 349 Solids, Total Dissolved 4020 Sulfate 1050 Sulfate 1050 Sulfate 31.4 Zinc < 0.1 Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ = 5 day incubation	SAMPLES R	ECEIVED 4/24/81 CUST MALYSIS Water Sample Identification	Type of Analysis	mg/lit	<u>er</u>
Sample Analysis by: BP Date and Time of Analysis: BOD ₅ : 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ - 5 day incubation		Navajo Middle Pond	Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide	< 1 < 0.1 116 0.002 363 1468 0.1 < 0.01 < 0.001 7.4 1060 0.06 < 0.001 96 < 0.01 7.4 0.027 349 4020 1050 13.4	
		Date and Time of Analysis: pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ -	BOD ₅ : 4/24/81 @ 1600 hrs.	< 0.1	

 Elmer D. Martinez, Director of Quality Assurance 4/30/81 PAGE 3 OF 13 PAGE

Controls for Environmental Pollution Inc.

SAMPLES RECEIVED	4/24/81	CUSTCMER	ORDER NUMBER P.O	. # 20030		
YPE OF ANALYSIS	Water					
· ·	e ification o East Pond	Ai Ac Al Ba Bi Ca Ct Ct Ct Ct	vpe of malysis idity kalinity, "P" (as f rium ochemical Oxygen De dmium emical Oxygen Deman loride romium	emand nd	mg/liter 10 1 0.1 72 0.002 225 1632 0.1	
	/'	Cc Fl Ha Ir Le Ma Ni PH Ph Al	romium 6+ pper uoride rdness (as CaCO ₃) on ad gnesium ckel Units enols kalinity, "M"	< < < <	0.01 0.002 5.8 1160 0.1 0.001 110 0.01 7.2 0.001 214 4020	
Date a	Analysis by: nd Time of Anal /30/81 @ 1400 h	Su Su Zi BP ysis: BOD ₅	lids, Total Dissolv Ifate Ifide nc : 4/24/81 @ 1600 h	<	4920 1520 0.36 0.1	•

 Elmer D. Martinez, Director of Quality Assurance 4/30/81 PAGE 2 OF 13 PAGE

Controls for Environmental Pollution Inc.



STATE OF NEW MEXICO ENERGY AND MINERALS DEPARTMENT **OIL CONSERVATION DIVISION**

February 7, 1985

POST OFFICE BOX 2088 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87501 (505) 827-5800

CERTIFIED MAIL -RETURN RECEIPT REQUESTED

Mr. Randall T. Hicks, Vice President Geoscience Consultants, Ltd. 500 Copper Avenue, N.W. Suite 220 Albuquerque, New Mexico 87102

> Ground Water Discharge Plan (GW-28) for Navajo Re: Refinery, Artesia

Dear Mr. Hicks:

The New Mexico Oil Conservation Division Environmental Bureau has reviewed your December 7, 1984, discharge plan submittal for the Navajo Refinery. We have some comments and questions on the material submitted and requests for additional clarifying information. Also, in a meeting with you on January 24, 1985, several substantial issues regarding discharge plan coverage and future work efforts were raised. Ι will discuss these issues first and then provide our specific comments on the material submitted.

Discharge Plan Issues

1. During the meeting of January 24, 1985, the hydrocarbon product recovery system and its relationship to the ground water discharge plan was discussed. You requested that the issues remain separate except that water discharges from the recovery system to the conveyance ditch would be covered under the discharge plan. We are agreeable to your request to cover the product recovery system under WQCC Section 1-203 instead of WQCC Part 3 Regulations. However, such approval is contingent on your written assurance that you will comply with the provisions of Section 1-203.A., and your agreement that the existing compliance schedule or approval of the discharge plan will not exempt you from Section 1-203. If agreed to, use of Section 1-203 will be limited to past petroleum product discharges; action to be taken to

protect ground water in the event of future spills must be covered in the discharge plan.

- The WQCC Regulations do not provide exemptions for 2. discharges covered under the RCRA regulations. Therefore continuing discharges of RCRA-regulated effluent or leachate (such as to the land farming area) are also subject to the WQCC Regulations. If the RCRA land-farm disposal system is performing as designed to protect ground water from heavy metals and toxic organics, it is also likely to be protecting ground water from degradation by non-RCRA contaminants such as chlorides, sulfates and total dissolved solids regulated under WQCC rules. То demonstrate this Navajo must submit sufficient technical information on frequency of application, quantities, total volumes, conditions of application, monitoring currently performed, etc. This information will be reviewed for WQCC adequacy. If. needed, additional analyses of samples for some key WQCC constituents may have to be performed as part of the discharge plan. Similar information also should be submitted for any RCRA approved site currently receiving discharges.
- 3. Demonstration that continued use of the 3-mile unlined conveyance ditch does not provide a hazard to ground water will be very difficult. This ditch transfers all refinery wastewater to the evaporation ponds, contains levels of benzene and other constituents in excess of WQCC standards (as evidenced by pond levels exceeding these standards), and contains other pollutants discharged from the oil-water separators. Information provided in the discharge plan indicates that a very shallow aquifer exists at depths between 15 and 30 feet beneath the refinery. At a specific conductance of about 2500 umhos/cm (Appendix B), the quality of this so-called "perched" aquifer is good and apparently has provided water for stock (p. 4-11). The potentiometic map (Figure 4-7) shows water movement to the east toward the river. The same geologic conditions and shallow useable ground water are likely to occur in the area of the ditch until the Pecos Valley alluvium is reached. This water must be protected from any ditch discharges that would cause exceedance of ground water standards. The contention (p. 6-2) that the ditch is self-lined due to deposition of asphaltic material has not been demonstrated and no information

Mr. Randall T. Hicks, Vice President

on ground water quality along the ditch has been provided. Even if several monitoring wells along the 3-mile length showed no contamination, this would not be assurance that contamination is not occurring in between the monitoring points. The ditch is a possible line source of recharge and investigation of specific hydrologic conditions along its entire length would be time-consuming, expensive, and very possibly inconclusive. Navajo is strongly encouraged to look at other alternatives to the unlined ditch for transfer of effluent to the ponds.

4. Navajo should continue the hydrogelogic studies it is conducting in the vicinity of the evaporation ponds. Alternatives other than pond lining are available for discharge plan approval under Section 3-109.C. of the Regulations.

Specific Comments/Questions

HYDROGEOLOGY:

- 1. Are wells numbered 45, 46, and 47 the waste conveyance monitor wells referred to on p. 3-1?
- 2. Provide a table listing available information (location, owner, date drilled, depth, aquifer or water bearing zone, water level, date measured, use, etc.) for all water wells (except those drilled by Navajo) within one mile of the refinery property, one mile either side of the conveyance ditch, and within one mile of the evaporation ponds (on both sides of the river).
- 3. A statement on p. 4-1 asserts that Pecos Valley alluvium is not used for any purpose in "this area." What is the extent of the referenced area and what is the source of water for the windmill in the NW/4, SW/4 of Section 12, Township 17 South, Range 26 East, and the water well listed on Figure 4-9?
- 4. What is the source of information for the geologic map shown in Figure 4-1?
- 5. Provide a legible copy of Figure 4-2 and provide units for permeability and other listed soil characteristics.

Mr. Randall T. Hicks, Vice President

Page 4

- 6. Clarify whether the depth to the top of the Queen formation is 150 or 200 feet (p. 4-10).
- 7. The depth and aquifer designation for well 6612 is incorrectly drawn on Figure 4-3.
- 8. Describe the characteristics and extent of the Bower Sand shown on Figure 4-3. This sand was not discussed in the discharge plan submittal.
- 9. Several of the well records in Appendix A from the State Engineer's Office have critical information that is illegible. Provide legible logs or tabulate the critical information (eg. depth of well, depth to water upon completion, major water-bearing strata, etc.).
- 10. Logs for Navajo wells #2, 4 to 8, 10 and 11, 14 and 15, A to J, and the product recovery wells are missing. Provide the logs if available or a narrative on construction information, date, depth, use, etc.
- 11. The photocopies of the sample log for wells AA through AI, and R through T are illegible in part. Provide legible log copies.
- 12. What is the source of the apparent artesian head in the perched water unit and shown in Figure 4-6? Do all monitor wells near the refinery exhibit these apparent artesian conditions?
- 13. Is there any apparent source of recharge or discharge (pumping) that could account for the potentiometric anomalies described on p. 4-12 for wells #19 and 34 and 29, 37, 39 and 40?
- 14. What is the hydrologic relationship of Eagle Draw to the perched shallow artesian zone?
- 15. Provide the conductance vs. discharge vs. relationship for the Pecos River near Artesia for October through April 1982 and 1983.
- 16. The potentiometric surface map at the evaporation ponds (Figure 4-9) shows ground water levels several feet above river elevations. Water movement to the north or south could be inferred from differences in these elevations. The time of year the measurements

were made was omitted from the figure. To determine what the actual situation is and verify the accuracy of the statement on p. 4-14 that the gradient is reversed at low flow, additional shallow subsurface information needs to be obtained. This should include comparison of seasonal water levels in the river with those in the pond monitoring wells. Frequent water level measurements by hand or through use of a water level recorder may be needed to make this determination. Seepage from the ponds producing a ground water mound may also contribute to high water levels in pond monitor wells.

- 17. Figure 4-9 shows water levels to be higher in pond 3 than in upstream pond 2. If the dike(s) has been breached, why are the levels unequal?
- 18. Is Navajo's property boundary given by the heavy black line in Figure 4-9? If so, provide the names and show the locations of the property owners immediately adjacent to the ponds.
- 19. Regarding the conveyance ditch, does Navajo own the ditch or have an easement? If an easement, provide the name and location of the property owners.
- 20. Provide a map showing the current 100-year flood plain at the refinery and the maximum 100-year flooding that could occur after the city makes changes in the Eagle Creek drainage. Indicate the status and proposed completion date of the flood control efforts (eg. planning only, money allocated, under construction).
- 21. Figure 4-9 shows that dike levels at the ponds are 10 to 14 feet above the river rather than the 16 to 18 feet given on p. 4-15. Clarify this discrepancy.
- 22. On Figure 4-9, where is monitoring well #16 located? What are its completion details?
- 23. Provide the 100-year flood plan map in the vicinity of the end of the conveyance ditch and the ponds. Show on the map the 1932 flood stage of 17.4 feet and the 13.76 feet stage of 1954. Show the extent and frequency of the largest discharge expected under controlled discharge conditions. What precautions have been taken to protect the conveyance ditch and ponds from such releases?

Mr. Randall T. Hicks, Vice President

WATER QUALITY:

- 1. Provide a summary of water quality characteristics of the San Andres and upper Queen aquifers in the refinery area.
- 2. Contrary to the statement on p.4-16, the water quality in the Pecos River Valley alluvial sand/silt aquifer has not yet been sufficiently characterized by Navajo. Background quality cannot be defined until seasonal variations, and ground water flow direction(s) are known. Since pond seepage appears to have affected some close monitoring wells, analyses of water samples from those wells would not be representative of the back- ground water quality.
- 3. Analyses of the Pecos River up and downstream of the ponds and at low flow should be made to characterize river quality and any effect of pond seepage on NM Stream Standards.
- 4. Which "well water" is referred to in the 4/30/81 CEP Analysis labeled "Page 1 of 13 pages?" Where is this well located? What are its depth and completion details? From what zone is it producing?
- On page 4-17, the statement is made that direct 5. contamination of ground water at the refinery is unlikely due to the presence of artesian conditions and that contamination could be occurring due to contact between artesian water in the wellbore and hydrocarbons in the soil. While we believe this could be true for some individual wells, the presence of floating product up to several feet in thickness in at least ten of the wells, as shown in drilling logs, shows that product has indeed moved downward despite apparent artesian conditions. There is also the possibility that the artesian conditions are recent and localized, and contamination predated a rise in water levels and pressures to current This statement needs to be revised to elevations. reflect actual conditions.
- 6. The last paragraph of page 4-17 asserts that the ground water of the shallow, perched-water unit is 1) of limited extent, 2) not utilized by any off-site wells, and 3) not connected with any other aquifer. Navajo has not conclusively demonstrated the correctness of these assertions (see issue 3 above).

Even if the situation is as Navajo suggests, this ground water is to be protected for present and potential future use since it can be used as a water supply and has an existing concentration much less than 10,000 mg/l TDS.

- 7. Provide TOC, Chloride, Sodium, and sulfate data for the TEL and colony areas (see Appendix B).
- Although Navajo will provide additional effluent flow and quality characterization in the February 25, 1985 submittal, the following deficiencies were found in the December 7, 1984, submittal:
 - (a) Where were effluent rates measured? Flow measurements need to be made at the beginning and end of the datch.
 - (b) No analysis was provided for waste stream #14 (Desulfurizers).
 - (c) Table 5-2 does not provide analyses for benezene, toluene, ethylbenzene, xylenes, or the other WQCC organic standards. The presence or likelihood of toxic pollutants has not been discussed.

PLANT PROCESSES:

- 1. Are injection wells used for disposal of any produced water or any refinery generated wastewater?
- 2. In addition to the information provided in Section 5.3.1., provide additional information on the fire pond. Include engineering information (size, depth, volume, liner, discharge rates in and out), range of TDS and flow variation from individual boilers, and use of additives (chromates, phosphates, organics, etc). Provide information on uncontaminated ground water quality in the pond vicinity.
- 3. Discuss the TEL pond, its use, dates of use, type of effluents, closure procedures, and if it is under a RCRA monitoring plan. This information will be useful in interpretation of the subsurface hydrologic data.

Mr. Randall T. Hicks, Vice President

Page 8

- Provide construction details for the oil-water 4. separators. Provide residence times prior to sludge removal, frequency of sludge removal, and residence time after removal.
- 5. Describe the blending operations, additivites used, and storage and drainage for this area.
- In Table 5-2, indicate the type of chromium 6. analysis performed. Is the analysis for CN listed in Table 5-2 for streams #3 and #9 in error?
- Waste stream #18 is not on drawing 5-2 but an 7. unnumbered waste stream is present on the drawing. Clarify the waste stream numbering.
- 8. Does Navajo have any underground storage tanks?

Please provide three copies of all future submittals (including maps and drawings), so that additional copies are available for field office use and public review. If you have any questions regarding these comments or the additional information requested, please contact me at the above address or by telephone at 827-5812.

Sincerely,

DAVID G. BOYER Hydrogeologist

cc:	OCD An	ctesia	Fiel	d Offi	lce	
	NMEID	Hazard	lous	Waste	Section	
	David	Griffi	n N	Javain	Refinina	Co.

 SENDER: Complete items 1, 2, 3, and 4. Add your address in the "RETURN TO" space on reverse. 	 (CONSULT POSTMASTER FOR FEES) 1. The following service is requested (check one). 2. Show to where and data delivered 	to whom, date	2. C RESTRICTED DELIVERY (The restricted delivery fee is charged in addition to the return receipt fee.)	TOTAL \$	ADORESSED TO:	Mr. Kandall T. HICKS Geoscience Consultants, Lt	500 Cop	4. TYPE/OR DEGWCE:	CENTIFIED CON P 505 905 84	(Always obtain signature of addressee or agent)	I have received the article described above.	SIGNATURE7 E Addressee , D Authorized agent	attent -	3. DATE OF DELIVERY	6. ADDRESSEE'S ADDRESS (Only if redicated Ch.		RECE NO IN. N Sent to Street an	SURANCE OT FOR IN (See Randa d No.	R CERTIFI COVERAGE P ITERNATIONA e Reverse	ROVIDED- L MAIL Hicks	
---	--	---------------	--	----------	---------------	--	---------	--------------------	----------------------------	---	--	---	----------	---------------------	---	--	---	--	---	-----------------------------	--

ETURN RECEIPT, REGISTERED, INSURED AND CERTIFIED MAIL

GIL CONSERVATION DIVISION DEC 11 1984

主体

RECEIVED

なな社会

DISCHARGE PLAN SECTIONS 1.0-6.0 NAVAJO REFINING COMPANY ARTESIA, NEW MEXICO REFINERY

K

Prepared for:

David Griffin Navajo Refining Company P.O. Drawer 159 Artesia, New Mexico 88210

December 3, 1984

Prepared by:

Geoscience Consultants, Ltd. 500 Copper Avenue Suite 220 Albuquerque, New Mexico 87102

TABLE OF CONTENTS

1

1.0	EXECUTIVE SUMMARY		1–1
2.0	LOCATION AND PHYSIOGRAPHY		2-1
3.0	BRIEF HISTORY OF OPERATION		3-1
4.0	DESCRIPTION OF PHYSICAL ENVIRONMENT AT SITE		4-1
5.0	PROCESS DESCRIPTION AND WASTEWATER CHARACTERISTI	CS	51
6.0	PRESENT WASTE MANAGEMENT SYSTEM		6–1
	LIST OF FIGURES		
2-1	TOPOGRAPHIC MAP OF ARTESIA AREA		2-2
4-1	GEOLOGIC MAP OF ARTESIA AREA		4-3
4-2	SOILS MAP OF ARTESIA AREA		4-5
4-3	CROSS SECTION OF NAVAJO REFINING COMPANY AND ARTESIA AREA	(IN	POCKET)
4-4	POTENTIOMETRIC SURFACE MAP OF DEEP AQUIFER		4–8
4–5	POTENTIOMETRIC SURFACE MAP OF SHALLOW AQUIFER		4-9
4-6	HYDROGEOLOGIC CROSS SECTION OF REFINERY SITE AREA	(IN	POCKET)
4-7	POTENTIOMETRIC SURFACE SHALLOW PERCHED AQUIFER	(IN	POCKET)
4-8	DISCHARGE OF PECOS RIVER		4–13
4–9	POTENTIOMETRIC SURFACE OF VALLEY FILL AQUIFER EVAPORATION POND AREA	(IN	POCKET)
5–1	LOCATION OF PROCESS UNITS AND DISCHARGE POINTS AT REFINERY	(IN	POCKET)
5-2	PROCESS FLOW DIAGRAM OF NAVAJO REFINERY	(IN	POCKET)
	APPENDICES		

APPENDIX A WELL LOGS

APPENDIX B WATER QUALITY

1.0 EXECUTIVE SUMMARY

Navajo Refining Company, P.O. Drawer 159, Artesia, New Mexico, 88210 discharges approximately 405,200 gallons per day of oil refinery wastewater to evaporation ponds. The refinery is located in Section 9, T. 17S. R. 26 E. and the 85 acre evaporation ponds are located in Section 12,T.17 S, R. 26 E. Wastewater from the process units flows through an oil/water separator to remove the bulk of the hydrocarbons discharged with the wastewater. The refinery's effluent has a total dissolved solids content of 2000-4000 mg/1. The ground water near the evaporation ponds is at a depth of 8 feet with a background total dissolved solids content of about 15,000 mg/l. In the refinery area the "shallow aquifer" (upper Queen Formation), which is at a depth of 150 to 250 feet below land surface, exhibits nearly 100 feet of artesian head. The total dissolved solids content of the ground water in this aquifer is about 500-1000 mg/l. About 15 feet below land surface a 2 to 5 foot thick water-bearing unit is present in the Refinery area. This unit exhibits some artesian pressure and has a total dissolved solids content of about 1500 mg/l.

1-1

2.0 LOCATION AND PHYSIOGRAPHY

2.1 LOCATION

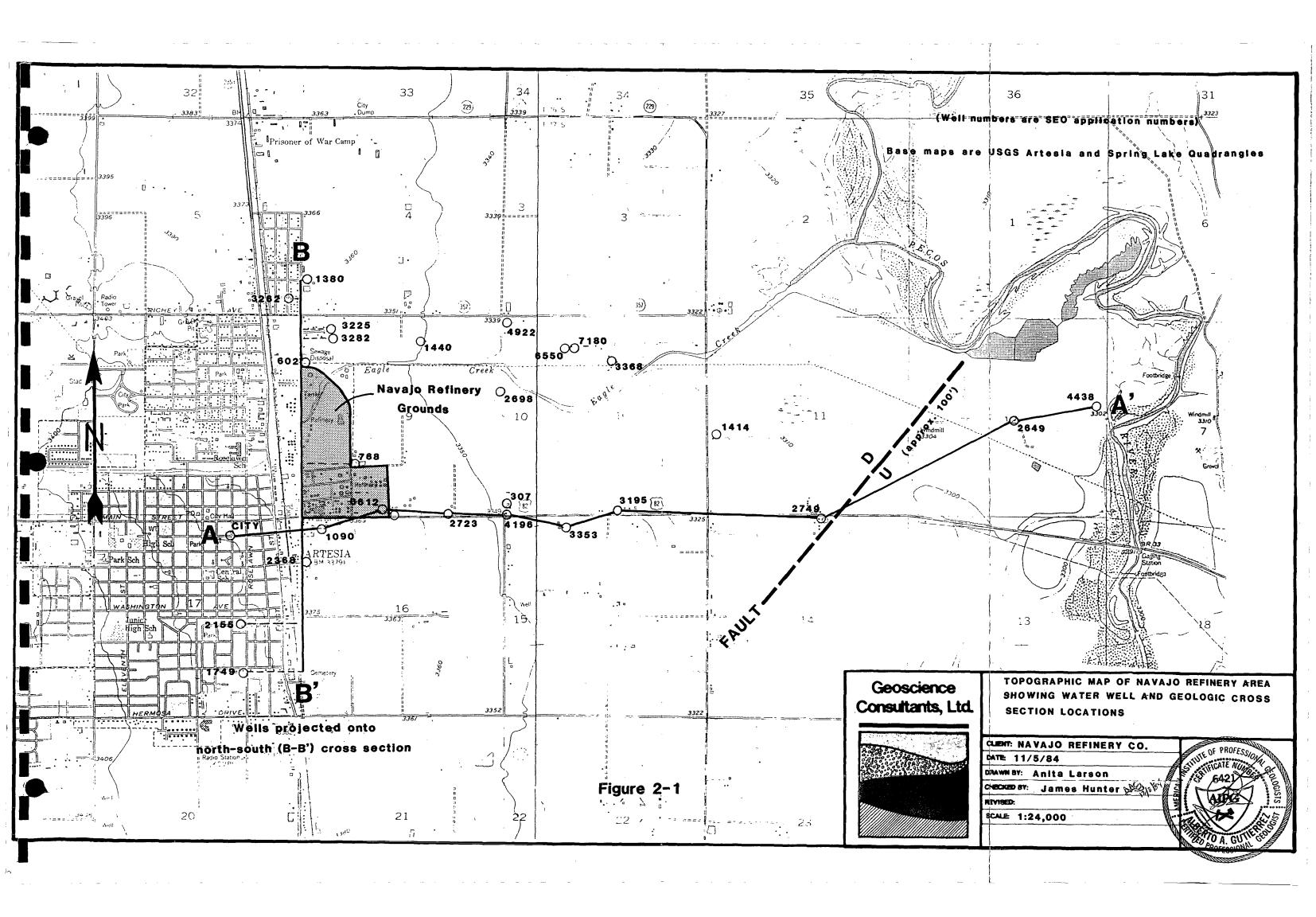
The Navajo Refining Company's plant facilities and wastewater management system are located in and near the town of Artesia, in Eddy County, New Mexico. The refinery's processing plant and much of the waste management system is located within the city limits, in the west 1/2 of Section 9, T. 17 S., R. 26 E. The associated wastewater evaporation facilities are located in Sections 1, 2, 9, 10, 11, and 12 of T. 16 S., R. 26 E., and in part of the west 1/2 of Section 6, T. 16 S., R. 27.E. (Figure 2-1).

2.2 PHYSIOGRAPHY

Ĵ

L

Artesia lies in the Eastern Plains of New Mexico; a broad, flat plateau with a local elevation of 3300 to 3400 feet above sea level. Topography in the Artesia area slopes gently (15 to 20 feet per mile) to the east, and is drained by the nearby Pecos River (Figure 2-1). The region is semiarid, with rainfall averaging less that 11 inches per year. Soils are typically of the Arno, Harkley, Pima and Karro associations, developed by deep weathering of bedrock or old alluvium (USSCS, 1971).



3.0 BRIEF HISTORY OF OPERATION

The refinery began operations in the 1920's. The technology, size and ownership of the facility have changed numerous times since commencement of crude processing. Until 1969, the North Division and the South Division were operated by Conoco. Navajo then purchased both units and began to further integrate the operation into a single refinery capable of processing New Mexico sour crude (an asphalt-based crude with a high sulfur content) in the South Division and New Mexico intermediate crude (a paraffinbased crude produced mainly from the Abo Formation) in the smaller North Division.

Since the 1970's Navajo has constructed over 50 monitor wells and product-recovery wells to address the environmental concerns at the facility. The installation of four productrecovery trenches has resulted in a significant reduction in the total amount of hydrocarbons which exist in soil. Hydrocarbon product recovery will continue and, if necessary, be expanded to insure environmental protection.

Ground-water monitor wells are also in place throughout the refinery to assist in delineating soil contamination by hydrocarbons, for RCRA monitoring of landfarms and other RCRA disposal facilities, and to monitor the integrity of the waste conveyance and evaporation facilities.

In addition to ground water monitoring, Navajo maintains a strict manifest and record-keeping system. This system helps to insure that all waste is handled and disposed of properly. This system is in compliance with all applicable RCRA regulations.

4.0 DESCRIPTION OF PHYSICAL ENVIRONMENT AT SITE

Four water-bearing units are present beneath the Navajo Refining Company facility:

- o The San Andres Formation
- o The upper Queen Formation
- o Alluvium in the Pecos River Valley
- o Small, discontinuous perched-water aquifers in the Seven Rivers Formation

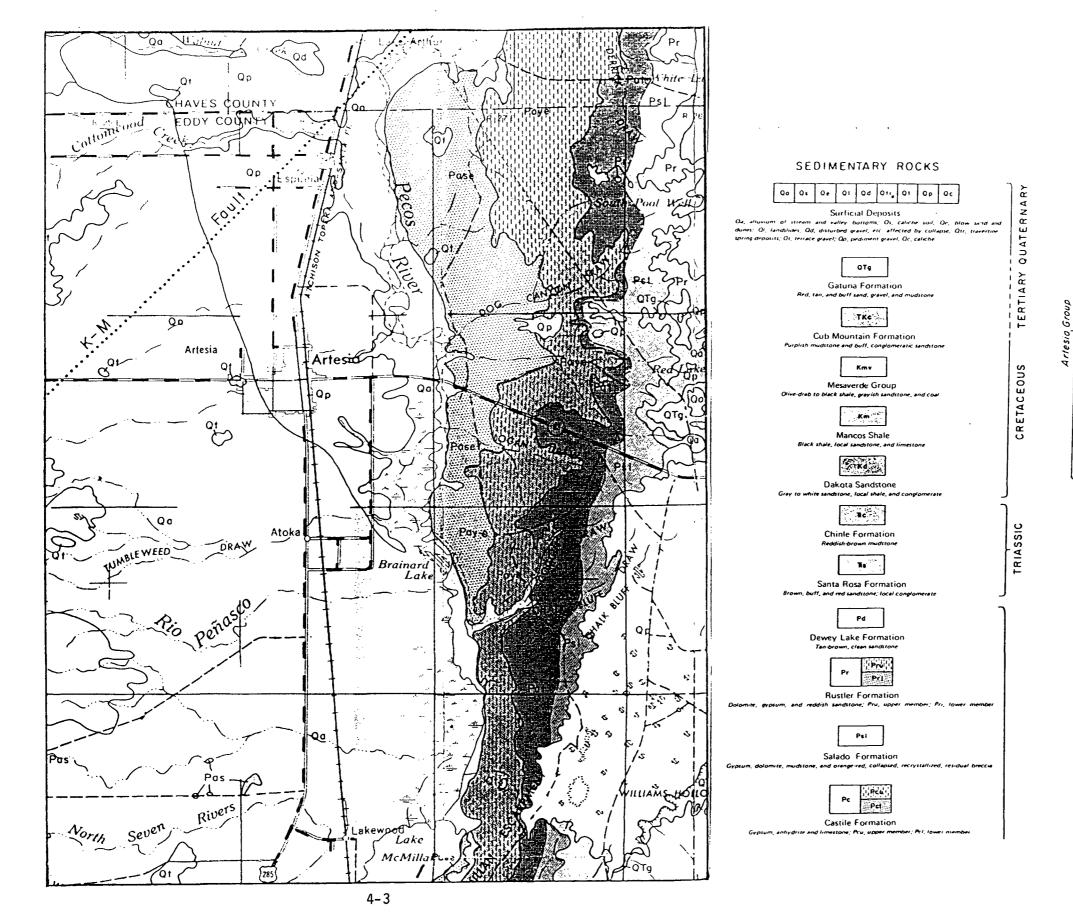
The San Andres and upper Queen formations are the principal aquifers of the Artesia area (Welder, 1983). The San Andres also locally called the deep or artesian aquifer has been extensively developed for industrial, municipal and agricultural purposes. This unit is under considerable artesian pressure. The upper Queen in the Artesia area is principally used for individual domestic wells, but some larger capacity wells completed in this unit are employed for irrigation. Unlike the "shallow" aquifer in the Roswell area, water-bearing sand units in the upper Queen exhibit artesian head. Adjacent to the Pecos River a third water-bearing unit is present: the Pecos River Valley alluvium. This unit is not currently utilized in this area for any purpose due to its poor water quality. Within the Seven Rivers Formation isolated permeable sands and fractured evaporites will produce small quantities of poor quality water. These isolated units may show a few feet of artesian head. One such unit is present about 15 feet below the Refinery. The evaporation ponds and portions of the conveyance ditch lie on the flood plain of the Pecos River and Eagle Draw. However, numerous flood control structures up stream from Navajo have eliminated most of the flooding potential of the facility.

4.1 GEOLOGY

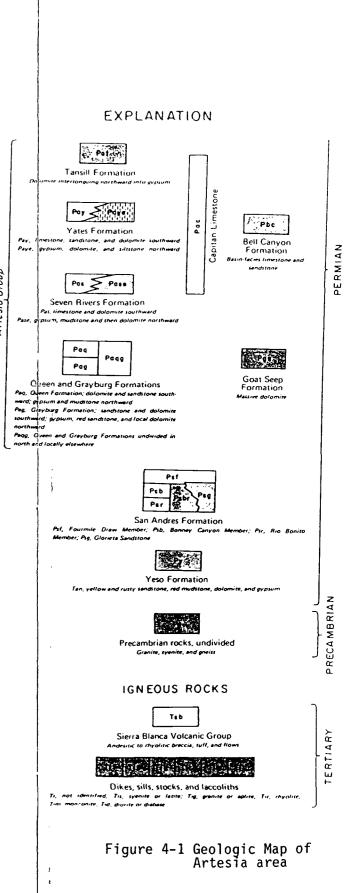
The town of Artesia and the Navajo site are underlain by thin (20 feet or less) layer of soils, alluvium and weathered bedrock, which generally conceals subcrops of the Artesia Group (Permian). As seen in the explanation of figure 4-1, the Artesia Group consists of carbonates, evaporites and shales deposited in a backreef environment. The Artesia area is located on the northwestern shelf of the Permian Basin and basinward (southeasterly) stratigraphic dips of 1 to 3 degrees are typical.

Structure in the Artesia area is expressed as gentle (1-3 degree) southeasterly dips, with few other features. One fault (inferred from subsurface data) is mapped in the area. This fault trends about N. 40 E. through sections 11, 12 and 14 (Figure 4-1), and is apparently a normal fault with the northwest block downthrown. This structure parallels the other major structural elements of this area, such as the Y-O and K-M "buckles" or fault zones (Kelley, 1971).

In Section 12, the fault appears to pass beneath the Navajo Refining Company's evaporation ponds near the Pecos River.



.

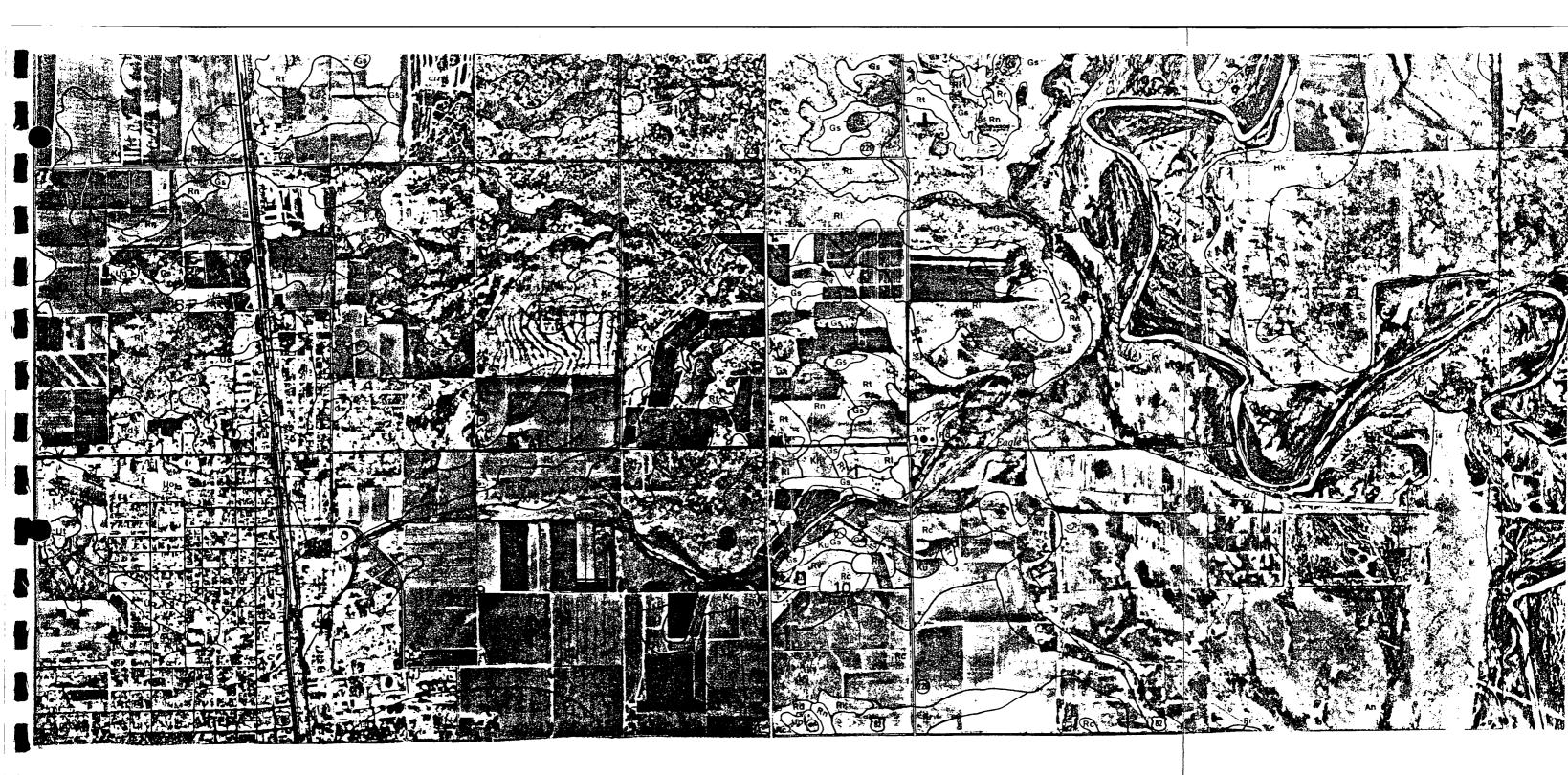


Although the fault may cut across all known and potential aquifers, there are several reasons why the fault is not a potential conduit for ground water contamination. First, faults in evaporites (Queen, Seven Rivers) typically "heal" or self-seal by flowage and recrystallization of gypsum and anhydrite. Second, the net hydrostatic head of the shallow and deep artesian aquifers is upward and would prevent any downward flow.

4.2 GEOMORPHOLOGY AND SOILS

The Artesia region is located on a broad, gently sloping plateau which has developed as a result of <u>in-situ</u> weathering of flat-lying carbonate and evaporitic bedrock. Localized areas of valley fill (Pecos River Valley and major arroyos) form the only other significant substrate for soil formation. Within soil series formed on a particular substrate, soil properties vary as a result of differing grain size, land slope and available moisture. Figure 4-2 shows the distribution and properties of soil types in the Artesia area. The Navajo plant site is located in an area of Karro Loams (USSCS, 1971). These soils are developed on deeply weathered calcareous rocks, and are moderately permeable. Much of the refinery site area has been filled, graded and leveled, leaving little natural soil in place.

The effluent ditch (Figure 2-1) parallels Eagle Creek, and is constructed in soils of the Pima Series. These dark, calcareous loams develop on carbonate bedrock and carbonate-rich alluvial material. They are moderately permeable and have a high water-holding capacity.



			Classif	ication		Perc	entage passi	ng sieve-	Permea- bility	Available water	Reaction	Electrical Conductivity (Ec x 10 ³)	Corrosivity (Untreated	Shrink-swell potential
Soil series and map symbols	Depth to bedrock, hard caliche, or gypsum	Depth from surface	USDA texture	Unified	AASHO	No. 4 (1.7 mm.)	No, 10 (2.0 mm.)	No, 200 {0.074 mm.}		Capacity		(Steel pipe)	
Arno: AH, Ak, An (For Harkey part of AH and Ak, Harkey series).	More than 60. see	0-14 14-60	Silty clay loam Silty Clay	CL CH	A-6 A-7	100 100	100 100	90-95 90-95	0.05-0.20 0.05-0.20	0.18-0.20 0.15-0.17	7.9-8.4 7.9-8.4	4.0-8.4 8.0-12.0	High High	Moderate High
Harkey: Ha, Hk	More than 60.	0-87	Very fine sandy Loam, Loam and silt loam.	ĦL	A-4	100	100	60-75	0.8-2.5	0.17-0.19	7.4-7.8	2.0-12.0	Moderate to high	Low
Karro: KA, KL, Kr, Ku, KV	More than 60.	0-20 24-60	Loam Elay loam	ML-CL CL	A-4 A-6	100 100	100 100	60-75 70-80	0.8-2.5 0.8-2.5	0.16-0.18 0.18-0.20	7.9-8.4 7.9-8.4	4.0-10.0 8.0-15.0	High High	Moderate Moderate
Pima: PM, Pe, Pn, Pv	More than 60.	0-60	Silt loam to silty clay loam	٢L	A-6	100	100	85-95	0.2-0.8	0.18-0.20	7.4-7.8	0-4.0	Moderate	Moderate

Figure 4-2 Characteristics and distribution of soils in Artesia area. The evaporation ponds are built on soils of the Arno Series which develop on fine, silty alluvium in the Pecos River Valley. These soils have low permeability and high waterholding capacity. 4.3 REGIONAL HYDROGEOLOGY

The Artesia area is located in the Roswell-Artesia artesian water basin (Welder, 1983). The two principal ground water reservoirs are the artesian San Andres aquifer, and two shallow aquifers (Queen Formation and valley alluvium). Local, perched water-bearing units with small storage capacity also occur in isolated stratigraphic traps. With the exception of some wells located in valley alluvium immediately adjacent to the Pecos River, all wells in the Artesia area exhibit some degree of artesian head. Deep (800-1200 feet) artesian wells are completed in the Grayburg-San Andres formations, and have static water levels 50 to 80 feet below ground level. The deep aquifer is confined by shales and evaporites of the lower Queen Formation.

Shallow aquifer wells (150-250 feet) produce from the upper sands of the Queen Formation, and are confined by aquitards of anhydrite, gypsum and shale in the overlying Seven Rivers Formation (Figure 4-3). Water levels in shallow wells range from 40 to 60 feet below ground level.

Regionally, some wells tap the shallow, perched "gyp water" reservoirs in stratigraphic traps in the upper Seven Rivers Formation. These waters are effectively isolated from both major aquifers. Even in very shallow wells (20 feet) these perched zones exhibit 3 to 5 feet of artesian head.

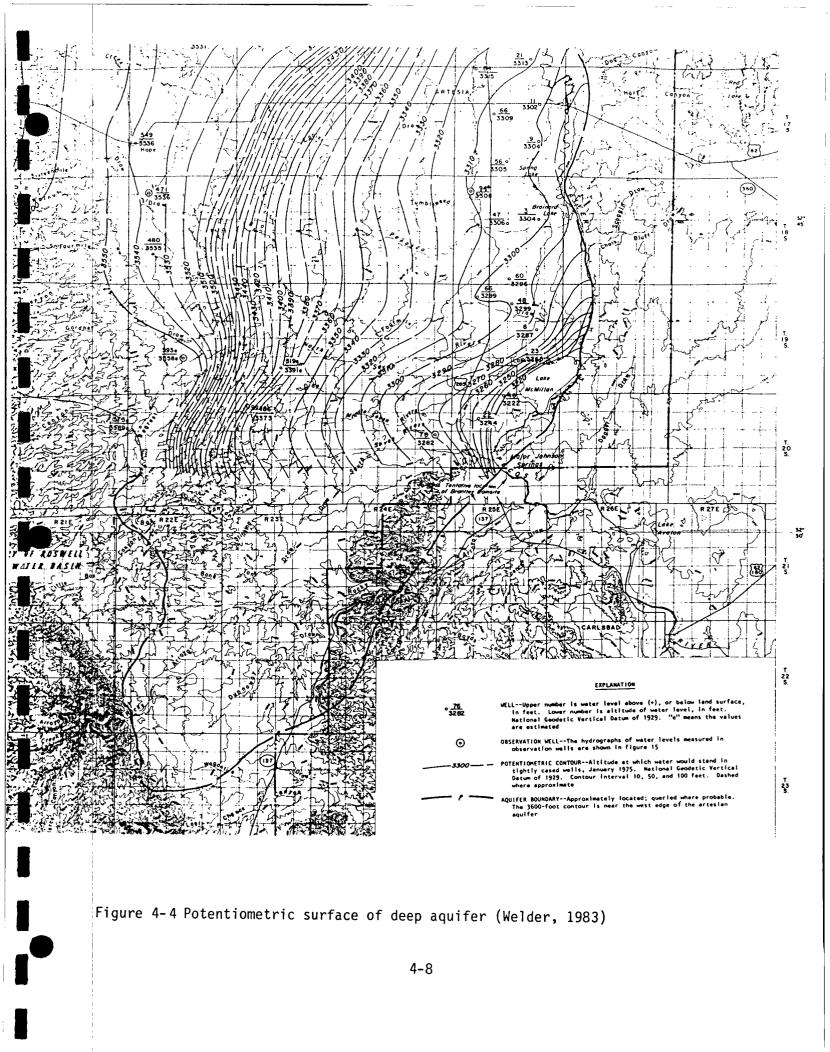
The regional potentiometric surfaces of the deep and shallow aquifers are shown in figures 4-4 and 4-5. The two potentiometric surfaces have very similar elevations (about 3300' msl), with the deep artesian aquifer's surface slightly above the shallow aquifer's surface.

Both aquifers produce water for irrigation, industrial and domestic purposes. Water quality is variable from 500 to over 5000 ppm total dissolved solids, and in general the more saline waters are found at greater depths and/or to the east.

4.4 GROUND WATER HYDROGEOLOGY

The deep artesian aquifer is the major source of ground water in the Artesia area and supports most of the large local agricultural industry. Artesian water, of quality ranging from 500 to over 5000 ppm TDS, is found in the San Andres and Grayburg formations (Permian) at depths of 850 to 1250 feet below the surface (Kelley, 1971). This aquifer system is recharged along San Andres outcrops in the Sacramento Mountains west of Artesia. In the early 1900's many wells in this aquifer flowed 1000 to 3000 gallons per minute (gpm), but extensive withdrawals have lowered the head to about 50 to 80 feet below the land surface (Figure 4-4). The artesian aquifer is confined by the impermeable (or very slightly permeable) carbonates, shales and evaporites which comprise much of the overlying Queen and Seven Rivers formations (Figure 4-3). Its potentiometric surface is typically slightly above the shallow aquifer's upper surface (Welder, 1983).

The shallow aquifer, which has been described as a "water table" aquifer, is in fact a second artesian aquifer. With the



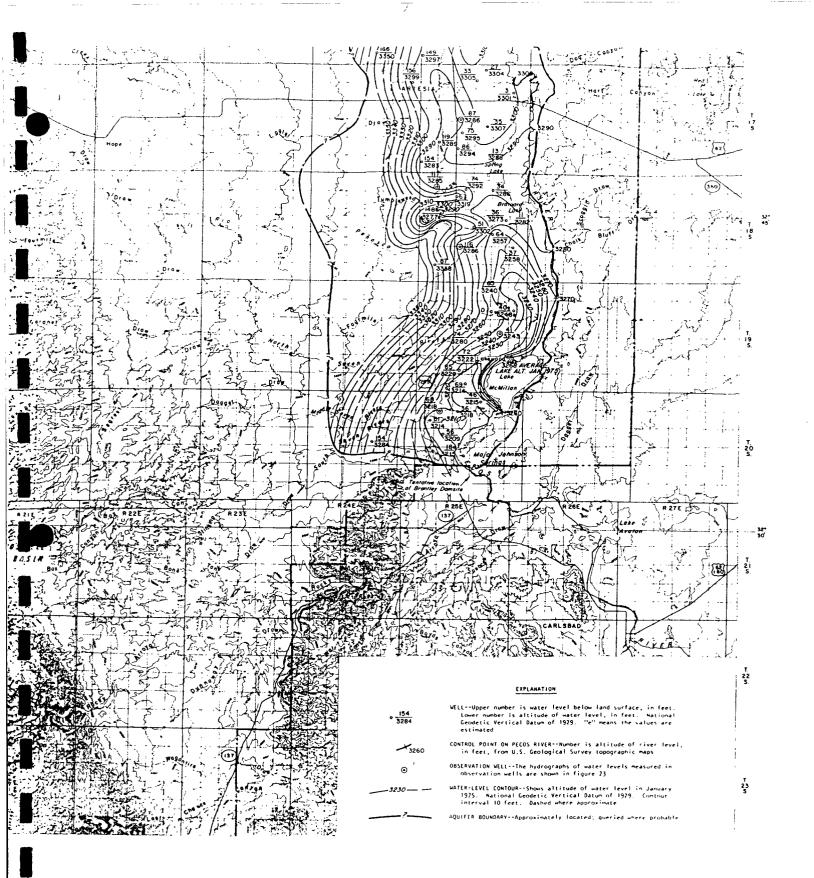


Figure 4-5 Potentiometric surface of shallow aquifer (Welder, 1983)

exception of wells drilled immediately adjacent to the Pecos River nearly all shallow-aquifer wells exhibit 100 to 150 feet of artesian head. Shallow wells typically produce from sands in the upper Queen Formation at depths of 150 to 250 feet. These sands are confined by the thick anhydrites and shales (aquitards) of the overlying Seven Rivers Formation. Relatively impermeable shales and evaporites several hundred feet thick separate the upper Queen sands from the underlying San Andres.

Analysis of driller's and geophysical logs (Appendix A) shows that the Navajo site is underlain by evaporites, carbonates and shales of the Seven Rivers Formation. These rocks are nearly impermeable, with the exception of local, isolated bodies of sand and fractured anhydrite. Only minor amounts of ground water is found in or produced from the Seven Rivers Formation. Cross sections illustrating the hydrogeologic relationships of the shallow aquifer are shown in Figure 4-3.

At depths of approximately 200 to 250 feet, the uppermost sands of the Queen Formation are encountered. These sands contain and produce usable amounts of ground water, and constitute most of the shallow aquifer in this area. These sands are 10 to 50 feet thick, and lie at the top of about 700 feet of relatively impermeable carbonates and evaporites which comprise the bulk of the Queen.

A map of the shallow-aquifer potentiometric surface (Figure 4-5) shows that it typically slopes gently to the east and southeast, and follows the regional stratigraphic dips. South of the Artesia area, where extensive agricultural development

exists, the potentiometric surface forms a trough due to significant withdrawals from the shallow aquifer. The shallowaquifer's potentiometric surface is generally slightly below the artesian aquifer's potentiometric surface, indicating that any interconnection (along faults or poorly completed wells) would cause flow upward from the deep to the shallow aquifer. The configuration of the shallow aquifer is locally complicated by large, seasonal irrigation withdrawals. Although considerable local variation is observed, the shallow aquifer generally provides water of quality adequate for domestic and irrigation use (500-1500 ppm TDS).

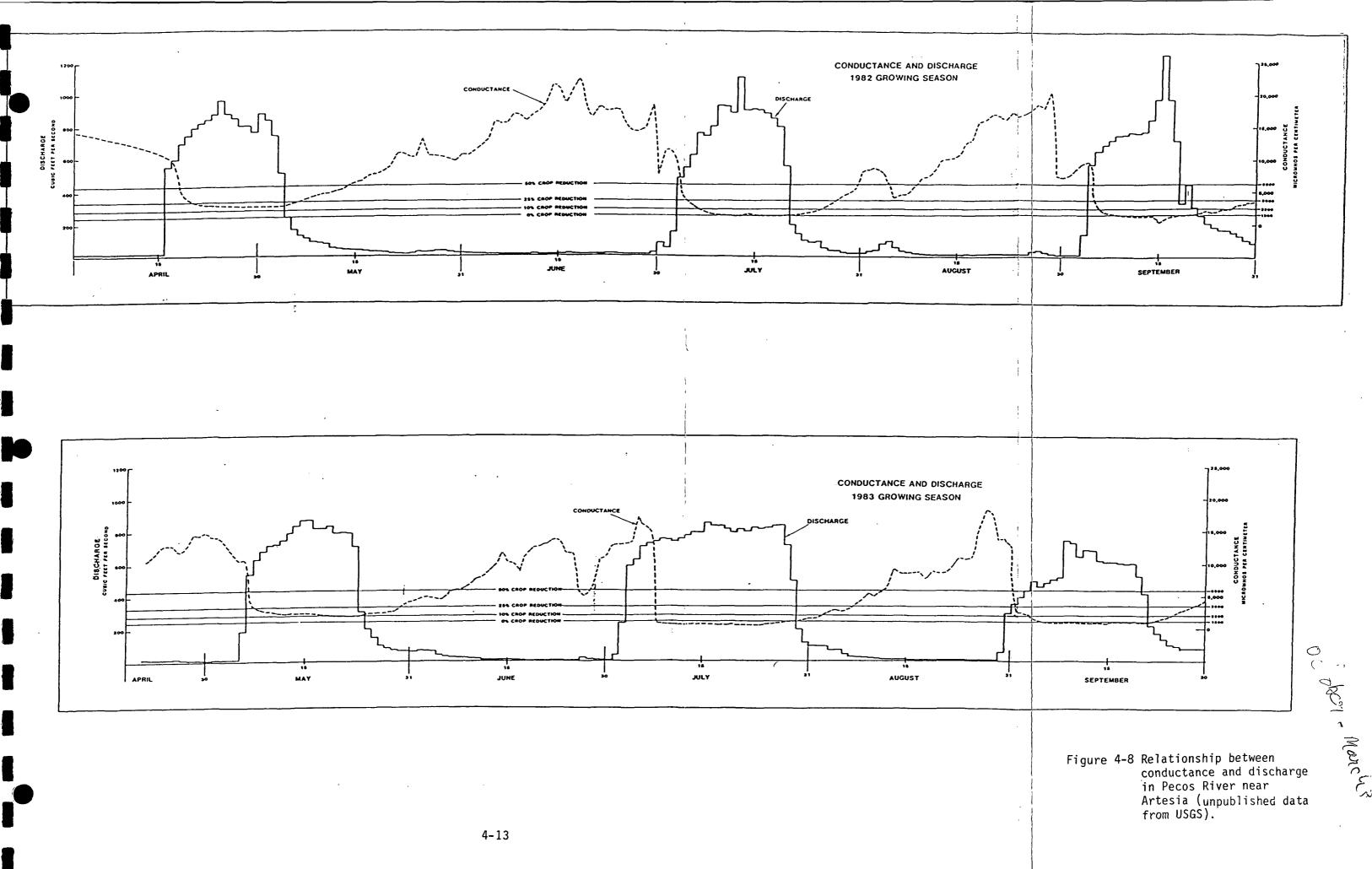
In some areas there is evidence for the existence of an isolated, discontinuous perched-water aquifer, which lies on top of clay or anhydrite lenses above the confined shallow aquifer. Very shallow (10-30 feet), low-production wells may have tapped this "gyp water" in the past and used the production for stock. Many of these wells have been abandoned for a variety of reasons including exhaustion of water or poor quality. These small, stratigraphically-trapped accumulations of ground water are highly variable in areal extent, volume, saturated thickness and quality. One such confined body of water underlies part of the Navajo facilities.

The configuration of the perched-water unit under the Navajo site is revealed by over 40 monitor wells, installed by Navajo Refining Company. Lithologic drillers logs show that water is encountered in weathered and fractured anhydrite (so called gypsum sand) at depths of 15 to 30 feet, and typically

rises to levels 3 to 5 feet above the saturated unit (Appendix A). This water-bearing unit is confined above by layers of gypsum, anhydrite and caliche, and below by a continuous layers of clay and anhydrite. Figures 4-6 and 4-7 illustrate the geometry and hydrology of the plant site area.

These figures show that this perched gypsum/anhydrite/sand unit is comprised of several water-bearing zones at different depths. The water-bearing zones are generally less than 5 feet thick and are typically hydraulically connected. However, wells #19 and #34, and #29, #37, #39 and #40 show that anomalies in the potentiometric surface are present due to complex hydraulic connections in some areas of the plant.

Navajo Refining Company maintains 3 evaporation ponds near the Pecos River, which are connected to the plant site by a conveyance channel paralleling Eagle Creek (Figure 2-1). These ponds, and the portions of the conveyance channel in Sections 12, 11 and the E 1/2 of 10 are located in Pecos valley alluvium. Monitor wells installed by Navajo show that ground water in the valley alluvium is typically 6 to 12 feet below the surface. Although the alluvium is generally silty sand, some 6 inch monitor wells can maintain a pumping rate of 10-15 gpm indicating the presence of lenses of higher permeability material. Figure 4-8 shows the configuration of the water surface in this unit. As expected, flow is sub-parallel to the Pecos River Valley. The water level in this unit does respond to the fluctuations of flow in the River (Figure 4-8). Therefore, during periods of high flow the hydraulic gradient is from the river to the alluvium



and the Pecos River loses water. During low flow periods the gradient is reversed. Figure 4-9 is a potentiometric surface map of the area near the evaporation ponds.

4.5 SURFACE WATER HYDROGEOLOGY AND FLOODING POTENTIAL

Artesia lies in the eastern plains of New Mexico on a broad, mature plateau developed on flat-lying bedrock. The city is at an average elevation of 3380 feet (msl) on an essentially featureless plain which slopes eastward at about 3 feet per mile (0.35 degrees). Surface drainage is typically controlled by small, ephemeral creeks and arroyos which flow eastward into the Pecos River. These small drainages are subparallel and spaced at about 0.75 to 1.5 miles.

The major drainage in the immediate Artesia area is Eagle Creek which runs from west to east through the city, northeast through the Navajo Refinery and then eastward to the Pecos (Figure 2-1). Eagle Creek's channel has been rectified (artificially formed and straightened) from west of Artesia to the Pecos. Discussions with the City of Artesia engineer (Mr. John Brown) indicate that there is no historical record of Eagle Creek overflowing its banks. However, such an overflow could occur in a 100 year event (5.0 inches of precipitation). To deal with this problem, the city is continuing its efforts at rectifying Eagle Creek and plans to construct a check dam several miles west of Artesia within 2 years. These measures will effectively remove Artesia and the Refinery from the 100-year floodplain.

The evaporation ponds and parts of the conveyance ditch lie

in the geologic floodplain of the Pecos River. In the past, large releases from upstream reservoirs coupled with high rainfall events have resulted in minor damage to the conveyance ditch. The ponds are located on alluvial material next to the Pecos. Pond perimeters are 16 to 18 feet above the river channel, and the largest pond is protected by a 5-foot high dike. Analysis of historic records of Pecos floods (Patterson, 1965; USGS unpublished data 1946-1983) shows that a maximum stage height of 17.4 feet was reached on September 30, 1932. Is is unlikely that this level will ever be equalled, owing to the construction of several flood-control dams (Alamogordo, Los Esteros) on the upper Pecos. No discharge event since 1941 has exceeded the 13.76 foot stage (25,200 cfs on October 8, 1954) and no discharge since 1960 has exceeded 7000 cfs. Modern "floods" in the Pecos are now controlled releases of water for irrigation, and these discharges are deliberately controlled to prevent any actual or potential flooding of lands and structures adjacent to the Pecos. Anv release or rainfall event large enough to flood the evaporation ponds would effectively dilute the effluent to a level far below stream or ground water standards.

4.6 GROUND WATER QUALITY

Four separate hydrogeologic units are present at the Navajo facility:

- o the artesian aquifer (San Andres)
- o the shallow aquifer (upper Queen)
- o the Pecos River Valley alluvium, and
- o the perched water in the terrace regolith and surficial deposits.

The well-defined pressure regime in the confined aquifers (San Andres and the upper Queen) demonstrates that these units cannot be degraded by surficial sources (Section 4.4). Therefore, water quality data for these units was not collected

for this study. Published data on the water quality of these units are available (NMEID, 1980).

The water chemistry of the two surficial water-bearing units which have the potential of being affected by Navajo's operation is summarized in Appendix B. The water quality in the Pecos River Valley alluvial sand/silt aquifer is well defined near the evaporation ponds and is consistent with surface water quality data from the Pecos River (Figure 4-8). Comparison of ground water quality with water quality in the evaporation ponds reveals that, in terms of the major cations/anions and metals, the water quality in the lagoons is better than or equal to ground water quality (Appendix B). Both are unsuitable for use as irrigation, domestic or industrial purposes. Even though some monitor wells have an odor characteristic of hydrocarbons, in all wells sampled except for well #13 neither phenols, toluene nor benzene are present in concentrations above ground water standards.

4-16

1

Water quality in the perched terrace/regolith water-bearing unit is also well defined (Appendix B). The water quality in this unit is better than the Pecos Valley alluvium. It should be noted that the ground water in this perched water-bearing zone under the refinery is under some artesian pressure. Direct contamination of this ground water is therefore unlikely. The lithologic logs of the monitor wells (Appendix A) indicate that the soil in the aquitards above the unit is locally contaminated from surficial spills. Therefore, the ground water in some wells may in fact be unaffected by spills and other discharges. High hydrocarbon or TDS content in samples from these wells could be a result of artesian water in the well bore coming into contact with contaminated soil. Many wells have been installed to identify zones of hydrocarbon contamination and four oil recovery systems have been installed to recover product and therefore, mitigate the hydrocarbon contamination (Figure 4-7).

This shallow, perched-water unit appears to be of limited areal extent, and does not seem to be utilized by any wells off the plant site. It is not connected with any of the other aquifers, and it is very unlikely that any possible hydrocarbon contamination would affect any other ground water.

5.0 PROCESS DESCRIPTION AND WASTEWATER CHARACTERISTICS 5.1 OVERVIEW

A petroleum refinery is a complex combination of interdependent operations engaged in separating crude molecular constituents, molecular cracking, molecular rebuilding, and solvent finishing to produce petroleum-derived products. There are a number of distinct processes utilized by the industry for the refining crude petroleum and its fractionation products. An EPA survey of the petroleum refining industry, conducted during 1977, indentified over 150 separate processes being used and indentified many more process combinations that may be employed at any individual refinery.

Each process is itself a series of unit operations which cause chemical and/or physical changes in the feedstock or product. In the commercial synthesis of a single product from a single feedstock there are sections of the process associated with the preparation of the feedstock, the chemical reaction, the separation of reaction products, and the final purification of the desired product.

At the Navajo Refining Company Artesia, New Mexico facility the major refining processes are:

- 1) Crude Oil Fractionation (with vacuum fractionation)
- 2) Fluidized Catalytic cracking
- 3) Alkylation
- 4) Reforming

Ī

5) Desulferization

Associated with these processes are several auxiliary activities which do not directly result in conversion of crude

oil' to product nor result in complex chemical changes in the product but instead separate impurities from the feedstocks and products, or are required for other aspects of the operation and maintenance of refinery.

These auxiliary units are:

- 1. Boilers
- 2. Cooling towers
- 3. Storage tanks
- 4. Water purification facilities
- 5. Desalting units
- 6. Drying and sweetening units

Figure 5-1 shows the location of these process and auxiliary units at the refinery. The North Division of the refinery processes New Mexico intermediate crude whereas the South Division processes sour crude. The Artesia facility can refine a total of about 30,000 barrels of crude per day with the South Division producing about two-thirds of the total. Figure 5-2 is a process diagram which shows the interrelationship between the two divisions and the location of discharge points.

Each process or auxiliary unit operation has different water usages associated with it and the nature and quantity of waste water produced by the units varies according to the process involved. The final aqueous effluent of the Artesia Refinery is a blend of 19 process and auxiliary waste streams (Table 5-1) as well as some additional wastewater produced during general cleanup at the facility. The relative flow volumes from the different units are:

Cooling Towers	60%
Boiler Blowdown	20%
Desalter	8%
Process Units and Water Softener	12%

Based upon four wier measurements taken over the course of several days, the total effluent discharge is approximately 0.627 cfs or about 405,200 gallons per day.

A brief description of each process and its wastewater characteristics is given below.

5.2 MAIN PROCESS UNIT DESCRIPTIONS AND WASTEWATER CHARACTERISTICS 5.2.1. Crude Oil Fractionation

Fractionation serves as the basic refining process for the separation of crude petroleum into intermediate fractions of specific boiling-point ranges. Fractionation is a thermal distillation process which, at the south crude unit, yields gas, straight run gasoline, naptha, kerosene, diesel, atmospheric gas oil and reduced crude (Figure 5-2). Reduced crude is transferred to the associated vacuum unit where it is further fractionated into asphalt and vacuumed gas oil.

In the North Crude Unit, where New Mexico intermediate crude is refined, the product streams consist of gas, straight run gasoline, naptha, kerosene, diesel and topped crude. Wastewater produced from the crude units contains ammonia, sulfides,

chlorides, oil, and phenols. The process description flow sheet (Figure 5-2) shows the location of all wastewater discharges for this and other units. Table 5-1 summarizes the type of effluent produced at each unit and shows the treatment units to which the streams are discharged. Four wastestreams originate in the crude units the bleedstream from the overhead accumulators #4, #5 #8 #11 and #13 and the effluent from the vacuum distillation unit (co-mingled with blowdown from the TCC cooling tower, #7).

TABLE 5-1 PROCESS UNITS AND WASTEWATER TREATMENT/DISPOSAL UNITS

ł

ľ

LOCATION	PROCESS UNIT	WASTE STREAM SOURCE NUMBER	DISPOSAL/ TREATMENT SYSTEM
South Division	Cooling Tower		south division Separator
South Division	Boilers	sys sto ove	fire control tem water orage ponds orflow directly to colveyance cch
South Division	Crude Unit Desalter (D-130)		south division separator
South Division	Crude Unit Overhead Accumulaton (D-140)		south division separator
South Division	Crude Unit Stabilizer (D-202)		south division separator
South Division	Alkylation Unit Regenerator	6 To	API separator
South Division TCC Unit	Cooling Tower and Vacuum Unit		south division separator
South Division	Crude Unit Straig Run Gasoline stabilizer (W-58		API separator
North Division	Crude Unit Desalters (D-1, D-2)) oil	north division /water parator
North Division	Cooling Tower	oil	north division /water parator

Table 5-1 Continued

North Division	Crude Unit Overhead Accumulator (D-5)	11	To oil/water separator
North Division	Low Pressure Boiler	12	To North division oil/water separator
North Division	Crude Unit Overhead Accumulator (D-4)	13	North division oil/water separator
North Division	Desulfurizers (D-15)	14	North division oil/water separator
North Division	Fluidized Cat. Cracker Unit Cooling Tower	15	North division oil/water separator
North Division	Sour Water Stripper Bottom	16	To desalters, excess to North division oil/water separator
North Division	High pressure Boilers	17	To North division oil/water separator
North Division	FCC overhead acc- umulator Unit (DA- 301)	18	To north division oil/water separator

Un-numbered waste streams on Figure 5-2 have not been analyzed

 Like all wastestreams that have contacted crude or product (contact wastewater) and contain oil, these streams are treated in the oil/water separators prior to release into the conveyance ditch and the evaporation ponds. A chemical characterization of wastestreams #4, #5, #8, #11 and #13 is shown in Table 5-2.

5.2.2. Catalytic cracking

Fluidized catalytic cracking process is employed at Navajo. Catalytic cracking involves at least four types of reactions:

- 1) Thermal decomposition
- 2) Primary catalytic reactions at the catalyst surface
- 3) Secondary catalytic reactions between the primary products
- Removal of products which may be polymerized from further reactions by adsorption onto the surface of a fluidized bed of catalyst as coke.

The catalysts are in the form of powder for the fluidized unit. The catalyst is usually heated and lifted into the reactor area by the incoming oil feed which, in turn, is vaporized upon contact. Vapors from the reactors pass upward through a cyclone separator which removes most of the entrained catalyst. These vapors then enter the fractionator, where the desired products are removed and heavier fractions recycled to the reactor.

The major wastewater constituents resulting from catalytic cracking operations are oil, sulfides, phenols, cyanides, and ammonia. These produce an alkaline wastewater with high BOD and COD concentrations. Sulfide and phenol concentrations in the wastewater can be significant. The wastestreams produced by the FCC unit are #19 and #15. Both #8 and #19 are also contact wastewater but are sent directly to the oil/water separators as shown in Table 5-1. A characterization of the effluent from the

TABLE 5-2 CHEMICAL ANALYSES OF SELECTED WASTE STREAMS AT NAVAJO REFINERY (AFTER BRANVOLD, 1984) (VALUES IN MG/L EXCEPT WHERE NOTED)

.

- - -----

.

WQCC 3-103 Standards	CRUDE UNIT PROCESS (#4, #11, #13)	CAT. CRACKER PROCESS Before Sour Water Stripper	SOUR WATER STRIPPER EFFLUENT (#17)	ALKY. NEUTRALIZING SEWER (#6)	ND & SD DESALTERS (#3, #9)
4-					
As Ba					
Cd					
Cr	<0.1	<0.1	<0.1	7.0	
CN	<0.1	<0.1	<0.1	7.8 <0.1	(1.4
					<1.0
F	1.3	0.5	0.4	10.8	
fb			•		
Hg					
NO ₃ Se					
Ag					
U					
C1					
Cu					
Fe	<0.1	3.9	17.0	7.8	
Ħn SB -					
S04					
TDS Zn	B05	2160	560	2872	2524
рH	<0.1 6.3	<0.1 9.0	0.12 9.5	18.8	
Al	0.0	7.0	7.0	3.6	
В		4			
Co					
Mo					
Ni					
Phenols TSS	9.9	710	250	0.26	
Cond.					
COD	1202	8379	1700	0070	
NH.	78	2320	1702 256	8870	600 5
S	64	180	7.7	<1 1.4	5.0
				1.7	<1.0

Table 5-2 (continued)

i.

BOILERS

WQCC 3-103	S.D.	N.D.	N.D.
PARAMETERS	BOILER Blowdown	HIGH PRESSURE BOILER	LOW PRESSURE BOILER
	(#2)	(#18)	(#12)
As	.004	.005	.003
Ba	<.1	<.1	<.1
Cd	<.01	<.01	<.01
Cr	<.05	<.05	<.05
CN			
F	3.1	2.2	1.5
Pb	.18	.14	.05
Hg			
NO ₃	.2	.1	.05
Se			
Ag	<.05	<.05	<.05
U	<.05	<.05	<.05
C1	127	73	44
Cu	<.03	<.03	<.03
Fe	1.9	0.65	0.25
Hn DD	.07	<.03	<.03
SD TRO	1549	1242	693
TDS	4220	2873	1807
Zn	.06	<.01	<.01
pH	11.6	11.6	11.2
Al B	<1.0	<1.0	<1.0
Co	<.01	.02	.01
No.	<.5	<.5	<.5
Ni	<.05	<.05	<.05
Phenols Toc	•	_	
TSS Cood	20	0	0
Cond. COD	6000	5000	2800
NH4	116	0	0
лп ₄			

S

•

Table 5-2 (continued)

þ

COOLING TOWERS

WOCC 3-103 Standards	N.D. COOLING TOWER Blowdown (#10)	S.D. ALKY COOLING TOWER BLOWDOWN (#1)	S.D. TCC COOLING TOWER BLOWDOWN	N.D. FCC COOLING TOWER BLOWDOWN (#16)
As	.004	<.001	.011	.001
Ba	<.1	<.1	< . 1	<.1
Cd	<.01	<.01	<.01	
Cr	.06	1.05	<.05	<.01 0.22
CN	100	1.00	1.03	0.22
F	1.6	4.4	2.2	1.6
Pb	.05	.05	<.05	.05
Hg			1.00	.03
N O ₃	.5	.75	.2	
Se		.75	• 1	4 Ú
Ag	<.05	<.05	<.05	<.05
บ้	<.05	<.05	<.05	<.05
C1	48	53	44	47
Cu	<.03	<.03	<.03	<.03
Fe	.05	.5	<.05	<.05
Mn	<.03	.07	<.03	<.03
S0	1077	1461	1236	1067
TDS4	1906	2732	1694	1973
Zn	.48	28	<.01	.17
pH	7.6	6.9	7.7	8.0
A1	<1.0	<1.0	1.0	<1.0
В				
Со	<.01	.01	.02	.01
Ko	<.5	<.5	<.5	<.5
Ni	<.05	<.07	<.05	<.05
Phenols				
TSS	13	0	67	0
Cond.	0	0	108	1800
COD	1850			15
NH.	0			

catalytic cracking process before and after sour water stripping is displayed in Table 5-2.

5.2.3. Alkylation

Alkylation is the reaction of an isoparaffin (usually isobutane) and an olefin (butylenes) in the presence of hydroflouoric acid as a catalyst at carefully controlled temperatures and pressures to produce a high octane alkylate for use as a gasoline blending component. The reaction products are separated in a catalyst recovery unit, from which the catalyst is recycled. The hydrocarbon stream is passed through a caustic and water wash after going to the fractionation section.

The wastewater from the alkylation unit is an acidic solution containing some suspended solids, oil, dissolved solids, fluoride and phenols. The waste stream (#6) is discharged to the neutralizing sewer and is treated to raise the pH prior to discharge to the API oil/water separator (see Table 5-1). An analysis of this coming wastestream is shown in Table 5-2.

5.2.4. Reforming

Reforming converts low octane naphtha, naphthene-rich stocks to high-octane gasoline blending stock, aromatics for petrochemical use, and isobutane. At Navajo the reformers do not produce a waste stream. Feed stocks are usually hydrotreated for the removal of sulfur and nitrogen compounds prior to charging to the reformer (see Section 5.3.6), since the extremely expensive platinum catalysts used in the unit are readily contaminated and ruined by the sulfur and nitrogen compounds. The predominant reaction during reforming is the dehydrogenation of naphthenes.

Important secondary reactions are the isomerization, cyclization and cracking of paraffins. All reactions result in high octane products.

5.2.5 Desulfurizers

Desulfurizing is primarily used to remove sulfur compounds, and other impurities from gasoline, kerosene, jet fuels and diesel fuel. The wastewater typically consists of sulfides or phenolic compounds. This waste stream (#14) is routed to oil water separator.

5.3 AUXILIARY PROCESS UNIT DESCRIPTIONS AND WASTEWATER CHARACTERISTICS

5.3.1 Boilers

Steam is consumed throughout the refining process and is generated in boilers at the North and South Divisions. To assure proper operation of the boilers, a certain amount of boiler water must be discharged (blowdown) and treated water added as make-up. Boiler blowdown is used as a water source for the fire protection system (Table 5-1) prior to direct discharge into the conveyance ditch. Analyses of the boiler blowdown wastestreams (#2, #17 and #12) are shown in Table 5-2. A characterization of the fire water pond is also included in Appendix B.

5.3.2 Cooling Towers

Water used for cooling process streams throughout the facility is cooled by cooling towers located in both the North and South Divisions and comprises most of the water usage at the facility. A significant amount of water is lost by evaporation in the cooling towers resulting in an increased concentration of dissolved solids in the cooling water over time. To prevent scaling, corrosion and biological growth in the towers, inhibitors such as chromate are added to the cooling water. Blowdown from cooling towers pass through the oil water separator to permit contact of chromate with the oil in the separator. This precipitates much of the metal due to reduction of the metal. Analyses of cooling tower blowdown (#1, #10 and #15) is displayed in Table 5-2.

5.3.3 Water Purification System

Pure water must be supplied to several of the boiler units as well as some process systems. Backwash from the purification system contains dissolved solids removed from the water supply system. The water purification system is basically a water softener and produces a periodic waste stream enriched in dissolved solids. The waste is never in contact with product and is discharged directly into the conveyance ditch in the South Division and to the Oil Water separator in the North Division. 5.3.4 Desalters

All produced crude contains some formation (connate) water and suspended solids. Because SE New Mexico crude is generally found in marine formations, this water is highly saline.

Desalters remove the saline fluid and suspended solids from the crude by passing crude (with some added water) through an electrostatic field which acts to agglomerate the dispersed brine droplets.

Wastewater can contain high dissolved solids, phenols and (depending upon crude type) ammonia and sulfides. This contact waste water is discharged to the oil-water separator. This waste stream is a significant contributer to the total effluent volume. A characterization of desalter effluent (streams #3 and #9) is shown in Table 5-2.

5.3.5 Washdown and Stormwater

A certain amount of wash water is intermittently utilized for general clean-up of the facility. This activity occurs within the concrete lined process areas. In areas where the clean up may result in oil-contaminated water, the areas drain to the oil water separator sewer. At the heat-exchanger bundle cleaning area the concrete pad drains directly into a sump which is constructed similar to an oil water separator thence into the conveyance ditch and thence to the evaporation ponds.

5.3.6 Storage Tanks

Storage of crude and product typically permits some separation of any water or suspended solids entrained in the fluid. These wastes, removed from the tank bottoms, contain emulsified oil, phenols, iron, sulfide and other consituents which depend

upon the nature of the material stored in a particular tank.

This liquid is removed to the oil water separators by vacuum trucks. The volume of effluent from this unnumbered source is also small.

5.3.7 Produced Water from Oil Recovery System

The oil recovery system pumps water from below the oil-water interface in order to create a gradient toward the skimmer pump in the trench. This water is discharged directly into the conveyance ditch.

6.0 PRESENT WASTE MANAGEMENT SYSTEM

The Navajo Artesia Refinery generates, treats and disposes of liquid and solid wastes. RCRA solid wastes, which include oil-water separator sludges, heat exchanger bundle cleaning sludges, slop oil emulsion solids and, when produced, leaded tank bottoms are disposed of at the RCRA landfarms on the refinery site pursuant to U.S. EPA regulatory provisions. These waste treatment facilities are fully addressed in EPA permitting documents and are not discussed further in this discharge plan.

The wastewater management system presently employed by Navajo is composed of four units: the evaporation ponds, the conveyance ditch, and the two oil-water separators. A general description of each unit is provided below.

6.1 OIL/WATER SEPARATORS

All wastewater delivered to the oil-water separators flow by gravity from the discharge points through subsurface pipelines. At the separators the flow velocity is reduced and the density difference between the water and entrained oil permits separation of the two phases. The oil is then skimmed from the water and pumped back to the processing units. Chromate and other metals which are discharged into the separator are removed from solution by the reducing effect of the hydrocarbons. The effluent is discharged to the conveyance ditch. The sludges are removed to the RCRA landfarm.

Periodically, blow sand and suspended solids in the effluent will enter the separator and oil droplets may adhere to the

solid. This phenomenon results in a sand/oil particle which may have the same density as water. These oily particles can flow through the unit and into the conveyance ditch. Upsets in the plant can also result in a short-term oily discharge from the separators. Much of the oil and grease discharged into the ditch will settle into the soft, bottom sediments. Over time this oil, grease and sediment has formed a very fine-grained asphaltic "liner" for the ditch.

6.2 Conveyance Ditch

The conveyance ditch originates at the oil-water separators and terminates at the evaporation ponds in Section 1,6 and 12 (T. 17 S., R. 26 E.) approximately three miles east of the refinery. As Figure 2-1 shows, the ditch is sub-parallel to Eagle Creek until it nears the Pecos River, where the ditch then turns south toward the evaporation ponds. The ditch is generally about 3-4 feet wide and less than 1 foot deep. Throughout its course, it is bermed to prevent any influx of stormwater or excess irrigation water.

In the refinery area several wastestreams discharge directly into the ditch. These streams (eg. boiler blowdown) are not contact wastewater and, therefore, need not be routed to the oil/ water separators.

6.3 Evaporation Ponds

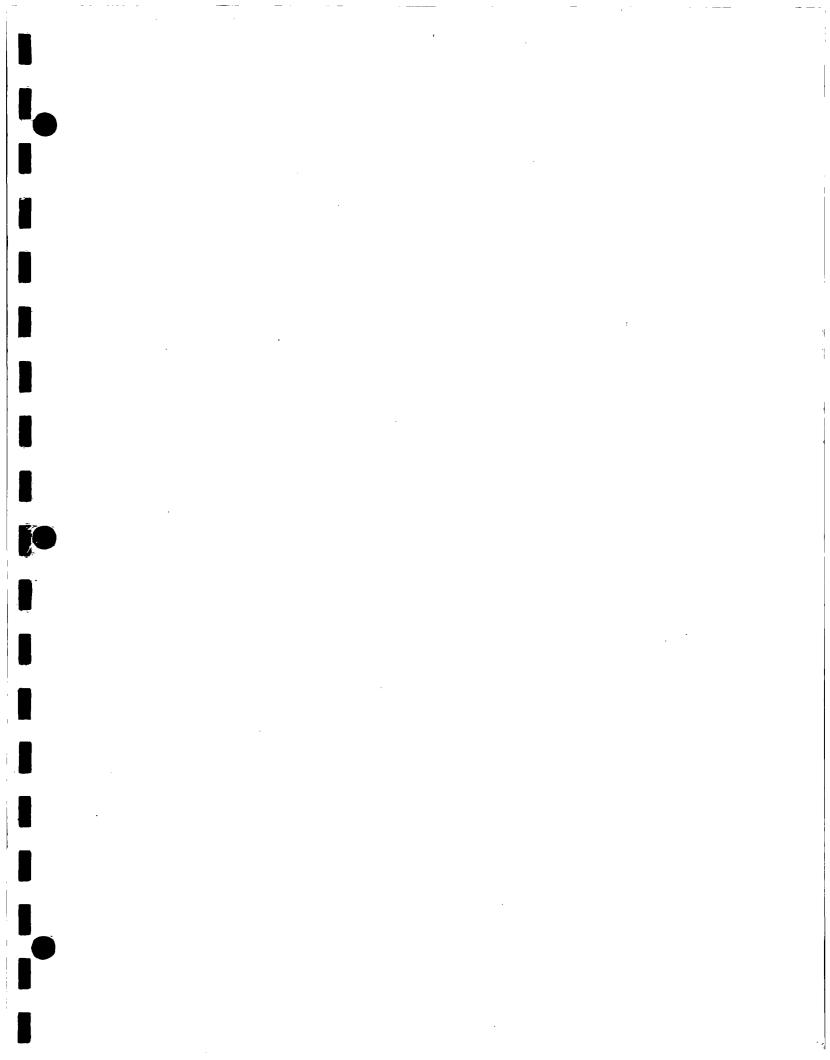
Originally, three ponds were built to evaporate the wastewater generated at the refinery. At the present time, the berm between the lower ponds (2 and 3) has been removed resulting in

a two-pond system. The ponds cover an area of approximately 85 acres square feet and are generally less than 3 feet deep. The ponds are bermed to prevent any storm water runoff from entering the impoundment.

All of the wastewater discharged by the refinery is disposed of in these ponds. The effluent in these ponds is a very good representation of the overall quality of the discharges from the facility. Upsets in the refinery and minor modifications of the operation could result in a variable quality of discharge. The ponds, however, have a long enough retention time to adequately homogenize the effluent. Analyses of the fluid in the ponds is shown in Appendix B.

REFERENCES CITED

- Kelley, V.C., 1971 Geology of the Pecos Country, Southeastern New Mexico: New Mexico Bureau of Mines and Mineral Resources, Memoir 24, Socorro, New Mexico, 77p. 7 maps.
- 2. New Mexico Environmental Improvement Division, 1980, Chemical Quality of New Mexico Community Water Supplies, 256 p.
- Patterson, J.L., 1965, Magnitude and Frequency of Floods in the United States, part 8: United States Geological Survey Water Supply Paper 1682, Washington, D.C., 506 p., 1 map.
- United States Soil Conversation Service, 1971, Soil Survey of Eddy Area, New Mexico: United States Department of Agriculture, Washington, D.C. 82 p., 152 maps.
- 5. Welder, E.G., 1983, Geohydrologic Framework of the Roswell Ground-Water Basin, Chaves and Eddy Countries, New Mexico: New Mexico State Engineer's Technical Report 42, Santa Fe, New Mexico, 28 p, 28 maps.



OUL COONSERVATION DIVISION

ŧ,

ł,

1.100°.

Jarvèque

DEC 11 1984

RECEIVED

APPENDICES FOR NAVAJO REFINING COMPANY ARTESIA, NEW MEXICO

L

December 4, 1984

Prepared for:

Dave Griffin Navajo Refining Company P.O. Drawer 159 Artesia, New Mexico 88210

Prepared by:

Gecscience Consultants, Ltd. 500 Copper Avenue NW Suite 220 Albuquerque, New Mexico 87102 APPENDIX A WELL LOGS

.

l i

LITHOLOGIC AND COMPLETION LOGS OF NAVAJO'S MONITORING WELLS

OUL CONSERVATION DIVISION

DEC 11 1984

RECEIVED

APPENDICES FOR NAVAJO REFINING COMPANY ARTESIA, NEW MEXICO

1

¥.

1

1

1000

December 4, 1984

Prepared for:

Dave Griffin Navajo Refining Company P.O. Drawer 159 Artesia, New Mexico 88210

Prepared by:

Gecscience Consultants, Ltd. 500 Copper Avenue NW Suite 220 Albuquerque, New Mexico 87102 APPENDIX A WELL LOGS

2

g.

1

3

8

1

4

Ţ

1

1 1

J

LITHOLOGIC AND COMPLETION LOGS OF NAVAJO'S MONITORING WELLS

2

1

1

i

i

i

Ŧ

1

· · /

Revised June 1972

I

:

I

ł

(A) Owner of we	u <u>Nava</u> j	<u>o Refinin</u>	no (o.		L INFORMATIO	# 	1	
		A	159	•				
Well was drilled un	•							
• <u></u>					- •	<u> 175</u> Ran		
						······		
		of Block No I in				<u></u>		· · · · · · · · · · · · · · · · · ·
					, N.M. Coordinate	System		
		& W Enter				License No	م ا	-
			•					
						cable		
Elevation of land s	urface or			at	well is	ft. Total depth	of well2/_	ft.
Completed well is	🗆 sh	allow 🗆 a	artesian.		Depth to wate	r upon completion	of wellO	ft.
				CIPAL WA	TER-BEARING S	TRATA	·	
Depth in F From	eet To	Thickness in Feet		Description	of Water-Bearing	Formation	Estimated (gallons per	
				. <u> </u>				
					N/A			
					·•		•	
Diameter	Pounds	Threads		n 3. RECO in Fect	RD OF CASING	Type of Sho	Perfo	orations
	per foot	per in.	Тор	Bottom			From	To
690		<u>P/E</u>	2	2(23	<u> </u>		20
								+
l		Secti	ion 4. RECOI	RD OF MU	DDING AND CEN	MENTING	. <u></u>	JJ
Depth in F From	reet To	Hole Diameter	Sack of Mu		Cubic Feet of Cement	Metho	d of Placement	
							<u>م</u>	
	Į				N/A			
			Sectio	n 5. PLUG	GING RECORD			
Plugging Contracto Address		· <u>·</u> ·····		· · ·	No.	Depth in l	Feet C	ubic Feet
Plugging Method _ Date Well Plugged					No.	Тор		f Cement
Plugging approved	by:							
		State Eng	gineer Repress	entative				
Date Received			FOR USE	OF STATE	ENGINEER ON	LY		

. .____

			Section 6. LOG OF HOLE
Depth From	in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	21	21	Sand
<u></u>	<u></u>		
<u></u>			
·			· · · · · · · · · · · · · · · · · · ·
	·		
<u> </u>			
			777 NG 31 NG 31 NTE EVEN NEER OFFICE 31
	·	Section 7	7. REMARKS AND ADDITIONAL INFORMATIONS
	2		τ. ω 5 μ = 10

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

.

11

2 Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted *** the appropriate district office of the State Engineer. drilled, repaired or deepe When this form is used as a plugging record, only Section 1(a) and Section. dieed be completed.

STATE ENGINEER OFFICE WELL RECORD

.

Revised June 1972 FIELD ENGE. LDG

·,*

				2	Section 1	GENER	AL INFO	RMATIO	N				
(A)							PANY			ner's Wel	11 No	1	6
	Street or City and	Post Office Ad State	dressf	Irte	Box 19 sia. M		xico	88210]				
	-												
Well		under Permit I									26	-	
								-	<u>17.5</u> R	•		<u>.</u> F	N.M.P.M.
		*											<u></u>
		o vision, recorded											
		· · · · · · · · · · · · · · · · · · ·	feet, Y⊐			fe	et, N.M. C		system				
(B)			C1)	/de	Tidwel	1			License No.				
Addr	P 55	80	x 17. R	oute	1. A,	rtesia	. New !	Mexico	88210				
									Cable				
	• •			-				-					
Eleva	ition of lar	id surface &				i			ft. Total dep				
Com	pleted well	lis 🗙 sh	allow 🗖	artes	sian.		Dept	th to wate	er upon completi	on of we	:11	10	ft.
r					2. PRIN	CIPAL W	ATER-BE	ARING S	STRATA				
	Depth From	in Feet <u>T</u> o	Thicknes in Feet		I	Descriptio	n of Wate	r-Bearing	Formation	(1	Estima gallons		
	10	25	15		Re	ed San	d				NA		
	28	35	× 7		Gi	ay Sa	nd				NA		
			<u> </u>						· · · · · · · · · · · · · · · · · · ·				
L						- 2 DEC				I			
D	iameter	Pounds	Threads			in Feet	ORD OF (Length			P	erfor	ations
	inches)	per føot	per in.		Тор	Botto		(feet)	Type of S	hoe	Fro	m	To
E	3_5/8	28			٥	60		60	Texas Pat	tern	N	IA	
		•,											
L		·	Sec	tion	4. RECO		UDDING	AND CE	MENTING		1		
—	Depth From	in Feet To	Hole Diameter		Sack of Mi		Cubic of Cen		Met	hod of I	Placeme	ent_	
				+	•							-	
				+						·			
					Sectio	n 5. PLU	GGIN <mark>G</mark> R	ECORD					
		actor						·		<u> </u>			
	ress zing Metho			.				No.	Depth Top	in Feet Botte	0.00		bic Feet Cement
	Well Plug								тор	Bott			
Plugg	ing appro	ved by:				~		2					

April 6, 1981 Date Received

Ì.

FOR USE OF STATE ENGINEER ONLY

State Engineer Representative

----· - . RA-6775-E

File No.

Quad _ Observation ŝ _ Use .

4

Location No. 175.26E.12.1224 ----

_ FWL __

_ FSL.

		·	Section 6. LOG OF HOLE
Depth From	in Feet To	Thickness in Feet	Color and Type of Material Encountered
D	25	25	Fine red sand
25	28	3	Blue-gray clay
28	35	7	Fine gray sand
35	46	11	Coarse gravel
46	60	14	med to fine gravelly sand
•			
	· · · · · ·		
	<u> </u>		
			· · · · · · · · · · · · · · · · · · ·
	<u>_</u>		

Section 7. REMARKS AND ADDITIONAL INFORMATION

*81 APR 6 AH 8 03 STATE ENGINEER OFFICE ROSWERFICE

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

د. سر:د: ۱

. .

Glyde J. Julwell Driller

INSTRUCTIONS: This for 'ould be executed in triplicate, preferably typewritten, and submitted to of the State Engineer. AL ons, except Section 5, shall be answered as completely and accurate drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section related to the section of the section o

appropriate district office possible when any well is need be completed. Į

. T

			6T 4	TE ENCINEER	OFFICE		Kevi	sod June 1972
			514	TE ENGINEER				
							F把D	
		in Dal.			FORMATION			
Sumal or	Post Office Ad	Idraes P.U.	. Urawer 1	59		Owner's W	'ell No	
City and	State <u>Arte</u>	<u>esia, New</u>	Mexico			<u></u>		
Vell was drilled	under Permit	No2A-	<u>5143-X-2</u>	-	and is located	in the:		
a <i>NW</i>	_ <u>%_NW_</u> %	<u>NW_</u> %_	¼ of Se	ction <u>12</u>	Township	175 Range_	268	N.M.P.M.
b. Tract	No	of Map N	o	of the				
c Lot N	o <u>+</u>	of Block No		of the				
Subdiv	vision, recorded	1 in		Co	ounty.			
					M. Coordinate S	System		Zone in
						License No		
ddress	P.O. Box 4	37	_Artesia,	New Mexic	<i>•</i>			
rilling Began .	6-16-7	_7 Cor	npleted <u>6</u>	-16-77	. Type tools	_cable	Size of hole_	<u>890</u> in.
levation of lar	nd surface or _			at well	l is	ft. Total depth of w	/ell2(2 ft.
ompleted well	is 🗆 st	hallow 🗇	artesian.	1	Depth to water	upon completion of w	/ell	<u> </u>
-					- R-BEARING ST			·
Depth i	in Feet	Thicknes	ss ,		Water-Bearing F		Estimated	
From	То	in Feet				~	(gallons per	minute)
				N/:	<u>A</u>			
		ļ						
					· .		<u> </u>	
	<u> </u>		Sectio	n 3. RECORD (OF CASING			
Diameter	Pounds per foot	Threads		in Fect	Length (feet)	Type of Shoe		rations
(inches)	period	per in.	Тор	Bottom			From	To
890	4	P/E	2	20	2	P/e	3	19
1							1	1 1
		 	·····					<u> </u>
					NG AND CEM	ENTING		
Dep th From	in Feet To	Sec Hole Diameter	Saci	cs Cu	NG AND CEM bic Feet Cement		Placement	
		Hole	Saci	cs Cu	bic Feet		Placement	
		Hole	Saci	cs Cu ud of	bic Feet Cement			·
	То	Hole	Saci	cs Cu	bic Feet Cement			·
	<u>To</u>	Hole	Saci	cs Cu ud of	bic Feet Cement			·
From	To	Hole Diameter	Sach of M Section	cs Cu ud of	bic Feet Cement			·
From	To	Hole Diameter	Sach of M Section	n S. PLUGGIN	bic Feet Cement	Method of	3	
From lugging Contra ddress lugging Metho	To	Hole Diameter	Saciof M	n S. PLUGGIN	bic Feet Cement 4 G RECORD	Method of Depth in Feet		·
From lugging Contra ddress lugging Metho	To	Hole Diameter	Saciof M	n S. PLUGGIN	bic Feet Cement A G RECORD	Method of Depth in Feet		bic Feet
From lugging Contra ddress lugging Metho bate Well Plugg	To	Hole Diameter	Saciof M	n S. PLUGGIN	GRECORD	Method of Depth in Feet		bic Feet
From lugging Contra ddress lugging Metho bate Well Plugg	To	Hole Diameter	Sach of M Section Section	n S. PLUGGIN	bic Feet Cement //A G RECORD	Method of Depth in Fcet Top Bot		bic Feet
From lugging Contra ddress lugging Metho bate Well Plugg	To	Hole Diameter	Sach of M Section Section	n S. PLUGGIN	GRECORD	Method of Depth in Fcet Top Bot	tom of	bic Feet Cement

|

Depth i		Thickness	Color and Type of Material Encountered	
From	To	in Feet		
0	20	20	Sand	
			· · · · · · · · · · · · · · · · · · ·	
			-	
	=			
			_	
			₹	
		ļ	#	
				<u> </u>
	<u></u>			
	· ·			
ļ				
			· · · ·	
	•.			
1		Section	7. REMARKS AND ADDITIONAL INFORMATION	
		STATE ENGINEER OFFILE ROEWELL N.M.		
	· • •	<u>x</u> .		
	AN	E Z		
	a	E. F.		
	15 AUG 31	9 N 3		
	90	R0 R0		
	4	2	The second s	

e general de la service

`...

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

021 Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted the appropriate district office of the State Engineer. Stions, except Section 5, shall be answered as completely and accura s possible when any well is drilled, repaired or deepen. When this form is used as a plugging record, only Section 1(a) and Section 2 need be completed.

									Revise	d June 197
			ST	WELL				FIE	• 0 F13	0r. 10
			Section	1. GENER	AL IN	FORMATION		#3	C C 19.	نداد. كري
	well Nas	min Reli	r iro (<u>o.</u>			Own			
Street or I City and S	Post Office Ac State	idress tenia, Nei	Drawer u Mexico	159		<u></u> .	Own			
vell was drilled										
8 <u>S</u> W	_ ¼ _ <u>NE_</u> ¥	<u>NW %</u>	¼ of :	Section	12	_ Township	<u>75</u> Ri	ange <u>26 (</u>		N.M.P.N
				•			··			
c. Lot No Subdiv	ision, recorde	of Block No. d in	- <u></u>	<u></u>	of the_ Cou	unty.		<u></u>		
			4	fe	et, N.M	. Coordinate	System			Zone i Grant
			елолілел	···, -··· - · · ·			License No	WD-675		Gan
B) Dritting C	P.D. Box	477	Arte	sia. Ne	w Mex	ico				
							cable		hole_c	890 ⁻ ir
							_ ft. Total dept			
ompleted well	_	hallow 🗆					upon completio			
ompieted wen						BEARING ST				
Depth i		Thicknes in Feet	s			ater-Bearing F	· · · · · · · · · · ·		mated Y as per m	
From	To				I/A			Gano		
		+			<u></u>					
							•			
		r				FCASING				
Diameter (inches)	Pounds per foot	Threads per in.	Dept Top	th in Feet Botte		Length (feet)	Type of Sh	ice F	Perfor rom	ations To
890	4	PIE	2	23		25	P/E		,	22
				_						
			<u>_</u> , <u>_</u>							
Depth i	in Feet	Sec Hole		ORD OF Macks	-	IG AND CEM				
From	То	Diameter		Muđ		Cement	Meth	nod of Placer	ment 	
	i.		-	N/A					 	
	4	<u> -</u>					<u></u>			
	Ļ	1	1		J	ł				
			Sec	tion 5, PLL	JGGINO	RECORD				
lugging Contra	actor									
Address							Depth in			bic Feet
Address Plugging Metho Date Well Plugg	od			·			Depth in Top	n Feet Bottom		bic Feet Cement
Address Plugging Metho	od					— —	the second s			

1

ł

i

I

i

I

Ŷ

/

File No. <u>RA-6143</u>

Quad FWL Use OBS. 5 ETPL. Location No. 17.26.12.

FSL

			Section 6	LOG OF HOLE			
Depth i		Thickness in Feet		Color and Type	of Material Enc	ountered	
From	To		<u> </u>	t _t	······································		······
	23	_23	Sand	·······			
			1				
					<u></u>		
				· · · · · · · · · · · · · · · · · · ·			
	4						
	م	-				<u> </u>	*
							•
	<u> </u>						
			_				
							· · · <u>· · · · · · · · · · · · · · · · </u>
	_						
				······			
						_	
1							
		-		·····			<u></u>
				•			
				<u></u>			
			······································				
						···-	
1							
	·	++	·				
	······			······································			
		Section 7	7. REMARKS AND	ADDITIONAL INFO	RMATION		
			. •			• •	
		N N					
	AH	ш., ш.,					
	31	STATE ENGINEER OFFICE ROSWELLN.M.					
	5	E COS					
	AUG	ATE F					
	LĿ.	ST 🙀					
	•	° O		•	•	· · · ·	
			•				
		$\mathbb{E}_{i}(x) = \sum_{j=1}^{n} (x_{ij} - x_{ij})$	•••				-
undersigned ribed hole.	i hereby cer	tifies that, to the	best of his knowl	edge and belief, the fo	regoing is a true	and correct rec	ord of the abov
		-	•				11.1
						ony	TUY_
			* .•			Driller	

ľ

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to be appropriate district office of the State Engineer. / tions, except Section 5, shall be answered as completely and accura : possible when any well is drilled repaired or deepen. When this form is used as a plugging record, only Section 1(a) and Section , used be completed

	Γ	` .				$\widehat{}$		Revised June 1972	
		STA	TE ENGI	NEER OFF	ICE				
			WELL F	RECORD				*. \$ 6 1*# 4	
		Section 1	. GENER	AL INFOR	MATION		15	SANTA	lit
) Owner of well	avajo Refin	ina (o.							
) Owner of well <u>1</u> Street or Post Offic City and State <u>1</u>	Address	D _m	шел 15	9					•
-	•								
ell was drilled under Per									
a. <u>1111</u> 14 <u>St</u>	_ ¼ <u></u> ¼	¼ of Se	ction	Tov	wnship 🔟	7.5 Ran	ge _26 <u>Ç</u>	N.M.P.M.	•
b. Tract No	of Map N	0	0	f the					
c, Lot No	of Block No.			of the					
c. Lot No Subdivision, reco									
d. X≈	feet. Y=			t. N.M. Co	ordinate S	vstem		Zone in	
the								Grant.	
) Drilling Contractor	H & W Ent	erprises				License No	B-675		
Idress P.O. Box 4	· A.	.talia Na	n Manta				•		
illing Began <u>6-12-</u>	Cor	mpleted	-18-77	² Type	e tools¢	able	Size of h	iole_ <u>852</u> in.	
evation of land surface	or		a	t well is		_ ft. Total depth	of well	<u></u>	· ·
ompleted well is	shallow 🗖	artesian.		Depth	to water	upon completion	of well	Qft.	
•									··
Depth in Feet	Thickne	ection 2. PRIN					Estim	ated Yield	Depth
From To	in Fee		Descriptio	n of Water-	Bearing F	ormation		per minute)	
									(n.) (e)
				N/A					Dep7/17 0-21 50 21 Seet
			·· <u></u> _						21 Seel
			<u> </u>	····					Soul
		Section	on 3. REC	ORD OF C	ASING				_
Diameter Pound (inches) per fo			in Feet		ength feet)	Type of Sho	e	Perforations	-
		Тор	Botto			0.15		om <u>To</u>	-
	<u> 19/8</u>	2	21	2	3	<u>P/E</u>	3	20	4
					ĺ				
		ction 4. RECO			ND CEM	ENTING	13.		•
Depth in Feet	Hole	Sac	ks	Cubic F	eet		d of Placem		י ר
From To	Diamete	r of M	4ud	of Cem	ent				4
						•		~ A	
				NIA				5	
1								· · · ·	1
	1	····		I					<u>ل</u>
					CORD			14 FICE	
		Sect	ion 5. PLU	GGING RE					
lugging Contractor			ion 5. PLU	GGING RE		n	Ennt		-
ddress lugging Method			ion 5. PLU		No.	Depth in Top	Feet Bottom	Cubia Feet of Cement] .
Address lugging Method Date Well Plugged			ion 5. PLU		No.	the second se			
ddress lugging Method				e	No.	the second se			
Address lugging Method Date Well Plugged				·	No.	the second se			

File N

÷ ; 2.5 1.01

Location No.

Use

• :

		· · ·					1. Ann		Kevi	acd June 1972	
		·	STA	TE ENGI	NEER OFF	ICE					
				WELL F							
			Casting 1	CENCO		MATION		#7		SAITA FI	
	well <u>Nava</u>	in Colini	section I	, GENCK	L INFOR	WATION					
Owner of Street or F	well Post Office Ad	dress	Traver 15	9			Own	er's Well No	»		
City and S	state	sia, l'en	licrico				Own			<u> </u>	
ell was drilled	under Permit	No	-6143-1-7		and i	s located i	n the:				
a. <u>NE</u>	<u> % SE %</u>	<u></u>	¼ of Se	ction	/ Tov	vnship	<u>175 Ra</u>	nge <u>268</u>		N.M.P.M.	
b. Tract N	10	of Map No	• <u></u>	0	f the			*''		<u> </u>	
c. Lot No)	of Block No.		o	of the			·.			
	ision, recorded						•				
		_ fcet, Y=		fee	et, N.M. Co	ordinate S	ystem			Zone in Grant.	
) Drilling C	ontractor	H & W Er	rterprise	4			_ License No				
ddress P.	0. Box. 437	,	Antenia	New M	exico		_ License No	•			
							able				
										. •	
evation of lan	d surface or _	<u> </u>		a	it well is		_ ft. Total dept	h of well	22	£ ft.	·
ompleted well	is 🗆 sl	nallow 🗖	artesian.		Depth	to water	upon completio	n of well	() ít.	SH
		,	ction 2. PRIN	CIPAL W.	ATER-BEA	RING ST	RATA	- <u>t</u>			Dep/4
Depth i From	n Feet To	Thicknes in Feet		Descriptio	n of Water-	Bearing Fo	ormation		timated ons per	Yield minute)	Dop/4 0-2250 225000 Soud
					N/A						22 400
								1			Sond
											-
1		L					·····	_!			
			C								
Diameter	Pounds	Threads		in Feet					Perf	orations	
Diameter (inches)	Pounds per foot	Threads per in.		in Feet Botto	L	ength fcet)	Type of Sl	10e -	Perf From	orations To	
			Depth	in Feut	Dim L	ength	Type of Sli P/E				
(inches)	per foot	per in.	Depth Top	in Feut Botto	Dim L	ength fcet)			From	To	•
(inches)	per foot	per in.	Depth Top	in Feut Botto	Dim L	ength fcet)			From	To	
(inches)	per foot	per in.	Depth Top	in Feut Botto	Dim L	ength fcet)			From	To	
(inches) 890	per foot 4	per in. P/E Sec	Depth Top 2 tion 4. RECO	in Feut Botto 22 RD OF M	UDDING A	ength fcet) 4	P/E ENTING	······	From 3	то 21	•
(inches) 890	per foot	per in. P/E	Depth Top 2 tion 4. RECO	in Feut Botto 22 PRD OF M	L om(2	ength fcet) 4 4 AND CEM	P/E ENTING		From 3	то 21	•
(inches) 890 Depth	per foot 4 in Fcet	per in. P/E Sec Hole	Depth Top 2 tion 4. RECO	in Feut Botto 22 PRD OF M	UDDING A Cubic F	ength fcet) 4 4 AND CEM	P/E ENTING	······	From 3	то 21	•
(inches) 890 Depth	per foot 4 in Fcet	per in. P/E Sec Hole	Depth Top 2 tion 4. RECO	in Feut Botto 22 PRD OF M	UDDING A Cubic F of Cem	ength fcet) 4 	P/E ENTING	nod tot Plac	From 3	то 21	•
(inches) 890 Depth	per foot 4 in Fcet	per in. P/E Sec Hole	Depth Top 2 tion 4. RECO	in Feut Botto 22 PRD OF M	UDDING A Cubic F	ength fcet) 4 	P/E ENTING	nod vit Plac	From 3	<u>To</u> 21	•
(inches) 890 Depth	per foot 4 in Fcet	per in. P/E Sec Hole	Depth Top 2 tion 4. RECO	in Feut Botto 22 PRD OF M	UDDING A Cubic F of Cem	ength fcet) 4 	P/E ENTING	nod ⁱ o [†] Plac	Some AD		•
(inches) 890 Depth	per foot 4 in Fcet	per in. P/E Sec Hole	Depth Top 2 tion 4. RECO Sac of M	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength feet) 4 ND CEM eet cat	P/E ENTING	nod ⁱ o [†] Plac	Some AD	<u>To</u> 21	•
(inches) <u>890</u> Depth From Plugging Contr	per foot 4 in Fcet	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength feet) 4 ND CEM eet cat	P/E ENTING	nod ⁱ o [†] Plac	From 3		•
(inches) <u>890</u> Depth From Plugging Contr Address	per foot 4 in Fcet To actor	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength feet) 4 ND CEM eet cat	P/E ENTING Meth	nod of Plac	From 3	To 21	
(inches) <u>890</u> Depth From Plugging Contr Address Plugging Metho Date Well Plug	per foot 4 in Fcet To actor pd	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength feet) 4 AND CE.M feet eet ent 6 CORD	P/E ENTING Meth	nod 'QP Plac	From 3		•
(inches) <u>890</u> Depth From Plugging Contr Address	per foot 4 in Fcet To actor pd	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength feet) 4 AND CEM feet eet ent a CORD	P/E ENTING Meth	nod of Plac	From 3	To 21	•
(inches) <u>890</u> Depth From Plugging Contr Address Plugging Metho Date Well Plug	per foot 4 in Fcet To actor pd	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength feet) 4 AND CE.M feet eet ent 6 CORD	P/E ENTING Meth	nod of Plac	From 3	To 21	
(inches) <u>890</u> Depth From Plugging Contr Address Plugging Metho Date Well Plug	per foot 4 in Fcet To actor pd	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M Secti	in Feet Botto 22 RD OF M ks fud	UDDING A Cubic F of Cem	ength fcet) 4 4 AND CEM cet cet cet cet cet cet cet cet cet cet	P/E ENTING Meth Depth i Top	nod of Plac	From 3	To 21	
(inches) <u>890</u> Depth From Plugging Contr Address Plugging Metho Date Well Plug	per foot 4 in Fcet To actor	per in. P/E Sec Hole Diameter	Depth Top 2 tion 4. RECO Sac of M Secti	in Feat Botto 22 DRD OF M iks fud	UDDING A Cubic F of Cem N/H	ength feet) 4 4 ND CEM feet eet ent 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	P/E ENTING Meth Depth i Top	nod vit Plac	Some AD Contraction of the second sec	To 21 21	

Use

17.26.1. Expi. Location No.

				WELL RE			FIELD	and the L
		• -			INFORMATION	п	*9	
A) Owner	of well <u>Navi</u> or Post Office Ad	ajo <u>Refin</u>	ing (o.			Owner	's Well No	
Street City ar	or Post Office Ad	esia, New	Mexico					
/ell was dril	led under Permit	No. RA-	6143 <u>-X-9</u>		and is located	d in the:		
						<u>175</u> Rang	<i>⊷ 26</i> ₹	NMP
•	-							
c. Lot	No division, recor fe e	of Block No. 1 in		of th	County.			
	£					System	-	7074
		_ leet, 1				System		Gra
B) Drillin	Contractor	& W Ente	rprises			License No	D-675	
	P.O. Box 43	7 An	tesia. Ne	w Mexico				
								ନପ୍ରୀ
						cable		•
levation of	land surface or _				ell is	ft. Total depth	of well2/	
ompleted v	ellis 🗆 sl	hallow 🗖	artesian.		Depth to wate	r upon completion	of well	
		Se	ction 2. PRI	NCIPAL WAT	ER-BEARING S	TRATA		
<u> </u>	h in Feet	Thicknes in Feet		Description o	f Water-Bearing	Formation	Estimated (gallons per	
From	<u>To</u>						Ganona het	
	·				N/A			
<u>.</u>								
			Secti	on 3. RECOR	D OF CASING			
Diameter	Pounds per foot	Threads per in.		n in Feet	Length (feet)	Type of Sho	e	orations
(inches)			Тор			0.0	From	То
	4	P/E	2	21	23	<u> </u>		20
				1			L	
		Sec	tion 4. RECO	ORD OF MUD	DING AND CEN	MENTING		
Dep From	th in Feet To	Hole Diameter			Cubic Feet of Cement	Metho	d of Placement	
	-	1	-			•		• •`
		<u> </u>				·		.
			_		N/A			-
	-	1	1		l			,
			Secti	ion 5. PLUGG	ING RECORD			
	ntractor							
	thod				No.	Depth in F		ubic Feet of Cement
Date Well Pl Plugging app					$\frac{1}{2}$			
		State Fr	igineer Repre	centative	3			
					4			
			EOD UC	F OF STATE	ENGINEER ON	LY		
Date Receiv	d i	. •	FOR US	•		FWL		•

. .

| | |

|

ļ

L

i !

1

.

ł

Depth	in Feet	Thickness	Color and Type of Material Encountered
From	То	in Feet	
0	21	21	Sand
		1	
<u></u>			
	· · ·		
		_	
		•	
	<u> </u>		
	·		
·			
		+	
			······································
			· · · · · · · · · · · · · · · · · · ·
			·

The undersigned here by certifies that, to the best of his knowledge and belief, the foregoing is a true and correspected of the above described hole. described hole.

12 'n, ص INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted + "he appropriate district office of the State Engineer. : :tions, except Section 5, shall be answered as completely and accura s possible when any well is drilled, repaired or deepen, ... When this form is used as a plugging record, only Section 1(a) and Section , need be completed.

15 JUL 11.

ź

				WELL REC	ORD		ricLy ;	ENGR. LO
					NFORMATION		# 12	
A) Owner of	well Nava	<u>io Refini</u>	ng (o.	••••••••••••••••••••••••••••••••••••••		Owne	ř's Well No	
n	Post Office Ac State	ideaca UNO	wer 159					
					and is located	in the:		
						<u>17</u> Rar	268	N.M.P.M.
	-	-						
c. Lot N Subdiv	o vision, recorde	of Block No. d in		of the	County.	· · · · ·		
d. X=	ž	_ feet, Y=		feet, N	.M. Coordinate	System	•	ž Zone in
								E Grant.
						License No	•	
ddress P.O.	Box 437	A	<u>tesia, Ne</u>	m Mexico				
rilling Began .	6-22-7	7 Cor	npleted	22-77	_ Type tools	cable	Size of hole	. <u>890</u> in.
levation of lar	nd surface or				11 is	ft. Total depth	of well	ft.
ompleted well	lis 🗖 si	hallow 🗖	artesian.		Depth to water	upon completion	of well0	ft.
					R-BEARING ST			
Depth	in Feet	Thickne	55		Water-Bearing F		Estimate	
From	To	in Feet					(gallons pe	r minute)
	· · · · · · · · · · · · · · · · · · ·	<u> </u>				<u></u>		
		 		N/	'A			
	·	<u> </u>						
			Sectio	on 3. RECORD	OF CASING			
Diameter (inches)	Pounds per foot	Threads per in.	Depth Top	in Feet Bottom	Length (feet)	Type of Sho	e Perf	forations To
002	4	PIE		19	21	P/E	3	18
<u>89</u> D .	4		2	19	21	·//		+
<u></u>				<u> </u>	<u> </u>			
<u> </u>	<u> </u>	I		<u> </u>	l	L	<u>l</u>	
Druth	in Feet	Sec Hole	tion 4. RECO		UNG AND CEM			
From	То	Diameter			f Cement	Metho	d of Placement	
							4	
	Ę			N	IA		-	
	á							
	····· [*]	L		1	I I			J
				on 5. PLUGGIN	IG RECORD			
	actor					Depth in	Feet	Cubic Feet
lugging Metho ate Well Plug	od be				No.	Тор		of Cement
lugging appro	-							
		State Er	ngineer Repres	sentative	<u>3</u>			
		<u></u>	FOR USE	OF STATE EI	NGINEER ONL	Y		
ate Received	` .:	•				FWL		· ·
				Cure A		FWI		1

I I

i

:

i

1

- -

.

į.

ļ

: . .

Depth		Thickness		Color and Type of Mater	rial Encountered	
From	To	in Feet				
0	19	19	Sand			·
						<u></u>
		, ,				
<u> </u>						
		1				
	<u>i</u> _			······································		<u></u>
	r			<u></u>		
						<u> </u>
			······································		<u>,</u>	
	.					
			····•••			
				· · · · · · · · · · · · · · · · · · ·		
				<u> </u>		
			·····			
	<u> </u>					·····
			_			
						· · · · · · · · · · · · · · · · · · ·
				·····		
			-			
	•.	Section	7. REMARKS AND A	DDITIONAL INFOR		
				¥		
				5	AUG	
					ENO	
				WE.	61K	
				ŗ	AH	
				:	FFI 3	•
	<u>,</u> .				.m	••
						• 1
		-	e increase National			
		a ga ta ta	Carport			
				e and belief, the foregoing	is a true and correc	t record of the sh

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted the appropriate district office of the State Engineer. drilled, repaired or deepe. When this form is used as a plugging record, only Section 1(a) and Section 3 need be completed.

l

Dritter'

l

2	1	a Martin Same	<u>) (146</u> % em	C.	in and a company	and the second s	يتعليك والإخراج ال مناه ^ر من والا			
						,	• •	¥.	•	Revised June 197
•			\sim	STAT	E ENGI	NEER OFFICI	E		FIFIF) ENGA. LC
				١	VELL P	RECORD			بالمناجة عر م 1927 -	i
				Section 1.	GENER	al informa	TION			
	(A) Owner of	well	DEAVAN	REFININ Box 15	<u>g Com</u>	PANY		Owner	's Well No	16
		Post Office Ad				xico 88	210			i
	Well was drilled	under Permit	No	6775-E	<u>.</u>	and is lo	ocated	in the:		
	aSlil_,	. ¼ <u>SE</u> ¼	_NE ¼N	네 ¼ of Sec	tion	12 Towns	hip	<u>175</u> Ran	ge <u>26</u>	<u> </u>
	b. Tract N		of Map No		c	of the				
	c. Lot No)	of Block No			of the				·
			1 in					•		
			_ feet, Y=			et, N.M. Coord	inate	System		Zone ii Grant
	(B) Drilling C	ontractor	Clyd	e Tidwel	1			License No	WD-406	
			••					88210		
								Cable		nole8 ir
								ft. Total depth		
1991 6 1		(T T)	hallow 🗆 ar					upon completion		
	Completed well	دد تيمب 12.				ATER-BEARI			01 wen	
	Depth i	n Feet	Thickness			on of Water-Bea		·····		ated Yield
	From	<u> </u>	in Feet		-			-		per minute)
	10	25	15		d San				NA	<u> </u>
	28	35	<u> </u>	GI	ay Sa	nd			NA	·····
				-						
	L									
	Diameter	Pounds	Threads		n 3. REC in Feet	ORD OF CAS				Perforations
× • •	(inches) /	per føot	per in.	Тор	Botto			Type of Sho	e Fr	om To
	8 5/8	28		0	60	60	<u> </u>	Texas Patte	rn	NA
					·					
		in Fast	· · · · · · · · · · · · · · · · · · ·			UDDING ANI		IENTING		· · ·
	From	in Feet To	Hole Diameter	Sack of Mu		Cubic Feet of Cement		Metho	d of Placen	ient
			<u> </u>	Ļ		Ĩ	<u></u>	Chewirth?	1.2.5.	
					·				<u></u>	
		l						MAR OB TS	لمطاير	·····
				Sectio	n 5. PLU	GGING RECO		CONSERVATION SANTA F	E EIVISICH	
	Plugging Contra	actor								
	Address Plugging Metho					I	No.	Depth in Top	Feet Bottom	Cubic Feet of Cement
	Date Well Plug Plugging appro					 [1 2			
	I IGEEIIE BPP. 0		State Eng	ineer Repres	- entative	[3 4		· · · · ·	
						TE ENGINEE				1
	Date Received									FSI
. S		RA-677	5-E			Observatio	.n	FWL		100/
						opsel vacio		്ലംഗുംബം പെയാണ് 1.11,1110	2 768	

i

!

-

. . .

A state of the sta

•

ļ

•

Alter Alle - Marke

Same turned

.

and the second s

Manual States and a sub-

ある ちょうしょう

A Start

10

2.5

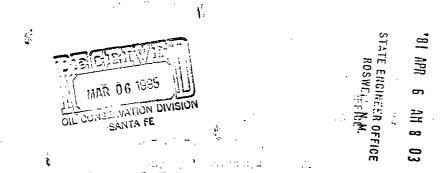
୍ଷ

いる。「「「「「「「「」」」



Depth in	n Feet	Thickness	Section 6. LOG OF HOLE
From	То	in Feet	Color and Type of Material Encountered
0	25	25 _	Fine red sand
25	28	3	Blue-gray clay
28	35	7	Fine gray sand
35	46	11	Coarse gravel
46	60	14	med to fine gravelly sand
			· · · · · · · · · · · · · · · · · · ·
			·
·			·
	•		
	•		·
	<u>،</u>		
			· ·
;			
			· · ·
	· · · · · ·		
			-
·			
	•		
	<u> </u>		·····

Section 7. REMARKS AND ADDITIONAL INFORMATION



The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Ç lyde D Í Driller

INSTRUCTIONS: This for "ould be executed in triplicate, preferably typewritten, and submitted tr of the State Engineer. Al. ons, or t Section 5, shall be answered as complete ad accurate drilled, repaired or deepened. When the im is used as a plugging record, only Section 1, and Section

appropriate district office possible when any well is need be completed.

Revised June 1972

THEN ENGR. LOG

. .

STATE ENGINEER OFFICE WELL RECORD

			Section 1.	GENER	AL INFO	RMATIC	NC			
(A) Owner of	well	NAVAJO	REFININ	G COMP	PANY			er's Well	No. 17	
Street or I	Post Office Ad	dress	BOX	159						
City and S	State	Arte	<u>esia, Ne</u>	J l'lex:		882	10			
Well was drilled	under Permit !	No. <u> </u>	5776-E		and	d is locat	ed in the:			
							<u>17 S</u> Ra	-		N.M.P.M.
b. Tract N	No	_ of Map No.		· '	of the					
	ision, recorded									
		. feet, Y=			et, N.M. C		te System			Grant.
(B) Drilling C	ontractor	Clyde '	Tidwell_	- 			License No	<u>WO-4</u> (
Address	80	x 17, Rou	itel, A	rtesia	<mark>ь New</mark>	Mexic	<u>n 88210</u>			
Drilling Began _	3/29/81	Сотр	leted	29/81	Ту	pe tools	Cable	Siz	ze of hole	<u>8</u> in.
Elevation of lan	d surface X r	<u></u>		i	at well is_	3305	5 ft. Total dept	h of well	I3[1 ft.
Completed well	is 🗔 sh	allow 🗋 at	rtesian.		Dep	th to wa	ter upon completio	n of wel	110_	ft.
		Sect	ion 2. PRINC	CIPAL W	ATER-BE	ARING	STRATA			
Depth i	n Feet To	Thickness in Feet	D	escriptic	n of Wate	r-Bearing	g Formation		Estimated Y allons per m	
From 10	28	18	R	ed sar	nd		- <u></u>	1	NA	
							<u></u>	+		
							<u></u>			
							- <u></u>	- <u> </u>		
<u> </u>			Section	3 REC	ORD OF	CASING				
Diameter	Pounds	Threads	Depth i			Length			Perfor	ations
(inches)	per foot	per in.	Тор	Botto	om	(feet)	Type of Sh		From	To
8 5/8"	28		0	30		30	Texas Pat	tern	NA	
		Sectio	on 4. RECOF	D OF M	UDDING	AND CE	EMENTING			
Depth i From	n Feet To	Hole Diameter	Sack of Mu		Cubic of Cer		Meth	od of P	lacement 🔒	
1 Yom									-	
	÷									
	چ									
			,							
				n 5. PLU	GGING R	ECORD				
Plugging Contra Address	ictor					-	Depth ir	Feet		bic Feet
Plugging Metho						No.	Тор	Botto		Cement
Date Well Plugg						- –		<u> </u>		

Date Received April 6, 1981

RA-6776-E

File No.

FOR USE OF STATE ENGINEER ONLY

State Engineer Representative

Quad ___ ___FWL ___ Use Observation Location No. 175.268.12.1243

_ FSL_

÷.,

Depth	in Feet	Thickness	Color and Type of Material Encountered
From	То	in Feet	
٥	28	28	Fine red sand
28	30	2	Red clay
		++	
		++	
	*	E E	
			· ·
			- -
		<u> </u>	· · · · · · · · · · · · · · · · · · ·
			·
		+	· · · ·
		++-	
		+	
	· · · · ·		
	<u> </u>		
		+	





The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

. . .

<u>...</u>

Elype J Z.d. Driller

INSTRUCTIONS: This for of the State Engineer. A.

of the State Engineer. A. ions, except Section 5, shall be answered as completely and accurat is possible when any well is drilled renaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section is de be completed.

. . ..

			STATE EN	GINFFP	OFFICE			Revised June 19 Š
				L RECO			FIFID	
			Section 1. GEN					ENGR. LO
1) O	well	NAVAJO RE	FINING COM			0	er'e Wall No-	18
Street or	Post Office Ad	dressE	lox 159			Own		
City and S	State	Art	esia, N M	882	10			
ell was drilled	under Permit	No. RA E	969		and is located i	n the: Obs	ervation,	/Monitor w
a. <u>Nu</u>	_ ¼ <u>_SW</u> ¼	<u></u>	¼ of Section	9	_ Township _17	<u>'S</u> Ra	ange <u>26 E</u>	N.M.P
b. Tract 1	No	of Map No		_ of the _				
	-							
								- -
				feet, N.M	I. Coordinate S	ystem		-
							·····	Gra
B) Drilling C	ontractor	Hughes Or	illing Com	pany		License No	WD 749	
ddress		Box 199A,	Route 1,	Artesi	a, NM 88	210		· · · · · · · · · · · · · · · · · · ·
rilling Began	6/8/82	Comple	eted6/8/8	2	Type tools Air	rotary	Size of	hole 7- 7/8
levation of lan	id surface or _	casing						
ompleted well	is 🔀 sl	nallow 🗖 art	esian.	D	epth to water u	pon completic	n of well	10
		Sectio	on 2. PRINCIPAI	WATER	BEARING STR	RATA		-
Depth i		Thickness in Feet	Descrit	ption of W	ater-Bearing Fo	rmation		nated Yield s per minute)
From 16	<u> </u>	in Feet			ic sand ar			NA
	17	ļ	1208 00					
							+	<u> </u>
			<u> </u>		.	<u> </u>		
		1	Section 3. R	· · · · · ·				.
Diameter (inches)	Pounds per foot	Threads per in.	Depth in Fee	ottom	Length (feet)	Type of St	ice Fr	Perforations om To
6	PVC		100 2		20			15 19
	PV6							
						•		
·	<u></u>	Section	n 4. RECORD O	FMUDDI	NG AND CEME	NTING		
Depth		Hole	Sacks	Cut	Dic Feet	·	od of Placen	nent
From	То	Diameter	of Mud	_	Cement			
0	12 🐔				3	hand		÷
	, á							
	L	<u>†</u> †						
		Ll		1				
			Section 5. F	LUGGING	G RECORD			
lugging Contra	actor							<u></u>
ddress	od				No	Depth i	n Feet Bottom	Cubic Feet of Cement
ate Well Plugg	ged					Тор	BUILOM	or cement
lugging approv	ved by:			• ••	2			
		State Engin	eer Representati	ve	4			· · ·
			FOR USE OF S	TATE EN	GINEER ONLY			
Date Received	June 22,	1982						
	•			-				_ FSL
File No.	RA-6969	•.	Us	0bs.//	Monitoring	ocation No	17.26.9.1	3111

Depth i		Thickness	Color and Type of Material Encountered
From	То	in Feet	
D	2	2	Red soil
2	8	6	gyp (weathered anhy) with red shale
8	14	6	gyp white and anhydritic sand
19	19	5	Fine red shale and anhyritic sand - water @ 16'
		·	······································
		+	
	- <u></u>		

Section 7. REMARKS AND ADDITIONAL INFORMATION

observation/monitoring well

ł

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Hughes hale

20" 1.1 co L 11 102

51.57 . J.,

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All ons, except Section 5, shall be answered as completely and accurate consider when any well is drilled, repaired or deepend on this form is used as a plugging record, only Section 1(a) and Section considered be completed

								Revised	June 1
				EENGINEER					
			w	ELL RECO	DRD		E IELD E	ENGR	. 10
			Section 1. C	GENERAL IN	FORMATION				- 20
(A) Owner of	f well	DEAVAN	REFINING D	COMPANY	-		er's Well No	19	
Street or City and	Post Office Ad State	dressAr	Box 1 tesia, N	M 88:	210	······································			
-						in the: Observ	ation/Mc	nitor	
a. <u>NE</u>	_%SE %	<u>NE %</u>	¼ of Secti	on <u>8</u>	Township	L75 Ra	nge <u>26 E</u>		_N.M.
b. Tract	No	of Map No		of the					
c. Lot N	o	of Block No		of the					
Subdi	vision, recorded	1 in		Co	ounty.			-	
		_ feet, Y=		feet, N.I	M. Coordinate S	System		2	_ Zor Gi
		Hugh	es Drillin	ng Compar	тy	License No	WD 749	<u>.</u>	0
			1, Box 199						
						ir Rotary			7/0
			-						
Elevation of lar	nd surface or	<u> </u>	ng	at well	is_3367	_ ft. Total depth	of well	19	
Completed wel	lis ⊡XI sh	nallow 🗆 a	artesian.	I	Depth to water	upon completior	of well	10	
		Sec	tion 2. PRINCI	PAL WATER	-BEARING ST	RATA			
	in Feet	Thickness in Feet	De	scription of W	Vater-Bearing F	ormation		ated Yi per mi	
From 15	18 18	3		-	tic sand a		NA	Per III	
							····		
				·					
							•		
	L	<u> </u>		3. RECORD (_		
Diameter	Pounds	Threads	Depth in		Length	Turne of Cha		Perforat	ions
(inches)	per foot	perin.	Тор	Bottom	(feet)	Type of Sho	Fre	om	То
6	PVC				20			15	19
									•
I	l	ـــــــــــــــــــــــــــــــــــــ	ion 4. RECORD	יממו א ס			!	I	
Depth	in Feet	Hole	Sacks	Cu	bic Feet		od of Placem	ent "	
From	То	Diameter	of Mud	of	Cement			*	<u> </u>
0	12 🛒				3	hand		÷	<u></u>
L	1	L	.1	I	<u>l</u>		••••••		
				5. PLUGGIN	G RECORD				
Plugging Contr Address	actor					Depth in	Feet	Cub	ic Fee
Plugging Metho	bc				No.	Тор	Bottom		emen
Date Well Plugg Plugging approv					<u> </u>	· · · · ·			
		State Eng	incer Represent	tative	3				
		5.2.0 2.18	,		4			<u> </u>	,
Date Received	June 22	1982	FOR USE O	F STATE EN	GINEER ONL	Y			
Date Received	oune 22,	1302		Quad .		FWL _		FSL_	
File No	RA-6970			Use Monit	oring	Location No.	7.26.8.24	234	
FHC INO.				V3C		LUCATION NO.			

1

Depth		Thickness	Color and Type of Material Encountered	8
From	То	in Feet		8
0	3 1	31/2	gravel	
	6	2 1	brown soil	
	9	3	дур	
	18	9	gray clay & gyp	
	19	1	Red clay	•
				<u>a</u>
	<u></u>			
	<u> </u>			<u> </u>
·				<u> </u>
				••
				······
·				
÷ •				
				<u>,</u>

Section 7. REMARKS AND ADDITIONAL INFORMATION

State 1 and 2 and 2 and 22 B of All 32

observation/monitor well

The undersigned here by certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Le Ay chos Defiler

|

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All one, except Section 5, shall be answered as completely and accurate possible when any well is drilled, repaired or deepen in this form is used as a plugging record, only Section 1(a) and Section and Section are the completed.

Revised June 1972 Ŀ. STATE ENGINEER OFFICE WELL RECORD **FIELD ENGR. LOG** Section 1. GENERAL INFORMATION Owner of well ______ NAVAJD REFINING COMPANY ___ Owner's Well No. ____ 20 -___ Box 159 Street or Post Office Address _____ Artesia, New Mexico 88210 City and State _____ Well was drilled under Permit No._____ RA 6972 and is located in the: observation/monitor C.U a. _____ Xu__ X ____ Xu__ Xu__ Xu__ Y of Section _____ Township ____ 17 S___ Range ___26 E_____ N.M.P.M. _____ of the ____ b. Tract No.___ ____ of Map No. ____ T____oLBlock No. ______ of the___ c. Lot No._____ = Subdivision, recorded in _____ County. Zone in Grant. _____ feet, N.M. Coordinate System ____ d. X= _____ feet, Y=____ the _ (B) Drilling Contractor Hughes Drilling Company License No. WD 749 Route 1, Box 199A, Artesia, N.M. 88210 Address -Drilling Began ______ 6/9/82 _____ Completed ______ 6/9/82 _____ Type tools Air ratury _____ Size of hole 7 7/8 in. Elevation of land surface or <u>Casing</u> at well is <u>3366</u> ft. Total depth of well <u>20</u> ft. 🕱 shallow 🗖 artesian. Depth to water upon completion of well _____11___ ____ ft. Completed well is Section 2. PRINCIPAL WATER-BEARING STRATA Depth in Feet Thickness Estimated Yield Description of Water-Bearing Formation in Feet (gallons per minute) Τо From 18 3 15 fine red & gray anhydritic send Section 3. RECORD OF CASING Depth in Feet Perforations Pounds Threads Length Diameter Type of Shoe per foot per in, (inches) Тор Bottom (feet) From Тο PVC 16 20 6 20 Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet Method of Placement Diameter of Mud of Cement From To 12 🕴 3 hand 0 â Section 5. PLUGGING RECORD Plugging Contractor _ Address Depth in Feet Cubic Feet No. Plugging Method . Bottom of Cement Top Date Well Plugged 1 Plugging approved by: 2 3 State Engineer Representative 4 FOR USE OF STATE ENGINEER ONLY Date Received June 22, 1982 Quad _ ___ FWL ____ _ FSL_

Monitoring

Use

RA-6972

File No..

Location No. ______17.26.9.13313

			Section 6. LOG OF HOLE
	in Feet To	Thickness in Feet	Color and Type of Material Encountered
From		ł	
0	3	3	soil
	5	2	tan gyp - oil soaked
	10	5	gray anhydritic sand and shale
	15	5	50/50 gray & red anhydritic sand
	20	5	fine red shaley anhydritic sand
<u></u>			
<u> </u>	<u> </u>		
<u></u>			
		·	•
<u> </u>			
			· · · · · · · · · · · · · · · · · · ·

Section 7. REMARKS AND ADDITIONAL INFORMATION

observation/monitor well



The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Zu <u>Al:</u> Deller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All environs, except Section 5, shall be answered as completely and accurate ossible when any well is drilled, repaired or deepend on this form is used as a plugging record, only Section 1(a) and Section of the completed.

Revised June 1972

-

STATE ENGINEER OFFICE WELL RECORD

(A) Owner of	well	NAVA			L INFORMATIO ANY	Owner	EIELD	
Street or	Post Office Ad State	dress	80	<u>x 159</u>				
Well was drilled	under Permit		<u>RA 6971</u>	·······	and is locate	d in the: Observ	vation/mo	onitor
aNE	_ ¼ _ <u>Nid</u> ¼	<u></u> %	¼ of S	ection9	Township .	<u>17 S</u> Ran	ge 26 8	EN
b. Tract l	No	of Map No	o.:	of t	the			
c. Lot No	* 0 *	of Block No.		of (the			
	ision, recorded							_
		_ feet, Y=		feet,	N.M. Coordinate	System		
(B) Drilling C	ontractor	Hu	ghes Dri	lling Cor	прапу	License No	UD7	749
Address		Route	1, Box	199A, A	rtesia, N (1 88210		
Drilling Began .	6/11/1	В2 Сол	npleted	6/11/82	Type tools I	ir rotary	Size of h	ole _7 _
Elevation of lar	d surface or _	casin	g	at v	well is 3362	ft. Total depth	of well	33
Completed well	is 🛛 St	hallow 🗆	artesian.		Depth to wate	er upon completion	of well7	1
		Se	ection 2. PRI	NCIPAL WAT	FER-BEARING S	TRATA	·····	
Depth i From	n Feet To	Thicknes in Feet		Description of	of Water-Bearing	Formation	Estima (gallons)	ited Yield per minu
16	20	4	f	ine gray	anhydritid	sand & shal	le	NA
-0								
								•
								•
					D OF CASING			
	Pounds per foot	Threads per in.		on 3. RECOR h in Feet Bottom	Length	Type of Show		erforatio
Diameter	-		Deptl	h in Feet	Length	Type of Show	e P	erforation m
Diameter (inches)	per foot		Deptl	h in Feet	Length (feet)	Type of Show	e P Fror	erforation m
Diameter (inches)	per foot		Deptl	h in Feet	Length (feet)	Type of Show	e P Fror	erforation m
Diameter (inches) 6	per foot PVC	per in.	Dept Top tion 4. RECC	h in Feet Bottom	Length (feet) 33 DDING AND CE		e P Fror	erforation m
Diameter (inches)	per foot PVC	per in.	Dept) Top tion 4. RECC	h in Feet Bottom	Length (feet) 33	MENTING	e P Fror	erforation m }
Diameter (inches) 6 Depth	per foot PVC	per in.	Dept) Top tion 4. RECC	h in Feet Bottom DRD OF MUI	Length (feet) 33 DDING AND CE Cubic Feet	MENTING	e P From 29	erforation m
Diameter (inches) 6 Depth From	per foot PVC in Feet To	per in.	Dept) Top tion 4. RECC	h in Feet Bottom DRD OF MUI	DDING AND CE Cubic Feet of Cement	MENTING Metho	e P From 29 d of Placeme	erforation m
Diameter (inches) 6 Depth From 0	per foot PVC in Feet To 12	per in.	Dept) Top tion 4. RECC	h in Feet Bottom DRD OF MUI	DDING AND CE Cubic Feet of Cement	MENTING Metho hand	e P From 29 d of Placeme	erforation m
Diameter (inches) 6 Depth From 0	per foot PVC in Feet To 12	per in.	Depth Top tion 4. RECC Sa of 1	h in Feet Bottom DRD OF MUI Cks Mud	DDING AND CE Cubic Feet of Cement 3	MENTING Metho hand	e P From 29 d of Placeme	erforation m
Diameter (inches) 6 5 0 12 Plugging Contra	per foot PVC in Feet To 12 33	per in. Sec Hole Diameter	Depth Top tion 4. RECC Sa of t	h in Feet Bottom Bottom DRD OF MUE Cks Mud ion 5. PLUGC	Length (feet) 33 DDING AND CE Cubic Feet of Cement 3	MENTING Metho hand gravel pa	e P From 29 d of Placeme	erforatio m
Diameter (inches) 6 	per foot PVC In Feet To 12 33 ctor d	per in. Sec Hole Diameter	Depth Top tion 4. RECC Sa of 1	h in Feet Bottom Bottom DRD OF MUI Cks Mud ion 5. PLUGC	Length (feet) 33 DDING AND CE Cubic Feet of Cement 3	MENTING Metho hand	e P From 29 d of Placeme	erforation m) int
Diameter (inches) 6 Depth From 0 12	per foot PVC In Feet To 12 33 Sector deed_	per in. Sec Hole Diameter	Depth Top tion 4. RECC Sa of 1	h in Feet Bottom Bottom DRD OF MUI Cks Mud ion 5. PLUGC	Length (feet) 33 DDING AND CE Cubic Feet of Cement 3 CING RECORD , No. 1 2	MENTING Metho hand gravel pa	e P From 29 d of Placeme	erforation m
Diameter (inches) 6 0 12 Plugging Contra Address Plugging Metho Pate Well Plugg	per foot PVC In Feet To 12 33 Sector deed_	per in. Sec Hole Diameter	Depth Top tion 4. RECC Sa of 1	h in Feet Bottom Bottom DRD OF MUI Cks Mud ion 5. PLUGC	Length (feet) 33 DDING AND CE Cubic Feet of Cement 3 GING RECORD	MENTING Metho hand gravel pa	e P From 29 d of Placeme ack	erforation m) int

÷ 4

			Section 6. LOG OF HOLE
Depth From	in Feet	Thickness in Feet	Color and Type of Material Encountered
0	5	5	oil soaked sand
	10	5	fine anhydritic sand & clay
	15	5	fine anhydritic sand & clay
	20	5	fine gray anhy sd, clay, & gravel
	25	5	coarse gravel and gray clay cement
	30	5	gyp & red clay or shale
	33	3	very shaley gyp.
. <u> </u>		ŀ	
	-		
	_		
•			
			- 3

ł

Section 7. REMARKS AND ADDITIONAL INFORMATION

observation/monitor well

The undersigned here by certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole. $\bigcap I$

Dale Hugher Driver

ļ

1

Revised	June	1972	
---------	------	------	--

STATE ENGINEER OFFICE WELL RECORD

1				1	WELL RECO	ORD		FIFI	.D. EN	GR
				Section 1.	GENERAL IN	FORMATION		, 1 _1 ~ ~ ~		un.
	0	11	NAVAJO R	EFINING C			0	nor'r Well No	22	,
(A)	Street or 1	Post Office Ad	ddress	<u>Drawer</u>	159		0*	ner s weil No	·	
	City and S	State		<u>Artesia</u> ,	<u>NM</u> 8	8210				
We	ll was drilled	under Permit	NoRA	6975		and is located	in the:			
	aNE	_ ¼ <u>NE</u> ;	4 <u>NU ¼</u>	Sul_ ¼ of Sec	tion	Township	175 F	Range26E		_N.N
	b. Tract 1	No	of Map No	0	of the			<u></u>		
		-								
	Subdiv	ision, recorde	d in		C	ounty.			-	
						M. Coordinate S	System			
						,				(
B)) Drilling C	ontractor	S. Dale	Hughes	. <u></u> <u></u>	<u></u>	License No	WD 749)	
Ad	dress	Rout	e 1, Box	199 A, A	<u>rtesia, N</u>	<u>M 88210</u>				
Dr	illing Began	June 1	14. 182 on	nnleted Ju	ne 14. '8	2Type tools	Air Rota	CV Size of	fhole 7	· 7/
Ele	evation of lan	id surface or _			at well	l is3359	_ ft. Total dep	th of well		
Co	mpleted well	is 🗷 s	hallow 🗖	artesian. M	onitor	Depth to water	upon completi	on of well	5	
			م م	ction 7 PRIN	10 AT WATER	R-BEARING ST	₽ ለ T ለ			
	Depth i	in Feet	Thicknes	ss	- <u>,</u>			Esti	mated Y	'ield
	From	To	in Feet	r	Description of V	Water-Bearing F	ormation		ns per m	
	16	18	2	дур	sand				a	
				1						
		<u></u>			<u></u>		<u> </u>			
-		. <u>.</u>			I H H H H H		<u> </u>			<u> </u>
					2 BECORD	OF CASING				
	Diameter	Pounds	Threads		n 3. RECORD in Feet				Perfor	ation
	Diameter (inches)	Pounds per foot	Threads per in.		n 3. RECORD in Feet Bottom	OF CASING Length (feet)	Type of S	F	rom	
				Depth	in Feet	Length	Type of S	F		Ţ
	(inches)			Depth	in Feet	Length (feet)	Type of S	F	rom	Ţ
	(inches)			Depth	in Feet	Length (feet)	Type of S	F	rom	Ţ
	(inches)			Depth	in Feet	Length (feet)	Type of S	F	rom	ations T 20
	(inches)		per in.	Depth Top	in Feet Bottom	Length (feet)		F	rom	Ţ
	(inches) 6 Depth	per foot	per in.	Depth Top tion 4. RECOR	In Feet Bottom RD OF MUDD	Length (feet) 20 ING AND CEM	ENTING	F	6	Ţ
	(inches) 6 Depth From	per foot in Feet To	per in.	Depth Top tion 4. RECOR	In Feet Bottom RD OF MUDD	Length (feet) 20 ING AND CEM bic Feet Cement	ENTING Me		6	ĩ
	(inches) 6 Depth	per foot in Feet To 4	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOR	In Feet Bottom RD OF MUDD	Length (feet) 20 ING AND CEM	ENTING		6	ĩ
	(inches) 6 Depth From	per foot in Feet To 4 i	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOR	In Feet Bottom RD OF MUDD	Length (feet) 20 ING AND CEM bic Feet Cement	ENTING Me		6	ĩ
	(inches) 6 Depth From	per foot in Feet To 4	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOR	In Feet Bottom RD OF MUDD	Length (feet) 20 ING AND CEM bic Feet Cement	ENTING Me		6	ĩ
	(inches) 6 Depth From	per foot in Feet To 4	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOR	In Feet Bottom RD OF MUDD	Length (feet) 20 ING AND CEM bic Feet Cement	ENTING Me		6	Ţ
	(inches) 6 Depth From	per foot in Feet To 4	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOF Sack of Mu	In Feet Bottom RD OF MUDD	Length (feet) 20 NG AND CEM bic Feet Cement 3	ENTING Me		6	Ţ
	(inches) 6 Depth From 0	per foot	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOF Sack of Mu Sectio	n S. PLUGGIN	Length (feet) 20 NG AND CEM bic Feet Cement 3	ENTING Me		6	ĩ
Ad	(inches) 6 Depth From 0	per foot	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOF Sack of Mu Sectio	n S. PLUGGIN	Length (feet) 20 NG AND CEM bic Feet Cement 3	ENTING Me hand Depth	in Feet	ment -	1 20
Ad Plu	(inches) 6 Depth From 0	in Feet To 4 sactor	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOF Sack of Mu Sectio	n S. PLUGGIN	Length (feet) 20 ING AND CEM Ibic Feet Cement 3 G RECORD	ENTING Me hand	thod of Place	ment -	1 20
Ad Plu Da	(inches) 6 Depth From 0	in Feet To 4 sector	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOF Sack of Mu Sectio	n S. PLUGGIN	Length (feet) 20 NG AND CEM bic Feet Cement 3 G RECORD	ENTING Me hand Depth	in Feet	ment -	Ţ
Ad Plu Da	(inches) 6 Depth From 0 Uugging Contra Idress Jugging Metho ate Well Plugg	in Feet To 4 sector	per in. Sec Hole Diameter 8	Depth Top tion 4. RECOF Sack of Mu Sectio	In Feet Bottom RD OF MUDDI Is CL ad of n 5. PLUGGIN	Length (feet) 20 NG AND CEM bic Feet Cement 3 G RECORD	ENTING Me hand Depth	in Feet	ment -	20

File No. RA-6975

Use _____Observation _____ Location No.____

17.26.9.31222 .

Depth in Feet From To		Thickness in Feet	Color and Type of Material Encountered
0	4	4	fill
<u> </u>		+	
	5	1	oil soaked sand
	10	5	gyp and clay
	16	6	gyp and clay
	18	2	anhydritic sand, gravel
	19	1	gyp and clay
		ļ	
. <u> </u>		ļ	
			۰ ــــــــــــــــــــــــــــــــــــ
		<u> </u>	
		ļ	
		<u> </u>	
			······································
		<u> </u>	
		<u> </u>	
<u>. </u>			
		<u> </u>	
		ļ	·
·			·
		ļļ.	
		· · · · · · · · · · · · · · · · · · ·	·
		,	۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰ ۰
		Section 7.	REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Huck Driller

20° HA CS 🖯

ċ

55

!

INSTRUCTIONS: This for "hould be executed in triplicate, preferably typewritten, and submitted trong appropriate district office of the State Engineer. Al ions, except Section 5, shall be answered as completely and accurate possible when any well is drilled, repaired or deepeneu when this form is used as a plugging record, only Section 1(a) and Section 2 need be completed.

Revised June 1972

EIELD ENGR. LOG

STATE ENGINEER OFFICE WELL RECORD

			FINING COM		ORMATION	Owner	r's Well No	23	
Street or City and	Post Office Ad State	dress Ar	<u>Drawer</u> tesia, N M	<u> 159 </u>					
-			6975 X			n the:			
			L ¼ of Section				ige <u>26</u>	E	N.M.P.
b. Tract	No	_ of Map No.		of the					
	_								
Subdi	vision, recorded	in		Cou	inty.			ž	
d. X=		. feet, Y=		feet, N.M.	. Coordinate S	ystem		<u>ع</u> م	Zone i
			Hughes						
			<u>199 A. Ar</u>						
rilling Began	6/28/82	Comp	leted <u>6/28/</u>	<u>′82</u> 1	Type tools <u>A</u>	<u>ir Rotary</u>	Size of	f hole_7	<u>7/8</u> i
levation of la	nd surface or			at well is	<u>s3363</u>	ft. Total depth	of well	2	f
ompleted wel	llis 🗖 🖬 sh	allow 🗆 a	tesian. Monit	or De	epth to water i	pon completion	of well	9	f
		Sect	ion 2. PRINCIPA	L WATER-H	BEARING STI	RATA			
Depth From	in Feet To	Thickness in Feet	Descr	iption of Wa	iter-Bearing Fo	mation		mated Y ns per m	
15	17	2	Anhyri	tic san	ic sand				
									,
							L		
Diameter	Pounds	Threads	Depth in Fe	RECORD OI	Length			Perfor	ations
(inches)	per foot	per in.	Top B	Bottom	(feet)	Type of Sho	F	Tom	То
					20			15	20
6	PVC			1					
6	PVC								
6	PVC								
6		Sectio	on 4. RECORD C	F MUDDIN	G AND CEME	NTING			
Depth	PVC	Section Hole Diameter	on 4. RECORD C Sacks of Mud	Cubi	G AND CEME		od of Place	ment 🗸	
	in Feet	Hole	Sacks	Cubi of C	ic Feet		od of Place	ment	
Dep th From	in Feet To 7	Hole Diameter	Sacks	Cubi of C	ic Feet Cement	Metho	od of Place	ment -	
Dep th From	in Feet To 7 ±	Hole Diameter	Sacks	Cubi of C	ic Feet Cement	Metho	od of Place	ment 🚽	
Depth From	in Feet To 7	Hole Diameter	Sacks	Cubi of C	ic Feet Cement	Metho	od of Place	ment	
Depth From D	in Feet To 7 :	Hole Diameter 8	Sacks of Mud Section 5.	Cubi of C	ic Feet Cement 3	Metho	od of Placer	ment	
Depth From D	in Feet To 7 : 	Hole Diameter 8	Sacks of Mud Section 5.	Cubi of C	RECORD	Metho Hand Depth in			bic Feet
Depth From D	in Feet To 7 : 	Hole Diameter 8	Sacks of Mud Section 5.	Cubi of C	ic Feet Cement 3	Metho Hand			bic Feet Cement
Depth From D	in Feet To 7 ± • • • • • • • •	Hole Diameter 8	Sacks of Mud Section 5.	PLUGGING	RECORD	Metho Hand Depth in	Feet		

File No. RA-6975 x

Use Observation Location No. 17.26.9.31122

· · · ·			Section 6. LOG OF HOLE
Depth From	in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	5	5	gyp with anhydrite crystals
	10	5	19 W 19 B
	12	2	gyp and granular anhydrite
	15	3	anhydritic sand and clay
	17	2	n n n
	20	3	anhy sand with limestone gravel
	· ·		·
<u></u>			
<u></u>			
·			
			······································
i,,			
			· · · · · · · · · · · · · · · · · · ·
<u> </u>			, , , <u>, , , , , , , , , , , , , , , , </u>
		Section 7	C
			7

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Dale <u>Hughes</u> Driller

INSTRUCTIONS: This for should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. A tions, except Section 5, shall be answered as completely and accurat possible when any well is , drilled, repaired or deepene. When this form is used as a plugging record, only Section 1(a) and Section need be completed.

;

STATE ENGINEER OFFICE

Revised 2	lune 19	72
÷		
EIELD EN	IGR.	LOG

/

Į.

					INFORMATIC				
(A) Owner o	f well	DLAVAN	REFINING	COMPANY	<u> </u>	Ow	ner's Well No.	2	4
Street or	Post Office Ad State	dress	Urawe	9 <u>r 159</u> m	88710				
• •									
Well was drilled	d under Permit 1	No	RA_E	5975 X 2	and is locat	ed in the:			
					-	<u>17.5</u> R	-		N.M.P.M.
b. Tract	No	of Map No.	•	of th	ie				·
						<u> </u>			
Subdi	vision, recorded	in			County.			-	
				feet, N	N.M. Coordinat	te System			Zone in Grant.
(B) Drilling (Contractor	S. Dale	e Hughes	==_		License No	WD 749		<u> </u>
Address	R	oute 1, l	Box 199A,	Artesi	la, NM	88210			<u> </u>
Drilling Began	7/5/82	Com	pleted	5/82	Type tools	Air rotary	Size of	hole	8 in.
Elevation of la	nd surface 😽 🔔	·····	<u>.</u>	at w	ell is <u>3362</u>	ft. Total dep	th of well		<u>19ft.</u>
Completed wel	ilis 🗷 sh	allow 🗆 a	artesian.		Depth to wa	ter upon completi	on of well		8 ft.
		Sec	tion 2. PRIN	CIPAL WATE	R-BEARING	STRATA			
Depth	in Feet	Thickness	r	Description of	Water-Bearing	Formation		nated)	
From	To	in Feet					(galion	s per n	ninute)
16	18	2	Anh	iy sand				па	
				<u></u>					
			1						
L	l		 	- 1 PECODI					
Diamatan	Pounds	Threade		n 3. RECORI	O OF CASING	r		Perfor	ations
Diameter (inches)	per foot	Threads per in.	Тор	Bottom	Length (feet)	Type of S	hoe F	renor	To
6	PVC				20			15	20
									· · · · · · · · · · · · · · · · · · ·
L	<u> </u>				DING AND CE				
Depth	in Feet	Hole	Sack	s (Cubic Feet		hod of Placen	nent a	
From	То	Diameter	of Mi	ud o	of Cement			<u></u>	
O	7 :	8			3	hand		÷	
								-	
	*		1						
L	1	L	Sectio	n 5. PLUGGI	NG RECORD				
Plugging Contr	actor			·			. <u></u>		
Address	_			<u> </u>	No.	Depth			bic Feet
Date Well Plug	od ged					Тор	Bottom	- or	Cement

V

Plugging approved by:

 State Engineer Representative
 3

 FOR USE OF STATE ENGINEER ONLY

 Date Received
 August 19, 1982

 Quad
 FWL

	Section 6. LOG OF HOLE						
	in Feet	Thickness	Color and Type of Material Encountered				
From	То	in Feet					
0	- 5 -	5	gyp & gran. anhydrite				
	10	5	a n n n N				
	15	6	gyp & clay				
	18	2	anhydritic sand and gravel				
<u></u>	19	1	gyp and gravel				
	· ·						
			• • • • • • • • • • • • • • • • • • •				
			· · · · · · · · · · · · · · · · · · ·				
	-						
			· · · · · · · · · · · · · · · · · · ·				
		Section 7	REMARKS AND ADDITIONAL INFORMATION				

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

• •

•...;

Hughos Driller

Fue L1 0 23 MI 182

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. tions, except Section 5, shall be answered as completely and accure s possible when any well is drilled, repaired or deepen. When this form is used as a plugging record, only Section 1(a) and Sectio. need be completed.

Revised	June	1972	

STATE ENGINEER OFFICE

			WELL RECORD					E IELD I	ENGR. LO	
			Section	1. GENER.	AL IN	FORMATION				
A) Owner o	f well	NA	VAJO RE	FINING	Cor	PANH	Owner'	's Well No2	5	
Street or	Post Office Ad	IdressA		awer N M					<u></u>	
Vell was drille	d under Permit	No. <u>RA 69</u>	75 X 3			and is located	in the:			
a. <u> </u>	_ ¼ <u>NE</u> %	SE_ %_N	E ¼ of Se	ection	8	_ Township	17_5 Rang	e <u>26 E</u>	N.M.P.M.	
b. Tract	No	of Map No		c	of the	<u></u>				
a Lat N		of Block No			f the					
C. LUCN Subdi	vision, recorde	d in			Co	ounty.				
d Y=		feet Y=		fe	+ N I	M. Coordinate S	ystem			
B) Drilling (Contractor	S. Dal	e Huohe	S			_ License Nol	in 749		
. –			-							
.ddress		Route 1,	<u>Hox 199</u>	А., А:	rtes	ua, N.M.	88210			
rilling Began	7/13/8	32 Comp	leted7	/13/ 8	2	Type tools	ir rotary	Size of hole	in.	
levation of la	nd surface or				t well	is3364	_ ft. Total depth o	of well 20	ft.	
						•	-			
ompleted we	llis LXS s	hallow 🗆 ar	tesian.]	Depth to water	upon completion of	of well <u>8</u> .	ft.	
		Sect	ion 2. PRIN	CIPAL W	ATER	BEARING ST	RATA			
Depth From	in Feet To	Thickness in Feet		Descriptio	n of V	Vater-Bearing F	ormation	Estimated Yield (gallons per minute)		
15	17	2	а	nhydri	tic	sand		па		
	<u> </u>							<u></u>		
	l									
	<u> </u>	1								
					ORD	OF CASING				
Diameter (inches)	Pounds per foot	Threads	 Тор	in Feet Botto	m	Length (feet)	Type of Shoe	From	To	
6	POC					20		16	20	
							<u> </u>			
	· · ·	<u>↓</u>								
	A	Sectio	n 4. RFCO	RDOFM	יחמט	NG AND CEMI	FNTING		њ	
Depth	in Feet	Hole	Sac			bic Feet		l of Place		
From	То	Diameter	of M	lud	of	Cement		i of Placement		
۵	8	8				4	hand	-	÷	
	1								-	
	i							_		
		.1	r			1				

Section 5. PLUGGING RECORD

Plugging Contractor Address		······································	[Depth	in Feet	Cubic Feet
Plugging Method			No.	Тор	Bottom	of Cement	
Date Well Plugged			[1			
Plugging approved by:			· E	2			
	State E	ngineer Representative	<u> </u>	3 4			
Date Received August	19, 1982	FOR USE OF STAT		RONLY			. FSL

	· ·	· · ·		
File No. RA-6975 X 3		UseObservation	ocation No	17.26.8.24241

	in Feet	Thickness	Color and Type of Material Encountered
From	То	in Feet	
0	5	5	oil soaked soil
	12	7	дур
	15	3	gyp & clay
	17	2	anhydritic sand
	20	3	red gyp clay
	** **		
<u> </u>			
	9 m=		
	1		
			· · · · · · · · · · · · · · · · · · ·
	<u>_</u>		
	· · · ·	├─── }	

ï

The undersigned here by certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

.

Wals. Hucker Driller ſ

20111,1 22 J LI GU

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. : itions, except Section 5, shall be answered as completely and accura s possible when any well is drilled renaited or deepen. When this form is used as a plugging record, only Section 1(a) and Section and be completed

					•		'		Revi	sed June 1972
			STA	TE ENGI	NEER O			FIFI) ENGF	2 100
			6 • · · ·				N	21664	- FUA	
		NAVI				RMATIO	N Ow	!_ == .	N 7	26
Street or	Post Office Ad	ldress	Drawe	<u>r 159</u>				ner's Weil	No	
						210		· · · · · ·		
ell was drilled	under Permit	No. RA 65	975 X 4		an	d is locate	d in the:			
a. <u>SE</u>	_ % <u>NE</u> %	<u>SE_ %</u> _N	<u>IE</u> ¼ of Se	ction	81	Fownship_	<u>17 s</u> R	ange	26 <u>E</u>	<u>N.M.P.M.</u>
b. Tract l	No	of Map No.		(of the					
c. Lot Ne	* 0*	of Block No			of the					
		d in				-			z	
		_ feet, Y=		fe	et, N.M. (Coordinate	System		-	Zone in Grant.
							License No.			
ddress	Ro	ute 1, Bo	<u>x 199 A</u> ,	Artes	sia, N	<u>M 88</u>	3210			
rilling Began .	7/15/82	Comj	pleted $-7/$	/15/82	T,	pe tools A	lir Rotary	Siz	e of hole_	<u> </u>
evation of lar	nd surface or _				at well is_	3364	ft. Total dep	th of well	20	ft.
ompleted well	lis Dad si	hallow 🗖 a	irtesian.		Der	oth to wate	r upon completi	on of well	. <u></u>	8 ft.
•		Sec	tion 2. PRIN	CIPAL W	ATER.B	ARING S	TRATA			-
Depth i	in Feet	Thickness							Estimated	
From	To	in Feet					Formation	(g:	allons per	minute)
16	18	_ 2		nhydri	Ltic s	and			na	
							······································			
				= ==			······	-		
				- 2. DEC		CASDIC			······································	,
Diameter	Pounds	Threads		on 3. REC in Feet	ORD OF				Perfo	
Diameter (inches)	Pounds per foot	Threads per in.				CASING Length (feet)	Type of S	hoe	Perfo From	
			Depth	in Feet		Length	Type of S	hoe		rations
(inches)	per foot		Depth	in Feet		Length (feet)	Type of S	hoe	From	rations To
(inches)	per foot		Depth	in Feet		Length (feet)	Type of S	hoe	From	rations To
(inches)	per foot	per in.	Depth Top	in Feet Botto	om	Length (feet) 20		hoe	From	rations To
(inches)	per foot PVC	per in.	Depth Top on 4. RECO Sac	in Feet Botto RD OF M ks	Dom UDDING Cubic	Length (feet) 20 AND CE! Feet	MENTING		From 16	rations To
(inches) 6 Depth From	per foot PVC in Feet To	per in.	Depth Top on 4. RECO	in Feet Botto RD OF M ks	UDDING Cubic of Ce	Length (feet) 20 AND CE! Feet	MENTING	hoe hoe hod of Pl	From 16	rations To
(inches) 6 Depth	per foot PVC	per in.	Depth Top on 4. RECO Sac	in Feet Botto RD OF M ks	Dom UDDING Cubic	Length (feet) 20 AND CE! Feet	MENTING	hod of Pl	From 16	rations To
(inches) 6 Depth From	per foot PVC in Feet To	per in.	Depth Top on 4. RECO Sac	in Feet Botto RD OF M ks	UDDING Cubic of Ce	Length (feet) 20 AND CE! Feet	MENTING	hod of Pl	From 16	rations To
(inches) 6 Depth From	per foot PVC in Feet To	per in.	Depth Top on 4. RECO Sac	in Feet Botto RD OF M ks	UDDING Cubic of Ce	Length (feet) 20 AND CE! Feet	MENTING	hod of Pl	From 16	rations To
(inches) 6 Depth From	per foot PVC in Feet To 9	per in.	Depth Top on 4. RECO Sac of M	in Feet Botto RD OF M ks ud	UDDING Cubic of Ce 5	Length (feet) 20 AND CE! Feet ment	MENTING	hod of Pl	From 16	rations To
(inches) 6 Depth From 0	per foot PVC in Feet To 9	per in. Secti Hole Diameter 8	Depth Top on 4. RECO Sac of M	in Feet Botto RD OF M ks	UDDING Cubic of Ce 5	Length (feet) 20 AND CE! Feet ment	MENTING	hod of Pl	From 16	rations To
(inches) 6 Depth From 0	per foot PVC in Feet To 9 4 5 7 actor	per in.	Depth Top on 4. RECO Sac of M Sectio	in Feet Botto RD OF M ks ud	UDDING Cubic of Ce 5	Length (feet) 2D AND CEF Feet ment	MENTING Men hand	hod of Pl	From 16	rations To
(inches) 6 Depth From 0	per foot PVC in Feet To 9 i actor	per in.	Depth Top on 4. RECO Sac of M Section	in Feet Botto RD OF M ks ud	UDDING Cubic of Ce 5	Length (feet) 20 AND CEF Feet ment RECORD	MENTING Men hand	hod of Pl	From 16 accement	rations To 20
(inches) 6 Depth From 0	per foot PVC in Feet To 9 i actor ed	per in.	Depth Top on 4. RECO Sac of M Section	in Feet Botto RD OF M ks ud	UDDING Cubic of Ce 5	Length (feet) 2D AND CEF Feet ment	MENTING Men hand	hod of Pl	From 16 accement	rations To 2D

.....

ł

: | |

ł

August	, 1902	-Quad		FWI	·	FSL
		•	. 4 .	(A.)	· .	
RA-6975 X 4	•.	Use Observat	tion	Location No	17.26.8	24243

File No...

ł

!

ļ

ł ł

ļ

L

Depth		Thickness	Color and Type of Material Encountered	.•
From	To	in Feet		eš –
•	6	6	oil soaked gyp	
	10	4	дур	
	12	2 .	gyp & clay	<u> </u>
	16	4	gyp & clay	
	18	2	anhydritic sand	
		<u> </u>		
	20	2	gyp & gravel	····•
	_			
				······································
				4
	·	ļļ.		·
				-
		<u> </u>		
- : -		<u>├</u>		
		├ ───	······································	
	<u> </u>		· · · · · · · · · · · · · · · · · · ·	
		├		
<u>·</u>		ļ ļ		
هېنې	·			· · · · · · · · · · · · · · · · · · ·
			·····	
			· · · · · · · · · · · · · · · · · · ·	
		L	· · · · · · · · · · · · · · · · · · ·	
		Section 7	REMARKS AND ADDITIONAL INFORMATION	. 1.2. La
				u
				23 FII 102
				23
				E.
				-5

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Lali Hug 4

drilled, repaired or deepen. . When this form is used as a plugging record, only Section 1(a) and Section - need be completed.

			STA	TE ENGINEEF	R OFFICE			vised June 1972 ENGR. L(
				WELL RECO	ORD			Endin <u>El</u>
			Section 1	. GENERAL IN	FORMATION			
		810	אא אחר פרבי			Owner's	W. 11 X1	
Street or	Post Office Ad	Idress		Drawer 1	59			
City and	State	A:	<u>rtesia, f</u>	<u>M 882</u>	210			- ·
ell was drilled	l under Permit	No. RA	<u>6975 X 4</u>	5	_ and is located	in the:		
a. <u>SE</u>	_ % _ <u>NE_</u> %	<u>SE_ % N</u>	E ¼ of Se	ction <u> </u>	Township	<u>17 S</u> Rang	e <u>26 E</u>	N.M.P.M
b. Tract	No	of Map No)	of the				
	-							
				of the				~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
					-			
d. X≃ the		_ feet, Y=		feet, N.	M. Coordinate S	System		-
			ale Hucha			License No	LID 740	
ddress		Route 1	<u>, Box 199</u>	A, Artes	ia, N M	88210		
ddress rilling Began	<u>7/15/82</u> nd surface or _	Route 1	, Bax 199	2 A, Artes /15/82 at weL	Lia, N.M. Type tools A.		Size of hole	2 <u>8</u> in. 20 ft.
ddress rilling Began levation of las	<u>7/15/82</u> nd surface or _	Route 1 Com	Box 199	2 A, Artes /15/82	Lia, N.M. Type tools A.	BB211 ir Rotary ft. Total depth o upon completion c	Size of hole	2 <u>8</u> in. 20 ft.
ddress rilling Began levation of lan ompleted wel Depth	$\frac{7}{15}$	Route 1 Com	PIC 199	2 A, Artes /15/82 at wel CIPAL WATEF	ia, NM _Type tools A l is3363_ Depth to water	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well Estimate	8 in. 20 ft. -9 ft. d Yield
ddress rilling Began levation of lat ompleted wel Depth From	7/15/82 nd surface or 11 is 2 s in Feet To	Route 1 Com hallow Sec Thickness in Feet	BOX 199	A, Artes /15/82 at wel CIPAL WATER Description of V	Depth to water BEARING ST Water-Bearing F	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well2 Estimate (gallons pe	20 ft. 9 ft. d Yield r minute)
ddress rilling Began levation of lan ompleted wel Depth	$\frac{7}{15}$	Route 1 Com	BOX 199	2 A, Artes /15/82 at wel CIPAL WATEF	Depth to water BEARING ST Water-Bearing F	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well Estimate	20 ft. 9 ft. d Yield r minute)
ddress rilling Began levation of lat ompleted wel Depth From	7/15/82 nd surface or 11 is 2 s in Feet To	Route 1 Com hallow Sec Thickness in Feet	BOX 199	A, Artes /15/82 at wel CIPAL WATER Description of V	Depth to water BEARING ST Water-Bearing F	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well2 Estimate (gallons pe	20 ft. 9 ft. d Yield r minute)
ddress rilling Began levation of lat ompleted wel Depth From	7/15/82 nd surface or 11 is 2 s in Feet To	Route 1 Com hallow Sec Thickness in Feet	BOX 199	A, Artes /15/82 at wel CIPAL WATER Description of V	Depth to water BEARING ST Water-Bearing F	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well2 Estimate (gallons pe	20 ft. 9 ft. d Yield r minute)
ddress rilling Began levation of lat ompleted wel Depth From	7/15/82 nd surface or 11 is 2 s in Feet To	Route 1 Com hallow Sec Thickness in Feet	BOX 199	A, Artes /15/82 at wel CIPAL WATER Description of V	Depth to water BEARING ST Water-Bearing F	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well2 Estimate (gallons pe	20
ddress rilling Began levation of lat ompleted wel Depth From	7/15/82 nd surface or 11 is 2 s in Feet To	Route 1 Com hallow Sec Thickness in Feet	BOX 199	A, Artes /15/82 at wel CIPAL WATER Description of V	Depth to water BEARING ST Water-Bearing F	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well2 Estimate (gallons pe	20
ddress rilling Began levation of lan ompleted wel Depth From 17	_7/15/82_ nd surface or 1 is \$ sl in Feet 19	Route 1 Com hallow Thickness in Feet 2	BIDX 199	A Artes /15/82	Type tools A Type tools A l is <u>3363</u> Depth to water R-BEARING ST Water-Bearing F Sand	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well Estimate (gallons pe na	8 in. -9 ft. -9 ft. d Yield r minute)
ddress rilling Began levation of lan ompleted wel Depth From 17 Diameter	7/15/82 nd surface or l is si in Feet To 19 Pounds	Route 1 Com hallow Thickness in Feet 2 Threads	BIDX 199 pleted artesian. ction 2. PRIN s art Sectio Depth	A Artes /15/82 at well CIPAL WATEF Description of V hydritic n 3. RECORD in Feet	Type tools A Type tools A l is 3363 Depth to water R-BEARING ST Water-Bearing F Sand OF CASING Length	882111. ir Rotary ft. Total depth o upon completion c RATA	Size of hole of well2 of well2 Estimate (gallons pe Na	2 8 in. 2 1 ft. 9 ft. 9 ft. 1 ft.
ddress rilling Began levation of lan ompleted wel Depth From 17	_7/15/82_ nd surface or 1 is \$ sl in Feet 19	Route 1 Com hallow Thickness in Feet 2	BIDX 199	A Artes /15/82	Type tools A Type tools A l is <u>3363</u> Depth to water R-BEARING ST Water-Bearing F Sand	882111. ir Rotary ft. Total depth o upon completion c RATA 'ormation	Size of hole of well2 of well Estimate (gallons pe na	8 in. -9 ft. -9 ft. d Yield r minute)

Section 4. RECORD OF MUDDING AND CEMENTING

Fi	Depth i	n Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement	
		8	8	,	4	hand	
-		· · · · · · · · · · · · · · · · · · ·		,		······································	

Section 5. PLUGGING RECORD

Plugging Contractor		<u> </u>			_
Address		- No	Depth	in Feet	Cubic Feet
Plugging Method		No	Top Bottom		of Cement
Date Well Plugged	<u> </u>	_ 1			
Plugging approved by:		2		1	
· · · · ·	······································	- 3			1
	State Engineer Representative	4			
<u>۲۰۰۰ و به اجامه ۲۰۰۰ و ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲۰۰۰ ۲</u>	FOR USE OF STATE ENGI	NEER ONLY			
Date Received August 1	9, 1982				

· · · · · · · · ·-					•
File	No	RA-6	<u>975</u>	<u>x 5</u>	

1

/

Quad _ FWL

_ FSL_ . . . Use Observation 17.26.8.24244 Location No._

	in Feet	Thickness	Color and Type of Material Encountered
From	To	in Feet	Color and Type of Material Encountered
0	8	- 8	oil soaked gyp
	13	5	дур
	17	4	gyp & clay
	19	2	anhydritic sand
	20	1.	anhydritic sand & gravel
			· · · · · · · · · · · · · · · · · · ·
			· · · · · · · · · · · · · · · · · · ·
		-	-
		+	
			· · · · · · · · · · · · · · · · · · ·
			· · · · · · · · · · · · · · · · · · ·
<u> </u>			
		+	
	 		
	 		
	<u> </u>		
	 		

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Dale Hughes Driller

23" MA CE C EV 231

...

				INEER OFFICE			EIEI D) ENĠI			
			WELL	RECORD							
			Section 1. GENE								
	well	NAVAJ(Idress	D REFINING CI Drawer 159	MPANY		Own	ner's Well N	o. <u>28</u>			
	State		tesia, N M								
/ell was drilled	1 under Permit	No. RA 69	975 X 6	and is lo	cated in the	:					
a. <u>NE</u>	¼ _ <u>NE_</u> ¥	<u>SE % SI</u>	1_ ¼ of Section	9 Townsl	hip <u>17</u> 9	E Ra	ange	26 E	N.M.F		
b. Tract	No	of Map No	· · · · · · · · · · · · · · · · · · ·	of the							
Subdi	vision, recorde	d in	•	County.				ž			
			f		inate System	l <u></u>		- 3	Zon Gr		
					<u> </u>			_	·		
			lughes								
ddress		Route_1,	, Box 199 A,	Artesia, A	<u> </u>	210			 _		
rilling Began	7/7/82	Compl	eted <u>7/8/82</u>	Type too	ols <mark>Air Ro</mark>	tary	Size (of hole	8		
levation of la	nd surface or _			at well is <u>33</u>	361 ft. 1	Fotal dept	th of well_	30			
Completed wel	lis 🗙 si	hallow 🗀 ari	tesian.	Depth to	water upon	completic	on of well_	_ 10			
			on 2. PRINCIPAL V								
				ALENDEARIN		•	Es	timated Y			
Depth	in Feet	Thickness	Deceri-+	on of Water Deer	ring Lommon	ion			(gallons per minute)		
From	To	in Feet		on of Water-Beau	ring Format	ion 			inute)		
<u> </u>			Descripti anhydri		ring Format	ion 		ns per m	inute)		
From	To	in Feet			ring Format.	ion 			inute)		
From	To	in Feet			ring Format.	ion 			ainute)		
From	To	in Feet			ring Format.	ion			ainute)		
From	To	in Feet	anhydri	ic sand		ion					
From 10 Diameter	To 12 Pounds	in Feet 2	anhydri	CORD OF CASI	NG	•					
From 10 Diameter (inches)	To 12 Pounds per foot	in Feet 2	anhydri Section 3. REf	CORD OF CASI Lengt	NG	ion ,	hoe	Perfor From	ations To		
From 10 Diameter	To 12 Pounds	in Feet 2	anhydri Section 3. RE Depth in Feet	CORD OF CASH	NG	•	hoe	na Perfor	ations		
From 10 Diameter (inches)	To 12 Pounds per foot	in Feet 2	anhydri Section 3. RE Depth in Feet	CORD OF CASI Lengt	NG	•	hoe	Perfor From	ations To		
From 10 Diameter (inches)	To 12 Pounds per foot	in Feet 2	anhydri Section 3. RE Depth in Feet	CORD OF CASIN Lengt om (feet	NG	•	hoe	Perfor From	ations To		
From 10 Diameter (inches)	To 12 Pounds per foot	in Feet 2 Threads per in.	anhydri Section 3. RE Depth in Feet	CORD OF CASIN Lengt om (feet	NG th T	ype of St	hoe	Perfor From	ations To		
From 10 Diameter (inches) 6 Depth	To 12 Pounds per foot PVC	in Feet 2 Threads per in.	Section 3. REC Depth in Feet Top Bott	CORD OF CASIN Lengt om (feet	NG th T	ype of St	hoe	Perfor From 25	ations To		
From 10 Diameter (inches) 6 Depth From	To 12 Pounds per foot PVC in Feet To	in Feet 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Section 3. RE Depth in Feet Top Bott	CORD OF CASIN Lengt om (feet 30	NG th T	Type of St NG Mett	hoe hod of Plac	Perfor From 25	ations To		
From 10 Diameter (inches) 6 Depth	To 12 Pounds per foot PVC	in Feet 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Section 3. RE Depth in Feet Top Bott	CORD OF CASI Lengt om (feet 30 UDDING AND Cubic Feet of Cement	NG th T	ype of St	hoe hod of Plac	Perfor From 25 ement	ations To		
From 10 Diameter (inches) 6 Depth From	To 12 Pounds per foot PVC in Feet To 10	in Feet 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Section 3. RE Depth in Feet Top Bott	CORD OF CASI Lengt om (feet 30 UDDING AND Cubic Feet of Cement	NG th T	Type of St NG Mett	hoe hod of Plac	Perfor From 25 ement	ations To		
From 10 Diameter (inches) 6 Depth From	To 12 Pounds per foot PVC in Feet To 10	in Feet 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	Section 3. RE Depth in Feet Top Bott	CORD OF CASI Lengt om (feet 30 UDDING AND Cubic Feet of Cement	NG th T	Type of St NG Mett	hoe hod of Plac	Perfor From 25 ement	ations To		
From 10 Diameter (inches) 6 Depth From	To 12 Pounds per foot PVC in Feet To 10	in Feet 2 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	anhydri f	CORD OF CASI Lengt om (feet 30 UDDING AND Cubic Feet of Cement	NG h CEMENTIN	Type of St NG Mett	hoe hod of Plac	Perfor From 25 ement	ations To		
From 10 Diameter (inches) 6 Depth From 0	To 12 Pounds per foot PVC in Feet To 10 * * *	in Feet 2 2 Threads per in. Sectio Hole Diameter 8	anhydri i Section 3. REf Depth in Feet Top Bott n 4. RECORD OF I Sacks of Mud	CORD OF CASIN CORD OF CASIN MUDDING AND Cubic Feet of Cement 4	NG h CEMENTIN	ype of St NG Mett hand	hoe hod of Plac	Perfor From 25	ations To 30		
From 10 Diameter (inches) 6 Depth From 0 Plugging Contr Address Plugging Metho	To 12 Pounds per foot PVC in Feet To 10 in C in C in C in C in C in C in C in C	in Feet 2 2 Threads per in. Sectio Hole Diameter 8	anhydri i Section 3. REf Depth in Feet Top Bott n 4. RECORD OF I Sacks of Mud	CORD OF CASIN Lengt om (feet 30 4UDDING AND Cubic Feet of Cement 4	NG th T CEMENTIN RD	Type of St NG Mett	hoe hod of Plac	Perfor From 25 ement	ations To 3D		
From 10 Diameter (inches) 6 Depth From 0 Plugging Contr Address Plugging Metho Date Well Plug	To 12 Pounds per foot PVC in Feet To 10 * * * * *	in Feet 2 2 Threads per in. Sectio Hole Diameter 8	Section 3. REf Depth in Feet Top Bott n 4. RECORD OF 1 Sacks of Mud	CORD OF CASIN CORD OF CASIN MUDDING AND Cubic Feet of Cement 4 JGGING RECON	NG NG T CEMENTIN CEMENTIN RD No. 7 1	ype of St NG Mett hand	hoe hod of Plac	Perfor From 25 ement	ations To		
From 10 Diameter (inches) 6 Depth From 0 Plugging Contr Address Plugging Metho	To 12 Pounds per foot PVC in Feet To 10 * * * * *	in Feet 2 2 Threads per in. Sectio Hole Diameter 8	anhydri i Section 3. REf Depth in Feet Top Bott n 4. RECORD OF I Sacks of Mud	CORD OF CASIN Lengt om (feet 30 4UDDING AND Cubic Feet of Cement 4	NG NG th T CEMENTIN RD	ype of St NG Mett hand	hoe hod of Plac	Perfor From 25 ement	ations To 30		

. Use

____ Location No.__17.26.9.34223

1

File No. RA-6975 : X 6

	in Feet	_ Thickness	Color and Type of Material Encountered
From	То	in Feet	
٥	5	5	gyp & red clay
	10	5	11 11 A
	12	2	anhydritic sand & gravel
	25	13	gyp & gravel
	30	5	дур
		<u> </u>	
	=		·····
	.		
			· · · · · · · · · · · · · · · · · · ·
		<u> </u>	
		++	
		++	
		++	
<u></u>		<u> </u>	
	 	<u> </u>	
		++	
		1	
		1	· · · · · · · · · · · · · · · · · · ·

100 14 C 30 M1 62

1.3

I.

ı.

ļ

i

The undersigned here by certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Dale Augher Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. tions, except Section 5, shall be answered as completely and accur is possible when any well is drilled, repaired or deepend. When this form is used as a plugging record, only Section 1(a) and Section need be completed.

			STA	TE ENGINEE	R OFF	ICE		FIFIDI	ENGR. LOG
				WELL REC	ORD			*****U (
			Section 1.	GENERAL I	NFOR	MATION			V
() Owner of	well			NG COMPAN				's Well No	29
City and	Post Office Ad State	aress	Artesia,	N M 88				·······	
'ell was drilled	under Permit	No. <u>RA</u> .	6975 X 7		_ and i	s located i	in the:		
aNE	- % - HE %	<u></u>	<u>NUL_</u> ¼ of Sec	ction9	Tov	vnship	<u>17 5</u> Ran	ge <u>26 E</u>	
									~
d. X=		_ feet, Y=		feet, N.	M. Co	ordinate S	ystem		
			<u></u>					<u> </u>	Gran
 Drilling C 	Contractor	S. Dal	e Hughes				License No	WD 749	<u> </u>
ddress		Route 1,	Box 199	A, Artesi	a, N	<u>m 88</u>	210		
rilling Began .	7/20/82	Cor	npleted7/	21/82	_ Туре	tools Ai	r rotary	Size of 1	
levation of lar	nd surface or			at wel	ll is	3363	_ ft. Total depth	of well	21.5f
ompleted well	tis Kosh	allow 🗆	artesian.		Denth	to water i	upon completion	of well	וו וו
enpreted wen			ection 2. PRIN						
Depth	in Feet	Thickne	ss	Description of '					ated Yield
From 20	To 21.5	in Feet			· · · ·				per minute)
20		1.9		ydritic s		··· · ·		Па	
			·						
			Section	n 3. RECORD	OF CA	SING			
Diameter (inches)	Pounds per foot	Threads per in.	Depth Top	in Feet Bottom		ngth eet)	Type of Sho	e Fro	Perforations
6	PVC		10p	Bottom	+	22			9 22
					<u> </u>				
			: 		╂───		<u> </u>		
					L				
	in East		tion 4. RECOR			· · · · · ·	INTING	<u> </u>	
From	in Feet To	Hole Diameter	Sack of Mu		ubic Fe f Ceme		Metho	d of Placem	ent 🥃
0	8 -	8			6		hand		/ *
			-				••••••••••••••••••••••••••••••••••••••		
······································	Å								
	L	l	l						
			Sectio	n 5. PLUGGIN	IG REC	CORD			
lugging Contr	actor	······································			: 1	i	Depth in l	Feet	Cubic Feet
	od bi		······································			No.	Тор	Bottom	of Cement
ddress lugging Metho	- d					1			
ddress lugging Metho	ged ved by:			•		2			
ddress lugging Metho ate Well Plugg			ngineer Repress			2 3 4			

i				
" Quad	! <u></u>		_ FWL	
		, .		

File No.

17.26.9.13422 Use _Observation ____ Location No.__

	Section 6. LOG OF HOLE						
	in Feet	Thickness in Feet	Color and Type of Material Encountered				
From	To	5	miscellaneous fill				
0	5						
	10	5	oil stained gyp				
	15	5	дур				
	20	5	дур				
	21.5	1.5	anhydritic sand & gravel				
	-						
	₹		. *				
			٠				
i							
			· · · · · · · · · · · · · · · · · · ·				
			· · · · · · · · · · · · · · · · · · ·				
	·						
·	{						
			· · · · · · · · · · · · · · · · · · ·				
	<u> </u>						
·							
			· · · · · · · · · · · · · · · · · · ·				
		Section 2	7. REMARKS AND ADDITIONAL INFORMATION				

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

52

4

:.:.

· *.

Hur Kas Driller

100 IN OF U EI DUI

									Revised June 1972
				E ENGINEER		CE		Ð	ELD ENGR.
			Section 1. C	GENERAL IN	FORM	ATION			/
A) Owner of	f well	NAVA	<u>JO REFININO</u>	COMPANY	,		Owner	's Well No	30
Street or	Post Office Ad	dress	<u>Drawer</u>	159					
vell was drilled	d under Permit	No. RA	6975 <u>x 8</u>		and is	located	in the:		
						-	<u>17 5 </u>	-	
	A								
							.		 Ā
	• •	_ feet, Y=		feet, N.M	1. Coor	dinate S	system		Zone in Grant.
B) Drilling (Contractor	S. Da	le_Hughes_				_ License No	WD 749_	
							8210		
									-
			-				<u>ir Rotary</u>		-
levation of la	nd surface or			at well	is3	358	_ ft. Total depth (of well	8 21.5 ft.
ompleted wel	llis 🛛 🗙 sh	allow 🗖	artesian.	1	Depth to	o water	upon completion	of well	_ 8 ft.
Death	in Frank		ection 2. PRINCI	PAL WATER	-BEAR	ING ST	RATA		
From	in Feet To	Thickne in Feet		scription of W	/ater-Be	aring F	ormation		ated Yield per minute)
18	20	2	ant	ydritic	sand	ågr	avel	1	na
<u> </u>	<u></u>			<u></u>					
	L								
Diameter	Pounds	Threads	Section Depth in	3. RECORD (Feet	DF CAS Len				Perforations
(inches)	per foot	per in.	Тор	Bottom	(fe	- I	Type of Shoe		om To
6	PVC	<u> </u>			22	2		1	7 22
	1						······································		
	<u> </u>	£	tion 4. RECORI						
Depth	in Feet	Hole	Sacks	Cu	bic Fee	t	·	i of Placem	
From	То	Diameter	of Mud	of	Cemen	t			
0	4 =	8			2		hand		
	i								
		••	Section	5. PLUGGJN	G RECO	ORD			
	••								
	ractor			- <u>-</u>	r		· D · · · · ·		
ddress lugging Metho	ractor			<u>.</u>	_[No.	Depth in F Top	eet Bottom	Cubic Feet of Cement
ddress lugging Metho Date Well Plug	ractor od			· · · ·		1			
ddress	ractor od		ngineer Represen						

File N&A-6975 X 8

1

İ

J.

Ì

Use Observation Location No. 17.26.9.13222

Ļ

ŀ

			Section 6. LOG OF HOLE
Depth From	in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	5	5	oil soaked grevel, sand & gyp (fill)
	10	5	gyp
	15	5	дур
	18	3	gyp & gravel
<u> </u>	20	2	anhydritic sand & gravel
	21.5	1.5	gyp & gravel
	<u> </u>		
~ <u></u>			
:			
?			
<u></u>			
			·
	·		
		L,l	······································
		Section 7	7. REMARKS AND ADDITIONAL INFORMATION - 프로그램 일곱 - 프로그램
			A. REMARKS AND ADDITIONAL INFORMATION
			029
			29
	-		۲ <u>۲</u>
			• · ·

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

<u>Hughry</u> Driller Nale

i

Street or Post Office Address UP2 and State City and State Address DE210 Well was drilled under Permit No. RARGE 26.E N.M.I IN SEC N.M.I b. Track of Auge No. of the County. 2 Of Map No. of the County. 2 Address County. 2 Of Map No. Of the State of No. County. 2 Or The County. 2 Or The County. 2 Address License No. License No. Diverse of Note B Drilling Contractor S. Dala Hughes License No. License No. Diverse of Note B Drilling Contractor S. Dala Hughes Dept in Sec of Note B Ervation of land surface					WELL R	ECOR	D		FIFI	D Fric	Q IC
(A) Owner of weil NAVA3D REFINING COMPANY Owner's Well No. 31 Street or Post Office Address DEDuber 159 Description Description Description Well was drilled under Permit No. RA-6975-X-9 and is located in the: * Street No. Street No. No. b. Tract No. of Map No. of the Street No. Street No. Street No. c. Lot No. of Block No. of the Street No. <								NNI	وملوحة البيادو		11. LU
Street or Post Office Address DFRUETAL N M B8210 Well was dipled under Permit No. RAFESTAL, N M B8210 Well was dipled under Permit No. RAFESTAL, N M Street in the: a. Stip 4: AUE AUE N.K. N.M. December 2010 b. Tract No. of May No. of the		A1								יד	
City and State ARTESIA, N. M BS210 Well was drilled under Permit No. RA-6975-X-9 and is located in the: aStill WBE	Street or	Post Office Ad	ldress	Drawer 1	.59		·	Ow	ner's Well I	No	•
a _Siji & HE_ K GE_ K _NE_ K of Section B Township 17. S Range 26. E N.M.F b. Tract No	City and	State				10					
Control of Block No County. d. Xs feet, Ys feet, N.M. Coordinate System Zon the Teet States No Zon defress Rt. 1, Bnx 199 A, Artesia, N.R. BB210 Drilling Began10/19/82 Completed10/19/82 Type tools Sue of hole B Elevation of land surface or at well is3355 ft. Total depth of well Z2 Completed well is Depth to water upon completion of well ID Depth in Feet Depth to water upon completion of well ID Depth in Feet Decinion of Water-Bearing Formation Estimated Yield (galons per minute) 14 15 2 dolomite gravel w gray-brown silty Clay NA Depth in Feet Inegation IS Depth in Feet Depth in Feet Length IN Section 3. RECORD OF CASING Diameter Polon Type of Shoe From To Depth in Feet	Well was drille	d under Permit	No. <u>RA-6</u>	975 -X-9		ап	id is locat	ed in the:			
c. Lot No	a —Suj-	¼ -NE ¼	-682 ¹⁴	NE 4 of Se	ction <u>8</u>		Fownship	<u>175</u> R	ange <u>26</u>	E	N.M.P
Subdivision, recorded in	b. Tract	No	of Map No	0,	of	f the		· ····			
a. Xa											
(B) Drilling Contractor S. Dale Hughes License No. WD. 749 Address Rt. 1, Bnx 199 A, Artensia, N.M. BR210 Drilling Began 10/19/82 Completed Drilling Began 10/19/82 Completed Elevation of land surface or								te System			
Address Rt. 1, Enx 199 A, Artesia, N.M. B8210 Drilling Began _10/19/82	the							<u>.</u>			Gra
Drilling Began10/19/82Completed10/19/82Type toolsAugerSize of hole _B Elevation of land surface orat well is3365ft. Total depth of well22 Completed well isS shallowartesian. Depth to water upon completion of well10 Section 2. PRINCIPAL WATER-BEARING STRATA 	(B) Drilling (Contractor _5_	<u>Dale Hu</u>	ghes				License No	<u>ШD 74</u>	9	
Elevation of land surface or	Address	Rt.	1, Box	199 A, Ar	tesia,	<u>N.M.</u>	8821	.n			
Completed well is Image: shallow artesian. Depth to water upon completion of well 10 Section 2. PRINCIPAL WATER-BEARING STRATA Image: shallow Thickes Description of Water-Bearing Formation Estimated Yield (gallons per minute) 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA Section 3. RECORD OF CASING Diameter Pounds (inches) per foot Threads Depth in Feet Length Type of Shoe Perforations 2 PUC 18 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet Method of Placement 0 12 S 4 sx hand placement - Option S. PLUGGING RECORD Plugging Contractor No. Depth in Feet Cubic Feet No. Depth in Feet Cubic Feet Plugging wethod <td< td=""><td>Drilling Began</td><td>10/19/8</td><td>2 Соп</td><td>npleted</td><td>1/19/82</td><td> Tı</td><td>ype tools</td><td>Auger</td><td> Size</td><td>e of hole_</td><td>8</td></td<>	Drilling Began	10/19/8	2 Соп	npleted	1/19/82	Tı	ype tools	Auger	Size	e of hole_	8
Completed well is Image: shallow artesian. Depth to water upon completion of well 10 Section 2. PRINCIPAL WATER-BEARING STRATA Image: shallow Thickes Description of Water-Bearing Formation Estimated Yield (gallons per minute) 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA Section 3. RECORD OF CASING Diameter Pounds (inches) per foot Threads Depth in Feet Length Type of Shoe Perforations 2 PUC 18 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet Method of Placement 0 12 S 4 sx hand placement - Option S. PLUGGING RECORD Plugging Contractor No. Depth in Feet Cubic Feet No. Depth in Feet Cubic Feet Plugging wethod <td< td=""><td>Elevation of la</td><td>nd surface or _</td><td></td><td></td><td> at</td><td>t well is_</td><td>3365</td><td> ft. Total dep</td><td>th of well_</td><td>22</td><td></td></td<>	Elevation of la	nd surface or _			at	t well is_	3365	ft. Total dep	th of well_	22	
Section 2. PRINCIPAL WATER-BEARING STRATA Depth in Feet Thickness Description of Water-Bearing Formation Estimated Yield (gallons per minute) 14 15 2 dolomite gravel w gray-brown silty clay NA 14 15 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 15 16 18 13 18 13 18 16 1 18 13 18 13 18 16 1 1 10 10 10 10 16 1 1		_									
Depth in Feet Thickness in Feet Description of Water-Bearing Formation Estimated Yield (gallons per minute) 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA Section 3. RECORD OF CASING Diameter per foot per foot per in. Top Bottom Type of Shoe Perforations 2 PVC 18 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet Method of Placement 0 12 8 4 sx hand placement - No. Depth in Feet Plugging Contractor - - - - Address Plugging approved by:	Completed we	اک ښمت دئین			CIPAT WA					* L4	
From 10 Direct Callod per finition 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 14 16 2 dolomite gravel w gray-brown silty clay NA 16 170 Section 3. RECORD OF CASING Perforations 16 18 13 18 2 PUC 18 13 2 PUC 18 13 18 13 18 19 10 10 2 PUC 18 13 18 13 18 10 12 Section 4. RECORD OF MUDDING AND CEMENTING Section 4. RECORD OF MUDDING AND CEMENTING 10 12 Section 5. PLUGGING RECORD Firem To Diameter of Mud of Cement of	Depth	in Feet	Thicknes	ss							
Section 3. RECORD OF CASING Diameter (inches) Pounds per foot Depth in Feet per in. Length Top Type of Shoe Perforations 2 PVC 18 13 18 1 18 13 18 1 1 13 18 1 1 13 18 1 1 13 18 1 1 13 18 1 1 13 18 1 1 13 18 1 1 13 18 1 1 13 18		1			-						
Section 3. RECORD OF CASING Diameter (inches) Pounds per foot Threads per in. Depth in Feet Top Length (feet) Type of Shoe Perforations 2 PVC 18 13 18 1 1 18 13 18 1 1 1 1 13 18 1 1 1 1 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet of Cement Method of Placement 1 12 8 4 sx hand placement 1 1 1 1 1 Section 5. PLUGGING RECORD			<u>_</u>		gr	9 AGT	m dra)	-010000 8113		10	
Section 3. RECORD OF CASING Diameter (inches) Pounds per foot Threads per in. Depth in Feet Top Length (feet) Type of Shoe Perforations 2 PVC 18 13 18 1 1 18 13 18 1 1 1 1 13 18 1 1 1 1 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet of Cement Method of Placement 1 12 8 4 sx hand placement 1 1 1 1 1 Section 5. PLUGGING RECORD			1	1							
Diameter (inches) Pounds per foot Threads per in. Depth in Feet Top Length (feet) Type of Shoe Perforations 2 PVC 18 13 18 1 18 13 18 1 1 18 13 18 1 1 10 10 10 2 PVC 18 13 18 1 1 10 10 10 2 PVC 18 10 10 2 PVC 18 13 18 1 1 10 10 1 10 12 2 10 10 1 12 8 4 9X hand placement 1 1 10 10 10 10 1 1 1 10 10 10 1 1 1 10 10 10 1 1 1 10 10 10 1 1 1 10 10 10		<u> </u>						<u></u> .			
Diameter (inches) Pounds per foot Threads per in. Depth in Feet Top Length (feet) Type of Shoe Perforations 2 PVC 18 13 18 1 18 13 18 1 1 18 13 18 1 1 10 10 10 2 PVC 18 13 18 1 1 10 10 10 2 PVC 18 10 10 2 PVC 18 13 18 1 1 10 10 1 10 12 2 10 10 1 12 8 4 9X hand placement 1 1 10 10 10 10 1 1 1 10 10 10 1 1 1 10 10 10 1 1 1 10 10 10 1 1 1 10 10 10			· ·								
(inches) per foot per in. Top Bottom (feet) Type of Shoe From To 2 PVC 18 13 18 13 18 2 PVC 18 13 18 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet Method of Placement 0 12 8 4 sx hand placement - Section 5. PLUGGING RECORD Plugging Contractor No. Depth in Feet Cubic Feet Plugging Method Depth in Feet Cubic Feet Plugging Contractor Address Plugging approved by: 2 Section 5. PLUGGING RECORD						`					
2 PVC 18 13 18 2 PVC 18 13 18 3 13 18 13 18 13 18 13 18 13 18 14 16 18 13 18 13 18 Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Sacks Cubic Feet Method of Placement 0 0 12 8 4 5x hand placement - - Section 5. PLUGGING RECORD Plugging Contractor Address No. Depth in Feet Cubic Feet 1 1 1 - - Plugging Method 0f Cement Date Well Plugged - 2 2 - - - Section 5. PLUGGING RECORD)RD OF	CASING				
Section 4. RECORD OF MUDDING AND CEMENTING Depth in Feet Hole Diameter of Mud O 12 8 4 sx 4 sx 1		1	Threads	Depth	in Feet		Length		hoe		
Depth in Feet Hole Diameter Sacks of Mud Cubic Feet of Cement Method of Placement 0 12 8 4 sx hand placement - 1 1 1 1 - - 1 1 1 1 - - 1 1 1 1 1 - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(inches)	1	Threads per in.	Depth	in Feet		Length (feet)		hoe	From	To
Depth in Feet Hole Diameter Sacks of Mud Cubic Feet of Cement Method of Placement 0 12 8 4 sx hand placement - 1 2 8 4 sx hand placement - 1 2 8 4 sx hand placement - 1 5 1 5 5 5 5 1 5 5 5 7 5 6 <	(inches)	1	Threads per in.	Depth	in Feet		Length (feet)		hoe	From	To
Depth in Feet Hole Diameter Sacks of Mud Cubic Feet of Cement Method of Placement 0 12 8 4 sx hand placement - 1 1 1 1 - - 1 1 1 1 - - 1 1 1 1 1 - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(inches)	1	Threads per in.	Depth	in Feet		Length (feet)		hoe	From	To
0 12 8 4 sx hand placement Image: Section S. PLUGGING RECORD Section S. PLUGGING RECORD Plugging Contractor	(inches)	1	Threads per in. PVC	Depth Top	in Feet Bottor	n	Length (feet) 18	Type of S	hoe	From	To
Section 5. PLUGGING RECORD Plugging Contractor Address Plugging Method Date Well Plugged Plugging approved by: State Free December 3	(inches) 2 Depth	per foot	Threads per in. PVC Sec: Hole	Depth Top tion 4. RECO	IN Feet Bottor	n JDDING Cubic	Length (feet) 18 G AND CE Feet	Type of S		From 13	To
Section 5. PLUGGING RECORD Plugging Contractor	(inches) 2 Depth From	per foot	Threads per in. PVC Sect Hole Diameter	Depth Top tion 4. RECO	IN Feet Bottor	n JDDING Cubic of Ce	Length (feet) 18 G AND CE Feet ment	Type of S EMENTING Met	hod of Pla	From 13	To
Section 5. PLUGGING RECORD Plugging Contractor Address Plugging Method Date Well Plugged Plugging approved by: State Fining Dependentiation	(inches) 2 Depth From	per foot	Threads per in. PVC Sect Hole Diameter	Depth Top tion 4. RECO	IN Feet Bottor	n JDDING Cubic of Ce	Length (feet) 18 G AND CE Feet ment	Type of S EMENTING Met	hod of Pla	From 13	To
Plugging Contractor	(inches) 2 Depth From	per foot	Threads per in. PVC Sec: Hole Diameter	Depth Top tion 4. RECO	IN Feet Bottor	n JDDING Cubic of Ce	Length (feet) 18 G AND CE Feet ment	Type of S EMENTING Met	hod of Pla	From 13	To
Address Depth in Feet Cubic Feet Plugging Method Top Bottom of Cement Date Well Plugged 1 1 1 Plugging approved by: 2 3 1	(inches) 2 Depth From	per foot	Threads per in. PVC Sec: Hole Diameter	Depth Top tion 4. RECO	IN Feet Bottor	n JDDING Cubic of Ce	Length (feet) 18 G AND CE Feet ment	Type of S EMENTING Met	hod of Pla	From 13	To
Plugging Method No. Top Bottom of Cement Date Well Plugged 1 1 1 1 Plugging approved by: 2 3 3	(inches) 2 Depth From 0	in Feet To 12	Threads per in. PVC Sec: Hole Diameter	Depth Top tion 4. RECO Sacl of M Sectio	In Feet Bottor	JDDING Cubic of Ce 4 s	Length (feet) 18 GAND CE Feet ment X	Type of S EMENTING Met hand placer	hod of Pla	From 13	To
Plugging approved by:	(inches) 2 Depth From 0 Plugging Cont	in Feet To 12 Factor	Threads per in. PVC Sec: Hole Diameter	Depth Top tion 4. RECO Sacl of M Sectio	In Feet Bottor	JDDING Cubic of Ce 4 s	Length (feet) 18 GAND CE Feet ment SX RECORD	Type of S EMENTING Ment hand placer	hod of Pla	From 13 accement	
	(inches) 2 Depth From 0 Plugging Cont Address Plugging Meth	in Feet To 12	Threads per in. PVC Sec: Hole Diameter 8	Depth Top tion 4. RECO Sacl of M Sectio	in Feet Bottor	JDDING Cubic of Ce 4 s	Length (feet) 18 G AND CF Feet ment SX RECORD	Type of S EMENTING Met hand placer	hod of Pla nent	From 13 accement,	18
	(inches) 2 Depth From 0 Plugging Cont Address Plugging Meth Date Well Plug	in Feet To 12 ractor	Threads per in. PVC Sec: Hole Diameter 8	Depth Top tion 4. RECO Sacl of M Sectio	in Feet Bottor	JDDING Cubic of Ce 4 s	Length (feet) 18 GAND CE Feet ment SX RECORD	Type of S EMENTING Met hand placer	hod of Pla nent	From 13 accement,	18

Use Observation Location No. 17.26,8,2423

File No. _____ RA-6975-X-9

			Section 6. LOG OF HOLE
Depth i From	n Feet To	Thickness in Feet	Color and Type of Material Encountered
_			
	2	2	brown topsoil with gravel & concrete
2	3	1	brown silty clay w white pebbles
3	7	4	tan silty clay dense
7	8]	11	tan silty clay
81	14	<u>51</u>	gray silty clay with gyp & unweathered anhydrite
14	16	22	dolo gravel water bearing seams w gry-brn silty clay
_16	20	=4	brown sandy silty clay
20		7 7	red clay well sorted =
	•		
	· ·		• • • • • • • • • • • • • • • • • • •
			· · · · · · · · · · · · · · · · · · ·
			-
			· · · · · · · · · · · · · · · · · · ·
· ·		1	
	- · - · · · · · · · · · · · · · · · · ·		
	-		

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

1

Dale Flinghes

ن<u>ب</u> مثلق س

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. *F* tions, except Section 5, shall be answered as completely and accurate to possible when any well is drilled, repaired or deepen. When this form is used as a plugging record, only Section 1(a) and Section the deepender of the section of the section of the section 1(a) and Section the section of the

			STATE	E ENGINEE	R OFFICE				
			w	ELL REC	ORD		E IELD E	NGR.	LOG
					NFORMATI	ON			
				MPANY 159		Owne	r's Well No.	32	<u>.</u>
Street or City and	Post Office Ad State	ARTESIA	, N M	88210					
		No. RA-70			and is loca	ted in the:			
						<u>17 S</u> Rai			NMP
							5		
b. Tract l	No	of Map No	<u> </u>	of the	e	<u> </u>			
		of Block No in						ž	
	•				•	ate System		-	7
							·····		Zone Gra
B) Drilling C	ontractor _5.	Dale Hug	hes			License No	WD 749	<u> </u>	
ddress		Box 199	A. Artes	ia <u>, N M</u>	88210	·····	<u> </u>		
			•	•		Auger			
		-			••	ft. Total depth			
ompleted well	is 🖾 sh	allow 🗆 art	esian.		Depth to wa	iter upon completior	of well	10	
			on 2. PRINCI	PAL WATE	R-BEARING	STRATA	1		
Depth i From	n Feet To	Thickness in Feet	De	scription of	Water-Bearin	g Formation	Estim (gallons	ated Y	
16	22	6				bles with		NA	
		· ····	Oroun1	sn rea :	sanny si	lty clay			
					·				
								. <u></u>	
					·· · · · · · · · · · · · · · · · · · ·		l		
		· ····			OF CASING	G			
Diameter (inches)	Pounds per foot	Threads per in.	Depth in Top	Feet Bottom	Length (feet)	Type of Sho	⊃e †——	Perfora om	tions To
2	PVC				22		17	,	22
					1				
					<u> </u>		l		
Depth	in Feet	Section Hole	n 4. RECORE Sacks		UNG AND C	EMENTING			
From	To	Diameter	of Mud		f Cement	Meth	od of Placem	ent ,	
C	16	8			5 sx	Rose Gravel	truck	-	
						<u> </u>	<u> </u>		
				I		l			
				5. PLUGGI	NG RECORI)			
lugging Contra ddress					r	Depth in	Faat		·
lugging Metho	d				No	Depth in Top	Bottom		ic Feet Cement
ate Well Plugg lugging approv	-		<u> </u>		12				
		State Engin	eer Represent	tative					
<u></u>					4				
	Novembei	9, 1982	FOR USE O	F STATE E	NGINEER O	NLY			
Date Received									

Revised June 1972

. ·

			Section 6. LOG OF HOLE
	in Feet	Thickness in Feet	Color and Type of Material Encountered
From D	<u>To</u> 2 1 2	2 ¹ /2	Dark brown topsoil
2 ¹ /2	4	$1\frac{1}{2}$	lt. brown silty clay with unweathered anhydrite
	6	2	tan silty clay
4			
6	6 <u>1</u>	<u>1</u>	red silty clay
61/2	10 <u>1</u>	4	lt brown silty clay with pebble seam at bottom
10 1	13	2 1	tan silty clay
13	16	3	
16	22	6	anhydritic sand & pebbles with brn-red sdy, silty clay
22	24	2	red clay hard
<u> </u>			
	·		

The undersigned here by certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Hughes Driller

4

÷

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. A tions, except Section 5, shall be answered as completely and accurat ; possible when any well is drilled, repaired or deepen. When this form is used as a plugging record, only Section 1(a) and Sectio. ...eed be completed.

								Revi	sed June 19
			ST	ATE ENGINEE	R OFFICE		Fire		
				WELL REC	ORD		ELL	<u>D</u> Eive	R. LO
		חר מעמע		I. GENERAL I. COMPANY				· •	33
Street or	well Post Office Ad State	dress	Drawer TESIA, N	159		Ow	ner's Well	No	
ell was drilled	under Permit !	No. RA	7098		and is locat	ed in the:			
						<u>17 5</u> F		26 E	NMD
						I			
	-			of the					
d. X=	, .					te System			
			Huchee				140 7		
, -						License No			
ddress	R	<u>t. Box</u>	<u>199 A, A</u>	<u>rtesia, N</u>	<u>882.</u>	10			<u> </u>
rilling Began .	10/20/	82 Cor	mpleted1	0/20/82	_ Type tools	Auger	Siz	e of hole_	8
1	d audience on				11 10 336	3 ft. Total dep	th of wall	101	- F
levation of lar	nd surface or								
ompleted well	lis ⊡X sh	iallow 🗆				ter upon completi	ion of well	10	<u> </u>
Depthi	in Feet	S Thickne		NCIPAL WATE	R-BEARING	STRATA		Estimated	Yield
From	To	in Fee		Description of	Water-Bearing	Formation	(g;	allons per i	minute)
14 1	17	2 1	Anhy	. sand wi	th white	gray silty	clay	NA	
				on 3. RECORD	T			Bodo	
Diameter (inches)	Pounds per foot	Threads per in.		ол 3. RECORD h in Feet Bottom	OF CASING Length (feet)	Type of S	ihoe	Perfo From	rations To
			Depth	in Feet	Length		ihoe		Y
(inches)	per foot		Depth	in Feet	Length (feet)		ihoe	From	To
(inches)	per foot		Depth	in Feet	Length (feet)		ihoe	From	To
(inches)	per foot	per in.	Depth Top	i in Feet Bottom	Length (feet) 18	Type of S	ihoe	From	To
(inches) 2 Depth	per foot PVCX	per in. Sea Hole	Depth Top	DRD OF MUDD	Length (feet) 18 ING AND CF ubic Feet	Type of S		From 13	To
(inches) 2	per foot PVDX	per in.	Depth Top	n in Feet Bottom DRD OF MUDD tks C Aud o	Length (feet) 18	Type of S	thod of P	From 13	To
(inches) 2 Depth From	per foot PVDX in Feet To	per in. Sea Hole Diameter	Depth Top	DRD OF MUDD	Length (feet) 18 NING AND CE ubic Feet f Cement	Type of S MENTING Me	thod of P	From 13	To
(inches) 2 Depth From	per foot PVCX in Feet To 12	per in. Sea Hole Diameter	Depth Top	n in Feet Bottom DRD OF MUDD tks C Aud o	Length (feet) 18 NING AND CE ubic Feet f Cement	Type of S MENTING Me	thod of P	From 13	To
(inches) 2 Depth From	per foot PVCX in Feet To 12	per in. Sea Hole Diameter	Depth Top	n in Feet Bottom DRD OF MUDD tks C Aud o	Length (feet) 18 NING AND CE ubic Feet f Cement	Type of S MENTING Me	thod of P	From 13	To
(inches) 2 Depth From	per foot PVCX in Feet To 12	per in. Sea Hole Diameter	Depth Top	n in Feet Bottom DRD OF MUDD tks C Aud o	Length (feet) 18 NING AND CE ubic Feet f Cement 4 sx	Type of S MENTING Me	thod of P	From 13	To
(inches) 2 Depth From 0	per foot PVCX in Feet To 12 	per in. Sec Hole Diameter B	Depth Top	DRD OF MUDD ks C fud o	Length (feet) 18 NING AND CE ubic Feet f Cement 4 sx	Type of S MENTING Rose Grav	thod of Prel tru	From 13 lacement Ck	
(inches) 2 Depth From 0 dugging Contra ddress	per foot PVCX in Feet To 12 	per in. Sec Hole Diameter B	Depth Top	DRD OF MUDD ks C fud o	Length (feet) 18 NING AND CE ubic Feet f Cement 4 sx	Type of S MENTING Me Rose Grav	thod of P	From 13	To
(inches) 2 Depth From 0 dugging Contra ddress lugging Metho bate Well Plugg	per foot PVEX in Feet To 12 	per in. Sec Hole Diameter B	Depth Top	DRD OF MUDD ks C fud o	Length (feet) 18 NING AND CE ubic Feet f Cement 4 sx NG RECORD	Type of S MENTING Rose Grav	thod of Prel tru	From 13	To 18
(inches) 2 Depth From 0 C	per foot PVEX in Feet To 12 	per in. Sec Hole Diameter B	Depth Top	a in Feet Bottom DRD OF MUDD cks C Aud o on S. PLUGGIN	Length (feet) 18 MING AND CE ubic Feet f Cement 4 sx NG RECORD	Type of S MENTING Rose Grav	thod of Prel tru	From 13	To 18

Use <u>Observation</u> Location No. <u>17. 26 8. 2422</u>

i

ļ

ļ

ŀ

ļ

ł

i i

I.

1

File No.___

RA-7098

			Section 6. LOG OF HOLE
Depth in		Thickness in Feet	Color and Type of Material Encountered 🤅
From	<u> </u>		
0	4	4	Brown topsoil
4	13	9	lt brown silty clay w anhy.
13	1412	11/2	gray silty clay
1412	17	2 1 /2	anHyd. eend in white gray silty clay & red-tan clay
17	191/2	2 1 /2	red clay
			•
			···
			~
		+	
		ļ	· · · · · · · · · · · · · · · · · · ·
			· · · · · · · · · · · · · · · · · · ·
		<u> </u>	
		Section	7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Date Highis

ι

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. A tions, except Section 5, shall be answered as completely and accurate possible when any well is when this form is used as a plugging record, only Section 1(a) and Section are the completed.

Revised June 1972

L

STATE ENGINEER OFFICE WELL RECORD

EIELD ENGR. LUG

__ FSL

FWL

_Location No. 17. 26.8.2424

6 a S

				. GENERAL						-,
Street or	Post Office Ad	dress	Drawer	159			Owi	ner's Well No.		
City and	State	AR	TESIA, N	<u>m 88</u>	210	<u> </u>		·		
Well was drilled	under Permit 1	No. RA-70	98-X		and i	is locate	ed in the:			
a. <u>SE</u>	_ <u>% _ NE</u> %	_ <u>SE_</u> %_	NE ¼ of Se	ction A	Tov	wnship	<u>175</u> R	ange <u>26</u>	Ε	N.M.P.M.
b. Tract	No	_ of Map No	D,	of 1	the					
	oŢ									
	vision, recorded	-			•					-
					N.M. Co	ordinat	e System		د م	Zone in Grant.
(B) Drilling C	ontractor	<u> </u>	Dale Hugh	185			License No	<u>WD 749</u>		
Address	Rt	Box 19	9A. Arte	sia, N	<u>м </u> е	38210				····
Drilling Began .	10/20/8	3 <u>2</u> Com	pleted _10/	<u>20/82</u>	Туре	e tools .	Auger	Size of	hole_	<u> </u>
Elevation of lar	nd surface or	<u></u>		at v	well is	3363	ft. Total dep	th of well	22	ft.
Completed well	is IX sh	allow 🗍	artesian		Denth	to wat	er upon completio	on of well	9	ft
Completed wen										
Depth i	in Feet	Thicknes	ction 2. PRIN					Esti	mated	Yield
From	То	in Feet		Description (DI Water-	Bearing	Formation	(gallor	ns per i	minute)
16	20	4	Anhyd.	sand i	n gray	sil	ty clay & g	yp N	А	
								_		
L			Sectio	n 3. RECOR	D OF C	ASING		<u> </u>		
Diameter (inches)	Pounds per foot	Threads per in.		in Feet		ength	Type of S	hoe		rations
2	PV(Тор	Bottom		feet) ?1			10m 6	<u>To</u> 21
				··		· •				
										ļ!
										L
	·····	Sect	tion 4. RECO	RD OF MUL	DING A	ND CE	MENTING			
Depth From	in Feet To	Hole Diameter	Saci of M		Cubic Fe of Ceme		Met	hod of Placer	nent •	
· 0	15 z	8			5 sx		Rose Grave	1 Truck	 	-
			-				<u> </u>			
L		L		<u>l</u>				<u></u>		
Plugging Costs	ector		Sectio	on 5. PLUGO	SING RE	CORD				
Plugging Contra Address						No.	Depth i	n Feet		bic Feet
Plugging Metho Date Well Plugg				·	······	1	Тор	Bottom	of	Cement
Plugging approv						2				
		State En	gineer Repres	entative		3	1		1	
			EOD USE	OF STATE						

November 9, 1982 Date Received

Quad _

Use Observation

File	No.		 	RA-	7098-	- <u>X</u>
	·	÷-	 -	. '		
	. •	-				

1

i

Depth	in Feet	Thickness	
From	То	in Feet	Color and Type of Material Encountered
0	6	6	Brown topsoil & fill
6	10	4	Gray-brown silty clay with unweathered anhydrite
10	16	6	gyp in silty clay & unweathered anhydrite
16	20	4	anhydritic sand in gray silty clay & gyp
20	22	2	gray clay.
	×		•
		<u> </u>	*
 -			
			· · · · · · · · · · · · · · · · · · ·
- 11			
		1	

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Dale Hughes

			~					Revised Ju
			STATE ENG		ICE		FIEL	; 1) (5.55)
			WELL	RECORD			يسلبوا فيسلاه	D Engi
			Section 1. GENEI	RAL INFORM	MATION	T		
A) Owner of	well	I DCAVAN	REFINING COMP	ANY	<u>-</u>	Owner	r's Well No	35
	Post Office Ac State		<u>Drawer 15</u> tesia, N M				· <u>··········</u> ·····	
			3 X 2					-
a. <u>SW</u>	_ ¼ <u>_5E</u> ;	4 <u>50</u> % NI	1 14 of Section	_ <u>9</u> Tow	vnship	<u>175</u> Ran	ige20	<u> </u>
b. Tract	No	of Map No		of the				
						<u> </u>		
	-			-				× -
		_ feet, Y=	f	eet, N.M. Coc	ordinate	System		
(B) Drilling (ontractor	S. Dale H	ughes			License No. L	JD 749	
			<u>x 199 A, Arte</u>					
Drilling Began	10/20,	/82 Compi	eted <u>10/20</u> /	<u>/82</u> _ Type	tools	Auger	Size of I	hole
Elevation of lar	1d surface or _			at well is	3362	ft. Total depth	of well	<u>211</u>
Completed wel	tis 🗆 🗴	hallow 🗆 ar	tesian.	Depth	to water	upon completion	of well	7
			on 2. PRINCIPAL V					
Depth	in Feet	Thickness	1				Estim	ated Yield
From	То	in Feet		on of Water-E				per minut
15	20	5	Dolo gravel	. in tig⊦ <u>_Clav</u>	nt gra	y sdy silty	N	A
		· · · · · · · · · · · · · · · · · · ·				•		
		1	1					
		· · · · · · · · · · · · · · · · · · ·	Section 3. REC			I		De de la tra
Diameter (inches)	Pounds per foot	per in.	Depth in Feet Top Bott		ngth eet)	Type of Sho	e	Perforation om
2		PVC		2	20		1	5 2
		<u> </u>				<u> </u>		
	1							
	·				· · · · ·			
· · · · · · · · · · · · · · · · · · ·		Sectio	n 4. RECORD OF N	UDDING A	ND CEM	ENTING		
	in Feet To	Sectio Hole Diameter	n 4. RECORD OF N Sacks of Mud	Cubic Fe	et		od of Placem	enţ
Depth From	То	Hole	Sacks	Cubic Fe of Ceme	et nt			
From		Hole Diameter	Sacks	Cubic Fe	et nt	Metho		
From	То	Hole Diameter	Sacks	Cubic Fe of Ceme	et nt	Metho		
From	То	Hole Diameter	Sacks	Cubic Fe of Ceme	et nt	Metho		
From	То	Hole Diameter	Sacks of Mud	Cubic Fe of Ceme 4 ¹ / ₂ s>	c	Metho		
From C		Hole Diameter 8	Sacks	Cubic Fe of Ceme 4 ¹ / ₂ s>	c	Metho		
From 0 Plugging Contr Address	To 14 	Hole Diameter 8	Sacks of Mud	Cubic Fe of Ceme 4 ¹ / ₂ s>	cord	Metho	el Truck	Cubic I
From 0 Plugging Contr Address — Plugging Metho	To 14 	Hole Diameter 8	Sacks of Mud	Cubic Fe of Ceme 4 ¹ / ₂ s>	c CORD	Metho Rose Grave	el Truck	Cubic I
From 0 Plugging Contr Address	To 14 	Hole Diameter 8	Sacks of Mud Section 5. PLU	Cubic Fe of Ceme 4 ¹ / ₂ s>	cord	Metho Rose Grave Depth in	el Truck	· · · · · · · · · · · · · · · · · · ·

___ Use Observation ___ Location No. 17. 26. 9. 1323

File No. RA-7098-X-2

			Section 6. LOG OF HOLE
	Depth in Feet Thickn		Color and Type of Material Encountered
From	<u>To</u>		
0	2	2	Brown-shite topfill
2	5	3	brn-gry silty clay with gravel & gyp
5	10	5	lt. brn silty clay with gravel
10	1112	112	lt. brn silty clay with gravel
$11\frac{1}{2}$	15	3 ¹ / ₂	white silty clay w anhydrite
15	20	5	dolomite seams in tight gray sand-silty clay
20	21 1	11/2	dry tight white silty clay with anhydrite
	•		· ·
		L	
	AN		
			· · · · · · · · · · · · · · · · · · ·
-		<u>,</u>	

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Dale Hugher Driller

i 1

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. A tions, except Section 5, shall be answered as completely and accurate possible when any well is when this form is used as a plugging record, only Section 1(a) and Section is even be completed.

								Revised Ju	
					ER OFFICE			Ă	
				WELL RE	CORD		EIELI	D Elvun	. 1
			Section 1	GENERAL	INFORMATIO	N	•	411	
	well			ING COMP	PANY		r's Well No.	36	
Street or City and	Post Office Ad	dressAF		er 159 NM 88	3210				
					and is locate	ad in the:			
								_	
			-	_	•	<u>17.5</u> Rai	0		.M.P.N
b. Tract	No	of Map No		of t	he	<u> </u>			
c. Lot N	D	of Block No		of t	he				
Subdiv	ision, recorded	l in			County.			ž	
				feet,	N.M. Coordinat	e System			Zone i Grant
			4.19M					4	Gran
 Drilling C 	ontractor	<u> </u>	<u>Hughes</u>			License No	<u>MD 74</u>	9	
ddress		<u>Rt. 1, F</u>	lox 199	A, Arte	esia, N M	88210			
rilling Began .	10/21/8	3 <u>2</u> Compl	leted <u>10</u>	/21/82	Type tools .	Auger	Size of	hole <u>8</u>	ir
levation of la-	id surface or	-		atu	ell is336P	1 2 ft. Total depth	of well	25	f
levation of far						-			
ompleted well	is 🗴 sh	nallow 🗆 ar	tesian.		Depth to wat	er upon completion	of well		fi
		Sect	ion 2. PRIN	CIPAL WAT	ER-BEARING	STRATA	• ······	<u>.</u>	
Depth From	in Feet To	Thickness in Feet	I	Description o	of Water-Bearing	Formation	Estimated Yield (gallons per minute)		
14	155	11/2	Anhyd	. clayey	/ and in t	ight gype cl	+	NA	
						··			
			Sactio	- 3 PECOP		<u>.</u>	1		
Diameter	Pounds	Threads		n 3. RECOR in Feet	D OF CASING		· · · · · · · · · · · · · · · · · · ·	Perforation	ns
Diameter (inches)	Pounds per foot	Threads per in.			1	Type of Sho	be Fi		ns To
			Depth	in Feet	Length	Type of Sho		rom	То
(inches)	per foot		Depth	in Feet	Length (feet)	Type of Sha	Fi	rom	To
(inches)	per foot		Depth	in Feet	Length (feet)	Type of Sho	Fi	rom	To
(inches)	per foot		Depth	in Feet	Length (feet)	Type of Sho	Fi	rom	To
(inches) Z	per foot PVC	per in.	Depth Top	in Feet Bottom	Length (feet) 17 DING AND CE		Fi	rom	To
(inches)	per foot PVC	per in.	Depth Top	IN Feet Bottom	Length (feet) 17	MENTING	Fi	rom 2 1	To
(inches) 2 Dep th	per foot PVC	per in.	Depth Top on 4. RECOI	IN Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet	MENTING	od of Placer	rom 2 1	To
(inches) 2 Depth From	per foot PVC in Feet To 11	per in.	Depth Top on 4. RECOI	IN Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement	MENTING	od of Placer	rom 2 1	To
(inches) 2 Depth From	per foot PVC in Feet To 11	per in.	Depth Top on 4. RECOI	IN Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement	MENTING	od of Placer	rom 2 1	To
(inches) 2 Depth From	per foot PVC in Feet To 11	per in.	Depth Top on 4. RECOI	IN Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement	MENTING	od of Placer	rom 2 1	To
(inches) 2 Depth From	per foot PVC in Feet To 11	per in.	Depth Top	In Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement	MENTING	od of Placer	rom 2 1	To
(inches) 2 Depth From 0	per foot PVC in Feet To 11	per in.	Depth Top	In Feet Bottom	DING AND CE Cubic Feet of Cement 4 sx	MENTING	od of Placer	rom 2 1	To
(inches) 2 Depth From 0	per foot PVC in Feet To 11 : : : :	per in.	Depth Top	In Feet Bottom	DING AND CE Cubic Feet of Cement 4 sx	MENTING Metho Rose Grave	od of Placer	nent	To 7
(inches) 2 Depth From 0	per foot PVC in Feet To 11 i actor d	per in. Section Hole Diameter 8	Depth Top	In Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement 4 SX ING RECORD	MENTING Metho Rose Grave	od of Placer	rom 2 1 nent	To 7
(inches) 2 Depth From 0	per foot PVC in Feet To 11 in feet actor actor ed	per in.	Depth Top	In Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement 4 SX ING RECORD	MENTING Metho Rose Grave	od of Placer	nent	To 7
(inches) 2 Depth From 0	per foot PVC in Feet To 11 in feet actor actor ed	per in. Section Hole Diameter B	Depth Top	in Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement 4 sx ING RECORD	MENTING Metho Rose Grave	od of Placer	nent	To 7
(inches) 2 2 Depth From 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	per foot PVC in Feet To 11 in feet actor actor ed	per in. Section Hole Diameter 8	Depth Top on 4. RECO Sach of M Sach of M	in Feet Bottom	Length (feet) 17 DING AND CE Cubic Feet of Cement 4 SX ING RECORD	MENTING Metho Rose Grave	od of Placer	nent	To 7

ł

Depth in Feet Thickness		Thickness	Color and Type of Material Encountered				
From	To	in Feet					
D	4 1	4 1 /2	Brown soil & fill				
$4\frac{1}{2}$	8	3 ¹ / ₂	lt brn silty clay with gravel				
8	14	6	gray silty clay				
14	15 <u>1</u>	$1\frac{1}{2}$	anhydritic clayey sand in tight gyp clay				
151/2	19	31/2	white clay with anhydritic nodules, gyp				
19	25	5	red-gray clay				
			· · · ·				
			<u>e</u>				
	<u> </u>						
		<u></u>					
			· · · · · · · · · · · · · · · · · · ·				
		·	· · · · · · · · · · · · · · · · · · ·				
		<u> </u>					
·	. <u></u>	<u> </u>					
			· · · · · · · · · · · · · · · · · · ·				
		+					

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Nale Auchue Driller

 \sim

INSTRUCTIONS: This forr bould be executed in triplicate, preferably typewritten, and submitted to of the State Engineer. All ons, except Section 5, shall be answered as completely and accurate. Jossible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 used be completed.

				WELL F	RECORD			· ·		Elv <u>GR.</u> J
			Section 1	. GENER	AL INFOR	ΜΑΤΙΟ	ИС			
(A) Owner	of well		O REFINI		PANY		0 ⁻	wner's We	11 No	37
Street	or Post Office Ac	dress ARTE	Drawe: SIA. N N		210					
Well was dril	led under Permit	NoHA	7098 X 4		and	is locat	ed in the:			
a. <u>N</u>	<u>E ¼SE_</u> ½	4 <u>.5W</u> 4. <u>N</u>	<u> ₩</u> ¼ of Se	ction	9 To	wnship	17 5	Range	26 E	N.M.P
b. Tra	ct No	of Map No		0	of the					
	± No									
Sut	division, recorde	d in			County	•			-	
	¥	_ feet, Y=		fee	et, N.M. Co	ordina	te System			
the		<u>_</u>	· · · · · · · · · · · · · · · · · · ·						_	Gra
(B) Drillin	g Contractor	<u> S. Dal</u>	e Hughes				License No	<u> </u>	749	
Address	. <u> </u>	Rt. Bo	<u>x 199 A.</u>	Artes	ia, N M	88	210			
Delling Room	an <u>10/21/8</u>	37 Com	nlated 10	/21 /82	Tvn	e toole	HUDBE	C:	ing of held	8
Elevation of	land surface or _							-		-
Completed v	vell is 🕱 s	hallow 🗖	artesian.		Deptł	to wa	ter upon comple	tion of we	11 (9
		Sec	ction 2. PRIN	CIPAL W	ATER-BEA	RING	STRATA			
Dep	th in Feet	Thicknes	5				g Formation		Estimated	
From	To	in Feet				Dearing		on (gallons per minute)		
14	18	4 -	Anhyd	ritic :	sand in	1t.	gray silt	y ¢lay	ы дур	NA
							•			
									·	
L					·····					
·····					ORD OF C		; 			
Diameter (inches)	Pounds per foot	Threads per in.	Top	in Feet Botto		ength feet)	Type of	Shoe	From	orations To
2	PVC					17			12	17
			<u>.</u> ,							
		Sect	ion 4. RECO	RD OF MI	UDDING A	ND CE	EMENTING			
Dep	th in Feet To	Hole Diameter	Sack of M		Cubic F		M	ethod of F	Placement	
	11	8			4 sx		Rose grav	el tru	ck	L
									÷	-
				l						
		<u> </u>	·		<u> </u>	I		· ·		, <u></u> ,
				n 5. PLUC	GGING RE	CORD				
							Denth	in Feet		Cubic Feet
	ntractor					No.	Тор	Botto		of Cement
Address Plugging Me	thod		· · ·					1		
Address Plugging Me	thod		· ·			12				
Address Plugging Me Date Well Pl	thod		·	entative		23				
Address Plugging Me Date Well Pl	thod		gineer Repres	entative	· •	2 3 4				
Address Plugging Me Date Well Pl	thod ugged proved by: 		gineer Repress	entative	· •	2 3 4		<u> </u>		

· ---·

.....

. . . _.

.

i.

_ . _ .

·····			Section 6. LOG OF HOLE
Depth i From	n Feet To	Thickness in Feet	Color and Type of Material Encountered
0	10 2 1 /2	$2\frac{1}{2}$	Brown topsoil & fill
		<u> </u>	
2 1	5	2 1	Dark brown silty clay
5	14	9	Lt. brn silty clay
14	18	4	Anhydritic sand in light gray silty clay with gyp
18	20 1	2 1 /2	Tight gray clay
	۲		· ·
			*
			· · · · · · · · · · · · · · · · · · ·
		ļ	
:			
		ļ	
			·
	_		
		†	
			<u> </u>
		<u> </u>	

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

:

.

<u>Hughe</u> Briller

INSTRUCTIONS: This for `ould be executed in triplicate, preferably typewritten, and submitted tr of the State Engineer. Al. ons, except Section 5, shall be answered as completely and accurate. drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

.) Owner of u				NGINEER (EIFID	ENGR. LU	
.) Owner of u				L RECO	RD		JULIE	ENGR. LU	J G .
.) Owner of u			Section 1. GEN	ERAL INF	ORMATIO	N ¹			
			REFINING CO	DMPANY		Owner'	s Well No	38	
Street or Po City and St	ost Office Add		Drawer 159 ESIA, N M		0		······		- , -
ell was drilled u	inder Permit N	No. RA 709	8 X 5	a	and is locate	ed in the:			
a. <u>SE</u>	% <u>SE</u> %	<u>SU % NU</u>	¼ of Section_	9	Township.	<u>17 S</u> Rang	e <u>26</u>	EN.M.P.N	A .
b. Tract N	0	_ of Map No		_ of the _				······	_
									_
-	•				-			-	
						e System		Zone i Gran	
3) Drilling Co	ntractor	S. Dale	Huobes		_	License No	MD 749		_
			_			8210			_
		•	•	•		Auger			-
						ft. Total depth c			
ompleted well i	s i∆Jsh⊨					er upon completion o	of well	f	t.
Depth in	Feet	Sectio Thickness	on 2. PRINCIPAL	L WATER-I	BEARING	STRATA	Fetime	ated Yield	٦
From	To	in Feet	Descrip	ption of Wa	ater-Bearing	Formation		per minute)	4
16	21	5	Anhydriti gray sili			pebbles with	N	A	4
							<u></u>		
			Section 3. R	ECORD O	F CASING			. <u></u>	_
Diameter (inches)	Pounds per foot	Threads per in.	Depth in Fee Top Bo		Length (feet)	Type of Shoe		erforations m To	-
2	PVC				21		1		1
						1			
+						+			1
					C AND 07		1	1	
Depth in	Feet	Hole	4. RECORD OI Sacks	Cub	ic Feet		of Placeme	ent .	٦
From	To	Diameter	of Mud	O to	Cement				-
	15	8			5 sx	Rose Gravel	Truck	÷ 	-
									4
<u> </u>			<u> </u>						
			Section 5. P	LUGGING	RECORD				
lugging Contrac	tor	<u> </u>				- <u>T</u>	······		-
ddress lugging Method					No.	Depth in F Top	eet Bottom	Cubic Feet of Cement	
ate Well Plugge lugging approve					<u> </u>				-
		State Engin	eer Representativ	ve	$-\frac{3}{4}$				7
		- 	-						
			FOR USE OF ST	IAIEENG	INEEK ON				
ate Received	November	7, 1902		Quad		FWL			

ļ

|

			Section 6. LOG OF HOLE					
Depth		Thickness in Feet	Color and Type of Material Encountered					
From D	<u>То</u> 4	in Feet	Brown topsoil					
U	4							
- 4	6 <u>1</u>	$2\frac{1}{2}$	Brn silty clay					
6 1	10	31/2	Lt. brn silty clay - soft					
10	11	1	Very hard Anhydrite					
11	• 16	5	gray soft silty clay					
16	21	5	Anhydritic sand & dolomite pebbles with dense gray silty					
21	23 1	$2\frac{1}{2}$	Very tight gray clay marbled with anhydrite					
<u> </u>	-4							
	्र							
<u> </u>		<u> </u>						
·		+						
<u></u>								
·								
			· · ·					
	··	L						
	• •	f						
		· ·	· · ·					
		C						

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Hughe Friller

INSTRUCTIONS: This for "ould be executed in triplicate, preferably typewritten, and submitted to ons, except Section 5, shall be answered as completely and accurate." appropriate district office possible when any well is drilled, repaired or deepened. when this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Wells 31-38 also logged by Geraghty and Miller, Inc.

	Geraghty &	Miller. Inc.			
		1			
	Well	≠ <u> 31</u>	Sample Loc	<u>[</u>	Page_/_of
	Project	<u>Navajo Ref</u> i	nery Locati	.on SW corner	of Colony Landfarm
	Drilling (Contractor D	Anderson Drille	r Richard	Helper Eddie
· · · ·	Rig Type_	Hollow Sten	Hole Diameter $\underline{8}$	inches Dr	illing Fluid NA
	Type of Sa	ample <u>SplitSpoo</u>	<u>Shelk</u> Drilling E	legan <u>1:30pm</u>	Drilling End 3:00
	Geraghty a	and Miller R	epresentative	Dauchy T.I	Bourette
	Blows per 6 inches	& Recovery	Sample De	escription	Depth Feet to Feet
			fill - brown topso	I w gravel i c	oncrete 0-Z
			brittle brown silty.	· •	
			brittle brown silty day	(, dense, nopebb	les 3-7
		6.114	tan silty clay, plast	ic, moist	7-81/2
	9-11-16	Split Spoon 872-10 organic smell	gray silty day w/ gy	s. i unweather and	hydrite, poorly sorted 8/z -14
	6-6-8	Split Spoon 14 - 151/2	dobmite gravel water w/ gray brown silty eli	bearing seams (ay, saturated,	z") interbed 1-1 - 16
	4-4-5	Split Spoon 1772 - 19			oarse grains 16 - 20
		Shelby Tube 20-22	red clay, well sor	ted, unsaturate	d 20-22
		÷			
			F		·
	<u> </u>				<u> </u>
			· · ·		
		,		— ــــــــــــــــــــــــــــــــــــ	
			· · · · · · · · · · · · · · · · · · ·		

١

Ţ

Geraghty & Miller, Inc.

5

ł

l

Well <u>#3Z</u> Sample Log	Page_Z_of
Project Navajo Refinery Location SE	corner of Telephone Storage
Drilling Contractor D. Anderson Driller Rich.	and Helper Eddie
Rig Type <u>Hollow Stem</u> Hole Diameter <u>8</u> incl Date and Time	hes Drilling Fluid <u>N/A</u> 2/20/82 Date and Timé
Type of Sample Split Speen Shelby Drilling Began_	<u>P:202M</u> Drilling End <u>9:00</u> 2M
Geraghty and Miller Representative <u>J. Dauch</u> y	T. Bouvete
Blows per % 6 inches Recovery Sample Descript:	Depth ion Feet to Feet
Dark brown topsoil	0 - 2/2
light brown silty day of son	veather poorly 212 - 4
3-4-5 Split Spoon 5-6/2 tan silty clay, brittle, poorly	ysorted 4-6
red silty clay	<u>6 - 6⁷2</u>
5-6-10 Split Spoon 10-111/2 light brown sitty cby, mothed,	poorlysorted 61/2-101/2
organic smell Pebble seam wet, dobite	gizzel, 2" 1042
tan sittychy, some as abo	$10\frac{1}{2}-13$
5-8-12 15-161/2 organic smell gray silty day, wellsorted,	less dense 13-16
9-16-17 17/2-19 brownish red sandy silty day	is interbed w/ $(6 - 22)$
6-7-9 Split Spoon 20-21/2	-
7-8-9 ZZYZ-24 Ted clay, wellsorted, dr	y i hard 221/2-24
	······
	·

6

Ì,

Ŋ

Ĭ,

7

ł

ł

Well	# 33	Sample Log	Page <u>3</u> of
Project_ <u></u>	Vavajo Refi	nery Location NE of Colo	ony CEntrance Gate
Drilling	Contractor C	Anderson Driller Richard	Helper Eddic
Rig Type	Iollow Sten	Hole Diameter <u>6</u> inches Date and Time 19/20/87	Drilling Fluid N/A
Type of S	ample <u>SplitSpo</u>	on Shelby Drilling Began 10:00	Am Drilling End 12:30 pm
Geraghty	and Miller R	epresentative <u>J.D.uchy</u>	T. Bouvete
Blows per <u>6 inches</u>	و Recovery	Sample Description	Depth Feet to Feet
	· · · · · · · ·	Brown topsoil	0 - 4
-	Shelby Tube 10-11	light brown silly clay w/ unweithered	
	organic smell	gray brittle silty by w (white ired a	parse grains 13 - 14/2
3-7-8	Split Spoon 15-16/2	gray brittle silty by w/ white ired of Analydritic sand interbedded in w sity cby and red itan silty clar	4/2 - 17
5-5-7	Split Speen 17-18/2	red day	17 - 19/2
	.4		
			~
		· · · · · · · · · · · · · · · · · · ·	

į

ļ

T

İ

.

ĥ

ĺ

Well	Sample Log	Page_4_of
Project Navajo Refin	nery Location East Fence	of Colony
Drilling Contractor D	Anderson Driller Richard	Helper Eddie
Rig Type <u>Hollow Stem</u> Type of Sample <u>SplitSpo</u>	Hole Diameter <u>6</u> inches I Date and Time 10-20- ShelbyDrilling Began <u>2:0 p</u>	Drilling Fluid N/A 82 Date and Time M Drilling End <u>3:30</u> PM
	epresentative_J.Dauchy	
Blows per & 6 inches Recovery		Depth Feet to Feet
	Brown Topsoil ? Fill	0-6
organic smell	Gray brown mottled silty day w/ and	nydrite, sorted, 6-10
7-12-16 Splitspoon 10-11/2 Shelby Tube	very brittle gyp in silty day w/ unw water bearing and ydritic sand int silty day sigge.	esthered subjectite 10-16
15-17	silty day sayp.	16-20
	gray clay, well sorted	20-22
· ·		
· · · · · · · · · · · · · · · · · · ·	·	· · · · · · · · · · · · · · · · · · ·
		· · · ·

.

Well	35	Sample Log Pa	ige_5_of
Project_N	Javajo Refin	nery Location <u>SW corner C</u> T	EL weathering
Drilling (Contractor_D	Anderson Driller Richard Help	per_ <u>Eddic</u>
Rig Type <u></u>	lollow Stem	Hole Diameter 8" inches Drilli	ng Fluid N/A
Type of Sa	ample <u>SplitSpo</u>	Hole Diameter <u>8</u> inches Drilli Date and Time 10-20-82 Da <u>en Shelby</u> Drilling Began <u>4.25pm</u> Dr	illing End <u>5.4</u> 5pm
Geraghty a	and Miller R	epresentative J. Dauchy T. Bo	ovete
Blows per 6 inches	% Recovery	Sample Description	Depth Feet to Feet
		Brown white topsill	0 - Z
		brown gray sitty day w/ gravel (1) 3 gypsun	2-5
		light brown silty clay w/ gravel (3/8) mixed	
3-4-6	split Spoon 10-1112	light brown silly clay w/out gravel, moist	
		white silty clay w/ anhydrite, very wet not.	saturated 11/2-15
7-16-37	Split5poon 15-16/2	Water bearing domite gravel seans in tight gray sandysi dry tight white silly clay w/ anhydi	Ituday 15-20
5-5-10	Split Spoon 20-211/2	dry tight white silly day w/ anhydi	rite $20-21/2$
			C
	ŧ	· · · · · · · · · · · · · · · · · · ·	
			

i

i

İ

•

Well	#36	Sample Log	Page_6_of
Project	Javajo Refin	Location North of T	EL in NonHazardous Landfar
Drilling (Contractor D	Anderson Driller Richard	Helper Eddic
Rig Type <u>f</u> Type of Sa	<u>lollow Stem</u> ample <u>SplitSpo</u>	Hole Diameter <u>8</u> inches D Date and Time 10/21/6 on ShelyDrilling Began <u>7:20</u>	rilling Fluid <u>N/A</u> 2 Date and Time 2 Drilling End <u>8:3</u> 520
Geraghty a	and Miller R	epresentative J. Douchy J	. Bouvete
Blows per 6 inches	<pre>% Recovery</pre>	Sample Description	Depth Feet to Feet
		Brown topsoil : fill	0-41/2
	organic smell	light brown silty clay w/ gravel (3/8) poorly 41/2-8
	large Split Spean	gray silly day w/ black, red, white o water bearing. anhydritic dayay in tight gyp alay	parsegrains 8-14
18-33-50	15-16/2	in tight gyp alay	14-151/z
10-8-7		white gray clay w/ anhydritic nodules,	
		red gray day	19-25
		· · · · · · · · · · · · · · · · · · ·	
	·		
			·····
		·	·
			~
		· · · · · · · · · · · · · · · · · · ·	
			<u> </u>

.

Well	#37	Sample Log	Page 7 of
Project <u>N</u>	Javajo Refin	Location <u>NE</u> Come	r of TEL
Drilling C	Contractor D	Anderson Driller Richard	Helper Eddie
Rig Type <u>H</u> Type of Sa	ollow Stem	Hole Diameter <u>6</u> inches I Date and Time 10/z1/6 ² ShellyDrilling Began <u>1:05</u>	Drilling Fluid <u>N/A</u> Date and Time Drilling End 2:8
	• •	epresentative J. Dauchy	
Blows per 6 inches	% Recovery	Sample Description	Depth Feet to Feet
		brown topsoil - fill	0-2 ^y z
	ocquoic siell	dark brown silly clay mottled	· 2 ¹ 2 - 5
	5	light brown silty clay white ! black peble anhydritic sand in light y ray	oles poorly 5-14
15-62-23	14-15/2	ω / gyp.	sitty clay 14-18
12-13-16	Split Spoon 19-20/2	tight gray day well sorted	18-207
	· · · · · · · · · · · · · · · · · · ·		
	÷		
		· · · · · · · · · · · · · · · · · · ·	
			~
		·	
	·····		

6

• •

Well	±38	Sample Log	Page 8 of
Project	Vavajo Refin	nery Location East Fence	of TEL
Drilling	Contractor D	Anderson Driller Richard E	lelper <u>Eddic</u>
Rig Type <u>}</u> Type of S	<u>lollow Stem</u> ample <u>SplitSpo</u>	Hole Diameter <u>6</u> " inches Dri Date and Time 10-21-82 In ShelbyDrilling Began	lling Fluid <u>N/A</u> Date and Time _Drilling End
		epresentative J. Dauchy T.	
Blows per 6 inches	Recovery	Sample Description	Depth Feet to Feet
		Brown topsoil	0-4
	organic smell	poorly sorted brown silly clay marbled w/ gray soft	
	organic smell Shelby Tube	light brown silty clay soft, poorly sor	·••
9-17-19	10-12 Split Speen	very hard anhydrite (cement/crystals) w/	
4-8-9	Split Spoon	aray soft silly cby reddish tint, po anhydritic large grain sand : dobmite pel	porty sorted 11 - 16 poles water
8-13-13	1 Split Speen	bearing zones (1-2") interbed w/ dense grav very tight gray clay narbled w/ anhy	
			<u>.</u>
	i		
			-
	·		~
		·	
			· · · · · · · · · · · · · · · · · · ·

SAMPLE LOG Well # 39 Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Split spoon core barrel 18" Rig - Hollow stem auger 8" diameter Fasio & Chancey Date 6-13-84 3311 Depth Sample description 0-6-Lt-Red Clay Soil -104 gyp anhy pebbles, clay 14 gry gyp. oder gas 174 gra gyp, anhy - - Oil ador and stain 18 12 anhy, gyp, clay 20 Red + gry shok, anhy + anhy x/s, Red shale water - 21th Red Clay & anhy mixed with pebbles. water -24 " mixed red twhite anhy + clay - some pebbles 26 fine red 4 wht anhy with clay-dry.

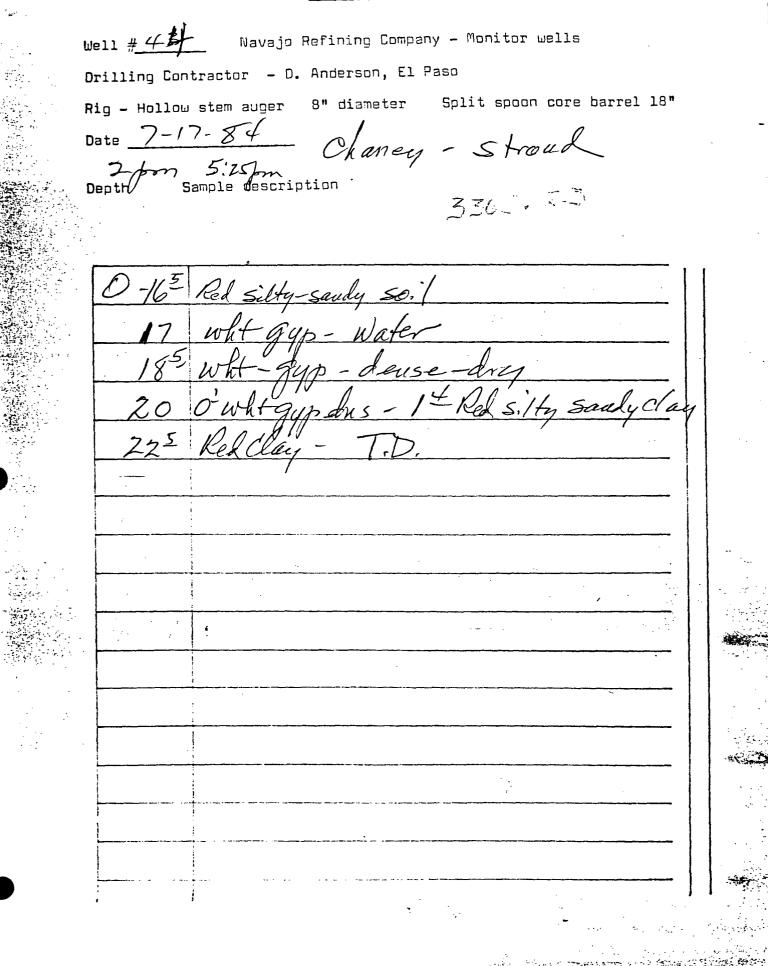
SAMPLE LOG Well # 40 Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 8" diameter Split spoon core barrel 18" Fasio & chaney Date <u>6-14-84</u> 3361.26 Sample description Depth 0-4 50,1 82 gyp, anhy, gry shale dry 13 gyp, anhy, gry shale water 16 anhy, shale, gyp- Bleeding Oil 18th L+ gry fine anhy - no oil 19 14 L+ gry, tan, granular anhy - 0:1 20³/4 gyp - water 23³/4 gyp, anhy - water 25¹/4 Tan, fine, xIn anhy 28'4 Tan fxIn anky - sand - gravel at 25.55 31h Red sandy silt

SAMPLE LOG Well # 4 / Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 8" diameter Split spoon core barrel 18" Date 6-15-84 765104 Chaney Sample description Depth 3.5. 0-15 Soil - Wet at 13 feet 16' wht+ Tau anhy + gyp - water 21 wht gyp with anhy pieces (gravely) 25" whit + gry gyp + anhy - deuse 272 gry sandy clay tight 29 Red & gry sandy clay 31 Red sandy shale (Clay)

a chiant

SAMPLE LOG Well # 42 Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 8" diameter Split spoon core barrel 18" Date 6-18-84 . Fasio & chaney Sample description Depth 50 2 0-10 Soil damp at 9' 14 12 wht gyp, anhy & Clay - tight 1912 whit gyp, anhy pebbles, clay water 221/2 gyp + gry, red sandy silt 24 Vy fine gry shaley silt with pabbles 29° gry shaley, sandy, silt 29 Red Shaley, Saudy, Silt

Well # 42 Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Split spoon core barrel 18" 8" diameter Rig - Hollow stem auger Chaney - Stroad Date 7-17-84 7:15 au - 12:10 pm Sample desoription Depth 42 Soil soil (Red & gyp. mixed Shale + gyp - vyred ottore mixe Y GUB -.67 W 5 with anky pebbles HCR-odornu blag Qul wanty bolbles HCR- ,7. Pas stutodor-O gub-51.94+14 1 - gyp, gravel 5 63 1 = gry gyp -anly gypwthdo pesravel - wt 18 Sauly + philes - 0 - Ren The Silter RX Dr Saud



Well #45 Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso 8" diameter Split spoon core barrel 18" Rig - Hollow stem auger Date 8/22/84 Stroud-Ledesma By Effluent ditch Sample description Depth at NW Corner farme 11' So. C ditch 0-45 Red Soil dry 5 gyp- dry 575 6⁵ 6³ wht gyp. dry - 6² gry shale dry 596. 8 gry sky shale w very 1ge anhy pes- dry 9⁵ 18⁸ 9⁵ gry shale & gyp. Denhy gravel - 9⁵ gry shale + anhy dry 10 z'core 11⁵ 10⁸ - 9ry shalo ws auky pes - 11² anky gravel- 11⁵ gry shil 49 flows 13 gry shale w gyp-anky pes - demp. 31/2 when do blows Why 61-14 - gravel at top: 14' and at 14 - gry stil w gravel streaks 27 blows 16 14 - is rgrysh + gravel - 15-16-gry shele - wtv 16 Casing gravel 18-10⁵ Pellets 10-8⁵ cmyt 200

Well # 46 Navajo Refining Company - Monitor wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 8" diameter – Split spoon core barrel 18" stroud - Ledesman Date 8/22/84 11:55 a Sample description Center north side Depth Novago-Collier Far 0-65 Dark red 50:1 8 Lite Red soil + gyp dry 11 gry clay w gyp damp 12⁵ gry clay, gyp, anky pc. - tight-drg. 14 gryclay-gyp. auky gravel - wtr 15⁵ 14-15²-gry sly-shalo 15³⁻⁵ Red shale Fine Red Shale. C.sq- 17' gravel + Perps 17-12 12-10 Rellets Cummt- 10-0

SAMPLE LOG 47 Well # Navajo Refining Company - Monitor wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 8" diameter Split spoon core barrel 18" Date 8/22/84 Stroud-Ledesma Depth Gample description SE Comer Novajo . Collier Fare TP 72 (L) . 0-5 derk Red soil deup 10 Lite Red soil daup 11⁵ Red Shale Orange Red Anele banch. 124 ŝ Casing 14 gravel + Rerps - 14-9 Bilots 9-8 Cunt

. .

Well <u># AA</u> Navajo Refining Company - Monitor Wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 9" diameter Split spoon core barrel 19" Date <u>6/8/83 11:15</u> am

Depth Sample description

0 - 5 Fill - clay & gravel $5 - 6\frac{1}{2}$ Red clay - fill? $6\frac{1}{2} - 8$ Blk oil stained soil or fill Rec. 1' lost $\frac{1}{2}$ ' Heavy HCR (hydrocarbon residue) in gypsum - oil odor 8 - 97 F Red Clay Rec. 1' lst 눈' BIK Oul stained $9\frac{1}{2} - 10$ Drill gyp HEAVY HER $10 - 11\frac{1}{2}$ l.l' gyp oil odor .4' gyp & red clay oil odor 11- - 13 .5' porous gyp heavy gasoline odor. 1' gyp with 94P gasoline odor Gassline $13 - 14\frac{1}{2}$.5' porous gyp gasoline dripping. 1' gyp $14\frac{1}{2}$ - 16 .3' porous gyp with free gasoline. 1.2' gyp sli por gasoline odor. Tr gray clay $16 - 17\frac{1}{2}$ 1' gyp & 1st gravel with gasoline. .5' gyp no odor 15 Up + STAU $17\frac{1}{2}$ - 19 gyp & lst gravel - water s oder $19 - 19\frac{1}{2}$ Orill gyp $19\frac{1}{2}$ - 21 1.2" gravel & gyp; water. .3' dry gravel - solid No go core. Rec. + .25' very crs gravel & gyp 21+ SIDBUN -19 wf -10 94 - 2/4. (7/23) MAR 06. 1995 ON CONSERVATION DIVISION •**)** <u>9</u>6 SANTA FE E . T. al Art. Company.

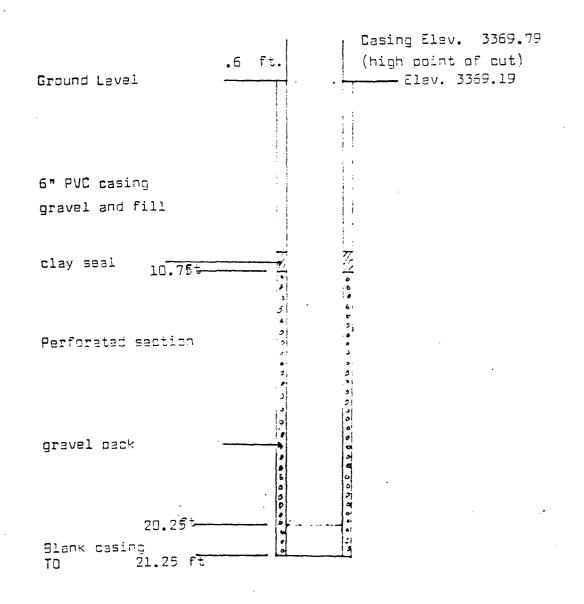
DETAILS OF MELL CONSTRUCTION

Data <u>6/8/93</u>

UN."

<u>2911 # 29</u>

Company <u>Davajo Refining</u>



and the second sec

Well <u># A9</u> Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 9" diameter Split spoon core barrel 18" Date <u>6/9/83</u> <u>7:15 a</u>m

Depth Sample description

0 - 9 Sail - Fill - Red 9 - $10\frac{1}{2}$ dk. gry gyp & clay with 1st pebbles and blk HCR seams. sli gas odor $10\frac{1}{2} - 12$ gravel (crs 1st pebbles in gyp) free gasoline free gasoline $12 - 13\frac{1}{2}$ crs. 1st pebbles in gyp $13\frac{1}{2} - 15$ crs 1st pebbles in gyp free gasoline $15 - 16\frac{1}{2}$ gyp & med gravel - gasoline & water 94 p. obor HCR $16\frac{1}{2} - 19\frac{1}{2}$ Orill gyp & gravel 10-Gassline Top Gasoline gapt mg -16.5 20 r - 11. 34 Top fli 7/= 3 TP 20 MAR 06 1985 OIL CONSERVATION DIVISION SANTA FE

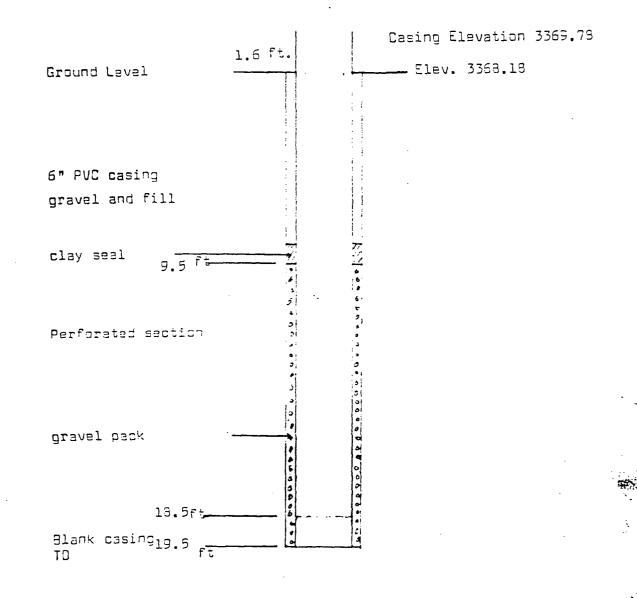
DETA	÷ 1	~	75	1121	1 6	10010		i nu -	
リミナー		=				بال اقت و	21.7	ا سا ب	1 - 1

Date 6/9/83

₩ell # <u>A3</u>____

Section and

Company <u>Navejo Refining</u>



and the second sec

1

SULT STAURS

Well <u># AC</u> Navajo Refining Company - Monitor wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 9" diameter Split spoon core barrel 18" Date <u>6/9/83 10 am</u>

Depth

Sample description

0 - 5 Fill dirt. Top lt red soil @ 5' Lt red soil. Top gravel 2 8' 5 - 8 8 - 10 gravel & red soil $10 - 12\frac{1}{2}$ gravel & red soil or clay - top gyp gas odor 2 $12\frac{1}{2} - 13$: Orill gyp .5' gyp w gas & water some gry clay 1' gyp $13 - 14\frac{1}{2}$ Gravel 4 Red Soil $14\frac{1}{2} - 15\frac{1}{2}$ gyp & gry clay. Sli gravel $14\frac{1}{2}-\frac{2}{4}$ water 10-212 15¹/₂ - 17 1.4' gyp wet .1' dry gyp 94P+ qiak gas 4 water evater TD - 1475 whi 10.47 411 123 20 1.74 800 朝 MAR 06 1985 OIL CONSERVATION DIVISION SANTA FE

DETAILS	0f	WELL COMETRUCTION

Date <u>6/9/83</u>

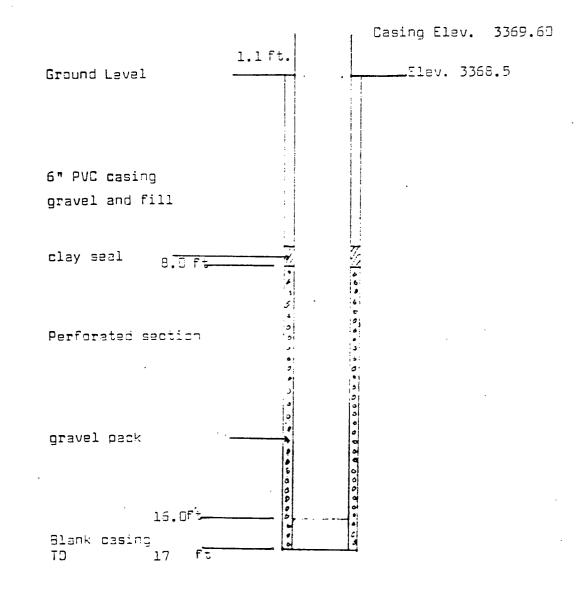
i.

8

Mell # _____AC

and the second second second second second second second second second second second second second second second

Company <u>Navaio Refining</u>



Well <u># AD</u> Navajo Rafining Company - Monitor wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 9" diameter Split spoon core barrel 19" Date <u>6/9/83</u> 1:55 pm

Depth

Sample description

 $1^{\circ} - 7\frac{1}{2}$ Fill $7\frac{1}{2} - 11\frac{1}{2}$ Sandy gravel $11\frac{1}{2} - 12$ Orill gyp odor gas 12 - 13¹/₂ gyp w lst pebbles (gravel) gasoline - fair porosity 5^{4} \mathbb{N} $13\frac{1}{2} - 15$ gyp w anhydrite pcs - no gravel. Fair to poor porosity Odor gasoline 1' - No odor bottom .5' Santu 15 - $16\frac{1}{2}$ gyp w anhydrite pcs - water gravel $16\frac{1}{2} - 17\frac{1}{2}$ gyp w abhydrite pcs - water 12- $17\frac{1}{2} - 19$ gyp TD dor gas inhyd vile ga sol in 15-Water TD 20 MAR 06 1985 OIL CONSERVATION DIVISION SANTA FE a

DETAILS OF WELL CONSTRUCTION

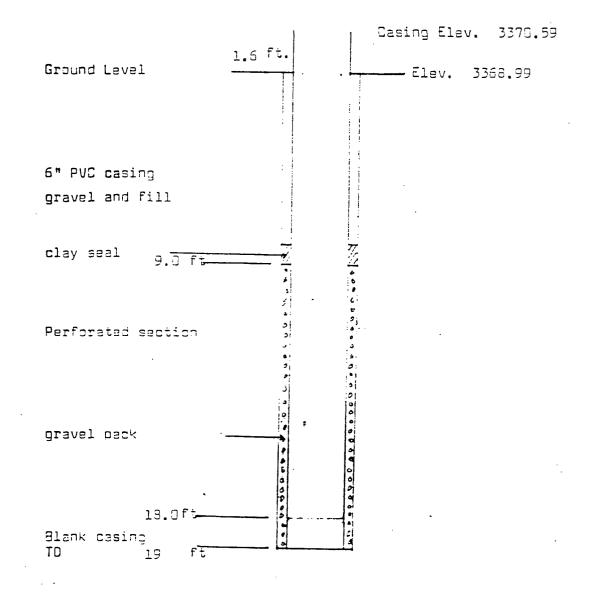
Date 6/9/33

ล

Mell # ____

ر موجود موجود می از مرجود موجود می از مرجود از منه این از منه ماند. از موجود موجود موجود موجود موجود مرجود موجود م

Company <u>Navajo Refinino</u>



Well #_AE____ Navajo Refining Company - Monitor wells

Orilling Contractor - D. Anderson, El Paso

Rig - Hollow stem auger 9" diameter Split spoon core barrel 19"

Date 6/10/83 7:15 am

Depth Sample description

5 Fill & soil D 7 Gry clay & gyp 5 Gry clay & gyp - change at bottom 7 9 9 - 10 Drill cau 10 - 114 granular gyp & anhy .8'. porous gyp .45' gasoline in whole core 11- - 12.7 med gravel & gyp - porous gasoline 12⁷ - 14² 1' med gravel & gyp. .5' gran gyp. gasoline 10gran gup 14² - 15 gravel & gyp Gasoline qasoline $15 - 16\frac{1}{2}$ l' grav seams in gyp. . . 9' gyp w water $16\frac{1}{2} - 18$ $\frac{3}{4}$ ' gravel & gyp w water. $\frac{3}{4}$ ' tight gyp 15. 18 - 18⁸ hard gyp Water nt QUP 18⁸ - 20³ Orill hard gyp 20. T() -1 MAR 06 1985 OIL CONSERVATION DIVISION SANTA FE

 $\epsilon < 1.5$

DETAILS OF WELL CONSTRUCTION

Date 6/10/33

3

]

İ

Sec. 1

Ţ

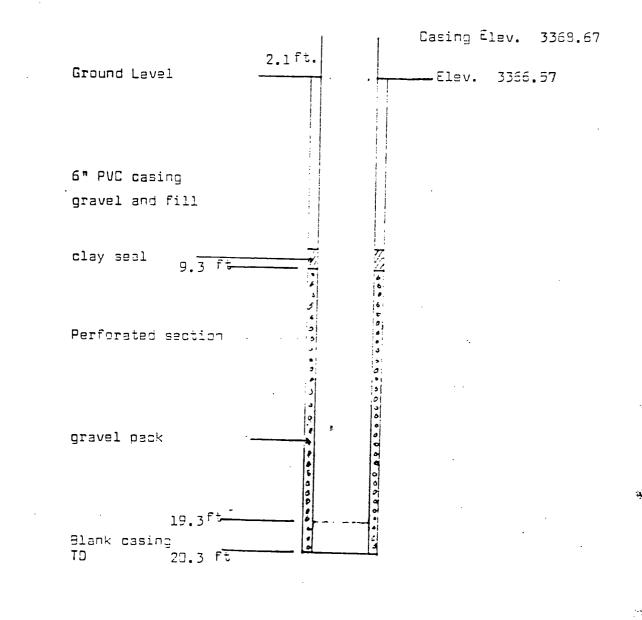
:,

•.,

Uell # <u>AE</u>

-231-202

Company <u>Davajo Refinino</u>



Well <u># AF</u> Navajo	Rafining Compan	y - Monitor Wells	•
Orilling Contractor - 0.	Anderson, El P	350	
Rig - Hollow stem auger	9" diameter	Split spoon core	barrel 18"
Date <u>6/10/83 10:30</u>	am		

Depth Sample description

Fill - $\Im 7\frac{1}{2}$ ' top gry clay (gyp) & pebbles $0 - 7\frac{1}{2}$ 73 - 11 HCR stained gyp ω crs pebbles. Top gasoline section 11 - $12\frac{1}{2}$ gry gyp w med gravel - gasoline saturated $12\frac{1}{2} - 13$ gry gyp w med gravel - gasoline saturated $13 - 13\frac{1}{2}$ Drill gyp å gravel gup & crs grave HCR: $13\frac{1}{2} - 14$ Orill gyp $14 - 15\frac{1}{2}$ gry gyp w med gravel 1.2' .31 water. Hard gyp 102 Gasoline $15\frac{1}{2} - 17\frac{1}{2}$ Drill gyp aravel HATC 15 ΤĎ 22 MAR 06 1985 OIL CONSERVATION DIVISION SANTA FE 11111 STORN. And The Scherolder

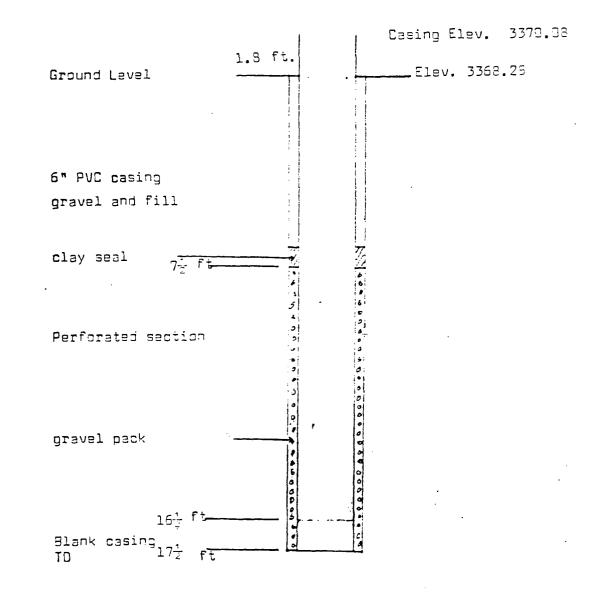
DETAILS OF WELL CONSTRUCTION

Date _______

Uell # 9F

الالالية المحر والموالية المعاد المالية

Company <u>Navajo Refininc</u>



المرتبع المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية الم المرتبع المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المرتبية المر

Well #_AG____ Navajo Refining Company - Monitor wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 9" diameter Solit sooon core barrel 19" Date 6/10/83 3:00 pm

Depth Sample description

المرجعة بالمدرية

0 - $7\frac{1}{2}$ gravel & clay $7\frac{1}{2} - 9$ gyp & clay - tight 9 - 10¹/₂ gyp & clay - slight odor. Tight clay last 2' $10\frac{1}{2} - 12$ gyp and gry clay no fluid 5 $12 - 13\frac{1}{2}$ gyp & gry clay ŧŧ 94128Chay No flaid $13\frac{1}{2} - 15$ qyp & gry clay . 11 a dor gas 15 - 16¹/₂ gry clay & gyp "" 10gry clay & gyp .5'. gry sand l' sli wet at bottom $16\frac{1}{2} - 18$ 18 - 191 gry sand 1.4' gyp & gry clay .1' fluid in ss water $19\frac{1}{7} - 20$ drill gyp 15-20 - 21¹ .6' sand wet .9' gyp & clay water 217 - 22 Drill to TD 20-55 Water Sector. MAR 05 1985 OIL CONSERVATION DIVISION SANTA FE المرجع المرجع مناعات محادثا والح and the second

tan transferre

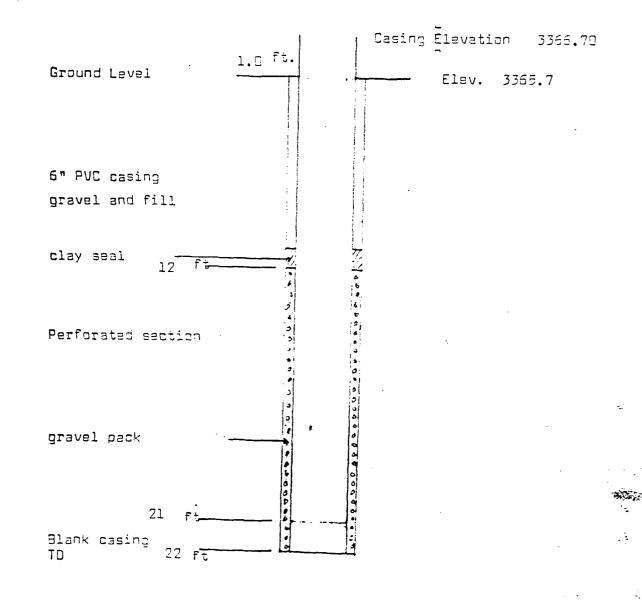
DETAILS OF WELL CONSTRUCTION

Date <u>6/10/33</u>

Vell # _ag

\$ 5

Company <u>Navajo Refinino</u>



and the second sec

Well <u># AH</u> Navajo Refining Company - Monitor wells Orilling Contractor - O. Anderson, El Paso Rig - Hollow stem auger 9" diameter Split spoon core barrel 18" Date <u>6/11/83</u> <u>7:30</u> am

Depth Sample description

 $0 - 4\frac{1}{2}$ Crs gravel fill & valley fill $4\frac{1}{2}$ - 5 gry clay & gyp $6\frac{1}{2}$ Pnk sdy clay & gravel 5 -5¹/ - 8 Crs gravel & gyp gravel $8 - 9\frac{1}{2}$ gyp - dry - no gravel No Gravel 몃 - 11 gyp & gry shale - no gravel gyp No gravel 11 - $12\frac{1}{2}$ gravel & gran. gyp & gry shale. Tr fluid odor gas 124 .2' gravel, gyp & gry shale. 1.3' med gravel & gyp $12\frac{1}{2} - 14$ no free fluid 14 - $15\frac{1}{2}$ gyp, gry shale & gravel zones .1' thick. sli odor na fluid gyp, gry shale - dry. Tr sand on bottom $15\frac{1}{2} - 17$ 15-17 - 18.5 clay & gyp sli wet $18\frac{1}{2} - 20$ lt red clay & gyp - water Water $20 - 20\frac{1}{7}$ Orill zε $20\frac{1}{2} - 22$ clay & gyp - tight - no fluid. Red shale on bottom TO PLAK 📲 TD C² MAR 0 G 1985 OIL CONSERVATION DIVISION SANTA FE G. 14-2.

DETAILS OF MELL CONSTRUCTION

Date 6/11/83

ويايره المعلى توجوه التشريق وتركز

CARLAGE STANK

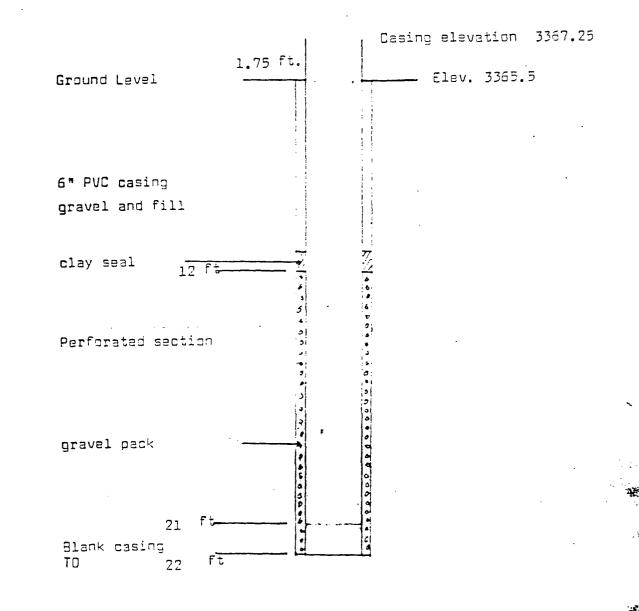
С. e.

n

1

Well # AH

Company <u>Navejo Refinino</u>



Well <u>#_AI____</u> Navajo Refining Company - Monitor wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger S" diameter Split spoon core barrel 19" Date <u>6/11/83 10:35</u> am

Depth Samole description

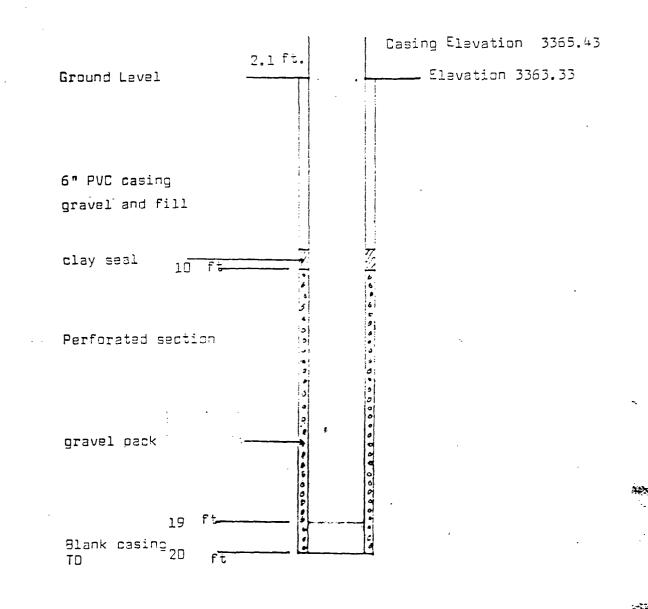
0 - 9 Valley fill 9 - $10\frac{1}{2}$ clay & gyp - no fluid; no gravel 10¹/₂ - 12 l' clay & gyp. .5' gyp & gravel odor gas 12 - 131 l' gyp & gravel - sli odor- damp. .5' hard dry gyp 5- $13\frac{1}{2} - 15$.5' gyp & gravel - water ; 1' red clay & gyp dry 15 - 15¹/₇ Drill -Clay 4 94P 👫 gyp & red clay w gravel - wtr. 😤 dk gry clay & gyp $15\frac{1}{2} - 17$ 94 P w gravel ito Gravel gyp w little gravel at top. Balance tight 17 - 18 st: odor : 18 - 20 Orill TD riater 15 4P Tight 20 our Harold

DETAILS OF MELL CONSTRUCTION

Date 5/11/83

Uell # aI

Company <u>Navajo Refining</u>



Well <u># R</u> Navajo Refining Company - Monitor Wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 3" diameter Split spoon core barrel 18" Date 6/7/83 10:15 am

Sample description Depth

 $0 - 4\frac{1}{2}$ Red soil 41/₂ - 6 Red clay & gyp no porous zone ċ 6 - $7\frac{1}{2}$ gyp & anhydrite - $1\frac{1}{4}$ ': gyp $\frac{1}{4}$ ' w oil odor Redcky 57 $7\frac{1}{2} - 8\frac{3}{4}$ gyp & anny - oil stained - sli porosity $8\frac{3}{7} - 9$ drill 9 - 10% l' ail wet gyp - porous. .5' tight gyp ail ador $10\frac{1}{2} - 12$.7' dk gry gyp & gravel wet - oil - .5' dk gry gyp & $10\frac{1}{2}$ gravel sli wet: .3' gry & rd shly gyp $12 - 1\frac{5}{2} \frac{1}{4}$ red gravelly shale - water: .5' gry gyp water: .3' red anny, gravel dry odor: .4' rd hard limey shi 13-1 - 15 .4' rd-gry shly gyp: .9' gravel w water: .2' red shale 15 - $16\frac{1}{2}$.7' red shale 15 Retshale $16\frac{1}{2}$ - 18 Red shale TD TD 20

S. Sugar Barry Sugar Sec.

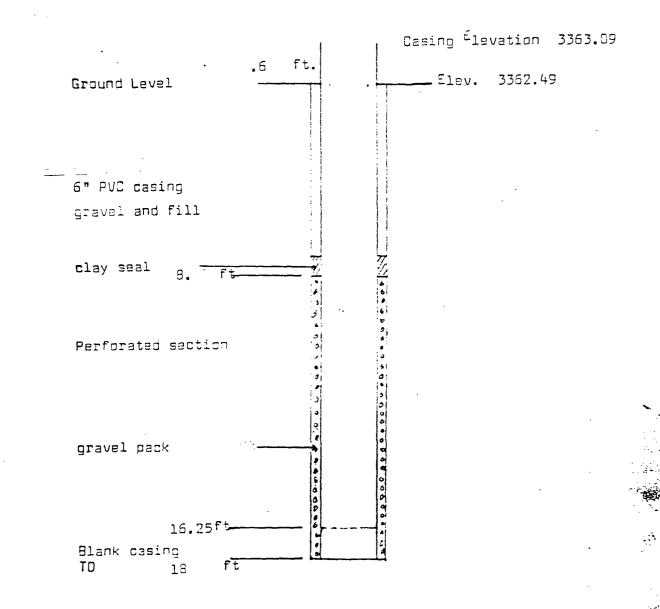
DETAILS OF WELL CONSTRUCTION

Date <u>6/7/83</u>

.

Well # R

Company <u>Navajo Refining</u>



Well #____ Navajo Refining Company - Monitor wells Orilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 9" diameter Split spoon core barrel 19" Date <u>6/7/83 3:05</u> pm

Depth Sample description

 $0 - 4\frac{1}{2}$ Soil 4- - 6 Lt rd sdy gyp dry .7' : dk gry clay .8' 50 $6 - 7\frac{1}{2}$ gy shl & gyp - oil stain & odor dk gy shly gyp ½' oil stn & odor : 1½' lt gy shly gyp 5 gyp Akgry cheur 7북 - 9 oil odor 94P-01 9 - $10\frac{1}{2}$ lt & dk gy shly anhy & $g\bar{y}p$ - granular - bldg oil drill $10\frac{1}{2} - 12$ 12 - 13 lt & dk gy shly gyp, sli porous - ail & wtr 10- $13\frac{1}{2} - 15$ It gy gravel 1' w wtr : It gy gyp w oil & wtr .5': at bottom tight. 0:1 & Water 15 - $16\frac{1}{2}$ gravel, clay & gyp - water water 163 - 19 Orill to TD qub-tight 151 - <u>- -</u> TD 20

· ·

DETAILS OF WELL CONSTRUCTION

Date <u>6/7/33</u>

ĩ

3

ž

1

۰.

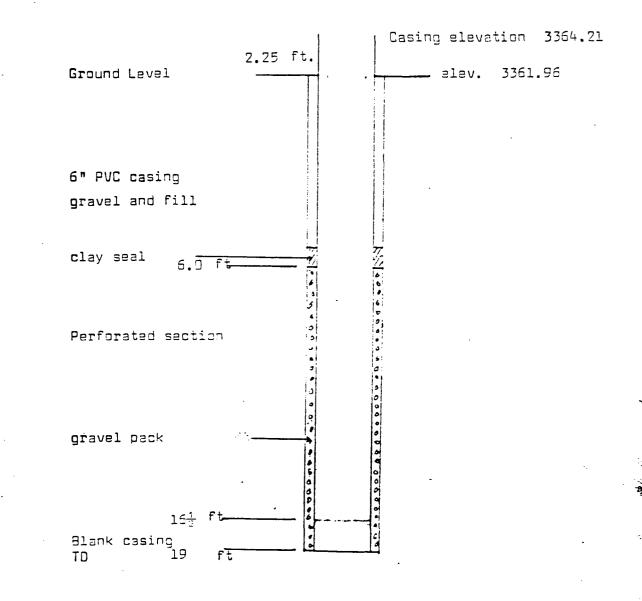
1. - -

Well # _ 5

Service has

Sec. 1

Company <u>Navajo Refinino</u>



SAMPLE LOG

Well <u>#_T_____</u> Navajo Refining Company - Monitor Wells Drilling Contractor - D. Anderson, El Paso Rig - Hollow stem auger 8" diameter Split spoon core barrel 18" Date <u>6/8/83 8:45</u> am

Depth Sample description

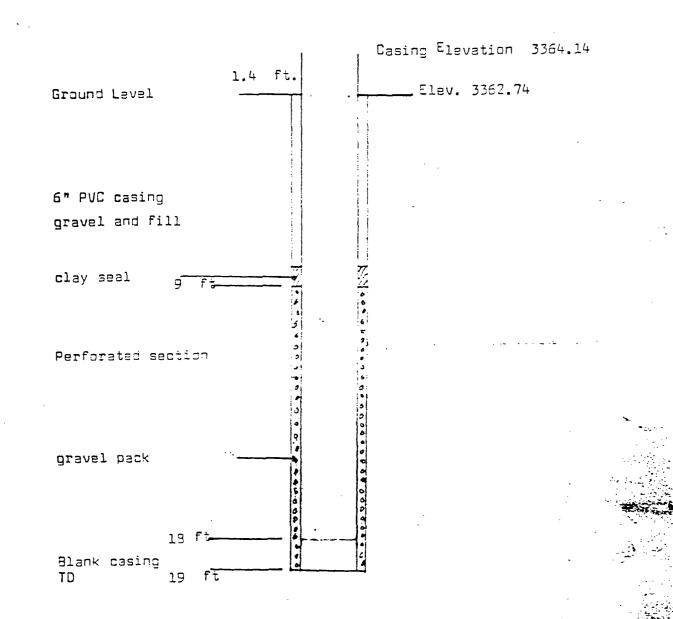
8 - 0	Red soil - clay	
8 - 10	Pok clay w gravel - valley fill l' : .5' gyp	
10 - 11	<pre>pyr + .15': gry clay & gravel + 1. : .15' dk gy gyp</pre>	
$11\frac{1}{2} - 13$	¹ / ₄ ' dk gry gyp, oil odor, core bbl wet w oil : l ¹ / ₄ ' gy gyp sli odor tight	
13 - 13	lt gy gyp & gravel - water - core blocked	2
$13\frac{3}{4} - 18$	dk gy clay & gyp	elay, gr
18 - 19	Red clay TO	
		gyp-tigh
	· · · · · · · · · · · · · · · · · · ·	eco Weler
		15
		Rei else
		TD 20-
		-
		-
	•	- -

DETAILS OF WELL CONSTRUCTION

Date _____ 6/3/83

Vell # ____

Company <u>Navajo Refinino</u>



WELL LOGS USED ON THE EAST - WEST CROSS SECTION 1

ł

L

ì

L

I

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1			(A) Owner of well City of Artesia	a			
		1 1 1 1	Street and Number CityArtes:		State	N.M.	
-			Well was drilled under Permit No <u>4 NW</u> <u>4 NE</u> <u>4</u> of Section				
	1		(B) Drilling ContractorGGesler & Street and Number				
	Ť Ť		City Drilling was commenced		June	21	
(Plat of 6	1 1 40 acres)		Drilling was completed	<u></u>	Aug.	24	<u>19_09</u>

968 Elevation at top of casing in feet above sea level____ <u>2...2</u> Total depth of well _Depth to water upon completion_ State whether well is shallow or artesian.

Section 2

Form WR-23

PRINCIPAL WATER-BEARING STRATA

No.	Depth	in Feet	Thickness in	Description of Water-Bearing Formation
NO.	From	To	Feet	
1				lst flow 890'
2	`			2nd flow gradual increase 890-920
3				
4				
5				

Section 3	3			RECOR	D OF CA	SING		
Dia	Pounds	Threads	De	pth	Feet	Type Shoe	Perfor	ations
in.	fL.	in	Top	Bottom	1.661	Type Shoe -	From	To
11 5/	8				121			
8					727			
6					211			
		akar batu		e"		T		

Section 4

RECORD OF MUDDING AND CEMENTING

Jection 4					7440			
Depth in	Feet	Diameter	Tons	No. Sacks of	1		Meth	ods Used
From	To	Hole in in.	Clay	Cement		<u></u>		
		1			ــــ		.	
					<u> </u>			
				L	<u> </u>		· · · · · · · · · · · · · · · · · · ·	
i				1	<u> </u>			<u> </u>
ection 5				PLUGGING	RECO	RD		• • • •
	ugging	Contractor		• • • • • • • • •			I.	icense No
Street and l	Numbe	r.á		City	·		St	ate
ons of Clay	y used.	<u> </u>	Tons of Ro	ughage used			Type of r	oughage
lugging me	ethod u	sed				Dat	e Plugged	1
lugging ap	proved	by:	•			Cemen	t Plugs were	placed as follows:
	_	_			No.	Depth	of Plug	No. of Sacks Used
			Basin Super	rvisor		From	To	
F(OR USE	OF STATE EN	GINEER ON	LY				
Date Rec	eiv ed _							
	from	driller's lo	og 12-6-6	2				
File No				Use		L	ocation No.	17.26.17,210

Т. -Ę.

• --÷ Section 6

LOG OF WELL

	in Feet	Thickness	Color	Type of Material Encountered
From	То	in Feet	- Color	
	13			soil
13	30			rock
30	40			sand
40	100			<u>вур</u>
100	121		2113	sand
121	141	ļ	2.25	rock
.141	205		, .	shale
205	228	1	. <u></u>	rock
228	698	*	28-5	shale
698	768	1		rock
768	830	-	•	shale -
830	856			rock
856	877			shale
877	890			rock
890	920			water rock, hard
920	968		l	Rock-hard
			ļ	
				· · · · · · · · · · · · · · · · · · ·
	••			,
				•
			1	
		1	1	

ļ.

i

2

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

4

Well Driller

-

æ

Form WR-23

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1	(A) Owner of well	Albert F. Woods,	
	Street and Number City		Wertico
	Well was drilled under Permit	Noand	is located in the
	(B) Drilling Contractor		
 	City	State	······
	Drilling was commenced	April 15.	1930
(Plat of 640 acres)	Drilling was completed	June 1.	1930

Elevation at top of casing in feet above sea level ______ Total depth of well _1233'_______ State whether well is shallow or artesian ______ Depth to water upon completion ______

Section	2		PRINCIP	AL WATER-BEARING STRATA
No.	Depth i	n Feet	Thickness in	Description of Water-Bearing Formation
110.	From	To	Feet	
1				
2				
3				
4				
5				· .

Section 3	3 -			RECOR	D OF CAS	ING		
Dia	Pounds	Threads	D	epth	Feet	Type Shoe	Perfor	rtions
in.	ft.	in	Top	Bottom	reet	Type Shoe -	From	То
123	50		0	1233	1233			
		·						
				T				

BECORD OF OVERIO

Section 4

Depü. in Test

Timesne

RECORD OF MUDDING AND CEMENTING

Depth :	in Feet	Diameter	Tons	No. Sacks of	Methods Used
From	To	Hole in in.	Clay	Cement	intenious osed
		<u> </u>			· · · · · · · · · · · · · · · · · · ·

Section 5 PLUG	GING R	ECO	RD		
Name of Plugging Contractor			_	L	icense No
Street and Number	City_			St	ate
Tons of Clay usedTons of Roughage	used			Type of r	oughage
Plugging method used			Dat	e Plugged	19
Plugging approved by:			Cemen	t Plugs were	placed as follows:
<u> </u>		No.	Depth	of Plug	No. of Sacks Used
Basin Supervisor		110.	From	To	NO. OI SACKS USED
FOR USE OF STATE ENGINEER ONLY					
Date Received					
				11	······································
There is a pro-				·1	

C.....

File No. RA-1090 Use Location No. 17 26.16.110

Section 6

E sub- Latina

LOG OF WELL

Depth i	n Feet To	Thickness in Feet	Color	Type of Material Encountered
		in Feet 22707		
	15	22.2.5	····	soil
2	30	3340		БУР
8		<u>+</u> -		бур
0	35	3395	<u> </u>	sand
8	450	2		gyp and clay
50	460			gyp rock
60	490	_ <u>. </u>		sandy shale and gyp stratas
90	690			sandy sable and gyp stratas
90	710			rock
10	740		· .	red sand
40	770		· ·	rock "
70	820		<u>.</u>	red sand
20	840			rock lime
40	876			sbale
76	912			lime rock
12	913			water rock
13	958	,	······································	lime rock
58	960			water rock
60	<u></u> 996			lime rock
96	1000			water rock
000	1027			lime rock
027	1032			water rock
032	1058		······································	lime rock
058	1060			water rock
060	1118			lime rock
118	1132		······	water rock
132	1218			lime rock
218	1218		·	Water rock
220	1232		······································	lime rock
			······································	

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

ï

PANE TOTALS & OFFIC

Well Driller

ł

STATE ENGINEER OFFICE WELL RECORD

.

Revised June 1972

Ł

į.

£

···· -

_

			STATE ENGINEER	OTTICE		
			WELL RECC	RD	لمان بالماني	و من المحسة المعاملية الأسل ا
		5	Section 1. GENERAL IN	FORMATION	•	
(1) 0	well_Fred	! Jones			Owner's Well No.	R1-6612
(A) Owner of Street or	Post Office Ad	dress P ()	HU, 422		_ Owner's well No	
City and	State	sia. No de	210 423			
			612			
a. <u></u>	_ <u>%</u> %	<u> 1/1 × XXX (°F</u>	4 of Section 9	_ Township <u>175</u>	Range25 <u>°</u>	N.M.P.M.
b. Tract	No	of Map No	of the	Hilcrest acre	subdivision	
	3	- C Dile Ni -	of the_	Drilled east o	enten of lot	
			of the			
			feet, N.M	I. Coordinate System		Zone in Grant.
(B) Drilling (Contractor	H & !! Enterp	oninen	Licens	e No. <u>"D-675</u>	
			Antenia			
Drilling Began	<u> 4-7-°0</u>	Complete	ed <u>4-21-80</u>	Type tools <u><i>Cable</i></u>	Size of ho	le <u>7</u> " in.
Elevation of la	nd surface or		at well	is ft. Tot	al depth of well	<u>25</u> ft
						225ft.
Completed wel	lis 🖾 sh	nallow 🗖 artes	ian. I	epth to water upon co	mpletion of well	ft.
		Section	2. PRINCIPAL WATER	BEARING STRATA		
Depth	in Feet	Thickness			Estimat	ted Yield
From	То	in Feet	Description of W	ater-Bearing Formation	1 (gallons p	er minute)
273	303	30	Fire snad ar	d Gravel	6 <u>7</u>	
	-		•	•		
					4	
L'		l				

Diameter	Pounds	Threads	Depth	in Feet	Length	Type of Shoe	Perfora	tions
(inches)	per foot	per in.	Тор	Bottom	(feet)	Type of Silde	From	То
?"	26	PE	1	302	303	PE	273	303
				:				
		+					++	

Section 4. RECORD OF MUDDING AND CEMENTING

Depth i	n Feet	Hole	Sacks	Cubic Feet	Method of Placement
From	То	Diameter	of Mud	of Cement	
		++-			
ſ				1 1	

Section 5. PLUGGING RECORD

Plugging Contractor				
Address	No.	Depth	in Feet	Cubic Feet
Plugging Method	NO.	Тор	Bottom	of Cement
Date Well Plugged	1			
Plugging approved by:	2		1	
	3			
State Engineer Representative	A			· ·

FOR USE OF STATE ENGINEER ONLY Date Received April 30, 1980

Quad _____ FWL ____ __ FSL - -17.26.9.34430 Dom. RA-6612 . File No.... _ Use _ _ Location No.

Temp.	on	SW	Corner
-------	----	----	--------

L

	h in Feet	Thickness	Color and Type of	Material Encountere	ed
From	To	in Feet			
0	10	10	Jop Soil	3525	·
10	70	60	Сурл ы т	3775	·
70	190	120	lypsim and clay sand	3175	
190	240	50	(lay	3125	
240	270	30	(Lay and Sand	2015	272-293
270	290	20	fine Gravel and Sand	<u> </u>	10-00 F
290	325	35	tine Gravel clay Red B		
					•
				* <u> </u>	· · ·
			······································		· ·
					<u></u>
		+	······	· · · · · · · · · · · · · · · · · · ·	
			······································		- <u></u>
				. <u> </u>	
	=	-			
		+			<u></u>
	·				
				STA	005
					Npe
		Section 7	REMARKS AND ADDITIONAL INFOR	ROSWELL . N. M.	30
				LC. N	АН
				3 ОР 1. М.	CO
				FIC	05

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

10mg 11 V ヤ 7 Driller

ł

I

- t INSTRUCTIONS: This for of the State Engineer. A should be executed in triplicate, preferably typewritten, and submitted tions, except Section 5, shall be answered as completely and accura possible when any well is in used as a plugging record, only Section 1(a) and Section need be completed

WELL RECORD

File No.

INSTRUCTIONS: This form should be typewritten, and filed in the office of the State Engineer, P. O. Box 1079, Santa Fe, New Mexico, or in the office of the Artesian Well Supervisor, Roswell, New Mexico. Section 5 should be answered only if an old artesian well has been plugged. All other sections should be answered in full in every case, regardless of whether the well drilled is shallow or arissian in character. This report must be subscribed and sworn to before a Notary Public.

	NE	Stree Post Well is loo	t and N Office was dril cated in	lumber.Rt. Art lled under F	tton Co 1 Box esia Ne	30 w Mexi	. <u>co</u>	
	NE	Stree Post Well is loo	t and N Office was dril cated in	lumber.Rt. Art lled under F	<u>l Box</u> esia Ne	30 w Mexi	co	
	NE	Post Well is loc	Office was dril cated in	Art lled under F	esia Ne	w Mexi	<u>.co</u>	
	S.E	Well is loo	was dri	lled under F			•	-
		is loo	cated in		ermit NoF	A-2723	5	
	S.E	-1		the SE				
	S.E	-1					SE y	of Section 9
4		·1 ····	hehin	17 Sout	ĥ	Bange	26	EAS+
400	j						•	
1997	x	- (t)	-	•				
		Stree	t and N					
t of 640 A e Well Ac	curately				Artesia			
ommenced	Jı	<u>uly 9</u>	,	1951. Dri				
p of casing	g in feet abo	ve sea lev	<u></u> S	hallow				
			•					
240	to	18	, Thick	uness in feet		, Forr	nation.Sa	and rock
	to		, Thick	ness in feet		Forn	nation	
			REC	ORD OF C	ASING			
Pounds	•Threads		1	Feet of	Type of			Purpose
per Foot	per Inch	Manui	lacturer	Casing	_ Shoe	From		
		-	-	240				
Per	forate	1		85				Liner
								· · ·
		RECOR	D OF M	UDDING A	ND CEMEN	ITING		
of	· ·			Methods Us	ed	-		Tons of
iches	QI Ceme	mr (01	mud 	Clay Used
	·							
	·							
								· · · · · · · · · · · · · · · · · · ·
		1						
					lection		, Town	18hip
•	-	plugging						· · · · · · · · · · · · · · · · · · ·
mber						.		······
		. lons of	rougna	ge used		Туре	•••	-
		·	-		binkkink st		ALCEBIAN	Well Supervisor?
						-		
were place	d as follows			- Cont Nin				
were place			· · · ·	feet Num	ber of make	of cement	neer been	an canal construction of the second second second second second second second second second second second second
were place od at	अन्तर्थ एत्रह थ [*]		• • •	feet_Num	ber of sacks	of cement	used note	ayeranaan ei an
were place od at od at	anned end of			feet. Num	ber of sacks	of cement	used and a mo	
were place ed at ed at ed at	anned end of			feet_ Num feet_ Num	ber of sacks ber of sacks ber of sacks	of cement of cement	used	Alexandress of au Alexandress of au Alexandress of au
were place ed at ed at ed at ed at	3. 41 253 5°		2 • • • :	feet_ Num feet_ Num feet_ Num	ber of sacks ber of sacks ber of sacks	of cement of cement of cement	used	<u> 644 (31)</u>
were place ed at ed at ed at ed at	anned end of	(a * 67.1	и 	feet_Num feet_Num feet_Num feet_Num (over)	ber of sacks ber of sacks ber of sacks ber of sacks	of cement of cement of cement of cement	used the mo	
were place ed at ed at ed at ed at	3. 41 253 5°	(a * 67.1	и 	feet_ Num feet_ Num feet_ Num	ber of sacks ber of sacks ber of sacks ber of sacks	of cement of cement of cement of cement	used the mo	<u> 644 (31)</u>
	p of casing well is sha well 240 Pounds per Foot Per of iches	p of casing in feet abo well is shallow or arter well	p of casing in feet above sea let well is shallow or artesian	p of casing in feet above sea level	p of casing in feet above sea level 22-5 well is shallow or artesian Shallow well 318 feet Water level upon comp PRINCIPAL WATER-BEA 240 to 318 Thickness in feet to 7 hickness in feet to 7 hickness in feet to 7 hickness in feet RECORD OF C Pounds Threads Name of Feet of per Foot per Inch Manufacturer Casing 240 Perforated 85 RECORD OF MUDDING A of Number of Sacks Methods Us af Coment Methods Us PLUGGING RECORD C A in the 4 of plugging contractor	p of casing in feet above sea level 22-5 well is shallow or artesian Shallow, Domes well 318 feet Water level upon completion of w PRINCIPAL WATER-BEARING STR 240 to 318 Thickness in feet 78 to Thickness in feet 78 to Thickness in feet 78 to Thickness in feet 78 to Thickness in feet 78 RECORD OF CASING Pounds Threads Name of Feet of Type of per Foot per Inch Manufacturer Casing Shoe 240 Perforated 85 RECORD OF MUDDING AND CEMEN of Number of Sacks Methods Used PLUGGING RECORD OF OLD WE d in the 4 4 4 4 of Section	p of casing in feet above sea level 22-5 well is shallow or artesian Shallow, Domestic well 318 feet Water level upon completion of well 40 PRINCIPAL WATER-BEARING STRATA 240 to 318 Thickness in feet 78 For to 78 Thickness in feet 78 For to 78 Thickness in feet For RECORD OF CASING Pounds Threads Name of Feet of Type of Perfor per Foot per Inch Manufacturer Casing Shoe From RECORD OF MUDDING AND CEMENTING RECORD OF MUDDING AND CEMENTING of Number of Sacks Methods Used of PLUGGING RECORD OF OLD WELL d in the 4 Y Y of Section Name of plugging contractor	well is shallow or artesian Shallow DOMESTIC well318 .feet. Water level upon completion of well_40

· .

- From (Depth in Feet)	To (Dopth th' Fort)	Thickness in Tost	Classification of Formation
	مر <u>، مر</u> بی روز م م	1. Fold Ten gentermanys	H Alusda enel HAT SMOTTON
n (na bonea na atu) atur n <u>a tuto na sura</u> tu	3355 04	ودفريه ويصفقهم الوقيصاف فير	rth off to sprite his in the colors in the most complexite term in
		meller. 73.8 report :	o ni asisetta ta velta te del sili Surface & clay
30 - 40	3315		gravel & gyp
40 - 164	\$19) sasri	19 - 19-11 13 TARMO	clay & gyp
164 - 200	3155	The second second	sand rock
200 - 225	3130	ter antropol	loose sand
225 - 260	30.95	a-bay copercision of the	shells & clay
260 - 274	3031		clav
274 - 318	3037		sandrock & clay
			Additions a citay
			
	$ \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad \qquad$	h	
	· · · · · · · · · · · · · · · · · · ·	/	
	······································		
		t	
			<u> </u>
		<u> </u>	
		· · · · ·	
	· · · · · · · · · · · · · · · · · · ·		
	· · · · · · · · · · · · · · · · · · ·		
	· · · · · · · · · · · · · · · · · · ·		····
	└─── <u></u>		· · ·
·			to a second provide the second second
		<u> </u>	
<u> </u>	· · · · · · · · · · · · · · · · · · ·		
		· · · · · · · · · · · · · · · · · · ·	
	· · · · ·		
	·		
· · · · · · · · · · · · · · · · · · ·			
·······		-	
			· · ·
		·· · · · ;; · ··	a det a de la companya de la companya de la companya de la companya de la companya de la companya de la company
<u> </u>	:		····· ·

I, ______, do solemnly swear that, to the best of my knowledge and bellsf, the foregoing information is a true and correct record of the well for which report is hereby made, insofar as can be determined from all available records.

SUBSCRIBED AND SWORN TO BEFORE ME this A.D., 19.5/ \mathcal{Q} day of ig.u Su Abelas Notary Public My Commission Expires / Quig. 1952

bo Britte Signe Drille Position Bet 20 ze Street and Number Post Otto atteria, new Madice

Form WR-23 FIELD F ?. LOG

STATE ENGINEER OFFICE

Ń

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

Section 1	(A) Owner of well	Bruce Harris		
	Street and Number	Box £42		
	City		State New	Mexico
┝────│───┤───┤	Well was drilled under	Permit No. RA-4196		
	SW 1/4 SW 1/4 SW	4 of Section 10	17-S	Rge. 26E
	(B) Drilling Contractor	Willard Beaty		
	Street and Number	1102 Merchant		
┟╾╾╾┥╾╾╼┝	City	Artesia	State New	Mexico
	Drilling was commence	ed April 26		19.60
	Drilling was completed	May 12		<u>19.60</u>

(Plat of 640 acres)

Elevation at top	of casing in feet	above sea level_	To	otal (depth	of we	<u>11 294</u>	
		Shell	OW					
State whether w	ell is shallow or	artesian Shall	OW Depth	to y	water	upon	completion.	

Section	1 2		PRIM	CIPAL WATER-BEARING STRATA					
No.	Depth	in Feet	Thickness in	Description of Water-Bearing Formation					
NO.	From	To	Feet	•					
1	280	292	12	Sand & Gravel					
2		1							
3									
4	1								
5									

Section	3			RECO	RD OF CA	SING		•
in.	Pounds	Threads	D	epth	Feet	Type Shoe	Perforations	
	ft.	in	Top	Bottom	rect	Type Bloe	From	To
7"0D	20	E Round		294	294	Steel.	275	294
	ļ				<u> </u>			
					ļ			
					1			

Section 4			RECORD	OF MUDDING AND CEN	MENTING	
Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used	
From	To	Hole in in.	Clay Cement	Cement	Methods Osed	
		811				
		1 1		1 1		

Section 5 PLUG	GING	RECO	RD		
Name of Plugging Contractor					License No
Street and Number	City			8	State
Tons of Clay usedTons of Roughage	used			Type of	roughage
Plugging method used			Date	Plugged	19
Plugging approved by:			Cement	Plugs we	re placed as follows:
Basin Supervisor		No.	Depth From	of Plug To	No. of Sacks Used
FOR USE ON STATE FULLINGER ONLY II [J]UISIO Date Received]]]]]]0 UJJNISIO 61 :8 WU 8-NOF 05 (***********************************					
File NSA-4196Use	<u>Dem</u>		L	cation No	17.26.101.833

đ

Depth	in Feet	Thickness	C -1	Type of Material Encountered
From	To	in Feet	Color	3350 14
0	2	2	Brown	Top Soil 3343
2	25	23	Red	Clay 3325
25	30	5	Gray	Gravel 3430
30	40	10	Red	CLAY 3310
40	70	30	Red	Sandy Clay 3150
70	140	70	Red	Clay 32/0
140	160	20	Brown	Sand 3190
160	200	40	Red	Clay 3/50
200	240	40	Brown	Sand 3110
240	250	10	Red	Clay 3100
250	270	20	Brown	Sand 3080
270	260	10	Red	Clay 3038
280	292	12	Brown	Sand & Gravel
292	294	2	Red	Elay 3055
<u></u>				
<i></i>	<u> </u>			
<u> </u>	<u> </u>			
	<u> </u>		· · · · · · · · · · · · · · · · · · ·	
·	<u> </u>			
····	<u> </u>			
	<u> </u>			
	ļ			

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well

. . .

Well Driller

-

Tria

(This form to be executed in triplicate)

WELL RECORD

Date of Receipt	Permit No
Name of permittee,	<u>.</u>
Street or P. O.,	8 18. N. H.
1. Well location and description: TheBhallow well is located inW	
The section 15 Township 175 Range	EGE; Elevation of top of
casing above sea level, 22.12 feet; diameter of hole,	
depth to water upon completion,	100. 14
and completed	D. I. GIBy
Address, Artesia, Hew Hox. ; Drille	r's License No

2. Principal Water-bearing Strata:

	Depib From	in Feet To	Thickness	Description of Water-bearing Formation
No. 1	260	295	35	Sand & Clay streeks
No. 2				· ····
No. 3				
No. 4				
No. 5				

3. Casing Record:

1-2253

Diameter in inches 8 N	Pounds per fi.	Threads per inch		or Liner Bottom	Fect of Casing	Type	of Shoe		Perfor From	ation Te
16212"		•••••	· - ·		167'8*	 		 • ••••••		
7*0D	<u>.</u>				25719*			 	·	
5*I D					62'9*				232 t	
							· •		· · · -	• -
	•••••					••••••	-	· ••••••		
					· · · · · · · · · · · · · · · · · · ·					

of Section, Township, Range; name and address of plugging contractor, 1

.

ROEWELL

17.26.16,121

นาย สาว จาก อย่างจาก ก็แห่ง ก็มหาย จาก ก็ได้ได้เหตุประจำช่วยมาก เหมาะก็เป็นสร้างสู่สุดเรา องสาวกระบาม แล้ว ing presses and נסבדאבע דנסטיל מו יוה אסטא אי אינאייע האוון.

date of plugging na la cara da cara da cara da cara da cara da cara da cara da cara da cara da cara da cara da cara da cara da c ار المحديدية • •

fratauctions-DEC.3. rably types risten. In propincie and the way the State Engineer's Office at ara Pre GROUND WATER SUPERVISOR H bler / sidiene, in contrain the stalgrams in

WELL RECORD

... ...

١

5. Log of Wel				·	Name of permittee.
Depth I		Thiskness in fast		Description of Fermatic	22450 German
الم مردي التراقي			3 ::	· ·	
	- 55				1 D Son material (1997
			- 12412273	ಡ್ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗ ಕನ್ನಡ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅಂಗಿ ಕನ್ನಡ ಅ	
	40	Fanci	Rock & Gr		3305 ₩3210 + ¹
40	100	60			
teet.	estal depth.	ຕະເສດແມ່, ແລະ	Clay & Bo	n na sana ana sa sa sa sa sa sa sa sa sa sa sa sa sa	3245
100	120	20	sund is 197	arel	3225
· · · • • • · · · · · ·	125			• • • • • • •	2 . 10 f.r.
- 120	125		Olay		3220
125	131	6	oand		3 2 4
	· · _ · _]				_
131	134	3	Clay		3211
					3190
134	155		sand		
155	164	9	Clay	•	
					·····
164	200			······	3145
	6 00	8	Clay		
200	208		<u> </u>		3137 : 1
	276	8			
£36	- 237			· · · · · · · · · · · · · · · · · · ·	3100 8
237	253	21	Sand		3:37
· ·	EA /ID		ANERAA	· · · · · · · · · · · · · · · · · · ·	27 P. 1. 1. 1. 1. 1. 2. 2.
	260		Clay		3085
		·	•		37.50
-260	295	35	and & C	ay streaks	3120
				······································	
				· ····	
{	[1			
	{				
				···· · · · · · · · · · · · · · · · · ·	
.,					
			· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	<u> </u>
no at same		e se se se se se se se se se se se se se		·	mir ve ib

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Instructions

This form shall be executed, preferably typewritten, in triplicate and filed with the State Engineer's Office at Roswell, New Mexico, within 10 days after drilling has been completed. Data on water-bearing strata and on all formations encountered should be as complete and accurate as possible.

Form WR-23

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1	(A) Owner of well D . Sullivan Den		
	Street and Number		
	City	State	
	Well was drilled under Permit No 		
	(B) Drilling Contractor <u>Gesler & S1</u> Street and Number		
	City	State	
	Drilling was commenced	July 27,	1909
(Plat of 640 acres)	Drilling was completed ORIGINAL FLOW	900 GPM	19
	- fast share and level 2440 Potel donti	- of moll 10071	

Elevation at top of casing in feet above sea level ______ Total depth of well ________ State whether well is shallow or artesian ______ Depth to water upon completion ______

Section 2 PRINCIPAL WATER-BEARING STRATA	
--	--

No.	Depth in Feet		Thickness in	Description of Water-Bearing Formation	
	From	То	Feet		/
1					
2					
3				-	
4					
5					

3			RECORD OF CASING					
Pounds	Threads	Depth		Fact	Trong Shan	Perforations		
ft.	in	Top	Bottom	reet	Type Shoe -	From	То	
		0	763	783				
		0	244	244				
				1				
	Pounds ft.	Pounds Threads	Pounds Threads D ft. in Top 0	Pounds ft.Threads inDepth Top0763	Pounds ft. Threads in Depth Top Feet 0 7E3 7E3	Pounds ft. Threads in Depth Top Feet Type Shoe 0 7E3 7B3	Pounds ft. Threads in Depth Top Feet Type Shoe Perfor 0 7E3 7B3	

RECORD OF CASING

Section 4

RECORD OF MUDDING AND CEMENTING

Section 4			RECORD		
Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used
From	To	Hole in in.	Clay	Cement	
		1			
		1			
		· · · · · · · · · · · · · · · · · · ·			

Section 5

PLUGGING RECORD

Name of Plugging Contractor		License No				
Street and Number	City		St	ate		
Tons of Clay usedTons of Roughage u	ised		Type of r	oughage		
Plugging method used		Dat	e Plugged	19		
Plugging approved by:	2	Cemen	t Plugs were	e placed as follows:		
· · · · · · · · · · · · · · · · · · ·	No.	Depth	of Plug	No. of Sacks Used		
Basin Supervisor		From	To	NO. OL ORCES USCU		
FOR USE OF STATE ENGINEER ONLY		!				
Date Received	_ ├──	 		~		
		•				
Богат и роза (дарана File No. R4-3/357-337- Use		<u> </u>	ocation No.	17.26.10.439		

		1		
Depth i	n Feet To	Thickness in Feet	5340 64	Type of Material Encountered
,	10		3330	soil
0	22	-	3318	gyp rock
22	34	ļ	3306	sand
34	44	· .	3276	bouldera
44	78	<u>↓</u>	3262	rock
78	120		3220	sand
120	302		- 303B	shele
302	320		3020	gumbo
320	340	<u> </u>	3000	clay
340	420			shale
420	480	-		rock
180	757			shale
757	764			rock
764	789	ļ		rock
789	837	L		rock
B37	856			shale
356	865			water rock
865	891			rock
391	956			shale
956	968			rock
96 8	988			shale
988	1007			rock
	•			
		1		

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Well Driller

į.

and a standard and a standard a standard a standard a standard a standard a standard a standard a standard a st Secondard a standard a s Secondard a standard a s

AR-32 E VIE TRONSTRE OFFICE

.

- RECORD E

14

File No

INSTRUCTIONS: This form should be typewritten, and filed in the office of the State Engineer, (P.O. Box 1079) Santa Fe, New Mexico, unless the well is situated in the Roswell Artesian Basin, in which case it should be filed in the office of the Artesian Well Supervisor, Roswell, New Mexico. Section 5 should be answered only if an old artesian well has been plugged. All other sections should be answered in full in every case, regardless of whether the well drilled is shallow or artesian in character. This report must be subscribed and sworn to before a Notary Public.

Sec. 1	1						•	. !
				6. 3. She	-			
	NW	NE	Street and Num Post Office	ber East Star Artesia,	r Route New Mex	Lco		
		<u>S.E</u>	is located in the	under Permit No IW 4 IV 17 South		5¥i of l	Section	L 4
	(Plat of 640 a Locate Well Ac	ucres)	Drilling Contra Street and Num	tor D. N. ber 1007 Artes	Gray No. St.			
	-		uly 19	_	-	ug. 18		
State w	on at top of cash whether well is s	hallow or arte	esian	Shallew	· · · · · · · · · · · · · · · · · · ·	•••••••••••••	· • • • • • • • • • • • • • • • • • • •	

PRINCIPAL WATER-BEARING STRATA Sec. 1 No. 1, from 213 to 241 , Thickness in feet 27 , Formation ... Sand RECORD OF CASING Sec. 3

IN INCHES PER FO	OT PER INCH	MANUPACTURER	CASING	SHOE	PROM		1 PURF	-OSE
OFTD					FROM TO		PURPOSE	
0.17	8		15488*	Collar			water	Shut-o:
7"OD.			214*	Larkin			water	Shut to:
\$"ID			341	Collar	214	241	1	

Sec. 4

RECORD OF MUDDING AND CEMENTING

DIAMETER OF HOLE IN INCHES	NUMBER OF SACKS OF CEMENT	METHODS USED		GRAVITY	TONS OF CLAY USED	
				- 11	FD	
				AUG	27 1951 -	
ell is located in the	PLU	W W of Section	A	TESIAN WE		
ms of clay used	Tons of n	was plugging	Type	of roughage	all Superview	
ement plugs were p	laced as follows:	Tant Number of a	and a set of a second	ntanington namer Salah na Siri Kabupatèn na Siri Kabupatèn na Siri		
o. 2 was placed a o. 3 was placed at		feet Number of s	acks of cemer	t used		

-04 26

11.

211

- FROM (depth in feet)	TO (depth in feet)	THICKNESS IN FEET	CLASSIFICATION OF FORMAT	ION
and the state of the set of	المحادثان والجنين	and a state of the second	3310 64	
at a r O			8011 3305	•
مې مېر مېد د د کې کې کې د د. ۲۳ ۲۹ ۲۰۰ کې کې کې کې د د	A 22 18	18	Galeche 32 2	
18	55 ST	57 - 11 ST	8end 3235	· •
55	70	15	- 01ay	
70	180	110	Send 3/33	5
180	184	4	01ay 3126	- •
184	241	57	Sand . 3069	
· #			······	
	· · · · · · · · · · · · · · · · · · ·		· · · · ·	·
			•	
· · · · · · · · · · · · · · · · · · ·				
· · · · · · · · · · · · · · · · · · ·		•		
				_
·····				
				4
· · · · · · · · · · · · · · · · · · ·				
				•
		1		
,,			•	
· · · · · · · · · · · · · · · · · · ·			• • • • • •	
			• · · · · ·	
		1 2		

be determined from all available records.

ì

Notary Public Street and Number ... 1.0.0.7. M.O. St., My Commission Expires Post Office Antesia, N.M.

INSTRUCTIONS: This form abould be typewritten, and filed in the office of the State Engineer, P. O. Box 1079, Santa Fe, New Mexico, or in the office of the Artesian Well Supervisor, Roswell, New Mexico. Section 5 should be answered only if an old artesian well has been plugged. All other sections should be answered in full in every case, regardless of whether the well drilled is shallow or artesian in character. This report must be subscribed and sworn to before a Notary Public.

. . .

25.476.503

WELL RECORD

ŧ

. . ..

Gatterners V. C. Stationesser

- ----

• :		
	Owner of wellW. L. Webb	
	Street and Number 1801 Oak Street	· '
NWNE	Post Office Artesia, New Mexico	
	Well was drilled under Permit No. RA-2649	
	is located in the SW 4 SW 4 SE 34 of Section	12
SW	Township. 17 South , Range 26 East	······································
	Drilling Contractor Willard Beaty	·····
	Street and Number1102 Merchant St.	
(Plat of 640 Acres) Locate Well Accurately	Post Office Artesia, New Mexico	
	19.50 Drilling was completed 8/5	
Elevation at top of casing in feet above	Bea level	
State whether well is shallow or artesia	m Shellow	
Total depth of well 150 fe	et. Water level upon completion of well_85feet below 1	and surface.
Sec. 2	PRINCIPAL WATER-BEARING STRATA	-
No. 1, from 114 to 130	Thickness in feet16, Formation Water, San	nd & Gravel
No. 2, from to	Thickness in feet, Formation	
No. 3, from to to	, Thickness in feet, Formation	-
No. 4, from	, Thickness in feet, Formation	
No. 5, from to		
Sec. 3	RECORD OF CASING	

Diameter	Pounds	Threads	Name of	Feet of	Type of	Perfors	ted	.
in Inches	per Foot	per Inch	Manufacturer	Casing .	Shoe	From	'AU	Purpose
6	12	Welded		150		114	130	
							·	

RECORD OF MUDDING AND CEMENTING

Well is located in the % % of Section Township. OFFICE lange Name of plugging contractor OFFICE Netting itreet and Number Post Office HOW STILL N.W. MILL oms of clay used Tons of roughage used Type of roughage was plugging approved by Artesian Well Supervisor? Was plugging approved by Artesian Well Supervisor? Jament plugs were placed as follows:	Sec. 4	REC	ORD OF MUDDING	AND CEMENT	TING	
Sec. 5 PLUGGING RECORD OF OLD WELE AUG 15 1950 Vali is located in the % % of Section Township Range Name of plugging contractor O F F1C E EVISOR Range Name of plugging contractor O F F1C E EVISOR Range Name of plugging contractor D F I C E EVISOR Range Name of plugging contractor EDSW211 Nin Hillenco Roms of clay used Tons of roughage used Type of roughage Yeas plugging approved by Arisalan Well Supervisor? Sument plugs were placed as follows: No. 1 was placed at Meet Number of sacks of cement used D F K 1 1 m. Hillenco No. 2 was placed at Yeat Number of sacks of cement used Min and the sacks of cement used No. 8 was placed at feet. Number of sacks of cement used Min and the sacks of cement used No. 4 was placed at Feet. Number of sacks of cement used Min and the sacks of cement used No. 5 was placed at Feet. Number of sacks of cement used Min and the sacks of cement used			Mothode Head			
Sec. 5 PLUGGING RECORD OF OLD WELE AUG 15 1950 Vell is located in the <u>4</u> 4 of Section OF FICE Township OF FICE Renge Name of plugging contractor Renge Toms of clay used Tons of roughage used Tops of roughage Was plugging approved by Arisalan Well Supervisor? Renent plugs were placed as follows No. 1 was placed at Sect. Number of sacks of cement used Sect. Structure and sale approved at Sect. Number of sacks of cement used Sect. Structure and Sect. Sec	· _ · _					<u>+</u>
iec. 5 PLUGGING RECORD OF OLD WELE AUG 15 1950 Vali is located in the	: *			-		
isc. 5 PLUGGING RECORD OF OLD WELL AUG 15 1950 Vall is located in the % % of Section OFFICE tange Name of plugging contractor OFFICE Number treet and Number Post Office NIMITIC PUISOR ons of clay used Tons of roughage used Type of roughage was plugging approved by Artesian Well Supervisor? inc. 1 was placed at Mastrice of sacks of cement used bc. 2 was placed at Tote of sacks of cement used ic. 3 was placed at feet. Number of sacks of cement used ic. 4 was placed at Feet. Number of sacks of cement used	· · · · · · · · · · · ·					E B
Vell is located in the 14 14 14 16 Township tenge Name of plugging contractor OFFICE DFICE PUTTOR treet and Number Post Office HOT SWELL NI.N HEALCO ons of clay used Tons of roughage used Type of roughage was plugging approved by Artesian Well Supervisor? tement plugs were placed as follows: Image: Image: Image: Imag	1				مـــ نا ان	Sand State
Tons of clay used Tons of roughage used Type of roughage Was plugging approved by Ariesian Well Supervisor? lement plugs were placed as follows: No. 1 was placed at rest. Number of sacks of cement used I but sybalwork for to seet at at sail as a follows: No. 2 was placed at feet. Number of sacks of cement used I to 2 was placed at feet. Number of sacks of cement used in the sybalwork between the def satisfies at satis	Vell is located in the	Name of plugging	% of	Bection	Towns	1CE
Was plugging approved by Artesian Well Supervisor?			and the second se	1	1	
No. 1 was placed at Teet. Number of sacks of cement used I to 2 was placed at feet. Number of sacks of cement used I to 30 to 100 t	dis di city used	101	W	as plugging appr	roved by Artesian W	Tell Supervisor ?
bno sybawoon ym 70 beet af ad dad i newr glansfar ob Io. 2 was placed at I to Yeet. Number of sacks of cement used borost in the WE GMA GISTINGUE No. 8 was placed at feet. Number of sacks of cement used WE GMA GISTINGUE Io. 4 was placed at feet. Number of sacks of cement used in the WE GMA GISTINGUE Io. 5 was placed at feet. Number of sacks of cement used in the WE GMA GISTINGUE feet. Number of sacks of cement used in the WE GMA GISTINGUE Io. 5 was placed at feet. Number of sacks of cement used in the WE GMA GISTINGUE feet. Number of sacks of cement used in the WE GMA GISTINGUE	ement plugs were pla	ced as follows:				and the state of the state of the state of the state of the state of the state of the state of the state of the
to. 8 was placed atfeet. Number of sacks of cement used	bac saba wors to	in the the the track of	sere glassics ob	mber of sacks of	Coment used	and a set the set of the
to. 5 was placed at PT			feet. Nu	mber of sacks of	f cement used	
			· · · ·			
to Junio 1 Soft and and ine sail (over)	- te tim dori	1 Soft	over)	Start mast		
the mak wat state and a set of the state of the state of the	the make way					

T

2

-2649

RA

File No.

- ~-

с.

- From (Depth in Fool)	To (Dopth th (Fat))	Anicandre hi tout	Classification of Formation
ther P C Per 10' B. nt	3298	51 512 2:8 8-814 9-1	Top Soil an Bronny
5 should be sarwared only	noilas and and a section of	Stan Well Supervisor For	teaugo, or in the office of the Ar-
informative a state of		nifter entice 81 auto for unrecter. This report mus	Cleache, & Gravel
20	•	60	
80	90 32/0	10	Sand
90	114 3/86		Red Clay
<u>-114</u>	1501 (Career	Erret and Binber	Mater. Sand & Gray
130	150		Red Clay & Cheache
	192-121	ribar to Unb age 15.7	
I	51. ²¹	12 1 A 1950	
	·	1.2	
	· · · · · ·		
	· · · ·		
		· ·	
		· • · · ·	
		、 	- ,
	, , ,		
•		71 ·	• • • •
· · · · · · · · · · · · · · · · · · ·			
·····			
			· · · · · · · · · · · · · · · · · · ·
		<u> </u>	
,,, <u>,,,,,,</u> ,,,,,,,,,,,,,,,,,,,,,,		11.12.1.12	
	· ·	• •	2 Y 3 A
			·····
· · ·	· · ·	·	· · · · · ·
	· · · · · · · ·	-	
· ·			-
		:	
		1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	and the second sec
	n - to a contractor	-	· · · · · · · · · · · · · · · · · · ·
		[and a substantial device a

SUBSCRIBED AND SWORN TO BEFORE ME this

Ulico. J Besty Position Drilling Contractor

___, A.D., 19_50

Street and Number 1102 W. Merchant St.

My Commission Expires March 2, 1952

.

Artesia, New Mexico. Post Office

•

Form WR-23

STATE ENGINEER OFFICE

FIELD ENGR. LUG WELL RECORD INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1

	Street and Number City	State	•
	Well was drilled under Permit No	and is 1	
	(B) Drilling Contractor Street and Number•	License N	No. WD-342
	City Drilling was commenced		
(Plat of 640 acres)	Drilling was completed		19

		_	130
State whether well is shallow or	artesian	_Depth to water upon	n completion

Section 2			PRINCIPAL WATER-BEARING STRATA						
No.	Depth in Feet		Thickness in	Description of Water-Bearing Formation					
	From	To	- Feet						
1									
2	·	1							
3									
4									
5									

Section 3

RECORD OF CASING

Dia in.	Pounds ft.	Threads in	Depth		Feet	The Chas	Perforations			
			Top	Bottom	reet	Type Shoe	From	То		
`			·.	- 1	·	- 14 1	•••• •••	•• , ••		
							```			

Section 4

Section 5

___

#### RECORD OF MUDDING AND CEMENTING

Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used			
From	То	Hole in in.	Clay Cement					
					••			
			-					
	1							

#### PLUGGING RECORD

Name of Plugging Contractor		License No				
Street and Number	City	y State				
Tons of Clay usedTons of Roughage	used		Type of r	oughage		
Plugging method used		Date	Plugged_	19		
Plugging approved by:		Cement Plugs were placed as follows:				
	- No.	Depth	of Plug	No. of Sacks Used		
Basin Supervisor		From	To	NO. UL DELLE CIEL		
FOR USE OF IT AND THE POINT OF IT IT IT IT IT IT IT IT IT IT IT IT IT						
	De m	La	cation No.	17.26.12.244		

. . . . .

ction 6			DF WELL			
Depth in Feet From   To		Thickness in Feet	Color	Type of Material Encountered		
<u>)</u>	10 32.90	10	white	Calechie and Cravel		
10	-03122	(0	white	White Cley and Gravel		
78	-78 -90 ^{-31 /0}	12	viite	Sand and Gravel		
00	3175 125	35		Clay and Gravel		
	140	-	-	Send and Grovel		
125	<u>140</u> 3,45 155	15				
140	155	15	Grey	Conglomerate		
155	160	5	<u></u>	Sand and Gravel ( water )		
160	175	15	Red	Clay		
		1				
			·····			
ſ						
		T				
;						
		1				

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

45.15

1. . . . .

11.2

Vin ment

## WATER WELL LOGS USED ON NORTH-SOUTH CROSS SECTION

··· ·· -

. ... ....

6

Í

N

ľ

Form WR-23

#### STATE ENGINEER OFFICE

#### WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1	(A) Owner of well Boward R. Stroup
	Street and Number
	Street and Number
(Plat of 640 acres)	

Elevation at top of casing in feet above sea level	Total	depth	of we	212 <u>-</u>
State whether well is shallow or artesian	Depth to	water	upon	completion

#### Section 2

PRINCIPAL WATER-BEARING STRATA

No.	Depth : From	in Feet To	Thickness in Feet	Description of Water-Bearing Formation
1				
2				
3				-
4				•
5				

Section 3	3			RECOR	D OF CAS	ING		
Dia	Pounds	Threads	Depth		Feet '	Type Shoe	Perforations	
in.	ft.	in	Top	Bottom	reel	Type Shoe	From	То
121					196			
10	[				30			
	1		[	1				

Section 4

#### RECORD OF MUDDING AND CEMENTING

Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used		
From	То	Hole in in.	Clay Cement				

#### Section 5

#### PLUGGING RECORD

Name of Plugging Contractor		License No	
Street and Number	City	State	
Tons of Clay used	Tons of Roughage used	Type of roughage	
Plugging method used		Date Plugged	_19
Plugging approved by:		Cement Plugs were placed as follows:	
		Depth of Plug	

		Basin Supervisor	No.	From	To	No. of Sacks Used	
FOR U	SE OF STATE EN	GINEER ONLY					
Date Received	3						
		L	L				
File No	RA-1380	Use		L	cation No	La 17.26.4.331	

eg ter and r

The rest of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second s Second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second seco second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec

LOG OF WELL

C )				LOG	OF WELL
• •	1.5 A.C. 1.5	lia ist	। । उन्ह		Type of Material Encountered
	 T.A	32-7	1		
•		2342			Gravel - water
	[	ر بو			Red clay
5	1.5	1 2142	L		Sand
• • •	1 1 1	216-1			Rock
· .	, · ?	353			Red clay
12	1 133	. 3147			Red clay
.15		1 3. 2P			Red sand
240		2:27	:		White gyp
	-		 		-
	- - 	i I			· · · · · · · · · · · · · · · · · · ·
	:	÷	, , ~~ <b>~~ ~</b>		
	;				
	;	F 1	·		
	1		· · · · · · · · · · · · · · · · · · ·		
	:		 		
		)			
	:				
		:			
		į			
	1	F			
			İ		
		ļ			
	ĺ				
					, , , , , , , , , , , , , , , , , , , ,
·····		1			
			-		
	·	÷			

We draw the draw the draw the draw the draw the best of his knowledge and belief, the foregoing is a true and correct record of the draw theory draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the draw the dr

· · ·

EC. DED

1 . . . .

Buck	Bros.		
	Well	Driller	

11%

I

Т

(This form to be executed in triplicate)

26

# WELL RECORD

Da	te of Receipt	Permit	No. RA-3262	
	Name of permittee,J. B. Stophons			
St	reet or P. O BOX 121, City and State	Artesia,	New Mexico	<u> </u>
1.	Well location and description: The <b>Shallow</b> well is located in (shallow or artesian)	SE	%, <u>Se</u>	¥,
	SE% of Section Township 17S., Re	inge <u>26</u> E	; Elevation of	top of
	casing above sea level, feet; diameter of hole,	inches; total	depth, <b>100</b>	_ feet;
	depth to water upon completion,40 feet; drilling was comm	nenced _Septer	<u></u>	1954,
	and completed September 14	contractor	ard Peaty	
	1102 M rchent ; Address, Artesia, N. K.	; Driller's Licen	se No. 11D-62	
2	Principal Water-bearing Strata:			

Depth in Feet Thickness Description of Water-bearing Formation From то No. 1 10 70 80 sand No. 2 87. 96 9 se nd No. 3 No. 4 No. 5

3. Casing Record:

in inches	Pounds per fi.	Threads per inch	Depth of C Top	Bottom	Feet of Casing	Type of Shoe	Perio From	To
6	14	welde	<u>a o</u>	100	100	none	70	96
<u> </u>				<u></u>				<b></b>
<u></u>					• <b>* * * *</b> • • • • • • • • • • • • • • • •	<u></u>		<b></b>
		<del></del> ···				<u></u>		
			at mail to	he shendone	d cive least	ion:%,	1/	
		-						
of Section		., Townshij	-	, Range		; name and addres		-
							<u> </u>	·····
								·····
date of plug		1945 - Frank	•	, 19	.; describe h	ow well was plugge	đ:	- · · · · · · · · · · · · · · · · · · ·
date of plug	gging	· · · · · · · · · · · · · · · · · · ·	·····		; describe he	ow well was plugge	d:	
date of plug		· · · · · · · · · · · · · · · · · · ·	· · · · · ·	, 19 	.; describe h	ow well was plugge	<b>d:</b>	
date of plug	gging	· · · · · · · · · · · · · · · · · · ·	· · · · ·	2 - 4 2 - 8 - 5	_; describe h		· · · · ·	
date of plug	gging	· · · · · · · · · · · · · · · · · · ·	· · · · ·	2 - 4 2 - 8 - 5			· · · · ·	
date of plug	gging	· · · · · · · · · · · · · · · · · · ·	· · · · ·	2 - 4 2 - 8 - 5			· · · · ·	
date of plug	gging	· · · · · · · · · · · · · · · · · · ·	· · · · ·	2 - 4 2 - 8 - 5				
date of plug	gging	· · · · · · · · · · · · · · · · · · ·	· · · · ·	2 - 4 2 - 8 - 5	· · · · · · · · · · · · · · · · · · ·	FILE OCT 26 19	<b>D</b> 154	
date of plug	gging		· · · · ·	2 - 4 2 - 8 - 5	· · · · · · · · · · · · · · · · · · ·	FILE OCT 26 19	D 154 PPERVISOR	

1-3212

 $\bigcirc$ 

5. Log of Well:

١

Depth Frank	in Fost To	Thickness in fast	Description of Formation
0	1	<b>1</b>	top soil 323 /
1	12	-11	oleachie 3253
12	22	10	red clay 2243
22	48		
48	70	22	red clay 2275
70	80	10	water sand 2024
80	87	. 7	red clay 13-72
87	96	9	water sand
96	100	4	clay 2008
·			
	ļ		
·			
<u></u>			
	ļ		· · · ·
<u></u>			
	]		

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

, waare .

Willard Licensed We <u>Jea</u> Instructions

- 44

This form shall be executed, preferably typewritten, in triplicate and filed with the State Engineer's Office at Roswell, New Mexico, within 10 days after drilling has been completed. Data on water-bearing strata and on all formations encountered should be as complete and accurate as possible.

(This form to be executed in triplicate)

WELL RECORD

Name of section	tee, J. C. CG	lemen	•		
	•				
	•	Challen Cit	i	1	
1. Well location and	d description: The i	Shallow well is (shallow or artesian)	located in	NF.	%, <u></u>
NY 4	of Section9		S, Rang	20E	_; Elevation
casing above see	a level,	feet; diameter of	hole,8	inches; total	depth,10
depth to water u	pon completion,	: 25 feet; drillin	ng was commen	ced Nay 17	
and completed	Lay_19	, 1954 ; name	of drilling con	tractor R111	ard Beat
1102 Merch	BDL ; Address	s, Artesia, Nev	Merico	; Driller's Licen	se No <u>FD_</u>
2. Principal Water-				· ·	
	pih in Feet	Thickness	Descripti	on of Water-bearing	Formation
No. 1	To			· · · · · · · · · · · · · · · · · · ·	
65	70	5	Send		
BC	94	14	Sand	<u> </u>	Anto \$_1***
No. 4					
No. 5	_			·	
	<u> </u>			<u> </u>	
3. Casing Record: Diameter Poun in inches per f			feet of Casing T	npe of Shoe	Perfors From
Diameter Poun	ft. per inch T	rop Bottom (	Casing T	IONS	•
Diameter Poun in inches per i	ft. per inch T	rop Bottom (	Casing T	,	From
Diameter Poun in inches per i	ft. per inch T	rop Bottom (	Casing T	,	From
Diameter Poun in inches per i	ft. per inch T	rop Bottom (	Casing T	,	From
Diameter Poun in inches per i	ft. per inch T	rop Bottom (	Casing T	,	From
Diameter         Poun           in inches         per f           6. ID         17	fi. per toch T	rop Bottom (	Castag Tr 100	Ione	Pross
Diameter Poun in inches Per f 6 ID 17	fi.         per mech         T	Nop         Bottom         Image: Control of the second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second sec	Castag 7, 100) 	Ione	Pross
Diameter Poun in inches Per f 6 ID 17	fi.         per mech         T	well to be abandoned,	Castag 7, 100) 	Ione	Pross
Diameter Poun in inches Per f 6 ID 17	fi.         per mech         T	well to be abandoned,	Castag T; 100) 	Ione	Pross
Diameter Poun is inches Per f 6 ID 17	fi. per inch T	Nop         Bottom	Castag T, 100) give location: 	Ione	From
Diameter Poun is inches Per f 6 ID 17	fi. per inch T	Nop         Bottom	Castag T, 100) give location: 	IONE	From
Diameter Poun is inches Per f 6 ID 17	fi. per inch T	Nop         Bottom	Castag T, 100) give location: 	IONE	From
Diameter Poun is inches Per f 6 ID 17	fi. per inch T	Nop         Bottom	Castag T, 100) give location: 	IONE	From
Diameter Poun is inches Per f 6 ID 17	fi. per inch T	Nop         Bottom	Castag T) 100 ) give location: ; ban describe how w	IONE	From
Diameter Poun is inches Per f 6 ID 17	fi. per inch T	Nop         Bottom	Castag T) 100 ) give location: ; ban describe how w	IONE	From

5. Log of Well:

Depth From	To To	Thickness in fuot	•.	Description of Formation
				- 267
0		3	Top Soil	3257
3	10	7	Cleachie	33ను
10	26	16	Red Clay	3224
26	42	16	Yellow Clay	. 32/5 .
42	50	8	Red Clay	₹ 3/ <i>3</i>
	-			3295
50	65		Red Bed	
65	70	5	Water Sand	<u> 3 2 ° 3</u>
80	80	10	Red Clay	3260
80	94	14	Water Sand	3266
94	100	6	Red Clay	2.76-
			· · · · · · · · · · · · · · · · · · ·	
				,
				· · · · · · · · · · · · · · · · · · ·
** *				
				······································
				· · · · · · · · · · · · · · · · · · ·
<u> </u>			<u> </u>	
			1	
		<i>į</i> .		
				••••

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

Willow

Instructions

This form shall be executed, preferably typewritten, in triplicate and filed with the State Engineer's Office at Roswell, New Mexico, within 10 days after drilling has been completed. Data on water-bearing strata and on all formations encountered abould be as complete and accurate as possible. Form WR-23

#### STATE ENGINEER OFFICE

#### WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

~		
	ction	

Section 2

	(A) Owner of well Cecil C. Standard Street and Number Box 232
-	City Loca Hills State New Mexico
	Well was drilled under Permit No. <u>RA 3282</u> and is located in the <u>NE 14 77 14 10</u> 4 of Section <u>9 Twp 175 Rge</u> 265
· · ·	(B) Drilling Contractor <u>Williard Bosty</u> License No. <u>11-62</u>
	Street and Number Box 382 1102 Kerchant
	City Artesia State New Mexico
	Drilling was commenced August 28 19 54
	Drilling was completed Set tember 2 19 54
(Plat of 640 acre	

____Total depth of well____125 Elevation at top of casing in feet above sea level 60 ____Depth to water upon completion__ State whether well is shallow or artesian Shallow

#### PRINCIPAL WATER-BEARING STRATA

No.	Depth i	n Feet	Thickness in	Description of Water-Bearing Formation
NO.	From	То	Feet	· · · · · · · · · · · · · · · · · · ·
1	-69	0.2		Fine Sand
2	105	22	20	- Veter Sund & Gravel
3				
4				
5				

Section 3				RECOR	D OF CAS	ING		
Dia	Pounds	unds Threads Depth		epth	Feet	Type Shoe	Perforations	
in.	ft.	in	Top	Bottom	reet	Type Shoe	From	To
2	17		0	3.05	3.05		105	125
	- 17	11		122	125	collar		
			1	1				

Section	4
---------	---

#### RECORD OF MUDDING AND CEMENTING

		Diameter	Tons	No. Sacks of	Methods Used
		Hole in in.	Clay Cement		
1					
					n 12 - Le
				1	

		_
<b>C</b> ~	ction	5
	, mon	

File No. 29-3282

#### PLUGGING RECORD

Name of Plugging Contr	actor				I	icense No
Street and Number	·····	_ Ci	ty		S	tate
Tons of Clay used	Tons of Roughage u	used.			Type of n	roughage
Plugging method used				Dat	e Plugged_	
Plugging approved by:		-		Cemen	t Plugs wer	e placed as follows:
			No.	Depth	of Plug	No. of Cooks Hand
	Bapin Supervisor		No.	From	To	No. of Sacks Used
FOR USE OF S	TATE ENGINEER ONLY					
	AUG 31 1955				•	· _ ·
Date Received					1 · · ·	
	OFFICE					

Use FOL C - MET

Location No. 17.26.9. 112

**.***. 2

GROUND WATER SUPERVISOR ROSWELL NEW MERICO

. 2

Feet		tion 6 LOG OF WELL					
To	Thickness in Feet	Color	Type of Material Encountered	1			
2	2	Brown	Top Soil	3255			
12	0		Cleachie	3348			
				3 310			
60	10	Broim "	Sand, Showing of Water	<u></u>			
<u> </u>	20	Red	Clay	3290			
- 92	12	Brown	Water Sand	3268			
105	13	Red	Clay	5225			
	18		-	3237			
-	2		1 -	3235			
	├		· · · · · · · · · · · · · · · · · · ·				
			· ·				
		· ·					
			-				
			· · · · · · · · · · · · · · · · · · ·				
	( f	<u> </u>					
·····							
<u> </u>	+						
	<u> </u>		······································				
		······					
<u>,</u>				•			
			<u> </u>				
	<b></b>						
			· ·				
	<b>1</b> 2 50 60 80	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	12         10         White           50         38         Red           60         10         Brown           E0         20         Red           92         12         Brown           105         13         Red           113         16         Brown	12     10     White     Cleachis       50     38     Red     Clay       60     10     Brown     Sand, Showing of Water       £0     20     Red     Clay       92     12     Brown     Water Sand       105     13     Red     Clay       113     18     Brown     Vater, Sand & Gravel       125     2     Red     Clay			

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

and a second second second second second second second second second second second second second second second s

£.

1. 1 -57

Wellard 10 Well Driller

#### Form WR-23

#### STATE ENGINEER OFFICE

#### WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1	(A) Owner of well N. E. Garrett	
	Street and Number	
	City Las Vegas, State New Mexico	
	Well was drilled under Permit Noand is located ir <u>NW ¼ NW ¼</u> of Section <u>9</u> Twp <u>17</u> Rge	
	(B) Drilling Contractor	
	City State	
	Drilling was commenced	
(Plat of 640 acres)	Original flow: 576 GEW	

Elevation at top of casing in feet above sea level ______ Total depth of well ______ 1005 ft______ State whether well is shallow or artesian ______ Depth to water upon completion ______

Section	2		PRINC	CIPAL WATER-BEARING STRATA	
No.	Depth i	in Feet	Thickness in	Description of Water-Bearing Formation	
NO.	From	То	Feet		V
1				1st flow at 880 ft.	
2				2nd flow at 940 ft.	
3					
4					
5					

Section 3	3			RECOR	D OF CA	SING		
Dia	Pounds	Threads	D	epth	Feet	Type Shoe	Perfor	tions
in.	ft.	in	Top	Bottom	reet	Type Shoe _	From	To
6."			Û	528				
								<u> </u>
				-				

Section 4

RECORD OF MUDDING AND CEMENTING

Section 4									
Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used				
From	То	Hole in in.	Clay	Cement					
		1		1					
I		<u> </u>	. <u> </u>	·					

Section 5	PLUGGING RECC	)RD	
Name of Plugging Contractor		License No	
Street and Number	City	State	
Tons of Clay used	Tons of Roughage used	Type of roughage	
Plugging method used		Date Plugged	19
Plugging approved by:		Cement Plugs were placed as fo	ollows:

	No.	Dept	h of Plug	No. of Sacks Used
Basin Supervisor		From	To	
FOR USE OF STATE ENGINEER ONLY				
Date Received				
	L			
File No. (8-35) PA-602 UBE			Location 1	No17.26.9.110

Depth i	in Feet	Thickness	Color	-	Type of Material Encountered		
m	To	in Feet	COILL	19	e vi materiai encountereu		
	5			Sandy loam	3355		
5	8			Clay	3352		
<b></b>	15			Gyp Pock	3 3 4 5		
5	21	· · ·		Gyp rock	3339		
ย	29			Clay	3331		
29	43			Clay	3317		
13	51			Gumbo	3309		
11	59			Sand	3301		
59	89			Gumbo	327/		
39	91			Gyp rock	3269		
91	109			Gumbo	3251		
109	120			Sand	3240		
20	156			Gumbo	3204		
156	241			Gyp rock	3119		
241	246			Sand	3114		
246	391			Gumbo	2969		
391	408			Hard shell roo	ck		
08	471			Soft shale			
471	498			Sand			
498	589			Sand			
582	602			Shale			
602	648			Sand			
648	661			Hard lime stor	ae		
661	791			Soft rock			
791	810			Shale			
810	828			Gray lime roc	<u>k</u>		
828	833			Gray lime roc	k		
E.33	852			Soft shale ro	ck		
852	875			Hard lime roc	k.		
875	1005			Hard lime roc	k `		

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

. . . . . . . . . .

· --.

t

G. R. Dublin Well Driller

.

ļ

ļ

l

Т

ļ.

į.

# WELL RECORD

1

į

: -

.

P

File No

**1**-

INSTRUCTIONS: This form should be typewritten, and filed in the office of the State Engineer, P. O. Box 1079, Santa Fe, New Maxico, or in the office of the Artesian Well Supervisor, Roswell, New Mexico. Section 5 should be answered only if an old artesian well has been plugged. All other sections should be answered in full in every case, regardless of whether the well drilled is shallow or artesian in character. This report must be cubscribed and sworn to before a Notary Public. . . . .

-÷.

3

g					of well	-			
Weil was drilled under Permit No. RAs. 2565         Image: State of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state	°NW		NE						
is located in the ST W V FT is of Section 173 Paage 265 Drilling Contractor Keyen Drilling Co. (Plat of 60 Acres) (Plat of 60 Acres) Post Office BDBWall, Have Mexicoo Drilling Val Accentery Post Office BDBWall, Have Mexicoo Sec. 2 PRINCIPAL WATER EERING STRATA No. 1, from 100 Thickness in feet Pormation. No. 6, from to Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. No. 6, from 100 Thickness in feet Pormation. Sec. 3 RECORD OF CASING Diameter of Number of Backs of Cannor BDBWall 216' Tozas None 2017faco Tons of Cannor Backs Of Cas None 111 Liner Sec. 5 PLUGGING RECORD OF OLD WELL Val is located in the X X X of Bection Tormatio. Rage Name of plugging contractor. Name of plugging contractor. Sec. 5 PLUGGING RECORD OF OLD WELL Val is located in the X X X of Bection Tormation. Name of plugging contractor. Sec. 5 PLUGGING RECORD OF OLD WELL Val is located in the X X X of Bection Tormation. Name of plugging sporved by Artesian Well Bupervicer! Common plugs were flaced as follows: No. 4 was plused at feet Number of acks of consent used No. 5 was placed at feet Number of acks of consent used No. 5 was placed at feet Number of acks of							•		
173       Rage       26E         Township       173       Rage       26E         Contractor Keyen Drilling Co.         (Plat of 60 Acres)         Locat Weil Accres/         Dest Office       Double Perm. Aye.         Street and Number 1012 South Perm. Aye.         Dest Office       Double January 26,         Elevation at top of caling in freet above sea love         Soc. 2         PRINCIPAL WATER BARING STRATA         No. 1, from       216         Thickness in feet       Formation         No. 1, from       Colspan="2">Pertorstor         No. 1, from       216         Thickness in feet       Formation         No. 1, from       Colspan="2">Pertorstor         No. 1, from       Colspan="2" <td< td=""><td></td><td>╧┽╴</td><td></td><td>- ·</td><td></td><td></td><td></td><td>-</td><td></td></td<>		╧┽╴		- ·				-	
Sec. 2       PRINCIPAL Water level upon completion of well_A2         No. 8, from       10         No. 8, from       10         No. 8, from       10         No. 8, from       10         Sec. 3       RECORD OF CASING         Sec. 4       RECORD OF CASING         Sec. 4       RECORD OF MUDDING AND CEMENTING         Sec. 4       RECORD OF MUDDING AND CEMENTING         Sec. 5       PLUGGING RECORD OF OLD WELL         Yeal to based or plugging contractor       Sec. 6         Sec. 5       PLUGGING RECORD OF OLD WELL         Yeal to come of plugging contractor       Sec. 6         No a diamate of the sec in the section       Sec. 7         Yeal to base of the section of the section       Sec. 7         No b, from       to         No b, from       to         Sec. 3       RECORD OF CASING         Sec. 4       RECORD OF ADD COND For the section         Sec. 5       PLUGGING RECORD OF OLD WELL         Yea to based at the section       Township         Sec. 5       PLUGGING RECORD OF OLD WELL         Yea to based at follow:       Name of plugging contractor         Blaesed at follow:       Yea plugging approved by Artistan Well Buparvisor 7         Commont plug were pl	<b>.</b>			-1					
Street and Number 1012 South Perm. Ave.         (Plat of 600 Acres)         Locate Well Accurately         Not Office	SX	·	+SE	-1	-				
Desite of 660 Acress)       Post Office       RoBwall, New Kertoo         Drilling was commenced JADUART 21, 1950. Drilling was completed JADUART 26,				1		•	•		
Locate Weil Accurately Post Office IoSO_ Drilling was completed JADUARY 21,			<u> </u>	-J Street a	nd Number 10	l2 Sout	<u>Perm</u>	<u>A</u> ¥.9.	
Driming with coordinating in feet above sea level       3.2 4 0         State whether well is aballow or artesian Bh2120M         Total depth of well 232       feet. Water level upon completion of well. 42         Sec. 2       PRINCIPAL WATER-BEARING STRATA         No. 1, from       10         No. 2, from       10         No. 3, from       14         No. 4, from       10         No. 5, from       14         No. 6, from       10         No. 7       10/cheese in feet         Pormation       Formation         No. 6, from       10         No. 7       10/cheese in feet         Pounds       Threads         Manufacturer       Casing         Sec. 3       RECORD OF CASING         Diameter       Pounds         None       Surface         5. 5/16 18       10/80         Buesded of MudDDING AND CEMENTING         Sec. 5       PLUGGING RECORD OF OLD WELL         Yell is located in the       K is of Section         Sec 5       PLUGGING RECORD OF OLD WELL </td <td>Loca</td> <td>te Well A</td> <td>ccurately</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Loca	te Well A	ccurately						
Blate whether well is shallow or artesin Bhallow Total depth of well 232feet. Water level upon completion of well_A2feet below land a Sec. 2 PRINCIPAL WATER-BEARING STRATA No. 1, fromtoThickness in feetFormationKALSF_3and No. 2, fromtoThickness in feetFormation No. 3, fromtoThickness in feetFormation No. 4, fromtoThickness in feetFormation No. 5, fromtoThickness in feetFormation No. 6, fromtoThickness in feetFormation No. 6, fromtoThickness in feetFormation Sec. 3 RECORD OF CASING            Diameter         Founds         Threads         Name of the saing Stoke         From 100         Purpose           7"         24         8         Used         216'         Texas None         Surface           5 3/16         18         1896d         30'         none         all         Linner           sec. 4         RECORD OF MUDDING AND CEMENTING         Sec. 4         RECORD OF OLD WELL         Town of Mud         Clay Used         Gay Used           Sec. 5         PLUGGING RECORD OF OLD WELL         Yes of Mud         Township	During was	commence	An and some spin is a desired of the	Ve ses level		lling was co	mpleted	anuar	7 20,
Sec. 2     PRINCIPAL WATER-BEARING STRATA       No. 1, from     216     to     220     Thickness in feet     4     Formation     Nator     Sator       No. 2, from     to     Thickness in feet     Formation     Formation     Nator     Sator       No. 2, from     to     Thickness in feet     Formation     Formation       No. 4, from     to     Thickness in feet     Formation       No. 6, from     to     Thickness in feet     Formation       No. 6, from     to     Thickness in feet     Formation       No. 6, from     to     Thickness in feet     Formation       No. 6, from     to     Thickness in feet     Formation       Sec. 3     RECORD OF CASING     Furpose       7"     24     B     Used     216*     Toza       7"     24     B     Used     216*     Toza     None       5.0     5     J/16 18     B     Used     30*     none     al1     Liner       Sec. 4     RECORD OF MUDDING AND CEMENTING     Sec. 4     RECORD OF OLD WELL     Tom of Mad     Clay Used       Sec. 5     PLUGGING RECORD OF OLD WELL     Yeld     Tom of Clay Used     Sec. 5     Township       Frange     Name of plugging contracto									
No. 1, from       216       to       220       Thickness in feet       Formation       Nature         No. 2, from       to       Thickness in feet       Formation       Formation         No. 8, from       to       Thickness in feet       Formation         No. 6, from       to       Thickness in feet       Formation         No. 6, from       to       Thickness in feet       Formation         Sec. 3       RECORD OF CASING         Diameter       Per loch       Manufacturer       Casing       Stop         7 ^m 24       8       Used       216 ^s Toreats       None         5 3/16       18       Used       216 ^s Toreats       None       Surface         5 3/16       18       Used       30 ^s none       all       Liner         Sec. 4       RECORD OF MUDDING AND CEMENTING       Sec. 4       RECORD OF OLD WELL       Tore of Mad       Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL       Tore sof Mad       Clay Used       Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL       Tore sof roughage       Tore sof roughage       Tore sof roughage         Farage       Name of plugging contractor       Biteet and Number<	Total depth	of well_2]	32						feet below land s
No. 2, from		216	22					•.•	
No. 8, from									
No. 4. fromto									
No. 5, from	-								
Sec. 3       RECORD OF CASING         Diameter per Fool per Inch Manufacturer Casing Type of Perforated Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Performed Perfor									
In Inches       per Foot       per Inch       Manufacturer       Casing       Shoe       From       To       Purpose         7"       24       8       Used       216°       Texas       None       Surface         5       3/16       18       8       Used       30°       none       all       Liner         5       3/16       18       8       Used       30°       none       all       Liner         5       5       3/16       18       8       Used       30°       none       all       Liner         5       5       7       RECORD OF MUDDING AND CEMENTING       Tone of Mudd       Gay Used       Gay Used         Sec. 5       Number of Sacks       Methods Used       Specific Gravity       Tone of Mad       Gay Used         Sec. 5       PLUGGING RECORD OF OLD WELL       Vell       Vell       Section       Township       Range         Range       Name of plugging contractor       Was plugging approved by Ariesian Well Supervisor ?       Was plugging approved by Ariesian Well Supervisor ?         Cement plugs were flaced at       feet. Number of sacks of cement used       Mod       Sec. 1       Sec. 1         No. 2 was placed at       feet. Number of sacks of cement									
In Inches       per Foot       per Inch       Manufacturer       Casing       Shoe       From       To       Purpose         7"       24       8       Used       216°       Texas       None       Surface         5       3/16       18       8       Used       30°       none       all       Liner         5       3/16       18       8       Used       30°       none       all       Liner         5       5       3/16       18       8       Used       30°       none       all       Liner         5       5       7       RECORD OF MUDDING AND CEMENTING       Tone of Mudd       Gay Used       Gay Used         Sec. 5       Number of Sacks       Methods Used       Specific Gravity       Tone of Mad       Gay Used         Sec. 5       PLUGGING RECORD OF OLD WELL       Vell       Vell       Section       Township       Range         Range       Name of plugging contractor       Was plugging approved by Ariesian Well Supervisor ?       Was plugging approved by Ariesian Well Supervisor ?         Cement plugs were flaced at       feet. Number of sacks of cement used       Mod       Sec. 1       Sec. 1         No. 2 was placed at       feet. Number of sacks of cement		Pounda	Threada	Name	T Feet of	Type of	Perform	+ a-1	
5       3/16       18       1890       30°       none       all       I.iner         Sec. 4       RECORD OF MUDDING AND CEMENTING         Diameter of Hole in Inches       Number of Sacks of Cement       Methods Used       Specific Gravity of Mad       Tons of Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL         Vell is located in the       %       % of Section       Township         Range       Name of plugging contractor       Post Office       Toynship         Street and Number       Tons of roughage used       Type of roughage       Toynship         Cement plugs were flaced as follows:       No. 1 was placed at       feet. Number of sacks of cement used       feet. Number of sacks of cement used         No. 2 was placed at       feet. Number of sacks of cament used       feet. Number of sacks of cament used       feet. Number of sacks of cament used         No. 4 was placed at       feet. Number of sacks of cament used       feet. Number of sacks of cament used						1	_		Purpose
Sec. 4       RECORD OF MUDDING AND CEMENTING         Diameter of Hole in Inches       Number of Backs of Cement       Methods Used       Specific Gravity of Mad       Tons of Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL         Vell is located in the       ½       ½ of Bection       Township         Range       Name of plugging contractor       Post Office       Type of roughage         Street and Number       Tons of roughage used       Type of roughage       Type of roughage	7*	24	8	Used	216'	Texas	None	,	Surface
Diameter of Hole in Inches       Number of Sacks of Oement       Methods Used       Specific Gravity of Mud       Tons of Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL         Vell is located in the       %       % of Section       Township         Range       Name of plugging contractor       Street and Number       Post Office         Tons of clay used       Tons of roughage used       Type of roughage	5 3/10	18 -	<b>8</b> ·	used	30'	none	all		Liner
Diameter of Hole in Inches       Number of Sacks of Oement       Methods Used       Specific Gravity of Mud       Tons of Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL         Vell is located in the       %       % of Section       Township         Range       Name of plugging contractor       Set Office       Tops of roughage         Street and Number       Post Office       Type of roughage         Cement plugs were flaced as follows:       No. 1 was placed at       feet. Number of sacks of cement used         No. 3 was placed at       feet. Number of sacks of cement used       feet. Number of sacks of cement used         No. 4 was placed at       feet. Number of sacks of cement used       feet. Number of sacks of cement used         No. 4 was placed at       feet. Number of sacks of cement used       feet. Number of sacks of cement used         No. 5 was placed at       feet. Number of sacks of cement used       feet. Number of sacks of cement used			1						
Diameter of Hole in Inches       Number of Sacks of Oement       Methods Used       Specific Gravity of Mud       Tons of Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL         Vell is located in the       %       % of Section       Township         Range       Name of plugging contractor       Street and Number       Post Office         Tons of clay used       Tons of roughage used       Type of roughage	L		<u> </u>	1		-			
Hole in Inches       of Cement       Methods Used       of Mud       Clay Used         Sec. 5       PLUGGING RECORD OF OLD WELL         Yell is located in the       %       % of Section       Township         Range       Name of plugging contractor       Sec. 5       Township         Street and Number       Post Office       Tore of roughage used       Type of roughage	Sec. 4			RECORD (	OF MUDDING	ND CEMEN	TING		
Sec. 5       PLUGGING RECORD OF OLD WELL         V/ell is located in the       ½         Y/ell is located in the       Yell is located in the         Yell is located in the       Yell is located in the         Yell is located in the       Yell is located in the         Yell is located in the       Yell is located in the         Yell is located in the       Yell is located in the         No. 1 was placed at       feet. Number of sacks of cement used         No. 4 was placed at       feet. Number of sacks of cement used <td></td> <td></td> <td></td> <td></td> <td>Methods U</td> <td>bed</td> <td></td> <td></td> <td></td>					Methods U	bed			
Well is located in the       ½       ½ of Section       Township         Range       Name of plugging contractor       Post Office       Street and Number         Tons of clay used       Tons of roughage used       Type of roughage									
Well is located in the       ½       ½ of Section       Township         Range       Name of plugging contractor       Post Office       Street and Number         Tons of clay used       Tons of roughage used       Type of roughage									
Well is located in the       ½       ½ of Section       Township         Range       Name of plugging contractor       Post Office       Street and Number       Post Office         Tons of clay used       Tons of roughage used       Type of roughage									·
Well is located in the       ½       ½ of Section       Township         Range       Name of plugging contractor       Post Office       Street and Number         Tons of clay used       Tons of roughage used       Type of roughage					<u> </u>	·		·····	
Well is located in the       ½       ½ of Section       Township         Range       Name of plugging contractor       Post Office       Street and Number       Post Office         Tons of clay used       Tons of roughage used       Type of roughage	5 See 5			PLUGO	ING RECORD				
Street and Number       Post Office         Tons of clay used       Tons of roughage used       Type of roughage		ed in the						, Town	ship
Tons of clay used       Type of roughage	Range		Name of	plugging con	tractor				· · · · · · · · · · · · · · · · · · ·
	Street and N	umber				t Office		<u> </u>	
Cement plugs were placed as follows: No. 1 was placed atfeet. Number of sacks of cement used	Tons of clay	used		Tons of re	ughage used		Туре	of rough	
No. 1 was placed at				······································	Wai	plugging ap	proved by	Artesian '	Well Supervisor?
No. 2 was placed atfeet. Number of sacks of cement usedNo. 3 was placed atfeet. Number of sacks of cement usedNo. 4 was placed atfeet. Number of sacks of cement usedNo. 5 was placed atfeet. Number of sacks of cement used				:					•
No. 5 was placed atfeet. Number of sacks of cement used	•					1		-	· · · ·
No. 6 was placed atfeet. Number of sacks of cement used		a 1. <b>61.</b> 11				e en el suge	. est. 11 at a	ಒ ಸಂಘಟನೆ	· · · · · · · · · · · · · · · · · · ·
No. 5 was placed atfeet. Number of sacks of cement used	-								
	TAO' A MATE DIS								•
A start of the start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the second start of the se	No. 5 was bla								
	No. 5 was pla			e	(over)				

5

OM (Depth in Feet)	TO (Depth in Feet)	THICKNESS IN FEET	CLASSIFICATION OF FORMATIO
0	<b>4</b> 52	76	Top Soil
4	18 336		Sandstone
18	<b>40</b> 334		Sandy clay
40	<b>56</b> 532		Send and clay
56	<b>60</b> 3.24		Gravel
60	118 3-5		Sand
118	140 3.24		Sandy clay
140	148 32.		Red elay
148	170 32		3and and Gravel
170	172 3 2		Red clay
172	<b>190</b> 3/1		Conglomerate
190	<u> </u>		Sand and clay
200	<u>. 200 . 2/3</u> 216 <i>3/6</i>		Sand and diay
216	<b>220</b> 2/6		Water sand
220	<b>23</b> 2 3/5		Conglomerate
220		<u> </u>	
	· · · · · · · · · · · · · · · · · · ·		
	- <u>12</u>	· · · · · · · · · · · · · · · · · · ·	
			¹ د بع
	·····		
	·		
	<u>,</u>		
	<u></u>		
		4	

SUBSCRIBED AND SWORN TO BEFORE ME this

day of_ , A.D., 19____ Notary Public

My Commission Expires.

. . .

Position Driller

Street and Number 1012 So. Penn. Ave.

1

,

Post Office_

Signed.

STATE ENGINEER OFFICE

. .

Form WR-23

#### WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

	(A) Owner of well City of Artesia	······································
	Street and Number	·
	City	State
	Well was drilled under Permit NoRA-2155	
	<u>SW ¼SW ¼NE</u> ¼ of Section <u>17</u>	
	(B) Drilling Contractor Vernon Wintheiser Street and Number Box 38	License No.
	City Hagerman,	StateNew Mexico
	Drilling was commenced October 5	19.44
	Drilling was completed October 22	19 44

ZEE Total depth of well 1071 Elevation at top of casing in feet above sea level____ State whether well is shallow or artesian artesian Depth to water upon completion

No.	Depth	in Feet	Thicknes		Description of Water-Bearing Formation					
-	From	То	Feet							
1	933	939	6		lime					
2	943	948	5		lime '	a	· · ·			
3	981	1002	21		lime i	ncrease :	at 995			
4	1035	1040	5	-	lime		- • • • • • • • • • • • • • • • • • • •			
5	1040	1055	15		lime increase at 1052					
ection	1055 3	1068				NCTEASE A				
Dia	Pounds	Thre	ads	Dep	oth	Feet Type Shoe Perfor:		ations		
in.	ft.	in	T	op	Bottom	reet	Type Shoe	From	То	
10 3/4	40.5	8				668	Larkin float	none		
13 3/8	48.0	8				174				
						- 942				

Section 4

Section 5

#### RECORD OF MUDDING AND CEMENTING

Depth i	Depth in Feet Diamete		Tons	No. Sacks of	Methods Used
From	То	Hole in in.	Clay	Cement	Methods 0364
		16		100	Halliburton
			P	urpose to ceme	nt casing
				· · ·	
i		1			

# Name of Plugging Contractor.

PLUGGING RECORD

Name of Plugging Contractor_		License No	
Street and Number	City	State	<u></u>
Tons of Clay used	_Tons of Roughage used	Type of roughage	
Plugging method used		Date Plugged	19
Plugging approved by:		Cement Plugs were placed as i	follows:
		Depth of Plug	

		No.			No. of Sacks Used
B	asin Supervisor		From	To	No. OI SECES USED
FOR USE OF STATE ENGL	NEER ONLY				
Date Received					· · · ·
					Hospital well"
File No	ر بر ۲ Use	÷	I	ocation No	41211 17.26.17. <del>235</del>

ection 6	• .		106 (	OF WELL
From	in Feet	Thickness in Feet	Color	Type of Material Encountered
0	36	36	3344	soil & caliche
36	50	14	3330	caliche
50	65	15	3.315	sand
65	94	34	· 3296	sand & gyp
94	98	4	2282	hard shell
98	175	85	3205	gyp & sand
175	200	25	دى:3	sand & gravel
200	205	5	3175	shell
205	234	29	2146	sand & gravel
234	260	26	3120	sand gyp
260	300	40	ي و ي	gyp & red rock
300	323	23	3257	hard ford rock
323	350	27	<u> </u>	sandrock
<u>323</u> 350	400	50	2 980	shale & gyp
	1		2 785	
400	580	180		clay
580	585	5 24	<u> </u>	hard shell
585	609 605			red sand
609	685	76		red rock & shale
685	695	10	<u></u>	hard gyp shell
695	700	5		red shale
700	704	4		lime shell
704	715	11		gyp shell
715	720	5		shale
720	758	38		red sand & rock
792	810	18	· · · · · · · · · · · · · · · · · · ·	hard shale
810	830	20		red sand
830	832	2	· · · · ·	hard sand & shale
832	837	5	ļ	lime shell
837	862	25		hard gray lime
862	875	13		hard gray lime
875	880	5		water rock (lime)
880	882	2	- • • •	soft sand
882	885	3		lime
885	895	10		hard gray lime
895	925	30		hard lime
925	933	8		lime
933	939	6	ļ	lime (water rock)
939	943	4		1ime
943	948	5		increase in water (lime)
948	955 981	7 26		lime lime with shale streaks
955	Ļ			
981	. 1002	21	<b> </b>	white lime (increase in water)
1002	1010	8		hard white lime
1010	1035	25		white lime
1 035	1040	5		lime (water rock)
1040	1055	15		lime (increase in water at 1052)
1055	1068	13		lime (increase in water at 1068)
1068	1071	3		brown lime

State States

AL AL

ļ

.

1

i.

Form WR-23

#### STATE ENGINEER OFFICE

### WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1		(A) Owner of well	J. B. Walls	Ce	
		Street and Number			
		City	Artesia,	State New Me	xico
		Well was drilled under Perr Lot 4, Blk. 4, Roselawn	nit No. RA-1749	and is loca	ited in the
	<u> </u>	(B) Drilling Contractor Street and Number	Roe L. Newberry	License No	
		City		State	
		Drilling was commenced	April	_15,	19.40
		Drilling was completed	April	20,	19.40
(Plat of 640 acre	s)	-			

Elevation at top of casing in feet above sea level______Total depth of well______Total depth of well_______Total depth of well______Total depth of

Section	2		PRINCIPAL WATER-BEARING STRATA					
No. Depth in Feet			Thickness in	Description of Water-Bearing Formation				
110.	From	To	Feet					
1								
2								
3								
4								
5								

Section 3 RECORD OF CASING								
Dia Pounds	Threads	D	Depth		Type Shoe	Perforations		
in.	ft.	in	Тор	Bottom	Feet .	· Type Shoe _	From	To
6					105			
<b>.</b>								

Section 4		RECORD OF MUDDING AND CEMENTING							
Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used				
From	То	Hole in in.	Clay	Cement	methods Used				
	 	++	······································						
		<u> </u>							

Section 5	PLUGGING	RECO	RD		
Name of Plugging Contractor.				I	icense No
Street and Number	Ci	ty		S	tate
Tons of Clay used	_Tons of Roughage used.		•	Type of	roughage
Plugging method used			Date	Plugged_	19
Plugging approved by:			Cement	Plugs wer	e placed as follows:
		No.	Depth	of Plug	No. of Sacks Used
	Basin Supervisor		From	To	NO. OI SACKS USED
FOR USE OF STATE E	NGINEER ONLY				
Date Received					

File No. **RA-1749** 

÷

Location No. __17.26.17.400

Depth is	Feet	Thickness		The of Material Reconstand
From	То	in Feet	Color	Type of Material Encountered
0	1			8011
1	17			Sand
17	23	<u> </u>		Gravel
23	37	┦────┤─		Pink clay
37	53			Grayel
53	105			Water, sand and gravel
		L		
		ļ		· · · · · · · · · · · · · · · · · · ·
·		╄		
		ļ		
				· · · · · · · · · · · · · · · · · · ·
		1		
		1		······································
		1		
		1	<u> </u>	
		1	······································	······································
		1		
		1		
		1		
†		++-		
		<u> </u>		
		╂╌───╂─		
		╂────╂─		
	<u></u>			
		╆	<u> </u>	

يحصيه المحادات

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well

> Roe Newberrry Well Driller

> > Ξ.

 $e_{i} \geq$ 

l

I.

I.

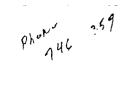
I

1. <u>1</u>. 2. 2011

## ADDITIONAL WELL LOGS

¢

5



## STATE ENGINEER OFFICE WELL RECORD

ŧ

Revised June 1972

ļ.

FIELD ERGR. LOG

			5	Section 1. GENEI	RAL INFORMATION	N		
(A)	Street or	Post Office A	<u>e Dilbeck</u> ddress <u>210 (e</u> Artesi	intre	co 88210			
Well			NU		and is located	•	Range <u>26</u> E	N.M.P.M.
	c. Lot N Subdi	o vision, recorde	of Block No		of the of the County. eet, N.M. Coordinate	18. <u>18. q. q.</u>	<u> </u>	
(B) Addi	the				E.6F Br+	License No.	WD675	Grant.
Drill	ing Began				Type tools	-		
Com	pleted wel	lis 🗶 s	shallow 🗖 artes		Depth to wate		tion of well	<u>50</u> ft.
	Depth From	in Feet To	Thickness in Feet		on of Water-Bearing			ated Yield per minute)
	95	120	25	Water Sa	rd		10	

From	То	in Feet	Description of Water-Bearing Formation	(gallons per minute)
95	120	25	Water Sand	10

Diameter	Pounds	Threads	Depth	in Fect	Length (feet)	Length	Type of Shoe	Perforations	
(inches)	per foot	per in.	Тор	Bottom		1990 01 31100	From	То	
7″	29 Lb	P/E	1	125	126	Р/Е	90	120	
·									
		1					1	+	

Section	4	RECORDOE	MUDDING AND	CEMENTING
Section	۰.	KECOKD OF	MODDING AND	CEMENTING

Depth i	in Feet	Hole			Method of Placement
From	To	Diameter	of Mud	of Cement	
		++-			

## Section 5. PLUGGING RECORD

Plugging Contractor		-			
Address		- No	Depth	in Feet	Cubic Feet
Plugging Method		- NO.	Тор	Bottom	of Cement
Date Well Plugged	<u></u>	- 🗌 🗌			
Plugging approved by:		2			,
		- 3			
	State Engineer Representative	4			

FOR USE OF STATE ENGINEER ONLY

Date Received 8/14/79	FOR	USE OF STATE ENGINEER OF	NLY	
		Quad	FWL	FSL
File No. RA - 6550	· · · · · · · · · · · · · · · · · · ·	Use D-S	_ Location No. 17.2	6. 10. 12323
	- 	.78 From E	Line	6. 10. 12323

Depth	in Feet	Thickness	Color and Type of Matail Economics
From	То	in Feet	Color and Type of Material Encountered
0	20	20	Jop Soil
20	60	40	Calicher-Clay
60	85	25	Fine Brown Sand
85	95	10	Coarse Sard
95	120	25	Water & Sard
120	125	5	Red Bed JD
<u></u>			· · · · · · · · · · · · · · · · · · ·
1			
	ļ		· · · · · · · · · · · · · · · · · · ·
			•
	<del> </del> -		
	-		
	-		
		Section	7. REMARKS AND ADDITIONAL INFORMATION
			ENCHICR OFFICE

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

 $\mathcal{P}$ 4 Priller 2 1

INSTRUCTIONS: This form - hould be executed in triplicate, preferably typewritten, and submitted to propriate district office of the State Engineer. Al ons, except Section 5, shall be answered as completely and accurately suble when any well is drilled, repaired or deepened. Then this form is used as a plugging record, only Section 1(a) and Section 5 n ed be completed. Form WR-23

#### STATE ENGINEER OFFICE

### WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

	(A) Owner of well H. G. Southworth	
	Street and Number	
	City <u>Artesia</u> State <u>New</u>	Mexico
	Well was drilled under Permit No. <u>RA-768</u> and is lo <u>SW 14 NE 14 SW 14 of Section 9 Twp. 17 R</u>	
<u> </u>	(B) Drilling Contractor Myron Bruning License No	- D
	Street and Number Box 881	
	City Artesia State New Mer	<u>kico</u>
•	Drilling was commenced September 20	19_43
	D 111 November 5	
levati	Drilling was completed November 5 Plat of 640 acres) on at top of casing in feet above sea level Total depth of well 214	
Elevati State w	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well	
Elevati State w Section	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well <u>214</u> hether well is shallow or artesian <u>Artesian</u> Depth to water upon completion 2 PRINCIPAL WATER-BEARING STRATA	
Elevati State w	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well214	
Elevati State w Section	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well214	
levati tate w section	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well214	
Elevati State w Section No.	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well214	
Elevati State w Section No. 1 2	Plat of 640 acres) on at top of casing in feet above sea levelTotal depth of well214	

Section 3	ł			RECOR	D OF CAS	SING		
Dia Pounds	Threads Depth		Feet	Type Shoe	Perforations			
in.	ft.	in	Тор	Bottom	rect	Type Shoe	From	To To
13" O.I	. 50	8			80	)	set in one str	ing joined
10 3/4	0.D 40				795	Drive	with sledge n:	pple.
						, · · · ·	total length	75
						1		

Section 4

RECORD OF MUDDING AND CEMENTING

Depth	in Feet	Diameter	Tons	No. Sacks of	• Methods Used
From	То	Hole in in.	Hole in in. Clay Ceme	Cement	Methous Oser
		13 3/4	540		pumped in by plug
		1			
		1 1			

#### Section 5

#### PLUGGING RECORD

Name of Plugging Contractor	License No					
Street and Number	City		State			
Fons of Clay used Tons of Roughage	e used	dType of roughage				
Plugging method used		Dat	e Plugged	19		
Plugging approved by:		Cement Plugs were placed as follows:				
	No.	Depth	of Plug	No. of Sacks Used		
Basin Supervisor		From	To	NO. OI SACES Used		
FOR USE OF STATE ENGINEER ONLY						
Date Received						
			<u> </u>			
	<b></b>	L	ocation No.	17.26.9.323		

lection 6			LOG OF WELL					
Depth From	in Feet	Thickness in Feet	Color	Type of Material Encountered				
0	5	<u>مَنْ قَدْ مَ</u>		soil				
5	30	2335		sandy gyp & clay				
30	80	3 28 2		sand & gyp				
80	290	3075		gyp & sandy clay				
290	385	2250		gyp & sandy clay				
385	720			red sand & gyp stratas				
720	755			arock				
775	870			red bed & rock stratas				
870	875			lime rock				
	casing	set		•				
875	880			water rock				
880	1214			limerock several streaks of water rock				
		``````````````````````````````````````	· · · · · · · · · · · · · · · · · · ·					
· ·								
			·					
	1		1					

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well

--S-- Myron Bruning Well Driller

R					:		7	۳. ۲۵۰ میں ۲۰۰۰ ۱۹۹۹ - ۲۰۰۱ ۱۹۹۹ - ۲۰۰۱	
1.DV			ι Μ		RFC		·	Fil∉ No	RA-1440
INSTRUCTIO)NS: This fe	orm should be t							ox 1079) Santa F
Mexico, unless	the well is a	situated in the	Roswell	Artesian 1	Basin, in wh	ich case it sho	uld be file	i in the of	lice of the Artesia
Supervisor, Ro	sewell, New	Mexico. Sect	ion 5 sl ecardles	aculd be an sof whether	swered only the well dri	if an old arte led is shallow	sian well h or artesiar	as been plu in charac	igged. All other s ter. This report r
subscribed and	sworn to be	efore a Notary	Public.	o or whether		· · · ·	12 °	*	·
SEC. 1					•		a star a		
		ar i			_			4	
			Owne	r of well	. T .	J. Jacks	02	· - ·	·· · · · ·
NW		N.E		t and Numb			••••••••••••••••••••••••••••••••••••••	1. I	
			Post	Office .	. Ar	osia, No	w-Meric	80 ¹	• •
		<u> </u>	Weli	was drilled	under Perm	it No. R	-1440	,	
				ated in the		<u>з л</u>	× ·	II	K of Section 9
					78/ -		261.		
		-3.				. Newber			 Black
	at of 640 acr		Stree						
	e Well Accu		Post	Office				· · · ·	
Drilling was c	mmenced	Tebruar	y 10	- 19 4	Drillin	g was compl	eted Tob	mary 2	6th 19 4
					_		-		
Elevation at to				-					
State whether	well is shal	llow or artesia	n	BUALL	3 20'				
			DI	PINCIPAL W	ATER-BEARI	NG STRATA			•
SEC. 2							•		
No. 2, from		to		, Thickness	in feet	·,	Formation	<u> </u>	
		to					· · ·	-	
No. 4, from		to		, Thicknes	s in feet		Formation		·····
No. 5, from		to		, Thickness	in feet	·	Formation		
SEC. 3				RECO	ORD OF CAS	ING		- •	
DIAMETER	POUNDS	THREADS	. NA	ME OF	FEET OF	TYPE OF	PERFO	RATED	PURPOSE
IN INCHES	PER FOOT	PER INCH	MANU	FACTURER	CASING	SHOE	FROM	TO	PURFUSE
12					202	•			
10					106				
10									
	Pipe	slit with	torc	h,6 sli	ts per c	Ircle.			
		1				<u> </u>			
SEC .4			RE	CORD OF M	UDDING AN		3		
	P. 05	NUMBER OF S		1			SPECIFIC	GRAVITY	TONS OF
DIAMETE	1	OF CEMEN		ļ	METHODS USE	r	OF		CLAY USE
DIAMETE HULE IN I				1					
					•		····		
				<u>+</u>					
				<u> </u>				• •	
			·····					-	
HOLE IN 1				PLUGGING	RECORD OF	OLD WELL			
HOLE IN 1				PLUGGING	RECORD OF				
HOLE IN I	d in the		; ·	¥	,	OLD WELL		, Town	abip
HOLE IN I		ŭ	; •	PLUGGING		of Section		, Town	
HOLE IN I		Name of ;	; •	¥		of Section		, Town	
HOLE IN I SEC. 5 Well is locater Range	lumber	Name of	plugging	×]	of Section		, Town	
HOLE IN I	umber	Name of	plugging	<pre>x</pre> contractor	Pos age used	c of Section	Туре	Town	2
SEC. 5 Well is located Range Street and N Toms of clay	lumber	Name of	plugging	contractor	Pos age used	c of Section	Type	Town	

was placed at leet feet No. 2 was placed at No. 3 was placed at No. 2

.

was placed at T feet 100 - T

Number of sacks of cement used - 77 Number of sacks of cement used 31.11.4 - C - C - C 7.2

TROM (DE		Surrar Jesse	THICKNESS IN FEET	CLASUIT A OF FORMATION
			Cicks Lite at	A second s
	· · · · · · · · · · · · · · · · · · ·	The second states of the second states of the	30	
A 10	201 705 70 F	CALCONS A STAT A		Pink Clay
<u>110</u>	and Dr wander	130		Bad Sand - Raier
130	And And And And And And And And And And	150	20	Bad Sandy Clay
		5 1 70	20	Tellow, sandy clay
3 170		4 196	26	Red sand olay, some
196		12 210	14	Pink Vater Sand
210		225	···· 15	· · ·
	5-6-5-5	- 245	20	Red Sandy Clay
		32 260	15	
·		Talalan adda ar ana an		Vator Sand
260		- 285		Red Clay
285		320	35	Water Sand, bottomed at red clay.
	<u> </u>			
				1
		· · · · · ·		
			1 · : ·	1
	h,			1
				· · · · · · · · · · · · · · · · · · ·
· · ·	· .·	· · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
<u> </u>			· · · · · · · · · · · · · · · · · · ·	، بر میں میں میں میں میں اور اور اور اور اور اور اور اور اور اور
	<u> </u>			
			· · · · · · · · · · · · · · · · · · ·	
	•		· · · · · · · · · · · · · · · · · · ·	-
		• · · · · · · · · · · · · · · · · · · ·		
		· · ·		
-				
<u> </u>				
<u> </u>	· ··· <u>-</u>			· · · · · · · · · · · · · · · · · · ·
			+	
	<u> </u>	<u> </u>	· · · · · · · · · · · · · · · · · · ·	
	·····	· · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
		/ . ; .	<u> </u>	· · · · · · · · · · · · · · · · · · ·
	- <u> </u>			· · · · · · · · · · · · · · · · · · ·
— <u>—, ". </u>				
<u></u>				1
			•	
			<u>+</u>	
		با ميند مود و 14 م بر ميند مود مود و 14 م برم مرد م		

I, _______ do s. ... by swear that, to the best of my knowledge and belief, the foregoing information is a true and correct record of the well for w). ..., etc. rt is hereby made, insofar as can be determined from all available records.

SUBSCRIBED AND SWORN TO BEFORE ME this

- - -

· · · · . ÷ 1 day of , A. D., 19 ;

Notary Public

Signed 🚑 Position U 5 . ^,

street and Number

J 👷 Off

G, L,

.

WELL RECORD

File N

INSTRUCTIONS: This form should be typewritten, and filed in the office of the State Engineer, P. O. Box 1079, Santa Fe, New Maxico, or in the office of the Artesian Well Supervisor, Roswell, New Maxico. Section 5 should be answered only if an old artesian well has been plugged. All other sections should be answered in full in every case, regardless of whether the well drilled is shallow or artesian in character. This report must be subscribed and sworn to before a Notary Public.

	-		·.	·.· •					· ·
] , Owne	r of we	1Br14	ton Co	11		· · · · · · · · · · · · · · · · · · ·
 } ;						•		•	
NW		NE	-				-		
			4			Permit No			
								-	4 of Section.9
			Town	ship	17.5.		, Range	26 E	
}-·SX		SE	1		-				
(P	lat of 640 A	cres)	Stree	t and N	umber	Route	1 Box-	30	
Loca	te Well Ac	curately	Post	Office _	Arte	sia, No	ew Mexi	co	
rilling was	commenced	Jul g in feet abo	y 28		^{19.} .51. Dri	illing was co	mpleted	July	<u> </u>
						······			****
stal depth (of well	L4C	feet. Wa	ter leve	upon com	pletion of w	Ae11		feet below land surface.
sc. 2			PRINC	CIPAL '	WATER-BE	ARING STI	RATA		
. 1, from	18	to	30	, Thick	ness in feet	-12	, Forn	ation	G Vp
. 2, from	50	to	8 0	, Thick	ness in feet	<u></u>	, Forn	nation C	lay & Gravel
. 8, from3.	30	tg	140	, Thick	ness in feet	10	, Forn	G	revel
. 4, from		to		, Thick	ness in feet	t	, Гогл	nation	
. 5, from		to		, Thick	ness in feet	£	, Forn	ation	
ж. З				REC	ORD OF C	ASING			
Diameter	Pounds	Threads		ne of	Feet of	Type of	Perfors	ted	Priviles
in Inches	per Foot	per Inch	Manuf	acturer	Casing	Shoe	From	ĩo	Purpose
8					40				Shut off
0			•		-10				surface water
-7					23				Meet dozestic
•					-				well requires
sc. 4			RECORI	D OF M	UDDING A	AND CEME	NTING		
Diamet		Number of			Methods U		Specific		Tons of
Hole in 1	Inches	of Ceme	int				of)	Mod	Clay Used
					•				
									- <u> </u>
						1			¹
c. 5						of old w			•••
- ,		¥.				Bection		, Towi	ship
		Name of j	lugging (• •		··· -
	umber				Pos	t Office		-	· · · · · ·
one of clay	used		. Tons of	rougha	-		Туре		
						s plugging a	pproved by	Artesian	Well Supervisor?
_		d as follows			ant Num	her of make		F	
	cod st					ber of sacks			
), 2 was pla), 3 was pla	· . •	- 1				iber of sacks			
•							•••••		DEC 12 1951
			-						OFFICE
	-				(over)				OSWELL, NEW MEXICO
·				، معريد			-		-
	· · · · · · · · ·				•••••	يىنى 1915مىسىك م	101.12 N		
RA=	1692				.				שע למצוע שאות ביניו
2A - :	2698	#•••		9 2/Rut -		• • • •			9.244

FROM (Depth in Feet)	TO (Depth is Feet)	THICKNESS IN FEET	CLASSIFICATION OF FORMATIO
		••••	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			na a sana ang ang ang ang ang ang ang ang ang
		· f	the state of the s
•	18	18	Topsoll & Clay
	30	·	Gyp
50	<u> </u>	20 30	Clay
• 1		_	Gravel & Clay
80	130		Sand rock
130	140		Sand & Gravel
	·	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·
			· · · · · · · · · · · · · · · · · · ·
	· ·		
	-		
			<u></u>
			<u> </u>
			······································
		· · · · · · · · · · · · · · · · · · ·	
· · · ·		······	
		•	
	·····	·	<u></u>
			·
}		•	
			<u></u>
+			
		·····	
•		· · · ·	

I,_____, do colemnly swear that, to the best of my knowledge and belief, the foregoing information is a true and correct record of the well for which report is hereby made, insofar as can be determined from all available records.

Post Office.

Notary Public

SUBSCRIBED AND SWORN TO BEFORE ME this _day of_

Signed___ Position_ Street and Number_

.

Ľ .

M	Commission	Expires
-	Comanusion	Lapire

Form WR-23 FIELD ENGR. LOU

- .

- ---- ---- --- ---.

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed. 1 -

Section 1	(A) Owner of well A. Leand
	Street and Number416
	City Loco Hills State Mimi
	Well was drilled under Permit No. $A - 492$ and is located in the
	7111 4 711 4 4 of Section O, Twp. 72 Rge 265
	(B) Drilling Contractor 1. 7. Amit License No. 11 28
	Street and Number Soy 122 2
	City Unland State 72, 727.
	Drilling was commenced der 1963
(Plat of 640 acres	Drilling was completed 19.6.3

218' Elevation at top of casing in feet above sea level______Total depth of well_____ 251 State whether well is shallow or artesian domestic Depth to water upon completion____

PRINCIPAL WATER-BEARING STRATA

Section	Section 2 PRINCIPAL WATER-BEARING STRATA								
No.	Depth From	in Feet	Thickness in Feet	Description of Water-Bearing Formation					
1	25	35	10	David					
2	96	139	43	parel -					
3		1, , ,							
4									
5		1							

Section 3	3			RECO		SING			
Dia Pounds in. ft.	Pounds	Threads D		pth	Feet	Type Shoe	Perforations		
	ft.	in	Top	Bottom	reet	Tibe Suce -	From	То	
711				•	139	Mone	118	139	
/				1		N	, , ,		
			· .	· · ·					
	1		•						

Section 4			RECORD	EMENTING	
Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used
From	То	Hole in in.	Clay	Cement	
		11			
		- 		+	
,				1	

Section 5	PLUGGING	RECO	RD				
Name of Plugging Contractor				T	icense No		
Street and Number	Cit	у	State				
Tons of Clay usedTons	of Roughage used_		Type of roughage				
Plugging method used			Dat	e Plugged	19		
Plugging approved by:			Cemen	t Plugs were	e placed as follows:		
		No.	- Depth	of Plug	No. of Sacks Used		
	in Supervisor		From	To	NO. OF SACES USED		
FOR USE OF STATE ENGINE	TER ONLY						
	าเช่นก /						
Date Received							
DEC 54 BH 8: 56	[32]			·			
File No. RA 4122	Use Lo				17.26.10.110		
File No	Usese	<u> </u>	L	ocation No.			
	Nem	,-07	k				
	/. t						

¥.

Ξ.

Section 6		LOE (DF WELL	
Depth From	in Feet	Thickness in Feet	Color	Type of Material Encountered
0	25	25		bed Clark
75	35.	10		Davel
25	96	61		hed Elay
96	139	43		sauch
139	918	n		bed (e) AL
<i>fZf</i>	-10	11	· · · · · · · · · · · · · · · · · · ·	per clog
<u></u>				· · · ·
	· ·			
			•••••	
	ļ			
•	ļ			
, 				
			•	÷ .
		7	•	•
				· · · · · · · · · · · · · · · · · · ·
<u> </u>	1	· · · ·	•	
	·.	· · ·		· · · · · · · · · · · · · · · · · · ·
		•		
	<u> </u>			
<u> </u>		· · · · · · · · · · · · · · · · · · ·		·····
-				
<u></u>			· · · · · · · · · · · · · · · · · · ·	
	 			· · · · · · · · · · · · · · · · · · ·
	1		1	

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well

.

ł

:

5

Well Driller 1. ~ Ŀ

•

÷

1.

. .

ትየአየል 5 ትሄዬን

Bath took

Form WR-23

STATE ENGINEER OFFICE

t

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1	(A) Owner of well V. L. Gates	
	Street and Number	State Novi Morriso
	City Artesia. Well was drilled under Permit No. RA-307 SW 14 SW 14 of Section 10	and is located in the
	(B) Drilling Contractor Pearson Bros. Street and Number	
	City Lake Arthur	State
	Drilling was commenced 5-15-26	
(Plat of 640 acres	Drilling was completed 6-28-26	

No	Depth is	n Feet	Thickness in	Description of Water-Bearing Formation
No.	From	То	Feet	
1				
2				
3				
4				

Section 3	ection 3 RECORD OF CASING							
	Pounds	Threads	reads De	pth	Feet	Marrie Diane	Perforations	
	ft.	ft. in Top	Bottom	Bottom	Type Shoe	From	То	
121					452			
10					930		•	
10 ir	ch comes	up about :	5 feet	n 12] in	nch casin	g no seal.		
					1			

_				
Sec	-+i	-	. A	

RECORD OF MUDDING AND CEMENTING

Occurr 1		-							
Depth in Feet		Diameter	Tons	No. Sacks of	Methods Used				
From	То	Hole in in.	Clay	Cement	BIELIIVIS USEI				
					······································				
		11							
	} 	1		1					

Section 5

PLUGGING RECORD

Name of Plugging Contractor_		License No	
Street and Number	City	State	-
Tons of Clay used	Tons of Roughage used	Type of roughage	
Plugging method used		Date Plugged	19
Plugging approved by:		Cement Plugs were placed as follows	:

		No.	Depti	h of Plug	No. of Sacks Used
	Basin Supervisor		From	To	NO. OF SACKS Used
FOR USE OF STATE	ENGINEER ONLY				
Date Received					
File No	; ලදු වි Use	₹	I	ocation No.	17.26.10.336

Depth From	in Feet	Thickness in Feet	Color	Type of Material Encountered
0	20			
20	45	<u>├</u> ───┤-		gravel
45	55	<u> </u>	······································	clay
55	60			rock
60	75			white gumbo
75	94		·····	white gumbo
94	118			white gumbo
118	139			white gumbo
139	159			gunbo
159	177			gunbo
177	197			sand
197	217			sand rock
217	239		·····	sand
239	276			sand
276	295			sand shale
295	314			sandy shale
314	334			sand
334	353		• • • • • • • • • • • • • • • • • • • •	rock
353	373			rock
373	393			gumbo and rock caving
393	411			gunbo
411	432			sand
432	452			rock and sand
452	471			rock and sand
471	491			red clay
491	512			sand
512	531			sand
531	552		······································	gumbo
552	572			gunbo
572	586			clay and typ rock
586	645			bres
645	664			clay
564	685			clay
585	705			sand
705	720			sand
720	740			sand rock
740	759			sand rock
759	779			sand rock
779	799			rock
799	818			sand rock
318	837	1		hard rock
337	852			rock and clay
852	871			rock
871	891			rock and sand
891	908			clay and sand
808	928			hard rock
928	947			bard rock
947	969			sand 4 ov rock 17
969	990	,		hard rock
990	1010	·		hard rock
010	1067			hard rock
067	1086			rough rock
	1106			first flow
086	1124			rock
086 1 06				limerock
	1143			
1 06	1143 1160			limerock
1 06 1 2 4 1 4 3				limerock
106	1160			

!

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and cor-

Form WR-23

STATE ENGINEER OFFICE

WELL RECORD

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the nearest district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1A and Section 5 need be completed.

Section 1	(A) Owner of well D. D	. Sulliv	78D		
	Street and Number				
	CityAr	tosia,	State	New Mexico	
	Well was drilled under Permit No <u>BW</u> <u>14</u> <u>SB</u> <u>14</u> <u></u> <u>14</u> of Sectio				
	(B) Drilling Contractor R & Street and Number			cense No	
	City		State		<u> </u>
	Drilling was commenced	March	24,		37
(Plat of 640 acres)	Drilling was completed	April	2,	19_	37

Section	2		PRINCIPAL V	WATER-BEARING STRATA
Depth		in Feet	Thickness in	Description of Water-Bearing Formation
No	From	To	- Feet	• · · · · · · · · · · · · · · · · · · ·
1		18'	lst flow	
2		36 to	40 2nd flow	
3				
4				
5		1		

Section 3 RECORD OF CASING

Pounds	Threads in	Depth		Feet	Type Shoe	Perforations	
ft.		Top	Bottom		Type Slide	From	То
					1	1	
				10000	reet	reet Type Shoe	reet Type Shoe

Section 4

RECORD OF MUDDING AND CEMENTING

Depth	in Feet	Diameter	Tons	No. Sacks of	Methods Used
From	To	Hole in in.	Clay	Cement	

Section 5

PLUGGING RECORD

Name of Plugging Contractor			<u> </u>	I	icense No	
Street and Number	City	ity State				
Tons of Clay usedTons of Roughage us	ed			Type of	roughage	
Plugging method used			Dat	e Plugged	19	
Plugging approved by:	÷.	.:	Cemen	t Plugs wer	e placed as follows:	
······································	1	No.	Depth	of Plug	No. of Sacks Used	
Basin Supervisor			From To			
FOR USE OF STATE ENGINEER ONLY	•	· ·	•			
· 	·					
Date Received	-	<u> </u>				
· .	1	L				
Der (h. F.et.) Trickeren. (Lr	L					
File NoUse		2.000.2	Ľ	ocation No.	17.96.10.430	

TE: WE-23

l

i

Depth i	n Feet	Thickness		Mana of Metandal Warman A
From	To	in Feet	; Color 	Type of Material Encountered
0	23		3217	Gypsum rock
23	25		33/6	Water sand
25	36	<u> </u>		Sand and gravel
36	- 40			Gravel (water)
40	43		3 297.	Water sand
43 .	48	<u> </u>	3292	White clay
48	55	· · ·	3235	White clay
55	70	· · · ·	3270	Water sand
70	76	<u> </u>	3234	White clay
76	80	<u> </u>	3210	Sand
80	90	ļļ	3250	White clay
90	125		2215	White clay
125	132	· -	3203	Sand rock
132	145		3195	White clay
145	150		3190	Send
150	157	·-	3133	Sand rock
157	175		3165	Water sand
175	195		3145	White clay
195	206		31.22/	Sand rock
206	210		3130	Water sand
				•
			······································	
		1		
		11		

ļ

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described well.

	R &	R Drilling Co.
-		Well Driller
	••••	
		· · ·
	ан —	••• •• •• ••• ••• •••
	the second and the second second second second second second second second second second second second second s	1
· · · · · · · · · · · · · · · · · · ·		
· · · -		3

Astron. TIOMA Time from storal laster of a laster of a storage product of the storage pr million, uni actualist to the contained our source track and contained on a source track

	۰.	-	÷	÷	THE COLORN	
41	٤.	ب ا	٠	۰.	BECOBD.	

STATE ENGINEERS OFFICE

APPENDIX B WATER QUALITY ANALYSES

-- ·

L

ł

i

i

ļ

I

İ

•

WATER QUALITY OF MONITOR WELLS NEAR EVAPORATION PONDS

 \sim

. · ·



TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

I.

DATE: 8 November 1984 1080, 1040

ANALYTE	SAMPLE	ID/ANALYTICAL RESU	ULTS
	11184	103184	103184
	1330	1432	1240
	Well 28	Well 45	Well 46
Benzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/l
Toluene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/l
Ethylbenzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/l
Xylenes	<0.005 mg/l	<0.005 mg/1	<0.005 mg/l
	103184 1520 Well 47	103184 1550 Fire Pond	
Benzene	<0.005 mg/l	<0.005 mg/l	
Toluene	<0.005 mg/l	<0.005 mg/l	
Ethylbenzene	<0.005 mg/l	<0.005 mg/l	
Xylenes	<0.005 mg/l	<0.005 mg/l	
	Well 3	Well 5	Well 12
NO 3 as N	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
NH 4	1.16 mg/1	2.5 mg/1	0.25 mg/1
CN	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
Benzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
Ethylbenzene	<0.005 mg/1	<0.005 mg/1	<0.005 mg/1
	Well 13	Pond 1	Pond 3
NO 3 85 N	<pre><0.01 mg/1 5.6 mg/1 0.09 mg/1 0.254 mg/1 0.345 mg/1 0.389 mg/1 <0.100 mg/1</pre>	<0.01 mg/1	<0.01 mg/1
NH 4		10.6 mg/1	13.87 mg/1
CN		0.4 mg/1	0.2 mg/1
Benzene		0.711 mg/1	0.027 mg/1
Toluene		0.588 mg/1	<0.005 mg/1
Xylenes		0.591 mg/1	<0.005 mg/1
Ethylbenzene		0.240 mg/1	<0.005 mg/1

SAMPLES RECEIVED 4	/24/81 c	USTOMER ORDER NUMBER P.O. #	20030	•
	ater			
Sample		Type of	<u> </u>	
Identif	ication	Analysis	mg/liter	- 11/21/8
Navajo	Well #1	Acidity	179	
		Alkalinity, "P" (As Ca Barium	⁽⁰ 3) < 1 0.1	
		Biochemical Oxygen Dema	ind 44	
$\langle \rangle$		Cadmium Chomical Oxygon Demand	0.05	
B B	рь р	Chemical Oxygen Demand Chloride	145 8313	5800
		Chromium	0.002	
	• .	Chromium 6+ Copper	< 0.01 0.001	
	,	Fluoride	0.001	0.2
	<u>^</u>	Hardness (as CaCO ₃)	5760	
	,69	Iron Lead	-0.05 0.006	
	1	Magnesium	850	-
		Nickel	0.02	
		pH Units Phenols	7.8 0.015	
		Alkalinity , "M"	700	E E O
	· .	Solids, Total Dissolved Sulfate	l 19700 4920	15800
		Sulfide	0.21	
		Zinc	< 0.1	×
1		· · · · · · · ·	n de la companya de	· · · · ·
		· · · · · · · · · · · · · · · · · · ·		· · ·
Sample A	Analysis by: B.P			
pH: 4/	d Time of Analysi '30/81 @ 1400 hrs.	s: BOD ₅ - 4/24/81 @ 1600 hr	'S•	
Method	of Analysis: BOD	5 - 5 day incubation		
pH: el	ectrode			· · ·
			· .	
		-		

- .. --- ---

ysis Water			•
Sample Identification	Type of Analysis	<u>mg/liter</u>	11/2 /20
Navajo Well # 3	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	Z200 5,0 7640
Sample Analysis by:	BP		
	•	~	
	BOD ₅ - 5 day incubation		
	Identification Navajo Well # 3 ,9 Sample Analysis by: Date and Time of An pH: 4/30/81 @ 1400	Identification Analysis Navajo Well # 3 Acidity Navajo Well # 3 Acidity Alkalinity, "P" (as CaCO3) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chioride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO3) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc Sample Analysis by: BP Date and Time of Analysis: BOD5: 4/24/81 @ 1600 hrs. pH: 4/30/81 @ 1400 hrs. Analysis	IdentificationAnalysismg/literNavajo Well # 3Acidity Alkalinity, "P" (as CaCO3) Barium32 (0.1) (0.009) (0.009) Chemical Oxygen Demand Cadmium32 (0.009) (0.009) Chemical Oxygen Demand Choride (0.001) Chromium 6+ Copper (0.001) Chromium 6+ Copper (0.001) Choride (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Chromium (0.001) Copper

Controls for Environmental Pollution, Inc. P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

4/30/81

AMPLES RECI	EIVED	4/24/81	CUSTOMER ORDER NUMBER P.O. # 2003	0	
, YPE OF ANAL	LYSIS	Water			
	Sample Identii	fication	Type of Analysis	mg/lite	r 11/21/50 19
	Navajo	Well # 5	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron	36 < 1.0 0.1 24 0.05 176 7089 0.002 < 0.01 0.001 0.44 4660 0.04	8600 4 C.96
м., ₁₁ ., 1			Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	0.007 650 < 0.01 7.7 < 0.001 506 16,800 4290 0.13 < 0.1	21.100
	Date an pH: 4/	nd Time of Anal /30/81 @ 1400 h of Analysis: B	BP ysis: BOD ₅ : 4/24/81 @ 1600 hrs. rs. OD ₅ - 5 day incubation		
			٦٠ -		

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

1

SAMPLES RECEIVED	4/24/81 cus	TOMER ORDER NUMBER P.0. # 200	30	
TYPE OF ANALYSIS	Water			
Samp Iden	le tification	Type of <u>Analysis</u>	<u>mg/liter</u>	11/21/80
- Nava	jo Well # 7	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand	36 < 1.0 < 0.1 38 0.04 136	,
		Chloride Chromium Chromium 6+	3570 0.002 < 0.01	3400
	,64	Copper Fluoride Hardness (as CaCO ₃) Iron Lead	0.004 0.3 3160 0.05 0.001	0.92
'		Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved	370 < 0.01 8.0 < 0.001 596 14,200	21,500
	•	Sulfate Sulfide Zinc	5600 0.05 < 0.1	
	le Analysis by: BP	• POD • 1/21/81 @ 1600 hms		
	4/30/81 @ 1400 hrs.	: BOD ₅ : 4/24/81 @ 1600 hrs.	~.	
	od of Analysis: BOD ₅ lectrode	- 5 day incubation		

.

Controls for Environmental Pollution, Inc.

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

ADDRESS Drawe CITY Artes ATTENTION Ed Kin NVOICE NO 10422			ANALYS
SAMPLES RECEIVED	4/24/81	SUSTEMER ORDER NUMBER P.O. # 20030	
TYPE OF ANALYSIS	Water		
Samp] Ident	e ification	Type of Analysis mg/li	ter 11/21/80
- Navaj	o Well # 9	Acidity36Alkalinity, "P" (as CaCO3)1.0Barium< 0.1	2200
	,65	Chromium 0.002 Chromium 6+ 0.01 Copper 0.006 Fluoride 0.7 Hardness (as CaCO ₃) 3120 Iron 0.01 Lead 0.001	1.8
1		Magnesium370Nickel< 0.01	
	£	Zinc < 0.1	
Date pH: Metho	4/30/81 @ 1400 hrs	is: BOD ₅ : 4/24/81 @ 1600 hrs. - - 5 day incubation	
		-	
)F		APPROVED BY	

Controls for Environmental Pollution, Inc. P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

SAMPLES RE	ECEIVED 4/24	/81 cu	STOMER ORDER NUMBER P.O. # 20	030	-
TYPE OF AN	NALYSIS Wate	er			
	Sample Identificat	ion	Type of Analysis	mg/liter	11/21/80 10
	Navajo Well	# 12 .,70	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	55 < 1.0 < 0.1 38 0.07 256 8058 0.002 < 0.01 0.002 0.9 8920 0.04 0.007 1330 0.02 7.6 *<0.001 545 28,900 11,500 0.05 < 0.1	6700 2.5
· .	* Data will	follow on 5/6			
	Date and Ti pH: 4/30/8	1 @ 1400 hrs. nalysis: BOD ₅	: BOD ₅ : 4/24/81 @ 1600 hrs. - 5 day incubation		

Controls for Environmental Pollution, Inc. P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

CITY TTENTION VOICE NO	Artesia, NM 88210 Ed Kinney 104223				
AMPLES RE	•••	CMER ORDER NUMBER P.0. # 2003	30		
YPE OF AN	JALYSIS Waler				
	Sample Identification	Type of Analysis	mg/liter	11/21/80	10,
	Navajo Well # 13	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium	11 < 1.0 0.1 22 0.002 48 357 0.002	3,50	1
	,20	Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel	< 0.01 0.001 1.2 1570 0.02 0.003 79 < 0.01	3.5	/
		pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	7.4 < 0.001 146 3200 1810 0.04 < 0.1	3060	2
	Sample Analysis by: BP				
	Date and Time of Analysis: pH: 4/30/81 @ 1400 hrs. Method of Analysis: BOD ₅ -	•	~		
	pH:electrode				
	,	-			

-

Controls for Environmental Pollution, Inc.

i.

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

CUSTOMER ADDRESS CITY ATTENTION VOICE NO	Navajo Refining Corry Drawer 159 Artesia, NM 88210 Ed Kinney 104223		REFORT O MIALVSIS
SAMPLES RE	CEIVED 4/24/81 CUS	TOMER ORDER NUMBER P.O. # 20030	
TYPE OF AN	ALYSIS Water		
	Sample Identification	Type of Analysis	mg/liter
	Navajo Well # 16 "br	Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium	13 1.0 0.1 44 0.002 152 1173 0.001 0.01 0.001 0.001 0.002 140 0.01 0.002 140 0.01 7.7 0.016 425 4,770 1,890 0.10 0.1
	Sample Analysis by: BP		
	Date and Time of Analysis: pH: 4/30/81 @ 1400 hrs.	: BOD ₅ : 4/24/81 @ 1600 hrs.	
	Method of Analysis: BOD ₅ · pH:electrode	- 5 day incubation	
		APPROVED BY	

Controls for Environmental Pollution, Inc. P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

Elmer D. Martinez, Director of Quality Assurance 4/30/81 PAGE 12 OF 13 PAGE

AMPLES RE	CEIVED	4/24/81	CUSTOMER ORDER NUMBER P.O. # 200	30	
YPE OF AN	ALYSIS	Water			·
· .	Sample Identi	fication	Type of Analysis		mg/liter
•	Navajo 	Well # 17	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel PH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc	< < < <	17 1.0 0.1 42 0.03 88 4692 0.002 0.01 0.001 0.03 4470 0.03 0.005 470 0.01 7.6 0.001 198 11,200 2,930 0.03 0.1
	Date an pH: 4,	/30/81 @ 1400 hr of Analysis: B0	sis: BOD ₅ : 4/24/81 @ 1600 hrs.		
			· .		

Controls for Environmental Pollution, Inc.

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

			AVAJO REFINING CO.			
SAMPLES RE(Nindm	ill (Fig 4-9 Revice	× 1	<u> </u>	
TYPE OF ANA	ALYSIS Water l	NINOM	ilk (sig 4-71042)e		/	
	Sample Identification		Type of Analysis		mg/liter	10
	Well Water		Acidity		13	
	10-2		Alkalinity, "P" (as CaCO ₃) Barium	< <	1 0.1	
	Logi		Biochemical Oxygen Demand Cadmium		38 0.002	
	Which ?		Chemical Oxygen Demand Chloride		88 1632	14
			Chromium Chromium 6+	<	0.002	
			Copper		0.01 0.004	2
	i.		Fluoride Hardness (as CaCO ₃)		0.25 2400	ć
		58	Iron Lead		0.06 0.005	
		0-	Magnesium Nickel	<	310 0.01	
			pH Units Phenols		7.8 0.022	
			Alkalinity, "M" Solids, Total Dissolved	_	205 6860	6
			Sulfate Sulfide		2830 0.03	
	ſ		Zinc		0.2	
-						
	Sample Analysis b				~	
	pH: 4/30/81 @ 14		BOD ₅ : 4/24/81 @ 1600 hrs.			
	Method of Analysi		5 day incubation			
	pH:electrode	5	• •			

ì

.....

Controls for Environmental Pollution, Inc.

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

CUSTOMER Navajo Refining Co. any ADDRESS Drawer 159 CITY Artesia, NM 33210 ATTENTION Ed Kinney INVOICE NO. 104223

1



<u>,</u> I

-

PLES RECEIVED 4/24/81	CUSTOMER ORDER	NUMBER P.O. #20030	
OF ANALYSIS Water			_
Sample Identification	Type of Analysis	mg/liter	
Navajo Well #12	Phenols	< 0.001	
	X	0/81 APETIMER D. Hartinez, Direct	

WATER QUALITY OF MONITOR WELLS IN REFINERY AREA



ANALYTICAL LABORATORIES, INC.

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM DATE: 8 November 1984 1080, 1040

!

ł

1

!

I

ANALYTE	SAMPLE I	D/ANALYTICAL RESU	LTS
	11184	103184	103184
	1330	1432	1240
	Well 28	Well 45	Well 46
Benzene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/1
Toluene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/1
Ethylbenzene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/1
Xylenes	<0.005 mg/l	<0.005 mg/l	<0.005 mg/1
	103184 1520 Well 47	103184 1550 Fire Pond	
Benzene	<0.005 mg/l	<0.005 mg/l	
Toluene	<0.005 mg/l	<0.005 mg/l	
Ethylbenzene	<0.005 mg/l	<0.005 mg/l	
Xylenes	<0.005 mg/l	<0.005 mg/l	
-	Well 3	Well 5	Well 12
NO 388 N	<0.01 mg/l	<0.01 mg/1	<0.01 mg/1
NH 4	1.16 mg/l	2.5 mg/1	0.25 mg/1
CN	<0.01 mg/l	<0.01 mg/1	<0.01 mg/1
Benzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Echylbenzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
	Well 13	Pond 1	Pond 3
NO 3 as N	<0.01 mg/1	<0.01 mg/1	<0.01 mg/1
NH 4	5.6 mg/1	10.6 mg/1	13.87 mg/1
CN	0.09 mg/1	0.4 mg/1	0.2 mg/1
Benzene	0.254 mg/1	0.711 mg/1	0.027 mg/1
Toluene	0.345 mg/1	0.588 mg/l	<0.005 mg/1
Xylenes	0.389 mg/1	0.591 mg/l	<0.005 mg/1
Ethylbenzene	<0.100 mg/1	0.240 mg/l	<0.005 mg/1

ASSAIGAI >
ANALYTICAL LABORATORIES, INC.

ΤΟ:	Geo Science
	Attn: Randy Hicks
	500 Copper N.W.
	Albuquerque, NM 87105

---- -----

DATE: 3 December 1984 1111

ANALYTE	SAMPLE IDENTI	FICATION/ANALY	YTICAL RESULTS
	Fire Pond 10/31/83 1550	Well 47 10/31/84 1520	Well 28 11/1/84 1330
Phenols Cl SO TDS TSS NO NH Cr CN	1800.0 mg/1	<0.01 mg/1	20.0 ug/1 101.0 mg/1 2150.0 mg/1 5192.0 mg/1 720.0 mg/1 1.63 mg/1 0.3 mg/1 <0.01 mg/1 <0.01 mg/1
	Well 45 10/31/84 1432	Well 46 10/31/84 1240	NOMINAL DETECTION LIMIT
Phenols Cl SO TDS TSS NO NH Cr CN	16.0 ug/1 495.0 mg/1 1650.0 mg/1 3836.0 mg/1 2004.0 mg/1 0.10 mg/1 11.6 mg/1 <0.01 mg/1 <0.01 mg/1	13.0 ug/1 446.0 mg/1 2100.0 mg/1 3988.0 mg/1 4084.0 mg/1 0.80 mg/1 1.0 mg/1 <0.01 mg/1 <0.01 mg/1	0.01 ug/1 1.0 mg/1 1.0 mg/1 1.0 mg/1 1.0 mg/1 0.1 mg/1 0.01 mg/1 0.01 mg/1

REFERENCE: "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, N.Y., 1980.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

Smith Unit Jennifer V. Smith, Ph.D. Laboratory Director

TEL Weathering Area

Geraghty &	Miller	pgraaient		Downgradient	
		Well 35	36	Wells 37	38
pН		7.28	7.27	7.57	7.37
Spec Cond		3942	9462	946 2	7899
тос	(*)				
TOX Ug/1		318	125	223	170
Chloride	(*)				
Iron		4.6	0.89	0.14	0.73
Manganese		1.34	1.34	1.26	0.789
Phenols		0.001	0.001	0.001	0.001
Sodium	(*)				
Sulfate	(*)				
Arsenic		0.07	0.03	0.02	0.02
Barium		0.1	0.1	0.1	0.1
Cadmium		0.001	0.001	0.001	0.001
Chromium		0.003	0.002	0.001	0.001
Fluoride		1.45	1.34	2.05	1.60
Lead		0.001	0.001	0.001	0.001
Mercury		0.0004	0.0004	0.0004	0.0004
Nitrate		0.1	0.1	0.1	0.1
Selenium		0.01	0.01	0.01	0.01
Silver		0.01	0.01	0.01	0.01
Pest & Hert)	-	-	-	-
Radio	(**)	-	-	-	-
Coliform		1	1	2700	1

. .

1.

-

* Results pending, re-analysis by laboratory. ** Radioactivity activity results were omitted due to high TDS.

Chemical data from TEL Weathering area monitoring wells taken 12-1-82. Table 5.

Colony Landfarm

Geraghty &	Mill	upgradient		Downgradient Wells	
		Well 31	32	33	34
рН		7.31	7.41	7.41	7.30
Spec Cond.		-25544.5 2489	2693	3590	2563
TOC mg/1	(*)	2101			
TOX ug/l		41.5	102.3	64.5	26
Chloride	(*)				
Iron		0.06	0.01	0.01	1.81
Manganese		1.08	0.311	0.521	0.567
Phenols		0.001	0.001	0.001	0.001
Sodiu		100	35.4	44.4	88.5
Sulfate	(*)				
Arsenic		0.01	0.01	0.01	0.01
Barium		0.1	0.1	0.1	0.1
Cadmium		0.001	0.001	0.001	0.001
Chromium		0.001	0.001	0.001	0.004
Fluoride		1.15	1.28	2.70	1.28
Lead		0.002	0.001	0.001	0.005
Mercury		0.0004	0.0004	0.0004	0.0004
Nitrate		0.1	0.1	0.1	0.1
Selenium		0.01	0.01	0.01	0.01
Silver		0.01	0.01	0.01	0.01
Pest & Herb		ND	ND	ND	ND
Radio	(**)	-	-	-	-
Coliform	(*)				

* Results pending, re-analysis by laboratory. ** Radioactivity results were omitted due to high TDS.

Table 4. Chemical data from the Colony Landfarm monitoring wells taken 12-2-82.

QUALITY OF WATER IN EVAPORATION PONDS

6

ł



TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM

ANALYTE

DATE: 8 November 1984 1080, 1040

i

SAMPLE ID/ANALYTICAL RESULTS

	11184	103184	103184
	1330	1432	1240
	Well 28	Well 45	Well 46
Benzene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
Toluene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
Ethylbenzene	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
Xylenes	<0.005 mg/l	<0.005 mg/l	<0.005 mg/l
	103184 1520 Well 47	103184 1550 Fire Pond	
Benzene	<0.005 mg/l	<0.005 mg/l	
Toluene	<0.005 mg/l	<0.005 mg/l	
Ethylbenzene	<0.005 mg/l	<0.005 mg/l	
Xylenes	<0.005 mg/l	<0.005 mg/l	
	Well 3	Well 5	Well 12
NO 3 as N	<0.01 mg/l	<0.01 mg/1	<0.01 mg/1
NH 4	1.16 mg/l	2.5 mg/1	0.25 mg/1
CN	<0.01 mg/l	<0.01 mg/1	<0.01 mg/1
Benzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Toluene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Xylenes	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
Ethylbenzene	<0.005 mg/l	<0.005 mg/1	<0.005 mg/1
-	Well 13	Pond 1	Pond 3
NO 3 25 N	<0.01 mg/1	<0.01 mg/l	<0.01 mg/1
NH 4	5.6 mg/1	10.6 mg/l	13.87 mg/1
CN	0.09 mg/1	0.4 mg/l	0.2 mg/1
Benzene	0.254 mg/1	0.711 mg/l	0.027 mg/1
Toluene	0.345 mg/1	0.588 mg/l	<0.005 mg/1
Xylenes	0.389 mg/1	0.591 mg/l	<0.005 mg/1
Ethylbenzene	<0.100 mg/1	0.240 mg/l	<0.005 mg/1

TO: Geo Science 500 Copper Ave. N.W. Albuquerque, NM DATE: 8 November 1984 1080, 1040 Page 2 of 2

ļ

ANALYTE

. .

SAMPLE ID/ANALYTICAL RESULTS

floa				
Toluene 0. Xylenes 0.	617 mg/1 467 mg/1 463 mg/1 201 mg/1	0.01 t 0.1 t 0.01 t 0.005 t 0.005 t 0.005 t	ng/1 ng/1 ng/1 ng/1 ng/1	

REFERENCE: "Standard Methods for the Examination of Water and Wastewater", 15th Edition, APHA, N.Y., 1980.

An invoice for services is enclosed. Thank you for contacting Assaigai Laboratories.

Sincerely,

similar V. Smith

Jennifer V. Smith, Ph.D. Laboratory Director

ADDRESS Dr. CITY Ar ATTENTION Ed	awer 159 tesia, NM 88210 Kinney	lу 	
VOICE NO 10	4223		
SAMPLES RECEIVE	D 4/24/81	CUSTOMER ORDER NUMBER P.O. # 200)30
TYPE OF ANALYSI	s Water		
	mple entification	Type of Analysis	mg/liter
Nav	vajo West Pond	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide	13 < 1 0.2 116 0.003 102 918 0.04 < 0.01 < 0.001 < 0.001 < 0.002 60 0.06 0.002 60 0.01 7.7 0.04 173 2930 885 25.1
-	i -	Zinc	< 0.1
Dat pH:	4/30/81 @ 1400 hr:	sis: BOD ₅ : 4/24/81 @ 1600 hrs. s.	
	hod of Analysis: BOI electrode	D ₅ - 5 day incubation	
		. . .	
		APPROVED BY	ctor of Quality Assurance

Controls for Environmental Pollution, Inc. P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

Elmer D. Martinez, Director of Quality Assurance 4/30/81 PAGE 4 OF 13 PAGE

-CUBIEMER Navajo Refining Con Ly ADDRESS Drawer 159 CITY Artesia, NM 88210 ATTENTION Ed Kinney INVOICE NO 104223



MPLES RECEIVED	4/24/81 CUST	OMER ORDER NUMBER P.O. # 200	030	
PE OF ANALYSIS	Water			· · · · · · · · · · · · · · · · · · ·
Sampl Ident	e ification	Type of Analysis		mg/liter
Navaj	o Middle Pond	Acidity Alkalinity, "P" (as CaCO ₃) Barium Biochemical Oxygen Demand Cadmium Chemical Oxygen Demand Chloride Chromium Chromium 6+ Copper Fluoride Hardness (as CaCO ₃) Iron Lead Magnesium Nickel pH Units Phenols Alkalinity, "M" Solids, Total Dissolved Sulfate Sulfide Zinc		29 1 0.1 116 0.002 363 1468 0.1 0.01 0.001 7.4 1060 0.06 0.001 96 0.01 7.4 0.027 349 4020 1050 13.4 0.1
Date pH: Metho	e Analysis by: BP and Time of Analysis: 4/30/81 @ 1400 hrs. d of Analysis: BOD ₅ - ectrode	BOD ₅ : 4/24/81 @ 1600 hrs. 5 day incubation		

Elmer D. Martinez, Director of Quality Assurance 4/30/81 PAGE 3 OF 13 PAGE

Controls for Environmental Pollution, Inc.

+CUSTUMER ADDRESS CITY ATTENTION IVOICE NO	Navajo Refining Co Drawer 159 Artesia, NM 88210 Ed Kinney 104223		
SAMPLES RE	CEIVED 4/24/81	CUSTOMER ORDER NUMBER P.O. # 20030	
TYPE OF AN	ALYSIS Water		
	Sample Identification	Type of Analysis mg	g/liter
	Navajo East Pond	Chemical Oxygen Demand 22 Chloride 16 Chromium 0. Chromium 6+ < 0. Copper 0. Fluoride 5. Hardness (as CaCO ₃) 11 Iron 0. Lead < 0. Magnesium 11 Nickel < 0. pH Units 7. Phenols < 0. Alkalinity, "M" 21 Solids, Total Dissolved 49 Sulfate 15	1 002 25 32 1 01 002 8 60 1 001 0 01 2 001 4 920 520 36
	pH: 4/30/81 @ 140	nalysis: BOD ₅ : 4/24/81 @ 1600 hrs.	-
	pH:electrode	. 5 .	
		APPROVED BY	of Quality Assuran

Controls for Environmental Pollution, Inc.

P.O. Box 5351 • 1925 Rosina • Santa Fe, New Mexico 87502

