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26 February 1990

Joel Curtis
Marketing Manager
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Dear Joel:

At long last, here is the manuscript for our recently completed California study. It has been appropriately scrubbed and approved for release by the project manager. Although it is probably overly technical for your needs, it should be possible to extract excerpts from it that will be useful. Please let me know if you have any questions. Take care.

Sincerely,



Michael R. Piotrowski, Ph.D.
Senior Project Scientist



Bioremediation Pilot Study
By Michael R. Piotrowski, Ph.D. and George A. Ford
Woodward-Clyde Consultants

ABSTRACT

The efficacies of three biological treatment approaches for the remediation of soil contaminated with a heavy, poorly soluble, petroleum product was evaluated in a seven week on-site pilot study of land treatment. One treatment involved application of a micronutrient solution, the second treatment involved application of an emulsifier and multiple nutrients (micro- and macronutrients), and the third involved application of the emulsifier, the multiple nutrients, and a microbial formulation containing several species of hydrocarbon-degraders (bioaugmentation).

The initial soil hydrocarbon concentration was 605 mg/kg. The treatments were applied to individual plots of the contaminated soil in early October, 1989. The treated soils were periodically tilled and irrigated, and composited, replicate soil samples were collected from each plot at two, four, and seven week intervals. Soil samples were analyzed for hydrocarbon contamination (initial, two, four, and seven weeks) and microbial content (initial, two, and four weeks). Microbial analyses included assessments of densities of total microorganisms, viable microorganisms, phenanthrene-degraders, and fluorescent pseudomonads.

All three treatments produced hydrocarbon reductions of approximately 40% after two weeks, but concentrations did not decline appreciably in the next two weeks. However, after seven weeks of treatment, hydrocarbon concentrations had declined to or below 200 mg/kg (>66% reduction from initial) in all three treatments. The microbial data indicated that enhancement of biodegradation had occurred and was the primary mechanism of contaminant loss. The greatest degree of contaminant reduction occurred in the treatment in which only micronutrients had been applied (final concentration: 145 mg/kg), suggesting that the additions of emulsifier, multiple nutrients, and non-indigenous, hydrocarbon-degrading microorganisms were not necessary to produce significant hydrocarbon reduction in the soil in seven weeks. A regression analysis indicated that all three biological treatments would reduce hydrocarbon concentration in the soil to below 100 mg/kg in approximately 2 months. Based on economic considerations, the addition of micronutrients is the treatment approach of choice.

Bioremediation Pilot Study

INTRODUCTION

Oil contamination has been discovered in portions of fill materials that were placed on a site in a city in central California as a part of demolition activities of buildings in the late 1970s. The site was paved and fenced in 1986 and currently contains two surface parking lots.

The two-block parking facility is to be the site of the new office building complex. The original plan for the fill materials at the site called for use as engineered fill and disposal of excess materials in a Class III landfill. However, the oil contamination exists at sufficient concentrations in portions of the fill that offsite hauling and disposal would be regulated by Titles 22 and 23 of the California Administrative Code. These regulations place disposition of the materials under the jurisdiction of the California Department of Health Services (DHS) and/or the California State Regional Water Quality Control Board (RWQCB). Hence, it is estimated that approximately 10,000 cubic yards of fill material currently require either deposition in a Class I landfill or sufficient remediation to allow deposition in a Class III landfill or use as engineered fill.

Woodward-Clyde Consultants (WCC) conducted an on-site, seven-week pilot-scale study that evaluated the efficacy of accelerated biological treatment of the oil contaminants in the fill in October and November 1989. The results and interpretation of the study are presented in this report.

BACKGROUND AND EXPERIMENTAL DESIGN

Biological treatment of soils and waters containing hazardous organic constituents has recently gained considerable attention as a cost-effective means of decontaminating affected materials. The remediation approach endeavors to stimulate the activities of naturally occurring or added microorganisms (e.g., bacteria or fungi) to enhance metabolic transformations of the hazardous organic compounds into innocuous compounds or cell biomass. Microbial capabilities in this regard have been well documented in the laboratory, and recent field efforts have achieved varying degrees of success in the microbial treatment of contaminated soils and waters.

For the majority of hazardous organic chemicals, microbial stimulation can be generally achieved by increasing oxygen availability, maintaining optimum pH conditions, enhancing mass transport within the affected soil or water by mixing, and supplying

macro- and/or micronutrients. Effective treatment in soils also often depends on maintaining optimum moisture levels throughout the soil mass.

These generalities are usually applicable for a number of organic contaminant situations. However, characteristics of the contaminants of concern can also necessitate other adjustments to the affected material to optimize microbial activity. For example, heavy oil in soil is usually poorly soluble, and recent evidence suggests that low solubility impedes microbial destruction of this organic material (Mihelcic and Luthy 1989). Therefore, effective microbial treatment of soil contaminated by heavy oil may be achievable by the proper application of emulsifiers or surfactants.

Finally, if a situation calls for accelerated microbial destruction of the hazardous organic compounds (as is the case in the present situation), it may be necessary to apply elevated numbers of contaminant-specific microorganisms to achieve the desired rate of contaminant destruction. This activity, termed bioaugmentation, has been effective in significantly reducing treatment times of contaminated media (A. Bourquin, ECOVA, pers. comm.).

The influences of these factors (oxygen availability, pH control, mixing, nutrient additions, moisture control, emulsifier addition, and bioaugmentation) on the acceleration of microbial destruction of the oil contamination in fill material for the California site was assessed in the study.

MATERIALS AND METHODS

Initial Soil Sampling

Approximately 20 cubic yards of the contaminated fill materials were isolated, mixed, and a set of composited, replicate soil samples was collected on October 2, 1989. The soil samples were sent that day to NET-Pacific, Santa Rosa, California, and analyzed for total fuel hydrocarbons (Method "II": Total Fuel Hydrocarbons, Medium-to-High Boiling Point Hydrocarbons, as specified in "Guidelines for Addressing Fuel Leaks", Regional Water Quality Control Board, revised 1986), and extractable lead (EPA Methods 3050 and 7420).

A second set of composited, replicate soil samples was collected on October 10, 1989 and sent to San Diego State University (SDSU), San Diego, California by over-night delivery and analyzed for microbial content. Four types of microbial counts were performed. One microbial count method estimated the density of total microorganisms (mostly bacteria) present in the soil sample (i.e., active, resting, or dead) using the acridine-orange direct counting technique (Hobbie et al. 1977). The second method

estimated the density of viable (active) microorganisms in the soil samples using a standard plating procedure (Hemmingsen, SDSU, pers. comm.). The third analysis estimated the density of viable microorganisms capable of degrading phenanthrene, a polynuclear aromatic hydrocarbon compound characteristically present in petroleum products, using a plating procedure developed by Hemmingsen that involves phenanthrene-amended plates. The fourth method estimated the density of fluorescent pseudomonads in the contaminated soil. This group of microorganisms characteristically possess the capability to degrade petroleum hydrocarbons (Hemmingsen, SDSU, pers. comm.). Although these methods have not as yet been approved by the EPA, they reflect current approaches by the scientific community to evaluate the microbial content of soil samples.

Setup of Soil Treatment Plots

The material was separated into three equally sized piles (~6.5 cubic yards per pile) and each pile was placed within a wooden frame (10 ft x 20 ft x 1.5 ft) located on a paved area adjacent to the site. Each pile has been spread to a depth of 1 foot within the wooden frame, thereby forming three separate test plots.

Treatment Applications

Three treatment regimens were evaluated in the study. One treatment evaluated the effect of the addition of a micronutrient mixture on oil biodegradation. The second treatment evaluated the addition of an emulsifier solution and a multiple-nutrient solution on oil biodegradation. The third treatment evaluated the effect of the addition of emulsifier, multiple nutrients, and hydrocarbon-degrading microorganisms (bioaugmentation) on oil biodegradation. Treatments were applied to the soil plots on October 11, 1989.

Micronutrient Treatment Plot - One plot received an initial, one-time application of a commercially available micronutrient mixture (Medina Soil Activator, Medina Agricultural Products, Hondo, TX). Five gallons of the concentrated micronutrient mixture were mixed with 45-gallons of city water and applied to the plot. This treatment was designated the "Nutrient" Treatment.

Emulsifier + Nutrient Treatment Plot - The second plot was initially treated (one time only) with surfactant and multiple-nutrient solutions. The surfactant applied (TOXIGON 2000, Formula Group Limited, Scottsdale, AZ) is advertised as being 100% biodegradable and non-toxic. It was used in the study because an earlier WCC bench-scale study (WCC 1990) indicated that the surfactant significantly enhanced the biodegradation rate of a complex petroleum contaminant (jet fuel) in soil over a three-month period. The

surfactant was applied as a 50-gallon dilute solution (10 gallons TOXIGON 2000 to 40 gallons city water).

Two pounds of a multiple-nutrient additive (NUTRIPAC 2000, Formula Group Limited, Scottsdale, AZ) were added to the dilute emulsifier solution prior to application to the test plot. The multiple-nutrient additive is a proprietary mixture of macronutrients (e.g., nitrogen and phosphorus) and micronutrients (e.g., trace elements) specially formulated to enhance microbial activity. Application of the nutrient additive was anticipated to enhance biodegradation of the oil by supplying indigenous microorganisms with an excess of available macro- and micronutrients. This treatment was designated the "Emulsifier + Nutrient" Treatment.

Emulsifier, Nutrient, and Bioaugmented Treatment Plot - The third plot was treated as was described for the second plot (emulsifier and multiple nutrients were added) and also received an initial, one-time application of a microbial additive (MYCOZYM 2000, Formula Group Limited, Scottsdale, AZ). The microbial additive is a proprietary mixture of several naturally occurring, non-pathogenic microbial species with capabilities for degrading heavy petroleum contaminants. Application of the microbial additive did not pose a health risk for humans or the environment. Augmentation of the indigenous microorganisms in the contaminated soil with the microbial additive was anticipated to enhance the oil biodegradation rate in the soil plot.

One pound of the dry, powdered microbial additive was rehydrated in 5 gallons of distilled (nonchlorinated) water for one hour prior to application. The 5-gallon microbial inoculum was evenly applied over the third plot. This treatment was designated the "Bacteria + Emulsifier + Nutrient" Treatment.

Initial Plot Tilling - The surfaces of all three plots were then tilled for approximately 30 minutes each to thoroughly mix the applied solutions into the soil plots.

Operations and Monitoring

Soil pH and moisture - Soil pH and moisture were periodically monitored. Soil pH was measured in a soil slurry using a Beckman pH meter and electrode system. Soil moisture was estimated using a electronic soil moisture probe inserted in various positions within each test plot. Soil moisture content was estimated by reading the gauge on the moisture meter. The average soil moisture in the plots was maintained at between 30 and 70% on the meter dial. Deviations from these limits were corrected by withholding irrigation when the soils are too wet or irrigating the soils when they were too dry. The occurrences of two rain events during the study led to a suspension of irrigation until the soils dried to acceptable moisture levels.

Tilling - Each plot was tilled three times each week for four weeks after treatment began. Tilling was conducted on each plot until it was thoroughly mixed. No tilling was conducted during the last three weeks of treatment.

Meteorological Conditions During the Study - The daily maximum and minimum air temperatures and total daily precipitation in the city during the study were recorded by the National Weather Service (NWS). These data were retrieved and the influences of meteorological conditions on treatment performances were included in this evaluation.

Soil Sampling and Analyses

Two weeks after treatment began (day 14 of incubation, October 25, 1989), twelve (12) composited samples were collected, four (4) from each plot. Compositing was accomplished by collecting of a series of soil aliquots using a clean trowel from randomly selected positions in a plot and placing the soil in a clean mixing bowl. The soil in the bowl was thoroughly mixed and two soil samples (~100 gm fresh weight each) were collected from the mixing bowl and placed in separate glass jars. The jars were tightly sealed and labelled. One soil sample was sent to NET-Pacific, Santa Rosa, California and analyzed for hydrocarbon content (Method "II": Total Fuel Hydrocarbons, Medium-to-High Boiling Point Hydrocarbons, as specified in "Guidelines for Addressing Fuel Leaks", Regional Water Quality Control Board, revised 1986).

The second soil sample was sent over-night to San Diego State University, San Diego, California and analyzed for microbial content (as described previously). The mixing bowl was then emptied, and the bowl and trowel were cleaned with an Alconox solution, and rinsed with distilled water. The compositing procedure was repeated to collect a second (replicate) set of hydrocarbon and microbial soil samples from the plot.

The sampling procedures were conducted for each plot, generating 12 soil samples (six hydrocarbon samples, 2 per plot; six microbial samples, 2 per plot). WCC's chain-of-custody procedures were used in collecting and transferring all samples.

Approximately four and seven weeks after the soil treatments began (days 29 [November 8, 1989] and 51 [November 30, 1989] of incubation, respectively), the procedures conducted for the two-week sampling interval were repeated, except that no microbial samples were collected for the final sampling interval (day 51). Therefore, hydrocarbon data were collected initially (day 0), two weeks (day 14), four weeks (day 29), and seven weeks (day 51) after soil treatments began, whereas microbial data were collected initially, two weeks, and four weeks after the treatments began.

RESULTS

Soil pH and Moisture

Soil pH was approximately 8 after two weeks of treatment. After four weeks, soil pH increased slightly to approximately 8.5 in all three treatments. The moisture content of the soil was maintained between 30% and 70% on the moisture meter except during the two rain events (see below) when soil moisture content briefly exceeded the target level of 70%.

Meteorological Conditions During the Study

Daily maximum and minimum air temperatures and daily total precipitation during the study are summarized in Figure 1. As can be seen, despite fluctuations in daily air temperature maxima, minimum daily air temperatures were relatively constant and remained above 50°F throughout the course of the study. Although the study was conducted late in the fall, no strong trend of decreasing air temperatures was experienced.

Two precipitation events occurred during the study, one just before the October 25th sampling, and one approximately one week prior to the November 30th sampling.

Soil Hydrocarbon Concentrations

Soil hydrocarbon concentrations were reported by NET-Pacific as "total petroleum hydrocarbons". The initial concentration in the soil before separation into treatment plots was 605 ± 35 mg/kg. By day 14, soil hydrocarbon concentration had declined to approximately 71% of the initial value in the "Nutrient" treatment (430 ± 0 mg/kg), 55% in the "Emulsifier + Nutrient" treatment (335 ± 7 mg/kg), and 60% in the "Bacteria + Emulsifier + Nutrient" treatment (365 ± 7 mg/kg). The reductions in hydrocarbon concentrations in all three treatments from the initial concentration were significant (t-test, 0.05 significance level, Sokal and Rohlf 1981).

By day 29, soil hydrocarbon concentrations had not declined appreciably from the day 14 concentrations. The average (± 1 standard error) hydrocarbon concentration for the "Nutrient" treatment was 405 ± 64 mg/kg (67% of initial), for the "Emulsifier + Nutrient" treatment it was 360 ± 14 mg/kg (~60% of initial), and for the "Bacteria + Emulsifier + Nutrient" treatment it was 390 ± 57 mg/kg (64% of initial). There were no significant differences between the day 14 and day 29 data (t-test) due in part to the relatively high variability in the day 29 soil samples.

By day 51, hydrocarbon concentrations in the soils of all three treatments had declined significantly (t-test). The average concentration in the "Nutrient" treatment was

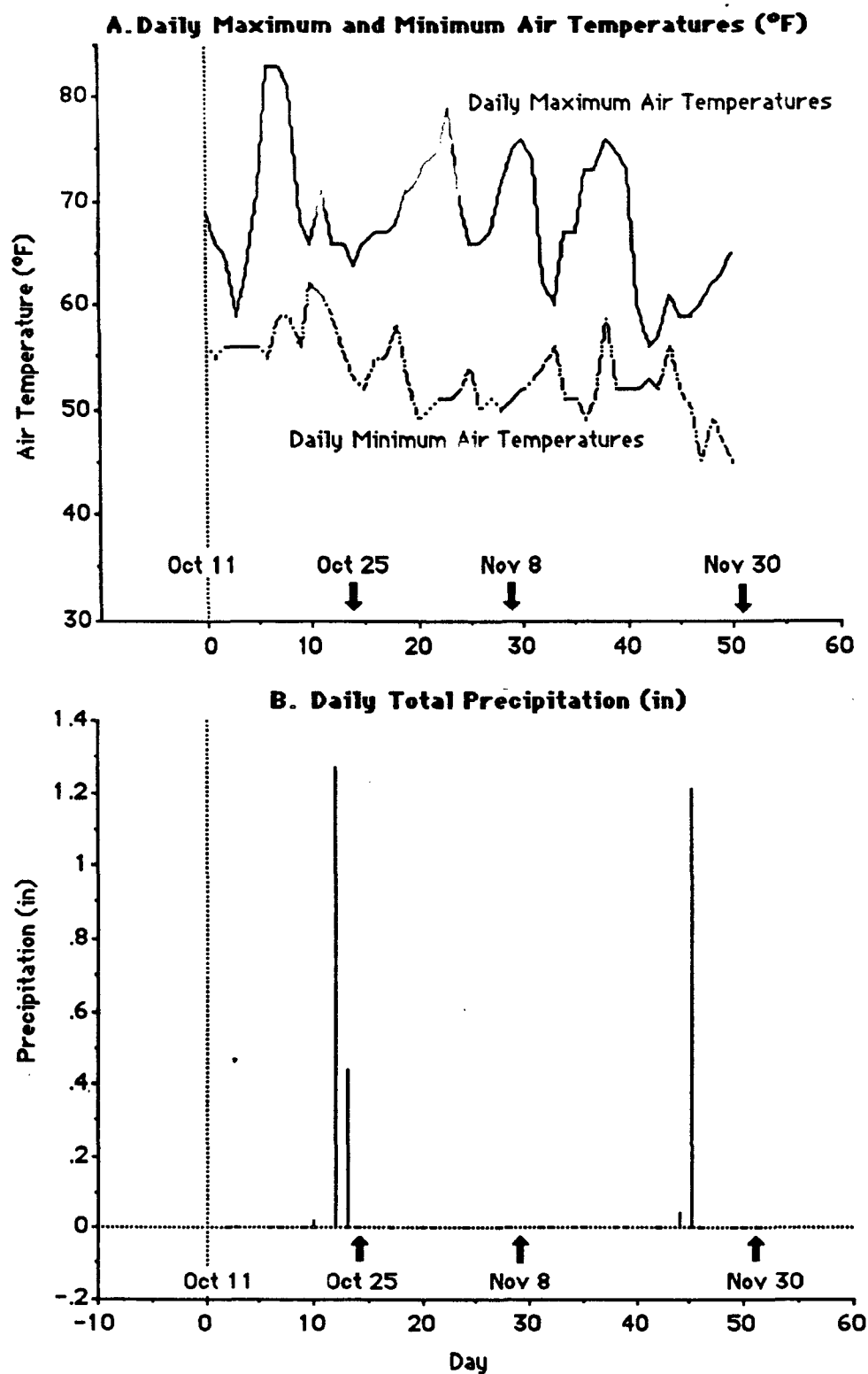


Figure 1. Meteorological Conditions During the Bioremediation Pilot Study, October-November, 1989: (A) Daily Maximum and Minimum Air Temperatures; (B) Daily Total Precipitation. Arrows Indicate Soil Sampling Dates. Source: National Weather Service.

145 \pm 21 mg/kg (24% of initial), for the "Emulsifier + Nutrient" treatment it was 205 \pm 7 mg/kg (~34% of initial), and for the "Bacteria + Emulsifier + Nutrient" treatment it was 160 \pm 14 mg/kg (26% of initial). These data are summarized in Figure 2.

Soil Microbial Contents

Total Microbial Densities - The densities of total microorganisms increased from approximately 4×10^8 cells/gm dry weight of soil (day 0) to between 17 and 22×10^8 cells/gm by day 14 (Figure 3a). The increases were significant in all cases (t-test), with the increase in the "Bacteria + Emulsifier + Nutrient" treatment the highest (22×10^8 cells/gm) and the increase in the "Nutrient" treatment the lowest (17×10^8 cells/gm). Although microorganisms were added to the "Bacteria + Emulsifier + Nutrient" treatment, bioaugmentation did not appear to have a significant influence on total microbial densities compared to the "Emulsifier + Nutrient" treatment using this microbial analysis technique. This may be related to the fact that it was necessary to irrigate the treated soils with chlorinated city water, and the chlorine may have adversely affected the added microorganisms (see Discussion).

By day 29, total microbial densities in the soils in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments had declined somewhat (Figure 3a). Again, bioaugmentation did not appear to appreciably enhance microbial densities in the soil. Densities in the soil in the "Nutrient" treatment continued to increase although not as rapidly as was observed during the first two weeks of treatment. By this time, the total microbial densities in all three treatments roughly equal.

Active Microbial Densities - The densities of active microorganisms in the treated soils (i.e., those microorganisms capable of growing on the agar plates) significantly increased from approximately 1×10^8 cells/gm on day 0 to $19-20 \times 10^8$ cells/gm in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments by day 14 (approximately 20-fold increases, Figure 3b). Although microorganisms were added to the "Bacteria + Emulsifier + Nutrient" treatment, bioaugmentation did not appear to appreciably enhance active microbial density in the soil. The density of active microorganisms in the "Nutrient" treatment only increased five-fold.

By day 29, the densities of active microorganisms significantly declined in both the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments. In contrast, active microbial densities continued to slowly increase in the "Nutrient" treated soil.

Densities of Phenanthrene-Degraders - The densities of phenanthrene-degrading microorganisms in the treated soils increased continuously over the first four weeks of the study in all three treatments (Figure 4a) from the initial density (day 0) of $\sim 2.4 \times 10^5$

Total Petroleum Hydrocarbons

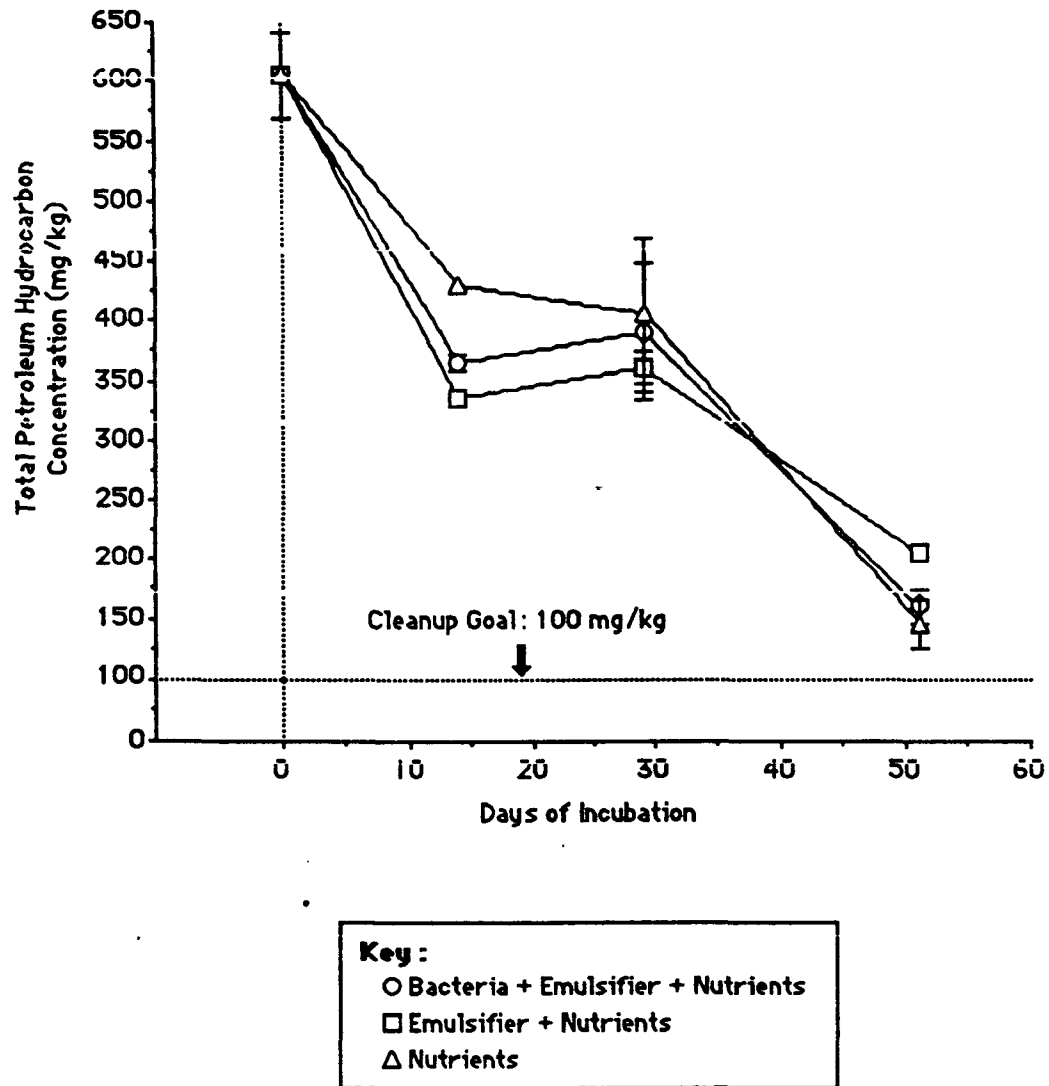


Figure 2. Average Concentrations (± 1 Standard Error) of Total Petroleum Hydrocarbons in Replicate Samples for Treated Soils Over Time for the Bioremediation Pilot Study, October-November 1989.

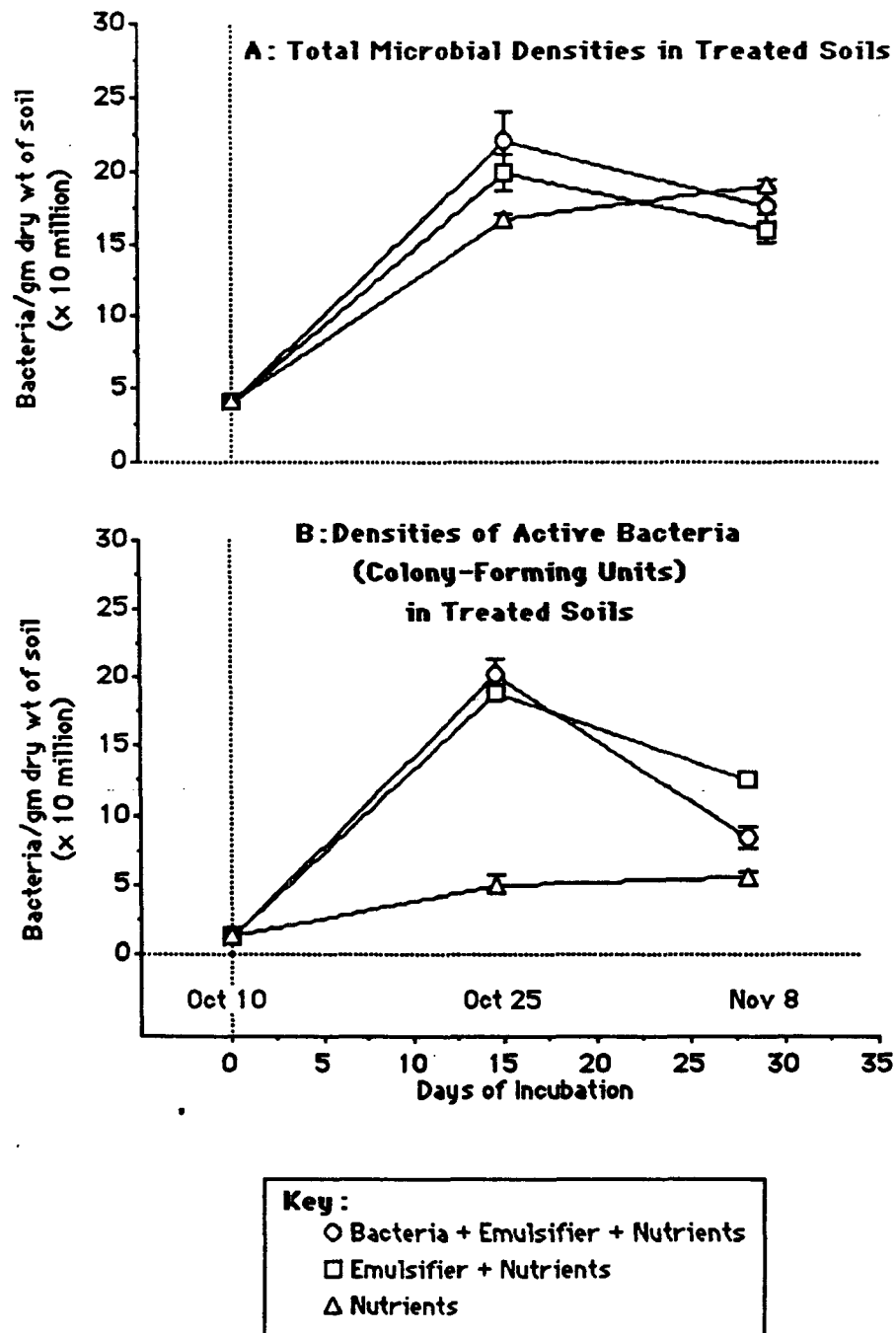


Figure 3. Average Microbial Densities (Mean \pm 1 Standard Error) for Soils During the Bioremediation Pilot Study: (A) Total Microbial Densities; (B) Active Microbial Densities in Soils During Treatment, October-November, 1989.

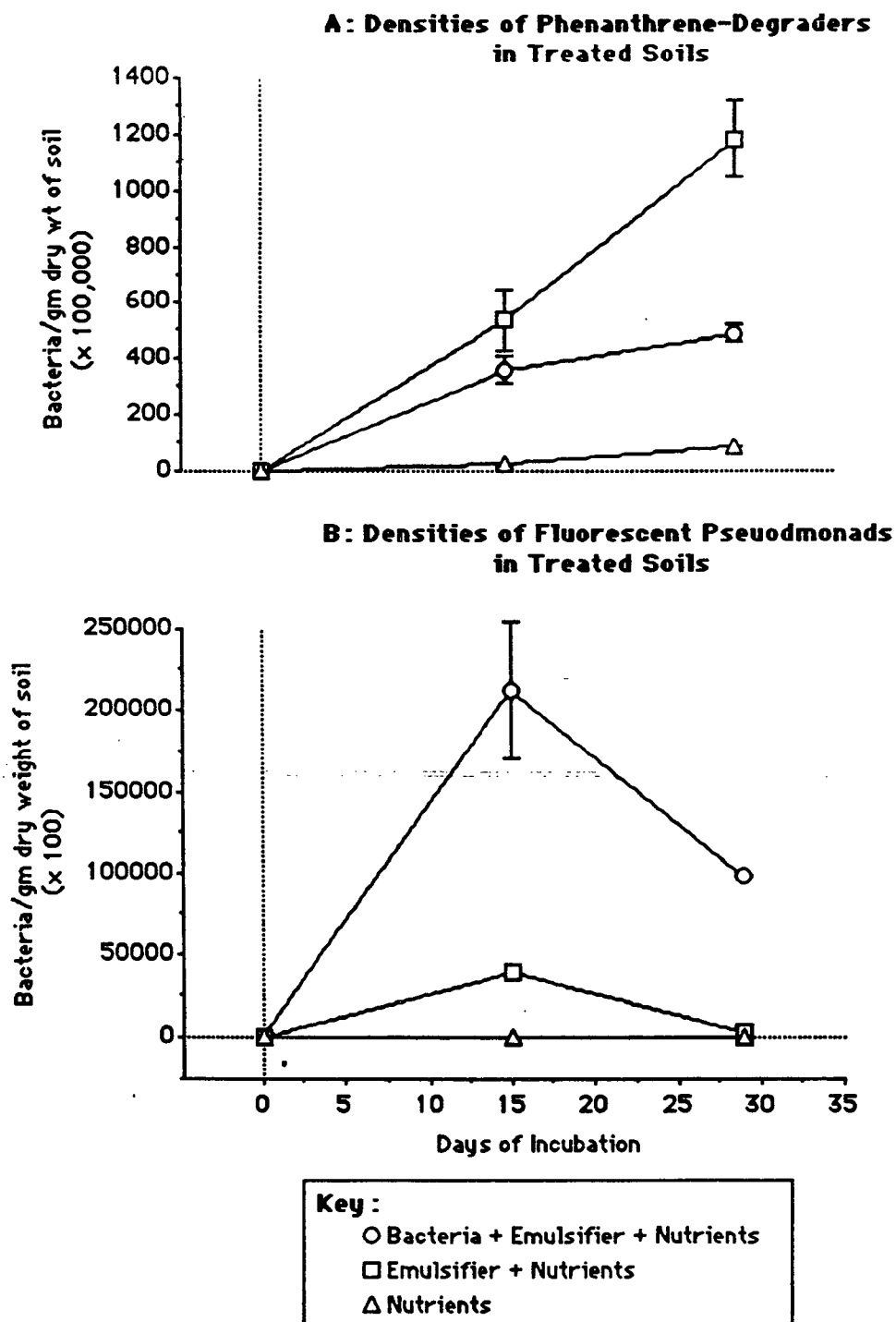


Figure 4. Average Microbial Densities (Mean \pm 1 Standard Error) for Soils During the Bioremediation Pilot Study: (A) Phenanthrene-Degrading Bacteria; (B) Fluorescent Pseudomonads, October-November, 1989.

cells/gm. The "Emulsifier + Nutrient" treatment appeared to have the largest influence on the density of phenanthrene-degraders, as density had increased by approximately three orders-of-magnitude by day 29 from the initial density. The "Nutrient" treatment did not appear to enhance the growth of phenanthrene-degraders, whereas the "Bacteria + Emulsifier + Nutrient" treatment produced an intermediate stimulation of growth of phenanthrene-degraders.

Densities of Fluorescent Pseudomonads - The densities of fluorescent pseudomonads in the treated soils (Figure 4b) varied in a pattern similar to that observed for the active microorganisms (compare Figure 4b with 3b), although densities of this group of microorganisms were always much lower than the active densities. The densities of these microorganisms peaked after two weeks of treatment in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments, with the highest densities observed in the latter treatment. This indicates that the bioaugmentation step added species that are quantified by this method. Growth of fluorescent pseudomonads was not enhanced by the "Nutrient" treatment.

DISCUSSION

The results of the seven-week bioremediation pilot study indicate that enhancement of biological activity in the contaminated soil can produce significant reduction in the concentration of the hydrocarbon contamination. The concomittent reduction in hydrocarbon concentrations with large fluctuations in microbial densities over the course of the study indicates that reduction was primarily induced by enhancement of microbiological processes in the soil. Because the original contamination was apparently poorly soluble and had low volatility, it is probable that other forms of contaminant loss, such as leaching and volatilization, were not appreciable in the study. The fact that the largest degree of contaminant reduction occurred in the "Nutrient" treatment after seven weeks (i.e., the treatment that did not include emulsifier addition) supports the hypothesis that leaching was not appreciable. Although photolytic loss of the contamination may have taken place during the study, the magnitude of this form of contaminant loss cannot be estimated from the available data.

The fluctuations in the densities of total and viable microorganisms, and of phenanthrene-degraders and fluorescent pseudomonads observed during the first four weeks of treatment indicate that microbial enhancement took place, especially in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments. Total microbial densities increased significantly after two weeks in all three treatments. Furthermore, the percentages of total microorganisms that were estimated to be active approached 100

percent after two weeks of treatment in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments (Figure 5a), suggesting that these two treatments had stimulated microbial activity to a higher extent than the "Nutrient" treatment. During this time, contaminant concentrations in these treated soils declined faster than in the "Nutrient" treated soil (Figure 2). The observations that the densities of phenanthrene-degraders and fluorescent pseudomonads in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments also increased to a greater extent than the "Nutrient" treatment, are additional indications that those treatments had greater stimulatory effects on the microorganisms than the "Nutrient" treatment.

After four weeks of treatment, the densities of all of the types of microorganisms assessed (i.e., total, viable, phenanthrene degrading, and fluorescent pseudomonads) had declined in the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments, whereas the densities in the "Nutrient" treatment continued to increase. The reductions in microbial densities in the two former treatments may be related to the relatively high degrees of reductions in contaminant concentrations produced by the treatments during the first two weeks (Figure 2). Presumably, microbial densities declined in response to lower concentrations of "food" (contamination) in the soil. These data suggest that the additions of the emulsifier and multiple nutrients had a relatively short-term stimulatory effect on microbial activity.

Phenanthrene-degraders appeared to be stimulated by emulsifier addition, but stimulation was somewhat reduced by bioaugmentation (Figure 5b). These observations suggest that the added microorganisms either directly competed with the phenanthrene-degraders for the contamination or that they otherwise interfered with the growth of the contaminant-specific microorganisms.

The observation that microbial densities were generally not different between the "Emulsifier + Nutrient" and "Bacteria + Emulsifier + Nutrient" treatments suggests that bioaugmentation did not appreciably enhance microbial densities. However, proper soil treatment with the microbial additive required irrigation with nonchlorinated water (S. Miller, Formula Group Limited, pers. comm.), and this was not done in the study. Study logistics required that chlorinated city water be used for irrigation, and this may have had an adverse effect on the added microorganisms, since chlorine will be toxic to microorganisms. Irrigation with chlorinated water may have had a severe impact on the performance of the added microorganisms.

In any event, bioaugmentation appeared to only enhance the densities of fluorescent pseudomonads. However, since these types of microorganisms did not constitute high percentages of the microbial communities in the treated soils (Figure 5c), appreciable

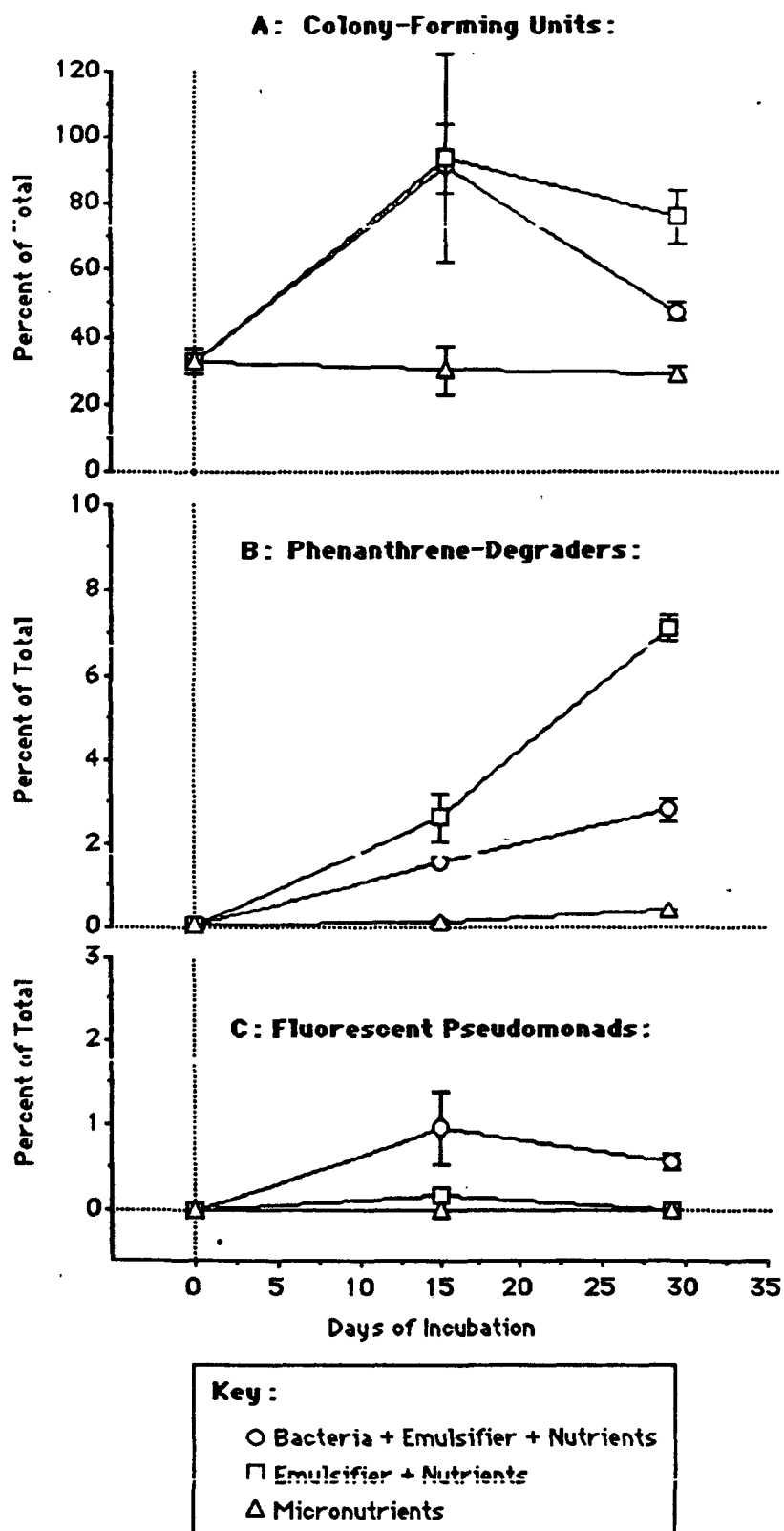


Figure 5. Microbial Data from the Bioremediation Pilot Study: Percentages of Total Microbial Densities Exhibiting Activity, (forming colonies)(A), Capable of Degrading Phenanthrene (B), and that were Fluorescent Pseudomonads (C), October-November, 1989.

contaminant reduction was apparently not dependant upon high densities of fluorescent pseudomonads.

The microbial data also suggest that application of the micronutrients had not produced immediate microbial stimulation (as measured by densities of active microorganisms) in the contaminated soil. After four weeks of treatment, total densities in the "Nutrient"-treated soil had approached the densities in the other two treatments; however, the percentage of active microorganisms remained low relative to the other two treatments (Figure 5a). Furthermore, the densities of phenanthrene-degraders and fluorescent pseudomonads were relatively low. Nevertheless, contaminant concentration in the "Nutrient"-treated soil was essentially similar to the concentrations in the other two soils after four weeks of treatment. These observations suggest that appreciable contaminant biodegradation had begun in the "Nutrient"-treated soil. The fact that the "Nutrient"-treated soil had the lowest average contaminant concentration after seven weeks further supports this hypothesis.

Although the hydrocarbon concentrations did not decline appreciably between two and four weeks, microbial stimulation apparently continued in all three treatments in the final three weeks of the study because contaminant levels were significantly reduced during this period. This occurred despite the fact that tilling had been suspended. These data indicate that tilling operations could be applied less frequently without appreciably harming microbial degradation rates.

After seven weeks, each treatment had reduced contaminant concentrations to at or below 200 mg/kg. The target level set for the study (so the soil could be disposed of in a Class III landfill) was 100 mg/kg. To evaluate the additional time necessary to treat the soil to an acceptable contaminant concentration, a regression analysis was performed relating hydrocarbon concentrations in the soil samples of each treatment to time (Figure 6). This analysis indicates that if the treatments were continued and treatment performances continued as observed during the study, soil hydrocarbon concentrations would have declined below the target level of 100 mg/kg in 58.5 days for the "Nutrient" treatment, ~64 days in the "Emulsifier + Nutrient" treatment, and 59 days in the "Bacteria + Emulsifier + Nutrient" treatment. Since the "Nutrient" treatment produced the highest degree of contaminant reduction and because it is the least expensive treatment approach, it is the treatment approach of choice.

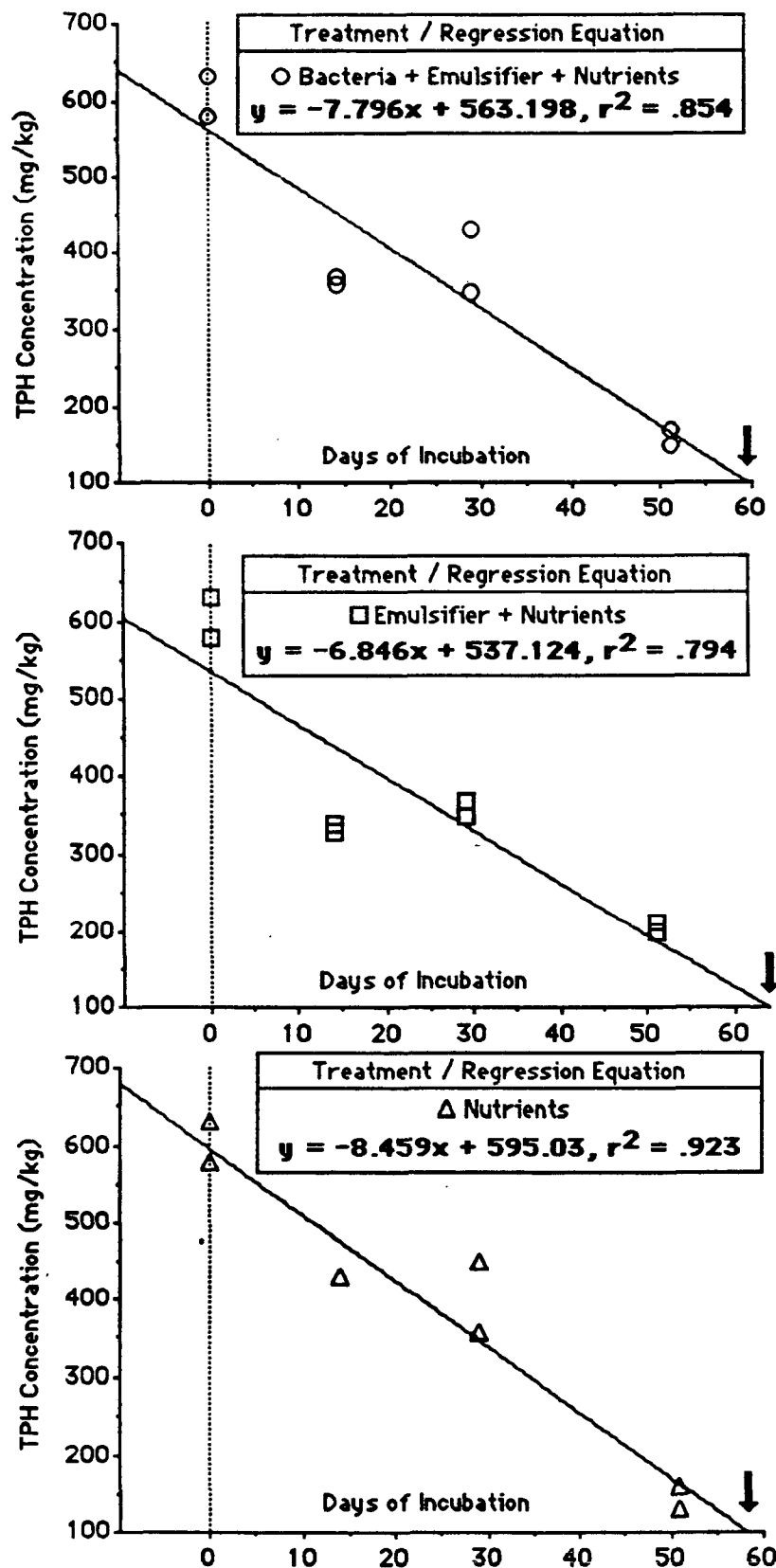


Figure 6. Regressions of TPH Concentration versus Time for the Three Treatments Used in the Bioremediation Pilot Study, October-November, 1989. Position of Arrows Along Time Axes Indicates Approximate Time Period Estimated for Treatment to Reduce TPH Concentration Below 100 mg/kg Target Level.

CONCLUSIONS

The conclusions of this study are as follows:

- All three treatment approaches produced significant reductions in the concentrations of the hydrocarbons in the contaminated soil in seven weeks. Final contaminant concentrations in all three treatments were at or below 200 mg/kg (>66% reduction from the initial concentration). Biological reduction of the contamination was indicated to be the major mechanism of contaminant loss;
- It is estimated that all three biological treatments could produce contaminant reduction below the target level of 100 mg/kg in approximately two months;
- The greatest degree of biological reduction of the contamination (76% of initial) occurred in the treatment in which only micronutrients were added. Based on economic considerations, this treatment approach is the treatment of choice;
- Addition of emulsifier and multiple nutrients appeared to immediately stimulate the indigenous microorganisms in the contaminated soil; however, stimulation was short term and did not appreciably enhance contaminant biodegradation relative to the treatment that did not include emulsifier addition over seven weeks;
- Addition of micronutrients alone eventually stimulated the indigenous microorganisms to degrade the contamination over seven weeks at a rate that exceeded the other two treatment approaches;
- Bioaugmentation with the selected microbial formulation did not produce enhanced biodegradation of the soil contamination relative to the other two treatments. Stimulation of the activity of the indigenous microorganisms in the contaminated soil was sufficient to produce appreciable contaminant reduction. However, evaluation of the usefulness of bioaugmentation in the study is complicated by the fact that chlorinated water was used for irrigation, and the chlorine may have adversely affected the added microorganisms.

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ODOR CONTROL with Actina & d-part

Bar Odor - Mix 1 part d-part to 5 parts of warm water and apply in the targeted areas daily with a hand sprayer the first week. Mix 1 part d-part to 10 parts of warm water for maintenance application daily after the first the week. If the odor is too persistent, use the 1 to 5 part ratio on a daily bases until odor control is achieved.

Drain Odor and Grease Control Maintenance in Drains and Traps Mix 1 part d-part to 10 parts warm water and pour into all drains in kitchen and bar areas on a daily bases for the first week. Mix 1 part d-part to 20 parts warm water and pour into all drains in kitchen and bar area on a daily bases as the maintenance rate after the first week.

Lagoon Odors - Apply 2 gallons of Actina for every 1,000 square feet of surface area the first day. For each following week, continue with 1 quart of Actina for every 1,000 square feet of surface area as the maintenance rate.

Sewage Lift Stations - For every 100,000 gallons of flow per day, use 1/2 gallon of d-part. However, the first day, apply 1/2 lb of dp-5 in 5 gallons of warm water along with the first 1/2 gallon of d-part.

Contained Animal Feeding Houses - Mix 1 gallon of Actina into 5 gallons of warm water. Spray this dilution for every 4,000 sq. ft. of surface area the first day. Apply 1/2 lb of Compost Starter, that has been pre-mixed in 5 gallons of warm water, and apply to every 4,000 sq. ft. of surface area the first day. For each following week, mix 1 quart to 1 gallon of warm water and spray every 4,000 sq. ft. of surface area for the maintenance rate.

Dog Pens and Runs - Mix 1 part of Actina to 10 parts of warm water and apply on a daily bases.

Vault Toilets, Pit Toilets, Holding Tanks - Day 1, "spike" with 1/2 lb. dp-5 plus 1/2 gallon d-part 1000 gallon capacity. Day 8, add 1 pint d-part plus 2 tablespoons dp-5 per 1000 gallon capacity. Repeat this step each week or as needed.

The shelf life of our products are 8 hours after they have been diluted with water. Do not mix with cleaners or solvents with our product. Make sure spray container is clean before using.

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CITY MUNICIPALITIES / INDUSTRY D-PART & BACTERIA PRODUCTS

<u>Reference</u>	<u>Product Use</u>
City of Rocky Ford Rocky Ford, CO Mr. Darryl Schultz 719-254-7414	City lagoon management for BOD, TSS and lagoon odors.
City of League City League City, TX Mr. Larry Webb 713-332-3431	Lift station maintenance of grease/sludge and odors.
City of Houston Houston, TX Mr. Norman Grundsner 713-221-5340	BOD, TSS, odors and main line maintenance.
El Paso Water Utilities El Paso, TX Mr. Fernando Arellano 915-859-3931	Anaerobic digester maintenance.
City of Uvalde Uvalde, TX Mr. Loyd Absure 512-278-3315	Liquifying dry sludge in steel tanks.
U.S.D.A. Forest Service San Diego, CA Mr. Dick Reynolds 619-376-3781	Vault toilet pump out and odor control.
City of Olney Olney, TX Mr. Ronnie Stroud 817-564-5317	Setable solid remediation in digesters.
Frito Lay Dallas, TX Sam Fenkel 214-579-2545	Grease remediation.
National Waste Dallas, TX John Daffron 214-637-5504	Anaerobic digester maintenance.

Bioremediation REPORT

Effects of Medina Soil Activator on Oil Contaminated California Land Site

Introduction

The effects of three biological treatment approaches for clean-up of oil contaminated soil were evaluated by Woodward-Clyde Consultants during a seven week on-site study. The original 20-page technical manuscript has been paraphrased with permission from the study's author in order to accurately and briefly demonstrate the effects of Medina Soil Activator.

The two other treatments studied include combinations of biodegradable surfactants, multiple-nutrient additives and a microbial additive. While these products were generally effective in reducing oil contamination levels, the study concluded that "the greatest degree of biological reduction of the contaminant (76% of initial) occurred in the treatment in which only Medina Soil Activator, a microbial activator was added. Based on economic considerations, this treatment approach is the treatment of choice".

Although the two other treatment methods were included in the original study, this BIOREMEDIATION REPORT will focus primarily on the effects of Medina Soil Activator.

Background

Oil contamination was discovered on a site in Oakland, California as a part of demolition activities of buildings in the late 1970's. The site was paved and fenced in 1986 for use as parking lots.

Study Conducted by:

Michael R. Piotrowski, Ph.D. and
George A. Ford
Woodward-Clyde Consultants
San Diego, CA

Study Dates:

October - November 1989

Location:

Oakland, California (on-site)

The two-block parking facility was to be the site of a new office building complex. The original plan for the fill material at the site called for use as engineered fill and disposal of excess materials in a Class III landfill. However, the oil contamination existed at sufficient concentrations that off-site hauling and disposal would be regulated by the California Administration Code. It is estimated that approximately 10,000 cubic yards of fill material would require either deposition in a Class I landfill, or sufficient remediation to allow deposition in a Class III landfill or use an engineered fill.

Woodward-Clyde Consultants, conducted an on-site, seven-week pilot scale study that evaluated the efficacy of accelerated biological treatment of the oil contaminants in the fill in October and November 1989. The initial soil hydrocarbon concentration was 605 mg/kg. Acceptable non-contamination level is 100 mg/kg.

Initial Soil Sampling

Approximately 20 cubic yards of the contaminated fill materials were isolated, mixed, and a set of composited, replicate soil samples was collected on October 2,

A summary of test results of the effectiveness of microbial bioremediation using Medina Soil Activator

1989. The soil samples were sent to NET-Pacific, Santa Rosa, California, and analyzed for total fuel hydrocarbons.

A second set of composited, replicate soil samples was collected on October 10, 1989 and sent to San Diego University (SDSU), San Diego, California for analysis of microbial content.

Set-up of Soil Treatment Plots

The material was separated into three equally sized piles (6.5 cubic yards per pile) and each pile was placed within a wooden frame (10 ft x 20 ft x 1.5 ft) located on a paved area adjacent to the site. Each pile has been spread to a depth of 1 foot.

Treatment Applications

Three treatment regimes were evaluated in the study. One treatment evaluated the effect of Medina Soil Activator on oil biodegradation. The second treatment evaluated the effect of an emulsifier solution combined with a multiple-nutrient fertilizer solution. The third treatment evaluated the effect of emulsifier, multiple nutrients, and hydrocarbon-degrading microorganisms. Treatments were applied to the soil plots on October 11, 1989.

Operations and Monitoring

Soil pH and moisture - Soil pH and moisture were periodically monitored. The average soil moisture in the plots was maintained at between 30% and 70%. The occurrence of two rain events during the study led to a suspension of irrigation until the soils dried to acceptable moisture levels.

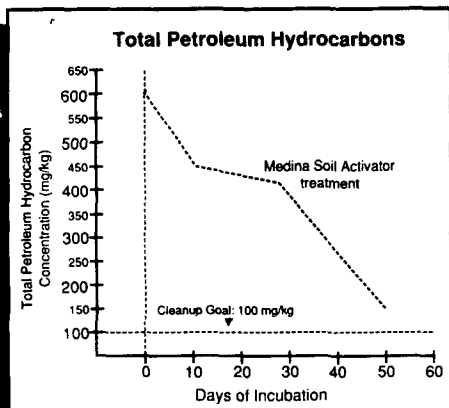
Tilling - Each plot was tilled three times each week for four weeks after treatment began. Tilling was conducted on each plot until it was thoroughly mixed. No tilling was conducted during the last three weeks of treatment.

Meteorological Conditions - The daily maximum and minimum air temperatures and total daily precipitation in the city during the study were recorded by the National Weather Service (NWS).

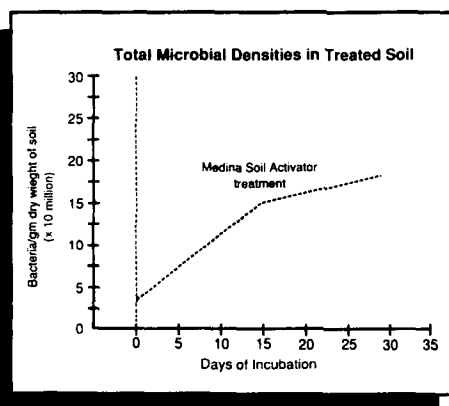
Soil Sampling and Analyses

Two weeks after treatment began (day 14 of incubation, October 25, 1989) composited samples were collected from each plot. One soil sample was sent to NET-Pacific, Santa Rosa, California and analyzed for hydrocarbon content. The second soil sample was sent to San Diego State University, San Diego, California and analyzed for microbial content.

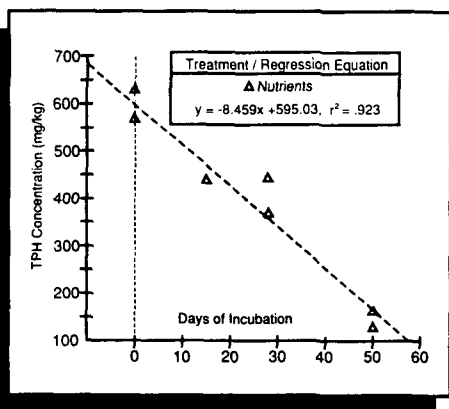
Approximately four and seven weeks after the soil treatments began procedures conducted for the two-week sampling interval were repeated, except that no microbial samples were collected for the final sampling interval. Therefore, hydrocarbon data were collected initially two weeks, four weeks, and seven weeks after soil treatments began, whereas microbial data were col-



Average Concentrations to Total Petroleum Hydrocarbons in Replicate Samples for Treated Soils Over Time for the Bioremediation Pilot Study.



Average Microbial Densities for Soils During the Bioremediation Pilot Study.



Regressions of TPH Concentration versus Time for the Medina® Soil Activator treatment used in the Bioremediation Pilot Study. Position of Arrows Along Time Axes Indicate Approximate Time Period Estimate for Treatment To Reduce TPH Concentration Below 100 mg/kg Target Level.

lected initially, two weeks, and four weeks after the treatments began.

Results

Soil Hydrocarbon Concentrations

The initial concentration in the soil before separation into treatment plots was 605 mg/kg. After two weeks, the concentration had declined to approximately 71% of the initial value in the Medina treatment. According to the study, the reductions in hydrocarbon concentrations from the initial concentration were significant. By day 51, the average concentration in the Medina treatment was 145 ± mg/kg (24% of initial).

Discussion

The results of the seven-week bioremediation pilot study indicate that enhancement of biological activity in the contaminated soil can produce significant reduction in the hydrocarbon contamination. The reduction in hydrocarbon concentrations with large fluctuations in microbial densities over the course of the study indicates that reduction was primarily induced by enhancement of microbiological processes in the soil. Because the original contamination was apparently poorly soluble and had low volatility, other forms of contaminant loss, such as leaching and volatilization, were not appreciable in the study. The fact that the largest degree of contaminant reduction occurred in the Medina treatment after seven weeks i.e., the treatment that did not include emulsifiers supports the hypothesis that leaching was not appreciable.

After seven weeks, Medina had reduced contaminant concentrations to at or below 200 mg/kg. The target level set for the study (so the soil could be disposed of in a Class III landfill) was 100 mg/kg. To evaluate the additional time necessary to treat the soil to an acceptable contaminant concentration, a regression analysis was performed relating hydrocarbon concentrations in the soil samples of each treatment to time. This analysis indicates that if the treatments were continued and treatment performances continued as observed during the study, soil hydrocarbon concentrations would have declined below the target level of 100 mg/kg in 58.5 days for the Medina treatment.

Since the Medina treatment produced the highest degree of contaminant reduction and because it is the least expensive treatment approach, it is the treatment approach of choice.

Conclusion

• All three treatment approaches produced significant reductions in the concentrations of the hydrocarbons in the contaminated soil in seven weeks. Final contamination concentrations in all three treatments were at or below 200 mg/kg (>66% reduction from the initial concentration). Biological reduction of the contaminant was indicated to be the major mechanism of contaminant loss;

• It is estimated that all three biological treatments could produce contaminant reduction below the target level of 100 mg/kg in approximately two months.

• The greatest degree of biological reduction of the contamination (76% of initial) occurred in the treatment in which only Medina Soil Activator was added. Based on economic considerations, this treatment approach is the treatment of choice.

• Addition of Medina alone eventually stimulated the indigenous microorganisms to degrade the contamination over seven weeks at a rate that exceeded the other two treatments approaches.

Manufacturer's Recommendations

• New Oil Spills - Since indigenous oil degrading bacteria may not be present, it is beneficial to add microbial degrading cultures to enhance the bioremediation process.

• High Contamination Levels - When contamination levels are high and soil nutrients are low, it is beneficial to add Medina Bio-D® Bioremediation Nutrients to properly balance the carbon-nitrogen-phosphorous ratio.



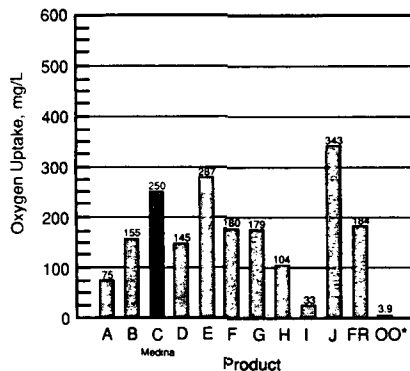
Medina Products Commercial Division

P.O. Box 309
Hondo, TX 78861
(512) 426-3011

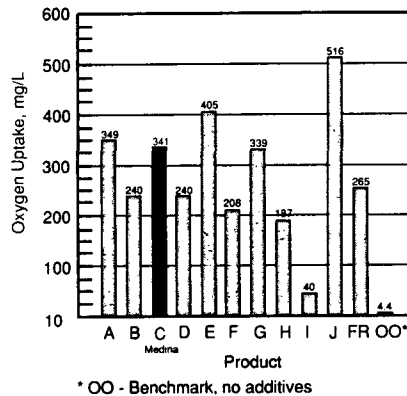
Medina® Bioremediation Products include:

Bio-D® Bioremediation Nutrients
Medina® Soil Activator (microbial activator)
d-part® Waste Conditioner
plus, specific bacterial cultures

**Cumulative Oxygen Uptake
Day 11**



**Cumulative Oxygen Uptake
Day 20**

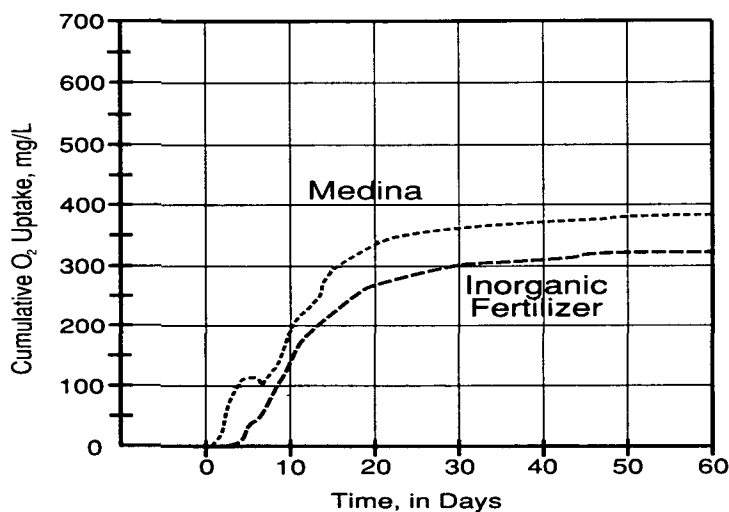


• The study also indicated a high degree of cumulative oxygen uptake. At day 11, tests showed 250 mg/L oxygen uptake, compared to the benchmark (no additives) of 3.9 mg/L. At day 20, Medina had a cumulative oxygen uptake of 341 mg/L, compared to the benchmark of 4.4 mg/L.

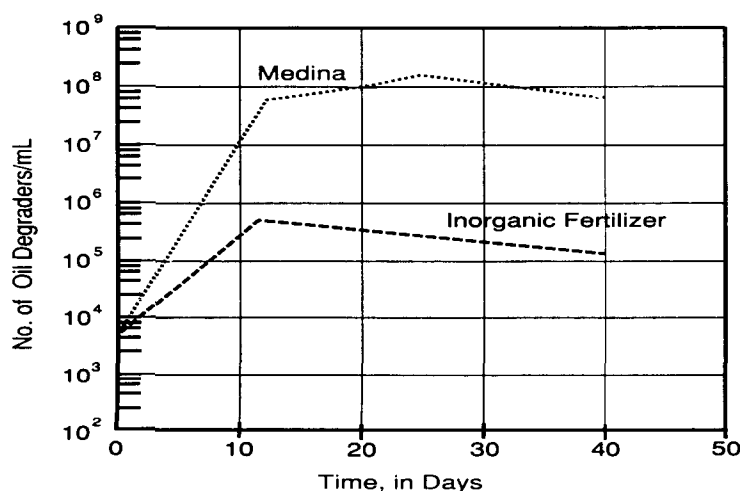
• Test results showed evidence of Medina's ability to stimulate the growth of oil degrading organisms. At the end of 20 days, Medina had increased the number of oil degraders to 1×10^8 , compared to 5×10^5 when stimulated with inorganic fertilizers.

• There is sufficient evidence to show that Medina has a demonstrated effect on alkane reduction, oxygen uptake and stimulation of oil degrading organisms. The manufacturer notes that the addition of microbial cultures is typically recommended to stimulate a fast response to the bioremediation process. However, these tests were conducted without the use of such cultures since Alaskan officials indicated a reluctance to introduce foreign cultures to the indigenous environment. Based on previous studies, the effectiveness of Medina Soil Activator on oil degradation is significantly improved by following the manufacturers recommendations which call for the addition of microbial degrading cultures.

Cumulative O₂ Uptake



Growth of Oil Degraders



**Medina Products
Commercial Division**

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Hondo, TX 78861
(512) 426-3011

Medina® Bioremediation Products include:

Bio-D® Bioremediation Nutrients
Medina® Soil Activator (microbial activator)
d-part® Waste Conditioner
plus, specific bacterial cultures

Bioremediation REPORT

Effects of Medina Soil Activator on Prudhoe Bay Crude Oil

Introduction

Since the catastrophic oil spill from the Exxon Valdez in 1989, researchers have been studying various methods for the bioremediation of residue oil. The EPA's Risk Reduction Laboratory solicited proposals for bioremediation products and processes, then narrowed the field of responses to 10 products for final testing. Due to the confidential nature of the tests, other product names were not disclosed.

Medina Soil Activator was used in combination with Toxigon 2000, an emulsifying agent and Custom Blend nutrients (fertilizers). This mixture was designated Product "C" for the purpose of the EPA study. The results indicated a significant effect on alkane reduction and oxygen uptake, two variables required for successful bioremediation.

The EPA tests did not measure the economic impact of Medina and competitive products. However, in previous tests conducted by an environmental consulting

firm, Medina Soil Activator was considered the treatment of choice based on economic and performance considerations.

This BIOREMEDIATION REPORT is a summary of information from the original NETAC study. It has been condensed to accurately and briefly demonstrate the effects of Medina Soil Activator on weathered crude oil.

A summary of test results of the effectiveness of microbial bioremediation using Medina Soil Activator

Methods

The following is a summary of the laboratory results obtained by EPA's Risk Reduction Laboratory, Cincinnati, Ohio. Ten commercially available bioremediation products were tested for possible use in Alaska to help clean up the residual oil from the 1989 Exxon Valdez oil spill. The tests were conducted during April and May 1990, according to a defined protocol made known before the tests. This protocol involved placing the products in seawater from Prince William Sound, together with

weathered Prudhoe Bay crude oil. To assure objectivity during the testing, the 10 treatments were designated by alphabetical codes A through J. Therefore, the results are represented on a coded basis.

Results

The results of the laboratory study indicate that Medina Soil Activator produced notable alkane reductions in the combination of seawater and weathered Prudhoe Bay crude oil.

- At day 11, tests showed reductions of 67.8% compared to 27.6% for the benchmark test with no additives. At day 20, tests showed reductions at 90.6%, compared to benchmark at 25.2%.

(Continued)

Study Conducted by:

National Environmental
Technology Applications Corp.
University of Pittsburgh Applied
Research Center for the U.S.
Environmental Protection Agency
Risk Reduction Laboratory

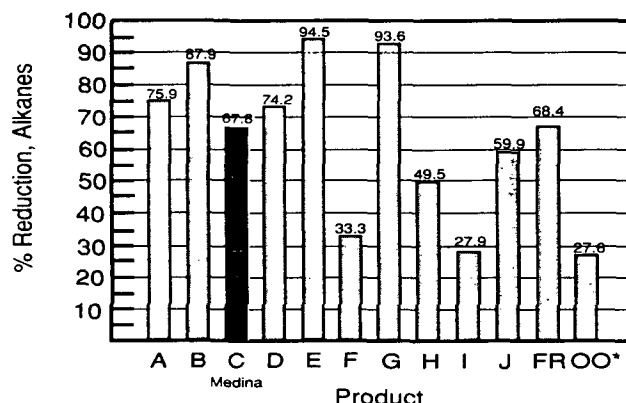
Study Dates:

April - May 1990

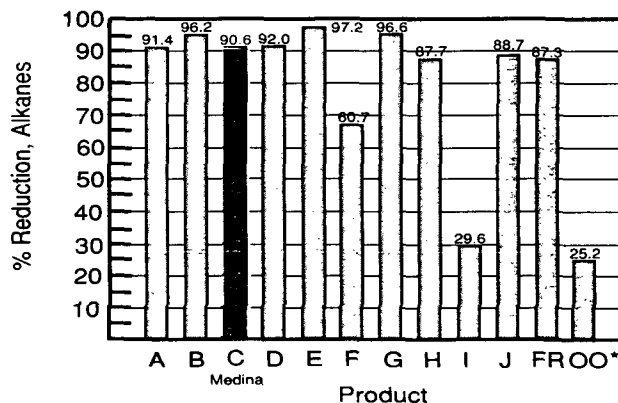
Location:

Laboratory

**Total Alkane Reduction
Day 11**



**Total Alkane Reduction
Day 20**



* OO - Benchmark, no additives

~~Confidential~~
~~Not for Publication~~
9/17/80

Results - Medina - 1980

Enclosed are Tables 1 through 9 which contain the results from studies with medina for 1980. There were three research objectives:

- 1) the influence of medina on nutrient availability and/or absorption,
- 2) The influence of medina on nitrogen fixation,
- 3) the influence of medina on soil microorganisms as measured by CO₂ evolution.

Each of these objectives and the results from studies utilized to evaluate the objectives will be discussed individually.

Objective 1: In discussions with Jack Megason of Medina, it was indicated that medina was having a positive effect on the growth of tomatoes in California. Studies in the field with medina and tomatoes in 1979 at Athens indicated a positive effect of medina. However, the results of nutrient analyses gave few consistent nutritional trends that could be related to this positive effect of medina on the growth of tomatoes. Since medina has added micro-nutrient, it has been suggested that the micronutrients may be the primary factor responsible for the positive effects of medina on the growth of tomatoes. Thus, to satisfy the requirements of objective one, tomatoes were grown in pine bark under greenhouse conditions. Pine bark was chosen as micronutrients are generally not added to pine bark utilized for plant production. More recently, plant response to added phosphorous and zinc have been reported. In this study no response to added phosphorous was observed, and the data are not reported.

Results: Tomato transplants were planted in aged pine bark on March 7, 1980. Medina was applied weekly at the rate of 10 ml/liter/plant for 11 weeks. Nitrogen was supplied as urea, (NH₄)₂SO₄, and Ca(NO₃)₂ at rates equal to that

normally recommended for greenhouse tomatoes (4.76 g N weekly). Micronutrients were applied at the concentration specified by Hoagland's each week for 11 weeks. Both the number of fruit and the weight of the fruit were greater with medina in comparison to the micronutrients added at Hoagland concentrations (Table 1). The addition of Ca with medina as CaCl_2 (50 ppm Ca weekly) increased yields slightly. Medina compared to seaweed plus the Hoagland's concentration of micronutrients was not significantly different in weight yield, though the number of fruit produced was higher with medina. The addition of Ca (CaCl_2 - 50 ppm weekly Ca) did not affect yield significantly.

Tables 2 and 3 show the elemental concentration averaged over sampling dates. Thus, these concentrations represent an average nutrient concentration over the growth cycle of 11 weeks.

Over all treatments, medina resulted in a significant increase in magnesium, zinc, and manganese. Sodium was significantly reduced due to medina. These results suggest that medina enhances the uptake of these elements. The reduction in sodium uptake would be significant for tomatoes grown in saline soils such as that found in California. It is my recommendation that studies be conducted under field conditions with saline soils to confirm that medina reduces sodium uptake. In addition, enhanced uptake of Mg, Mn, and Zn can be evaluated.

Table 4 shows the interactions of medina with urea, $\text{Ca}(\text{NO}_3)_2$, and $(\text{NH}_4)_2\text{SO}_4$. Also, Seaborn + F and Peter's are compared to the other N form with and without medina.

Medina increased fruit numbers but not fruit weight with $\text{Ca}(\text{NO}_3)_2$. Blossom end rot (BER) was lower though not statistically different. With urea, higher fruit weights were obtained though numbers of fruits were equal. BER was lowest with medina. With $(\text{NH}_4)_2\text{SO}_4$, no difference in fruit

weight, numbers, or BER was observed. In comparison to Seaborn + F and Peter's fruit weight of the $\text{Ca}(\text{NO}_3)_2$ + medina treatment was significantly higher. Again, the elements most affected with all nitrogen treatments due to medina were Mg, Zn, Mn, and Na (Tables 5 and 6).

Tables 1-6 indicate that under conditions where medina has a positive influence on the yield of tomatoes, increases in the elemental concentration of Mg, Mn, and Zn and a reduction of Na resulted. These results are preliminary and should be confirmed under field conditions.

Objective 2: The influence of medina on N_2 fixation in comparison to Seaborn and Seaborn + F is presented in Table 7. Medina did not influence N_2 fixation. However, Seaborn increased N_2 fixation significantly in comparison to the water control. Seaborn + F also increased N_2 fixation significantly in comparison to the water control and medina. Table 7 utilized only seed treatments. Table 8 shows the results of foliar applied treatments. None of the treatments influenced N_2 fixation positively.

Objective 3: Table 9 shows the effect of medina and Seaborn and Seaborn + F on microbial activity as measured by CO_2 evolution. No effects of any treatment on CO_2 evolution was observed.

Table 1. Medina effects on tomato yield - total fruit weight and numbers. ^y

Paired treatments	Yield weight per plant (Total)	Number of fruits per plant (Total)
Medina	9.55**	39.08*
FeEDTA + Micronutrients	7.92	33.92
Medina + Soil calcium	10.57***	41.92**
FeEDTA + Micronutrients	7.92	33.92
Medina	9.55	39.08**
Seaweed extract + FeEDTA + Micronutrients	9.15	34.67
Medina + Soil calcium	10.57	41.92**
Seaweed + Soil calcium + FeEDTA + Micronutrients	9.91	35.17

*Significantly higher at 10% level.

**Significantly higher at 5% level.

***Significantly higher at 1% level.

^yStudy conducted in pine bark--greenhouse conditions.

Table 2. Medina effects on tomato nutrient uptake - major elements. ^y

Paired treatments	Leaf nutrient content %			
	K	P	Ca	Mg
Medina	2.08	.72	.47	.43**
FeEDTA + Micronutrients	2.21	.73	.45	.39
Medina + Soil calcium	1.99	.72	.49	.45**
FeEDTA + Micronutrients	2.21	.73	.46	.39
Medina	2.08	.72	.47	.44**
Seaweed extract + FeEDTA + Micronutrients	2.30	.73	.51	.39
Medina + Soil calcium	1.99	.72	.49	.45***
Seaweed + Soil calcium + FeEDTA + Micronutrients	2.21	.71	.47	.39

*Significantly higher at 10% level.

**Significantly higher at 5% level.

***Significantly higher at 1% level.

^yStudy conducted in pine bark--greenhouse conditions.

Table 3. Medina effects on tomato nutrient uptake - minor elements.^Y

Paired treatments	PPM leaf element content						
	Fe	B	Cu	Mn	Zn	Na	Sr
Medina	88.69	32.86	7.45	331.2*	84.1**	109.2	8.3
FeEDTA + Micronutrients	91.98	36.52*	7.28	278.4	62.6	148.1**	7.5
Medina + Soil calcium	90.26	33.11	6.91	368.8**	93.2*	93.2	9.1**
FeEDTA + Micronutrients	91.98	36.52**	7.28	278.4	62.6	148.1***	7.5
Medina	88.69	32.86	7.45	331.2	84.1**	109.2	8.3
Seaweed extract + FeEDTA + Micronutrients	94.41	35.97	7.61	277.5	57.0	211.2***	8.2
Medina + Soil calcium	90.26	33.11	6.92	368.8***	93.2**	93.2	9.1*
Seaweed + Soil calcium + FeEDTA + Micronutrients	92.36	36.89**	7.05	269.0	60.0	225.0***	7.7

*Significantly higher at 10% level.

**Significantly higher at 5% level.

***Significantly higher at 1% level.

^YStudy conducted in pine bark--greenhouse conditions.

Table 4. Medina effects on tomato fruit yield and quality with different nitrogen sources.^y

Treatment	Total marketable fruit weight	Marketable fruit number	BER percentage**
Ca(NO ₃) ₂	11.32 abc*	37.00 bc	2.62 bc
Ca(NO ₃) ₂ + Medina	12.72 a	46.87 a	.24 c
Ca(NO ₃) ₂ + Seaweed extract	11.64 ab	39.37 ab	1.79 c
Urea	6.97 e	36.50 bc	15.10 ab
Urea + Medina	10.39 abc	40.50 ab	6.36 bc
Urea + Seaweed extract	9.18 cd	37.37 bc	16.08 a
(NH ₄) ₂ SO ₄	5.47 e	28.25 c	7.87 bc
(NH ₄) ₂ SO ₄ + Medina	7.06 de	34.12 bc	7.09 bc
(NH ₄) ₂ SO ₄ + Seaweed extract	7.03 e	35.12 bc	7.56 bc
Seaborn + F	8.60 cde	39.25 abc	9.77 abc
Peter's	9.27 bcd	40.17 ab	9.54 bc

*Means followed by the same letter within columns are not significantly different at 5% level.

**Figured as a percentage of total (not marketable) fruit yield.

^yStudy conducted in pine bark--greenhouse conditions.

Table 6. Tomato nutrient uptake influenced by Medina and nitrogen source - minor elements. ^y

Treatment	Fe	B	Cu	Mn	Zn	Na	Sr
Ca(NO ₃) ₂	100.9 a	28.1 ef	6.49 c	299.8 bcd	41.2 d	184.4 bc	12.28 a
Ca(NO ₃) ₂ + Medina	97.2 ab	27.9 f	7.05 c	342.4 ab	53.4 cd	126.7 d	13.49 a
Ca(NO ₃) ₂ + Seaweed extract	95.6 ab	30.7 ef	6.83 c	282.1 bcd	41.1 d	307.1 a	12.84 a
Urea	85.1 c	38.0 bc	7.31 bc	211.3 d	63.0 bcd	134.4 cd	4.07 c
Urea + Medina	83.6 c	33.0 de	6.75 c	292.5 bcd	85.0 b	87.2 e	5.15 bc
Urea + Seaweed extract	96.3 ab	39.7 ab	8.50 b	255.8 cd	66.4 bc	187.6 b	5.43 bc
(NH ₄) ₂ SO ₄	89.9 abc	43.4 a	8.04 bc	324.0 abc	83.5 b	125.5 de	6.09 bc
(NH ₄) ₂ SO ₄ + Medina	87.0 bc	38.0 bc	7.66 bc	401.2 a	127.7 a	87.0 e	7.12 b
(NH ₄) ₂ SO ₄ + Seaweed extract	85.9 c	40.2 ab	7.29 c	296.9 bcd	73.8 bc	161.8 c	5.11 c
Seaborn + F	82.4 c	43.9 a	10.11 a	260.8 bcd	56.5 bcd	178.8 bc	5.41 bc
Peter's 20-20-20	91.2 abc	34.5 cd	9.55 a	216.1 d	43.6 d	155.0 cd	4.80 c

^yStudy conducted in pine bark--greenhouse conditions.

Table 7. Effect of Medina, Seaborn and Seaborn + F applied to the seed on the acetylene reduction by 28-day-old soybeans.

Treatment	Micro-grams ethylene evolved/hr
H ₂ O	36 ± 7
Medina	
.1 ml/l	33 ± 5
0.5 ml/l	36 ± 4
1 ml/l	37 ± 7
Seaborn	
0.1 ml/l	107 ± 12
0.5 ml/l	148 ± 15
1 ml/l	119 ± 16
Seaborn + F	
0.1 ml/l	55 ± 5
0.5 ml/l	81 ± 7
1 ml/l	64 ± 6

Table 8. Effect of foliar application of Medina, Seaborn and Seaborn + F to 30-day-old soybean plants on acetylene reduction by detached soybean nodules.

Days after treatment	H ₂ O	<u>Micro-grams ethylene evolved/hr</u>							
		<u>Medina</u>		<u>Seaborn</u>		<u>Seaborn + F</u>			
		1 ml/l	5 ml/l	1 ml/l	5 ml/l	1 ml/l	5 ml/l	1 ml/l	5 ml/l
0	35	34	35	30	34	35	37		
5	39	29	30	26	20	17	7		
11	41	27	24	28	25	20	16		
14	40	36	35	35	33	20	16		
20	51	50	49	52	51	34	31		
27	48	44	44	47	49	49	45		
34	46	47	48	47	47	48	46		

All treatments reduced the rate of acetylene reduction for at least 14 days after application. The results for Medina and Seaborn were similar in this respect. Seaborn + F gave the greatest rate of reduction. Rates of acetylene reduction with all treatments approached that of the control after 20 days.

Table 9. Effect of Medina, Seaborn and Seaborn + F on CO_2 evolution from the soil (24-hour incubation).

Treatment	Days after treatment	
	7	120
	% CO_2	
Control	4.37	3.80
Medina		
1 ml/l	5.99	3.25
5 ml/l	6.23	3.91
Seaborn		
1 ml/l	6.05	3.77
5 ml/l	7.25	3.84
Seaborn + F		
1 ml/l	5.55	3.54
5 ml/l	6.12	3.81



MEDINA AGRICULTURE PRODUCTS CO., INC.

REFERENCE LIST FOR BIOREMEDIATION
OIL SPILLS
SALT SCALDS
OIL FIELD SERVICES

This list comprises of companies and a regulatory agency that will testify to the credibility of Medina Products relative to its ability to bioremediate oil spills, salt problems and for the use in oil field services such as bioremediating tank bottoms, tar pits and paraffin related problems for the oil field industry.

<u>Company</u>	<u>Contact</u>	<u>Phone</u>
Texaco	Richard Hayes	915-263-1227
Conoco	Donnie Rogers	915-732-2315
Mobil	Lyndal Trout	915-592-9507
Mobil	D.R. Brushenhan	915-524-1803
Arco	Randy Evans	915-558-3525
Amoco	Larry Frazier	915-894-8309
Exxon	Randy Tolman	915-287-1295

<u>Regulatory Agency</u>	<u>Contact</u>	<u>Phone</u>
Railroad Commission	Paul Carole	806-744-6944

P.O. Box 309, Highway 90 West
Hondo, Texas 78861

BIOLOGICAL PRODUCTS FOR
FARMING • GARDENING • ENVIRONMENTAL CONTROL

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Aug. 1, 1989

DISTRICT I
P.O. Box 1980, Hobbs, NM 88241-1980

RECEIVED OIL CONSERVATION DIVISION
P.O. Box 2088

DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719

Santa Fe, New Mexico 87504-2088

Permit No. A-009
(For Division Use Only)

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

SEP - 5 '89

O. C. D.

APPLICATION FOR EXCEPTION TO DIVISION ORDER R-8952
FOR PROTECTION OF MIGRATORY BIRDS Rule 8(b), Rule 105(b), Rule 312(h), Rule 313, or Rule 711(f)

Operator Name: Phillips 66 Natural Gas Company

Operator Address: 4001 Penbrook, Odessa, Texas 79762

Lease or Facility Name Artesia Plant Open Steel Tank Location SE/4 7 18-S 28-E
U. Ltr. Sec. Twp. Rge

Size of pit or tank: 100' Dia.

Operator requests exception from the requirement to screen, net or cover the pit or tank at the above-described facility.

 The pit or tank is not hazardous to migratory waterfowl. Describe completely the reason pit is non-hazardous.

The tank is to be netted by October 31, 1989.

1) If any oil or hydrocarbons should reach this facility give method and time required for removal:

Any oil or hydrocarbons which reach tank will be removed by vacuum truck
within one day.

2) If any oil or hydrocarbons reach the above-described facility the operator is required to notify the appropriate District Office of the OCD with 24 hours.

 Operator proposes the following alternate protective measures: In the interim prior to netting
completion, good maintenance standards will be upheld to minimize risk to
migratory birds.

CERTIFICATION BY OPERATOR: I hereby certify that the information given above is true and complete to the best of my knowledge and belief.

Signature L. M. Sanders Title Supervisor, Reg/Pro Date September 1, 1989

Printed Name L. M. Sanders Telephone No. (915) 367-1488

FOR OIL CONSERVATION DIVISION USE

Date Facility Inspected

Inspected by

Approved by

Title

Date

until 11-1-90

Submit 4 Copies
to Appropriate
District Office

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-134
Aug. 1, 1989

DISTRICT I
P.O. Box 1980, Hobbs, NM 88241-1980

RECEIVED
OIL CONSERVATION DIVISION
P.O. Box 2088

DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719

Santa Fe, New Mexico 87504-2088

Permit No. A-009
(For Division Use Only)

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

SEP - 5 '89

O. C. D.

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Signature L. M. Sanders Title Supervisor, Reg/Pro Date September 1, 1989

Printed Name L. M. Sanders Telephone No. (915) 367-1488

FOR OIL CONSERVATION DIVISION USE

Date Facility Inspected _____

Approved by _____

Inspected by _____

Title _____

Date _____

until 11-1-90



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

Artesia Gasoline Plant
H₂S Contingency Plan

OIL CONSERVATION DIVISION
RECEIVED
'90 AUG 8 AM 9 04

William J. Lemay, Director
New Mexico Oil Conservation Division
State Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Lemay:

In connection with Phillips Petroleum Company's Artesia Gasoline Plant, enclosed you will find the following:

Revised H₂S Contingency Plan for this facility;
and
Revised H₂S Reporting Form for Division Rule 118.

The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant. The legal description is Unit Letter N, Section 7, T18S, R28E, Eddy County, New Mexico.

In the event of a hazardous H₂S release, you will be notified immediately.

If you have any questions regarding this Plan or the attachments, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

Naomi Debeck, PE

FOR C. M. Anderson
Special Projects Supervisor

CMA:bpd

Enclosure
nmocd

*Supersedes letter dated June 29, 1987

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
H₂S REPORTING FORM
DIVISION RULE 118

OPERATOR: Phillips Petroleum Company

Address: 4001 Penbrook Street, Room 330

Odessa, Texas 79762

Artesia Gasoline Plant

(Pool, Plant, or Facility Name)

Lease, Plant or Facility	Well No.	Sampling Point (Tank, Separator, etc.)	Location USTR	Name of Tester	Test Method	Test Date	H ₂ S Concentration (Report in PPM) Vol. if available
Plant		Meter 4040 L.P. Inlet	N-7-185-28E Eddy County	R. Maikell	Tutweiler	4/16/90	12,800
Plant		Meter 8702 H.P. Inlet	"	"	"	4/16/90	8,600

Signed: Norma Dubek

for C. M. Anderson

Title:

Special Projects Supervisor

Date:

July 27, 1990



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990

Artesia Plant
Contingency Plan Revisions

Artesia Gasoline Plant
Contingency Plan Bookholders

Enclosed is a revision of your Artesia Gasoline Plant Contingency Plan. Please update your book in its entirety.

If you have any questions regarding this Plan, call Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

CM Anderson
FOR C. M. Anderson
Special Projects Supervisor

CMA:bpd
TRAN90

PHILLIPS PETROLEUM COMPANY

PERMIAN BASIN REGION

H₂S CONTINGENCY PLAN

IN COMPLIANCE WITH NEW MEXICO OIL CONSERVATION DIVISION

RULE 118

FOR

ARTESIA GASOLINE PLANT

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July 30, 1990*
Odessa, Texas

INTER-OFFICE CORRESPONDENCE / SUBJECT:

Revision Record and Schedule of Revision
Information for Reaction Contingency Plan

D. J. Fisher
Hobbs Office

The Artesia Gasoline Plant Contingency Plan has been revised for 1990 and distributed to plan holders.

The following criteria will be used to revise this Plan for 1991:

1. Changes occurring in key personnel to be contacted in an emergency.
2. Changes occurring in mobile unit radio numbers to be used in an emergency.
3. Substantial increase/decrease in the H₂S mole percent of inlet gas.
4. Substantial increase/decrease in the total volume of gas processed.
5. Population encroachment in the radius of exposure.

If you have any questions regarding this Plan, call Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Naomi Osbeck, PE
For C. M. Anderson
Special Projects Supervisor

CMA:bpd
Inst-118

Attachments

*Supersedes letter of June 29, 1987

RECORD OF REVISIONS

[illegible]

EMERGENCY LOG

INCIDENT AND LOCATION

Date

Time

Person Contacted

Action Taken Or Remarks

Signature

DISTRIBUTION LIST FOR
ARTESIA GASOLINE PLANT CONTINGENCY PLAN

NEW MEXICO OIL CONSERVATION DIVISION-SANTA FE	1
NEW MEXICO OIL CONSERVATION DIVISION-ARTESIA	1
NEW MEXICO ENVIRONMENTAL IMPROVEMENT BOARD	1
NEW MEXICO STATE POLICE	1
EDDY COUNTY SHERIFF DEPARTMENT-ARTESIA OFFICE	1
EDDY COUNTY SHERIFF DEPARTMENT-CARLSBAD OFFICE	1
CITY OF ARTESIA FIRE DEPARTMENT	1
CITY OF ARTESIA AMBULANCE SERVICE	1
ARTESIA GENERAL HOSPITAL	1
DR. HENRY L. WALL	1
PHILLIPS PETROLEUM COMPANY-SAFETY	1
PHILLIPS PETROLEUM COMPANY-D. J. FISHER, AREA MANAGER	1
PHILLIPS PETROLEUM COMPANY-B. L. BRUMBELOW, PLANT SUPT.	1
PHILLIPS PETROLEUM COMPANY-CENTRAL FILES	1
PHILLIPS PETROLEUM COMPANY-PROCESS SECTION	1

I. PURPOSE

The purpose of the Contingency Plan is to provide an organized plan of action for alerting and protecting the public following the release of a potentially hazardous volume of hydrogen sulfide. This Plan prescribes mandatory safety procedures to be followed in case of a release of H₂S into the atmosphere from exploration, production, and gas gathering operations included in the scope of this Plan. The extent of action taken will be determined by the supervisor and will depend on the severity and extent of H₂S release. All significant releases of H₂S must be reported and the emergency log sheet maintained.

II. SCOPE

This Contingency Plan shall cover the Artesia Gasoline Plant which processes gas with the specified H_2S content and could result in the listed maximum radius of exposure. Radius of exposure is defined as the maximum distance from the source of release that a specified calculated average concentration of H_2S could exist under specific weather conditions.

III. PROCEDURES

- A. ALL personnel involved in the operation of these properties will become familiar with this Contingency Plan.

The first employee on the scene should carefully survey the situation, note the wind direction, ensure his own safety, and proceed with the following:

1. REQUEST ASSISTANCE IF AND AS NEEDED.

Notify your immediate supervisor of your work location, the nature of the emergency, and of the assistance needed. The supervisor should request any necessary assistance from company personnel or outside agencies and obtain any safety equipment which might be required for company personnel, area residents, or the general public.

2. ALERT AND/OR EVACUATE PEOPLE WITHIN THE EXPOSURE AREA

If the escape of gas could result in a hazard to area residents, the general public, or employees, the person first notified or observing the leak should take immediate steps to notify any nearby residents as listed under Section V in this plan. The avoidance of injury or loss of life should be of prime consideration and given top priority in all cases. Location of residents, public areas, roads, etc., in relation to H₂S-containing facilities are attached to this plan (see Section X) and should be consulted to determine possible hazardous areas in relation to the leak source. In all situations, consideration should be given to wind direction and weather conditions. H₂S is heavier than air and can settle in low spots. Shifts in wind direction can also change the location of possible hazardous areas.

3. ESTABLISH ROADBLOCKS TO PREVENT ENTRY TO THE EXPOSURE AREA

Upon arrival at the scene the supervisor or superintendent will take charge of the situation; be responsible for this Contingency Plan; and establish the staging area, barricades and/or warning signs at or beyond the calculated 100 ppm H₂S exposure radius. If barricades are manned, the personnel must be equipped with hydrogen sulfide measuring devices or personnel monitors and two-way radios. A staging area should be established at a safe distance upwind of the gas escape area and should be used for storage of safety equipment, communications, briefings, first aid, and evacuation. Mobile unit numbers are listed in Section IX. Locations of road blocks and the staging area are shown on the radius of exposure drawing in Section X.

4. STOP THE ESCAPE OF H₂S

Plug the leak or shut off the sources of gas to the rupture. In some cases, clamps can be used to temporarily stop the smaller leaks. For large or inconveniently located leaks, isolate the leak by closing the most readily accessible valves upstream and downstream. A decision to ignite the escaping gas to reduce the toxicity hazard should be made only as a last resort. It must be determined if the gas can be safely ignited (i.e., is there a possibility of a widespread flammable atmosphere).

5. COMPLETE NOTIFICATIONS AS REQUIRED

Notify the New Mexico Oil Conversation Division, New Mexico Environmental Improvement Board, local public officials and other company personnel as provided for in Section VIII.

6. RETURN THE SITUATION TO NORMAL

When the total absence of hydrogen sulfide and combustible gas is confirmed throughout the evacuated area, allow and/or assist the evacuees in returning to the area. Remove all barricades and warning signs. Advise all parties previously notified that the emergency has ended.

7. POST EMERGENCY ACTIONS

Review the factors that caused or allowed the emergency to happen, and if the need is indicated, modify operating, maintenance, and/or surveillance procedures.

Replace emergency equipment and return to proper place.

Evaluate all actions. Train or retrain employees in emergency procedures, if necessary.

Refer media to public relations specialists (local or Bartlesville)

DO NOT DISCUSS OR SPECULATE about the cause, amount of damage, impact of the incident on the community, company, employees or the environment.

You should not say "NO COMMENT" (NO COMMENT implies covering up). If not comfortable answering the question or are unsure of the answer, use terms such as "I DO NOT KNOW", "I AM NOT QUALIFIED TO ANSWER THAT QUESTION", or "IT IS UNDER INVESTIGATION" Answer questions only if asked, then SHUT UP.

DO NOT DISCLOSE NAMES OF INJURED OR DEAD

B. A listing of safety equipment available at the Artesia Plant is provided in Section VII. Safety equipment applicable for use in H₂S service is also available at the following locations:

<u>Equipment</u>	<u>Location</u>	<u>Tel. No.</u>
2 - 30 min. Scott Air-Pak	Hobbs Booster	(505) 397-5500
5 - 30 min. MSA Air-Pak	Eunice Plant	(505) 397-5591
(All paks are Scott II a or Scott 2.2 with modifications)		
1 trailer-mounted cascade cylinder breathing air system, containing two 300 cu. ft. air cylinders.	Lee Plant	(505) 397-5592
5 30-minute Scott Air-Pak units		
4 Scott SKA-Pak hose-line work units.		
1 trailer-mounted cascade cylinder breathing air system, containing 5 300 cu. ft. air cylinders.	Hobbs Maint.	(505) 397-5547
1 30-minute Scott Air-Pak unit		
4 Scott SKA-Pak hose-line work units.		
1 trailer-mounted cascade breathing air system, containing 8 - 300 cu. ft. air cylinders.	Safety Training Trailer	(915) 367-1381
2 Scott 5 min. SKA-PAK hose-line work units.		
6 30 min. Scott Air-Paks		



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

Artesia Gasoline Plant
H₂S Contingency Plan

New Mexico Oil Conservation Division
324 West Main
P. O. Drawer DD
Artesia, New Mexico 88210-1980

Gentlemen:

In connection with Phillips Petroleum Company's Artesia Gasoline Plant, enclosed you will find the following:

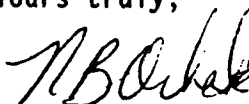
Revised H₂S Contingency Plan for this facility;
and
Revised H₂S Reporting Form for Division Rule 118.

The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant. The legal description is Unit Letter N, Section 7, T18S, R28E, Eddy County, New Mexico.

In the event of a hazardous H₂S release, you will be notified immediately.

If you have any questions regarding this Plan or the attachments, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,


C. M. Anderson
Special Projects Supervisor

CMA:bpd

Enclosure
nmocd

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP July 30, 1990*
Permian Basin Region

Artesia Gasoline Plant
H₂S Contingency Plan

William J. Lemay, Director
New Mexico Oil Conservation Division
State Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Lemay:

In connection with Phillips Petroleum Company's Artesia Gasoline Plant, enclosed you will find the following:

Revised H₂S Contingency Plan for this facility;
and
Revised H₂S Reporting Form for Division Rule 118.

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If you have any questions regarding this Plan or the attachments, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

Naomi Orbeck, PE

FOR C. M. Anderson
Special Projects Supervisor

CMA:bpd

Enclosure
nmocd

*Supersedes letter dated June 29, 1987

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION
H₂S REPORTING FORM
DIVISION RULE 118

OPERATOR: Phillips Petroleum Company
Address: 4001 Penbrook Street, Room 330
Odessa, Texas 79762

Artesia Gasoline Plant
(Pool, Plant, or Facility Name)

Lease, Plant or Facility	Well No.	Sampling Point (Tank, Separator, etc.)	Location USTR	Name of Tester	Test Method	Test Date	H ₂ S Concentration (Report in PPM) Vol. if available
Plant		Meter 4040 L.P. Inlet	N-7-185-28E Eddy County	R. Maikell	Tutweiler	4/16/90	12,800
Plant		Meter 8702 H.P. Inlet	"	"	"	4/16/90	8,600

Signed: Norm Babich for - C. M. Anderson
Title: Special Projects Supervisor
Date: July 27, 1990

V. PUBLIC NOTIFICATION

The following residents (s) or public areas are in the possible hazardous areas covered by this Contingency Plan. (See plat). If the incident is of such magnitude or at such location so as to create a hazardous situation, they should be requested to evacuate until the situation can be returned to normal. If such evacuation procedure is implemented or public roads require blockage, the applicable New Mexico Oil Conservation Commission office and the New Mexico Environmental Improvement Board should be notified immediately.

Regulatory Agencies

Telephone No.

New Mexico Oil Conservation Commission
Attn: Mr. Dave Boyer
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

(505) 827-5800

New Mexico Oil Conservation Commission
District II
Attn: Mr. Mike Williams
P. O. Drawer DD
Artesia, New Mexico 88210

(505) 748-1283

New Mexico Environmental Improvement
Board
406 N. Guadalupe
Carlsbad, New Mexico 88220

(505) 885-9023

Residence or Public Facility

County Road #204

County Road #206

County Road #231



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP July 30, 1990*
Permian Basin Region

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

New Mexico Environmental Improvement Board
406 N. Guadalupe
Carlsbad, New Mexico 88220

Gentlemen:

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant. The legal description is Unit Letter N, Section 7, T18S, R28E, Eddy County, New Mexico.

In the event of a hazardous H₂S emission you shall be notified of the situation as soon as possible.

This Plan will provide you with the location of the Artesia Gasoline Plant and other necessary information (see Section XI). If you have any questions regarding this Plan, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

FOR C. M. Anderson
Special Projects Supervisor

CMA:bpd

nmeib
attachments

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Sheriff Jack Childress
Eddy County Sheriff Department
P. O. Box 1240
Carlsbad, New Mexico 88220

Dear Sheriff Childress:

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant. The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

In the event of a hazardous H₂S release you may be requested to assist Phillips Petroleum Company in the following duties:

1. Secure the area and blockade the highways at designated points (See Section XI).
2. Notify and evacuate the residents within the radius of exposure. (See Section V and Section X).

If Phillips Petroleum Company personnel arrive on the scene first, they will set up temporary road blocks at the designated areas. Assemble your personnel at the staging area as designated in Section X. At that time you will be given further instructions by the supervisor in charge of emergency procedures.

If your personnel arrive on the scene first, proceed to blockade the roads at the designated areas as outlined in Sections X and XI. If your assistance is needed to perform additional duties, you will be directed by the supervisor in charge of the emergency procedures.

Phillips Petroleum Company vehicles will be identified by emergency blinking lights. Company vehicles equipped with radios and walkie-talkies will be utilized by company personnel during the emergency procedures. Note the list of mobile unit radios in Section IX.

Eddy County Sheriff Department
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant
Page 2

This Contingency Plan will provide you with the necessary information needed to perform the above services; however, if your personnel need additional H₂S training, contact the Phillips Safety Director at (915) 367-1439.

If you have any questions regarding this Plan, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

Naomi B. Orbeck PE

~~FOR~~ C. M. Anderson
Special Projects Supervisor

CMA:bpd

sheriff
attachments

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Captain Larry Wood
Eddy County Sheriff Department
702 West Chisum
Artesia, New Mexico 88210

Dear Captain Wood

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant. The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

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Eddy County Sheriff Department
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant
Page 2

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Yours truly,


FOR C. M. Anderson
Special Projects Supervisor

CMA:bpd

sheriff.2
attachments

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Sgt. Louie Medina
New Mexico State Police
P. O. Box 2287
Carlsbad, New Mexico 88221-2287

Dear Sir:

In compliance with New Mexico Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant. The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

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Sgt. Louie Medina
New Mexico State Police
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant
Page 2

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If you have any questions regarding this Plan, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

Naomi Orbeck, PE

~~FOR~~ C. M. Anderson
Special Projects Supervisor

CMA:bpd

nmSP
attachments

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Ray Castleberry, Fire Chief
City of Artesia Fire Department
309 North 7th Street
Artesia, New Mexico 88210

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant, located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

In the event of a hazardous H₂S release you may be requested to assist Phillips Petroleum Company in the following duties:

1. Assist in controlling a fire (See Section VII).
2. Assist in providing emergency medical services.

If you are notified that your assistance is needed during an emergency situation, proceed immediately to the staging area as designated in Section X. Wait at the staging area for further instructions from the supervisor in charge of emergency procedures.

This Contingency Plan will provide you with the necessary information needed to perform the above services; however, if your personnel need additional H₂S training, contact the Phillips Safety Director at (915) 367-1439.

If you have any questions regarding this Plan, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

Naomi Osbeck, PE

PTD C. M. Anderson
Special Projects Supervisor

CMA:bpd

fire
attachments

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Artesia EMS Ambulance Service
309 N. 7th Street
Artesia, New Mexico 88210

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant. The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U.S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

In the event of a hazardous H₂S release you may be requested to assist Phillips Petroleum Company in the following duties:

1. Provide emergency medical services.
2. Provide ambulance service from the area to local medical facilities.

If you are notified that your assistance is needed, report to the staging area as designated in Section X and wait for further instructions from the supervisor in charge of emergency procedures.

This Contingency Plan will provide you with the necessary information if your assistance is requested; however, if your personnel need additional H₂S training, contact the Phillips Safety Director at (915) 367-1439.

If you have any questions regarding this Plan, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

for C. M. Anderson
Special Projects Supervisor

CMA:bpd

ambulance
attachments

*Supersedes letter dated June 29, 1987



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Dr. Henry Wall
Medical Center, Suite A
Artesia, New Mexico 88210

Dear Dr. Wall:

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant, located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

In the event of a hazardous H₂S release you may be requested to provide medical services for person(s) being transported to the Artesia General Hospital by the Artesia EMS Ambulance Service. We are attaching the following information regarding the hazardous chemicals located at the Artesia Gasoline Plant:

1. Index list by manufacturer, chemical name and trade name.
2. Material safety data sheets on each hazardous chemical.

If you have any questions regarding this Plan or the attachments, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

N B Anderson, PE

FOR C. M. Anderson
Special Projects Supervisor

CMA:bpd
doctor

attachments

*Supersedes letter dated June 29, 1987

ARTESIA PLANT
MSDS SHEETS
ALPHABETICAL INDEX BY MANUFACTURER - CHEMICAL NAME - TRADE NAME

<u>Manufacturer</u>	<u>Chemical Name</u>	<u>Trade Name</u>
Air Products	Chlorine	Chlorine
Allied Chemical Corp.	Alkali Carbonate	Soda Ash
American Magnesium Co.	Cl2	Chlorine Liquid
Baker Chemical Co., J.T.	Sulfuric Acid	Sulfuric Acid
Baker Chemical Co., J.T.	Sulfur	Sulfur
Benzene	Benzene	Benzene
Betz	Balanced Polymer 6442	Balanced Polymer 6442
Baker, J.T. Chemical Co.	Sulfur	Bensulfoid
Baker, J.T. Chemical Co.	Sulfuric Acid	Oil of Vitriol
Betz	Balanced Polymer 6442	Balanced Polymer 6442
Betz	Chelant CL2	Chelant CL2
Betz	26K-26087	Corrosion Inhibitor
Betz	Inhibitor 66P	Corrosion Inhibitor
Betz	Betz 409	Betz 409
Betz	Betz 2020	Betz 2020
Betz	Betz 2040	Betz 2040
Betz	Betz K1-2	Betz K1-2
Betz	Corrogen	Corrogen
Betz	Foam-Trol CT	Foam-Trol CT
Betz	Inhibitor 562C	Inhibitor 562C
Betz	Magni-Form 305	Magni-Form 305
Betz	Slimicide C31	Slimicide C31
Betz	Slimicide 508	Slimicide 508
Betz	Slimicide C-71P	Slimicide C-71P
Betz	Slimicide J-12	Slimicide J-12
Betz	Slimicide J-12	Ammonium Chloride & Sodium Hydroxide
Celanese Chemical Co.	Methyl Alcohol	Methanol
Cities Service Oil & Gas Corp.	Natural Gasoline	Natural Gasoline
Diamond Shamrock Chemicals Co.	Potassium Hydroxide	Caustic Potash-Anhydrous
Diamond Shamrock Chemicals Co.	Potassium Hydroxide	Caustic Potash-Liquid
Dow Chemical Co.	Monoethanolamine	Monoethanolamine
Dow Chemical Co.	Methyldiethanolamine	Methyldiethanolamine
Dow Chemical Co.	SS Selective Solvent	SS Selective Solvent
Dupont de Nemours & Co., E. I.	Methyl Alcohol	Methanol
Enterprise Products Co.	Natural Gasoline	Petroleum Hydrocarbons
Exxon Chemical Co.	Sand #M93	Escoweld 7530
Georgia Pacific Corp.	Methyl Alcohol	Methanol
Grace, W.R. and Co.	Sulfuric Acid	Sulfuric Acid
IMC Chemical Group, Inc.	Potassium Hydroxide	Caustic Potash-Flake
KPL Gas Service	Natural Gas	Methane
Koch	Natural Gasoline	Petroleum Hydrocarbon
LCP Chemicals & Plastics, Inc.	Potassium Hydroxide Sol.	Potassium Hydroxide Sol.
LCP Chemicals & Plastics, Inc.	Potassium Hydroxide Sol.	Potassium Hydroxide Sol.
Lyondell Petrochemical Co.	Natural Gasoline	Petroleum Hydrocarbons
Martin Gas Sales, Inc.	Natural Gasoline	Petroleum Hydrocarbons
Oklahoma Natural Gas Co.	Natural Gas	Methane

Phillips Petroleum Co.
Phillips Petroleum Co.

Phillips Petroleum Co.
Phillips Petroleum Co.

Phillips Petroleum Co.
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Phillips Petroleum Co.

Phillips Petroleum Co.
Power Systems

Shield, Inc.
Sohio
Stauffer Chemical Co.
Sun Gas Liquids, Inc.
Sun Gas Liquids, Inc.
Union Carbide
Union Carbide
Union Carbide
Union Carbide
Weskem Odessa
WD-40 Company

Acids and Alkalies
Hydrocarbons

Ethylene glycol
Dexron Automatic
Transmission Fluid
Paraffins, Olefins
Paraffins, Olefins
Gear Oil

Mixture of Lubricating
Oil & Oilness Agent
Petroleum Oil
Kerosene
Petro. Based Lubricant

Hydrogen Sulfide
Ester & Performance Addtv.
Propane
Ethyl Mercaptan
Hydrocarbon Mixture
Sulfur
Detergent Motor Oil

Detergent Motor Oil

Used Motor Oil
Sulfuric Acid

Mark I
Sulfur
Sulfuric Acid
Natural Gasoline
Raw natural gas
Polyalkylene Glycol
Alkylalkanolamine
Molecular Sieve Type 3A
Triethylene Glycol
Potassium Hydroxide
Organic Mixture

Acids and Alkalies
Crude Oils, Desalted,
Sweet, Sour

Antifreeze
Dexron Automatic
Transmission Fluid
Gasoline, Regular
Gasoline, Unleaded
Philube All-purpose
Gear Oil

Hector Oils (All
Grades)
HDG Motor Oils
Kerosene
Magnus 105, 150, 215,
315, 465, 700,
1000, & 1500

H2S
Philesco (315)
Propane
Scentinel A
Stoddard Solvent
Sulfur (Liquid)
Trop Artic Multi-
Viscosity Motor Oil
Trop Artic Single-
Viscosity Motor Oil
Used Motor Oil
Sulfuric Acid-Battery
Electrolyte
Blended liquid deter.
Liquefied Sulfur
Sulfuric Acid
Natural Gasoline
Raw NGL mix
SAG GT-715
UCARSOL Solvent CR302
MOLSIV
Triethylene Glycol
Caustic Potash
WD-40

msds.art
7/27/90
bpd



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 30, 1990*

New Mexico Oil Conservation Commission
Hydrogen Sulfide H₂S
Contingency Plan Artesia Gasoline Plant

Artesia General Hospital
702 North 13th Street
Artesia, New Mexico 88210

Gentlemen:

In compliance with New Mexico Oil Conservation Commission Rule 118, Phillips Petroleum Company is providing the attached Contingency Plan for the Artesia Gasoline Plant. The facility is located approximately twelve (12) miles east of Artesia, New Mexico on U. S. Highway #82, turn right (at the Phillips sign) for approximately three (3) miles to County Road #206, then turn right and travel approximately one (1) mile to the plant.

In the event of a hazardous H₂S release you may be requested to provide medical facilities and services; therefore, we are attaching the following information regarding the hazardous chemicals located at the Artesia Gasoline Plant:

1. Revised Index list by manufacturer, chemical name and trade name
2. New Material safety data sheets on each hazardous chemical

If an emergency situation exists, you will be notified if the Artesia EMS Ambulance Service is transporting injured persons to your facility.

If you have any questions regarding this Plan or the attachments, call Phillips Petroleum Company, Gas Process/Supply Section, Virgie Martin (915) 367-1404 or Bernadette Dillard (915) 368-1573.

Yours truly,

R.C. M. Anderson
Special Projects Supervisor

CMA:bpd
hosp

attachments

*Supersedes letter dated June 29, 1987

VII. EQUIPMENT AND MAINTENANCE

- A. All materials used for repairs of original installations for service in systems with H₂S concentrations in excess of 100 ppm should be of suitable use in H₂S service. In general, carbon steels having low-yield strengths and a hardness below RC-22 are suitable. The engineering staff should be consulted if any doubt exists on material specifications.
- B. Appropriate signs should be maintained in good condition at lease entrances, wells, surface facilities, plants, road locations, and other locations specified in NMOCD Rule 118. See Section XI.
- C. All notification lists should be kept current with changes in names, telephone numbers, etc. Area personnel will document the results of visits to public officials and other companies involved in operations in this area of exposure on an annual basis. Records of these visits will be filed in Section VI.
- D. All shutdown devices, alarms, monitors, etc., should be maintained and checked at regular intervals to ensure that they are in proper working order.
- E. All personnel working in H₂S areas shall have attended safety meetings and received training on procedures and safety equipment applicable for use in H₂S areas. A record will be kept of the H₂S safety meeting dates and all personnel attending. Invitations will be extended to all public agencies to attend area safety meetings on H₂S safety presentations.

Emergency Equipment Suppliers

Leek Fire & Equipment Company, Odessa Day: (915) 332-4961
Night: (915) 362-1207
332-7645

Thompson Specialties, Odessa Day/Night: (915) 337-3891

Standby Monitoring System, Inc., Odessa (915) 563-3974

Callaway Safety Equipment, Inc. Hobbs (505) 392-2973

American Oxygen Co. Roswell (505) 623-2995
(night) (505) 623-1774

Fire Protection

Available for use in fighting fires at various locations covered by this plan, are approximately 600 employees who have been trained in fire-fighting techniques common to the industry. These employees may be called for duty from maintenance and plant groups throughout the entire Permian Basin Region.

Personnel of the plant or booster experiencing the fire emergency will man the fire equipment in the capacity in which they have been trained. The only exception to this rule would be when a fire truck or pumping unit is dispatched to the scene and the driver or operator of this equipment will remain the operator of same under direction of the Phillips' supervisor.

Fresh Air Breathing Equipment Available at Artesia Gasoline Plant

Control Room	3 30-min Scott Air-Pak
	2 5-min Scott SKA-PAK (egress only)
Refrigeration Unit	1 30-min Scott Air-Pak
	2 30-min Scott Air-Pak
Sulphur Plant	2 5-min Scott SKA-PAK (egress only)
	1 30-min Scott Air-Paks
Cooper Engine Room	3 5-min Scott SKA-PAK (egress only)
(west end)	1 2-300 cu ft breathing air cylinder mounted on 2-wheel cart with 2 Scott SKA-PAK hose-line work units
	1 1-300 cu ft breathing air cylinder unit mounted on 2-wheel cart with 2 Scott SKA-PAK hose line work units
Clark Engine Room	1 1-300 cu ft. breathing air cylinder unit mounted on 2-wheel care with 2 Scott SKA-PAK hose line work units
Warehouse	1 1-300 cu ft. breathing air cylinder unit mounted on 2-wheel cart with 2 Scott SKA-PAK hose line work units

Fire House

- 1 Spare 300 cu ft air cylinder
- 5 Spare 30-min air cylinder
- 7 Spare 5-min SKA-PAK cylinders
- 1 Oxygen Pneolator
- 1 4-300 cu ft Cascade breathing air system, refill station

Fixed H₂S Monitors

1 Dictaphone monitor with 4 sensor heads located at:

- 1 - East side of Sulphur Plant
- 3 - Gas Treater

2 Rexnord monitors with 8 sensor heads located at:

- 2 - Clark Engine Room
- 4 - Cooper Engine Room
- 1 - West of Sulphur Plant

VIII. EMERGENCY CALL LIST

Local Supervisory Personnel

Telephone No.

Ken Winn, Maint. Supvr.	Home: (505) 748-9829 Office: (505) 677-3154
G. S. Donaldson, Gas Gathering System Supvr.	Home: (505) 746-2870 Office: (505) 677-3154
B. L. Brumbelow, Plant Supt.	Home: (505) 746-9727 Office: (505) 677-3154

If unable to notify above personnel, call the following:

Phillips Petroleum Company

24 Hour Emergency Telephone Number

Odessa: 1-800-367-1266

D. J. Fisher, Area Manager	Home: (505) 397-2420 Office: (505) 397-5539
M. R. Comer, Safety Director (through 8/24/90) (effective 8/27/90)	Home: (915) 683-7930 Office: (915) 367-1439 Office: (915) 368-1439
P. D. Appel, Engineering Director (through 8/24/90) (effective 8/27/90)	Home: (915) 699-6508 Office: (915) 367-1204 Office: (915) 368-1204
Knut Am, Region Manager (through 8/24/90) (effective 8/27/90)	Home: (915) 363-9536 Office: (915) 367-1324 Office: (915) 368-1324
K. D. Laird, Media Representative (through 8/24/90) (effective 8/27/90)	Home: (915) 366-1712 Office: (915) 367-1208 Office: (915) 368-1208

New Mexico Oil Conservation Division

District II

324 West Main

P. O. Drawer DD

Artesia, New Mexico 88210-1980

Office: (505) 748-1283

New Mexico Environmental Improvement Board

406 N. Guadalupe

Carlsbad, New Mexico 88220

Office: (505) 885-9023

Fire Department (Artesia)

Ray Castleberry, Fire Chief

Office: (505) 746-2701

Law Enforcement Agencies

New Mexico State Police
Sgt. Louie Medina

Carlsbad: (505) 885-3137

Eddy County Sheriff, Jack Childress Carlsbad: (505) 887-7551

Captain Larry Wood

Artesia: (505) 746-9888

Ambulance Service

Artesia EMS, Artesia Fire Dept.

Artesia: (505) 746-2701

Physicians/Hospitals

Dr. Henry Wall

Office: (505) 746-2772

Residence: (505) 746-2615

Artesia General Hospital

Artesia: (505) 748-3333

IX. MOBILE UNIT NUMBERS

To reach personnel by mobile radios, first dial 1-505-397-5599. At the tone dial number listed below:

	<u>Radio #</u>	<u>Vehicle Equipped with Breathing Equipment</u>
Brumbelow, B. L.	1-324	
Donaldson, G. S.	1-333	
Fisher, D. J.	1-211	
Forelines, Danny	1-390	1 300 cu ft breathing air cylinder with SKA-PAK hose line work unit
Johnson, Wanda	1-394	1 300 cu ft breathing air cylinder with SKA-PAK hose line work unit
Moore, Kenneth	1-391	1 300 cu ft breathing air cylinder with SKA-PAK hose line work unit
Puckett, Johnny	1-389	
Thompson, Luther	1-212	
Valenzuela, O. M.	1-392	1 300 cu ft breathing air cylinder with SKA-PAK hose line work unit
Winn, K. D.	1-278	

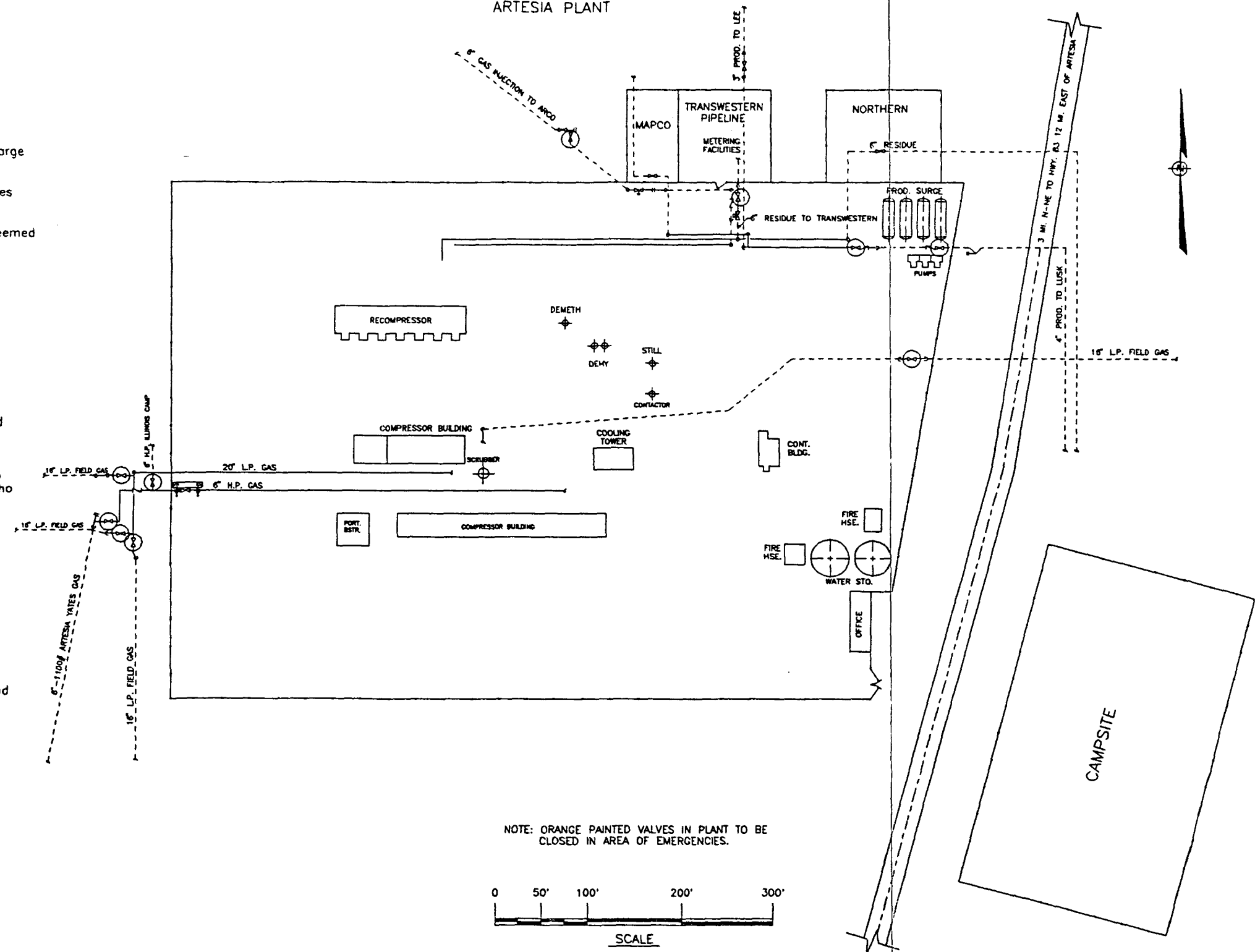
VALVE LOCATIONS FOR EMERGENCY SHUTDOWN ARTESIA PLANT

INSTRUCTIONS TO BE FOLLOWED DURING EMERGENCY

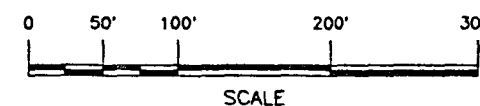
1. In case of fire or other emergencies, sound the alarms and then notify Operations Superintendent, or Maintenance Foreman.
2. The operator on duty in the area where the emergency occurs will be in charge until he is relieved by a supervisor.
3. The operator who is not working in the emergency area will see that all gates are closed— then he will assist where needed.
4. The operators should proceed to make any changes in operation that are deemed necessary.
5. When fires occur, boilers should be left operating if at all possible to assist in combating the emergency.
6. When notified of emergency, all personnel should report to plant fire house and aid in the combating of the emergency.
7. Road blocks, if necessary, will be set up to adequately clear company property. Only authorized personnel will be admitted through the road blocks.

Authorized personnel will include Exploration and Production Dept. personnel and emergency vehicles (ambulances, municipal fire fighting equipment, and law enforcement personnel.)

8. Plant personnel will not attempt to give out information pertaining to the emergency to any non-employee. The Plant Superintendent or personnel so designated in the Phillips Emergency Procedure (PEP) are the only ones who should provide news information to outsiders. News provided by those authorized should be in accord with procedures outlined in PEP.
9. In event of injuries or loss of life, the names will be withheld until next of kin are notified by proper company officials.
10. All radio-equipped vehicles should report to plant office for assignment.
11. Persons to be notified in event of an emergency:
 - PRODUCTION SUPERINTENDENT
 - ENGINEERING DIRECTOR
 - PRODUCTION MANAGER
 - SAFETY SECTION
12. Personnel who are fighting a fire must consider the safety of themselves and others. The following is a list of safety precautions to be taken:
 - A. Avoid being trapped by the fire.
 - B. Fight the fire from an up-wind position.
 - C. Take note of any flame impingement on vessels.
 - D. If there is a possibility of vessel or line failure, evacuate the danger area. Vessels containing flammables under pressure that have been absorbing heat from an intense fire (without being cooled) are considered to be extremely hazardous.



NOTE: ORANGE PAINTED VALVES IN PLANT TO BE CLOSED IN AREA OF EMERGENCIES.



NOTES

- EMERGENCY SHUTDOWN VALVES

NUMBER	REFERENCE DRAWINGS	REV.	DATE	REVISION	DRAWN	CHK'D	APPR.
		1	8/1/90	CHANGES PER MARK-UP	DGR		



		PHILLIPS PETROLEUM COMPANY PERMAN BASIN REGION ODESSA, TEXAS
SCALE: 1"=50' CHECKED:	DRAWN: SES DATE: 4/6/90	TITLE:

VALVE LOCATIONS FOR
EMERGENCY SHUTDOWN
ARTESIA PLANT

FILE: ARTESIO.DWG

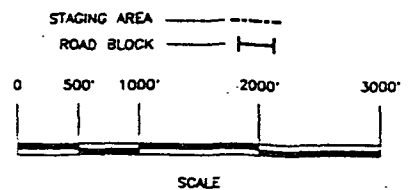
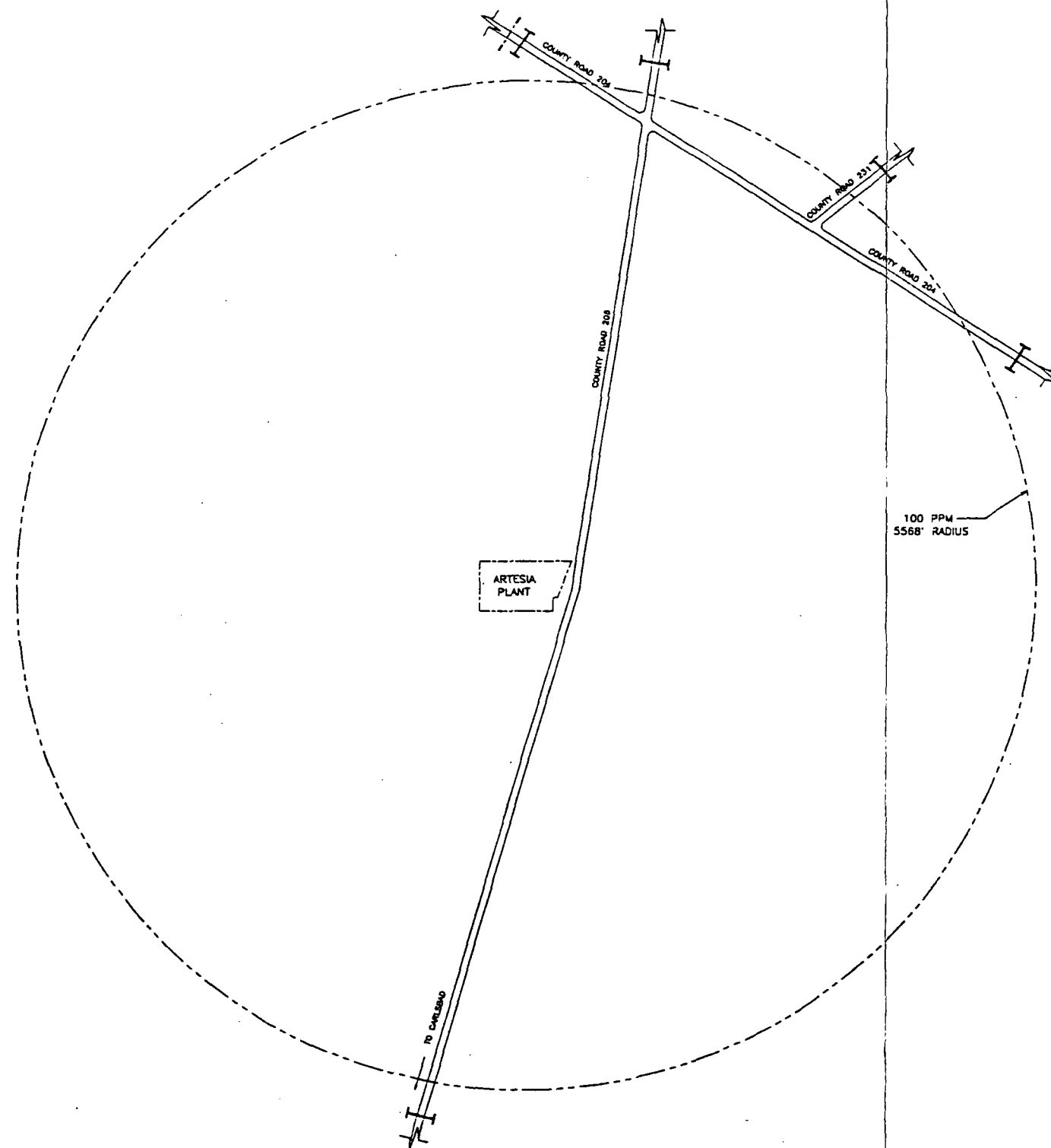
H₂S RADIUS OF EXPOSURE
ARTESIA PLANT

INSTRUCTIONS TO BE FOLLOWED DURING EMERGENCY

1. In case of fire or other emergencies, sound the alarms and then notify Operations Superintendent, or Maintenance Foreman.
2. The operator on duty in the area where the emergency occurs will be in charge until he is relieved by a supervisor.
3. The operator who is not working in the emergency area will see that all gates are closed— then he will assist where needed.
4. The operators should proceed to make any changes in operation that are deemed necessary.
5. When fires occur, boilers should be left operating if at all possible to assist in combating the emergency.
6. When notified of emergency, all personnel should report to plant fire house and aid in the combating of the emergency.
7. Road blocks, if necessary, will be set up to adequately clear company property. Only authorized personnel will be admitted through the road blocks.

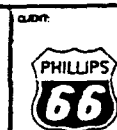
Authorized personnel will include Exploration and Production Dept. personnel and emergency vehicles (ambulances, municipal fire fighting equipment, and law enforcement personnel.)

8. Plant personnel will not attempt to give out information pertaining to the emergency to any non-employee. The Plant Superintendent or personnel so designated in the Phillips Emergency Procedure (PEP) are the only ones who should provide news information to outsiders. News provided by those authorized should be in accord with procedures outlined in PEP.
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PRODUCTION SUPERINTENDENT ENGINEERING DIRECTOR
PRODUCTION MANAGER SAFETY SECTION
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B. Fight the fire from an up-wind position.
C. Take note of any flame impingement on vessels.
D. If there is a possibility of vessel or line failure, evacuate the danger area. Vessels containing flammables under pressure that have been absorbing heat from an intense fire (without being cooled) are considered to be extremely hazardous.



NOTES

NUMBER	REFERENCE DRAWINGS	REV.	DATE	REVISION	DRAWN	CHKD	APPR.
		1	7/19/90	REVISED RADIUS OF EXPOSURE	DGR		



PHILLIPS PETROLEUM
COMPANY
PERMIAN BASIN REGION
ODESSA, TEXAS

SCALE: 1"=800'
CHECKED: DATE: 5/4/90

H₂S RADIUS OF EXPOSURE
ARTESIA PLANT

GWD-764-M-5



UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE

Ecological Services

Suite D, 3530 Pan American Highway, NE
Albuquerque, New Mexico 87107

May 30, 1990

William J. Lemay, Director
Oil Conservation Division
Energy, Minerals and Natural Resources Department
State Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Dear Mr. Lemay:

We have reviewed the Public Notice dated May 1, 1990 requesting comments for three groundwater discharge plan permit renewals as follows:

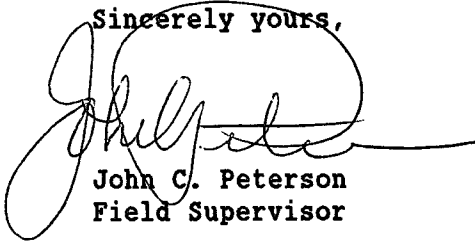
- (6W-20) - Conoco Incorporated, P.O. Box 2197, HU 3048, Houston, Texas 77252.
The permit is for a previously approved discharge plan. The plans call for the discharge of 2,300 gallons per day of process wastewater into an Oil Conservation Division (OCD) approved (Order #R-2403). The Maljamar Gas Plant located in Sections 21 and 28, T17S, R32E, NMPM, Lea County, New Mexico.
- (6W-25) - Warren Petroleum Company, P. O. Box 1589, Tulsa, Oklahoma 74102.
The permit is for a previously approved discharge plan. The plan calls for the discharge of 50,000 gallons per day of process wastewater into an OCD approved Class II injection wells from the Monument Gas Processing Plant located in the SW 1/4, Section 36, T19S, R36E, NMPM, Lea County, New Mexico.
- (6W-23) - Phillips 66 Natural Gas Company, 4001 Penbrook, Odessa, Texas 79762.
the permit is for a previously approved discharge plan. The plan calls for the discharge of 23,000 gallons per day of process wastewater into an OCD approved Class II injection well from the Artesia plant located in Section 7, T18S, R28E, NMPM, Eddy County, New Mexico.

We recommend that screens or mesh be placed over any open pits or tanks that may contain wastewater in order to eliminate risks to Federally protected migratory birds.

ADDITIONAL INFO.

If you have any questions, please contact Richard Roy at (505) 883-7877.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "John C. Peterson", written over a circular stamp or seal.

John C. Peterson
Field Supervisor

cc:

Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife
Enhancement, Albuquerque, New Mexico

Affidavit of Publication

STATE OF NEW MEXICO)
) ss.
COUNTY OF LEA)

Joyce Clemens being first duly sworn on oath deposes and says that he is Adv. Director of THE LOVINGTON DAILY LEADER, a daily newspaper of general paid circulation published in the English language at Lovington, Lea County, New Mexico; that said newspaper has been so published in such county continuously and uninterruptedly for a period in excess of Twenty-six (26) consecutive weeks next prior to the first publication of the notice hereto attached as hereinafter shown; and that said newspaper is in all things duly qualified to publish legal notices within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico.

That the notice which is hereto attached, entitled

Notice Of Publication

and numbered in the

..... Court of Lea County, New Mexico, was published in a regular and entire issue of THE LOVINGTON DAILY LEADER and not in any supplement thereof, once each week on the same day of the week, for one (1)

consecutive weeks, beginning with the issue of

May 8, 19 90

and ending with the issue of

May 8, 19 90

And that the cost of publishing said notice is the sum of \$ 41.59

which sum has been (Paid) ~~XXXXXX~~ as Court Costs

Joyce Clemens
Subscribed and sworn to before me this 9th

day of May, 19 90

Ms. Jean Serice
Notary Public, Lea County, New Mexico

My Commission Expires Sept. 28, 19 90

LEGAL NOTICE NOTICE OF PUBLICATION STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal applications have been submitted to the Director of the Oil Conservation Division, State Land Office Building, P. O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505) 827-5800:

(GW-20) Conoco Inc., Rick McCallip, Director of Safety and Environmental Services, P. O. Box 2197, HU 3048, Houston, Texas 77252, has submitted an application for renewal of its previously approved discharge plan for its Maljamar Gas Plant located in Sections 21 and 28, Township 17 South, Range 32 East, NMPM, Lea County, New Mexico. Approximately 2300 gallons per day of process wastewater is disposed in Conoco Inc.'s waterflood project for secondary oil recovery. The waterflood project consists of Class II injection wells and was approved by Oil Conservation Commission Order No. R-2403. The wastewater has a total dissolved solids concentration of approximately 3240 mg/l. Ground water most likely to be affected by any discharge to the surface is at a depth of approximately 120 feet with a total dissolved solids concentration of 440 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

(GW-25) Warren Petroleum Company, L.T. Reed, Senior Engineer, P. O. Box 1589, Tulsa, Oklahoma 74102, has submitted an application for renewal of its previously approved discharge plan for its Monument Gas Processing Plant located in the SW/4, Section 36, Township 19 South, Range 36 East and the NW/4, Section 1, Township 20 South, Range 36 East, NMPM, Lea County, New Mexico. Approximately 50,000 gallons per day of process wastewater is disposed of in an OCD approved Class II injection well. The wastewater has a total dissolved solids concentration of approximately 2800 mg/l. Ground water most likely to be affected by any discharge to the surface is at a depth of approximately 35 to 60 feet with a total dissolved solids concentration ranging from 500 to 3000 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

(GW-23) Phillips 66 Natural Gas Company, Michael D. Ford, Environmental Scientist, 4001 Penbrook, Odessa, Texas 79762, has submitted an application for renewal of its previously approved discharge plan for its Artesia Plant located in Section 7, Township 18 South, Range 28 East, NMPM, Eddy County, New Mexico. Approximately 23,000 gallons per day of process wastewater is disposed of in an OCD approved Class II injection well. The total dissolved solids concentration of the wastewater is approximately 2000 mg/l. Ground water most likely to be affected by any discharge to the surface is at a depth of 85 feet with a total dissolved solids concentration of 300 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and public hearing may be requested by any interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN under the Seal of New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 1st day of May, 1990. To be published on or before May 11, 1990.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

William J. Lemay
WILLIAM J. LEMAY, Director

S E A L

Published in the Lovington Daily Leader May 8, 1990.

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OIL CONSERVATION DIVISION

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If no public hearing is held, the

STATE OF NEW MEXICO } ss
County of Bernalillo

90 MAY 16 AM 8 34

Thomas J. Smithson, being duly sworn declares and says that he is National Advertising manager of the **Albuquerque Journal**, and that this newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Session Laws of 1937, and that payment therefore has been made or assessed as court costs; that the notice, a copy of which is hereto attached, was published in said paper in the regular daily edition,

for.....1.....times, the first publication being on the.....11.....day
of.....May....., 1990, and the subsequent consecutive
publications on....., 1990.

Sworn and subscribed to before me, a Notary Public in
and for the County of Bernalillo and State of New
Mexico, this11..... day of.....May....., 1990.

PRICE.....\$38.74.....

Statement to come at end of month.

ACCOUNT NUMBER.....C81184.....

OFFICIAL SEAL

Bernadette D. [Signature]

00117

NEW MEXICO

12-18-93

EDJ-15 (R-12/89)

Affidavit of Publication

No. 13122

STATE OF NEW MEXICO,

County of Eddy:

Gary D. Scott being duly sworn, says: That he is the Publisher of The Artesia Daily Press, a daily newspaper of general circulation, published in English at Artesia, said county and state, and that the hereto attached Legal Notice

was published in a regular and entire issue of the said Artesia Daily Press, a daily newspaper duly qualified for that purpose within the meaning of Chapter 167 of the 1937 Session Laws of

the state of New Mexico for 1 consecutive weeks on the same day as follows:

First Publication May 10, 1990

Second Publication _____

Third Publication _____

Fourth Publication _____

Gary D. Scott
Subscribed and sworn to before me this 10th day

of May 19 90

Darlene Ann Boers
Notary Public, Eddy County, New Mexico

My Commission expires September 23, 1991

LEGAL NOTICE

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY, MINERALS AND
NATURAL
RESOURCES
DEPARTMENT
OIL CONSERVATION
DIVISION

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Any interested person may ob-

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STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

May 8, 1990

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-246

Mr. Michael D. Ford
Phillips 66 Natural Gas Company
4001 Penbrook
Odessa, Texas 79752

RE: Discharge Plan GW-23
Artesia Gas Plant
Eddy County, New Mexico

Dear Mr. Ford:

The Oil Conservation Division (OCD) has received and is in the process of reviewing your application, dated April 25, 1990, for discharge plan renewal for the above referenced facility. The following requests for additional information and commitments are based on the information contained in the application and information obtained during the OCD site inspection on March 15, 1990.

1. The OCD is requiring that above grade tanks that contain materials with constituents that can be harmful to fresh water and the environment, if a sudden and catastrophic spill were to occur, be bermed so that the spill is contained at the site and mitigated immediately. Containment in a small area at the tank site allows for maximum recovery of fluids and small volumes of contaminants available for infiltration. Without berming the rupture of a tank will spread its contents over a large area minimizing the amount that can be recovered and increasing the surface area of contaminated soil available to leach contaminants. All tanks that contain these types of materials must be bermed to prevent migration of the fluids and decrease the potential for infiltration. The bermed areas shall be large enough to hold one-third more than the volume of the largest vessel or one-third larger than the total volume of all interconnected vessels contained within the berm.

The following tanks were identified during the inspection that may require berming:

- a. The vertical amine storage tank.
- b. The engine jacket water tank.

Submit a plan and completion timetable for berming these tanks and any other tanks you identify that may require berming.

- 2. The OCD is requiring that above grade saddle tanks and all drum storage areas be paved and curbed to contain any spills or leaks. The following areas were identified during the inspection that may require paving and/or curbing:**
 - a. The saddle tank containing chemicals at the product storage area.**
 - b. The glycol tank.**
 - c. The horizontal amine storage tanks.**
 - d. The drum storage at the north and south cooling towers.**
 - e. The acid and chemical storage saddle tanks at the north and south cooling towers.**
 - f. The lubes and storage saddle tanks.**
 - g. The oil filter and drum steaming acre.**
 - h. The drum storage at the injection disposal area.**
 - i. The loading area adjacent to the slop oil tanks.**
 - j. The central drum storage area.**
 - k. The solvent storage on the east end of the Cooper compressor building.**
 - l. The chemical addition troughs at the south cooling towers.**
 - m. The gasoline tanks.**

Submit a plan and completion timetable for the construction of containment facilities in these areas.

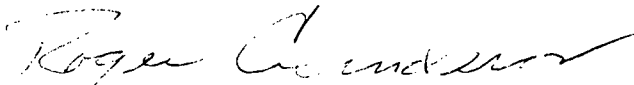
- 3. The steel reflux skid had evidence of amine leaking. Submit a plan and completion timetable for the repair or containment of all leaks on this skid.**
- 4. The White engine room and the Cooper and Clark engine room has evidence of oil and/or oily waste water draining off their pads. Submit a plan to contain all fluids from the engine rooms on the pads.**

Mr. Michael D. Ford
May 8, 1990
Page -3-

5. None of the sumps at the facility were constructed with leak detection. It is OCD's policy that all below grade facilities now in service that do not have leak detection are required to be visually inspected yearly to insure integrity. A commitment to incorporate leak detection in the design and construction of any replacement or newly constructed facilities is also required.
6. The area inside the berm of the slop oil tank had oil standing on the ground indicating the tank may have overflowed. What measures are being taken to prevent overflow of this tank? What measures were taken to cleanup the bermed area?
7. Oily liquids were observed in the bottom of the solid waste landfill. Submit a proposal to prevent all liquid disposal in this landfill. What measures were taken to remove the liquids from the landfill?

If you have any questions, please do not hesitate to call me at (505) 827-5884.

Sincerely,



Roger C. Anderson
Environmental Engineer

RCA/si

cc: OCD Artesia District Office

RECEIVED

JUN 28 1990

OIL CONSERVATION DIV.
SANTA FE



PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004

QUALITY, ENVIRONMENT AND SAFETY

June 27, 1990

Discharge Plan Renewal
Artesia Plant
Discharge Plan No. GW-23

Mr. Roger Anderson
Environmental Engineer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

Dear Mr. Anderson:

This is to provide information you requested in order to continue your review of the discharge plan submitted for our Artesia Plant. The items of concern contained in your letter of May 8, 1990 with our responses follows.

Item #1 - The OCD is requiring that above grade tanks that contain materials with constituents that can be harmful to fresh water and the environment, if a sudden and catastrophic spill were to occur, be bermed so that the spill is contained at the site and mitigated immediately. The vertical amine and the engine jacket water storage tanks were identified as tanks that will require berming during the recent inspection.

Response: The vertical amine and the engine jacket water storage tanks will have earthen or caliche berms constructed around them in order to contain their contents in the event of a tank failure. The berms will be installed by July 1, 1992.

Item #2 - The OCD is requiring that above grade saddle tanks and all drum storage areas be paved and curbed to contain any spills or leaks. The following areas were identified during the inspection that will require paving and/or curbing:

1. The saddle tank containing chemicals at the product storage area.
- ✓ 2. The glycol tank.
3. The horizontal amine storage tanks.
4. The drum storage areas at the north and south cooling towers.
5. The acid and chemical storage saddle tanks at the north and south cooling towers.
- ✓ 6. The lube oil storage saddle tanks.
- ✓ 7. The oil filter and drum steaming area.
- ✓ 8. The drum storage at the injection disposal area.

9. The loading area adjacent to the slop oil tanks.
10. The central drum storage area.
11. The solvent storage on the east end of the Cooper compressor building.
12. The chemical addition troughs at the south cooling towers.
13. The gasoline storage tanks.

Response: The above mentioned tanks/areas will be paved and/or curbed. This work will be completed by July 1, 1992.

Item #3 - The steel reflux skid had evidence of amine leaking. Submit a plan and completion timetable for the repair or containment of all leaks on this skid.

Response: All known amine leaks from the reflux skid have been repaired. If it appears that surface contamination from amine leaks continues to be a problem, a system will be designed and installed to catch the leaking fluid and ensure surface contamination does not occur.

Item #4 - The White engine room and the Cooper and Clark engine room have evidence of oil and/or oily wastewater draining off their pads. Submit a plan to contain all fluids from the engine room pads.

Response: New engine room pad drain systems will be installed at the Cooper and Clark engine rooms to contain the oily wastewater draining off their pads. The systems will be similar in construction to the systems installed at our Lee Plant and Hobbs Booster. These systems will be operational by July 1, 1992.

The White engine room is equipped with a concrete pad to prevent oily water from contaminating the surface. We have had maintenance problems with the portion of the drain system used to collect the fluids coming off of the concrete pad. The White engine room drain system will be upgraded to ensure it functions properly in preventing surface contamination. This work will be completed by July 1, 1991.

Item #5 - None of the sumps at the facility were constructed with leak detection. It is OCD's policy that all below grade facilities now in service that do not have leak detection are required to be visually inspected yearly to insure integrity. A commitment to incorporate leak detection in the design and construction of any replacement or newly constructed facilities is also required.

Response: The below grade sumps now in service at the plant will be visually inspected yearly to ensure integrity. Leak detection will be incorporated in the design and construction of any replacement or newly constructed sumps at the plant.

Item #6 - The area inside the berm of the slop oil tank had oil standing on the ground indicating the tank had overflowed. What measures are being taken to prevent overflow of this tank? What measures were taken to cleanup the bermed area?

Response: Plant operators have been instructed to check the level of fluid in the slop oil tanks on a more frequent basis to prevent overflows. The oil in the diked area was removed by vacuum truck. Oil contaminated soil was spread on our lease roads for road maintenance purposes.

Item #7 - Oily liquids were observed in the bottom of the solid waste landfill. Submit a proposal to prevent all liquid disposal in this landfill. What measures were taken to remove the liquids from the landfill?

Response: Plant personnel have been instructed not to dispose of any liquid containing material in the landfill. They have also been told to ensure contractors working at the plant comply with this requirement. The oily rock that had been disposed of in the landfill was used for lease road maintenance.

If you should have any questions regarding this information, please contact me at (918) 661-0478.

Very truly yours,

Michael D. Ford

Michael D. Ford
Environmental Scientist

MDF:artdisl



PHILLIPS 66 NATURAL GAS COMPANY

A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK, PHONE: 915 367-1266

April 25, 1990

Discharge Plan Renewal
Artesia Plant
Discharge Plan No. GW-23

Mr. David Boyer
Environmental Bureau Chief
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

Dear Mr. Boyer:

In accordance with the Water Quality Regulations, Phillips 66 Natural Gas Company submits the attached Groundwater Discharge Plan for our Artesia Plant, Eddy County, New Mexico. The current Groundwater Discharge Plan is scheduled to expire on July 1, 1990. The wastewater disposal system has not changed from what was approved in the previous plan.

If you should have any questions regarding this information, please contact me at (918) 661-0478.

Very truly yours,

Michael D. Ford

Michael D. Ford
Environmental Scientist

MDF:artdis1

Attachments

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NEW MEXICO
OIL CONSERVATION DIVISION

DISCHARGE PLAN
PHILLIPS 66 NATURAL GAS COMPANY
ARTESIA GASOLINE PLANT
SECTION 7, TOWNSHIP 18 SOUTH, RANGE 28 EAST, EDDY COUNTY

I. General Process Description

Artesia Plant's basic function is to remove the ethane and heavier hydrocarbon fractions from casinghead and gas well gas. The plant receives sour hydrocarbon gas streams from 5 and 750 psig gathering systems. The gas from the 5 psig system is compressed to 125 psig before going to a low pressure amine contactor where hydrogen sulfide and carbon dioxide in the gas stream is removed. Gas from the 750 psig system is sent directly to a high pressure amine contactor. Both amine contactors use Ucarsol solvent for the sweetening process. The hydrogen sulfide and carbon dioxide that is removed is sent to the plant's sulfur recovery unit. The sweet gas from the low pressure amine contactor is then compressed to 750 psig and commingled with the sweet gas from the high pressure amine contactor. The commingled gas stream is then sent to a molecular sieve dehydrator where the gas is dehydrated to a water content of less than 1 ppmv. From the dehydrator the gas stream flows to a turboexpander plant where it is cooled by propane refrigeration and expansion to a temperature of approximately -140 °F. The turboexpander plant produces two hydrocarbon streams, the first being a liquid hydrocarbon stream comprised of approximately 85 percent of the ethane and all of the propane and heavier hydrocarbons that entered the plant. This liquid hydrocarbon stream has a vapor pressure of approximately 500 psig and is sent to four 13'2" I.D. x 46' S/S, 550 psig MWP vessels for temporary storage before being delivered to a pipeline for sale.

CONDENSATE?
WHERE DOES
IT GO?

The second hydrocarbon stream produced from the turboexpander plant is comprised primarily of methane gas. This gas stream is divided with a portion going to Arco's Empire Abo Unit for reinjection into the formation and the remainder being sold to Transwestern Pipeline. The Arco gas is compressed to 750 psig before leaving the plant, and the gas sold to Transwestern is compressed to 680 psig before leaving the plant.

Attachments 1 and 2 are a plot plan and process flow sheet of the plant.

II. Plant Water Systems

A. Raw Water

Artesia Plant receives its water from a total of six wells owned by the Caprock Water Company of Loco Hills, New Mexico. The wells are located in Sections 26 and 35, Township 16 South, Range 32 East, Lea County and are completed at a depth of approximately 900 feet. The wells supply an average of 2650 bbls/day of water to the plant. Attachment 3 is an analysis of this water. Attachment 4 shows the location of our raw water feed line and water storage tanks.

B. Potable Water

A small fraction of the raw water is chlorinated and used as potable water for the plant's office and control room.

C. Cooling Tower System

The cooling tower system is comprised of two open recirculating cooling towers. The smallest of these towers has a recirculation rate of 3400 gpm with an approximate raw water make-up rate of 36 gpm. The larger of the two towers has a recirculation rate of 4400 gpm with an approximate raw water make-up rate of 46 gpm. The raw water in these towers is recirculated until the impurities in the water are concentrated to approximately five times their inlet concentrations, producing 556 bbls/day of blowdown wastewater. Blowdown from the towers is piped to the plant's wastewater disposal system. The following chemicals are being added to the cooling tower water for scale, corrosion and biological treatment:

Chemical

Betz 26K
Betz 30K (TTA)
Betz 409
Foam-Trol CT
Slimicide C-31
Slimicide C-41

Small quantities of sulfuric acid are also being added to the cooling tower water to maintain proper pH. Material safety data sheets for these chemicals are found in Attachment 5. Attachments 6 and 7 are simplified schematics of the cooling tower systems.

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D. Boiler Water System

The boiler water system is comprised of a Zeolite water softener, three boilers (two process and one waste heat boiler in the sulfur plant) which produce 250 psig steam, and one boiler and three sulfur plant condensers which produce 50 psig steam. The raw make-up water to this system passes through the Zeolite softener which removes calcium and magnesium in the make-up water. The soft water from the Zeolite softener flows to a holding tank before being pumped into the boilers and sulfur plant condensers. The 250 psig steam is used to drive steam turbines, heat input to a glycol dehydration system, heat input for an amine reclaimer, and heat tracing for the sulfur plant sump. The 50 psig steam is used for heat tracing of lines and heat input for an amine reboiler and a stabilizer reboiler. All condensate produced is returned to the boiler feed water tank for reuse. The following chemicals are being added to the boiler water for scale and corrosion treatment:

Chemical

Betz BP-6400
Betz CL2
Betz Sulfite III
Betz Optimeen

Material safety data sheets for these chemicals are found in Attachment 8. A process flow sheet of the boiler water system is contained in Attachment 9.

E. Engine Cooling System

An ethylene glycol based anti-freeze cooling system is used to cool all the engines at the plant. The plant is comprised of three engine rooms: the Cooper engine room, the Clark engine room and the White engine room. The Cooper and Clark engine rooms each have their own jacket water pumps, above ground jacket water surge tanks and air fin coolers. If an engine is being worked on, its anti-freeze charge is pumped to the surge tank. When this work is completed, the anti-freeze is pumped back into the engine.

All of the engines in the White engine room have individual self-contained cooling systems. When an engine in the White room is being worked on, its anti-freeze charge is drained into a buried coolant sump tank located next to the engine room (Attachment 1, #32). When the work is completed, the anti-freeze is pumped back into the engine.

III. Plant Drain and Disposal Systems

A. Engine Oil Drain System

All of the engines in the three main engine rooms are tied into a buried lube oil sump located next to the White engine room (Attachment 1, #31). The four portable compressor engines are tied into a lube oil sump located next to their skids. When an engine's lube oil is changed, the old lube oil charge is drained into the sumps.

The spent lube oil in the sumps is pumped to the plant's slop oil storage tanks (Attachment 10). Oil in the slop oil storage tanks is periodically hauled by tank truck to Phillips Hobbs Treater for reclamation.

B. Closed Drain System

The closed drain system is a pressure drain system constructed of buried, externally coated, schedule 40 steel pipe. This drain system empties into a buried API oil/water separator. The oil from this separator is pumped to the slop oil tanks. The water from the separator is pumped to the open drain system's oil/water separator. The closed drain system was revised and new piping installed in 1976 when the plant switched from oil absorption to a cryogenic process. Attachment 10 is a process flow sheet of this system.

IS ENGINE
OIL MIXED HERE?
OIL?

C. Open Drain System

The open drain system is an atmospheric drain system constructed of buried, externally coated, schedule 40 steel pipe. This drain system empties into a below grade, internally coated, oil/water separator. The oil from this vessel is pumped to one of the slop oil storage tanks. The water from this vessel is pumped to a wastewater storage tank for temporary holding prior to injection. The open drain system was also revised and new piping installed in 1976 when the plant switched from oil absorption to a cryogenic process. Attachment 10 is a process flow sheet of this system.

We are in the process of installing pads and curbing under the Cooper and Clark engine rooms to prevent oil leaked from the engines from reaching the ground. The containment system piping will be routed to two new sumps for accumulation and storage of the liquids prior to their being pumped or gravity fed to the open drain system's oil/water separator. The White engine room is already equipped with a similar type containment system. We also plan to install a containment system on the portable engines located west of the Cooper engine room.

D. Final Wastewater Disposal System

This system takes the water from the open drain oil/water separator into a 1,000 barrel, internally coated stock tank where sulfuric acid is injected to maintain a pH of approximately 7.0. From this tank, the water is pumped through a sock filter to remove any solid particles. The water then flows into another 1,000 barrel, internally coated stock tank and is then pumped to the injection well, where the flow rate and pressure is recorded. The overflow of both the 1,000 barrel tanks will flow into a 15,000 barrel emergency overflow tank. This tank will only be used during upsets to the system and any water in the emergency overflow tank will be pumped back into the first 1,000 barrel tank during normal operations. Attachment 11 is a process flow sheet of this system. Attachment 12 is a detailed chemical analysis of the wastewater disposed of in the injection well.

IV. Solid Waste Disposal

A. General Waste

The small amount of solid waste generated at the plant is handled in one of two ways. The spent paper products (i.e. paper towels, sacks, etc.) are burned in a safe manner at the plant. The non-combustible items (i.e. pieces of pipe, concrete, etc.) are disposed of in an excavated ditch and then covered.

B. Spent Molecular Sieve

Approximately every 3 to 4 years the molecular sieve dehydrators at the plant are recharged. The spent molecular sieve is disposed of on site. Approximately 21,600 pounds of this material is disposed of each time the beds are recharged.

C. Spent Sulfur Catalyst

Approximately once every five years the catalyst in the sulfur recovery unit converter beds is recharged. The spent catalyst is disposed of on site. Approximately 20,500 pounds of this material is disposed of each time the beds are recharged.

V. Miscellaneous Information

A. Groundwater Monitoring

Groundwater monitoring wells have been installed at the plant around the abandoned evaporation pond(s). The NMOCD has been furnished a copy of the groundwater monitoring well installation report and analyses of the water samples taken from the wells.

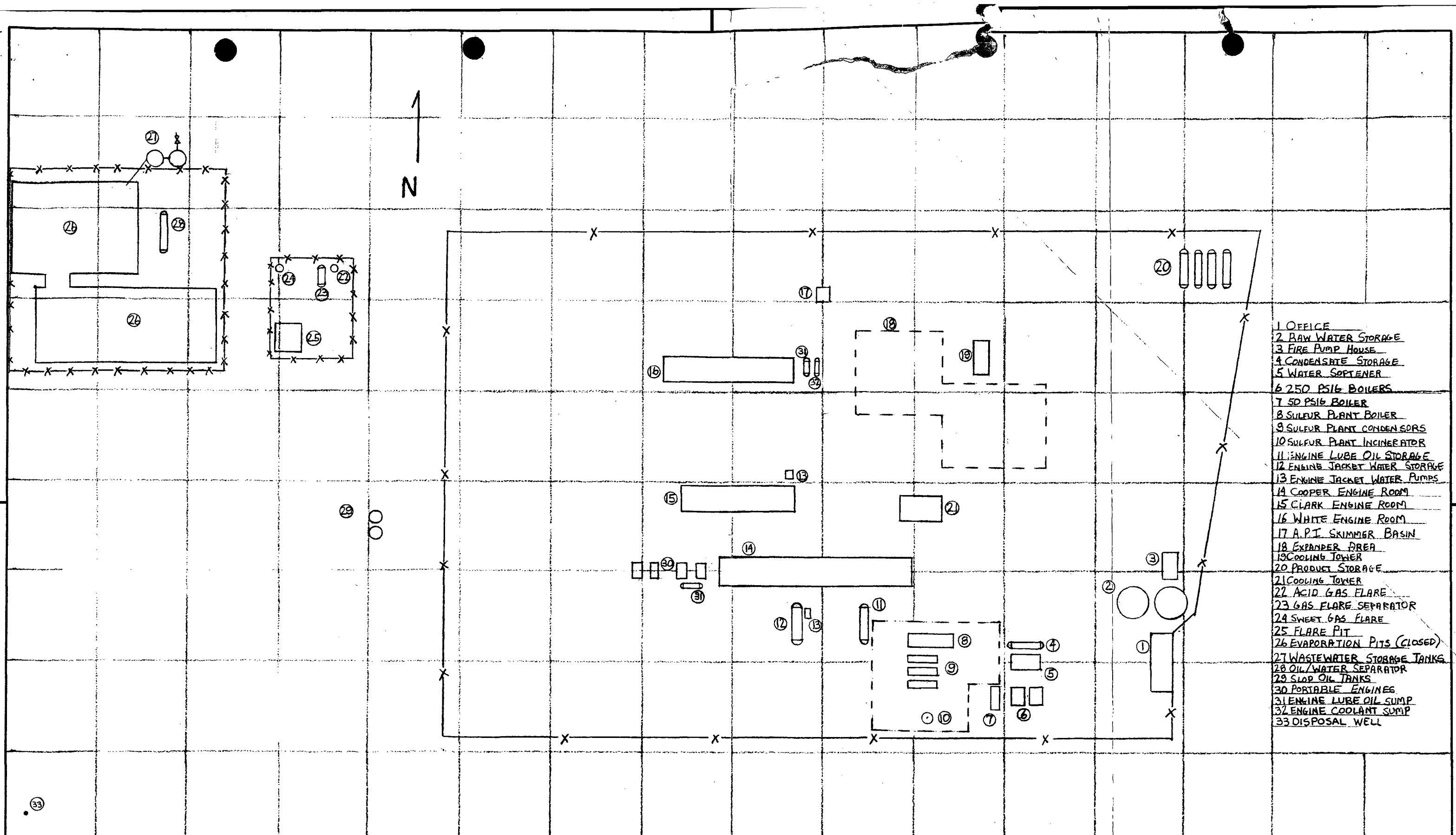
B. Topography


Attachment 13 is a topographic map of the area surrounding Artesia Plant. As can be seen from this map, there are no bodies of water within a one mile radius of the plant.

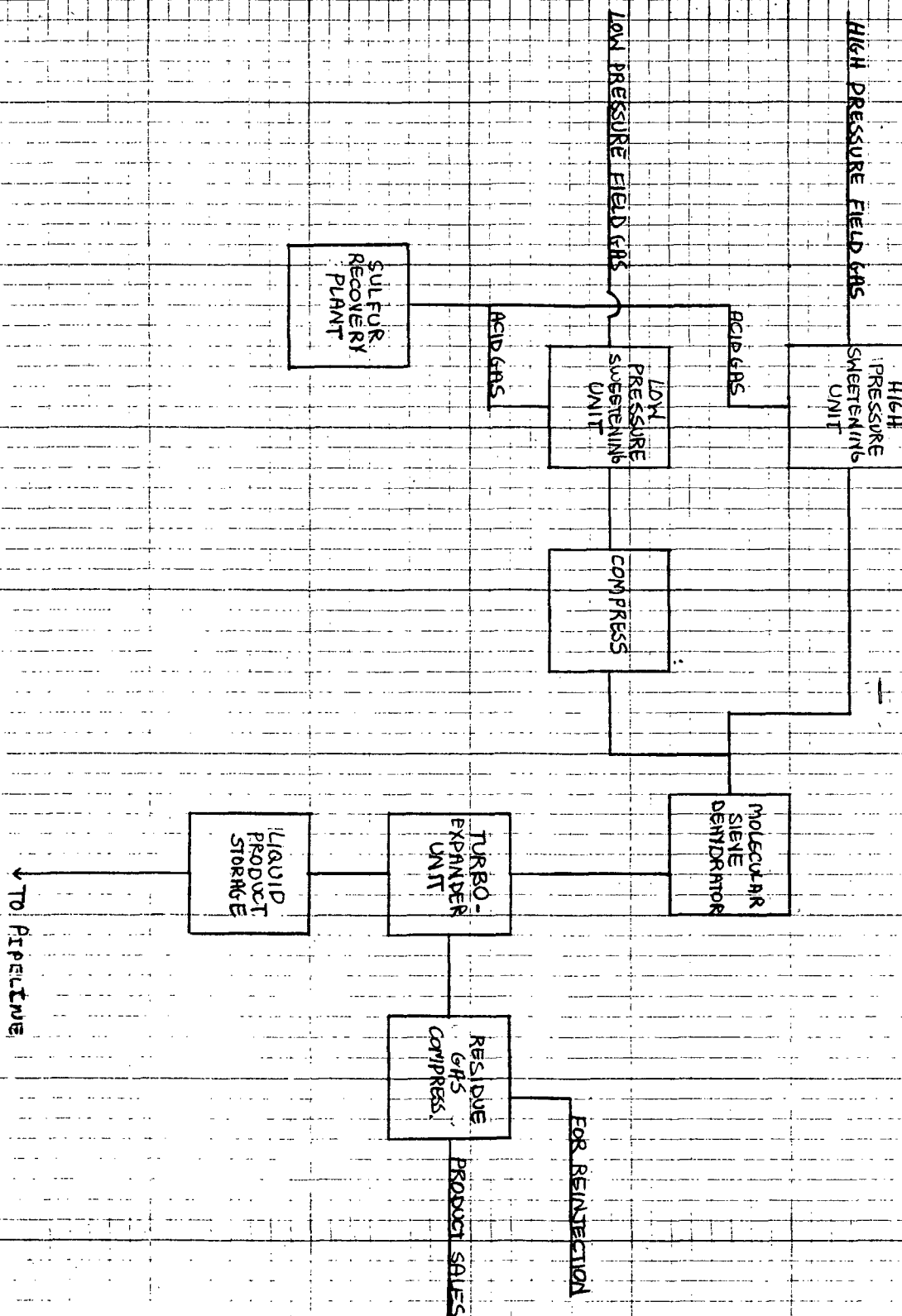
C. Flooding Potential

None

MDF/artdis



NO.	REVISION	BY	DATE						FOR BIDS	BARTLESVILLE, OKLAHOMA		AFE NO.
		CHKD	APP'D						FOR APPR			SCALE 1" = 100'
									FOR CONST			UNLESS OTHERWISE NOTED
												DWG NO.
												SH NO.
									DRAWN FORD 2-24-84			
									CHECKED REVISED 4-19-90			
									APP'D			



NO.	REVISION	BY	DATE	CHKD	APP'D
<div style="display: flex; justify-content: space-between; align-items: center;"> <div> <p>FOR BIDS</p> <p>FOR APPR</p> <p>FOR CONST</p> </div> <div style="text-align: center;"> <p>PHILLIPS PETROLEUM COMPANY</p> <p>BARTLESVILLE, OKLAHOMA</p> <p>ARTESIA GASOLINE PLANT</p> <p>PROCESS FLOW</p> <p>ATTACHMENT 2</p> </div> <div> <div style="display: flex; flex-direction: column; align-items: flex-end;"> <div>JA NO.</div> <div>FILE CODE</div> <div>AFE NO.</div> <div>SCALE</div> <div>DWG NO.</div> <div>SH NO.</div> </div> </div> </div>					
DRAWN FORD	2/21/84				
CHECKED					
APP'D					



CONTINENTAL PRODUCTS OF TEXAS

100 Industrial Avenue
(915) 337 4531P. O. Box 3527
Odessa, Texas 79750401 AHC Building
(915) 332 4528

Client: PHILLIPS PETROLEUM COMPANY

Plant: Artesia Plant

Page 1 of 2

Attention: Rita A. Johns

Date Sampled 1-22-81 In 1-23-81 Out 1-26-81

ANALYSIS NO.			328
SOURCE OF SAMPLE			Lab Fresh Water No Chlorine Res 12:17 Air Temp 46° F
CONSTITUENT		METHOD	PPM
Temperature	°F	Thermometer	44°
pH		Meter	7.0
Alkalinity, Total	CaCO ₃	Titration	
Alkalinity, Phenolphthalein	CaCO ₃	Titration	
Hardness, Total	CaCO ₃	Titration	
Chloride	Cl	Titration	24
Chlorine	Cl ₂	Colorimeter	
Sulfate	SO ₄	Turbidimeter	28
Sulfate	S	Turbidimeter	
Sulfite	SO ₃	Titration	
Sulfide, Total	S	Titration	
Sulfide, Hydrogen	H ₂ S	Titration	
Ammonia	NH ₃	Nessler	
Bromide	Br	Colorimeter	
Cyanide	CN	Colorimeter	None
Flouride	F	Colorimeter	0.4
Phosphorous	P ₂ O ₅	Colorimeter	
Phosphate, Ortho	PO ₄	Colorimeter	
Phosphate, Poly	PO ₃	Colorimeter	
Nitrate	NO ₃	Colorimeter	8.5
Nitrite	NO ₂	Colorimeter	
Nitrogen	N	Kjeldahl	
Specific Conductance 27°C	mmhos	Wheatstone	
Total Dissolved Solids		Evaporation	332
Total Residue		Evaporation	
Total Suspended Solids		Millipore	
Volatile Solids		Evaporation	
Settleable Solids		Stpl Sewage	
Color, PT-CO Units		Colorimeter	
Turbidity, Jackson Units		Turbidimeter	
Volatile Acids		Colorimeter	
Relative Stability		Turbidimeter	
Phenols		Colorimeter	0.14
Surfactants	DBS	Colorimeter	
Algaecides	OAC	Colorimeter	
Pesticides		Colorimeter	
Oil & Grease		Extraction	
Chlorinated Hydrocarbon			



↑
N

ARTESIA
PLANT

RAW WATER STORAGE

PLANT OFFICE

RAW WATER LINE
FROM CAPROCK WATER CO.

NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div>  PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div>  </div> </div>			JA NO.	FILE CODE
FOR APPR				AFE NO.	SCALE
FOR CONST	<div style="text-align: center;"> <h2>ARTESIA GASOLINE PLANT</h2> <h3>RAW WATER SUPPLY</h3> <p>ATTACHMENT 4</p> </div>			DWG NO.	
DRAWN				SH NO.	
CHECKED					
APP'D					

ATTACHMENT 5

MATERIAL SAFETY DATA SHEET

EMERGENCY TELEPHONE NUMBER 215/355-3300

PRODUCT : BETZ 20K Series

EFFECTIVE DATE 1/84

FOR PROPOSAL USE ONLY

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

OSHA INGREDIENT PERMISSIBLE EXPOSURE LIMIT:

NONE

ACGIH INGREDIENT TLV-TWA:

POTASSIUM HYDROXIDE-2MG/M3(CEILING)

*** GENERIC DESCRIPTION ***

AN AQUEOUS SOLUTION CONTAINING POTASSIUM HYDROXIDE, MIXED PHOSPHATE SALTS, AN ORGANOPHOSPHONATE AND AN AROMATIC NITROGEN HETEROCYCLE.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: AS IS (APPROX.) 12.1	B.P.T.OF OR B.RANGE: ND
FL.PT.(DEG.F): >200 SETA(CC)	SP.GR.(70/70oF)OR DENSITY: 1.431
VAPOR PRESSURE(mmHG): ND	VAPOR DENSITY(AIR=1): ND
VISC cps70oF: 33.8	XVOLATILES: 61
EVAP.RATE: <1 ETHER=1	XSOLUBILITY(WATER): 100
PHYSICAL STATE: LIQUID	APPEARANCE: AMBER
ODOR: MILD	FREEZE POINT(DEG.F): 10

-----SECTION 3-----REACTIVITY DATA-----

THERMAL DECOMPOSITION YIELDS OXIDES OF C,N,S,OR P IF PRESENT,
STABLE

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS***

SLIGHTLY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS***

SEVERE IRRITANT TO THE EYES, POSSIBLY CORROSIVE

ACUTE RESPIRATORY EFFECTS***

MISTS/AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS***

CHRONIC EFFECTS OF THIS FORMULATION HAVE NOT YET BEEN FULLY EVALUATED

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***

REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***

REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***

GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

OVER

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

GENERAL-VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED OIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS. SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND OR GRIT.

DISPOSAL INSTRUCTIONS***

GENERAL-WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT

PRODUCT (AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

GENERAL-FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE).

TRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

VENTILATION PROTECTION***

DEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

= VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, WEAR A RESPIRATOR WITH DUST/MIST/FUME CARTRIDGES

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

FLASH PROOF CHEMICAL GOGGLES

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

GENERAL-KEEP CONTAINER CLOSED

SPECIFIC- PROTECT FROM FREEZING

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE

SPECIFIC- ALKALINE. DO NOT MIX WITH ACIDIC MATERIAL.

-----SECTION 9-----FEDERAL REGULATIONS-----

IFRA (40CFR): EPA REG. NO. NOT APPLICABLE

SHA (29CFR)-FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH

APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATIONS. OTHERWISE, USE SUPPLIED AIR APPARATUS.

HA (40CFR) REPORTABLE QUANTITY: AS IS PRODUCT (HAZARDOUS SUBSTANCE)

1901 GAL (POTASSIUM HYDROXIDE)

CRA (40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# D002

DOT (49CFR) CLASSIFICATION: NOT APPLICABLE

SDA FEDERALLY INSPECTED MEAT AND POULTRY PLANTS- AUTHORIZATION: NONE

THIS FORM IS ESSENTIALLY EQUAL TO OSHA 20 FORM. WHILE THE INFORMATION AND

RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE

DATE HEREOF, BETZ LABORATORIES, INC. MAKES NO WARRANTY WITH RESPECT THERETO

AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

HAROLD M. HERSH
ENVIRONMENTAL INFORMATION COORDINATOR

ATTACHMENT 5
BETZ INDUSTRIAL

4636 SOMERTON ROAD TREVOSE, PA. 19047

BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 215/355-3300

PRODUCT :BETZ 30K SERIES

EFFECTIVE DATE 10-31-88

PRINTED: 12/15/8

PRODUCT APPLICATION : WATER-BASED CORROSION INHIBITOR/DEPOSIT CONTROL AGENT.

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD ARE LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

SODIUM HYDROXIDE*** (CAUSTIC SODA); CAS#1310-73-2; CORROSIVE; TOXIC IF ORALLY INGESTED; PEL:2.0MG/M3; TLV:2.0MG/M3 (CEILING).

1-H-BENZOTRIAZOLE, METHYL*** (TOLYLTRIAZOLE; TTA); CAS#29385-43-1; IRRITANT (EYE); PEL:NONE; TLV:NONE.

PHOSPHONIC ACID, (1-HYDROXYETHYLIDINE) BIS-*** HEDP; CAS#2809-21-4; EYE IRRITANT; PEL:NONE; TLV:NONE.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: 5% SOL.	(APPROX.) 12.5	ODOR: MILD
FL.PT.(DEG.F):	200 P-M(CC)	SP.GR.(70F)OR DENSITY: 1.239
VAPOR PRESSURE(mmHG):	18	VAPOR DENSITY(AIR=1): 1
VISC cps70F:	27	%SOLUBILITY(WATER): 100
EVAP.RATE: 1	ETHER=1	APPEARANCE: YELLOW
PHYSICAL STATE: LIQUID		FREEZE POINT(DEG.F): -15

-----SECTION 3-----REACTIVITY DATA-----

STABLE

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

MATERIAL SAFETY DATA SHEET (PAGE 2 OF 3)

PRODUCT: BETZ 30K SERIES

EFFECTIVE DATE 10-31-88

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE

CORROSIVE TO SKIN

ACUTE EYE EFFECTS ***

CORROSIVE TO THE EYES

ACUTE RESPIRATORY EFFECTS ***

MISTS/AEROSOLS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***

PROLONGED OR REPEATED CONTACT MAY CAUSE TISSUE NECROSIS.

MEDICAL CONDITIONS AGGRAVATED ***

NOT KNOWN

SYMPTOMS OF EXPOSURE ***

CAUSES SEVERE IRRITATION, BURNS OR TISSUE ULCERATION WITH SUBSEQUENT SCARRING.

PRECAUTIONARY STATEMENT BASED ON TESTING RESULTS ***

MAY BE TOXIC IF ORALLY INGESTED.

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***

REMOVE CLOTHING. WASH AREA WITH LARGE AMOUNTS OF SOAP SOLUTION OR WATER FOR 15 MIN. IMMEDIATELY CONTACT PHYSICIAN

EYE CONTACT***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES. IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***

REMOVE VICTIM FROM CONTAMINATED AREA. APPLY NECESSARY FIRST AID TREATMENT. IMMEDIATELY CONTACT A PHYSICIAN.

INGESTION***

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DO NOT INDUCE VOMITING. IMMEDIATELY CONTACT PHYSICIAN. DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.

FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***

WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT PRODUCT (AS IS)-

INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE).

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER. FOAM OR WATER CREATE A SLIPPERY CONDITION. SPREAD SAND OR GRIT

MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: BETZ 30K SERIES

EFFECTIVE DATE 10-31-88

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS
RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY,
USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

GAUNTLET-TYPE RUBBER GLOVES, CHEMICAL RESISTANT APRON

WASH OFF AFTER EACH USE. REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES. FACE SHIELD

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

PROTECT FROM FREEZING. IF FROZEN, THAW COMPLETELY AND MIX
THOROUGHLY PRIOR TO USE

HANDLING INSTRUCTIONS***

IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE
ALKALINE. CORROSIVE TO SKIN AND EYES. DO NOT MIX WITH ACIDIC
MATERIAL.

THIS MSDS COMPLIES WITH THE OSHA HAZARD COMMUNICATION STANDARD
HAROLD M. HERSH (ENVIRONMENTAL INFORMATION COORDINATOR)

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE
EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE.
ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED IN THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

653GAL (SODIUM HYDROXIDE)

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE, THE RCRA HAZARDOUS WASTE
IDENTIFICATION NUMBER IS: D002=CORROSIVE

...DOT HAZARD CLASSIFICATION: CORROSIVE TO SKIN

...DOT SHIPPING DESIGNATION IS: UN1824 SODIUM HYDROXIDE SOLUTION

...THIS PRODUCT CONTAINS THESE CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO
CAUSE CANCER OR REPRODUCTIVE TOXICITY: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 302 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 313 CHEMICALS: SODIUM HYDROXIDE(1310-73-2) , 11.0-15.0% ;

...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE) AND DELAYED(CHRONIC)

...MICHIGAN CRITICAL MATERIALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

NFPA/HMIS : HEALTH - 3 ; FIRE - 1 ; REACTIVITY - 0 ; SPECIAL - CORR ; PE - D

ATTACHMENT 5

MATERIAL SAFETY DATA SHEET
EMERGENCY TELEPHONE NUMBER 215/355-3300
EFFECTIVE DATE 1/84

PRODUCT : BETZ 409

* NFPA
* HEALTH - 2
* FIRE - 0
* REACTIVITY-0
* SPECIAL - ALK

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

OSHA INGREDIENT PERMISSIBLE EXPOSURE LIMIT:

SODIUM HYDROXIDE-2MG/M3

ACGIH INGREDIENT TLV-TWA:

SODIUM HYDROXIDE-2MG/M3(CEILING),ETHYLENE GLYCOL-10MG/M3(STEL=20MG/M3)

*** GENERIC DESCRIPTION ***

A WATER SOLUTION OF AN ALKYLPHENOXYPOLYALKYLENE GLYCOL ETHER,
ETHYLENE OXIDE-PROPYLENE OXIDE COPOLYMER,ALKYLENE GLYCOL,
SILICONE EMULSION AND SODIUM HYDROXIDE.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: AS IS (APPROX.) 12.4	B.PT.OF OR B.RANGE: >200
FL.PT.(DEG.F): >200 SETA(CC)	SP.GR.(70/70oF)OR DENSITY: 1.020
VAPOR PRESSURE(mmHG): ND	VAPOR DENSITY(AIR=1): ND
VISC CPS70oF: 9.4	%VOLATILES: ND
EVAP.RATE: <1 ETHER=1	%SOLUBILITY(WATER): 100
PHYSICAL STATE: LIQUID	APPEARANCE: COLORLESS
ODOR: NONE	FREEZE POINT(DEG.F): 25

-----SECTION 3-----REACTIVITY DATA-----

THERMAL DECOMPOSITION YIELDS OXIDES OF C,N,S,OR P IF PRESENT,
STABLE

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS***
SLIGHTLY IRRITATING TO THE SKIN
ACUTE EYE EFFECTS***
MODERATELY IRRITATING TO THE EYES
ACUTE RESPIRATORY EFFECTS***
MISTS/AEROSOLS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT
CHRONIC EFFECTS***
CHRONIC EFFECTS OF THIS FORMULATION HAVE NOT YET BEEN FULLY EVALUATED

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF
SOAP SOLUTION OR WATER FOR 15 MINUTES
EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A
PHYSICIAN FOR ADDITIONAL TREATMENT
INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE
FIRST AID TREATMENT AS NECESSARY
INGESTION***
GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF
STOMACH USING 3-4 GLASSES MILK OR WATER

OVER

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

GENERAL-VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT, CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.

SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND OR GRIT.

DISPOSAL INSTRUCTIONS***

GENERAL-WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT

PRODUCT (AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

GENERAL-FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE).

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER. FOAM OR WATER CREATE A SLIPPERY CONDITION. SPREAD SAND OR GRIT

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH ORGANIC VAPOR AND DUST/MIST/FUME CARTRIDGES

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

GENERAL-KEEP CONTAINER CLOSED

SPECIFIC- PROTECT FROM FREEZING

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE

SPECIFIC- ALKALINE. DO NOT MIX WITH ACIDIC MATERIAL.

-----SECTION 9-----FEDERAL REGULATIONS-----

FIFRA (40CFR): EPA REG. NO. NOT APPLICABLE

OSHA (29CFR)-FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH

APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATIONS. OTHERWISE, USE SUPPLIED AIR APPARATUS.

CWA (40CFR) REPORTABLE QUANTITY: AS IS PRODUCT (HAZARDOUS SUBSTANCE)

94,177 GAL (SODIUM HYDROXIDE)

RCRA (40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# D002

DOT (49CFR) CLASSIFICATION: NOT APPLICABLE

USDA FEDERALLY INSPECTED MEAT AND POULTRY PLANTS- AUTHORIZATION: SEC. 65, 67

THIS FORM IS ESSENTIALLY EQUAL TO OSHA 20 FORM. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, BETZ LABORATORIES, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

HAROLD M. HERSH
ENVIRONMENTAL INFORMATION COORDINATOR

ATTACHMENT 5

MATERIAL SAFETY DATA SHEET

EMERGENCY TELEPHONE NUMBER 215/355-3300

PRODUCT : FOAM-TROL CT

EFFECTIVE DATE 1/84

* NFPA

* HEALTH - 1

* FIRE - 1

* REACTIVITY-0

* SPECIAL - -

OSHA INGREDIENT PERMISSIBLE EXPOSURE LIMIT:

NONE

ACGIH INGREDIENT TLV-TWA:

NONE

*** GENERIC DESCRIPTION ***

A SOLUTION OF A FATTY ACID MIXTURE, MIXED POLYALKYLENE GLYCOL FATTY ESTERS
AND POLYALKYLENE GLYCOL IN MINERAL OIL.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: 50% SOL. (APPROX.) 6.8

B.P.T.OF OR B.RANGE: ND

FL.PT.(DEG.F): >200 SETA(CC)

SP.GR.(70/70oF)OR DENSITY: 0.841

VAPOR PRESSURE(mmHG): <10

VAPOR DENSITY(AIR=1): >1

VI SC cPs70oF: 18.0

SVOLATILES: 90

EVAP.RATE: <1 ETHER=1

XSOLUBILITY(WATER): 0

PHYSICAL STATE: LIQUID

APPEARANCE: OFF-WHITE TO AMBER

ODOR: MILD

FREEZE POINT(DEG.F): -20

-----SECTION 3-----REACTIVITY DATA-----

THERMAL DECOMPOSITION YIELDS OXIDES OF C,N,S,OR P IF PRESENT,
STABLE

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS***

SLIGHTLY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS***

SLIGHTLY IRRITATING TO THE EYES

ACUTE RESPIRATORY EFFECTS***

MISTS/AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS***

CHRONIC EFFECTS OF THIS FORMULATION HAVE NOT YET BEEN FULLY EVALUATED

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***

REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF
SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A
PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***

REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE
FIRST AID TREATMENT AS NECESSARY

INGESTION***

GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF
STOMACH USING 3-4 GLASSES MILK OR WATER

OVER

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

GENERAL-VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS. SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND OR GRIT.

DISPOSAL INSTRUCTIONS***

GENERAL-WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT

PRODUCT (AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

GENERAL-FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE).

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER. FOAM OR WATER CREATE A SLIPPERY CONDITION. SPREAD SAND OR GRIT

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

VENTILATION PROTECTION***

ADEQUATE VENTILATION

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES

RECOMMENDED SKIN PROTECTION***

NEOPRENE GLOVES

REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

GENERAL-KEEP CONTAINER CLOSED

SPECIFIC- PROTECT FROM FREEZING

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE

SPECIFIC- NORMAL CHEMICAL HANDLING

-----SECTION 9-----FEDERAL REGULATIONS-----

FIFRA (40CFR): EPA REG. NO. NOT APPLICABLE

OSHA (29CFR)-FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATIONS. OTHERWISE, USE SUPPLIED AIR APPARATUS.

CWA (40CFR) REPORTABLE QUANTITY: AS IS PRODUCT (HAZARDOUS SUBSTANCE) NOT APPLICABLE

RCRA (40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# NOT APPLICABLE

DOT (49CFR) CLASSIFICATION: NOT APPLICABLE

USDA FEDERALLY INSPECTED MEAT AND POULTRY PLANTS- AUTHORIZATION: NONE

THIS FORM IS ESSENTIALLY EQUAL TO OSHA 20 FORM. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, BETZ LABORATORIES, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

HAROLD M. HERSH
ENVIRONMENTAL INFORMATION COORDINATOR

BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 215/355-3300

PRODUCT: SLIMICIDE C31

(PAGE 1 OF 3)
EFFECTIVE DATE 1-85

PRODUCT APPLICATION : SOLVENT-BASED MICROBIAL CONTROL AGENT.

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD ARE LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

DODECYL GUANIDINE HYDROCHLORIDE*** (DGH); CAS#13590-97-1; CORROSIVE; PEL:NONE; TLV:NCNE.

METHYLENE BIS(THIOCYANATE)*** CAS#6317-18-6; POTENTIAL REPRODUCTIVE TOXIN; PEL:NCNE; TLV:NCNE.

ISOPROPYL ALCOHOL*** (IPA); CAS#67-63-0; FLAMMABLE LIQUID; CHRONIC OVEREXPOSURE MAY CAUSE LIVER AND KIDNEY TOXICITY; PEL:400PPM; TLV:400PPM.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: AS IS	(APPROX.) 3.2	ODOR: NONE
FL.PT.(DEG.F): 120	SETA(CC)	SP.GR.(70F)OR DENSITY: 1.095
VAPOR PRESSURE(MMHG): 24		VAPOR DENSITY(AIR=1): ND
VISC CPS70F: 64		%SOLUBILITY(WATER): 100
EVAP.RATE: ND WATER=1		APPEARANCE: YELLOW
PHYSICAL STATE: LIQUID		FREEZE POINT(DEG.F): <-30

-----SECTION 3-----REACTIVITY DATA-----

STABLE

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

PRODUCT: SLIMICIDE C31

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

TE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE

SEVERE IRRITANT TO THE SKIN. SKIN SENSITIZER

ACUTE EYE EFFECTS ***

SEVERE IRRITANT TO THE EYES, POSSIBLY CORROSIVE

ACUTE RESPIRATORY EFFECTS *** PRIMARY ROUTE OF EXPOSURE

VAPORS, GASES, MISTS AND/OR AEROSOLS CAUSE IRRITATION TO UPPER

RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE ***

PROLONGED OR REPEATED EXPOSURES MAY CAUSE REPRODUCTIVE SYSTEM TOXICITY.

MEDICAL CONDITIONS AGGRAVATED ***

NOT KNOWN

SYMPTOMS OF EXPOSURE ***

INHALATION MAY CAUSE IRRITATION OF MUCOUS MEMBRANES AND RESPIRATORY TRACT;

SKIN CONTACT CAUSES SEVERE IRRITATION OR BURNS.

PRECAUTIONARY STATEMENT BASED ON TESTING RESULTS ***

MAY BE TOXIC IF ORALLY INGESTED.

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT ***

REMOVE CLOTHING. WASH AREA WITH LARGE AMOUNTS OF SOAP SOLUTION OR WATER

FOR 15 MIN. IMMEDIATELY CONTACT PHYSICIAN

EYE CONTACT ***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES. IMMEDIATELY CONTACT A

PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE ***

REMOVE VICTIM FROM CONTAMINATED AREA. APPLY NECESSARY FIRST AID

TREATMENT. IMMEDIATELY CONTACT A PHYSICIAN.

INGESTION ***

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM

DILUTE CONTENTS OF STOMACH. INDUCE VOMITING BY ONE OF THE STANDARD

METHODS. IMMEDIATELY CONTACT A PHYSICIAN

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS ***

VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND

ABSORB ON ABSORBANT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE

CONTAMINATED ABSORBANT SHOULD BE CONSIDERED A PESTICIDE AND

DISPOSED OF IN AN APPROVED PESTICIDE LANDFILL. SEE PRODUCT LABEL

STORAGE AND DISPOSAL INSTRUCTIONS.

REMOVE IGNITION SOURCES. FLUSH AREA WITH WATER. SPREAD SAND OR

GRIT.

DISPOSAL INSTRUCTIONS ***

WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY

SEWER TREATMENT FACILITY, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A

PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT

PRODUCT (AS IS) -

BURY IN AN APPROVED PESTICIDE FACILITY OR DISPOSE OF IN

ACCORDANCE WITH LABEL INSTRUCTIONS

FIRE EXTINGUISHING INSTRUCTIONS ***

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING

APPARATUS (FULL FACE-PIECE TYPE).

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER. FOAM OR WATER CREATE A SLIPPERY

CONDITION. SPREAD SAND OR GRIT

ATTACHMENT 5
BETZ MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: SLIMICIDE C31

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS
RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY,
USE RESPIRATOR WITH ORGANIC VAPOR, HIGH EFFICIENCY PARTICULATE CARTRIDGES
RECOMMENDED SKIN PROTECTION***

GAUNTLET-TYPE RUBBER GLOVES, CHEMICAL RESISTANT APRON
REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES, FACE SHIELD

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

KEEP CONTAINER CLOSED
KEEP AWAY FROM FLAMES OR SPARKS. GROUND DRUMS DURING FILLING OR
DISCHARGE OPERATIONS

HANDLING INSTRUCTIONS***

IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE
COMBUSTIBLE. ACIDIC. DO NOT MIX WITH ALKALINE MATERIAL.

-----SECTION 9-----FEDERAL REGULATIONS-----

FIFRA(40CFR): EPA REG. NO. 3876- 121

OSHA(29CFR)-FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH
APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATIONS. OTHERWISE, USE SUPPLIED
AIR APPARATUS.

CWA(40CFR) REPORTABLE QUANTITY: AS IS PRODUCT (HAZARDOUS SUBSTANCE)
NOT APPLICABLE

RCRA(40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# D001

DOT(49CFR) CLASSIFICATION: COMBUSTIBLE

NFPA/HMIS : HEALTH - 2 ; FIRE - 1 ; REACTIVITY - 0 ; SPECIAL - NONE

THIS DOCUMENT IS PROVIDED TO SUPPLY ALL THE INFORMATION NECESSARY TO COMPLY
WITH OSHA HAZARD COMMUNICATIONS REGULATIONS, AND RIGHT-TO-KNOW REQUIREMENTS.
WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO
BE ACCURATE AS OF THE DATE HEREOF, BETZ LABORATORIES, INC. MAKES NO WARRANTY
WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

HAROLD M. HERSH
ENVIRONMENTAL INFORMATION COORDINATOR

ATTACHMENT 5
BETZ INDUSTRIAL

4636 SOMERTON ROAD TREVOSE, PA. 19047

BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 215/355-3300

PRODUCT :SLIMICIDE C41

EFFECTIVE DATE 10-31-88
PRINTED: 12/13/8

PRODUCT APPLICATION : SOLVENT-BASED MICROBIAL CONTROL AGENT.

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD ARE LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

B-BROMO-B-NITROSTYRENE***CAS#7166-19-0;EYE,SKIN AND RESPIRATORY IRRITANT;
PEL:NONE;TLV:NONE.

METHYLENE BIS(THIOCYANATE)***CAS#6317-18-6;IRRITANT(SKIN);CORROSIVE (EYES);
TOXIC(ORAL INGESTION);PEL:NONE;TLV:NONE.

AROMATIC SOLVENTS,PREMIUM***CAS#64742-94-5;COMBUSTIBLE LIQUID;EYE IRRITANT;
PEL:NONE;TLV:100PPM MANUFACTURERS' SUGGESTED.

NONYLPHENOXYPOLY(ETHYLENEOXY)ETHANOL***CAS#9016-45-9;EYE AND SKIN IRRITANT;
PEL:NONE;TLV:NONE.

DIMETHYLFORMAMIDE(DMF)***CAS#68-12-2;COMBUSTIBLE;TOXIC(DERMAL ABSORPTION);
EMBRYOTOXIC(ANIMALS,HIGH DOSES);POTENTIAL LIVER AND KIDNEY TOXIN;
PEL:10PPM(SKIN);TLV:10PPM(SKIN).

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: 50% EXTRACT (APPROX.)	3.3	ODOR: HYDROCARBON
FL.PT.(DEG.F): 147	SETA(CC)	SP.GR.(70F)OR DENSITY: 0.973
VAPOR PRESSURE(mmHG): 8		VAPOR DENSITY(AIR=1): 1
VISC cps70F: 14.8		%SOLUBILITY(WATER): 1
EVAP.RATE: 1	ETHER=1	APPEARANCE: DARK GREEN TO AMBER
PHYSICAL STATE: LIQUID		FREEZE POINT(DEG.F): -30

-----SECTION 3-----REACTIVITY DATA-----

STABLE

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

MATERIAL SAFETY DATA SHEET (PAGE 2 OF 3)

PRODUCT: SLIMICIDE C41

EFFECTIVE DATE 10-31-88

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE

SEVERE IRRITANT TO THE SKIN.ABSORBED BY SKIN.SKIN SENSITIZER.

ACUTE EYE EFFECTS ***

CORROSIVE TO THE EYES

ACUTE RESPIRATORY EFFECTS *** PRIMARY ROUTE OF EXPOSURE

VAPORS,GASES,MISTS AND/OR AEROSOLS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT. PROLONGED EXPOSURE MAY CAUSE DIZZINESS AND HEADACHE.

CHRONIC EFFECTS OF OVEREXPOSURE***

PROLONGED OR REPEATED OVEREXPOSURES MAY CAUSE LIVER AND KIDNEY TOXICITY AND MAY CAUSE DEFATTING-TYPE DERMATITIS.

MEDICAL CONDITIONS AGGRAVATED ***

NOT KNOWN

SYMPTOMS OF EXPOSURE ***

INHALATION MAY CAUSE IRRITATION OF MUCOUS MEMBRANES AND RESPIRATORY TRACT;
SKIN CONTACT CAUSES SEVERE IRRITATION OR BURNS.

PRECAUTIONARY STATEMENT BASED ON TESTING RESULTS ***

MAY BE TOXIC IF INHALED.

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***

REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***

REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

-----SECTION 6-----SPILL,DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.CONTAIN AND ABSORB ON ABSORBENT MATERIAL.PLACE IN WASTE DISPOSAL CONTAINER.THE CONTAMINATED ABSORBENT SHOULD BE CONSIDERED A PESTICIDE AND DISPOSED OF IN AN APPROVED PESTICIDE LANDFILL.SEE PRODUCT LABEL STORAGE AND DISPOSAL INSTRUCTIONS.

REMOVE IGNITION SOURCES.FLUSH AREA WITH WATER.SPREAD SAND OR GRIT. ACTIVE INGREDIENTS MAY BE DEGRADED BY TREATING WITH AN AQUEOUS SOLUTION OF 5% SODIUM HYDROXIDE AND 5% SODIUM SULFITE OR SODIUM BISULFITE.ALTROUGH LESS EFFICIENT,A COMBINATION OF CAUSTIC SODA AND SODIUM THIOSULFATE MAY ALSO BE USED.

DISPOSAL INSTRUCTIONS***

WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT PRODUCT(AS IS)-

BURY IN AN APPROVED PESTICIDE FACILITY OR DISPOSE OF IN ACCORDANCE WITH LABEL INSTRUCTIONS

FIRE EXTINGUISHING INSTRUCTIONS***

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).

DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: SLIMICIDE C41

EFFECTIVE DATE 10-31-88

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS. VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS
RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, DUE TO POOR WARNING PROPERTIES, USE ORGANIC VAPOR/ACID GAS AND DUST/MIST RESPIRATOR ONLY AS PERMITTED BY RESPIRATOR MFG. FOR INGREDIENTS LISTED IN SECTION 1. OTHERWISE USE POSITIVE PRESSURE SUPPLIED-AIR RESPIRATOR.

RECOMMENDED SKIN PROTECTION***

GAUNTLET-TYPE NEOPRENE GLOVES, CHEMICAL RESISTANT APRON
WASH OFF AFTER EACH USE. REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES. FACE SHIELD

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

STORE IN COOL VENTILATED LOCATION. STORE AWAY FROM OXIDIZERS

HANDLING INSTRUCTIONS***

IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE
COMBUSTIBLE. DO NOT USE AROUND SPARKS OR FLAMES. BOND CONTAINERS
DURING FILLING OR DISCHARGE WHEN PERFORMED AT TEMPERATURES AT OR
ABOVE THE PRODUCT FLASH POINT.

THIS MSDS COMPLIES WITH THE OSHA HAZARD COMMUNICATION STANDARD
HAROLD M. HERSH (ENVIRONMENTAL INFORMATION COORDINATOR)

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED IN THE TSCA INVENTORY

...FIFRA(40CFR):EPA REG.NO. 3876- 127

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

TREAT AS OIL SPILL

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE, THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: NOT APPLICABLE

...DOT HAZARD CLASSIFICATION: COMBUSTIBLE

...DOT SHIPPING DESIGNATION IS: NA1993 COMBUSTIBLE LIQUID, N.O.S.

...THIS PRODUCT CONTAINS THESE CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER OR REPRODUCTIVE TOXICITY: NONE PRESENT IN SIGNIFICANT AMOUNTS

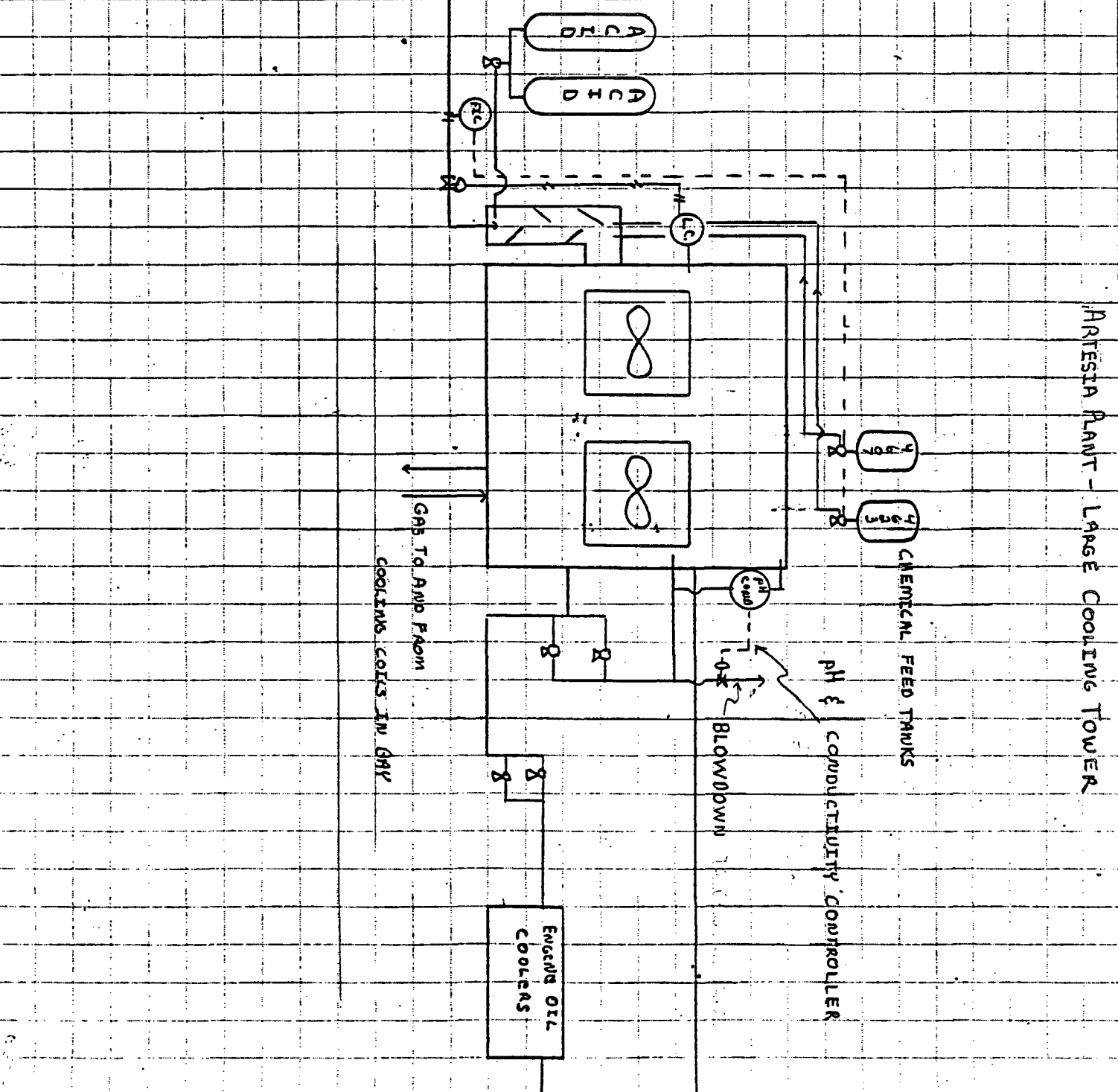
...SARA SECTION 302 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 313 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

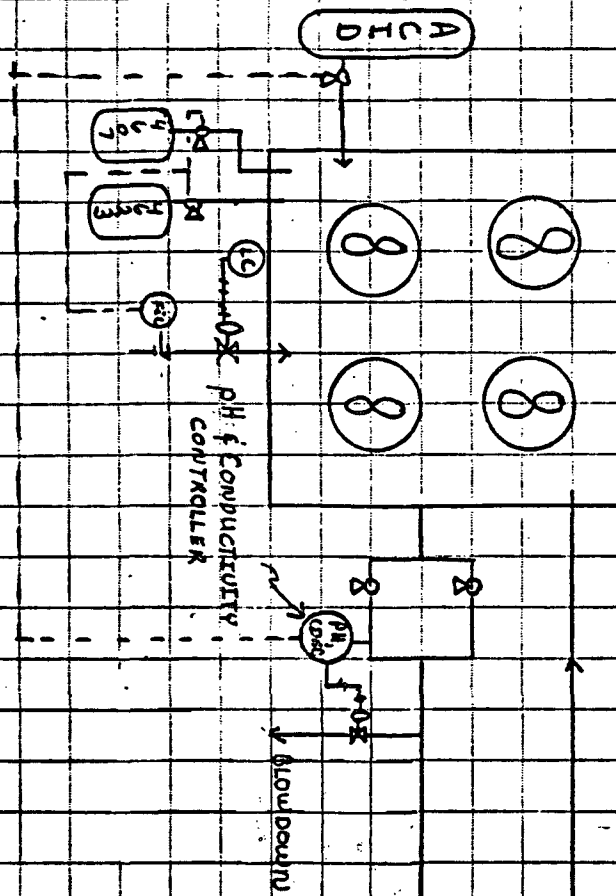
...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE), DELAYED(CHRONIC) AND FIRE

...MICHIGAN CRITICAL MATERIALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

NFPA/HMIS : HEALTH - 3 ; FIRE - 2 ; REACTIVITY - 0 ; SPECIAL - NONE ; PE - D



ARTESIA PLANT - SMALL COOLING TOWER



- TO SEAR COOLERS ON STEAM TANKS
- STELLER PRODUCT COOLER
- COOLING GAS COOLER
- AMINE COOLER
- REFRIGERANT CONDENSER
- REFRIGERANT SUG COOLER
- PRODUCT AIR-MS COOLER

ATTACHMENT 8

MATERIAL SAFETY DATA SHEET**EMERGENCY TELEPHONE NUMBER 215/355-3300****PRODUCT : BALANCED POLYMER 6400 SeriesEFFECTIVE DATE 1/84****FOR PROPOSAL USE ONLY****-----SECTION 1-----HAZARDOUS INGREDIENTS-----************** NEPA***** HEALTH - 2***** FIRE - 0***** REACTIVITY-0***** SPECIAL - ALK*************OSHA INGREDIENT PERMISSIBLE EXPOSURE LIMIT:****SODIUM HYDROXIDE-2MG/M3****ACGIH INGREDIENT TLV-TWA:****SODIUM HYDROXIDE-2MG/M3(CEILING)******* GENERIC DESCRIPTION *******AN AQUEOUS SOLUTION CONTAINING ANY OR ALL OF: SODIUM HYDROXIDE, SALTS OF EDTA, NITRATE, SILICATE, SULFITE, POLYCARBOXYLIC ACID, OR SULFONATED POLYCARBOXYLIC ACID; POLYALKYLENE GLYCOL; ANHYDROUS POLYPHOSPHATE.****-----SECTION 2-----TYPICAL PHYSICAL DATA-----**

PH:	B.P.T.OF OR B.RANGE: >200
FL.PT.(DEG.F): >200 SETA(CC)	SPGR.(70/70oF) OR DENSITY:
VAPOR PRESSURE(mmHG): 18	VAPOR DENSITY(AIR=1): <1
VISC cP@70oF: <10	%VOLATILES: ND
EVAP.RATE: <1 ETHER=1	%SOLUBILITY(WATER): 100
PHYSICAL STATE: LIQUID	APPEARANCE: COLORLESS TO YELLOW
ODOR: NONE	FREEZE POINT(DEG.F): 25 TO 41

-----SECTION 3-----REACTIVITY DATA-----**THERMAL DECOMPOSITION YIELDS OXIDES OF C,N,S,OR P IF PRESENT, STABLE****-----SECTION 4-----HEALTH HAZARD EFFECTS-----****ACUTE SKIN EFFECTS*******SEVERE IRRITANT TO THE SKIN****ACUTE EYE EFFECTS*******SEVERE IRRITANT TO THE EYES****ACUTE RESPIRATORY EFFECTS*******MISTS/AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT****CHRONIC EFFECTS*******CHRONIC EFFECTS OF THIS FORMULATION HAVE NOT YET BEEN FULLY EVALUATED****-----SECTION 5-----FIRST AID INSTRUCTIONS-----****SKIN CONTACT*******REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES****EYE CONTACT*******IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT****INHALATION EXPOSURE*******REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY****INGESTION*******GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER****OVER**

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

GENERAL-VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS. SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND OR GRIT.

DISPOSAL INSTRUCTIONS***

GENERAL-WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT

PRODUCT (AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

GENERAL-FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE). DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER. FOAM OR WATER CREATE A SLIPPERY CONDITION. SPREAD SAND OR GRIT

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST/FUME CARTRIDGES

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

GENERAL-KEEP CONTAINER CLOSED

SPECIFIC- PROTECT FROM FREEZING. IF FROZEN, THAW COMPLETELY AND MIX THOROUGHLY PRIOR TO USE

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE

SPECIFIC- ALKALINE. DO NOT MIX WITH ACIDIC MATERIAL.

-----SECTION 9-----FEDERAL REGULATIONS-----

FIFRA(40CFR): EPA REG. NO. NOT APPLICABLE

OSHA(29CFR)-FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATIONS. OTHERWISE, USE SUPPLIED AIR APPARATUS.

FDA(21CFR) INGREDIENTS AUTHORIZED UNDER: CONTACT BETZ

CWA(40CFR) REPORTABLE QUANTITY: AS IS PRODUCT (HAZARDOUS SUBSTANCE)

RCRA(40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# D002

DOT(49CFR) CLASSIFICATION: NOT APPLICABLE

USDA FEDERALLY INSPECTED MEAT AND POULTRY PLANTS- AUTHORIZATION: CONTACT BETZ

THIS FORM IS ESSENTIALLY EQUAL TO OSHA 20 FORM. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, BETZ LABORATORIES, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

HAROLD M. HERSH
ENVIRONMENTAL INFORMATION COORDINATOR

ATTACHMENT 8
BETZ INDUSTRIAL

4636 SOMERTON ROAD TREVOSE, PA. 19047

BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 215/355-3300

PRODUCT :CHELANT CL2

EFFECTIVE DATE 10-31-88

PRINTED: 12/15/8

PRODUCT APPLICATION : WATER BASED INTERNAL BOILER TREATMENT CHEMICAL.

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD ARE LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION.

ETHYLENEDIAMINE TETRAACETIC ACID, TETRASODIUM SALT*** (EDTA.4NA); CAS#64-02-8;
IRRITANT(SKIN); CORROSIVE(EYES); PEL:NONE; TLV:NONE.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: AS IS	(APPROX.) 13.5	ODOR: MILD
FL.PT.(DEG.F):	200 P-M(CC)	SP.GR.(70F)OR DENSITY: 10.9 LBS/GAL
VAPOR PRESSURE(mmHG):	18	VAPOR DENSITY(AIR=1): 1
VISC cps70F:	34	%SOLUBILITY(WATER): 100
EVAP.RATE: 1	ETHER=1	APPEARANCE: YELLOW
PHYSICAL STATE: LIQUID		FREEZE POINT(DEG.F): ND

-----SECTION 3-----REACTIVITY DATA-----

STABLE

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

MATERIAL SAFETY DATA SHEET (PAGE 2 OF 3)

PRODUCT: CHELANT CL2

EFFECTIVE DATE 10-31-88

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE

MODERATELY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS ***

CORROSIVE TO THE EYES

ACUTE RESPIRATORY EFFECTS ***

MISTS/AEROSOLS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***

PROLONGED OR REPEATED CONTACT MAY CAUSE PRIMARY IRRITANT DERMATITIS.

MEDICAL CONDITIONS AGGRAVATED ***

NOT KNOWN

SYMPTOMS OF EXPOSURE ***

INHALATION OF VAPORS/MISTS/AEROSOLS MAY CAUSE EYE, NOSE, THROAT AND LUNG IRRITATION; SKIN CONTACT MAY CAUSE SEVERE IRRITATION OR BURNS.

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***

REMOVE CONTAMINATED CLOTHING. WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES. IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***

REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR. APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DO NOT INDUCE VOMITING. IMMEDIATELY CONTACT PHYSICIAN. DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.

FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***

WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT PRODUCT (AS IS)-

INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE).

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER

MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: CHELANT CL2

EFFECTIVE DATE 10-31-88

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.

DO NOT STORE AT ELEVATED TEMPERATURES

HANDLING INSTRUCTIONS***

IMMEDIATELY REMOVE CONTAMINATED CLOTHING,WASH BEFORE REUSE

ALKALINE.CORROSIVE TO EYES.DO NOT MIX WITH ACIDIC MATERIAL.

THIS MSDS COMPLIES WITH THE OSHA HAZARD COMMUNICATION STANDARD

HAROLD M. HERSH (ENVIRONMENTAL INFORMATION COORDINATOR)

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED IN THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE

IDENTIFICATION NUMBER IS: D002=CORROSIVE

...DOT HAZARD CLASSIFICATION: NOT APPLICABLE

...DOT SHIPPING DESIGNATION IS: NOT APPLICABLE

...THIS PRODUCT CONTAINS THESE CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER OR REPRODUCTIVE TOXICITY: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 302 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 313 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE) AND DELAYED(CHRONIC)

...MICHIGAN CRITICAL MATERIALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

NFPA/HMIS : HEALTH - 3 ; FIRE - 1 ; REACTIVITY - 0 ; SPECIAL - ALK ; PE - B

ATTACHMENT 8

BETZ MATERIAL SAFETY DATA SHEET
EMERGENCY TELEPHONE NUMBER 215/355-3300
EFFECTIVE DATE 1/84

PRODUCT : SULFITE 3

* NFPA
* HEALTH - 2
* FIRE - 0
* REACTIVITY-0
* SPECIAL - -

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

OSHA INGREDIENT PERMISSIBLE EXPOSURE LIMIT:

SULFUR DIOXIDE-13MG/M3

ACGIH INGREDIENT TLV-TWA:

SODIUM BISULFITE-5MG/M3, SULFUR DIOXIDE-5MG/M3 (STEL=10MG/M3)

*** GENERIC DESCRIPTION ***

AN AQUEOUS SOLUTION CONTAINING A BISULFITE SALT, A COBALT SALT
AND AN ORGANOPHOSPHONATE.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

PH: AS IS (APPROX.) 4.1	B.P.T.OF OR B.RANGE: >200
FL.PT.(DEG.F): >200 SETA(CC)	SP.GR.(70/70°F)OR DENSITY: 1.241
VAPOR PRESSURE(mmHG): ND	VAPOR DENSITY(AIR=1): ND
VISC cps70°F: 4	%VOLATILES: ND
EVAP.RATE: <1 ETHER=1	%SOLUBILITY(WATER): 100
PHYSICAL STATE: LIQUID	APPEARANCE: PINK
ODOR: STRONG	FREEZE POINT(DEG.F): 18

-----SECTION 3-----REACTIVITY DATA-----

THERMAL DECOMPOSITION YIELDS OXIDES OF C,N,S OR P IF PRESENT,
REDUCING AGENT.DO NOT STORE OR MIX WITH OXIDIZING AGENTS.

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

ACUTE SKIN EFFECTS***
SEVERE IRRITANT TO THE SKIN
ACUTE EYE EFFECTS***
SEVERE IRRITANT TO THE EYES
ACUTE RESPIRATORY EFFECTS***
MISTS/AEROSOLS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT
CHRONIC EFFECTS***
CHRONIC EFFECTS OF THIS FORMULATION HAVE NOT YET BEEN FULLY EVALUATED

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF
SOAP SOLUTION OR WATER FOR 15 MINUTES
EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A
PHYSICIAN FOR ADDITIONAL TREATMENT
INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE
FIRST AID TREATMENT AS NECESSARY
INGESTION***
GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DILUTE CONTENTS OF STOMACH.INDUCE VOMITING BY ONE OF THE STANDARD
METHODS.IMMEDIATELY CONTACT A PHYSICIAN

OVER

PRODUCT: SULFITE 3

-----SECTION 6-----SPILL, DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

GENERAL-VENTILATE AREA, USE SPECIFIED PROTECTIVE EQUIPMENT. CONTAIN AND ABSORB ON ABSORBENT MATERIAL. PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL, OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.

SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. IF SO, SPREAD SAND OR GRIT.

DISPOSAL INSTRUCTIONS***

GENERAL-WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER, IN ACCORDANCE WITH ANY LOCAL AGREEMENT, A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT

PRODUCT (AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

GENERAL-FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS (FULL FACE-PIECE TYPE).

DRY CHEMICAL, CARBON DIOXIDE, FOAM OR WATER

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH ACID GASSES CARTRIDGES

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

FACE SHIELD, AIRTIGHT CHEMICAL GOGGLES

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

GENERAL-KEEP CONTAINER CLOSED

SPECIFIC- PROTECT FROM FREEZING

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE

SPECIFIC- ACIDIC. DO NOT MIX WITH ALKALINE MATERIAL.

-----SECTION 9-----FEDERAL REGULATIONS-----

OSHA (29CFR)-FOR RESPIRATORY PROTECTION USE PROPERLY FITTED MSHA/NIOSH APPROVED RESPIRATORY EQUIPMENT WITHIN USE LIMITATIONS. OTHERWISE, USE SUPPLIED AIR APPARATUS.

FDA (21CFR) INGREDIENTS AUTHORIZED UNDER: SECTION 173.310

CWA (40CFR) REPORTABLE QUANTITY: AS IS PRODUCT (HAZARDOUS SUBSTANCE)

1,685 GAL (SODIUM BISULFITE)

RCRA (40CFR): IF DISCARDED, THIS MATERIAL BEARS HWI# NOT APPLICABLE

DOT (49CFR) CLASSIFICATION: NOT APPLICABLE

THIS FORM IS ESSENTIALLY EQUAL TO OSHA 20 FORM. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, BETZ LABORATORIES, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

HAROLD M. HERSH
ENVIRONMENTAL INFORMATION COORDINATOR

BETZ LABORATORIES, INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19047
BETZ MATERIAL SAFETY DATA SHEET
24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 215/355-3300

PRODUCT : OPTI-MEEN SERIES PROPOSED C

(PAGE 1 OF 3)
EFFECTIVE DATE 05-18-89
PRINTED: 2-Jun-1989
REV: SEC.3

PRODUCT APPLICATION : NEUTRALIZING AMINE.

-----SECTION 1-----HAZARDOUS INGREDIENTS-----

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC
PRODUCT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS
LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE
AND CHRONIC HAZARDS OF THIS FORMULATION.

CYCLOHEXYLAMINE***CAS#108-91-8; FLAMMABLE; CORROSIVE; REPRODUCTIVE TOXIN;
TOXIC; PEL/TLV: 10PPM.

TRADE SECRET INGREDIENT; FLAMMABLE; CORROSIVE; PEL: NONE; TLV: NONE.

-----SECTION 2-----TYPICAL PHYSICAL DATA-----

: 5% SOL.	(APPROX.) 11.9	ODOR: AMINE
.PT. (DEG.F): 144	P-M(CC)	SP.GR. (70F) OR DENSITY: 0.964
POR PRESSURE (mmHG): 18		VAPOR DENSITY (AIR=1): <1
SC cps 70F: 20		% SOLUBILITY (WATER): 100
AP. RATE: ND	WATER=1	APPEARANCE: COLORLESS TO YELLOW
PHYSICAL STATE: LIQUID		FREEZE POINT (DEG.F): -2

-----SECTION 3-----REACTIVITY DATA-----

ABLE. MAY REACT WITH STRONG OXIDIZERS. DO NOT CONTAMINATE. BETZ TANK
LEAN-OUT CATEGORY 'B'

L DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

BETZ MATERIAL SAFETY DATA SHEET (PAGE 2 OF 3)

PRODUCT: OPTI-MEEN SERIES PROPOSED C

EFFECTIVE DATE 05-18-89

-----SECTION 4-----HEALTH HAZARD EFFECTS-----

CUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE

CORROSIVE TO SKIN.ABSORBED BY SKIN.POTENTIAL SKIN SENSITIZER.

EYE EFFECTS ***

CORROSIVE TO THE EYES

CUTE RESPIRATORY EFFECTS *** PRIMARY ROUTE OF EXPOSURE

VAPORS,GASES,MISTS AND/OR AEROSOLS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT. PROLONGED EXPOSURE MAY CAUSE DIZZINESS AND HEADACHE.

CHRONIC EFFECTS OF OVEREXPOSURE***

PROLONGED OR REPEATED CONTACT MAY CAUSE TISSUE NECROSIS.

MEDICAL CONDITIONS AGGRAVATED ***

NOT KNOWN

SYMPTOMS OF EXPOSURE ***

INHALATION MAY CAUSE IRRITATION OF MUCOUS MEMBRANES AND RESPIRATORY TRACT;
SKIN CONTACT CAUSES SEVERE IRRITATION OR BURNS.

PRECAUTIONARY STATEMENT BASED ON TESTING RESULTS ***

MAY BE TOXIC IF ORALLY INGESTED OR ABSORBED THROUGH SKIN.

-----SECTION 5-----FIRST AID INSTRUCTIONS-----

IN CONTACT***

REMOVE CLOTHING.WASH AREA WITH LARGE AMOUNTS OF SOAP SOLUTION OR WATER FOR 15 MIN.IMMEDIATELY CONTACT PHYSICIAN

EYE CONTACT***

IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***

REMOVE VICTIM FROM CONTAMINATED AREA.APPLY NECESSARY FIRST AID TREATMENT.IMMEDIATELY CONTACT A PHYSICIAN.

INGESTION***

DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

-----SECTION 6-----SPILL,DISPOSAL AND FIRE INSTRUCTIONS-----

SPILL INSTRUCTIONS***

VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.CONTAIN AND ABSORB ON ABSORBENT MATERIAL.PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL,OR ANY CONTAMINATED SOIL, SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.
REMOVE IGNITION SOURCES.FLUSH AREA WITH WATER.SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***

WATER CONTAMINATED WITH THIS PRODUCT MAY BE SENT TO A SANITARY SEWER TREATMENT FACILITY,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A PERMITTED WASTE TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
PRODUCT(AS IS)-

INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***

FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).

DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

BETZ MATERIAL SAFETY DATA SHEET (PAGE 3 OF 3)

PRODUCT: OPTI-MEEN SERIES PROPOSED C

EFFECTIVE DATE 05-18-89

-----SECTION 7-----SPECIAL PROTECTIVE EQUIPMENT-----

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE
RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

E VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS
RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT PRODUCT EXPOSURE IS LIKELY,
USE A RESPIRATOR WITH ORGANIC VAPOR CARTRIDGES.

RECOMMENDED SKIN PROTECTION***

GAUNTLET-TYPE NEOPRENE GLOVES, CHEMICAL RESISTANT APRON
WASH OFF AFTER EACH USE. REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES. FACE SHIELD

-----SECTION 8-----STORAGE AND HANDLING PRECAUTIONS-----

STORAGE INSTRUCTIONS***

KEEP DRUMS & PAILS CLOSED WHEN NOT IN USE.
STORE IN COOL VENTILATED LOCATION. STORE AWAY FROM OXIDIZERS

HANDLING INSTRUCTIONS***

GENERAL-IMMEDIATELY REMOVE CONTAMINATED CLOTHING, WASH BEFORE REUSE
SPECIFIC- COMBUSTIBLE. DO NOT USE AROUND SPARKS OR FLAMES. BOND CONTAINERS
DURING FILLING OR DISCHARGE WHEN PERFORMED AT TEMPERATURES AT OR
ABOVE THE PRODUCT FLASH POINT.

THIS MSDS COMPLIES WITH THE OSHA HAZARD COMMUNICATION STANDARD
ROLF M. HERSH (ENVIRONMENTAL INFORMATION COORDINATOR)

APPENDIX: REGULATORY INFORMATION

() CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE
EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE.
FUTURE CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

.TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED IN THE TSCA INVENTORY

.REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

9 GALLONS DUE TO CYCLOHEXYLAMINE

.RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE, THE RCRA HAZARDOUS WASTE
IDENTIFICATION NUMBER IS: D002=CORROSIVE

.DOT HAZARD CLASSIFICATION: CORROSIVE TO SKIN. COMBUSTIBLE

.DOT SHIPPING DESIGNATION IS: UN1760 CORROSIVE LIQUID, N.O.S.

.THIS PRODUCT CONTAINS THESE CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO
CAUSE CANCER OR REPRODUCTIVE TOXICITY: NONE PRESENT IN SIGNIFICANT AMOUNTS

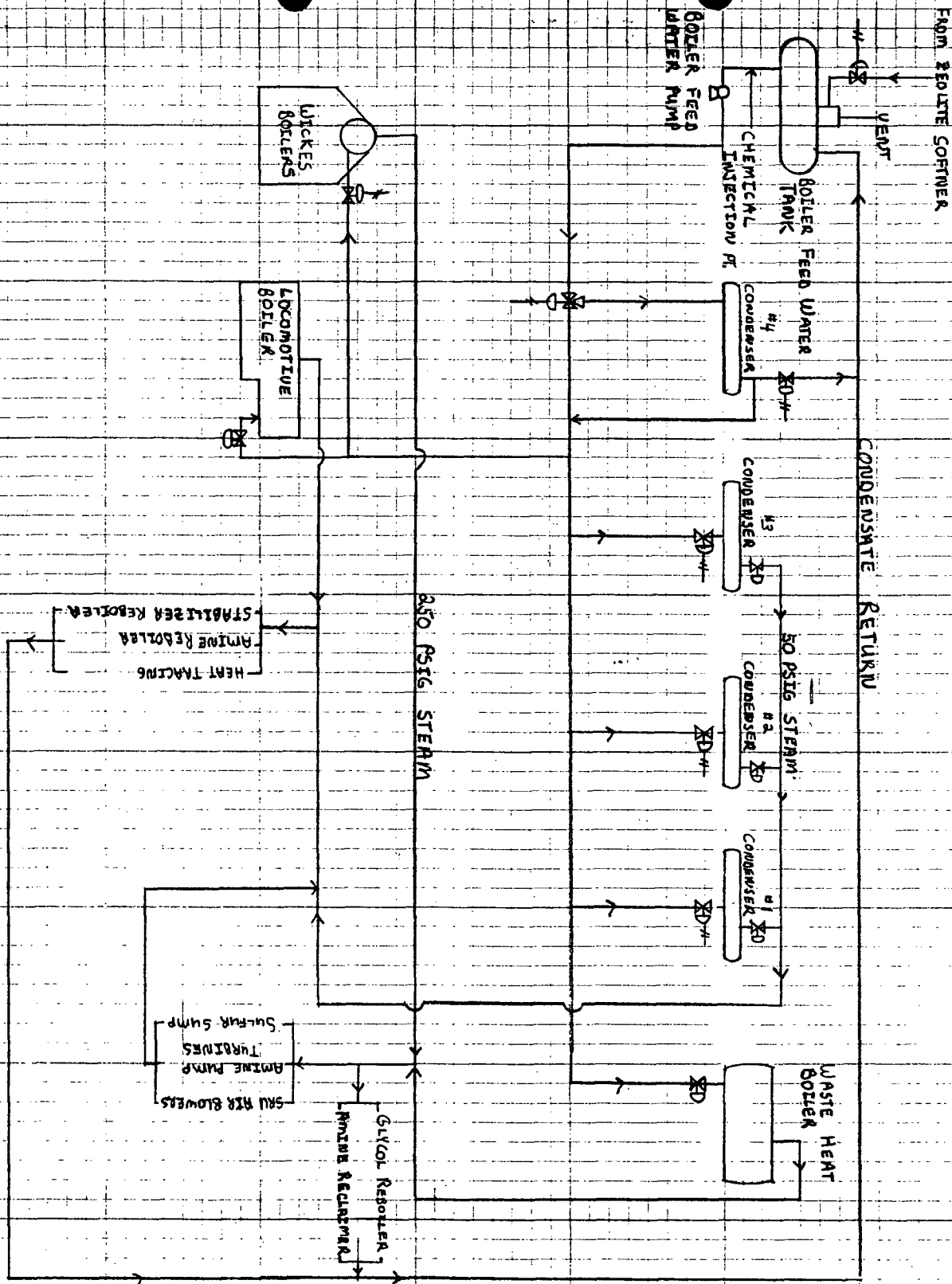
.SARA SECTION 302 CHEMICALS: CYCLOHEXYLAMINE(108-91-8) 11.0-15.0% ;

.SARA SECTION 313 CHEMICALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

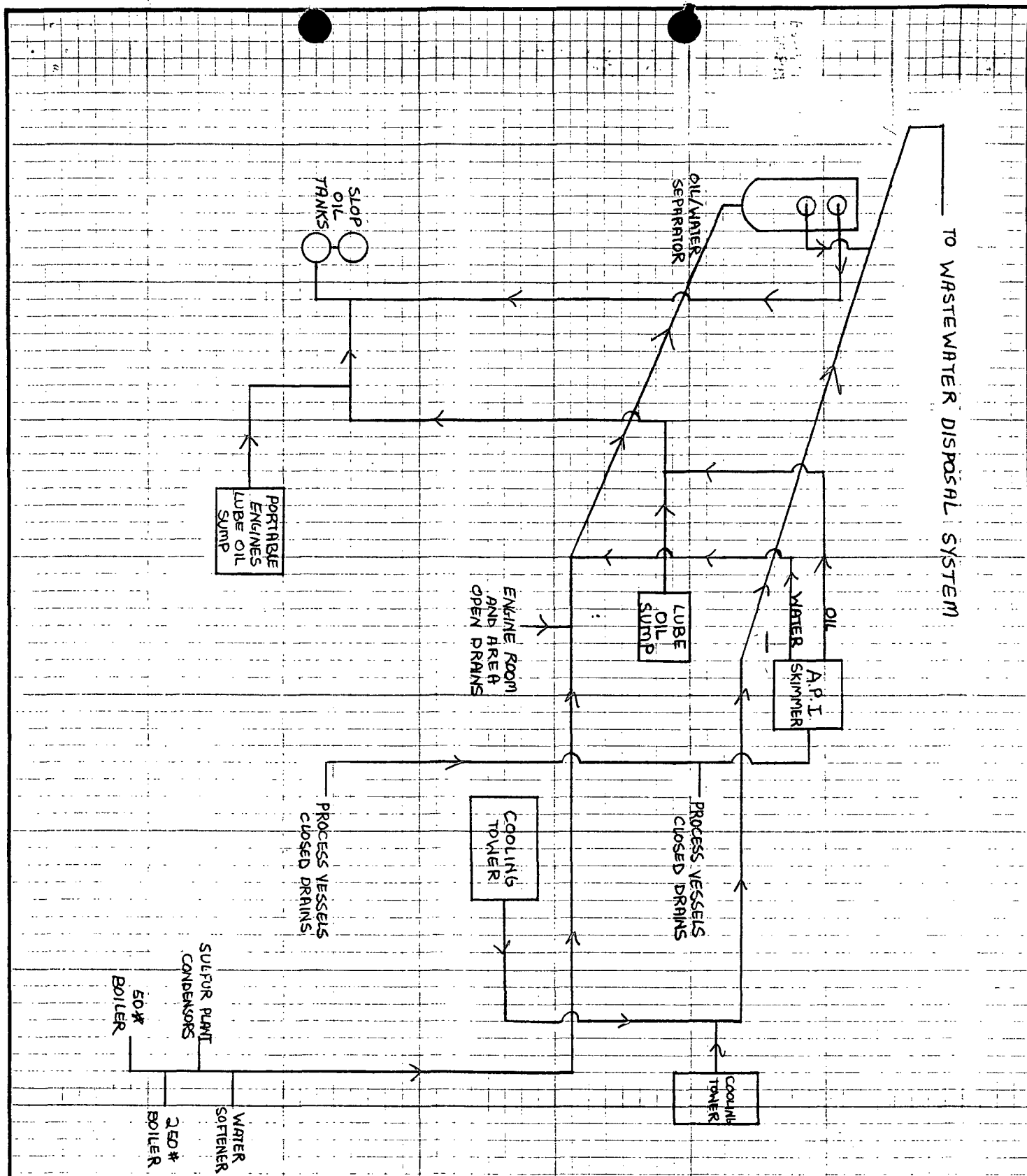
.SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE), DELAYED(CHRONIC) AND FIRE

.MICHIGAN CRITICAL MATERIALS: NONE PRESENT IN SIGNIFICANT AMOUNTS

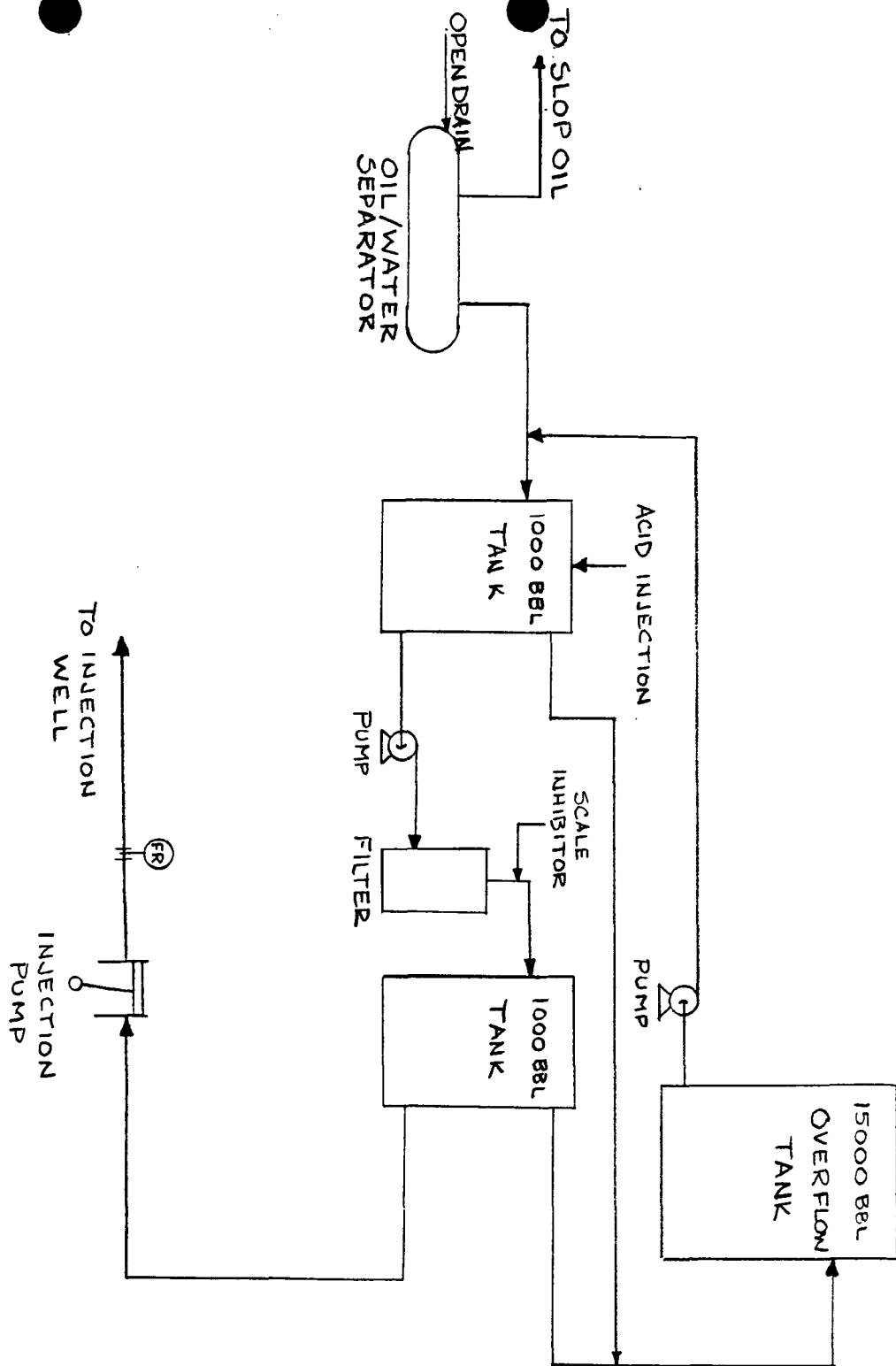
HAZARD/HMIS : HEALTH - 3 ; FIRE - 2 ; REACTIVITY - 0 ; SPECIAL - CORR ; PE - D



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS		PHILLIPS PETROLEUM COMPANY		JA NO.	FILE CODE
FOR APPR		BARTLESVILLE, OKLAHOMA		AFE NO.	SCALE
FOR CONST		ATESIA PLANT STEAM SYSTEM		DWG NO.	
DRAWN <i>stubs</i>		ATTACHMENT #9		SH NO.	
CHECKED					
APP'D					



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS		PHILLIPS PETROLEUM COMPANY		JA NO.	FILE CODE
FOR APPR		BARTLESVILLE, OKLAHOMA		AFE NO.	SCALE
FOR CONST		ARTESIA GASOLINE PLANT DRAIN SYSTEM		DWG NO.	
DRAWN		ATTACHMENT 10		SH NO.	
CHECKED					
APP'D					



NO.	REVISION	BY	DATE	CHKD	APP'D	
FOR BIDS		<div style="display: flex; justify-content: space-between;"> <div> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div> </div> </div>		AFE NO.		FILE CODE
FOR APPR				SCALE <i>NONE</i>		UNLESS OTHERWISE NOTED
FOR CONST				DWG NO.		
DRAWN <i>RDH</i>	9/84	ARTESIA GASOLINE PLANT WASTEWATER SYSTEM <i>ATTACHMENT II</i>		SH NO.		
CHECKED						
APP'D						



ATTACHMENT 12
SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue (915 - 683-3348) • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-W
Customer No. 3355796
Report No. 35020

Report Date 1-24-84

Date Received 12-21-83

Report of tests on: **Water**

Client: **Phillips Petroleum**

Identification: **Artesia Plant, Wastewater**

	mg/L
Aluminum-----Less Than	2
Arsenic-----Less Than	0.05
Barium-----Less Than	1
Boron-----	0.4
Cadmium-----Less Than	0.01
Chromium-----	0.00
Cobalt-----Less Than	0.1
Copper-----Less Than	0.1
Iron-----	0.3
Lead-----Less Than	0.05
Manganese-----	0.06
Mercury-----Less Than	0.002
Molybdenum-----Less Than	1
Nickel-----Less Than	0.5
Selenium-----Less Than	0.01
Silver-----Less Than	0.05
Zinc-----	0.06
Sulfate-----	357
Chloride-----	638
Fluoride-----	1.8
Nitrate-----	0.5
Cyanide-----Less Than	0.001
Phenols-----	0.060
Total Dissolved Solids @ 180° C-----	1984

Technician: **KLH, PCB, GMB**

Copies 3 cc: **Phillips Petroleum Co.**
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Larry M. Burch



ANALYSIS REQUEST FORM

Contract Lab Ana-lab Contract No. 78-521-07-013OCD Sample No. 9003151450

Collection Date	Collection Time	Collected by — Person/Agency	
3/15/90	1450	Anderson/Olson	OCD
SITE INFORMATION			
Sample location <u>Phillips Pet - Artesia Gas Plant</u>			
Collection Site Description <u>Cooling tower basin</u>			
			Township, Range, Section, Tract: | | | + | | + | + | |

SEND ENVIRONMENTAL BUREAU
FINAL NM OIL CONSERVATION DIVISION
REPORT PO Box 2088
TO Santa Fe, NM 87504-2088

SAMPLE FIELD TREATMENT — Check proper boxes

No. of samples submitted: 4 Vials + 2 plastic

- ☒ NF: Whole sample (Non-filtered)
☐ F: Filtered in field with 0.45 μ membrane filter
☐ PF: Pre-filtered w/45 μ membrane filter

- 4+1 ☒ NA: No acid added
☐ A: HCL
☐ A: 2ml H₂SO₄/L added
☒ A: 5ml HNO₃ added
☐ A: 4ml fuming HNO₃ added

FIELD COMMENTS:

SAMPLING CONDITIONS <input type="checkbox"/> Bailed <input type="checkbox"/> Pump <input checked="" type="checkbox"/> Dipped <input type="checkbox"/> Tap	Water level	—
	Discharge	—
	Sample type	<u>GRAB</u>
	Conductivity (Uncorrected)	<u>1100</u> μ mho
pH(00400)	—	
Water Temp. (00010)	<u>25°C</u>	Conductivity at 25° C <u>4</u> mho

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METHOD
<input checked="" type="checkbox"/> 001	VOA	8020	<input type="checkbox"/> 013	PHENOL	604	<input type="checkbox"/> 026	Cd	7130
<input type="checkbox"/> 002	VOA	602	<input type="checkbox"/> 014	VOC	8240	<input type="checkbox"/> 027	Pb	7421
<input checked="" type="checkbox"/> 003	VOH	8010	<input type="checkbox"/> 015	VOC	624	<input type="checkbox"/> 028	Hg(L)	7470
<input type="checkbox"/> 004	VOH	601	<input type="checkbox"/> 016	SVOC	8250	<input type="checkbox"/> 031	Se	7740
<input type="checkbox"/> 005	SUITE	8010-8020	<input type="checkbox"/> 017	SVOC	625	<input checked="" type="checkbox"/> 032	ICAP	6010
<input type="checkbox"/> 006	SUITE	601-602	<input type="checkbox"/> 018	VOC	8260	<input checked="" type="checkbox"/> 033	CATIONS/ANIONS	
<input type="checkbox"/> 007	HEADSPACE		<input type="checkbox"/> 019	SVOC	8270	<input type="checkbox"/> 034	N SUITE	
<input type="checkbox"/> 008	PAH	8100	<input type="checkbox"/> 020	O&G	9070	<input type="checkbox"/> 035	NITRATE	
<input type="checkbox"/> 009	PAH	610	<input type="checkbox"/> 022	AS	7060	<input type="checkbox"/> 036	NITRITE	
<input type="checkbox"/> 010	PCB	8080	<input type="checkbox"/> 023	Ba	7080	<input type="checkbox"/> 037	AMMONIA	
<input type="checkbox"/> 011	PCB	608	<input checked="" type="checkbox"/> 024	Cr	7190	<input type="checkbox"/> 038	TKN	
<input type="checkbox"/> 012	PHENOL	8040	<input type="checkbox"/> 025	Cr6	7198	<input type="checkbox"/>	OTHER	

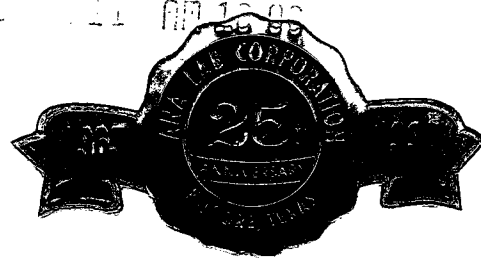


2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 214/984-0551

Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

06/07/90

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

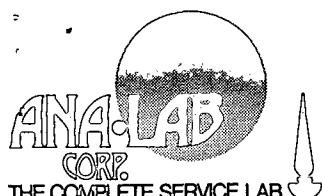


Sample Identification: Phillips- Cooling Tower
Collected By: Roger Anderson
Date & Time Taken: 03/15/90 1450
On Site Data: 9003151450
Others: Sampling Conditions Dipped Water Temp. 25°C Conductivity 1600 Grab

Lab Sample Number: 162259 Received: 03/21/90

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Acrolein	<100	ug/l	0049	03/31/90	EPA Method 8240	PH
Acrylonitrile	<100	ug/l	0049	03/31/90	EPA Method 8240	PH
Benzene	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
Bromoform	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
Bromomethane	<10	ug/l	0049	03/31/90	EPA Method 8240	PH
Carbon Tetrachloride	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
Chlorobenzene	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
Chloroethane	<10	ug/l	0049	03/31/90	EPA Method 8240	PH
2-Chloroethylvinyl ether	<10	ug/l	0049	03/31/90	EPA Method 8240	PH
Chloroform	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
Chloromethane	<10	ug/l	0049	03/31/90	EPA Method 8240	PH
Dibromochloromethane	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
Bromodichloromethane	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
1,1-Dichloroethane	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
1,2-Dichloroethane	<5	ug/l	0049	03/31/90	EPA Method 8240	PH
1,1-Dichloroethene	<5	ug/l	0049	03/31/90	EPA Method 8240	PH

continued



THE COMPLETE SERVICE LAB

Lab Sample Number:

2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 214/984-0551

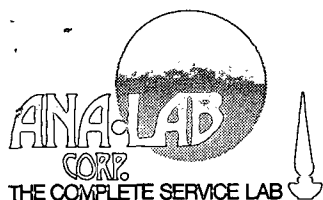
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162259 Continued

Page 2

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
trans-1,2-Dichloroethene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
1,2-Dichloropropane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
cis-1,3-Dichloropropene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Ethyl benzene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Methylene Chloride	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1,2,2-Tetrachloroethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Tetrachloroethene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Toluene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1,1-Trichloroethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1,2-Trichloroethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Trichloroethene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Vinyl Chloride	(10	ug/l	0849	03/31/90	EPA Method 8240	PM
trans-1,3-Dichloropropene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Iron	.6	ug/l	0935	06/04/90	EPA Method 236.1	CD
Alkalinity	13	mg/l	1200	04/03/90	EPA Method 310.1	DFK
Cation-Anion Balance	4.8	mg/l	0900	06/06/90	ference	NT
Carbonate	(.5	mg/l	1500	04/17/90	APHA Method 263	DFK
Chloride	170	mg/l	0900	03/22/90	EPA Method 325.3	SW
Specific Conductance	1900	Micromhos	2000	03/23/90	EPA Method 120.1	KLM
Bicarbonate	11	mg/l	1500	04/17/90	APHA Method 263	DFK
Sulfate	890	mg/l	1330	04/03/90	EPA Method 375.4	DFK

continued



THE COMPLETE SERVICE LAB

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Lab Sample Number:

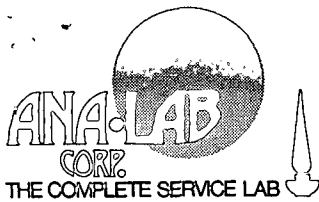
162259 Continued

Page 3

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Total Dissolved Solids	1680	mg/l	1200	04/12/90	EPA Method 160.1	DFK
pH	6.6	SU		03/22/90	EPA Method 150.1	LB
Calcium	240	mg/l	2300	03/29/90	EPA Method 215.1	SK
Chromium	1.05	mg/l	0830	03/29/90	EPA Method 218.1	MR
Potassium	30	mg/l	1120	04/13/90	EPA Method 258.1	BDG
Magnesium	48	mg/l	0015	04/05/90	EPA Method 242.1	SK
Sodium	130	mg/l	2200	03/29/90	EPA Method 273.1	SK

Quality Assurance for Sample Number 162259

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
Alkalinity									
	Standard	101	mg/l	100		101	1200	04/03/90	DFK
	Standard		mg/l			100	1200	04/03/90	DFK
162258	Duplicate	70	mg/l	69		101	1200	04/03/90	DFK
162258	Spike		mg/l		100	100	1200	04/03/90	DFK
Sulfate									
	Standard	97	mg/l	100		103	1330	04/03/90	DFK
162258	Duplicate	510	mg/l	510		100	1330	04/03/90	DFK
162258	Spike		mg/l		100	99	1330	04/03/90	DFK
Total Dissolved Solids									
	Standard	936	mg/l	1000		100	1200	04/12/90	DFK
163043	Duplicate	136	mg/l	132		103	1200	04/12/90	DFK
Potassium									
161990	Duplicate	156	mg/l	152		103	1120	04/13/90	BDG
162258	Duplicate	25	mg/l	23		100	1120	04/13/90	BDG
162261	Duplicate	4200	mg/l	4200		100	1120	04/13/90	BDG
162261	Spike		mg/l		.50	100	1120	04/13/90	BDG
Magnesium									
	Blank	.025	mg/l				0015	04/05/90	SK
	Blank	.026	mg/l				0015	04/05/90	SK
	Blank	.015	mg/l				0015	04/05/90	SK
	Blank	.026	mg/l				0015	04/05/90	SK
	Standard	.191	mg/l	.200		105	0015	04/05/90	SK
161322	Duplicate	2200	mg/l	2300		104	0015	04/05/90	SK
162121	Duplicate	1.2	mg/l	1.2		100	0015	04/05/90	SK
162258	Duplicate	410	mg/l	480		116	0015	04/05/90	SK




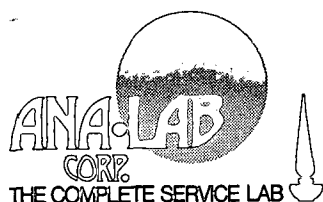
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Quality Assurance for Sample Number 162259

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
161322	Spike		mg/l		.196	90	0015	04/05/90	GK


C. H. Whiteside, Ph.D., President



2600 DUDLEY ROAD - KILGORE, TEXAS 75662 - 214/984-0551

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07/23/90

Environmental Bureau NM Oil D.
PO Box 2088
Santa Fe, NM 87504

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SANTA FE

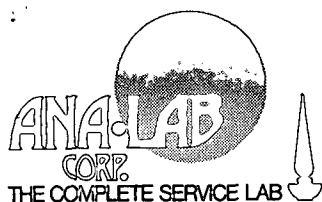
Sample Identification: Phillips- Cooling Tower
Collected By: Roger Anderson
Date & Time Taken: 03/15/90 1450
On Site Data: 9003151450
Other:

Sampling Conditions Dipped Water Temp. 25oC Conductivity 1600 Grab

Lab Sample Number: 162259 Received: 03/21/90 Client: SNM1

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Acrolein	(100	ug/l	0849	03/31/90	EPA Method 8240	PM
Acrylonitrile	(100	ug/l	0849	03/31/90	EPA Method 8240	PM
Benzene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Bromoform	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Bromomethane	(10	ug/l	0849	03/31/90	EPA Method 8240	PM
Carbon Tetrachloride	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Chlorobenzene	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Chloroethane	(10	ug/l	0849	03/31/90	EPA Method 8240	PM
2-Chloroethylvinyl ether	(10	ug/l	0849	03/31/90	EPA Method 8240	PM
Chloroform	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Chloromethane	(10	ug/l	0849	03/31/90	EPA Method 8240	PM
Dibromochloromethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
Bromodichloromethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1-Dichloroethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM
1,2-Dichloroethane	(5	ug/l	0849	03/31/90	EPA Method 8240	PM

continued



2600 DUDLEY ROAD — KILGORE, TEXAS 75662 — 214/984-0551

Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

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Lab Sample Number:

162259 Continued

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Page 2

OIL CONSERVATION DIV.
SANTA FE
METHOD

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
1,1-Dichloroethene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
trans-1,2-Dichloroethene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
1,2-Dichloropropane	15	ug/l	0849	03/31/90	EPA Method 8240	PM
cis-1,3-Dichloropropene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Ethyl benzene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Methylene Chloride	15	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1,2,2-Tetrachloroethane	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Tetrachloroethene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Toluene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1,1-Trichloroethane	15	ug/l	0849	03/31/90	EPA Method 8240	PM
1,1,2-Trichloroethane	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Trichloroethene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Vinyl Chloride	110	ug/l	0849	03/31/90	EPA Method 8240	PM
trans-1,3-Dichloropropene	15	ug/l	0849	03/31/90	EPA Method 8240	PM
Iron	.6	mg/l	0935	06/04/90	EPA Method 236.1	CD
Alkalinity	13	mg/l	1200	04/03/90	EPA Method 310.1	DFK
Cation-Anion Balance	4.8	mg/l	0900	06/06/90	ference	NT
Carbonate	1.5	mg/l	1500	04/17/90	APHA Method 263	DFK
Chloride	170	mg/l	0900	03/22/90	EPA Method 325.3	SM
Specific Conductance	1900	Micromhos	2000	03/23/90	EPA Method 120.1	KLM
Bicarbonate	11	mg/l	1500	04/17/90	APHA Method 263	DFK

continued



2600 DUDLEY ROAD - KILGORE, TEXAS 75662 - 214/984-0551

Analytical Chemistry • Waste Treatment & Disposal • Equipment Sales

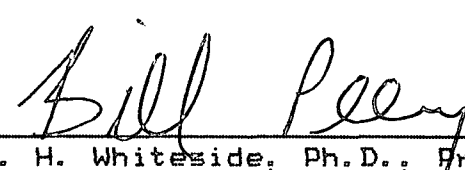
Lab Sample Number: 162259 Continued

Page 3

PARAMETER	RESULTS	UNITS	TIME	DATE	METHOD	BY
Sulfate	890	mg/l	1330	04/03/90	EPA Method 375.4	DFK
Total Dissolved Solids	1680	mg/l	1200	04/12/90	EPA Method 160.1	DFK
pH	6.6	SU		03/22/90	EPA Method 150.1	LB
Calcium	240	mg/l	2300	03/29/90	EPA Method 215.1	GK
Chromium	1.05	mg/l	0830	03/29/90	EPA Method 218.1	MR
Potassium	30	mg/l	1120	04/13/90	EPA Method 258.1	GOG
Magnesium	48	mg/l	0015	04/05/90	EPA Method 242.1	GK
Sodium	130	mg/l	2200	03/29/90	EPA Method 273.1	GK

Quality Assurance for Sample Number 162259

Sample #	Description	Result	Units	Dup/Std Value	Spk Conc.	Percent	Time	Date	By
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C. H. Whiteside, Ph.D., President

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OIL CONSERVATION DIV.
SANTA FE



PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 918 661-6600

LEGAL

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JAN 31 1992

OIL CONSERVATION DIV.
SANTA FE

January 30, 1992

New Mexico Oil Conservation Division
State Land Office Building
Attn: Roger Anderson
310 Old Santa Fe Trail
Santa Fe, NM 87504

Gentlemen:

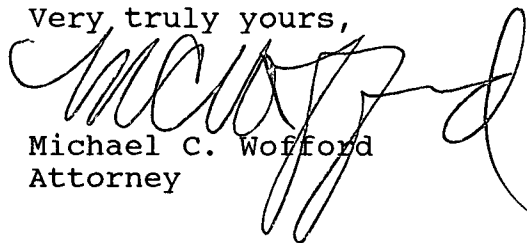
By agreement dated December 27, 1991 John Scott, Vice President, Quality, Environment, and Safety, Phillips Petroleum Company, and Robert Koch, promoter for the transferee, informed you of the transfer of certain permits, to wit:

Artesia Gas Plant	Permit No. GW-23
Eunice Gas Plant	Permit No. GW-16
Hobbs Booster	Permit No. GW-44
Lee Gas Plant	Permit No. GW-2

from Phillips Petroleum Company to "Phillips Gas Company". However, Phillips Gas Company, the permit transferee, will immediately change its name to "Phillips 66 Natural Gas Company."

Therefore, please have your records reflect that the above permits are to be held by Phillips 66 Natural Gas Company as of February 1, 1992.

Very truly yours,



Michael C. Wofford
Attorney

MCW:klk
/158



STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

ANALYSIS REQUEST FORM

Contract Lab Ana-labContract No. 78-521-07-013OCD Sample No. 9003151450

Collection Date	Collection Time	Collected by — Person/Agency
3/15/90	1450	Anderson/Olson

SITE INFORMATION

Sample location

Phillips Pet - Artesia Gas Plant

Collection Site Description

Cooling Tower basin

Township, Range, Section, Tract:

SEND
REPORT
ENVIRONMENTAL BUREAU
NM OIL CONSERVATION DIVISION
PO Box 2088
Santa Fe, NM 87504-2088

SAMPLE FIELD TREATMENT — Check proper boxes

No. of samples submitted: 4 Vials + 2 plastic

- ☒ NF: Whole sample (Non-filtered)
☐ F: Filtered in field with 0.45 μ membrane filter
☐ PF: Pre-filtered w/45 μ membrane filter

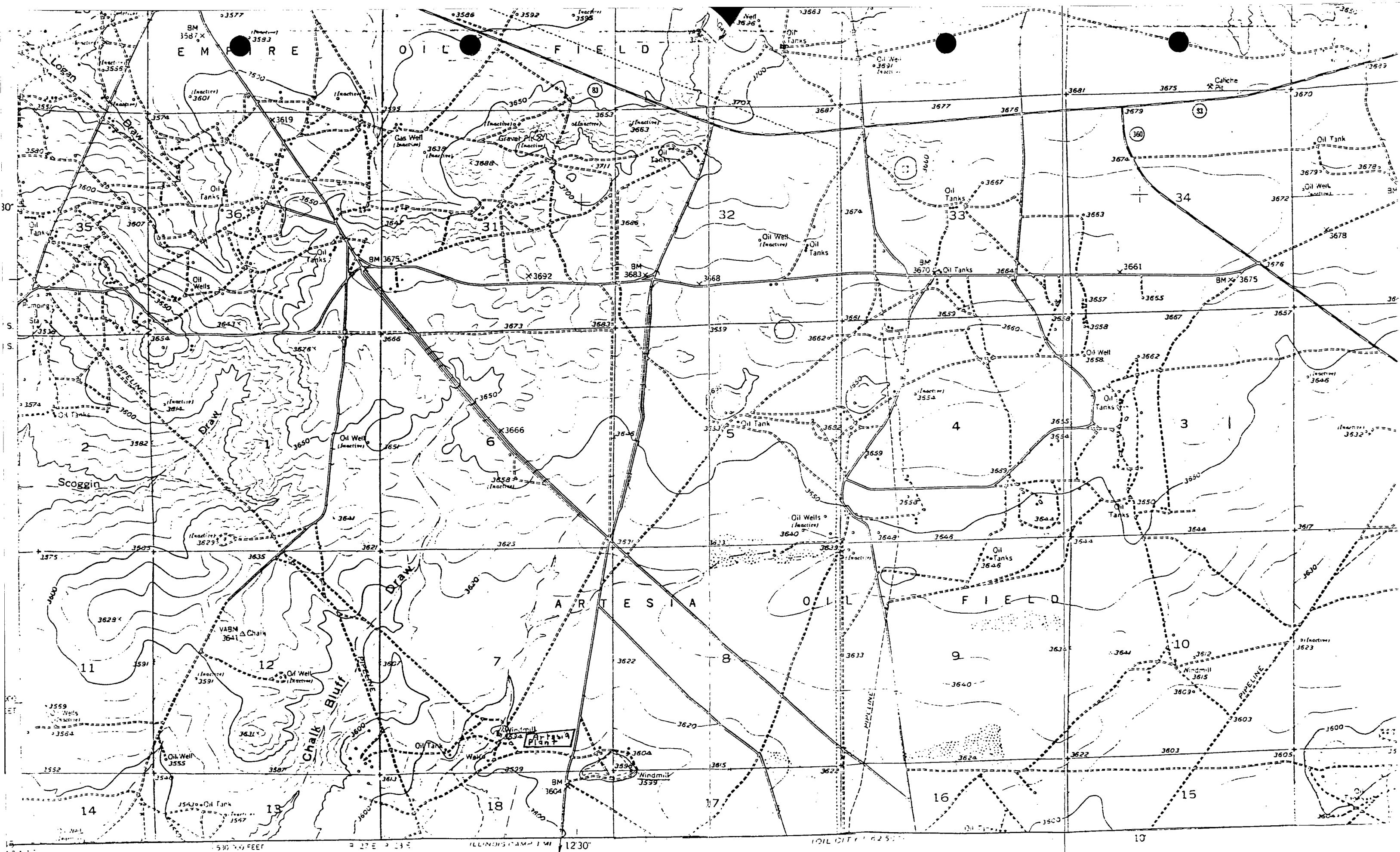
- 4+1 ☒ NA: No acid added
☐ A: HCL
☐ A: 2ml H₂SO₄/L added
☒ A: 9.0ml HNO₃ added
☐ A: 4ml fuming HNO₃ added

FIELD COMMENTS:

SAMPLING CONDITIONS	Water level	—
	Discharge	—
<input type="checkbox"/> Bailed <input type="checkbox"/> Pump <input checked="" type="checkbox"/> Dipped <input type="checkbox"/> Tap	Sample type	<u>GRAB</u>
pH(00400)	Conductivity (Uncorrected)	<u>1100</u> "mho
Water Temp. (00010)	Conductivity at 25° C	<u>25°C</u> mho

LAB ANALYSIS REQUESTED:

ITEM	DESC	METHOD	ITEM	DESC	METHOD	ITEM	DESC	METH
<input checked="" type="checkbox"/> 001	VOA	8020	<input type="checkbox"/> 013	PHENOL	604	<input type="checkbox"/> 026	Cd	7
<input type="checkbox"/> 002	VOA	602	<input type="checkbox"/> 014	VOC	8240	<input type="checkbox"/> 027	Pb	7
<input checked="" type="checkbox"/> 003	VOH	8010	<input type="checkbox"/> 015	VOC	624	<input type="checkbox"/> 028	Hg(L)	7
<input type="checkbox"/> 004	VOH	601	<input type="checkbox"/> 016	SVOC	8250	<input type="checkbox"/> 031	Se	7
<input type="checkbox"/> 005	SUITE	8010-8020	<input type="checkbox"/> 017	SVOC	625	<input checked="" type="checkbox"/> 032	ICAP	6
<input type="checkbox"/> 006	SUITE	601-602	<input type="checkbox"/> 018	VOC	8260	<input checked="" type="checkbox"/> 033	CATIONS/ANIONS	
<input type="checkbox"/> 007	HEADSPACE		<input type="checkbox"/> 019	SVOC	8270	<input type="checkbox"/> 034	N SUITE	
<input type="checkbox"/> 008	PAH	8100	<input type="checkbox"/> 020	O&G	9070	<input type="checkbox"/> 035	NITRATE	
<input type="checkbox"/> 009	PAH	610	<input type="checkbox"/> 022	AS	7060	<input type="checkbox"/> 036	NITRITE	
<input type="checkbox"/> 010	PCB	8080	<input type="checkbox"/> 023	Ba	7080	<input type="checkbox"/> 037	AMMONIA	
<input type="checkbox"/> 011	PCB	608	<input checked="" type="checkbox"/> 024	Cr	7190	<input type="checkbox"/> 038	TKN	
<input type="checkbox"/> 012	PHENOL	8040	<input type="checkbox"/> 025	Cr6	7198	<input type="checkbox"/>	OTHER	



Maped, edited, and published by the Geological Survey

Scale 1:50,000

ATTACHMENT 13

NOTICE OF PUBLICATION

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations, the following discharge plan renewal applications have been submitted to the Director of the Oil Conservation Division, State Land Office Building, P. O. Box 2088, Santa Fe, New Mexico 87504-2088, Telephone (505) 827-5800:

(GW-20) Conoco Inc., Rick McCalip, Director of Safety and Environmental Services, P. O. Box 2197, HU 3048, Houston, Texas 77252, has submitted an application for renewal of its previously approved discharge plan for its Maljamar Gas Plant located in Sections 21 and 28, Township 17 South, Range 32 East, NMPM, Lea County, New Mexico. Approximately 2300 gallons per day of process wastewater is disposed in Conoco Inc.'s waterflood project for secondary oil recovery. The waterflood project consists of Class II injection wells and was approved by Oil Conservation Commission Order No. R-2403. The wastewater has a total dissolved solids concentration of approximately 3240 mg/l. Ground water most likely to be affected by any discharge to the surface is at a depth of approximately 120 feet with a total dissolved solids concentration of 440 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

(GW-25) Warren Petroleum Company, L.T. Reed, Senior Engineer, P. O. Box 1589, Tulsa, Oklahoma 74102, has submitted an application for renewal of its previously approved discharge plan for its Monument Gas Processing Plant located in the SW/4, Section 36, Township 19 South, Range 36 East and the NW/4, Section 1, Township 20 South, Range 36 East, NMPM, Lea County, New Mexico. Approximately 50,000 gallons per day of process wastewater is disposed of in an OCD approved Class II injection well. The wastewater has a total dissolved solids concentration of approximately 2800 mg/l. Ground water most likely to be affected by any discharge to the surface is at a depth of approximately 35 to 60 feet with a total dissolved solids concentration ranging from 500 to 3000 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.

(GW-23) Phillips 66 Natural Gas Company, Michael D. Ford, Environmental Scientist, 4001 Penbrook, Odessa, Texas 79762, has submitted an application for renewal of its previously approved discharge plan for its Artesia Plant located in Section 7, Township 18 South, Range 28 East, NMPM, Eddy County, New Mexico. Approximately 23,000 gallons per day of process wastewater is disposed of in an OCD approved Class II injection well. The total dissolved solids concentration of the wastewater is approximately 2000 mg/l. Ground water most likely to be affected by any discharge to the surface is at a depth of 85 feet with a total dissolved solids concentration of 300 mg/l. The discharge plan addresses how spills, leaks or other discharges to the ground will be handled.



STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

January 5, 1990

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT NO. P-918-402-161

Mr. Michael D. Ford
Environmental Representative
PHILLIPS 66 NATURAL GAS COMPANY
4001 Penbrook
Odessa, Texas 79762

***RE: Discharge Plan GW-23
Artesia Gas Processing Plant
Eddy, County, New Mexico***

Dear Mr. Ford:

On July 1, 1985, the ground water discharge plan, GW-23 for the Phillips Petroleum Artesia Gas Processing Plant located in Section 7, Township 18 South, Range 28 East, NMPM, Eddy County, New Mexico, was approved by the Director of the Oil Conservation Division (OCD). This discharge plan was required and submitted pursuant to Water Quality Control Commission (WQCC) regulations and was approved for a period of five years. The approval will expire on July 1, 1990.

If your facility continues to have effluent or leachate discharges and you wish to continue discharging, please submit your application for renewal of plan approval as quickly as possible. The OCD is reviewing discharge plan submittals and renewals carefully and the review time can often extend for several months. Please indicate whether you have made, or intend to make, any changes in your discharge system, and if so, include an application for plan amendment with your application for renewal. To assist you in preparation of your renewal application, I have enclosed a copy of the OCD's guidelines for preparation of ground water discharge plans at natural gas processing plants. These guidelines are presently being revised to include berming of tanks, curbing and paving of process areas susceptible to leaks or spills and the disposition of any solid wastes. Please include these items in your renewal application.

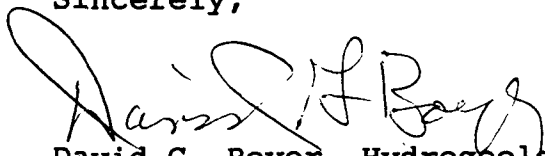
Mr. Michael D. Ford
January 5, 1990
Page -2-

If you no longer have such discharges and discharge plan renewal is not needed, please notify this office.

Please note that all gas plants, refineries and compressor stations in excess of 25 years of age will be required to submit plans for, or the results of, an underground drainline testing program as a requirement for discharge plan renewal.

If you have any questions, please do not hesitate to contact Roger Anderson at (505) 827-5884.

Sincerely,

A handwritten signature in dark ink, appearing to read "David G. Boyer", is written over the typed name and title.

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB/sl

Enclosure

cc: OCD Artesia Office



PHILLIPS 66 NATURAL GAS COMPANY

A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK, PHONE: 915 367-1266

OIL CONSERVATION DIVISION
RECEIVED

90 JAN 9 AM 8 42

January 3, 1990

Pit Closures
Artesia Gasoline Plant

CERTIFIED MAIL
RETURN RECEIPT NO. P-512 089 771

Mr. Roger C. Anderson
Environmental Engineer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Anderson:

This is to notify you we have completed closing the abandoned wastewater ponds at our Artesia Plant. Backfilling of the ponds was completed on December 22, 1989.

If you should have any questions regarding this information, please contact me at (915) 367-1316.

Very truly yours,

Michael D. Ford

Michael D. Ford
Environmental Representative

MDF

Attachment

Submit 4 Copies
to Appropriate
District Office

State of New Mexico
Energy, Minerals and Natural Resources Department

Form C-134
Aug. 1, 1989

DISTRICT I
P.O. Box 1980, Hobbs, NM 88241-1980

DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

OIL CONSERVATION DIVISION

P.O. Box 2088
Santa Fe, New Mexico 87504-2088

SEP -5 '89

Permit No. A-009
(For Division Use Only)

O. C. D.

**APPLICATION FOR EXCEPTION TO DIVISION ORDER R-8952
FOR PROTECTION OF MIGRATORY BIRDS Rule 8(b), Rule 105(b), Rule 312(h), Rule 313, or Rule 711(I)**

Operator Name: Phillips 66 Natural Gas Company

Operator Address: 4001 Penbrook, Odessa, Texas 79762

Lease or Facility Name Artesia Plant Open Steel Tank Location SE/4 7 18-S 28-E
Ut. Ltr. Sec. Twp. Rge

Size of pit or tank: 100' Dia.

Operator requests exception from the requirement to screen, net or cover the pit or tank at the above-described facility.

 The pit or tank is not hazardous to migratory waterfowl. Describe completely the reason pit is non-hazardous.

The tank is to be netted by October 31, 1989.

1) If any oil or hydrocarbons should reach this facility give method and time required for removal:

Any oil or hydrocarbons which reach tank will be removed by vacuum truck
within one day.

2) If any oil or hydrocarbons reach the above-described facility the operator is required to notify the appropriate District Office of the OCD with 24 hours.

 Operator proposes the following alternate protective measures: In the interim prior to netting
completion, good maintenance standards will be upheld to minimize risk to
migratory birds.

CERTIFICATION BY OPERATOR: I hereby certify that the information given above is true and complete to the best of my knowledge and belief.

Signature L. M. Sanders Title Supervisor, Reg/Pro Date September 1, 1989

Printed Name L. M. Sanders Telephone No. (915) 367-1488

FOR OIL CONSERVATION DIVISION USE

Date Facility Inspected

Inspected by

Approved by

Title

Date

until 11-1-90



PHILLIPS 66 NATURAL GAS COMPANY
A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK, PHONE: 915 367-1266

OIL CONSERVATION DIVISION
RECEIVED

'89 OCT 23 AM 8 52

October 20, 1989

Pit Closure Procedure
Artesia Gasoline Plant

CERTIFIED MAIL
RETURN RECEIPT NO. P-512 089 718

Mr. Roger C. Anderson
Environmental Engineer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Anderson:

Per our recent phone conversation, this is to provide you with our proposed procedure for closing the abandoned wastewater ponds at Artesia Plant. As you are aware, the plant was recently removed from the RCRA system and NMEID jurisdiction (see attached letter) enabling us to finally close the ponds.

Our plans are to use the pond dikes and demolition waste currently stored near the ponds as fill material. Some caliche may also have to be hauled in and used as fill. We will mound the top of the ponds to ensure rainwater runs off and does not accumulate. This work is scheduled to begin on or before November 15, 1989 and be completed by year's end.

If you should have any questions regarding this information, please contact me at (915) 367-1316.

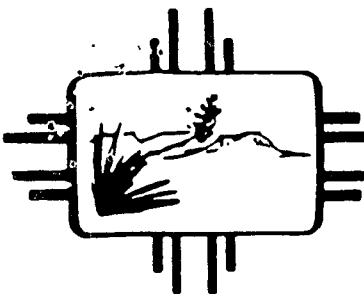
Very truly yours,

Michael D. Ford

Michael D. Ford
Environmental Representative

MDF

Attachment



New Mexico Health and Environment Department

Dennis Boyd
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

September 13, 1989

William F. Ballard, Manager
Phillips Petroleum Company
12 A4 Phillips Bldg.
Bartlesville, OK 74004

RE: RCRA status Artesia, Eunice, Lee and Lusk Plants-
NMD000709667, NMD000709634, NMD000709675, NMD000709659

Dear Mr. Ballard:

The New Mexico Environmental Improvement Division (NMEID), accepts Phillips Petroleum Company's (Phillips') position presented in their May 17, 1989 correspondence that the four Phillips facilities in New Mexico, Artesia, Eunice, Lee and Lusk are exempt from RCRA regulation based upon EPA's Regulatory Determination of July 6, 1988 Federal Register. NMEID also accepts Phillips' Certificate of No Hazardous Waste Activity included in the May 17, 1989 correspondence.

NMEID's acceptance of Phillips' position does not remove Phillips from regulation under the Hazardous Waste Management Regulations, (HWMR-5, as amended 1989) and the New Mexico Hazardous Waste Act, New Mexico Statutes Annotated 1978, (1989, Supp.), if Phillips transports, treats, stores or disposes of hazardous wastes in the future. To the extent that Phillips generates hazardous wastes, Phillips is subject to the generator requirements of HWMR-5.


If NMEID receives any new information that indicates that Phillips has been or may be regulated under RCRA, enforcement actions will be initiated. With NMEID's acceptance of Phillips' position, compliance with the April 19, 1988 Compliance Order/Schedule is determined to be resolved. However, Phillips may still be subject to EPA enforcement actions.

Mr. Ballard
September 13, 1989
Page 2

A copy of EPA's response to NMEID's request to provide an interpretation of the oil and gas exemption in the July 6, 1988 Federal Register is enclosed for Phillips' information.

If you have any questions or need additional information, please call me at (505) 827-2926.

Sincerely,


Boyd Hamilton
Program Manager
Hazardous Waste Program

BH/SMM/smm

Encl.

cc: Lynn Prince, EPA Region 6
Tracy Hughes, Office of General Counsel, EID
Knut Am, Phillips Petroleum Company
Reese B. Copeland, Phillips Petroleum Company



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 8

1445 ROSS AVENUE, SUITE 1200

DALLAS, TEXAS 75202

July, 18, 1989

Mr. Boyd Hamilton
Program Manager
Hazardous Waste Program
New Mexico Health and Environment Department
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, New Mexico 87503

Dear Mr. Hamilton:

On June 8, 1989, you requested that the Environmental Protection Agency (EPA) provide an interpretation of the so called oil and gas exemption to the Resource Conservation and Recovery Act (RCRA) as delineated in the Regulatory Determination in the July 6, 1988, Federal Register (FR). Specifically, you asked if the exemption applied to four gas plants operated by Phillips Petroleum Company (Phillips) in eastern New Mexico. This request was prompted by Phillips' assertion, in a letter dated May 17, 1989, that the surface impoundments in question are not RCRA regulated units based on that regulatory determination. Phillips supported this position with a certificate of no hazardous waste activity for the four plants.

In EPA's regulatory determination, on Page 25454, cooling tower blowdown is specifically included in the wastes exempted from RCRA regulation. However, gas plant cooling tower cleaning wastes are specifically excluded from the exemption. These determinations are based on the three criteria included as an attachment to the June 6, 1989, letter from Dan Derkics, (Chief, Large Volume Waste Section EPA Headquarters) to Julie Wanslow, a copy of which was included in your letter to me of June 15, 1989. Mr. Derkics letter states that cooling tower blowdown "... is comprised only of water, scale or other wastes generated by the actual operation of the cooling tower ... included as part of the functional operation of the cooling tower." The Region interprets this to mean that corrosion inhibitors and biological control agents are included in cooling tower blowdown.

Mr. Derkics also clarifies the meaning of cooling tower cleaning wastes as those wastes which, may be generated by any cooling tower and includes "...solvents, scrubbing agents or other cleaning materials introduced

into the process solely to remove-buildup or otherwise clean the equipment, and are not included as part of the functional operation of the cooling tower." Such wastes are not intrinsically derived from primary field operations for natural gas production. The Region interprets this to mean that the wastes generated during the periodic cleaning are not exempt.

In their No Hazardous Waste Activity Certificate, Phillips states that both chromate and non-chromate chemicals have been used in the cooling towers since November 19, 1980, as corrosion inhibitors at these sites. They further state that cooling towers must be cleaned on a periodic basis (approximately once every five years) and that this cleaning consists of removing the sludge by vacuum truck from the basin and removing scale from the cooling coil heads and laterals by sandblasting. Phillips also asserts that these materials have been tested and are not hazardous wastes.

One of the reasons that cleaning waste from a cooling tower may be RCRA hazardous waste is due to the chemicals added to the system for corrosion inhibition or control of biological agents. Chromate compounds have been widely used in this application as they have at the Phillips gas plants. Discarded materials generated in the cooling tower would be hazardous waste, as that term is defined in 40 CFR §261.3, when the chromium concentration reaches 5.0 mg/l when tested using the procedures for EP toxicity.

If the waste generated during the periodic cleaning exceeds a concentration of 5.0 mg/l for chromium, then the waste is hazardous waste. Phillips claims the waste is tested in their certificate but they do not provide enough information for a determination of the adequacy of the testing. Should this waste be EP Toxic and should it be placed in the same surface impoundments as the cooling tower blowdown, then the units are RCRA regulated regardless of the exemption for cooling tower blowdown. If on the other hand these conditions are not met, then the material is not hazardous waste. At the very least, the coil heads and laterals have the potential of having significant levels of chromium waste/scale which must be sandblasted off. It is this cooling tower cleaning waste that may make the units regulated, however, such a determination is not possible from the information provided in the certificate.

Some discussion is necessary about a mixture of an exempted waste and a non-exempted waste. EPA has in the past exempted some such mixtures as in the case of ash waste and flue gas emission control waste generated primarily from the combustion of coal and fossil fuels. [40 CFR 261.4(b)(4)] However, the wastes which are co-disposed and also exempt are those materials generated in conjunction with the exempted wastes. The waste materials are not segregated from the combustion wastes. Wastes which

are segregated and disposed of or treated separately from combustion wastes and otherwise meet the definition of a hazardous waste are regulated under RCRA. This determination was made in 1981 in response to the Utility Solid Waste Activities Group.

The clearest exposition of EPA's stand regarding the applicability of the mixture rule when an exempted waste is mixed with a hazardous waste is found in the proposed rule published in the Federal Register on April 17, 1989, for mining waste.

"EPA has decided, however, that it is appropriate to revise the proposed regulatory status of some mixtures of non-excluded 'characteristic' wastes and Bevill wastes. In these instances, the mixture will be considered a hazardous waste if it exhibits one or more of the same hazardous characteristics that are exhibited by the non-excluded waste. If the mixture exhibits one or more hazardous characteristics that are exhibited by the Bevill waste but not by the non-excluded characteristic waste, then the mixture is not hazardous waste.

EPA wishes to make clear, however that in any case, mixing a characteristic hazardous waste with a Bevill waste would require a RCRA treatment, storage or disposal permit.... "

Although this interpretation applies to a proposed mining waste rule, EPA's Office of General Counsel has assured the Region that the same idea applies in the petroleum exclusion.

Clearly, if at any time the cooling tower cleaning waste meets the definition of hazardous waste and it is mixed with the exempted waste, the unit where mixing takes place is a regulated unit.

The interpretations of the exemption contained in this letter are consistent with those of EPA's Office of General Counsel.

I would suggest that EID review Phillip's analysis and all available information to determine if the cooling tower cleaning waste is EP-toxic for chromium or is not. You should also determine what quantity of waste is generated and if this waste is/was placed in the surface impoundments after 1980.

Although further investigation/evidence is required to conclusively determine the regulatory status of these sites, I hope the information provided above will prove useful to your staff. If your staff has any questions, please have them call Court Fesmire at (214) 655-6775.

Sincerely,



Randall E. Brown, Chief
RCRA Enforcement Branch

cc: Tracy Huges
Office of General Counsel
NMEID



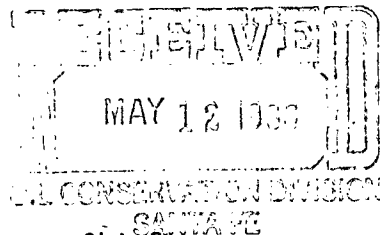
PHILLIPS 66 NATURAL GAS COMPANY

A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

May 10, 1988

Permitting Correspondence
Emergency Overflow Pit
East Vacuum Central Tank Battery



Mr. David Boyer
Environmental Bureau Chief
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Boyer:

Attached, per your request, is a copy of the correspondence regarding the permitting of the lined emergency overflow pit at our East Vacuum Central Tank Battery.

If you should have any questions regarding this information, please contact me at (915) 367-1316.

Very truly yours,

Michael D. Ford

Michael D. Ford
Environmental Analyst

MDF

Attachments

N O T E G R A M

March 8, 1979

To: J. W. Maharg
(r) W. W. Allen

From: R. L. Loper

Subject: East Vacuum Grayburg-San Andres Unit -
Emergency Overflow Pit

Joe Woodson and I met with Mr. Les Clements, field representative of the New Mexico Oil Conservation Division, yesterday, February 27, 1979 in Hobbs. We discussed our proposed emergency overflow pit at the Central Tank Battery and showed Mr. Clements the general tank battery layout and pit construction drawings. Mr. Clements stated that we could proceed with construction of the pit as planned and no application or permit will be required. They will expect the pit to be lined and will not allow it to hold produced water on a continuous basis.

Mr. Clements asked that he be kept advised of construction status and stated that he or another representative would probably visit the construction site from time to time. More out of curiosity than for inspection.

We touched upon the question of handling salt water flow during our drilling program. Mr. Clements' position was that he (New Mexico Oil Conservation Division) should be advised immediately we encounter a salt water flow, day or night. He further indicated that construction of a temporary, lined holding pit for containment of the water flow would be acceptable provided the Oil Conservation Division had been notified and that the rancher was aware of the problem and agreed to the pit. Mr. Clements' had no problem with our using the emergency overflow pit (if completed) for holding salt water on an emergency basis.

/hh

cc: J. O. Woodson
T. L. Surratt
C. A. Benson
(r) F. G. Schuman

Houston, Texas 77024 Phone: (713) 465-7545 DATE: May 22, 1979
 VENDOR: DATE OF ORDER: June 1, 1979 DESCRIPTION: REFERENCE: *W Smith 5/24*
 SEND COPIES TO: EST. EXTRA COPIES P.O. REQ.
 USED FOR: **Pit Liner - EVGSAU CTR, Emergency Overflow Pit**
 ADDITIONAL INFO: **RUSH THIS ORDER! We must do this work immediately to keep sand from blowing out of pit.**

PURCHASE ORDER

No. **9-606099-TF**

Koto-Lisa Loc
9225 Katy Freeway Suite 328
Houston 77024

DATE: *6/6/79*
 AND MAIL TO COMPANY SHOWN BELOW SEPARATE ITEMIZED AND EXTENDED INVOICE IN TRIPLICATE FOR EACH SHIPMENT, SHOWING ABOVE ORDER NO. INCLUDING PREFIX AND SUFFIX.

SHOW OUR ORDER NO. AND CONSIGNEE ADDRESS ON ALL SHIPPING PAPERS AND TAGS

Phillips Petroleum Company
 c/o T. L. Surratt
 EVGSAU Central Tank Battery
 Buckeye, New Mexico
 Phone: (505) 393-3573

PURCHASER: *Roseline 6328*
 PHILLIPS PETROLEUM COMPANY
 Purchasing
 BARTLESVILLE, OKLAHOMA 74004
 ROUTE: *6-12*
 F.O.B. DEST. _____ ORIG. _____

REFER ALL INQUIRIES TO: (IF NO ADDRESS IS SHOWN BELOW, SEND INQUIRIES TO PURCHASING)

CHARGE TO: *R Lopez* AFE # P-2160
 East Vacuum Co-SA Unit Central Tank Battery
 INVOICES, PACKING LISTS AND TAGS SHOULD SHOW CHARGE AND IF APPLICABLE PHILLIPS STOCK NUMBER

ITEM NO.	QUANTITY	DESCRIPTION
1	1	Fibre Line Pit Liner installed at East Vacuum Grayburg-San Andres Unit Emergency overflow pit near Buckeye, New Mexico. - see drawings attached. SH MP-10-0 Vendor shall: <ol style="list-style-type: none"> 1) Manufacture the Fibre-line sheets. 2) Deliver lining, materials, and supplies to job site. 3) Complete installation of the lining. 4) Double line the 4' x 4' x 2' concrete sump and seal to the outlet pipe. 5) Seal the inlet pipe to the liner. 6) Shape and refill anchor ditch for sealing purposes—Phillips will dig ditch, and fill and pack ditch after installation of liner. 7) Be required only to hand rake sand pad if necessary. Sand pad shall otherwise be installed and maintained by Phillips.

GENERAL INFO.

PURCHASE ORDER

No.

606099

DATE _____

CHARGE

AND MAIL TO COMPANY SHOWN BELOW SEPARATE ITEMIZED AND EXTENDED INVOICE IN TRIPLICATE FOR EACH SHIPMENT, SHOWING ABOVE ORDER NO. INCLUDING PREFIX AND SUFFIX.

PURCHASER -

PHILLIPS PETROLEUM COMPANY
Purchasing
BARTLESVILLE, OKLAHOMA 74004

SHIP BY

VIA:

01

PREPAID UNINSURED UNITED PARCEL SERVICE OR PARCEL POST IF PACKAGE(S) MEETS REGULATIONS; OTHERWISE, THE LEAST EXPENSIVE OF MOTOR FREIGHT OR EXPRESS.

□ 2

MOTOR
FREIGHTRAIL
FOR

RAIL FREIGHT

OTHER

ROUTE

F.O.B. DEST.

ORIG.

**CHARGE
TO**

RFE
NO

INVOICES, PACKING LISTS AND TAGS SHOULD SHOW

CHARGE AND IF APPLICABLE

PHILLIPS STOCK NUMBER

[illegible]

6

ORDERING DIVISION COPY

FORM 3503

VENDOR

DATE RECEIVED AT SITE

DESCRIPTION

DATE PREPARED

REFERENCE NO.

EST.

EXTRA COPIES
P.O. REQ'D.

ADDITIONAL INFO.

PURCHASE ORDER

No.

606099

DATE

CHARGE PURCHASER -

AND MAIL TO COMPANY SHOWN BELOW SEPARATE ITEMIZED AND EXTENDED INVOICE IN TRIPLICATE FOR EACH SHIPMENT, SHOWING ABOVE ORDER NO. INCLUDING PREFIX AND SUFFIX.

SHOW OUR ORDER NO. AND CONSIGNEE ADDRESS ON ALL SHIPPING PAPERS AND TAGS

PHILLIPS PETROLEUM COMPANY
Purchasing
BARTLESVILLE, OKLAHOMA 74004

SHIP BY

VIA:

☐ 1.

PREPAID UNINSURED UNITED PARCEL SERVICE OR PARCEL POST IF PACKAGE(S) MEETS REGULATIONS, OTHERWISE, THE LEAST EXPENSIVE OF MOTOR FREIGHT OR EXPRESS.

☐ 2.

MOTOR FREIGHT

RAIL FREIGHT

OTHER

ROUTE

F.O.B. DEST.

ORIG.

REFER ALL INQUIRIES TO: (IF NO ADDRESS IS SHOWN BELOW, SEND INQUIRIES TO PURCHASING)

CHARGE TO

RFE NO.

INVOICES, PACKING LISTS AND TAGS SHOULD SHOW

CHARGE AND IF APPLICABLE

PHILLIPS STOCK NUMBER

ITEM NO.	QUANTITY	DESCRIPTION
		NOTE: In reference to Kote-Line's bid attached per conversation Schuman/Jarrell 5-16-79:
		1. Deduct \$1500 if Phillips digs anchor ditch.
		2. Kote-Line will gel coat at least 20 feet down here at no extra charge.
		3. Kote-Line will use 17,000 volt holiday detector on seams in field, and will visually inspect and spot check sheets in plant with holiday detector.
		4. Kote-Line's bid is for a lump sum of \$1,225/ft ² , with the total cost estimated for a 100,000 ft ² pit.
		5. The pit is already constructed.
		Lining . 750 sq ft
		John & Equis . 400 sq ft
		Installation with . 1075 sq ft

6

ORDERING DIVISION COPY

FORM 3503



713 - 465-7545
915 - 563-0576

9225 Katy Freeway
12101 East Highway 80

Suite 325
P.O. Box 4595

Houston, Texas 77024
Odessa, Texas 79760

May 15, 1979

Phillips Petroleum Co.
4001 Penbrook
Odessa, Texas 79762

RE: Pit Lining
East Vacuum Grayberg-San Andres Unit
Lea County, New Mexico

Attn: Mr. Fred Schuman

Gentlemen:

Subject to your acceptance, Kote-Line, Inc., offeres to perform the following:

To furnish labor, equipment, and materials to manufacture, deliver and install one (1) "FIBRE-LINE" pit lining in your overflow pit with dimensions of 290' X 290' X 9' loacted near Buckeye, New Mexico.

Manufacture and Deliver

100,000 Ft. ²	@ \$.750/Ft. ²	\$75,000.
--------------------------	---------------------------	-----------

Install

Labor and Equipment	@ \$.400/Ft. ²	\$40,000.	
Materials	@ \$.075/Ft. ²	<u>\$ 7,500.</u>	
Total	@ \$.475/Ft. ²		<u>\$47,500.</u>
LUMP SUM BID:	\$1.225/Ft. ²		\$122,500.

State sales taxes are in addition to the base price.

The invoicing will be for the actual amount of lining material installed.
Invoices will be issued when the liner material is received at the job site.
Progress invoicing is normally done for the installation of the lining.

THE BASE PRICE INCLUDES:

1. Manufacturing of "FIBRE-LINE" sheets.
2. Delivery of the lining, materials, and supplies to the job site.
3. Complete installation of the lining.
4. Double lining the 4' X 4' X 2' concrete sump and sealing to the outlet pipe.
5. Sealing the inlet pipe to the liner.

6. Digging and shaping of the anchor ditch.
7. Refilling the anchor ditch only for sealing purposes. The dirt contractor must fill and pack the ditch and level the dike.
8. Hand raking only of the sand pad or receiving surface. The sand pad must be maintained by the dirt contractor.
9. Per Diem and travel expenses will be the responsibility of Kote-Line, Inc.
10. Cleaning job site.

The pit is to be prepared by your dirt contractor. Kote-Line, Inc. will furnish a Supervisor during the final stages of the dirt work to see that the finished surface is satisfactory to receive the liner. Usually the sand pad is installed directly before the liner is layed. If additional dirt work other than the final hand raking is done, it will be invoiced as per our labor and equipment rate schedule.

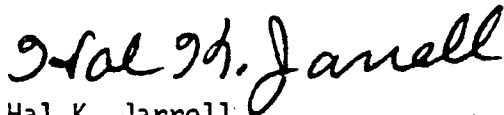
Manufacturing can commence within ten (10) days after notification and installation can commence the following week. Four weeks maximum should be allowed for installing the lining. At present we have over 100,000 square feet of lining in stock. We should be able to start the job immediately.

The "FIBRE-LINE" FRP lining is guaranteed against defects in material and workmanship for a period of ten (10) years. A written warranty is delivered at the completion of the job.

If further information is required for the acceptance of this bid, please advise.

Sincerely,

KOTE-LINE, INC.



Hal K. Jarrell
President

HKJ/lp
enc.



713 - 465-7545
915 - 563-0576

9225 Katy Freeway
12101 East Highway 80

Suite 325
P.O. Box 4595

Houston, Texas 77024
Odessa, Texas 79760

PHILLIPS PETROLEUM COMPANY

LEA COUNTY, NEW MEXICO FACILITY

PIT LINING SPECIFICATION

REFERENCE DRAWINGS: Pond Layout and Cross Sections, Drawing
No. PED-100.

I. SCOPE OF WORK

Furnish and install one "FIBRE-LINE", fiberglass reinforced plastic pond lining at the Lea County, New Mexico Facility.

II. GENERAL

1. The liner fabricator will furnish all supervision, insurance, labor, equipment, hand tools and materials for manufacturing and to provide complete installation of the lining.
2. Surfaces to be lined shall be smooth and free of all sharp rocks and objects, vegetation, stubble, etc., which could damage liner or prevent it from laying smoothly. An authorized representative of the fabricator shall certify in writing that the surface on which the lining is to be placed is acceptable. No installation of lining shall commence until this certificate is furnished. It shall be the responsibility of the dirt contractor to keep the receiving surface in the accepted condition until complete installation of the lining is accomplished.

III. MANUFACTURING

1. Polyester resin shall be a Kote-Line, Inc. flexible Iso with wax additive.
2. The lining material shall be 65 mils minimum thickness FRP sheets. The construction shall be a layer of 90# kraft paper and a layer of 1½ oz. fiberglass mat saturated with resin.
3. The sheet size shall be 10' x 50'.
4. The finished sheet shall be free of holes, blemishes, delaminations, or other defects.
5. All sheets shall be 100% visually inspected by the fabricator during fabrication and any defects marked at the plant for field repair.

IV. SHIPPING

1. The sheets shall be rolled into bundles with a one foot (1') minimum core diameter and secured with four (4) strips of banding straps.

V. INSTALLATION

1. Liner sheets are to be rolled out, cut and positioned, overlapped 3" to 4", stapled and/or riveted and the seams sandblasted.
2. Catalyzed resin shall be applied to the sandblasted seam, a layer of 6" wide 2 oz. fiberglass mat positioned, a second layer of resin applied and rolled out with paint rollers to finish out the seam.
3. The liner shall be anchored in the ground a minimum of one foot (1') at the top of each slope. The anchor ditch is to be dug and shaped by Kote-Line.
4. No fiberglass or sandblasted areas shall be left exposed either in the fabricated sheet or in the field seam.
5. Inspection of the installed lining shall be performed. All defects shall be repaired by solvent cleaning or sandblasting, then applying additional fiberglass mat and resin.

VI. GEL COATING

1. Not required.

VII. SAFETY

1. The fabricator shall instruct the installation crew of the hazards of installation, such as handling sheets in high winds, applying and handling resins and solvents, fire hazards, and walking on wet sheeted slopes. Soft rubber shoes are best for walking on the liner. Work gloves shall be worn while handling the sheets. Plastic gloves shall be worn while handling liquid resin and catalyst.

VIII. QUALITY OF WORKMANSHIP

1. All joints and seals upon completion of work shall be tightly bonded. Upon completion of the installation of the liners, the fabricator shall remove all trash, waste material and equipment. The work areas shall be left in a neat and acceptable condition.

IX. ACCEPTANCE OF INSTALLATION

1. No leakage will be allowed. If any leakage occurs prior to final acceptance, the fabricator shall make the necessary repairs in accordance with procedures under this specification. If the inspection indicates no leakage and all other parts of installation are satisfactory, the liner will be accepted.

X. WARRANTY

1. The installed "FIBRE-LINE" liner is guaranteed against defects in material and workmanship for a period of ten (10) years.

XI. COMPLIANCE WITH GOVERNMENT REGULATIONS:

The "FIBRE-LINE" Liner shall:

1. Have a permeability less than or equal to 10^{-7} cm./sec.
2. Be used which are expected to last 25% longer than the expected time of facility usage.
3. Be placed on a stable base.
4. Satisfactorily resist attack from ozone, ultraviolet rays, soil bacteria and fungus.
5. Have ample weather resistance to withstand the stress of freezing and thawing.
6. Have adequate tensile strength to elongate sufficiently and withstand the stress of installation or use of machinery or equipment.
7. Resist laceration, abrasion and puncture from any matter that may be contained in the fluids it will hold.
8. Be of uniform thickness, free of thin spots, cracks, tears, blisters and foreign particles.
9. Be easily repaired.



713 - 465-7545
915 - 563-0576

9225 Katy Freeway
12101 East Highway 80

Suite 325
P.O. Box 4595

Houston, Texas 77024
Odessa, Texas 79760

WARRANTY

To: Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

Date:

Invoice No.:

Covering: 1 - 100,000 Ft² FIBRE-LINE" Pond Lining installed in your
overflow pit located in Lea County, New Mexico.

Kote-Line, Inc. does hereby unconditionally guarantee the materials
used in lining the above overflow pit and the workmanship in applying
said materials for a period of ten (10) years from the above date of
completion of said work.

TERMS & CONDITIONS

Upon notification of our main office listed above, in the event that
this lining should fail during the warranty period we will repair the
lining using the same type and kind of FRP lining as originally installed
at no extra charge to the customer.

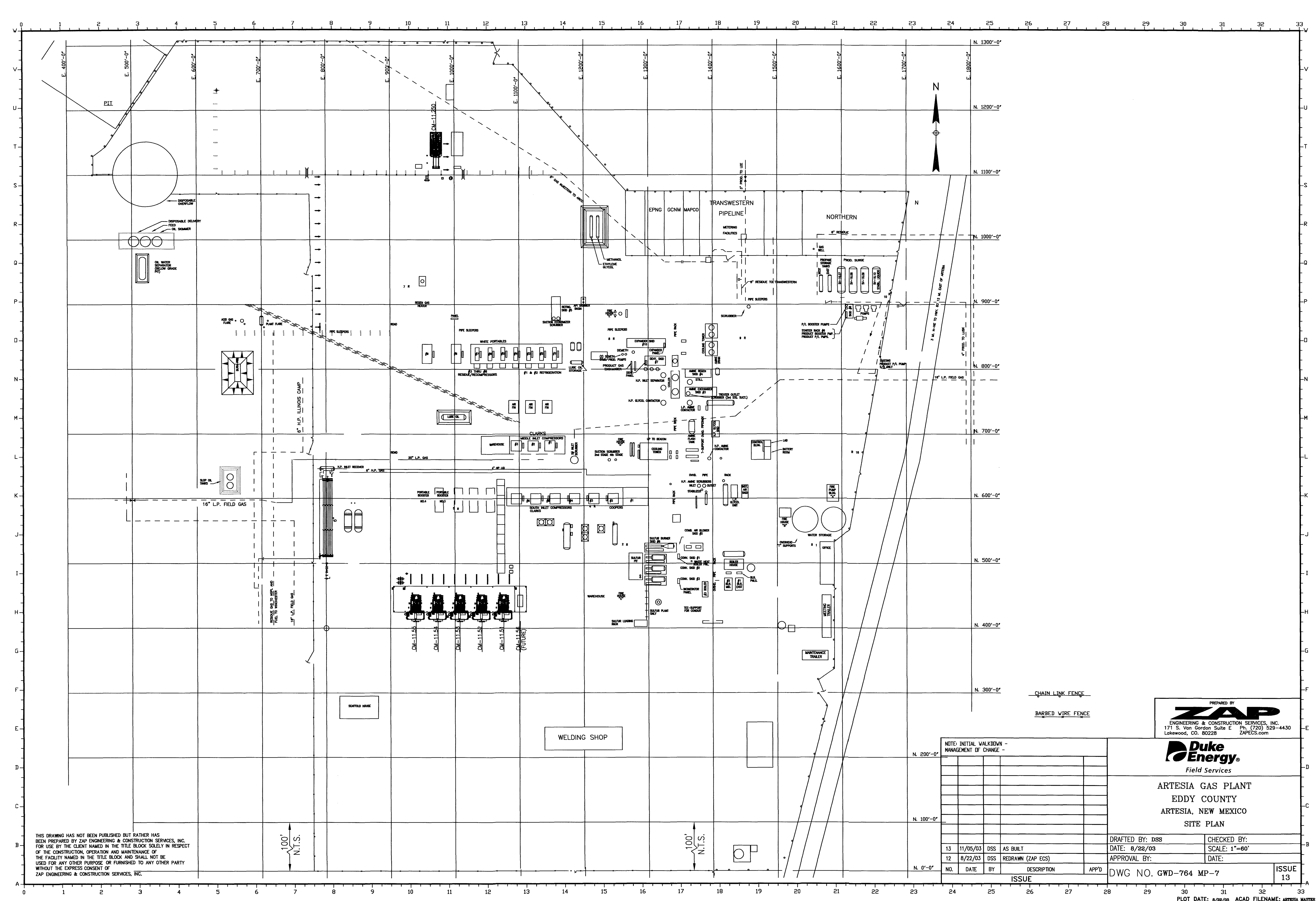
This warranty does not cover acts of God, changes in chemical compositions
of the inlet fluids, or any other circumstances which are beyond the
control of the contractor.

Validated: _____

Date

By: _____

Hal K. Jarrell, President





PHILLIPS 66 NATURAL GAS COMPANY

A SUBSIDIARY OF PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

February 19, 1986

Wastewater Discharge Plan
Artesia Plant

Mr. David Boyer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Boyer:

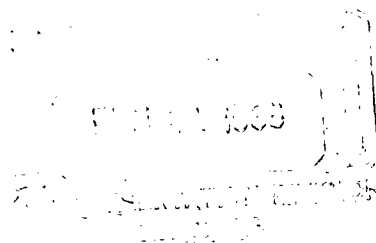
This letter is written to notify you the new wastewater system at Artesia Plant was put into service on February 7, 1986. We appreciate the cooperation extended by you and your office in granting the extensions we needed to get the system operational.

Very truly yours,

A handwritten signature in cursive script that reads "C.W. Zahn".

C. W. Zahn
Staff Director, Process Engineering

CWZ:MDF:gpp





STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

October 31, 1989

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

CERTIFIED MAIL

RETURN RECEIPT NO. P 106-675-176

Mr. Michael D. Ford
PHILLIPS 66 NATURAL GAS COMPANY
4001 Penbrook
Odessa, Texas 79762

RE: Discharge Plan GW-23
Artesia Gas Plant
Pond Closure

Dear Mr. Ford:

The Oil Conservation Division (OCD) has received your proposal, dated October 20, 1989, for the closure of the abandoned waste water ponds at the above referenced facility.

Based on the information contained in your proposal and E.P. Toxicity results on the sludges and soils at the bottom of the ponds dated October 31, 1989, the closure of the ponds is approved.

Please notify the OCD when closure is complete.

If you have any questions, please contact me at (505) 827-5884.

Sincerely,

A handwritten signature in cursive script that reads "Roger C. Anderson".

Roger C. Anderson
Environmental Engineer

RCA/sl

cc: OCD Artesia Office

50 YEARS



TONEY ANAYA
GOVERNOR

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION



1935 - 1985

December 20, 1985

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

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. C. W. Zahn
Phillips Petroleum Company
40001 Pennbrook
Odessa, Texas 79762

Re: Wastewater Discharge Plan - Artesia Plant

Dear Mr. Zahn:

We have received your letter dated December 17, 1985, requesting an additional 45-day extension of the October 31 deadline established in the discharge plan for start-up of your new wastewater system at the Artesia plant. It is our understanding that the injection well has been operational since September 1, but piping and surface equipment installation has been delayed due to the illness and resignation of the engineer assigned to the project.

Pursuant to Section 3-109.F. of the New Mexico Water Quality Control Commission Regulations and for good cause shown, Phillips is hereby granted its request for an extension until February 13, 1986, to dispose of all wastewater through the injection well system. Installation of a 15,000 bbl tank for emergency overflow from the system shall also be completed by that date. The pond closure requirements remain as stated in our November 4, 1985, letter.

With the time extension granted in this letter, you will have received total extensions of 105 days to complete plant connections to the operational injection well. Therefore you are requested to expedite the work and have the system operational on or prior to expiration date of this extension.

If you have any questions concerning this extension, contact Dave Boyer
at (505) 827-5812.

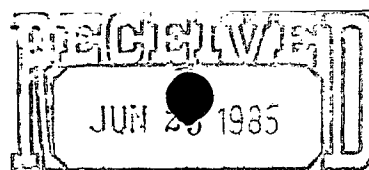
Sincerely,

A handwritten signature in cursive script, appearing to read "R. L. Stamets", followed by a large, stylized number "6".

R. L. STAMETS
Director

RLS/DB/dp

cc: Artesia District Office



OIL CONSERVATION DIVISION
SANTA FE



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

June 17, 1985

Wastewater Discharge Plan
Artesia Plant

Mr. Philip Baca
Environmental Engineer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Baca:

This letter is written as a follow up to your recent telephone conversation with Rodney Holsworth of this office. The conversation centered around the Wastewater Discharge Plan submitted for our Artesia Plant (reference your letter of January 17, 1985). Several questions were raised pertaining to the time frame required for installation of the disposal well, closure of the wastewater pond, flare pit operation, disposal of spent sulfur catalyst, and plant leak prevention methods.

The following information was offered in response to your questions:

1. The new wastewater system will be completely operational by October 31, 1985 if not sooner. (Drilling of the disposal well began June 6, 1985.)
2. The wastewater pond will be properly closed by November 30, 1985.
3. All liquids sent to the flare pit are burned. There is no accumulation of liquid in the pit.
4. The sulfur catalyst is buried upon disposal in the plant landfill. No liquids are sent to the landfill.
5. A. The plants' underground vessels and piping are visually inspected and/or pressure tested prior to being put in service. The vessels and lines are externally and/or internally coated to ensure against corrosion. This equipment is checked continuously by operators who are on duty 24 hours per day, and any leaks would be detected by them.
B. The wastewater tanks are not diked. Any leak or spill from a tank would be detected in a short time by the plant operator, who could then cut off the flow to the tank. The water remaining in the tank plus any spill would be removed by vacuum truck.
C. Operators are required to notify the plant superintendent of any leak. If the leak is significant, the plant superintendent will notify the Oil Conservation Division.

Mr. Philip Baca
Wastewater Discharge Plan
Artesia Plant
Page 2

Questions concerning this matter should be directed to Rodney Holsworth or
Mike Ford of this office at (915) 367-1302.

Very truly yours,
PHILLIPS PETROLEUM COMPANY

A handwritten signature in dark ink, appearing to read "E. E. Clark", with a long horizontal flourish extending to the right.

E. E. Clark
Authorized Agent, Permian Basin Region

EEC:MDF:ggp

STATE OF
NEW MEXICO

OIL
CONSERVATION
DIVISION



MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal

Time
2:15

Date
6/6/85

Originating Party

P. Baca - OCD

Other Parties

R. HOLSWORTH - PHILLIPS

Subject

ARTESIA GAS PLANT DISCHARGE PLAN

Discussion

I informed Mr. Holsworth of the importance in sending us the information requested on 1-17-85. He said he felt confident the injection well would be up and running by 10-31-85. The D.P. can't be approved until we get the information. Mr. Holsworth asked what would be the consequences of completing the injection well and finding that it could not receive all the effluent. I told him that if we are notified we could work on an alternative solution to the problem.

Conclusions or Agreements

Mr. Holsworth will send in the information requested on 1-17-85 and he will find a good time for us to meet and tour the Artesia and Lusk plants.

Distribution

Signed

Philip L. Baca

STATE OF
NEW MEXICO

OIL
CONSERVATION
DIVISION



MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal

Time 1:45 pm

Date 4-17-85

Originating Party

P. Baca - OCD

Other Parties

R. Holsworth - Phillips Pet. Co

Subject Artesia D.P.

Discussion

Informed Mr. Holsworth that the application to install a disposal well for the Artesia Plant had been approved, and that as soon as the information requested by OCD in a letter dated 1-17-85 is submitted by Phillips, we will be able to continue the review process and probably approve the D.P.

Conclusions or Agreements

Mr. Holsworth will have Mr. Mike Ford submit the information requested.

Distribution

Signed Philip L Baca

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 8526
Order No. R-7876

APPLICATION OF PHILLIPS PETROLEUM
COMPANY FOR SALT WATER DISPOSAL,
EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8 a.m. on March 13, 1985, at Santa Fe, New Mexico, before Examiner Gilbert P. Quintana.

NOW, on this 16th day of April, 1985, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) The applicant, Phillips Petroleum Company, is the owner and operator of the Artesia Plant SWD Well No. 1, located 330 feet from the South line and 2310 feet from the East line of Section 7, Township 18 South, Range 28 East, NMPM, Eddy County, New Mexico.

(3) The applicant proposes to utilize said well to dispose of produced salt water and gas plant process waste water into the Lower San Andres and Glorieta formations, with injection into the perforated interval from approximately 3370 feet to 3975 feet.

(4) The injection should be accomplished through 2 7/8-inch plastic lined tubing installed in a packer set at approximately 3300 feet; that the casing-tubing annulus should be filled with an inert fluid; and that a pressure gauge or approved leak detection device should be attached to the annulus in order to determine leakage in the casing, tubing, or packer.

(5) The injection well or system should be equipped with a pressure limiting switch or other acceptable device which will limit the wellhead pressure on the injection well to no more than 675 psi.

(6) The Director of the Division should be authorized to administratively approve an increase in the injection pressure upon a proper showing by the operator that such higher pressure will not result in migration of the injected waters from the Lower San Andres and Glorieta formations.

(7) The operator should notify the supervisor of the Artesia district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.

(8) The operator should take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface.

(9) Approval of the subject application will prevent the drilling of unnecessary wells and otherwise prevent waste and protect correlative rights.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, Phillips Petroleum Company, is hereby authorized to utilize its Artesia Plant SWD Well No. 1, located 330 feet from the South line and 2310 feet from the East line of Section 7, Township 18 South, Range 28 East, NMPM, Eddy County, New Mexico, to dispose of produced salt water and gas plant process waste water into the Lower San Andres and Glorieta formations, injection to be accomplished through 2 7/8-inch tubing installed in a packer set at approximately 3300 feet, with injection into the perforated interval from approximately 3370 feet to 3975 feet;

PROVIDED HOWEVER, that the tubing shall be plastic-lined; that the casing-tubing annulus shall be filled with an inert fluid; and that a pressure gauge shall be attached to the annulus or the annulus shall be equipped with an approved leak detection device in order to determine leakage in the casing, tubing, or packer.

(2) The injection well or system shall be equipped with a pressure limiting switch or other acceptable device which will limit the wellhead pressure on the injection well to no more than 675 psi.

(3) The Director of the Division may authorize an increase in injection pressure upon a proper showing by the operator of said well that such higher pressure will not result in migration of the injected fluid from the Lower San Andres and Glorieta formations.

(4) The operator shall notify the supervisor of the Artesia district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.


(5) The operator shall immediately notify the supervisor of the Division's Artesia district office of the failure of the tubing, casing, or packer, in said well or the leakage of water from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

(6) The applicant shall conduct disposal operations and submit monthly reports in accordance with Rules 702, 703, 704, 705, 706, 708, and 1120 of the Division Rules and Regulations.

(7) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION


R. L. STAMETS,
Director

S E A L

Affidavit of Publication

Co of Publication

No. 10967

STATE OF NEW MEXICO,
County of Eddy:

..... Gary D. Scott being duly
sworn, says: That he is the Business Manager of The
Artesia Daily Press, a daily newspaper of general circulation,
published in English at Artesia, said county and state, and that
the hereto attached Legal Notice

.....
was published in a regular and entire issue of the said Artesia
Daily Press, a daily newspaper duly qualified for that purpose
within the meaning of Chapter 167 of the 1937 Session Laws of

..... days
the State of New Mexico for 1 consecutive weeks on
the same day as follows:

First Publication February 25, 1985

Second Publication

Third Publication

Fourth Publication

and that payment therefor in the amount of \$
has been made

Subscribed and sworn to before me this 7th day
of March, 1985

Barbara Anne Boers
Notary Public, Eddy County, New Mexico

My Commission expires September 23, 1987

LEGAL NOTICE

AMENDED NOTICE

NOTICE is hereby given of
the application of Phillips
Petroleum Company.

Attention: E.E. Clark, agent,
4001 Pembroke Street,
Odessa, Texas 79762 —
telephone (915) 367-1290, to
the Oil Conservation Division,
New Mexico Energy &
Minerals Department for ap-
proval of the following injection
well(s) for the purpose of
salt water disposal at its
Artesia Plant.

Well(s) No(s): 1 (one)
Lease/Unit Name: Artesia
SWD

Location: Unit O, 330' FS and
2310' FE lines, Section 7,
T-18-S, R-28-E, NMPM, Eddy
County, New Mexico.

The injection formation is
Lower San Andres and
Glorieta at a depth of
3370-3975 feet below the sur-
face of the ground. Expected
maximum injection rate is
2000 barrels per day, and ex-
pected maximum injection
pressure is 655 pounds per
square inch. Interested par-
ties must file objections or
requests for hearing with the
Oil Conservation Division,
P.O. Box 2088, Santa Fe, New
Mexico 87501, within fifteen
days of this publication.

Published in The Artesia
Daily Press, Artesia, N.M.,
Feb. 25, 1985.

Legal No. 10967.



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

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

January 17, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. E. E. Clark
Phillips Petroleum Co.
4001 Penbrook
Odessa, Texas 79762

Re: Discharge Plan for
Phillips Artesia
Natural Gas Plant

Dear Mr. Clark:

We have received the additional information requested by the OCD for your Artesia Plant discharge plan in your letter dated December 18, 1984. Further clarification on some of the information provided in your letter is required to continue with the review process. The additional information needed is listed below:

- 1) A time schedule was submitted for installation of an injection well for wastewater disposal. Please indicate a date for start-up of the injection well.
- 2) The unlined pond currently being used for wastewater disposal must be de-watered and closed upon start-up of the injection well. Proper closure shall include leveling the dikes and mounding the area with soil in such a manner that rainwater will not accumulate over the old pond site. Please send a schedule with an approximate date for pond closure.
- 3) Are all the liquids sent to the flare pit burned or is there an accumulation of liquid in the pit?
- 4) Is the sulfur catalyst buried when disposed

of in the disposal area? Are any liquids sent to this disposal area?

- 5) With respect to the spill and leak prevention methods outlined in your letter, the following information is needed:
- How are underground vessels and piping inspected and what is the frequency?
 - Are the wastewater tanks diked to prevent the spread of the spills?
 - What steps are to be taken if a leak is detected in any of the above?

If you have any questions concerning this letter or the discharge plan process, please feel free to call me at (505) 827-5812.

Sincerely,

Philip L. Baca

PHILIP L. BACA
Environmental Engineer

PLB/dp

cc: OCD - Artesia Office
R. L. Stamets

P 505 905 818

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to	
Mr. E. E. Clark	
Street and No.	
Phillips Pet. Co.	
P.O., State and ZIP Code	
4001 Penbrook	
Odessa, Texas	
Postage	\$ 79762
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date	

PS Form 3800, Feb. 1982

APPLICATION FOR AUTHORIZATION TO INJECT

- I. Purpose: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal ☐ Storage
Application qualifies for administrative approval? ☐ yes ☐ no
- II. Operator: Phillips Petroleum Company
Address: 4001 Penbrook Odessa, Texas 79762
Contact party: T. H. McLemore Phone: (915) 367-1257
- III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? ☐ yes ☒ no
If yes, give the Division order number authorizing the project _____.
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;
 2. Whether the system is open or closed;
 3. Proposed average and maximum injection pressure;
 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
 5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)
- XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground source of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification
- I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.
- Name: W. J. Mueller Title Sr. Engineering Supervisor
Signature: *W. J. Mueller* Date: 1/30/85
- If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal.
Heard 3/13/85 before OAD
WJR

III. WELL DATA (PROPOSED)

A. Injection Well

1. Name: Artesia SWD, Well No. 1, ~~660'~~ ^{330'} FSL, ~~1900'~~ ^{2310'} FEL ^{NB}
Section 7, T-18-S, R-28-E.
2. Casing:
Surface: 8 5/8" OD, 24#/ft, K-55 @ + 350'. Cement to surface w/+ 300 sx. 12 1/4" hole size.
Production: 5 1/2" OD, 14#/ft, K-55 @ + 4100'. Cement to surface w/+ 750 sx. Hole size 7 7/8".
3. Tubing: 2 7/8" OD, 6.5#/ft @ + 3300'. Internally plastic coated.
4. Packer: Baker Model AD-1 @ ± 3300'. Internally and externally plastic coated.

B. Injection Zone

1. Name: Lower San Andres and Glorieta.
2. Injection Interval: ± 3370' - 3975', perforated.
3. Purpose: Injection.
4. Other Intervals: None.
5. Producing Formations
Upper: Grayburg @ ± 2050'
Lower: None

VI. OFFSET WELLS

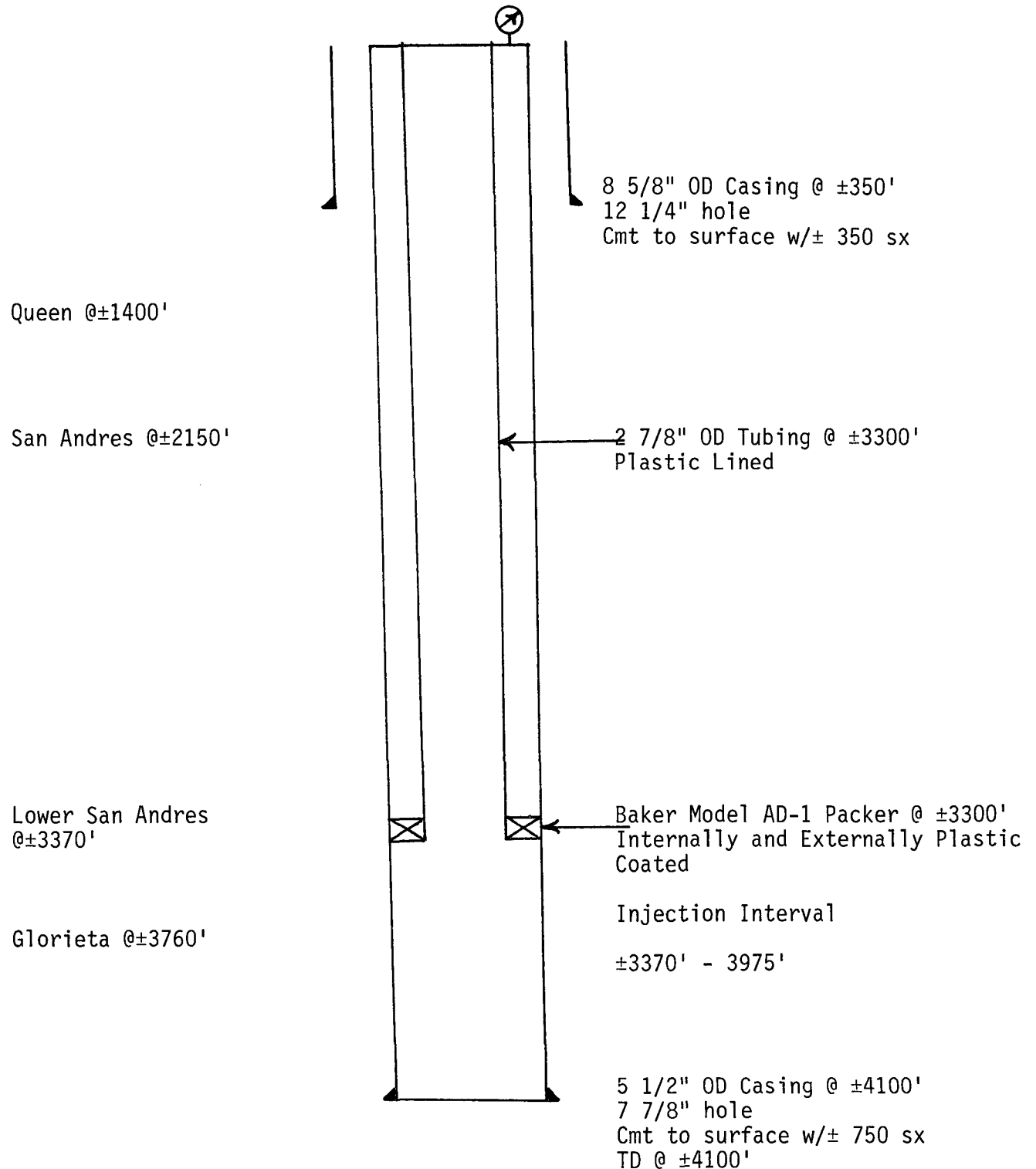
1. No wells within the area of review penetrate the proposed injection interval.

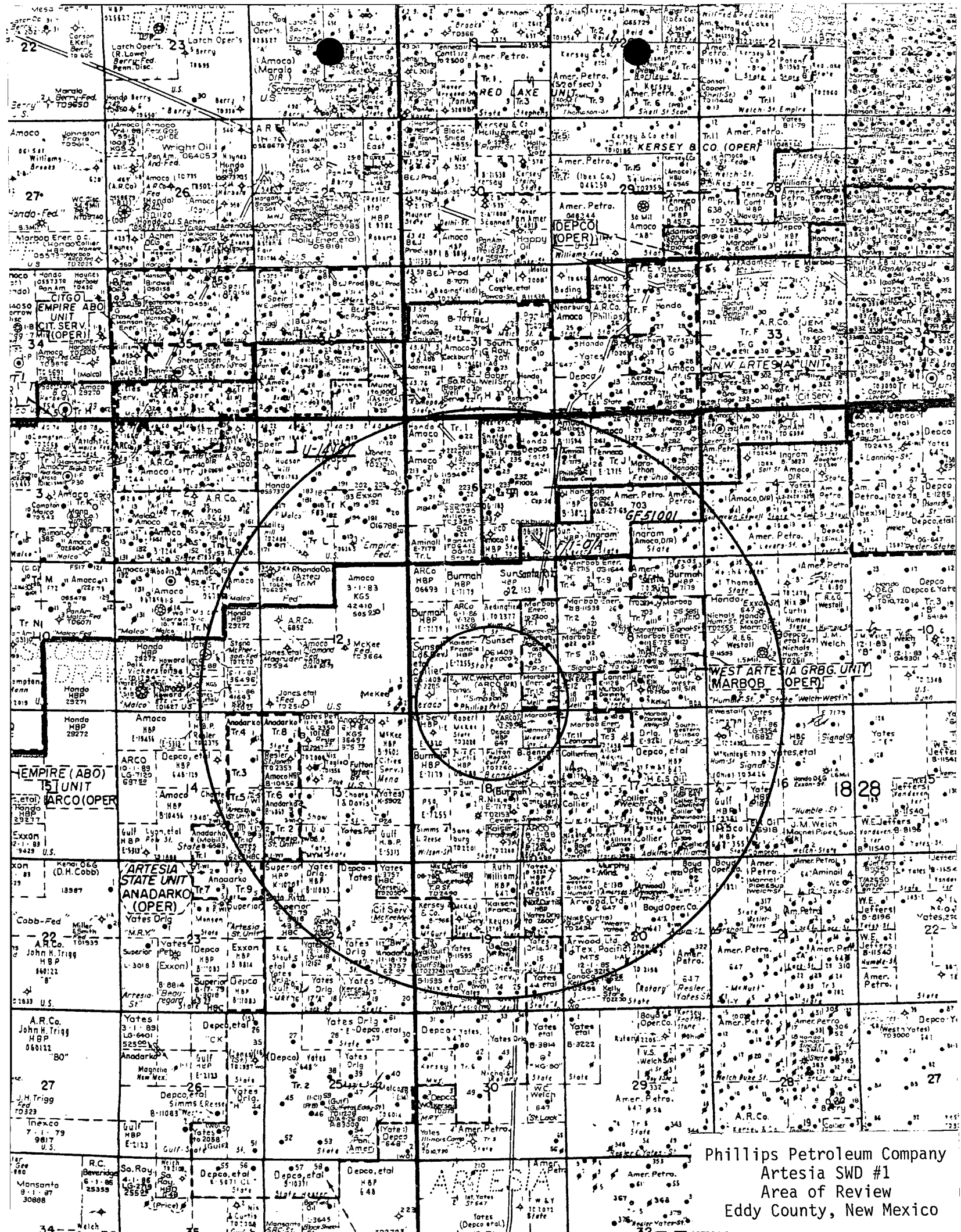
VII. PROPOSED OPERATIONS

1. Injection Rate: 1500 BWPD Average
2000 BWPD Maximum
2. Closed System
3. Injection Pressure: 500 psi Average
655 psi Maximum
4. Plant cooling water (analysis attached)

RE5.1/artesia

Phillips Petroleum Company
 Artesia SWD Well No. 1
 330' FSL, 2310' FEL, Section 7, T-18-S, R-28-E
 Proposed Completion





ARTESIA SWD WELL NO. 1

TABLE OF OFFSET WELLS

Lease/Well No. (Operator)	Unit Letter	Type & Date Drilled	ID	Hole Size	Casing Size & Wt.	Depth	Cement	TOC	Remarks
Section 7, T-18-S, R-28-E									
Texaco State #1 (Collier)	M	Dry Hole 12/21/61	2285' (2161')	10" 8-1/4"	8-5/8" 4-1/2"	450' 2268'	50 sx 200 sx	195' (C) 1498' (C)	Perfs 1600'-2130', P&A, See Attached Sketch
Simpson Federal #1 (Welch)	N	P&A 06/16/25	2620' (1700')	12-1/2"* 8-1/4"*	10" -	422' 2620'	Mudded -	- -	0.H. 422'-2620', P&A, See Attached Sketch
Texaco State #2 (Kersy & Co)	J	Oil 02/20/62	2362' (2333')	10" 8"	8-5/8" 4-1/2"	466' 2352'	50 sx 150 sx	108' (C) 1723' (C)	Perfs 2054'-2108'
West Artesia GRBG Tract 12 #15 (Marbob)	P	SI Oil 09/01/50	2236' (2222')	14-1/2"* 12-1/2" 10"	12-1/2" 10" 8-5/8"	186' 376' 497'	None None 50 sx	- - 139' (C)	0.H. 497'-2236'
West Artesia GRBG Tract 12 #14 (Marbob)	P	Oil 08/29/58	2225' (2222')	12-1/2" 9-1/2"* 8"	10" 8-5/8" 5-1/2"	112' 460' 2215'	None 30 sx 80 sx	Pulled 245' (C) 1760' (C)	Perfs 1937'-2163'
Simpson #2 (Welch)	N	Dry Hole 07/25/67	1795'	10" 8-1/4"*	8-5/8" -	407' 1795'	50 sx -	170' (C) -	P&A, See Attached Sketch
West Artesia GRBG Tract 8 #25 (Marbob)	I	Oil 07/04/81	2530' (2500')	12-1/4" 7-7/8"*	8-5/8" 4-1/2"	477' 2523'	300 sx 625 sx	Surface (C) Surface (C)	Perfs 1917'-2490'
Section 8, T-18-S, R-28-E									
West Artesia GRBG Tract 12 #16 (Marbob)	M	Oil 07/10/50	2493'	14-1/2"* 12-1/2" 10"	12-1/2" 10" 8-5/8"	129' 375' 503'	None None 50 sx	- - 145' (C)	0.H. 503'-2493'

RE2.1/artesia

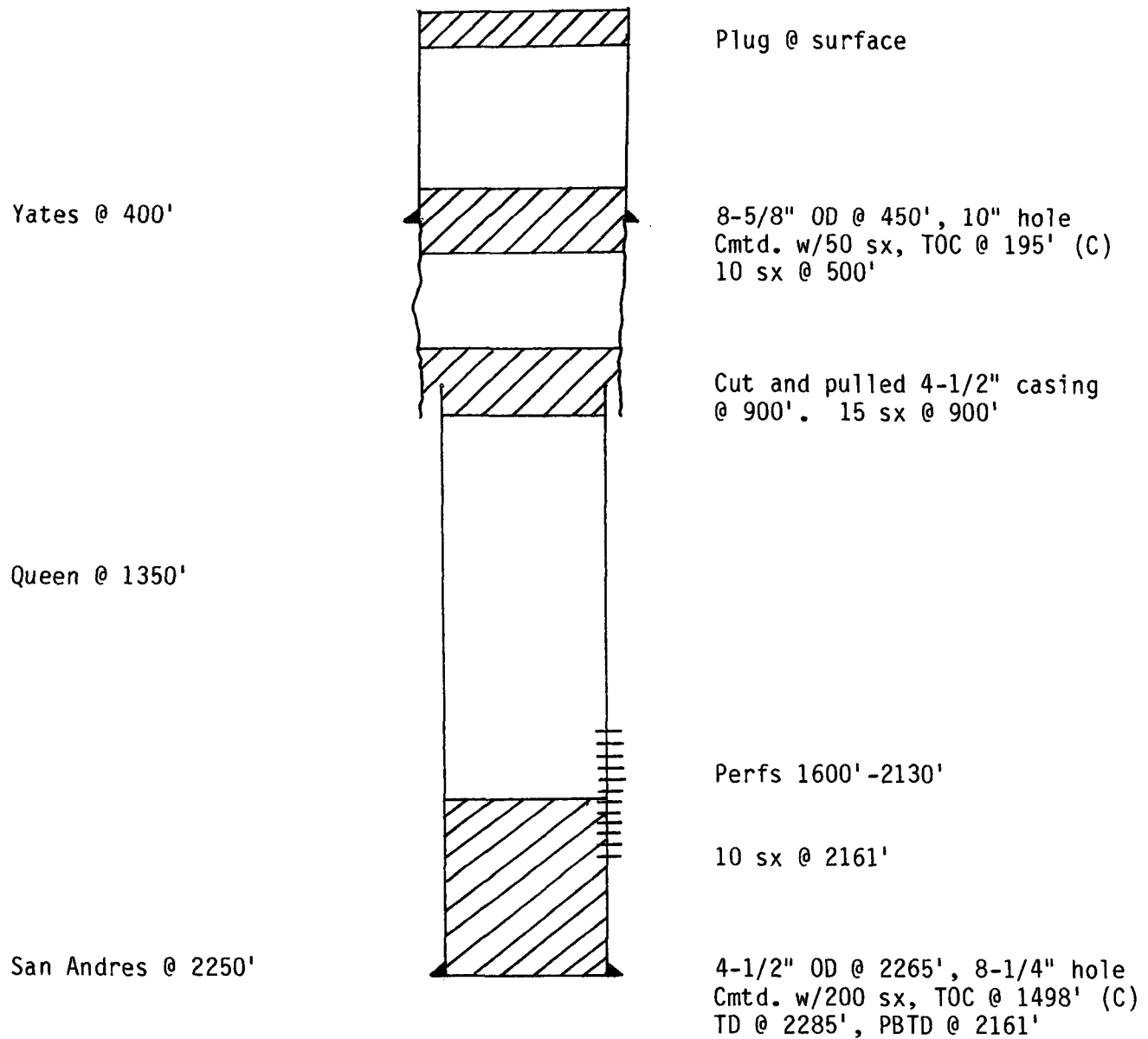
ARTESIA SMD WELL NO. 1

TABLE OF OFFSET WELLS

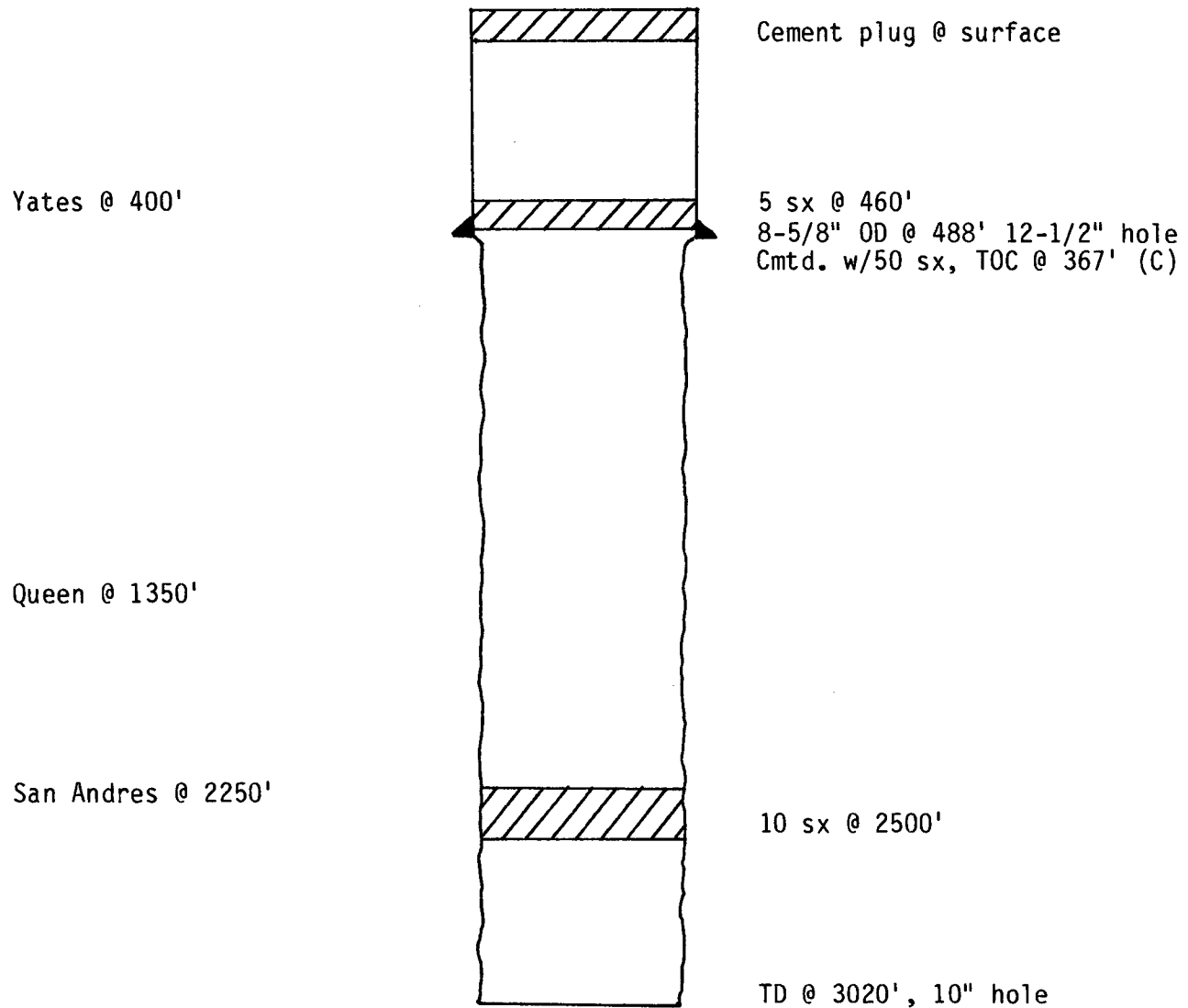
Lease/Well No. (Operator)	Unit Letter	Type & Date Drilled	ID	Hole Size	Casing Size & Wt.	Depth	Cement	TOC	Remarks
<u>Section 18, T-18-S, R-28-E</u>									
Jennings #1 (Marbob)	A	Oil 08/05/81	2634'	12-1/4" 7-7/8"*	8-5/8" 24# 4-1/2" 10.5#	518' 2634'	175 sx 550 sx	- 220' (C)	Perfs 1725'-2596'
State E #1 (McKee)	D	Dry Hole 08/20/57	3020'	14-1/2"* 12-1/2" 10"	12-1/2" 10" 8-5/8" 30#	96' 272' 488'	None None 50 sx	- - 130' (C)	P&A, See Attached Sketch

JLU/sdi
RE2.1/artesia.1

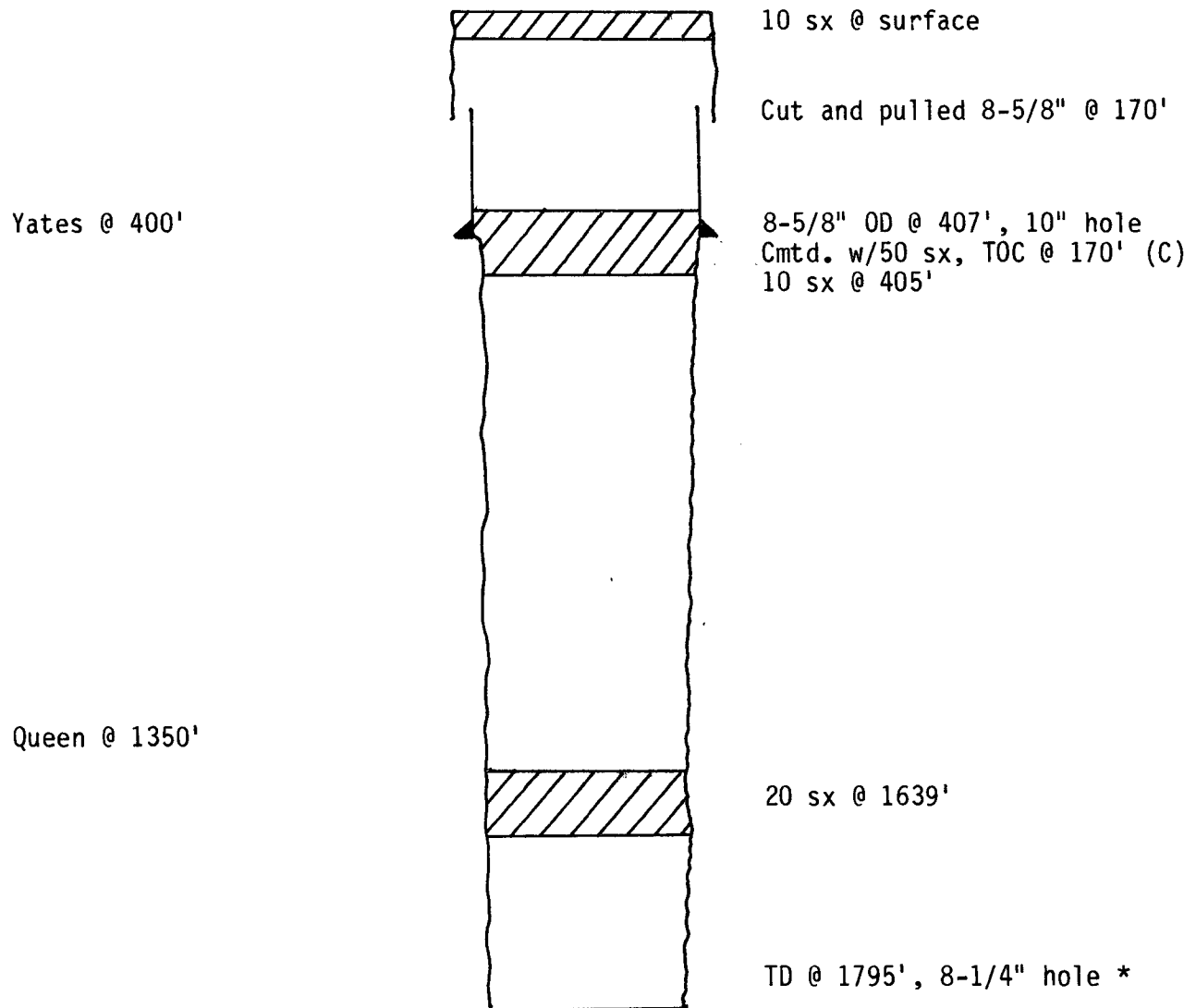
Texaco State #1
 660' FSL, 660' FWL, Section 7
 T-18-S, R-28-E



State E #1
660' FNL, 722' FWL, Section 18
T-18-S, R-28-E



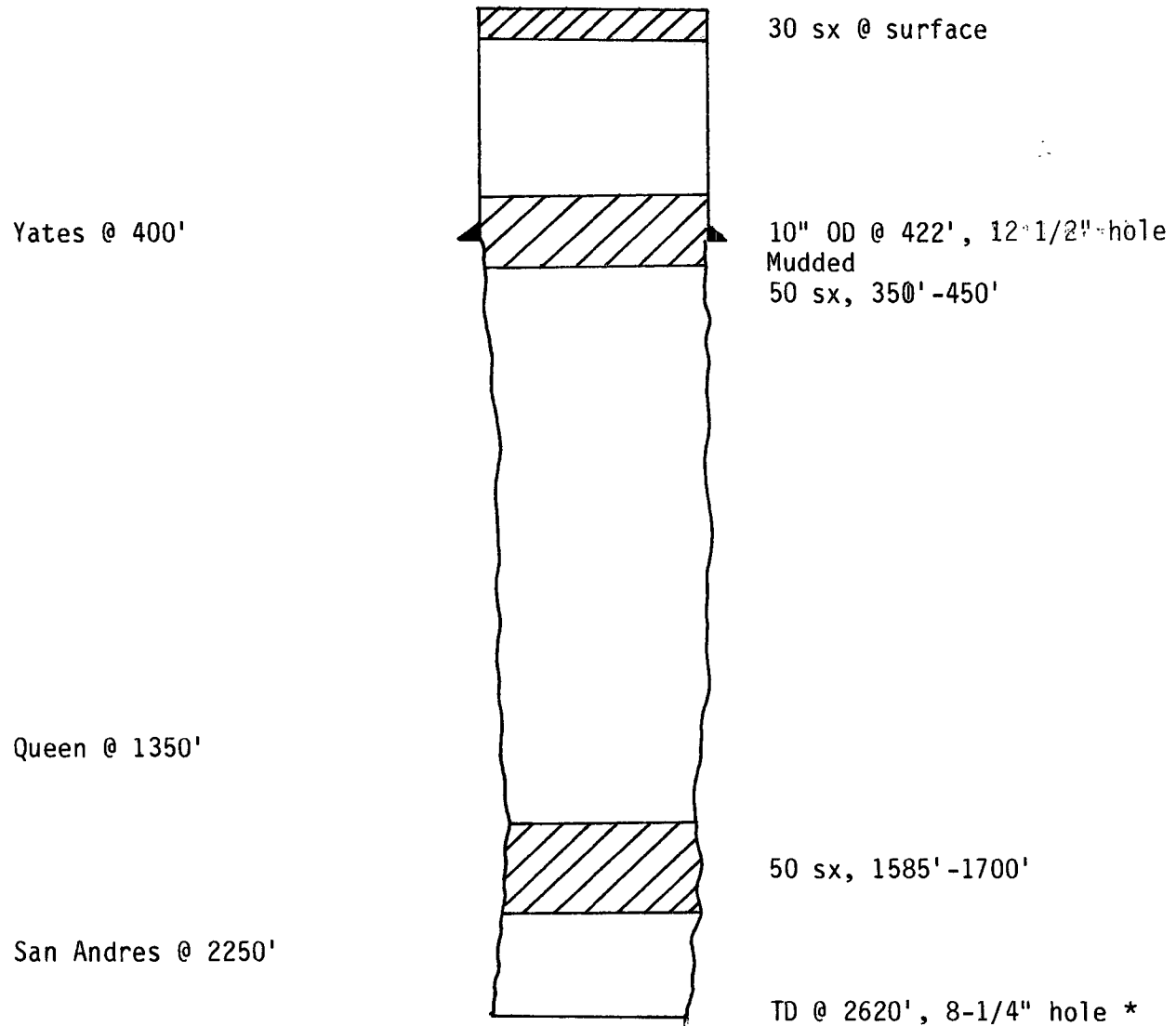
Simpson #2
990' FSL, 1650' FWL, Section 7
T-18-S, R-28-E



* estimate

RE2.1/artesial

Simpson-Federal #1
450' FSL, 1650' FWL, Section 7
T-18-S, R-28-E



* estimate

RE2.1/artesia2



SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue [915-683-3348] • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-W
Customer No. 3355796
Report No. 35020
Report Date 1-24-84
Date Received 12-21-83

Report of tests on: Water

Client: Phillips Petroleum

Identification: Artesia Plant, Wastewater

mg/L

Aluminum-----	Less Than	2
Arsenic-----	Less Than	0.05
Barium-----	Less Than	1
Boron-----		0.4
Cadmium-----	Less Than	0.01
Chromium-----		0.14
Cobalt-----	Less Than	0.1
Copper-----	Less Than	0.1
Iron-----		0.3
Lead-----	Less Than	0.05
Manganese-----		0.06
Mercury-----	Less Than	0.002
Molybdenum-----	Less Than	1
Nickel-----	Less Than	0.5
Selenium-----	Less Than	0.01
Silver-----	Less Than	0.05
Zinc-----		0.06
Sulfate-----		357
Chloride-----		638
Fluoride-----		1.8
Nitrate-----		0.5
Cyanide-----		0.001
Phenols-----		0.060

Total Dissolved Solids @ 180° C-----

1984

(Plant water
only)

Technician: KLH, PCB, GMB

Copies 3 cc: Phillips Petroleum Co.
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Larry M. Burch

COMPATABILITY TEST
ARTESIA PLANT WATER AND SAN ANDRES WATER
ANALYSIS BY UNICHEM INTERNATIONAL, HOBBS, N.M.

Plant Water (%)	90	0
Produced Water (%)	10	100
Specific Gravity	1.011	1.106
Total Dissolved Solids	18,919	157,864
pH	8.76	6.61
Cations		
Calcium (ppm)	374	2538
Magnesium (ppm)	435	3322
Sodium (ppm)	6,297	53,591
Anions		
Bicarbonate (ppm)	64.6	536.0
Carbonate (ppm)	48.6	0.0
Hydroxide (ppm)	0	0
Sulfates (ppm)	799	5875
Chlorides (ppm)	10,900	92,000
Iron (ppm)	0.7	0.4
Barium (ppm)	0.27	Not Run
Ionic Strength (Molal)	0.367	3.155
Carbonate Index @ 86 F	1.150	0.403
Calcium Carbonate		
Scaling?	Likely	Likely
Calcium Sulfate Index	-37.0	13.7
Calcium Sulfate		
Scaling?	Unlikely	Likely

(Mixture of Plant H₂O and produced water
in the formation, no "produced water"
injected.)



SOUTHWESTERN LABORATORIES

119904

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

Client # 3355796

File No. C-1950-W

Report No. 35938

Report Date 11-28-84

Date Received 11-7-84

Report of tests on: Water (Fresh water)

Client: Phillips Petroleum Company

Identification: Artesia West Windmill

Aluminum-----	less than 2
Arsenic-----	less than 0.05
Barium-----	less than 0.5
Boron-----	0.6
Cadmium-----	less than 0.01
Chromium-----	less than 0.05
Cobalt-----	less than 0.1
Copper-----	less than 0.1
Iron-----	0.3
Lead-----	less than 0.05
Manganese-----	0.07
Mercury-----	less than 0.002
Molybdenum-----	less than 0.5
Nickel-----	less than 0.5
Selenium-----	less than 0.01
Silver-----	less than 0.05
Zinc-----	0.09
Sulfate-----	286
Chloride-----	227
Fluoride-----	2.3
Nitrate-----	less than 0.5
Cyanide-----	less than 0.001
Phenols-----	0.008
Total Dissolved Solids @180°C-----	1226

Technician: KLH, GMB, RY

Copies Phillips Petroleum Company
Attn: Mike Ford

SOUTHWESTERN LABORATORIES



SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue [915-683-3348] • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-W
Customer No. 3355796
Report No. 35197

Report Date 3-22-84

Date Received 2-29-84

Report of tests on: Water (Fresh Water)

Client: Phillips Petroleum

Identification: Artesia Upgrad. Windmill, East Windmill

	mg/L
Aluminum-----Less Than	2
Arsenic-----Less Than	0.05
Barium-----Less Than	1
Boron-----	0.1
Cadmium-----Less Than	0.01
Chromium-----Less Than	0.05
Cobalt-----Less Than	0.1
Copper-----Less Than	0.1
Iron-----Less Than	0.2
Lead-----Less Than	0.05
Manganese-----Less Than	0.05
Mercury-----Less Than	0.002
Molybdenum-----Less Than	1
Nickel-----Less Than	0.5
Selenium-----Less Than	0.01
Silver-----Less Than	0.05
Zinc-----	0.13
Sulfate-----	17
Chloride-----	7
Fluoride-----	0.5
Nitrate-----	6.6
Cyanide-----	0.002
Phenols-----Less Than	0.001
Total Dissolved Solids @ 180° C-----	178

Technician: KLE, GMB, JHB, RY

Copies 3 cc: Phillips Petroleum Co.
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Larry M. Bunch

VIII. INJECTION ZONE GEOLOGY

1. Dolomite and sandy dolomite
2. Lower San Andres and Glorieta
3. Thickness $\pm 700'$
4. Depth $\pm 3250' - 3975'$
5. Ogallala Aquifer $\pm 250'$

IX. STIMULATION

1. Perforate and acidize w/ ± 5000 gallons of 15% NEFE HCl

X. LOG-DATA

1. Will be submitted when well is drilled.

XII. FAULTING

1. No faults are known to exist in the area.

PHILLIPS PETROLEUM COMPANY
Artesia SWD Well No. 1
Sec. 7, T-18-S, R-28-E,
Eddy County, NM

OFFSET OPERATORS

ARCO Oil and Gas Corp .
Box 1610
Midland, TX 79702

Kaiser-Francis Oil Co.
Box 21468
Tulsa, OK 74121-1468

Sun Exp. & Production Company
Box 1861
Midland, TX 79702

Brad & Robert Hillin
(B.Bennett)
Box 2062,
Midland, TX 79702

Kaiser-Francis Oil Co.
3300 N. A. St., Ste 111A
Midland, TX 79701

Texaco Inc.
Box 728
Hobbs, NM 88240

Burmah Oil & Gas Co.
600 Western United Bldg.
Midlandk TX 79701

Marbob Energy Corporation
Box 304
Artesia, NM 88210

W. C. Welch
Rte 1, Box 74A
Artesia, NM 88210

Cities Service Oil Co.
Box 1919,
Midland, TX 79702

Nix & Curtis
Box 617,
Artesia, NM 88210

C. O. Fulton
Box 1121
Artesia, NM 88210

Depco
800 Central Dr.
Odessa, TX 79760

J. M. Welch
Box 408
Artesia, NM 88210

Byard Bennett
7011 N. Camino Martin
Tucson, AZ 85704

SURFACE OWNER: Phillips Petroleum Company (within Artesia Plant yard)



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79701
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

CERTIFIED

P 503 931 299

MAIL

C.O. Fulton
Box 1121
Artesia, NM 88210

CERTIFIED

P 503 931 300

MAIL

Depco
800 Central Dr.
Odessa, TX 79760

CERTIFIED

P 503 931 301

MAIL

Nix & Curtis
Box 617
Artesia, NM 88210

CERTIFIED

P 503 931 302

MAIL

Cities Service Oil & Gas
Box 1919
Midland, TX 79702

CERTIFIED

P 503 931 303

MAIL

J. M. Welch
Box 408
Artesia, NM 88210

CERTIFIED

P 503 931 304

MAIL

MARBOB ENERGY CORP.
Box 304
Artesia, NM 88210

CERTIFIED

P 503 931 305

MAIL

J. M. Welch
Box 1, Box 74A
Artesia, NM 88210

CERTIFIED

P 503 931 307

MAIL

Burmah Oil & Gas Co.
600 West United Life Bldg.
Midland, TX 79701

CERTIFIED

P 503 931 308

MAIL

Byard Bennett
7011 N. Camino Martin
Tucson, AZ 85704

CERTIFIED

P 503 931 309

MAIL

KAISER-FRANCIS OIL CO.
Box 21468
Tulsa, OK 74121-1468

CERTIFIED

P 503 931 310

MAIL

KAISER-FRANCIS OIL CO.
3300 N. "A" ST. STE. 111A
MIDLAND, TX 79701

CERTIFIED

P 503 931 311

MAIL

Brad & Robert Hillin
(Bennett)
P.O. Box 2062
Midland, TX 79701

CERTIFIED

P 503 931 312

MAIL

ARCO OIL & GAS CORP.
Box 1861
Midland, TX 79702

CERTIFIED

P 503 931 313

MAIL

exaco, Inc.
Box 728
Odessa, NM 88240

CERTIFIED

P 503 931 314

MAIL

Sun Exploration & Production
Box 1861
Midland, TX 79702



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

January 31, 1985

Legal Notice - Classified
Application for SWD Well,
Artesia Plant, Eddy County

Artesia Daily Press
Box 179
Artesia, NM 88210

Attn: Legal Notices, Classified

Gentlemen:

Enclosed is notice of application for Oil Conservation Division, Dept. of Energy and Minerals, approval for a salt water disposal well to serve the Artesia Plant. Also enclosed is a certification of publication which is to be completed and returned to me. It is requested that this notice run on February 5, 1985.

Please direct billing and the certification of publication to my attention at the letterhead address.

Very truly yours,

T. Harold McLemore

THM:se
Enclosures

NOTICE is hereby given of the application of Phillips Petroleum Company
Attention: E. E. Clark, -AGENT, 4001 Penbrook Street,
Odessa, Texas 79762 - telephone (915) 367-1290, to the Oil Conser-
vation Division, New Mexico Energy & Minerals Department for approval -
of the following injection well(s) for the purpose of salt water disposal
at its Artesia Plant

Well(s) No(s).: 1 (one)

Lease/Unit Name: Artesia SWD

Location: Unit O, 660' FS and 1980' FE lines, Section 7, T-18-S, R-28-E,

NMPM,

Eddy County, New Mexico.

The injection formation is Lower San Andres and Glorieta at a depth
of 3370-3975 feet below the surface of the ground. Expected maximum
injection rate is 2000 barrels per day, and expected maxi-
mum injection pressure is 655 pounds per square inch. Interested
parties must file objections or requests for hearing with the Oil Conser-
vation Division, P. O. Box 2088, Santa Fe, New Mexico 87501, within fif-
teen days of this publication.

STATE OF
NEW MEXICO

OIL
CONSERVATION
DIVISION



MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal

Time
1:45

Date
1/17/85

Originating Party

Other Parties

R. HOLSWORTH - PHILLIPS PETROLEUM
Co. (915) 367-1302

Subject
ARTESIA PLANT D.P.

Discussion

I informed him that we would need approximate dates for injection well start-up and evaporation pond closure. He told me the catalyst and other solid wastes are buried in a landfill on site and that no liquids are disposed of in the landfill. He also said that all liquid H.C.'s ejected to the flare pit are automatically burned and there is no accumulation of H.C.'s in the flare pit. I told him we need a more detailed discussion of the spill/leak prevention practices.

Conclusions or Agreements

I will send him a letter asking for the above info.

Distribution

Signed

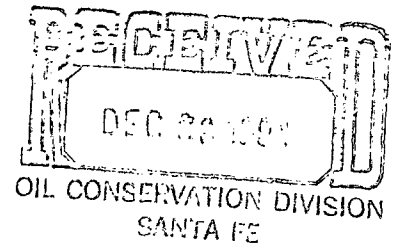
P. L. Baca



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region



December 18, 1984

Artesia Plant Discharge Plan

Mr. David G. Boyer, Hydrogeologist
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Boyer:

In your September 18, 1984 letter, you requested additional information to clarify our proposed discharge plan. The following are answers to your questions.

Plant Drain and Disposal Systems

1. The engine lube oil sump and engine coolant sump are externally coated steel tanks. The closed drain API oil water separator is concrete basin, and the open drain oil water separator is an internally coated steel tank.
2. An entirely new charge of glycol engine coolant is never needed.
3. The 1,000 barrel tanks are existing and the 15,000 barrel tank is proposed.
4. The domestic sanitary waste is not commingled with the other effluents or non-domestic type wastes. A drawing of the sanitary system is attached.
5. The discharge system will be shut-in if a leak or failure is detected. The waste water will be taken to the 15,000 barrel emergency storage tank and, if the tank fills up, the waste water will be trucked to another disposal facility. The OCD will be notified according to the procedure outlined in Rule 116 - Notification of Fire, Breaks, Leaks, Spills and Blowouts.
6. The flare pit receives all low temperature hydrocarbon liquids from the cryogenic plant during upsets. The composition and volume of liquids going to the flare pit depends on each individual upset. The flare pit is used approximately one time per month.
7. The disposal area for general waste is just north of the waste water storage tanks. The spent molecular sieve and sulfur catalyst is also disposed of there.
8. The fluids removed from the evaporation pit during dewatering will be trucked to a waste water disposal facility near Loco Hills, New Mexico. Run-off from heavy rains are diverted from the pit area by dikes that surround the pit.

9. In the event the disposal well or disposal line is shut-in for workovers or repairs, the waste water will go to the 15,000 barrel emergency storage tank. When the emergency storage tank fills up, the waste water will be trucked to a waste water disposal facility near Loco Hills, New Mexico.
10. The location of the proposed disposal well is 330' FSL and 2,260' FEL of Sec. 7, T18S, R28E, Eddy County, New Mexico. The location is also shown on Attachment I.

Spill/Leak Prevention and Housekeeping Procedures

1. Any spills from our plant process area would be NGL or liquid propane. The NGL and liquid propane will vaporize when exposed to atmospheric temperatures and pressures, so the plant process area is not curbed. The OCD will be notified according to the procedure outlined in Rule 116.
2. Operators are on duty 24 hours per day, and any leaks would be detected by them. The operators are required to notify the plant superintendent of any leak. If the leak is significant, the plant superintendent will notify the OCD.
3. During cleaning operations at the plant, the cleaning solution is pumped from a tank truck to the vessel or piece of equipment to be cleaned and is then pumped back to the tank truck. If an acid is used for cleaning, it is neutralized on site and then disposed of in the waste water system or taken to the waste water disposal facility near Loco Hills, New Mexico.

Hydrology

1. The two stock wells are the only water wells within one mile of the plant site.

The timetable to complete the disposal well and dewater and backfill the evaporation impoundment has been delayed. It took eight weeks to obtain the waiver from the zone leasee to inject. We are currently waiting for partnership approval to drill the disposal well. The revised timetable is as follows:

- | | |
|---|---------|
| 1. Obtain approval from partnership to drill well | 2 weeks |
| 2. Request and obtain approval from New Mexico to inject. | 3 weeks |
| 3. Drill the injection well. | 4 weeks |
| 4. Complete the well and run injectivity test. | 2 weeks |

Mr. David G. Boyer, Hyogeologist
Page 3

- | | |
|--|----------|
| 5. Order and install surface equipment. | 10 weeks |
| 6. Dewater and backfill evaporation impoundment. | 4 weeks |

If you have any questions regarding this matter, please contact R. D. Holsworth at (915) 367-1302.

Very truly yours,
PHILLIPS PETROLEUM COMPANY

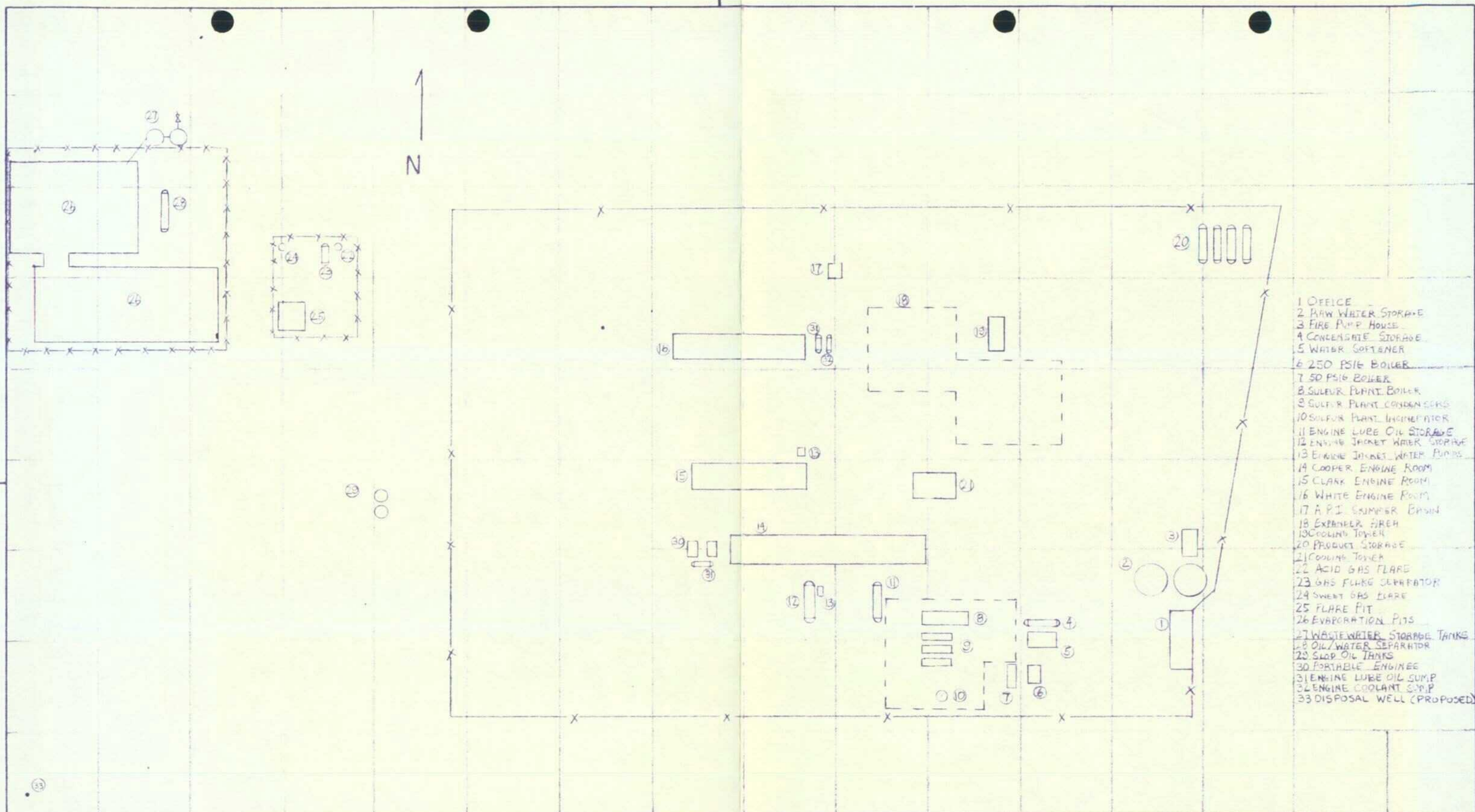


E. E. Clark
Authorized Agent, Permian Basin Region

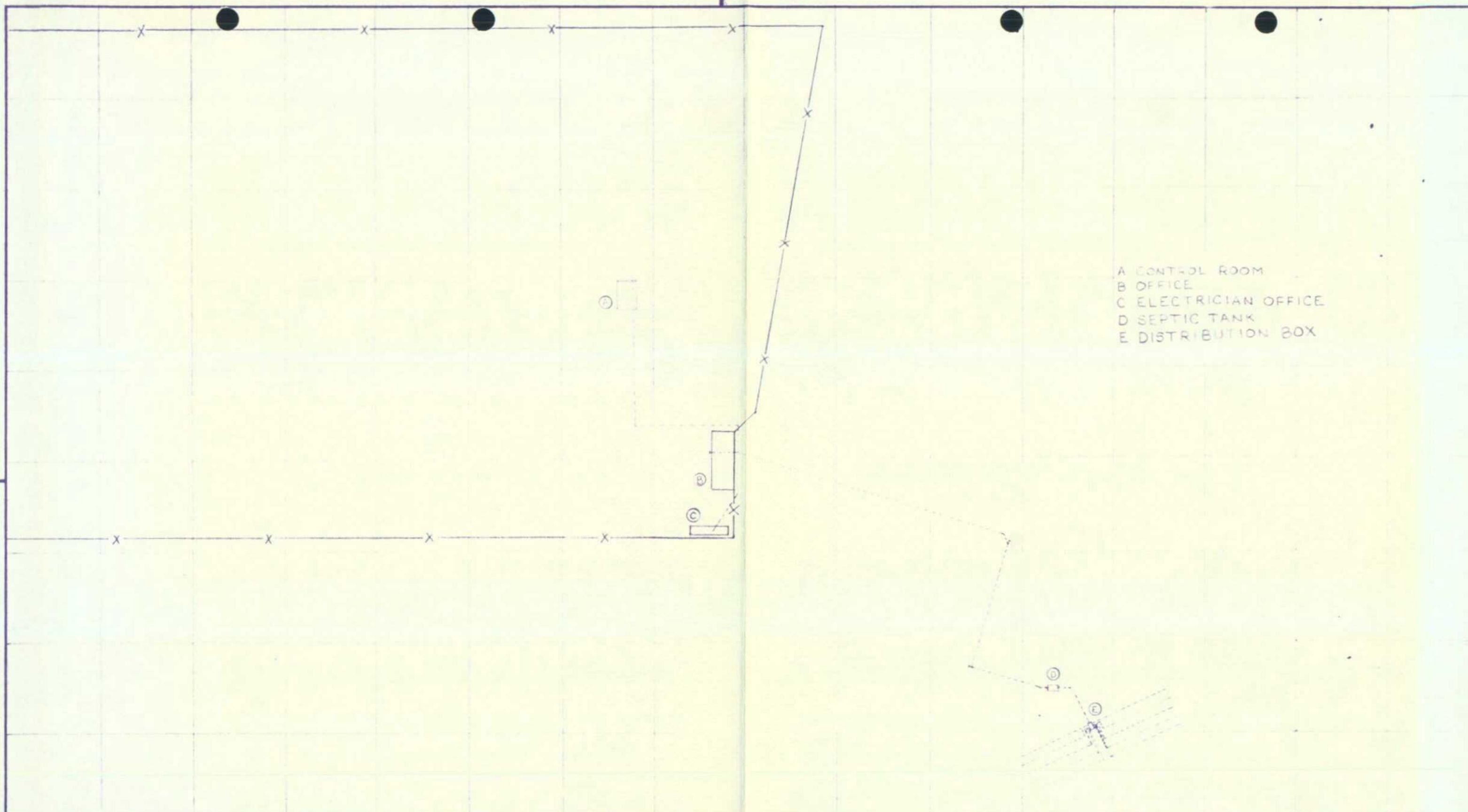
EEC:RDH:gpp

Attachments

bcc: J. W. Maharg
 (r) C. W. Zahn
 (r) R. D. Holsworth
 W. R. Higginbotham
 Bill Stoltz
 A. A. Hochstein
 (r) D. G. Laird
 Central Files



NO.	REVISION	BY	DATE					FOR BIDS		BARTLESVILLE, OKLAHOMA		AFE NO.
		CHKD	APP'D					FOR APPR				SCALE 1" = 100'
								FOR CONST				UNLESS OTHERWISE NOTED
								DRAWN FORV 2-24-84		ARTESIA PLANT PLOT PLAN ATTACHMENT 1		DWG NO.
								CHECKED			SH NO.	
								APP'D				



A CONTROL ROOM
 B OFFICE
 C ELECTRICIAN OFFICE
 D SEPTIC TANK
 E DISTRIBUTION BOX

NO.	REVISION	BY	DATE					FOR BIDS	PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA SANITARY SYSTEM ARTESIA PLANT		AFE NO.
		CHKD	APP'D					FOR APPR			SCALE 1" = 100'
								FOR CONST			UNLESS OTHERWISE NOTED
								DRAWN <i>KDH</i> 10/15/84			DWG NO.
								CHECKED			SH NO.
								APP'D			

PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

December 17, 1985

Wastewater Discharge Plan
Artesia Plant

Mr. David Boyer
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Boyer:

This letter is written as a request for a 45 day extension of the December 30, 1985 deadline established for startup of our new wastewater system at Artesia Plant. Due to the recent resignation of the engineer assigned to this project, the final piping drawings for the system have yet to be completed. The surface equipment (injection pumps, storage tanks) has been delivered to the plant. The injection well was operational as of September 1.

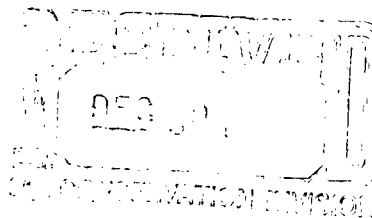
Questions concerning this matter should be directed to Mike Ford of this office at (915) 367-1316.

Very truly yours,

C.W. Zahn

C. W. Zahn
Staff Director, Process Engineering

CWZ:MDF:ggp



STATE OF
NEW MEXICO
OIL
CONSERVATION
DIVISION



MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal

Time 9am

Date 12/6/85

Originating Party

Other Parties

Mike Ford - Phillips Petroleum

Dave Boyer - OCD

Subject

Phillips Antesia Plant

Discussion

Mike called to ask if it was OK to store several feet of water in their emergency overflow tank at the Antesia Plant for liner protection.

I gave the OK to do so.

Conclusions or Agreements

Distribution

Antesia Plant DP file

Signed

DA Boyer



1935 - 1985

TONEY ANAYA
GOVERNORSTATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

November 4, 1985

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800CERTIFIED MAIL
RETURN RECEIPT REQUESTEDMr. C. W. Zahn
Phillips Petroleum Company
40001 Penbrook
Odessa, Texas 79762

Re: Wastewater Discharge Plan - Artesia Plant

Dear Mr. Zahn:

We have received your letter dated October 22, 1985 requesting a 60-day extension of the October 31 deadline established for start-up of your new wastewater system at the Artesia plant. It is our understanding that the injection well is operational but piping and surface equipment installation has been delayed.

Pursuant to Section 3-106.A. of the New Mexico Water Quality Control Commission Regulations, Phillips is hereby granted its request for an extension until December 30, 1985 to dispose of all wastewater through the injection well system. Installation of a 15,000 bbl tank for emergency overflow from the system shall also be completed by that date.

Regarding the dewatering and closure of the evaporation pond, it is our understanding that the Environmental Improvement Division is waiting on laboratory analyses of samples taken from the pond to determine closure procedures in accordance with RCRA regulations. We hereby grant you an extension of the November 30, 1985 deadline for closure of this pond with the following provisions:

- 1) Natural precipitation will be the only fluid added to the pond.
- 2) The Oil Conservation Division will be immediately notified of the deadline for and method of closure established by the EID.
- 3) The OCD will be notified of the actual closure date of the pond.

If you have any questions concerning this extension, contact Jami Bailey at (505) 827-5884, or David Boyer at (505) 827-5812.

Sincerely,



R. L. STAMETS
Director

RLS/JB/dp

cc: OCD-Artesia

P 612 458 065

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED
NOT FOR INTERNATIONAL MAIL

(See Reverse)

U.S.G.P.O. 1983-003-517

PS Form 3800, Feb. 1982

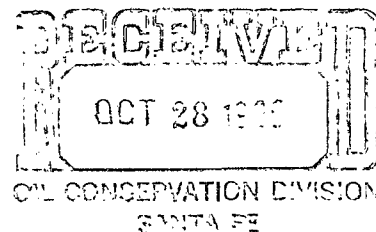
Sent to	C. W. Zahn
Street and No.	Phillips Pet. Co.
P.O. State and ZIP Code	40001 Penbrook, Odessa, Tx
Postage	\$79762
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return receipt showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date	



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region



October 22, 1985

Wastewater Discharge Plan
Artesia Plant

Mr. R. L. Stamets, Director
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Stamets:

This letter is written as a request for a 60 day extension of the October 31 deadline established for startup of our new wastewater system at Artesia Plant. Due to a recent illness, the final piping drawings for the system have yet to be completed. The surface equipment (injection pumps, storage tanks) has been ordered and should be delivered shortly. The injection well was operational as of September 1.

An extension is also requested for dewatering and closing the evaporation pond. As you may be aware, Phillips is in the process of closing the pond with the Environmental Improvement Division pursuant to the RCRA (hazardous waste) regulations. The EID conducted final sampling of the pond on August 29, 1985. Mr. Kelley Crossman of the EID informed us at that time that we were not to proceed with closing the pond until the final water and sludge analyses have been received and evaluated. We request that you contact the EID to establish a suitable closure date for the pond.

Questions concerning this matter should be directed to Rodney Holsworth or Mike Ford of this office at (915) 367-1302.

Very truly yours,

C. W. Zahn

C. W. Zahn
Staff Director, Process Engineering

CWZ:ggp

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
SANTA FE, NEW MEXICO

Notice Dates:
10/3/84 (ALB.)
10/1/84 (ARTESIA)

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission regulations, the following proposed discharge plan has been submitted for approval to the Director of the Oil Conservation Division, P. O. Box 2088, State Land Office Building, Santa Fe, New Mexico 87501, telephone (505) 827-5800.

PHILLIPS PETROLEUM COMPANY, Artesia Gasoline Plant (SE 1/4 Section 7, Township 18 South, Range 28 East, NMPM, Eddy County, New Mexico), E. E. Clark, Authorized Agent, 4001 Penbrook, Odessa, Texas 79762, proposes to modify its existing facility by eliminating and closing the existing unlined evaporation ponds, and disposing of approximately 41,000 gallons per day of industrial wastewater into a new Class II injection well to be located near the plant. The wastewater is composed of effluents from cooling towers, boilers, condensers, and process vessels. Process fluids containing oil by-products are treated by two oil/water separators before discharged to tank storage prior to disposal. The ground water most likely to be affected by any discharges from surface facilities is at a depth of approximately 85 feet with a total dissolved solids concentration of about 300 mg/l.

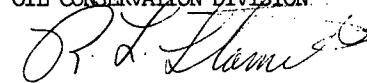
Any interested person may obtain further information from the Oil Conservation Division and may submit written comments to the Director of the Oil Conservation Division at the address given above. Prior to ruling on any proposed discharge plan or its modification, the Director of the Oil Conservation Division shall allow at least thirty (30) days after the date of publication of this notice during which comments may be submitted to him and a public hearing may be requested by an interested person. Requests for public hearing shall set forth the reasons why a hearing should be held. A hearing will be held if the Director determines there is signifi-

cant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed plan based on information available. If a public hearing is held, the Director will approve or disapprove the proposed plan based on information in the plan and information submitted at the hearing.

GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 28th day of September, 1984.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION



R. L. STAMETS
Acting Director

S E A L



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

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

September 18, 1984

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. E. E. Clark
Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

Re: Proposed Discharge Plan
for Phillips Artesia
Gasoline Plant, Eddy
County, New Mexico

Dear Mr. Clark:

The proposed discharge plan dated September 6, 1984, for the above referenced facility has been reviewed by me for compliance with the New Mexico Water Quality Control Commission (WQCC) Regulations. The proposed addition of a disposal well to eliminate the unlined evaporation ponds greatly simplifies the review of the discharge plan since upon approval and construction these effluents will no longer be discharge onto the surface of the ground. I do have several questions, comments, or requests for additional clarifying information on the material you submitted.

Plant Drain and Disposal Systems

- 1) For those buried tanks, separators and sumps described in the discharge plan and/or shown on Attachment 1, describe the lining material (coated steel, concrete, etc.) unless already provided.
- 2) How is glycol engine coolant disposed of if an entirely new charge is needed?
- 3) Are the 15,000 and 1,000 barrel tanks described on page 4 existing, or proposed as part of the discharge plan?
- 4) Is domestic sanitary waste commingled with the other

effluents? If not, locate the septic tanks on Attachment 1 and indicate whether any non-domestic type waste is disposed in that system (solvents, laboratory chemicals, etc.)

- 5) Describe the proposed actions and procedures (including OCD notification) to be undertaken by the discharger in the event of detecting leaks or failure in the discharge systems.
- 6) Describe the composition and volume of fluids discharged to the Flare pit and the frequency of discharge.
- 7) Indicate on Attachment A the disposal area for general waste and the spent molecular sieve and sulfur catalyst wastes.
- 8) Regarding current evaporation pit closure, what will be done with the fluids removed during dewatering? Describe how run-off from heavy rains will be diverted from the pit area.
- 9) Since an injection well is to be used for effluent disposal, describe the procedures to be followed to prevent unauthorized discharges to the surface or subsurface in the event the disposal well or disposal line is shut-in for workover or repairs (eg. extra storage tanks, emergency pond, shipment of site, etc.) Address actions to be taken in the event of disposal pipeline failure, extended disposal well downtime, etc.
- 10) Provide the location site of the proposed injection well.

Spill/Leak Prevention and Housekeeping Procedures

- 1) Describe procedures addressing containment and cleanup in case of spills from process units (i.e. contingency plans). Include information as to whether plant areas are curbed and drained to sumps, final disposition of spill material, proposed schedule for OCD notification of spills, etc.
- 2) Describe methods used to detect leaks and ensure integrity of above and below ground tanks, and in-plant piping. Discuss procedures to be undertaken if significant leaks are detected.

- 3) Discuss general "housekeeping" procedures for containment in-plant of spills, precipitation runoff, etc., not directly associated with major plant processes (eg. cleaning operations, truck washing). Include information on curbing, drainage, disposition, notification, etc. (See Item 1 above.)

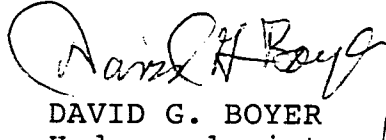
Hydrology

- 1) Are the two stock wells described on pages 5 and 6 the only water wells within one mile of the plant site? If not, locate the other wells on Attachment 22 or other topographic map quadrangle, and describe their current use.
- 2) The wastewater analysis (Attachment 16) includes chemical analyses of the inorganic contaminants listed in Section 3-103 A. of the WQCC Regulations. Several hydrocarbon components (eg. benzene), solvents and/or biocides listed in that section or listed as toxic pollutants (Section 1-101.UU) may be present in the discharge. Under the regulations, analyses for these contaminants can be required. However, if all discharges are now, or soon will be self-contained, the OCD will not at this time ask for additional chemical analyses.

As you know, application and processing for the Class II disposal well is separate from OCD processing of this discharge plan. However, the timetable for injection well installation that you presented in your September 6th letter will be incorporated as part of the discharge plan. If there are expected to be any delays in this timetable, you are requested to notify us prior to discharge plan approval so that a correct pond closure timetable may be included in the plan.

If you have any questions, please contact me at the above address or at (505) 827-5812. Since I will be out of the office until October 24, I will be unable to answer inquiries prior to that date.

Sincerely,


DAVID G. BOYER
Hydrogeologist

DGB/dp

cc: OCD Artesia Field Office

P 505 905 728

RECEIPT FOR CERTIFIED MAIL

NO INSURANCE COVERAGE PROVIDED—
NOT FOR INTERNATIONAL MAIL

(See Reverse)

Sent to Mr. E. E. Clark	
Street and No. Phillips Pet. Co.	
P.O. State and ZIP Code 4001 Penbrook - Odessa, TX	
Postage	\$ 79762
Certified Fee	
Special Delivery Fee	
Restricted Delivery Fee	
Return Receipt Showing to whom and Date Delivered	
Return Receipt Showing to whom, Date, and Address of Delivery	
TOTAL Postage and Fees	\$
Postmark or Date	

PS Form 3800, Feb. 1982



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

NATURAL RESOURCES GROUP
Exploration and Production

September 6, 1984

OIL CONSERVATION DIVISION
SEP 10 1984
RECEIVED

Mr. Joe D. Ramey, Director
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

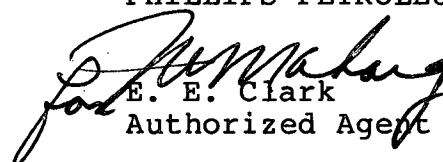
As required by Part 3-106-C of the Water Quality Regulations, Phillips Petroleum Company submits the attached discharge plan for our Artesia Gasoline Plant, Eddy County, New Mexico.

Our discharge plan submitted on April 12, 1984 was not approvable due to the possibility that our wastewater, which is discharged into an evaporation impoundment, could be contaminating the groundwater in the area. We are planning to drill and complete a disposal well to eliminate the evaporation impoundment. The time table for this plan is as follows:

- | | |
|--|----------|
| 1. Obtain waiver from zone (3800'-5000') leasee to inject. | 3 weeks |
| 2. Request and obtain approval from New Mexico to inject. | 4 weeks |
| 3. Drill the injection well. | 6 weeks |
| 4. Complete the well and run injectivity test. | 2 weeks |
| 5. Order and install surface equipment. | 10 weeks |
| 6. Dewater and backfill evaporation impoundment. | 4 weeks |

If you have any questions regarding this matter, please contact R. D. Holsworth at (915) 367-1302.

Very truly yours,
PHILLIPS PETROLEUM COMPANY


E. E. Clark
Authorized Agent

EEC:RDH:gpp

Plan separate in
File ARTB



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

NATURAL RESOURCES GROUP
Exploration and Production

September 6, 1984

OIL CONSERVATION DIVISION
SEP 10 1984
RECEIVED

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P. O. Box 2088
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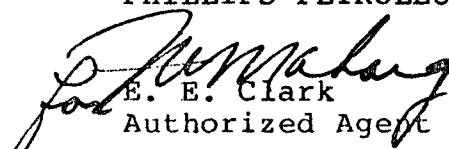
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Very truly yours,
PHILLIPS PETROLEUM COMPANY


E. E. Clark
Authorized Agent

EEC:RDH:gpp

DISCHARGE PLAN
PHILLIPS PETROLEUM COMPANY
ARTESIA GASOLINE PLANT
SECTION 7, TOWNSHIP 18 SOUTH, RANGE 28 EAST, EDDY COUNTY

I. General Process Description

Artesia Plant's basic function is to remove the ethane and heavier hydrocarbon fractions from casinghead and gas well gas. The plant receives sour hydrocarbon gas streams from 5 and 750 psig gathering systems. The gas from the 5 psig system is compressed to 125 psig before going to a low pressure amine contactor where hydrogen sulfide and carbon dioxide in the gas stream is removed. Gas from the 750 psig system is sent directly to a high pressure amine contactor. Both amine contactors use monoethanolamine for the sweetening process. The hydrogen sulfide and carbon dioxide that is removed is sent to the plant's sulfur recovery unit. The sweet gas from the low pressure amine contactor is then compressed to 750 psig and commingled with the sweet gas from the high pressure amine contactor. The commingled gas stream is then sent to a molecular sieve dehydrator where the gas is dehydrated to a water content of less than 1 ppmv. From the dehydrator the gas stream flows to a turboexpander plant where it is cooled by propane refrigeration and expansion to a temperature of approximately -140°F. The turboexpander plant produces two hydrocarbon streams, the first being a liquid hydrocarbon stream comprised of approximately 85 percent of the ethane and all of the propane and heavier hydrocarbons that entered the plant. The liquid hydrocarbon stream has a vapor pressure of approximately 500 psig and is sent to four 13'2" ID x 46' S/S, 550 psig MWP vessels for temporary storage before being delivered to a pipeline for sale.

The second hydrocarbon stream produced from the turboexpander plant is comprised primarily of methane gas. This gas stream is divided with a portion going to Arco's Empire Abo Unit for reinjection into the formation and the remainder being sold to Transwestern Pipeline. The Arco gas is compressed to 750 psig before leaving the plant, and the gas sold to Transwestern is compressed to 680 psig before leaving the plant.

Attachments 1 and 2 are a plot plan and process flow sheet of the plant.

II. Plant Water Systems

A. Raw Water

Artesia Plant receives its water from a total of six wells owned by the Caprock Water Company of Loco Hills, New Mexico. The wells are located in Sections 26 and 35, Township 16 South, Range 32 East, Lea County and are completed at a depth of approximately 900 feet. The wells supply an average of 2650 bbl/day of water to the plant. Attachment 3 is an analysis of this water. Attachment 4 shows the location of our raw water feed line and water storage tanks.

B. Potable Water

A small fraction of the raw water is chlorinated and used as potable water for the plant's office and control room.

C. Cooling Tower System

The cooling tower system is comprised of two open recirculating cooling towers. The smallest of these towers has a recirculation rate of 3400 gpm within an approximate raw water make-up rate of 36 gpm. The larger of the two towers has a recirculating rate of 4400 gpm within an approximate raw water make-up rate of 46 gpm. The raw water in these towers is recirculated until the impurities in the water are concentrated to approximately 5 times their inlet concentrations, producing 556 bbl/day of waste water. Approximately 1.8 gal/day of Dearborn's Endcor 4607 (Attachment 5) and 1.24 gal/day of Dearborn's Endcor 4623 (Attachment 6) are being added on a continuous basis to the cooling tower water for scale and corrosion inhibition. Small quantities of sulfuric acid are also added to the cooling tower water when needed to maintain a pH of approximately 6.8 in the water. Dearcide 702 (Attachment 7) and 709 (Attachment 8) are being added to the cooling tower to control bacteria, algae, and fungus. Dearborn 863 (Attachment 8A), a dispersant, is added to the cooling tower as needed. Attachments 9 and 10 are simplified schematics of the cooling tower systems.

D. Boiler Water System

The boiler water system is comprised of a Zeolite water softener, two boilers (one process and one waste heat boiler in the sulfur plant) which produce 250 psig

steam, and one boiler and three sulfur plant condensers which produce 50 psig steam. The raw make-up water to this system passes through the Zeolite softener which removes calcium and magnesium in the make-up water. The soft water from the Zeolite softener flows to a holding tank before being pumped into the boilers and sulfur plant condensers. The 250 psig steam is used to drive steam turbines, heat input to a glycol dehydration system, heat input for an amine reclaimer, and heat tracing for the sulfur plant sump. The 50 psig steam is used for heat tracing of lines and heat input for an amine reboiler and a stabilizer reboiler. All condensate produced is returned to the boiler feed water tank for reuse. Approximately .5 gal/day of Dearborn 66 (Attachment 11), .5 gal/day of Dearborn 244 (Attachment 12), 1.15 gal/day of Sludgtrol 651 (Attachment 13), and 1.78 gal/day of Steamate 2005 (Attachment 13A) are being added to the boiler water system on a continuous basis for corrosion and scale inhibition. Attachment 14 is a process flow sheet of the boiler water system.

Approximately 415 bbl/day of blowdown is generated by the boilers. This waste water is piped to the open drain system's oil/water separator.

E. Engine Cooling System

An ethylene glycol based anti-freeze (Attachment 25) cooling system is used to cool all the engines at the plant. The plant is comprised of three engine rooms: the Cooper engine room, the Clark engine room, and the White Superior engine room. The Cooper and Clark engine rooms each have their own jacket water pumps, above ground jacket water surge tanks, and air fin coolers. All of the engines in the White Superior room have individual self-contained cooling systems.

All the engines in the plant are tied into a buried coolant sump tank, located next to the White engine room (Attachment 1, #32). When an engine is being worked on, its coolant charge is drained to this tank and then pressured back into the engine when the work is completed.

III. Plant Drain and Disposal Systems

A. Engine Oil Drain System

All of the engines in the three main engine rooms are tied into a buried lube oil sump located next to the

White engine room (Attachment 1, #31). The two portable compressor engines are tied into a lube oil sump located next to their skids. When an engine's lube oil is changed, the old lube oil charge is drained into the sumps. From the sumps, the old lube oil is pumped to the slop oil tanks (Attachment 15).

B. Closed Drain System

The closed drain system is a pressure drain system constructed of buried, externally coated, schedule 40 steel pipe. This drain system empties into a buried API oil/water separator. The oil from this separator is pumped to the slop oil tanks. The water from the separator is pumped to the open drain system's oil/water separator. Attachment 15 is a process flow sheet of this system.

C. Open Drain System

The open drain system is an atmospheric drain system constructed of buried, externally coated, schedule 40 steel pipe. This drain system empties into a below grade, internally coated, oil/water separator. The oil from this vessel is pumped to a slop oil tank. The water from this vessel is pumped to one of the 1,000 barrel holding tanks. Attachment 15 is a process flow sheet of this system.

D. Final Waste Water Disposal System

This system takes the water from the open drain oil/water separator into a 1,000 barrel, internally coated stock tank where sulfuric acid is injected to maintain a pH of approximately 7.0. From this tank, the water is pumped through a sock type filter to remove any solid particles. After the water is filtered, approximately 2.0 gal/day of Visco 950 (Attachment 26) is added on a continuous basis for scale inhibition. The water then flows into another 1,000 barrel, internally coated stock tank and then is pumped to the injection well, where the flow rate and pressure is recorded. The overflow of both the 1,000 barrel tanks will flow into a 15,000 barrel emergency overflow tank. This tank will only be used during upsets to the system and any water in the emergency overflow tank will be pumped back into the first 1,000 barrel tank during normal operations. Attachment 15A is a process flow sheet of this system. Attachment 16 is a detailed chemical analysis of the waste water to this system.

IV. Solid Waste Disposal

A. General Waste

The small amount of solid waste generated at the plant is handled in one of two ways. The spent paper products (i.e. paper towels, sacks, etc.) are burned in a safe manner at the plant. The non-combustible items (i.e. pieces of pipe, concrete, etc.) are disposed of in an excavated ditch and then covered.

B. Spent Molecular Sieve

Approximately every 3 to 4 years the molecular sieve dehydrators at the plant are recharged. The spent molecular sieve (Attachment 18) is disposed of on site. Approximately 21,600 pounds of this material is disposed of each time the beds are recharged.

C. Spent Sulfur Catalyst

Approximately once every five years the catalyst in the sulfur recovery unit converter beds are recharged. The spent catalyst (Attachment 19) is disposed of on site. Approximately 20,500 pounds of this material is disposed of each time the beds are recharged.

V. Miscellaneous Information

A. Groundwater

A limited supply of groundwater is available in the Artesia Plant area. A total of 20 wells were drilled within four miles of the plant as possible water supply sources after the Artesia Plant was approved for construction. The majority of these wells were either dry holes or did not have the sufficient recharge volumes needed for plant operations. Attachment 20 contains the location and logs of the wells drilled. Analyses of the water encountered in these wells is contained in Attachment 21. As can be seen from the analyses, a wide variation in water quality, based upon total dissolved solids, was found in the area. There did not seem to be a relationship between the depth of the well and the quality of water found in the well. Total dissolved solids values ranged between 274 and 804 ppm with one exception, Well 15, in which this value was 2274 ppm.

↳ well 15

There are currently two operating livestock water supply wells, pumped by windmills, within a quarter

mile of the plant (location detailed in Attachment 22). The east well is completed at a depth of approximately 130 feet. The west well is completed at a shallower depth of approximately 85 feet. Water samples were obtained from both of these wells and analyzed (Attachment 23) in order to determine current groundwater quality in the plant area. A sample of water was also obtained from the Pecos River, which is approximately five miles west of the plant, and analyzed in order to determine surface water quality in the area (Attachment 24).

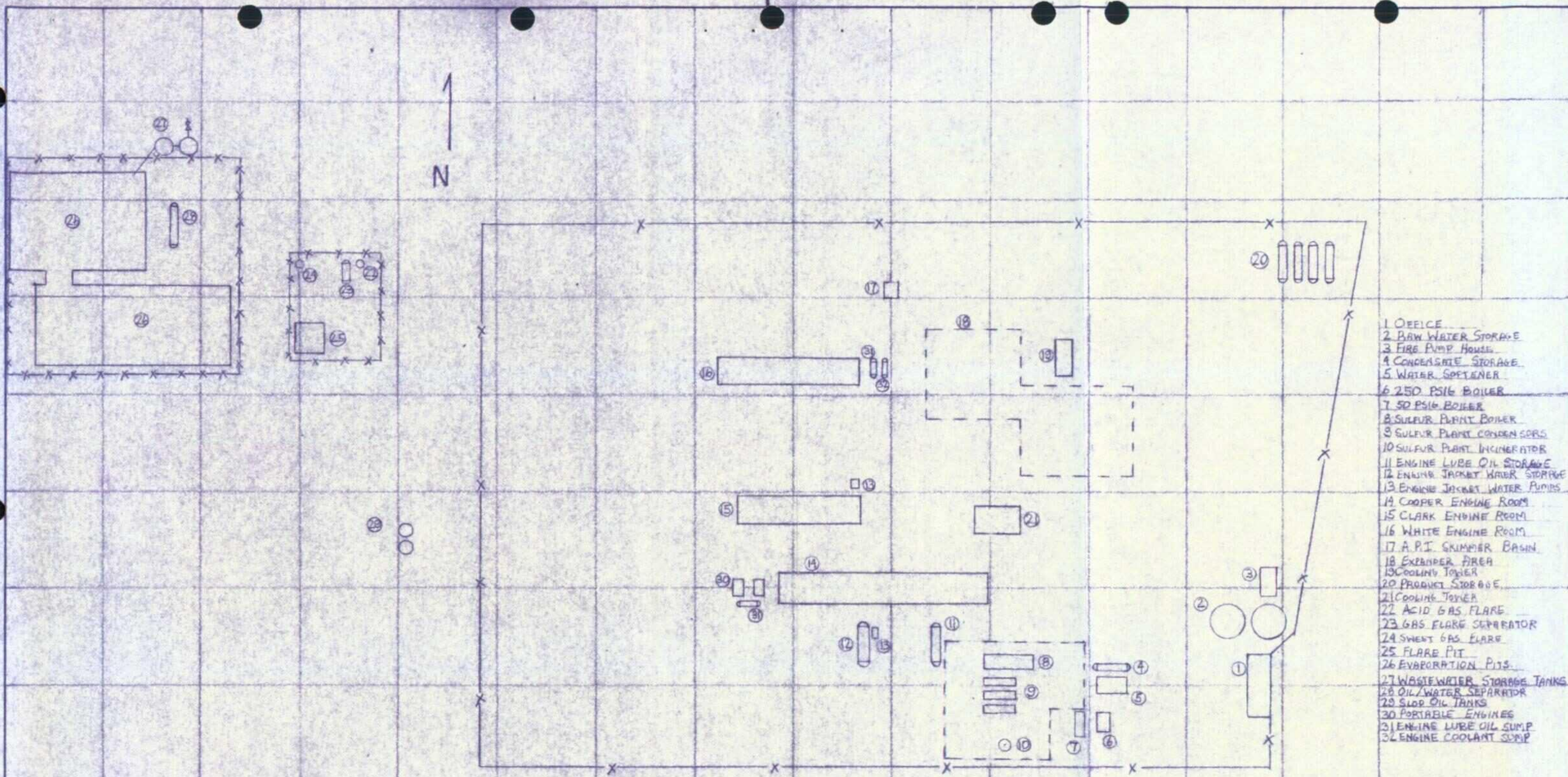
It is our opinion, from the analyses available, that our plant waste water is of no lower quality than some of the groundwater in the area, and is of a considerably high quality than surface water in the area.

B. Topography


Attachment 22 is a topographic map of the area surrounding Artesia Plant. As can be seen from this map, there are no bodies of water within a one mile radius of the plant.

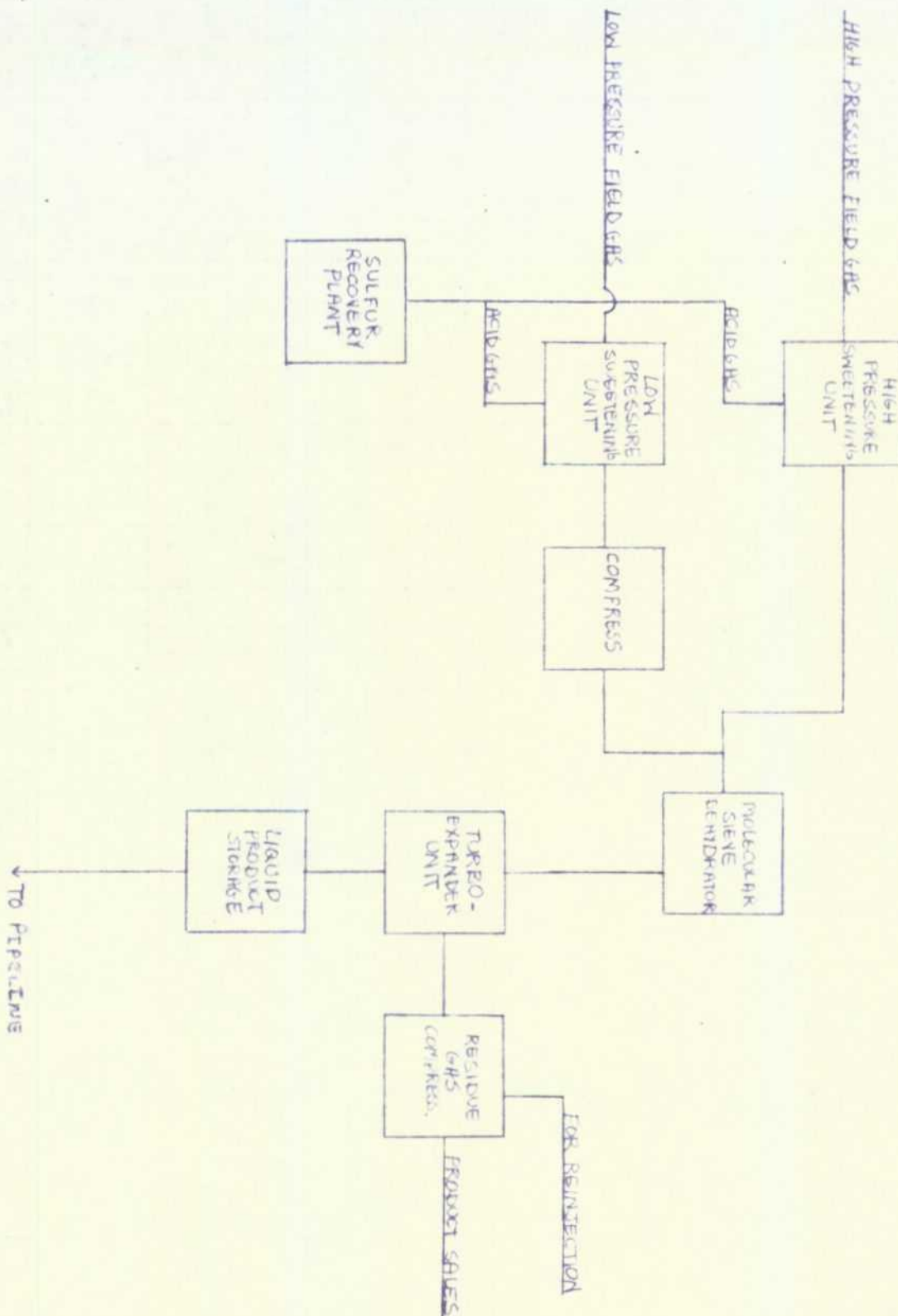
C. Flooding Potential

None



- 1 OFFICE
- 2 RAW WATER STORAGE
- 3 FIRE PUMP HOUSE
- 4 CONDENSATE STORAGE
- 5 WATER SOFTENER
- 6 250 PSIG BOILER
- 7 50 PSIG BOILER
- 8 SULFUR PLANT BOILER
- 9 SULFUR PLANT CONDENSERS
- 10 SULFUR PLANT INCINERATOR
- 11 ENGINE LUBE OIL STORAGE
- 12 ENGINE JACKET WATER STORAGE
- 13 ENGINE JACKET WATER PUMPS
- 14 COOPER ENGINE ROOM
- 15 CLARK ENGINE ROOM
- 16 WHITE ENGINE ROOM
- 17 A.P.I. SKIMMER BASIN
- 18 EXPANDER AREA
- 19 COOLING TOWER
- 20 PRODUCT STORAGE
- 21 COOLING TOWER
- 22 ACID GAS FLARE
- 23 GAS FLARE SEPARATOR
- 24 SWEET GAS FLARE
- 25 FLARE PIT
- 26 EVAPORATION PITS
- 27 WASTEWATER STORAGE TANKS
- 28 OIL/WATER SEPARATOR
- 29 SLOP OIL TANKS
- 30 PORTABLE ENGINES
- 31 ENGINE LUBE OIL SUMP
- 32 ENGINE COOLANT SUMP

NO.	REVISION	BY	DATE			FOR BIDS		BARTLESVILLE, OKLAHOMA		AFE NO.
		CHKD	APP'D			FOR APPR				SCALE 1" = 100'
						FOR CONST				UNLESS OTHERWISE NOTED
						DRAWN FORD	2-24-89	ARTESIA PLANT: PLOT PLAN ATTACHMENT 1		DWG NO.
						CHECKED			SH NO.	
						APP'D				



NO	REVISION	BY	DATE	CHKD	APP'D		
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div> </div> <div> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div> </div> </div>				JA NO	FILE CODE	
FOR APPR	ARTESIA GASOLINE PLANT PROCESS FLOW ATTACHMENT 2				AFE NO	SCALE	
FOR CONST					DWG-NO		
DRAWN FORD	2/24/84					SH NO	
CHECKED							
APP'D							



CONTINENTAL PRODUCTS OF TEXAS

100 Industrial Avenue
(915) 337-4581P. O. Box 1527
Odessa, Texas 79760AGC A.C. Printing
(915) 332-6728

Client:

PHILLIPS PETROLEUM COMPANY

Plant:

Artesia Plant

Page 1 of 2

Attention: Rita A. Johns ✓

Date Sampled 1-22-81 In 1-23-81 Out 1-26-81

ANALYSIS NO.

SOURCE OF SAMPLE

328
Lab Fresh Water
No Chlorine Res
12:17
Air Temp 46° F

CONSTITUENT

METHOD

PPM

PPM

PPM

Temperature	°F	Thermometer	44°		
pH		Meter	7.0		
Alkalinity, Total	CaCO ₃	Titration			
Alkalinity, Phenolphthalein	CaCO ₃	Titration			
Hardness, Total	CaCO ₃	Titration			
Chloride	Cl	Titration	24		
Chlorine	Cl ₂	Colorimeter			
Sulfate	SO ₄	Turbidimeter	28		
Sulfate	S	Turbidimeter			
Sulfite	SO ₃	Titration			
Sulfide, Total	S	Titration			
Sulfide, Hydrogen	H ₂ S	Titration			
Ammonia	NH ₃	Nessler			
Bromide	Br	Colorimeter			
Cyanide	CN	Colorimeter	None		
Fluoride	F	Colorimeter	0.4		
Phosphorous	P ₂ O ₅	Colorimeter			
Phosphate, Ortho	PO ₄	Colorimeter			
Phosphate, Poly	PO ₃	Colorimeter			
Nitrate	NO ₃	Colorimeter	8.5		
Nitrite	NO ₂	Colorimeter			
Nitrogen	N	Kjeldahl			
Specific Conductance 27°C	mmhos	Wheatstone			
Total Dissolved Solids		Evaporation	332		
Total Residue		Evaporation			
Total Suspended Solids		Millipore			
Volatile Solids		Evaporation			
Settleable Solids		Std Sewage			
Color, PT-CO Units		Colorimeter			
Turbidity, Jackson Units		Turbidimeter			
Volatile Acids		Colorimeter			
Relative Stability		Turbidimeter			
Phenols		Colorimeter	0.14		
Surfactants	DBS	Colorimeter			
Algae	QAC	Colorimeter			
Pesticides		Colorimeter			
Oil & Grease		Extraction			
Chlorinated Hydrocarbon					



CONTINENTAL PRODUCTS OF TEXAS

100 Industrial Avenue
(915) 337-4541P. O. Box 3627
Odessa, Texas 79762678 ABC Bu'g
(915) 332-0528

WASTE WATER ANALYSIS REPORT

Client PHILLIPS PETROLEUM COMPANYPlant Artesia Plant

Page 2 of 2

Date Sampled 1-22-81 In 1-23-81 Out 1-

ANALYSIS NO.

328

SOURCE OF SAMPLE

Lab Fresh Water
No Chlorine Res
12:17
Air Temp. 46°F

SECTION B. - METAL CONSTITUENTS

METHOD

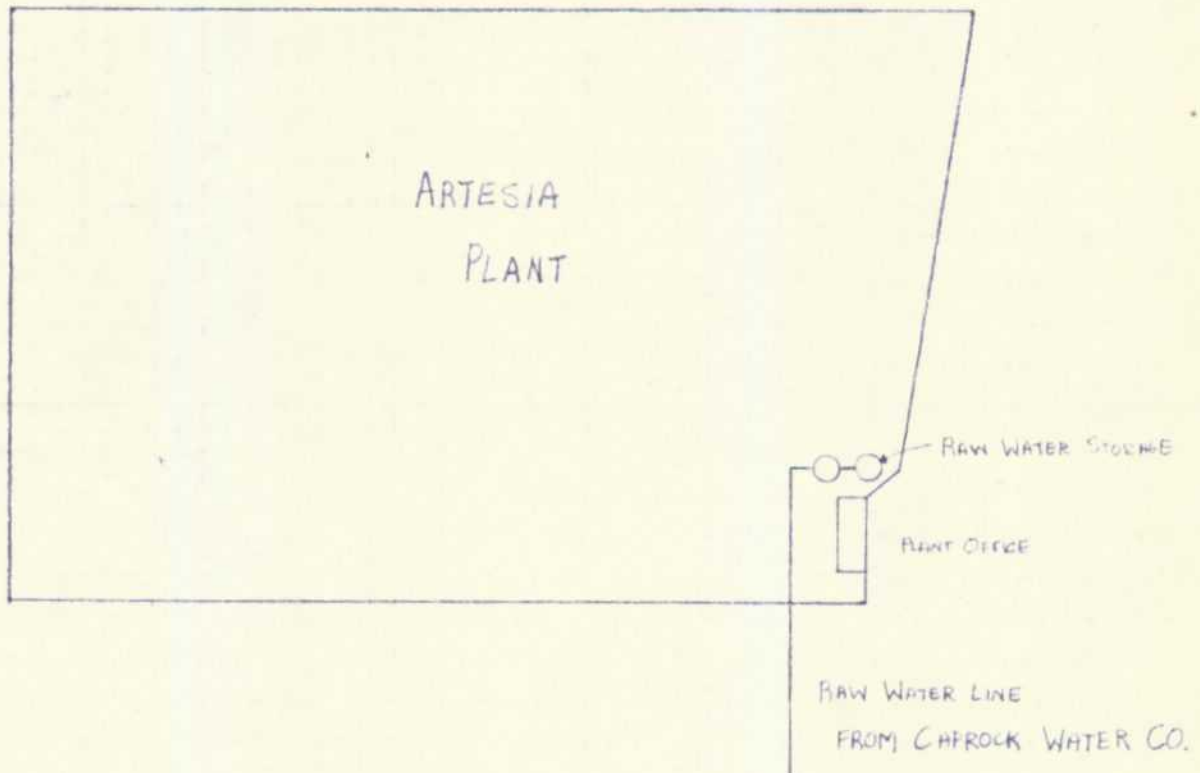
PPM



PPM

PPM

Aluminum	Al	A. A.*			
Antimony	Sb	A. A.			
Arsenic	As	A. A.	None		
Barium	Ba	A. A.	1.3		
Beryllium	Be	A. A.			
Boron	B	A. A.			
Cadmium	Cd	A. A.	None		
Calcium	Ca	A. A.			
Chromium	Cr	A. A.	None		
Cobalt	Co	A. A.			
Copper	Cu	A. A.	None		
Iron	Fe	A. A.	0.01		
Lead	Pb	A. A.	None		
Magnesium	Mg	A. A.			
Manganese	Mn	A. A.	None		
Mercury	Hg	A. A.	None		
Molybdenum	Mo	A. A.			
Nickel	Ni	A. A.			
Potassium	K	A. A.			
Selenium	Se	A. A.	None		
Silver	Ag	A. A.	None		
Silicon	Si	A. A.			
Sodium	Na	A. A.			
Thallium	Tl	A. A.			
Tin	Sn	A. A.			
Titanium	Ti	A. A.			
Zinc	Zn	A. A.	4.9		

↑
N



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div style="text-align: center;">  </div> </div>	JA NO	FILE CODE		
FOR APPR		AFE NO	SCALE		
FOR CONST					
DRAWN	<div style="text-align: center;"> ARTESIA GASOLINE PLANT RAW WATER SUPPLY ATTACHMENT 4 </div>			DWG NO	
CHECKED				SH NO	
APP'D					

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

• Section 1 — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME

DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Cooling water treatment

TRADE NAME OR CODE IDENT.

ENDCOR 4607

• Section 2 — INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

Potassium hydroxide

< 10

• Section 3 — PHYSICAL DATA

BILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.3	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Straw color liquid	pH	12.2

• Section 4 — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME	AUTO IGNITION TEMPERATURE
None	LOWER UPPER	

EXTINGUISHING MEDIA

☐ Water Fog☐ Foam☐ CO₂☐ Dry Chemical☐ Other

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 — REACTIVITY DATA

STABILITY (Normal Conditions)

CONDITIONS TO AVOID

☒ Stable☐ Unstable

INCOMPATIBILITY (Materials to Avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION

CONDITIONS TO AVOID

☐ May Occur☒ Will Not Occur

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Not expected

INGESTION

If ingested, do not induce vomiting. Immediately feed large quantities of water, citrus juice or dilute vinegar (1 teaspoonful in 1 glass of water). Contact physician.

SKIN OR EYE CONTACT

Will cause eye irritation and damage, and skin irritation. Wash from skin with water; remove contaminated clothing and wash before reuse. Flush eyes with clear water. Contact physician.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical exhaust is adequate.

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles or face shield

GLOVES (Specify Type)

Rubber or plastic

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Use industrial absorbent, bury or burn.

Flush spill area thoroughly with water.

WASTE DISPOSAL METHOD

May be used to neutralize acid waste, or use authorized chemical scavenger service.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

For industrial use only. Keep containers closed when not in use.

OTHER PRECAUTIONS

Freeze point, 17°F.

Shipping Name: DOT Water Treatment Compound, Liquid, Corrosive Material

IATA

Prepared By W. M. Morris

Date: 1/82 (Rev. 9/82)

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET****Section 1 - PRODUCT IDENTIFICATION****MANUFACTURER'S NAME**

DEARBORN CHEMICAL (U.S.), CHEMED CORPORATION

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Cooling water treatment

TRADE NAME OR CODE IDENT.

ENDCOR 4623

Section 2 - INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

Section 3 - PHYSICAL DATA

BOILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.17	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	
% VOLATILES BY VOLUME		EVAPORATION RATE, _____	= 1
APPEARANCE AND ODOR: Pale yellow liquid		pH	approx. 7.0

Section 4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
---------------------------------------	--	---------------------------

EXTINGUISHING MEDIA☐ Water Fog☐ Foam☐ CO₂☐ Dry Chemical☐ Other**SPECIAL FIRE FIGHTING PROCEDURES****UNUSUAL FIRE AND EXPLOSION HAZARD****Section 5 - REACTIVITY DATA****STABILITY (Normal Conditions)****CONDITIONS TO AVOID**☒ Stable ☐ Unstable**INCOMPATIBILITY (Materials to Avoid)****HAZARDOUS DECOMPOSITION PRODUCTS****HAZARDOUS POLYMERIZATION****CONDITIONS TO AVOID**☐ May Occur ☒ Will Not Occur

(over)

SECTION 6 - HEALTH HAZARD AND EXPOSURE LIMIT
Not established

EFFECTS OF OVEREXPOSURE

INHALATION Not expected

INGESTION

Not for internal use

SKIN OR EYE CONTACT

Product may irritate skin on prolonged contact. Keep out of eyes. Wash skin with soap and water; flush eyes with clear water.

EMERGENCY AND FIRST AID PROCEDURES

Section 7 - SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles

GLOVES (Specify Type)

Plastic or rubber

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

Section 8 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED Collect using industrial absorbent, bury or burn. Flush area of spill with water.

WASTE DISPOSAL METHOD

Use sanitary landfill for disposal - product is not an EPA Hazardous Waste.

Section 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE For industrial use only. Keep containers closed when not in use.

OTHER PRECAUTIONS

Product freezes at 24°F.

Shipping Name: DOT Compound, Industrial Process Water Treating, Liquid

IATA

Prepared By W. M. Morris

Date: 6/81

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET****• Section 1 – PRODUCT IDENTIFICATION**

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Cooling water Microbicide	EPA Reg. No. 4643-40	TRADE NAME OR CODE IDENTIFY DEARCID® 702

• Section 2 – INGREDIENTS

	CAS No.	%	EXPOSURE CRITERIA
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.15	
2-Methyl-4-isothiazolin-3-one	2682-20-4	0.35	

• Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg approx.	212°F.	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.01	VAPOR PRESSURE @ 77°F approx.	24 mmHg
VAPOR DENSITY (AIR = 1)	—	SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME By weight	94	EVAPORATION RATE, Butyl acetate = 1	less than
APPEARANCE AND ODOR Pale amber to green liquid	pH	approx.	4.0
	Mild aromatic odor		

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER N/A UPPER	AUTO IGNITION TEMPERATURE N/A
None		

EXTINGUISHING MEDIA ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES If material is involved in a fire, use approved self-contained breathing apparatus. Use water spray to cool exposed containers.

UNUSUAL FIRE AND EXPLOSION HAZARD Toxic combustion products include sulfur dioxide and hydrogen chloride.

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions)	CONDITIONS TO AVOID To avoid evaporation to dryness in shipping container, triple rinse drum with water, adding rinsate to treated system per EPA container handling instructions for all FIFRA regulated products
<input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	

INCOMPATIBILITY (Materials to Avoid) Do not allow concentrated product to boil.

HAZARDOUS DECOMPOSITION PRODUCTS

HCl and oxides of sulfur.

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
<input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	

(over)

MATERIAL SAFETY DATA SHEET (Continued)**• Section 6 -- HEALTH HAZARD INFORMATION**

EXPOSURE LIMIT Maximum time weighted average (TWA) for 5-chloro-2-methyl-4-isothiazolin-3-one is 0.5 mg/m³ as mist or aerosol. Human skin sensitization is induced in 1/18 subjects @ 25 pp active ingredient.

EFFECTS OF OVEREXPOSURE

INHALATION Avoid prolonged inhalation of fumes and mist. May cause irritation of mucous membranes of nose and throat. Remove to fresh air.

INGESTION Do NOT take internally. Do NOT induce vomiting. Drink a large quantity of milk, egg white, gelatin solution or if these are unavailable, drink large quantities of water. **AVOID ALCOHOL.** Call physician immediately. **NOTE TO PHYSICIAN:** Probable mucosal damage may contraindicate gastric lavage. Measures against circulatory shock, respiratory depression and convulsions may be necessary.

SKIN OR EYE CONTACT Prevent direct skin or eye contact. Direct contact with skin will cause severe irritation and burns. Material is a skin sensitizer at even low concentrations (see above). Wash skin with soap and water. **NOTE TO PHYSICIAN:** Use of sterile dressings over a bland bacteriostatic ointment for 4-5 days is suggested initially. If dermatitis reaction occurs, use wet soaks 3 or 4 times daily followed by corticosteroid ointment. For severe allergic reactions, use of an oral corticosteroid such as prednisone may be

EMERGENCY AND FIRST AID PROCEDURES considered for 6-7 days with decreasing dosages. **Eye contact:** Contact will cause severe irritation and corneal damage. If contacted, flush eyes immediately with large amounts of water for 15 minutes. Contact a physician at once. Use of antibiotic ointment may be indicated.

• Section 7 -- SPECIAL PROTECTION INFORMATION**VENTILATION REQUIREMENTS**

Mechanical exhaust is adequate for product in normal use.

RESPIRATORY PROTECTION (Specify Type)

Wear MESA/NIOSH approved respirator suitable for mist or high vapor concentrations as may be encountered in large spill.

EYE PROTECTION Wear splash-proof goggles and face shield (ANSI Z87.1, 1979)

GLOVES (Specify Type)

Impervious gloves

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

Impervious protective apron, eyewash facilities, emergency shower in vicinity of use.

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED Use industrial absorbent and transfer to suitable container for disposal using authorized chemical scavenger service. Flush area with water using suitable dike as required to control run-off.

WASTE DISPOSAL METHOD Product can be deactivated using 8 lb. calcium hypochlorite (65% active) 5 lb. caustic soda in 10 gal. water. Deactivated product must be handled as corrosive material. If disposal of active product is required, authorized hazardous waste handling procedure is necessary. (see below)

• Section 9 -- SPECIAL PRECAUTIONS**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE**

Keep container closed when not in use. Store in ventilated area. Freeze point, 32°F. If frozen, agitate when thawed to mix.

OTHER PRECAUTIONS Triple rinse empty containers into system using the product and dispose of containers per EPA-DOT regulations referred to in Dearborn Technical Bulletin 51-104.

Shipping Name: DOT Water Treatment Compound, Liquid - Corrosive Material

IATA

Prepared By W. M. Morris

Date: 6/81 (revised 12/82)

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

● Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.	EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047	

CHEMICAL NAME AND SYNONYMS Cooling water microbicide and slimicide	EPA Reg. No. 4643-16	TRADE NAME OR CODE IDENT. DEARCIDE® 709
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● Section 2 – INGREDIENTS

	CAS No.	%	EXPOSURE CRITERIA
Methylene bithiocyanate	6317-18-6	9.3	
Dimethylformamide	68-12-2	approx. 90.0	TLV: 20 ppm STEL

● Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg	307° F.	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	0.977	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)	2.51	SOLUBILITY IN H ₂ O, % BY WT.	Soluble at use conc.
% VOLATILES BY VOLUME	90.0	EVAPORATION RATE, _____	= 1
APPEARANCE AND ODOR	Light amber liquid, mildly sulfurous odor	pH of 1% aqueous solution	4.8

● Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) 135° F. TCC	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER @ 100° C. 2%	UPPER 15%	AUTO IGNITION TEMPERATURE
EXTINGUISHING MEDIA <input type="checkbox"/> Water Fog <input checked="" type="checkbox"/> Foam <input checked="" type="checkbox"/> CO ₂ <input checked="" type="checkbox"/> Dry Chemical <input type="checkbox"/> Other	SPECIAL FIRE FIGHTING PROCEDURES		

UNUSUAL FIRE AND EXPLOSION HAZARD

● Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
INCOMPATIBILITY (Materials to Avoid) Avoid strong alkali and halo-hydrocarbons; nitrates at elevated temperatures.	

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
---	---------------------

(over)

• Section 6 -- HEALTH HAZARD INFORMATION
EXPOSURE LIMIT

TWA: 10 ppm (skin)

EFFECTS OF OVEREXPOSURE

INHALATION

Inhalation may result in central nervous system toxic effects.

INGESTION Highly toxic if ingested. If ingested, do not induce vomiting, feed milk mixed with egg whites. Consult a physician immediately.

SKIN OR EYE CONTACT

May be absorbed with repeated prolonged contact. Irritating to skin; damaging to eyes. Remove from skin by immediate water flush. If eyes are affected, flush with water and get medical attention. Remove contaminated clothing and launder before reuse.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical exhaust is adequate.

RESPIRATORY PROTECTION (Specify Type)

Use respirator (vapor type) for prolonged exposure.

EYE PROTECTION

Goggles or face shield

GLOVES (Specify Type)

Chemical gloves

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Collect using industrial absorbent, bury or burn. Flush residue to sewer with plenty of water.

WASTE DISPOSAL METHOD Discard material through authorized scavenger service or incineration. Triple rinse empty containers into system using the product and dispose of containers per EPA-DOT regulations referred to in Dearborn Technical Bulletin 51-104.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Avoid extreme heat and keep container closed when not in use.

OTHER PRECAUTIONS

Protect container from physical damage. Keep away from children. For industrial use only.

Shipping Name: DOT CORROSIVE -Water Treatment Compound, Liquid-Corrosive Material
IATA

Prepared By W. M. Morris

Date: 1/79 (revised 2/83)

Attachment 8A

MATERIAL SAFETY DATA SHEET

• Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME

DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Cooling water treatment

TRADE NAME OR CODE IDENT.

DEARBORN® 863

• Section 2 – INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

• Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg	approx.	212°F.	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)		1.01	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)			SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		10	EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Pale yellow liquid with a musty odor		pH	2.1

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME		AUTO IGNITION TEMPERATURE
None	LOWER	UPPER	
EXTINGUISHING MEDIA	<input type="checkbox"/> Water Fog	<input type="checkbox"/> Foam	<input type="checkbox"/> CO ₂
	<input type="checkbox"/> Dry Chemical	<input type="checkbox"/> Other	

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions)	CONDITIONS TO AVOID
<input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	

INCOMPATIBILITY (Materials to Avoid)

Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
<input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	

(over)

● Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Avoid prolonged breathing of product. Remove to fresh air.

INGESTION

May be harmful if swallowed. If ingested, give water and induce vomiting by sticking finger down throat. Contact physician

SKIN OR EYE CONTACT

May cause skin and eye irritation on prolonged exposure. If eyes are affected, flush with water and consult a physician. Wash off skin with soap and water.

EMERGENCY AND FIRST AID PROCEDURES

● Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical is adequate

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles or face shield

GLOVES (Specify Type)

Chemical gloves

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

● Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Flush area of spill with water.

Collect using absorbent, bury or burn.

WASTE DISPOSAL METHOD

Dispose through authorized scavenger service. Product is an EPA Hazardous Waste (corrosive).

● Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Keep from freezing. Freeze point, 0°F.

OTHER PRECAUTIONS

Keep out of reach of children. For industrial use only.

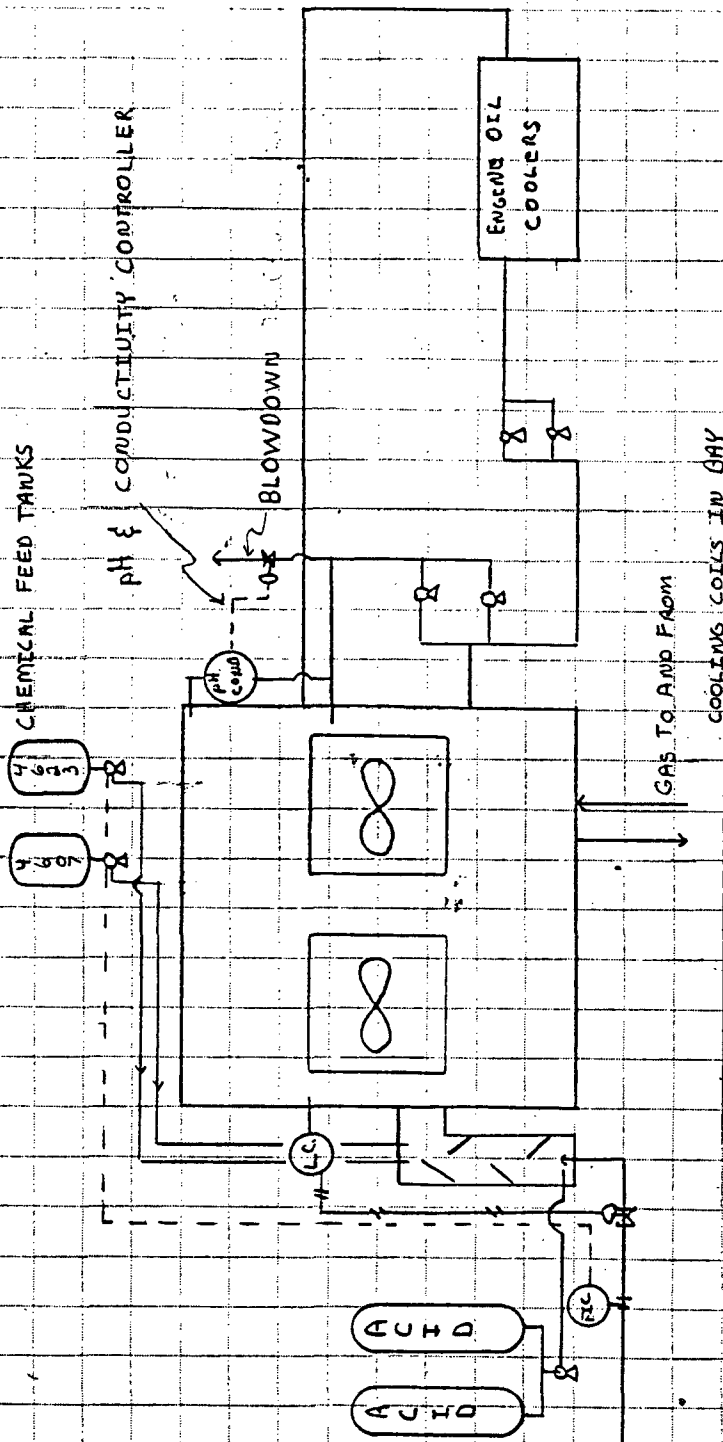
Shipping Name: DOT
IATA

Compounds, Industrial Process Water Treating, Liquid

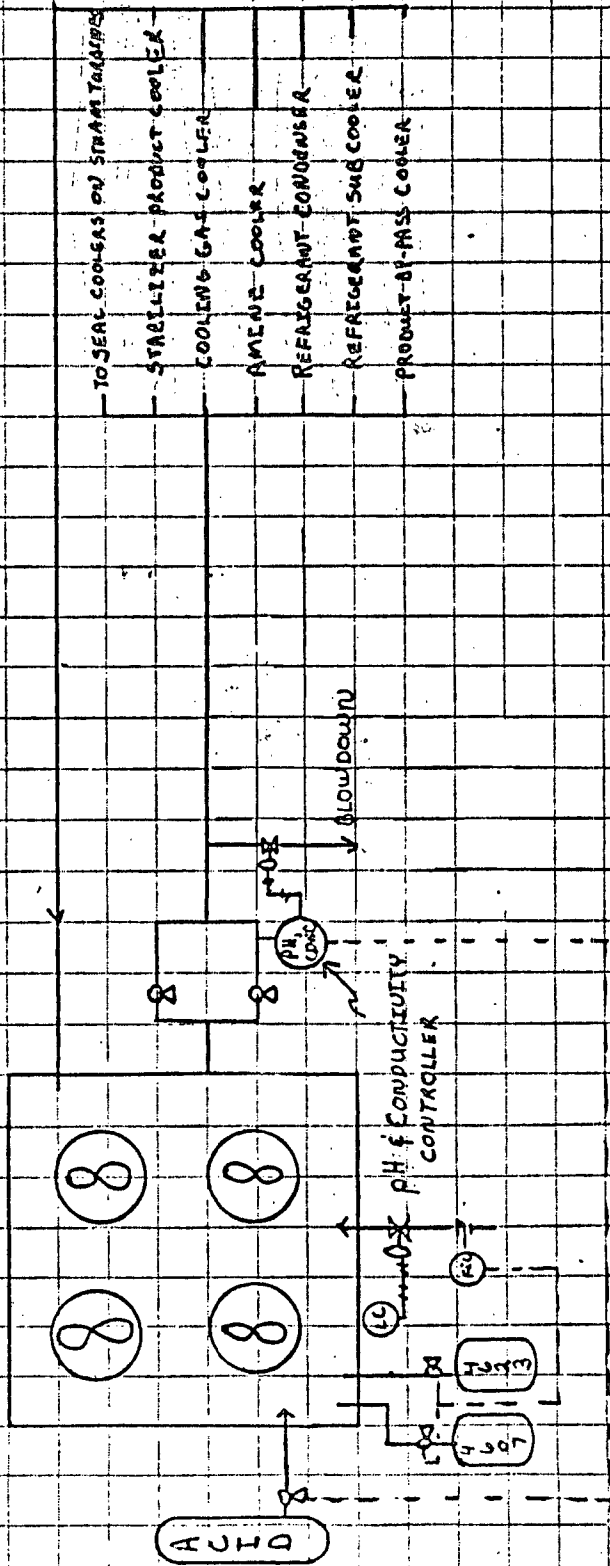
Prepared By W. M. Morris

Date: 6/78 (Revised 8/83)

ARTESIA PLANT - LARGE COOLING TOWER



ARTESIA PLANT - SMALL COOLING TOWER



~~CONFIDENTIAL~~
CONFIDENTIAL**MATERIAL SAFETY DATA SHEET****Section 1 — PRODUCT IDENTIFICATION**

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Catalyzed sodium sulfite	TRADE NAME OR CODE IDENT. DEARBORN® 66	

Section 2 — INGREDIENTS	CAS No.	%	EXPOSURE CRITERIA
Sodium sulfite	7757-83-7	approx. 95	

Section 3 — PHYSICAL DATA

BOILING POINT, 760mm Hg	Decomposes	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1) Density	91 lbs/ft ³	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	approx. 12%
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Reddish brown - mild odor (powder)	pH of 5% solution	9.3

Section 4 — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
---------------------------------------	--	---------------------------

EXTINGUISHING MEDIA ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES
Non-flammable

UNUSUAL FIRE AND EXPLOSION HAZARD
None

Section 5 — REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID Slowly oxidizes to sodium sulfate
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INCOMPATIBILITY (Materials to Avoid) Being a reducing agent, may be expected to react strongly with strong oxidizers (chlorine, peroxides, etc.)

HAZARDOUS DECOMPOSITION PRODUCTS
None

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
---	---------------------

(over)

MATERIAL SAFETY DATA SHEET (Continued)

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT TDC: oral - human LDLo 500 mg/kg

TLV: 30 m.p.p.c.f. (Nuisance particulate)

EFFECTS OF OVEREXPOSURE

INHALATION Not expected

INGESTION

If swallowed, possibly harmful by depression of blood pressure, gastric irritation, etc. Mild emetic and copious fluids suggested.

SKIN OR EYE CONTACT

For skin contact, wash off with water. Eye contact; very mildly alkaline, possibly irritant; flush with water.

EMERGENCY AND FIRST AID PROCEDURES

If swallowed, mild emetic and copious fluids suggested. For skin contact, wash off with water; for eyes, flush with water.

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

Use adequate respirator for dusting - 3M #8710 or equal has been suggested for similar use.

EYE PROTECTION

Goggles

GLOVES (Specify Type)

None required

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

None required.

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Sweep up spills and return to container if uncontaminated. Flush residue to drain with water. (~~Contaminated material may be taken to landfill.~~)

WASTE DISPOSAL METHOD

May mix with waste solutions of oxidizing agents to neutralize effects of both wastes, or dispose using chemical scavenger service. Destroy containers.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep containers closed and dry. Store in a dry place, away from strong oxidizers.

Use floating cover over solutions to avoid oxidation losses.

OTHER PRECAUTIONS

For industrial use only. Keep out of reach of children.

Shipping Name: DOT. Compound Boiler Cleansing, Preserving, Scale Removing Dry - NOT RESTRICTED
IATA

Prepared By W. M. Morris

Date: 5/78 (Revised 6/80)

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

● Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Liquid water treatment	TRADE NAME OR CODE IDENT. DEARBORN® 244	

● Section 2 – INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

● Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg approx.	212°F.	MELTING POINT	N/A
SPECIFIC GRAVITY (H ₂ O = 1)	1.21	VAPOR PRESSURE	No data
VAPOR DENSITY (AIR = 1)	No data	SOLUBILITY IN H ₂ O, % BY WT.	appreciable
% VOLATILES BY VOLUME	No data	EVAPORATION RATE, _____ = 1	No data
APPEARANCE AND ODOR Colorless liquid/no odor	pH		5.6

● Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER N/A UPPER	AUTO IGNITION TEMPERATURE N/A
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EXTINGUISHING MEDIA N/A ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES

None

UNUSUAL FIRE AND EXPLOSION HAZARD

None

● Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
---	---------------------

INCOMPATIBILITY (Materials to Avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
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(over)

MATERIAL SAFETY DATA SHEET (Continued)**● Section 6 -- HEALTH HAZARD INFORMATION****EXPOSURE LIMIT**

Not established

EFFECTS OF OVEREXPOSURE**INHALATION**

Not expected

INGESTION

If ingested in large quantity, nausea or vomiting may occur. Drink milk or water to dilute and contact physician if discomfort persists.

SKIN OR EYE CONTACT

If in contact with skin, wash area with soap and water. If in eyes, use clear water to flush for several minutes. If irritation persists contact physician.

EMERGENCY AND FIRST AID PROCEDURES**● Section 7 -- SPECIAL PROTECTION INFORMATION****VENTILATION REQUIREMENTS****RESPIRATORY PROTECTION (Specify Type)****EYE PROTECTION** Goggles**GLOVES (Specify Type)** Plastic or rubber**OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)****● Section 8 -- SPILL OR LEAK PROCEDURES****STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED**

Use industrial absorbent and bury or incinerate. Flush area with water.

WASTE DISPOSAL METHOD

Use chemical scavenger service. Tender metal container to drum reconditioner. Remove labels.

● Section 9 -- SPECIAL PRECAUTIONS**PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE**

Product is low toxic and non-hazardous.

Keep container closed. Freeze point, 10° F.

OTHER PRECAUTIONS**Shipping Name:** DOT NOT RESTRICTED - Compound Industrial Process Water Treating, Liquid
IATA**Prepared By** W. M. Morris**Date:** 9/25/78

MATERIAL SAFETY DATA SHEET● **Section 1 — PRODUCT IDENTIFICATION**

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.	EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047	

CHEMICAL NAME AND SYNONYMS Boiler water treatment	TRADE NAME OR CODE IDENT. SLUDGTROL® 651
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● **Section 2 — INGREDIENTS** CAS No. % **EXPOSURE CRITERIA****NON - HAZARDOUS MATERIAL**

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

● **Section 3 — PHYSICAL DATA**

BOILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.08	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR Brown liquid		pH	9.5

● **Section 4 — FIRE AND EXPLOSION HAZARD DATA**

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
---------------------------------------	--	---------------------------

EXTINGUISHING MEDIA ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD

● **Section 5 — REACTIVITY DATA**

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
---	---------------------

INCOMPATIBILITY (Materials to Avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
---	---------------------

(over)

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Not expected

INGESTION Product may be harmful if ingested. Drink large amount of water or citrous juice to dilute and neutralize. Contact physician if discomfort occurs.

SKIN OR EYE CONTACT

Wash off skin with water. Flush eyes with water for 15 minutes. Contact physician if irritation occurs.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles

GLOVES (Specify Type)

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Collect spills with absorbent, bury or burn. Flush area with water.

WASTE DISPOSAL METHOD

Use scavenger service for disposal in landfill.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

For industrial use only. Keep containers closed when not in use. Freezes at 30° F.

OTHER PRECAUTIONS

Shipping Name: DOT Compd. Boiler Cleansing, Preserving, Scale Removing, Liquid
IATA

Prepared By W. M. Morris

Date: 12/80

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**● **Section 1 – PRODUCT IDENTIFICATION**

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Return line treatment		TRADE NAME OR CODE IDENT. STEAMATE® 2005

● **Section 2 – INGREDIENTS**

CAS No.

%

EXPOSURE CRITERIA

Cyclohexylamine	)	108-91-8		TWA 10 ppm (skin)
)			
Diethylamino ethanol	)	100-37-8	approx. 25	TWA 10 ppm "
)			
Morpholine	)	110-91-8		TWA 20 ppm "

- in aqueous solution

● **Section 3 – PHYSICAL DATA**

BOILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	0.98	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Yellow liquid and no odor	pH	approx. 12.0

● **Section 4 – FIRE AND EXPLOSION HAZARD DATA**

FLASH POINT (and Method Used) 135°F. TCC	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER	AUTO IGNITION TEMPERATURE UPPER
EXTINGUISHING MEDIA <input type="checkbox"/> Water Fog <input type="checkbox"/> Foam <input type="checkbox"/> CO ₂ <input type="checkbox"/> Dry Chemical <input type="checkbox"/> Other		
SPECIAL FIRE FIGHTING PROCEDURES		

UNUSUAL FIRE AND EXPLOSION HAZARD

● **Section 5 – REACTIVITY DATA**

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
INCOMPATIBILITY (Materials to Avoid)	

HAZARDOUS DECOMPOSITION PRODUCTS

NO_x

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
---	---------------------

(over)

MATERIAL SAFETY DATA SHEET (Continued)

Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Inhaling fumes will cause dizziness. Remove to fresh air.
Strongly alkaline.

INGESTION

If ingested may cause convulsions. Drink large quantity of milk, egg whites, gelatin solution or if these are not available drink large quantity of water. Contact physician.

DO NOT INDUCE VOMITING

SKIN OR EYE CONTACT

Possible skin sensitizer. May cause dermatitis. Harmful to eyes. Wash skin with soap and water. Wash eyes with clear water. Contact a physician.

EMERGENCY AND FIRST AID PROCEDURES

Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical is usually adequate for normal conditions of use.

RESPIRATORY PROTECTION (Specify Type)

If large amounts are handled or in case of emergency, use Wilson THGW gas mask, or equal.

EYE PROTECTION

Goggles or face mask

GLOVES (Specify Type)

Rubber

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Use industrial absorbent to collect, burn or bury. Flush area with water. Flush residues to drain with water.

WASTE DISPOSAL METHOD

Incinerate or use authorized chemical scavenger service. Tender metal containers to drum reconditioners. Remove labels.

Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

For industrial use only. Keep away from open flames. Close container when not in use. Freeze point, -46°F

OTHER PRECAUTIONS

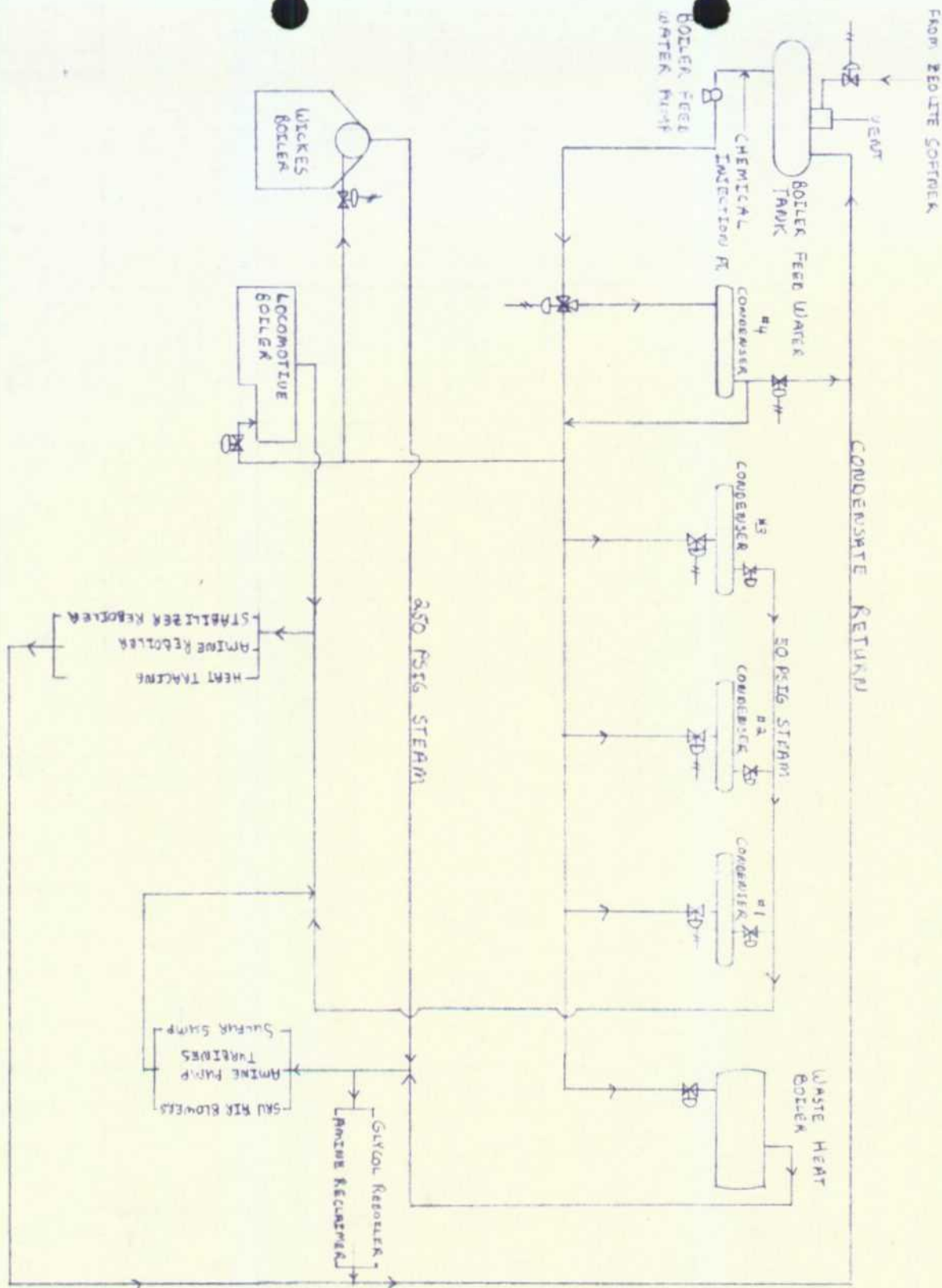
Protect container from physical damage. Keep away from reach of children. For industrial use only.

Shipping Name: DOT
IATA

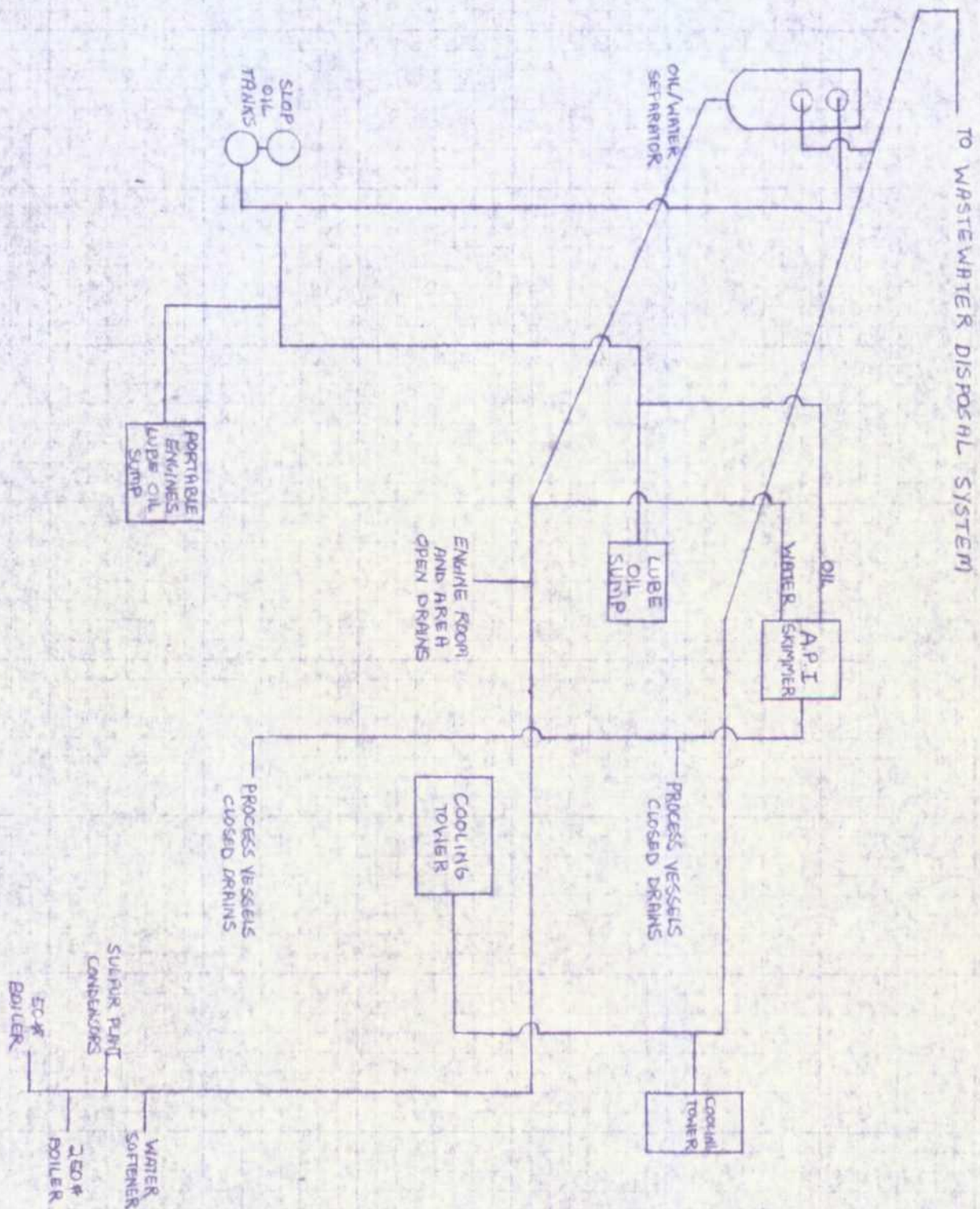
Boiler Compound, Liquid, Corrosive Material - CORROSIVE

Prepared By W. M. Morris

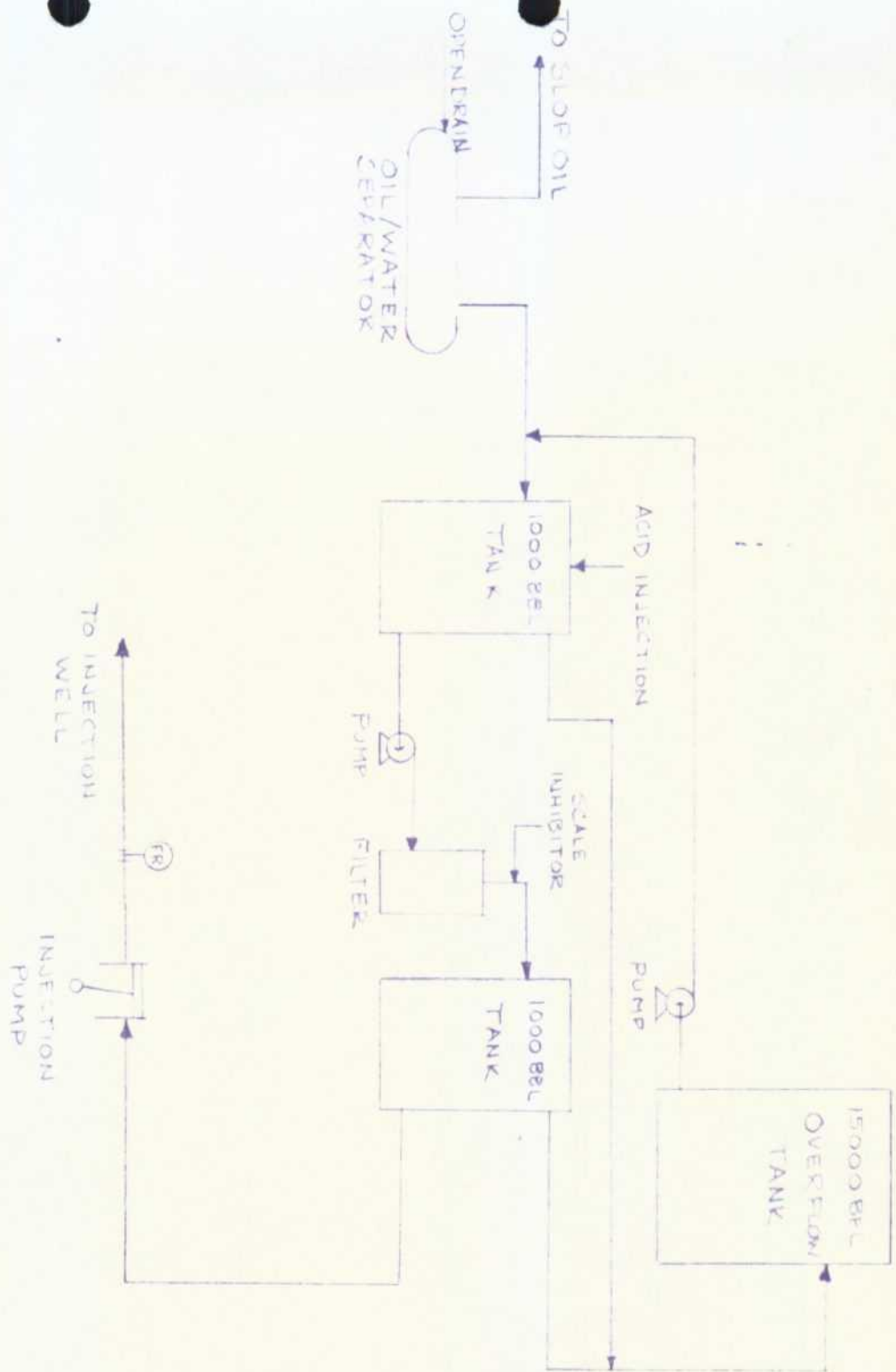
Date: 12/82



NO.	REVISION	BY	DATE	CHKD	APP'D	
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div> </div> <div style="text-align: center;"> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA ATESIA PLANT STEAM SYSTEM </div> <div> </div> </div>				JA NO	FILE CODE
FOR APPR					AFE NO	SCALE
FOR CONST						
DRAWN <i>stubs</i>	ATTACHMENT #14				DWG NO	
CHECKED					SH NO	
APP'D						



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div style="text-align: center;"> ARTESIA GASOLINE PLANT DRAIN SYSTEM </div> </div>			JA NO	FILE CODE
FOR APPR				AFE NO	SCALE
FOR CONST	ATTACHMENT 15			DWG NO	
DRAWN				SH NO	
CHECKED					
APP'D					



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div style="text-align: center;"> ARTESIA GASOLINE PLANT WASTEWATER SYSTEM </div> </div>			AFE NO.	FILE CODE
FOR APPR				SCALE <u>NONE</u>	UNLESS OTHERWISE NOTED
FOR CONST				DWG NO.	SH NO.
DRAWN <u>RDH</u>	9/84	ATTACHMENT 15A			
CHECKED					
APP'D					

**SOUTHWESTERN LABORATORIES***Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services*

1703 W. Industrial Avenue (915-683-3348) • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-W
Customer No. 3355796
Report No. 35020
Report Date 1-24-84
Date Received 12-21-83

Report of tests on: **Water**
Client: **Phillips Petroleum**
Identification: **Artesia Plant, Wastewater**

	mg/L
Aluminum-----	Less Than 2
Arsenic-----	Less Than 0.05
Barium-----	Less Than 1
Boron-----	0.4
Cadmium-----	Less Than 0.01
Chromium-----	0.14
Cobalt-----	Less Than 0.1
Copper-----	Less Than 0.1
Iron-----	0.3
Lead-----	Less Than 0.05
Manganese-----	0.06
Mercury-----	Less Than 0.002
Molybdenum-----	Less Than 1
Nickel-----	Less Than 0.5
Selenium-----	Less Than 0.01
Silver-----	Less Than 0.05
Zinc-----	0.06
Sulfate-----	357
Chloride-----	638
Fluoride-----	1.8
Nitrate-----	0.5
Cyanide-----	Less Than 0.001
Phenols-----	0.060
Total Dissolved Solids @ 180° C-----	1984

Technician: **KLH, PCB, GMB**

Copies 3 cc: **Phillips Petroleum Co.**
Attn: Mike Ford

SOUTHWESTERN LABORATORIES



WATER ANALYSIS REPORT

(Test 1, Livestock; Test 2, Domestic; Test 3, Irrigation)

SOIL AND WATER TESTING LABORATORY

LAB NO. 2173 YOUR SAMPLE NO. _____
NAME Phillips Petroleum 40 S. Wallace DATE 4/31/83
ADDRESS 4061 Penbrook Odessa, TX 79762

pH 6.75
Total Soluble Salts: 1728 Parts per Million 1106 % .11
EC x 10⁶ 1456 ppm*
Total Dissolved Solids 6.84 meq/l** Other Analysis: _____ ppm* _____ ppm*
Sodium (Na) 462 ppm* 27.0 grains _____ ppm* _____ ppm*
Hardness (CaCO₃ equivalent) _____
Sodium - Adsorption - Ratio (SAR) 3.18 Residual Sodium Carbonate (RSC) 0

REMARKS

Your water is classified as Satisfactory for livestock use.Your water ☒ exceeds ☐ is within the U.S. Public Health Department Standards for domestic use.

See below side for classification of irrigation water.

The U.S. Public Health Department recommends the following for domestic use water:

Hardness - up to 500 parts per million

Total dissolved solids - 500 parts per million with up to 1000 parts per million usable.

* ppm = parts per million

ppm x 2.7 = lbs. per acre-foot of water

** meq/l = milliequivalents per liter

meq/l of Na x 62 = lbs. of Na per acre-foot of water

NOTE: Some well waters should be checked for pathological organisms and for physiological effect.

EXPLANATION***

Salinity Hazard

- ☐ Low-Salinity Water (C1) can be used for irrigation with most crops in most soils with little likelihood that soil salinity will develop.
- ☐ Medium-Salinity Water (C2) can be used if a moderate amount of leaching occurs.
- ☒ High-Salinity Water (C3) cannot be used on soils with restricted drainage.
- ☐ Very-High-Salinity Water (C4) is not suitable for irrigation under ordinary conditions, but may be used occasionally under very special circumstances.

Sodium Hazard

- ☒ Low-Sodium Water (S1) can be used for irrigation on almost all soils with little danger of the development of harmful levels of sodium.
- ☐ Medium-Sodium Water (S2) will possibly cause a sodium hazard in fine-textured soils, under low-leaching conditions. This water can be used on coarse-textured soils with good permeability.
- ☐ High-Sodium Water (S3) may produce a sodium hazard and will require special soil management - good drainage, high leaching and possibly the use of chemical amendments such as gypsum.
- ☐ Very-High Sodium Water (S4) is usually unsatisfactory for irrigation purposes.

NMSU Classification System

The system used by the University is based upon three classes of water, which take into account salinity and sodium hazard.

- ☐ Class 1 water is suitable for use for most crops under most conditions.
- ☒ Class 2 water can be used satisfactorily for most crops if care is taken to prevent the accumulation of soluble salt and sodium in the soil.

Refer to the enclosed "guides" for additional information:

Guide A-116 "The NMSU Irrigation Water Classification System"

Guide A-110 "Classification of Irrigation Waters"

Sincerely,

Charles R. Glover

Charles R. Glover
Extension Agronomist

Classification of Irrigation Water



Reviewed by
Charles Glover, Extension Agronomist

Guide A-110

The New Mexico State University Soil and Water Testing Laboratory classifies irrigation water by both the U.S. Salinity Laboratory system and the NMSU system. These systems are similar. After the samples are analyzed, the water is classified by both systems on the irrigation water analysis report.

Composition and concentration of dissolved chemicals in irrigation water determine its quality for irrigation use.

Characteristics of an irrigation water that are important in determining its quality are electrical conductivity (expressed as $EC \times 10^6$), sodium adsorption ratio (SAR), and often the bicarbonate concentration (HCO_3), which is expressed as residual sodium carbonate (RSC). These three characteristics are included along with pH in routine irrigation water analyses by the laboratory (figure 1).

Fig. 1. NMSU analysis report for irrigation water

pH	_____
Total Soluble Salts:	_____
EC x 10 ⁶	_____ Parts per million _____ or _____ %
Total Dissolved Solids: _____ ppm* or _____ pounds per acre-foot of water	
Sodium (Na) _____ meq/l** or _____ pounds of Na per acre-foot of water	
Sodium Adsorption Ratio (SAR) _____	
Residual Sodium Carbonate (RSC) _____	

*ppm = parts per million

**meq/l = milliequivalents per liter

Electrical Conductivity

The total concentration of soluble salts in irrigation water is expressed in terms of electrical conductivity, or $EC \times 10^6$. In general, waters with conductivity values below 750 are satisfactory for irrigation use. Waters with $EC \times 10^6$ in the range of 750 to 2250 can be used, with good management and favorable

drainage. Saline soil conditions will develop if drainage and leaching are inadequate. Use of waters with $EC \times 10^6$ values above 2250 is hazardous and frequently results in excess accumulation of salts in the soil.

Sodium Adsorption Ratio

The SAR value of irrigation water indicates the alkali hazard involved in use of the water for irrigation. This value measures the proportion of sodium to other chemicals in the water. In general, waters with SAR values of less than 10 are considered usable for irrigation.

Residual Sodium Carbonate

This value is another measure of the alkali hazard of irrigation water. Under New Mexico conditions, irrigation waters with an RSC value of less than 1 are considered suitable for most crops under most conditions. Waters with an RSC of 1 to 2.5 can be used for most crops if care is taken to prevent the accumulation of soluble salt and sodium in the soil. Waters with an RSC above 2.5 is generally unsatisfactory for crop production.

pH

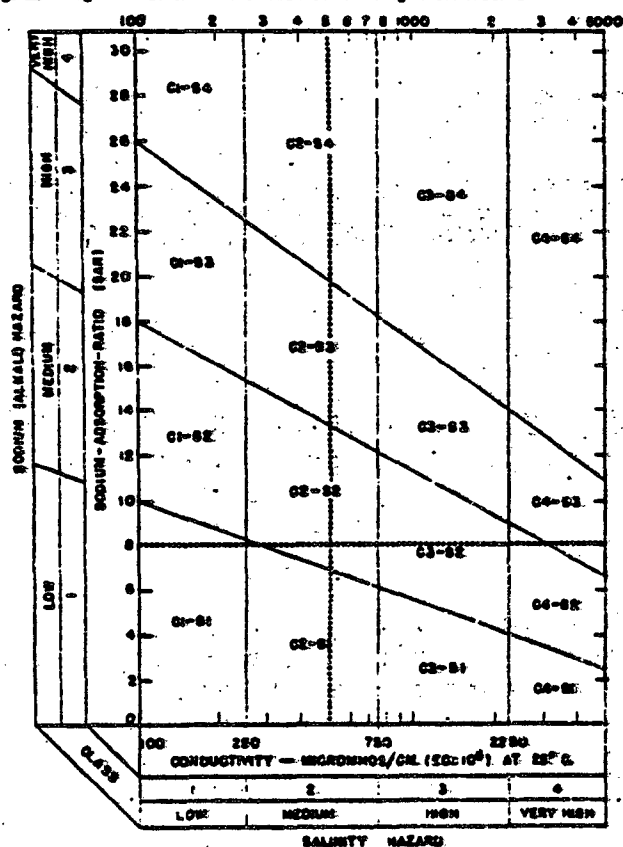
pH is the symbol for hydrogen ion concentration, a measure of acidity and alkalinity. pH 7 is the midpoint where a liquid is neither acid or alkaline; below pH 7 it is progressively more acid and above more alkaline.

A pH above 8.5 indicates a water high in soluble salts. Special irrigation and cropping practices may be required to use the water.

U.S. Salinity Laboratory Classification

This system uses the SAR and $EC \times 10^6$ values for classifying water. Figure 2 is a simplified diagram developed at that laboratory for use in the classification of irrigation waters. $EC \times 10^6$ values are shown across the bottom and top of the diagram. SAR values are shown along the left side.

Fig. 2. Diagram for the classification of irrigation waters*



Source: Agriculture Handbook 60, U.S. Dept of Agriculture

This figure can be used by finding the $EC \times 10^6$ value on the irrigation water analysis report. Find the same value along the bottom and top margin of the figure. Draw a line from the EC value on the bottom margin straight up to the same value on the top margin. Find the SAR value on the analysis report. Locate that value on the left margin of the diagram. Draw a line from this point across the diagram to the right margin. The area in which the two lines meet is the classification of your irrigation water.

Example: Assume an $EC \times 10^6$ value of 500 and an SAR value of 8. Drawing the lines at these points (dotted lines on diagram) we find the water is classified as C2-S2, or medium salinity—medium sodium.

Salinity Hazard

Low-salinity water (C1) can be used for irrigation with most crops in most soils with little likelihood that soil salinity will develop.

Medium-salinity water (C2) can be used if a moderate amount of leaching occurs.

High-salinity water (C3) cannot be used on soils with restricted drainage.

Very-high-salinity water (C4) is not suitable for irrigation under ordinary conditions, but it may be used occasionally under very special circumstances.

Sodium Hazard

Low-sodium water (S1) can be used for irrigation of almost all soils with little danger of development of harmful levels of sodium.

Medium-sodium water (S2) may cause an alkalinity problem in fine-textured soils, under low-leaching conditions. It can be used on coarse-textured soils with good permeability.

High-sodium water (S3) may produce an alkalinity problem. This water requires special soil management such as good drainage, heavy leaching, and possibly the use of chemical amendments such as gypsum.

Very-high-sodium water (S4) is usually unsatisfactory for irrigation purposes.

NMSU Classification System

The system developed at the University is based upon three classes of water which take into account salinity and sodium hazard:

- Class 1. Water is suitable for use on most crops under most conditions.
- Class 2. Water can be used satisfactorily for most crops if care is taken to prevent accumulation of soluble salts and sodium in the soil.
- Class 3. Water is generally unsatisfactory for crop production. Less salty water in Class 3 may be used as a supplemental source if the regular water is of good quality.

Reprinted 10/82

The NMSU Irrigation Water Classification System



Revised by - C. R. Glover, Extension Agronomist

Guide A-116

To farmers, water quality usually refers to the kind and amount of salts in the water and how they will affect crop production. Salts are present in varying amounts in all irrigation waters, and the way these salts influence the osmotic pressure of the soil solution determines the effect. The higher the concentration of dissolved salt, the greater the osmotic pressure of the solution. When the osmotic pressure is low, plant roots readily absorb water from moist soil. Plants have difficulty absorbing water when the osmotic pressure is high, even if the soil is thoroughly wet. Plants may actually wilt with their roots in water if there is a high concentration of salt in the soil. If the salt concentration is abnormally high, normal uptake of the water essential for good plant growth is impossible.

When salts go into solution, they separate into ions. There is considerable difference among the various cations and anions in their effects on soils and plants.

PRINCIPAL CATIONS

Calcium

Calcium (Ca), an essential plant nutrient, is found extensively in New Mexico soils as limestone (calcium carbonate) and as gypsum (calcium sulfate). Calcium carbonate is very slightly soluble in water, and calcium sulfate is moderately soluble. Irrigation waters coming from areas where gypsum is a major soil constituent are invariably high in calcium sulfate. The Pecos Valley, Tularosa Basin, and Estancia Valley are examples of such a condition.

For domestic purposes, waters high in calcium or magnesium, or both, are "hard" waters and are undesirable. For irrigation, hard waters are good waters; "soft" (sodium) waters are the undesirable ones. Calcium operates in the soil to help keep it in good physical condition, able to take water well and to be easily tilled.

Magnesium

Magnesium (Mg), another essential plant nutrient, is chemically similar to calcium in reactions. Found

abundantly in New Mexico well water, it is usually present in about half the concentration of calcium. In the Portales irrigated area, however, several irrigation waters contain more magnesium than calcium.

Sodium

Sodium (Na) is not generally considered an essential plant nutrient. It is found in varying amounts in almost all irrigation well waters in New Mexico. It is the most injurious of the cations commonly found in irrigation water. When the amount of sodium exceeds the amount of calcium plus magnesium in irrigation water, unfavorable physical conditions are likely to develop in soils to which such water is applied. Sodium adsorbed on the clay particles tends to disperse them and bring about the formation of "slick spots." Slick-spot soils take water slowly and, when dry, form hard clods that melt down when wetted and seal the soil surface. In addition to its effect on soil structure, sodium has a directly toxic effect on plants.

Improvement of sodium soils can be accomplished by exchanging the adsorbed sodium for calcium and then leaching the sodium salt out of the soil.

Potassium

Potassium (K) is an essential plant nutrient. Potassium-bearing rocks and minerals are common in New Mexico. It is a minor element, however, in most irrigation water in this state and is no longer included in routine analyses.

PRINCIPAL ANIONS

Sulfate

The sulfate (SO_4) ion is the dominant anion in most pump waters in New Mexico. The sulfate ion has no special harmful effects on soils or plants except as it increases the salinity of the soil solution.

Chloride

The chloride (Cl) ion is the next most common anion in well waters. The chloride ion has a directly toxic effect on some plants, aside from its effect on the salinity of the soil solution.

Carbonate

The carbonate (CO_3) ion is of minor importance in New Mexico irrigation water except in the southwestern part of the state.

Bicarbonate

The bicarbonate (HCO_3) ion is, like the carbonate ion, of minor importance in well water in New Mexico except in the southwestern area.

OTHER IONS

Boron, nitrates, silicates, and flourides are sometimes determined, in addition to the foregoing cations and anions. Of these, only boron and nitrates are of much importance in irrigation water. Nitrate analyses of selected irrigation waters have been made, but most of them, thus far, show only low levels of nitrate. Some Carlsbad waters contain considerable nitrates. A few boron analyses have been made which indicate that New Mexico waters do not contain amounts of boron that are considered harmful.

WATER QUALITY

There are several different ways of determining the quality of irrigation water. These include measuring the degree of acidity or alkalinity (pH) of the waters, weighing the salt content of a specified amount of water (total dissolved solids), determining electrical conductivity of a unit quantity of water, calculating the percentage of sodium of the cations present, determining "residual sodium carbonate," and calculating the "sodium-adsorption ratio." Weighing the dissolved salts and measuring electrical conductivity indicate the probable salt hazard from using the water. Determining the pH and calculating the sodium percentage, residual sodium carbonate, or sodium-adsorption ratio show the probable sodium hazard that would arise in the soil.

Electrical Conductivity

Ions in solution are capable of conducting an electric current. The more ions there are, the greater the conductivity of the solution. Estimates of the quantity of salts in solution can be made from electrical conductivity data. The results commonly are expressed in parts per million (ppm) of salt in the water. The higher the salt content of a water, the higher will be its electrical conductivity.

The values of electrical conductivity that are considered to represent satisfactory and harmful levels for New Mexico waters are given in tables 1, 2, and 3.

Residual Sodium Carbonate

Water containing more carbonate plus bicarbonate than calcium plus magnesium, on an equivalent basis,

has much of its calcium and perhaps, magnesium precipitated out of solution when it is applied to soil. As the soil dries out, after an irrigation, the salts become concentrated, and the least soluble ones tend to be precipitated. Removal of calcium and magnesium from solution automatically increases the sodium percentage of the soil solution, which, in turn, increases the rate of adsorption of sodium onto the soil particles. Water containing mostly chlorides and sulfates does not exhibit as marked a change in relative sodium content because of the greater solubility of these anions than of the carbonates and bicarbonates.

When the carbonate plus bicarbonate content exceeds the calcium plus magnesium content, the water is said to contain "residual sodium carbonate." The amount of residual sodium carbonate (RSC) in a water is calculated from the following formula:

$$\text{RSC} = (\text{CO}_3 + \text{HCO}_3) - (\text{Ca} + \text{Mg})$$

The potential sodium hazard in the soil from using water with little residual sodium carbonate is less than from water with a high level of residual sodium carbonate, under similar conditions.

Table 2 gives the values of residual sodium carbonate that are considered satisfactory and harmful in New Mexico waters.

Sodium-Adsorption Ratio

The sodium-adsorption ratio (SAR) is more reliable than the sodium percentage as an indicator of the effect of relative cation concentration on sodium accumulation in the soil. It is calculated from the following formula, where ion concentrations are expressed as milliequivalents per liter (meq./L):

$$\text{SAR} = \frac{\text{Na}}{\sqrt{\frac{\text{Ca} + \text{Mg}}{2}}}$$

The higher the SAR, the greater the potential sodium hazard from using the water. At a given sodium percentage, the SAR doubles when the cation concentration quadruples.

NMSU CLASSIFICATIONS

In New Mexico, local soil conditions and crops play a major part in determining whether irrigation water can be used with ordinary precautions or whether it must be handled with great care. Accordingly, three classification systems are proposed for groups of ground water areas in this state. Group I waters are those in the vicinity of Carlsbad, Artesia, and Roswell, in the Portales area, and in the Tularosa Basin. Group II waters are in the southwestern part of New Mexico, including Deming, Columbus, the Animas Valley, the Gila drainage, and nearby areas.

Group III waters are in the Estancia Valley, Lea County, the House area, the Bluewater area, and the Rio Grande Valley and include most of the other smaller areas in the state where well water is used for irrigation.

The classifications used in this guide are based on three classes of water. Class 1 water is suitable for use for most crops under most conditions. Class 2 water can be used satisfactorily for most crops if care is taken to prevent the accumulation of soluble salt and sodium in the soil. Class 3 water is generally unsatisfactory for crop production. The less salty water in Class 3 may be used as a supplemental source of water if the regular water is of better quality.

Group I

Most of the waters in Group I contain moderate amounts of salt, but all of these areas have some water with excessive salt concentrations. Sodium-adsorption ratios in a group of water samples taken several years ago averaged highest in the Roswell and lowest in the Artesia area. Only one water had any residual sodium carbonate.

A classification system for Group I water is presented in table 1.

Table 1. Quality classes for irrigation well waters from Group I areas

Class	Electrical Conductivity EC X 10 ⁶
1	0 - 1500
2	1500 - 4500
3	above - 4500

Group II

The irrigated areas in Group II include the Mimbres ground water basin, the Animas Valley, and scattered pump irrigated lands in the vicinity of Lordsburg, the Playas Valley, the Hachita Valley, and the Rodeo

17 cont. area. The waters are generally low in salt, with moderate-to-high sodium percentages and moderate-to-high sodium-adsorption ratios. All of them contain residual sodium carbonate.

Sodium is the dominant cation, followed by calcium, and bicarbonate is often the dominant anion. Sodium percentage, sodium-adsorption ratio, residual sodium carbonate, and the carbonate-plus-bicarbonate content increase as the electrical conductivity increases. The main problem is the sodium hazard.

The classification system proposed for Group II waters is presented in table 3.

Table 2. Quality classes for irrigation well waters from Group II areas

Class	Electrical Conductivity EC X 10 ⁶	Residual Sodium Carbonate (meq./L)
1	0 - 750	0 - 1
2	750 - 2250	1 - 2.5
3	above - 2250	above - 2.5

Group III

The classification system proposed for Group III waters, which represent the remainder of the state's irrigation water, is presented in table 3. Generally, these waters have little or no sodium hazard.

Table 3. Quality classes for irrigation well waters from Group III areas

Class	Electrical Conductivity EC X 10 ⁶
1	0 - 1000
2	1000 - 3000
3	above - 3000

Molecular Sieve Type 4A

Product Information

Description

ZEOCHEM Molecular Sieve Type 4A is an alkali aluminosilicate; it is the sodium form of the Type A crystal structure. Type 4A has an effective pore opening of about 4 angstroms.

Chemical Formula:



Applications

ZEOCHEM Molecular Sieve Type 4A is used to dehydrate most fluids. Applications include both static and dynamic drying. Static applications (non-regenerative) include drying of refrigerant gases, usage in desiccant packages, and in insulating glass units. Dynamic applications (regenerative) include drying of natural gas, LPG, air, inert gases, and solvents. ZEOCHEM Molecular Sieve Type 4A will adsorb molecules with a kinetic diameter of less than 4 angstroms and exclude those larger.

Regeneration

ZEOCHEM Molecular Sieve Type 4A can be regenerated by evacuating or purging, usually at elevated temperatures. The purge gas temperature must be sufficiently high to bring the molecular sieve to a level of 400 to 600°F, but not exceeding in any case 1000°F. Higher temperatures could cause physical alteration of the molecular sieve structure. The degree of regeneration depends on the temperature and humidity of the purge gas.

Typical Properties

Nominal pore diameter	4 angstroms
Type of crystal structure	cubic
Bulk density	47 lbs/cuft
Equilibrium water capacity (theoretical)	23% wt.
Water content (as shipped)	1.5% wt. (max.)
Heat of adsorption (max.)	1,800 BTU/lb H ₂ O
Specific heat (approx.)	0.23 BTU/lb/°F

Commercial bead sizes (nominal)

	$\frac{1}{8}$ "	$\frac{1}{4}$ "	
mesh	4×7	7×10	10×18
mm	3-5	2-3	1-2
crush strength, lbs.	18	9	4

ZEOCHEM Molecular Sieve 4A is available in powder form upon request.

Shipping Information

ZEOCHEM Molecular Sieve Type 4A beads are shipped in non-returnable drums as follows:

55 gal. steel drum containers
— 300 lb. net
23 gal. fiber drum containers
— 120 lb. net

5 gal. pails
— 25 lb. net

The information contained herein is based upon our testing and experience and is believed to be accurate. Since operating conditions may vary and since we do not control such conditions, we must DISCLAIM ANY WARRANTY, EXPRESS OR IMPLIED, with regard to results to be obtained from the use of our products or with regard to application of Zeochem technology.

Zeochem is a trademark of Zeochem, Inc. and United Catalysts Joint Venture.

ZEOCHEM

P.O. Box 35940 Louisville, Kentucky 40232. Telephone 502-634-8384 Telex 204190

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Molecular Sieve Type 4A

ZEOCHEM

**S-201 ALUMINA
PRODUCT DATA****PRINCIPAL USES**

As a sulfur conversion catalyst used in natural gas plants, refineries and smelters having Claus process plants and other sulfur recovery type plants.

GRADES

3 x 6 mesh

For special sizing contact nearest Kaiser Chemical Sales Office.

TYPICAL CHEMICAL ANALYSIS

(Percent on Dry Basis)

SiO ₂	0.02
Fe ₂ O ₃	0.02
Na ₂ O	0.35
Loss on ignition	6.0
Al ₂ O ₃	93.6

TYPICAL PHYSICAL PROPERTIES

Form	Balls
Surface Area	325 m ² /gm
Bulk Density, packed	• 44 lbs/ft ³
Abrasion Loss	• 1.5
Crushing Strength	30 lbs. force
Sizing	+ 3 mesh—3%, -6 mesh—3%

SHIPPING INFORMATION

Container:

Bagged shipments in multiwall, moisture-proof bags. Also available in fiber or steel drums and by bulk pneumatic trucks and bulk hopper

Weight: Bagged:
Fiber or Steel Drums:

100 pounds net
300 pounds net

Shipping Point:

Baton Rouge, Louisiana

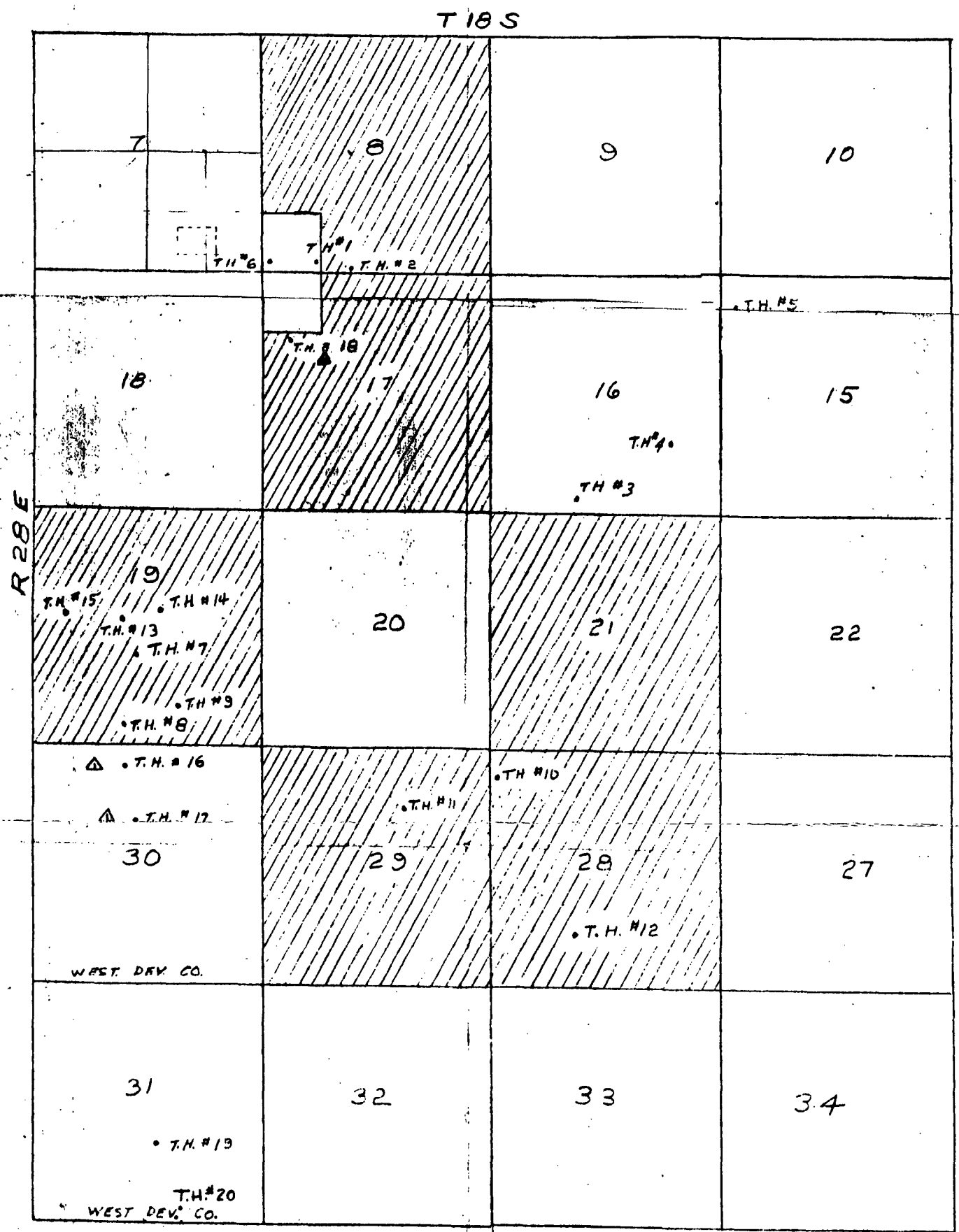
The information contained in this data sheet, to the best of our knowledge, is true and accurate. Any recommendations or suggestions are made without warranty or guarantee, since the conditions of use are beyond our control. Nothing contained herein shall be construed to imply the permission, inducement, or recommendation to practice any invention covered by any patent owned by Kaiser Aluminum and Chemical Corporation or by others, without authority from the owner of the patent.

• Indicates change or addition from previous issue.

ON LENS
ON DAM

Attachment 20

NO.	REVISION	BY	DATE
5625, 31, 32, 33 & 34 A0020			
TH'S 16, 17, 18, 19 & 20 A0020 B34			
FOR APPR.	FOR CORR.	DESIGN	CHECKED
PHILLIPS PETROLEUM COMPANY	BARTLESVILLE, OKLAHOMA	PLAN OF COMMERCIAL WATER RIGHTS	TH'S, REEF, GLEN CO., NEW MEXICO
ARTERIA GASOLINE PLANT			
NO. 6-B03	SCALE 1" = 2000'	NO. 1	REV. #1



NOTES:

TH #1	LOCATED	1265' E & 190' N. OF SW CORNER SEC.	8
" #2	"	2085' E & 115' N. OF SW "	16
" #3	"	1980' E & 400' N. OF SW "	15
" #4	"	1170' W & 1650' N. OF SE "	15
" #5	"	330' E & 645' S. OF NW "	8
" #6	"	265' N & 135' E. OF SE "	19
" #7	"	2830' W & 2020' N. OF SE "	19
" #8	"	3160' W & 420' N. OF SE "	19
" #9	"	1920' W & 835' N. OF SE "	28
" #10	"	515' S & 150' E. OF NW "	29
" #11	"	1325' S & 1980' W. OF NE "	28
" #12	"	1960' E & 1820' N. OF SW "	19
" #13	"	2440' S & 3170' W. OF NE "	19
" #14	"	2310' W & 2235' S. OF NE "	19
" #15	"	770' E & 2350' S. OF NW "	19
" #16	"	2635' E & 1760' S. OF NW "	30
" #17	"	2100' E & 430' S. OF NW "	30
" #18	"	400' E & 1450' S. OF NW "	17
" #19	"	2540' W & 1050' N. OF SE "	31
" #20	"	1890' W & 325' N. OF SE "	31

TEST HOLES 1, 2, 6, 7, 13, 15, 19 & 20
HAVE BEEN CALED, CEMENTED, AND
GRAVEL PACKED.

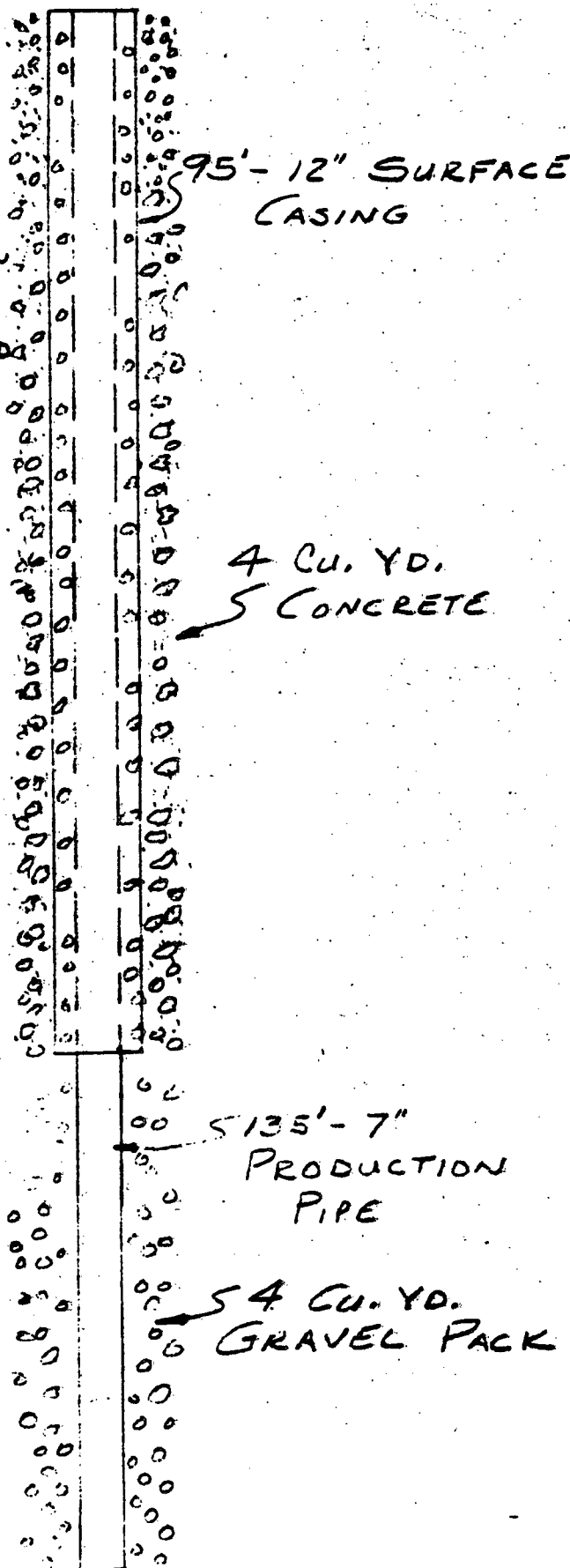
ABOVE DISTANCES ARE APPROXIMATE

SHADDED PHILLIPS COMMERCIAL
WATER RIGHTS

LOG

0'-1' SOIL
 1'-22' CALICHE & SAND
 22'-80' SANDY CLAY
 80'-94' DRY SAND
 94'-98' SANDY CLAY
 98'-106' WATER SAND { PRODUCTION
 106'-112' SANDY CLAY { PIPE
 112'-126' WATER SAND { PERFORATED
 126'-130' SANDY CLAY
 130'-135' RED BED

MAX. TEST 30 GPM



5' 135'-7"
 PRODUCTION
 PIPE

54 CU. YD.
 GRAVEL PACK

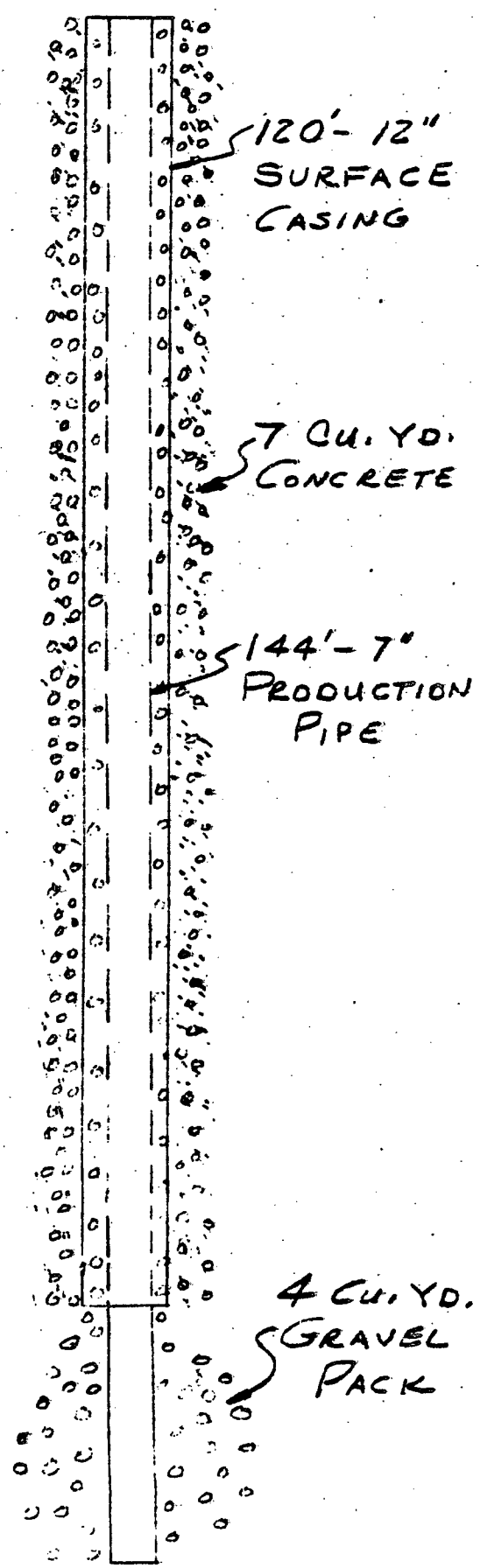
BY: J. B. DATE: 2/4/60 SUBJECT: WATER WELL #2
SW SE, SEC. 8, T-1 S
R-28-E, EDDY CO. N. MEX.
ARTESIA PLANT

JOB NO. AFE G-803

LOG

0'-2'	SOIL
2'-12'	CALICHE
12'-18'	ROCK
18'-28'	CALICHE
28'-60'	SANDY CLAY
60'-74'	DRY SAND
74'-96'	SANDY CLAY
96'-122'	DRY SAND
122'-126'	SANDY CLAY
126'-132'	WATER SAND {PERFORATED
132'-138'	SANDY CLAY
138'-144'	RED BED

NO TEST



LOG OF TEST HOLE #3

0'-2'	SOIL
2'-12'	CALICHE
12'-28'	SAND ROCK
28'-40'	SANDY CLAY
40'-62'	SAND, GRAVEL, CLAY
62'-168'	SANDY CLAY
168'-172'	RED CLAY
172'-220'	RED CLAY
220'-234'	GYP SUM ROCK
234'-237'	SANDY CLAY
237'-254'	GYP. ROCK
254'-274'	RED CLAY
274'-300'	GYP ROCK
No WATER	

LOG OF TEST HOLE #4

0'-1'	SOIL
1'-18'	CALICHE
18'-30'	SAND ROCK
30'-72'	CLAY
72'-134'	SANDY CLAY
134'-146'	DRY SAND
146'-165'	SANDY CLAY
165'-170'	RED BED

LOG OF TEST HOLE #3

0'-2'	SOIL
2'-14'	CALICHE
14'-22'	ROCK
22'-28'	SAND & CALICHE
28'-126'	SANDY CLAY
126'-135'	SAND & GRAVEL
135'-170'	SANDY CLAY
170'-174'	GYP SUM ROCK
174'-226'	SANDY CLAY
226'-254'	RED CLAY
254'-274'	SANDY CLAY
274'-278'	WATER SAND
278'-285'	SAND CLAY
285'-288'	SAND - WATER
288'-300'	RED BED

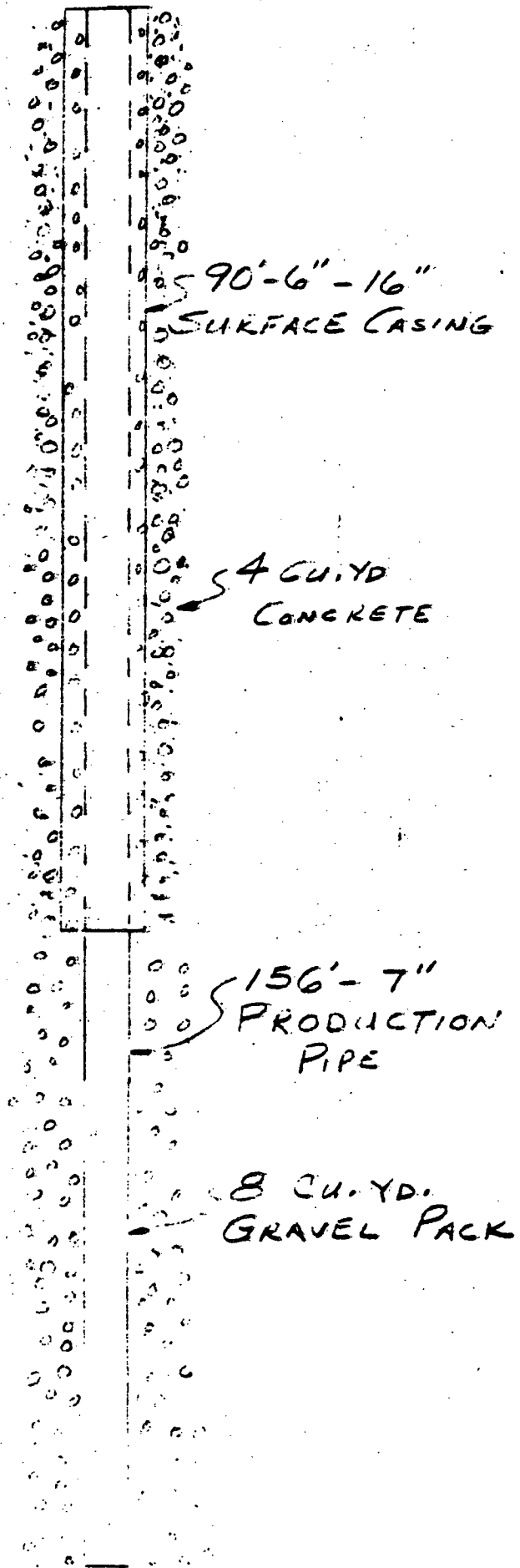
STATIC HEAD 270'
5 GPM (ESTIMATED)

NOTE: LOGS FOR TEST HOLES
No. 1, 2, & 6 WERE INCLUDED
IN REPORT #1

LOG

0'-1'	SOIL	
1'-12'	CALICHE	
12'-18'	ROCK	
18'-30'	CALICHE	
30'-60'	DRY SAND	
60'-78'	SANDY CLAY	
78'-96'	DRY SAND	
96'-112'	WATER SAND	{ PERFORATED PRODUCTION PIPE
112'-132'	RED CLAY	
132'-144'	ROCK	
144'-150'	SAND	
150'-151'	YELLOW CLAY	
151'-156'	RED CLAY	

MAX. TEST 30 GPM



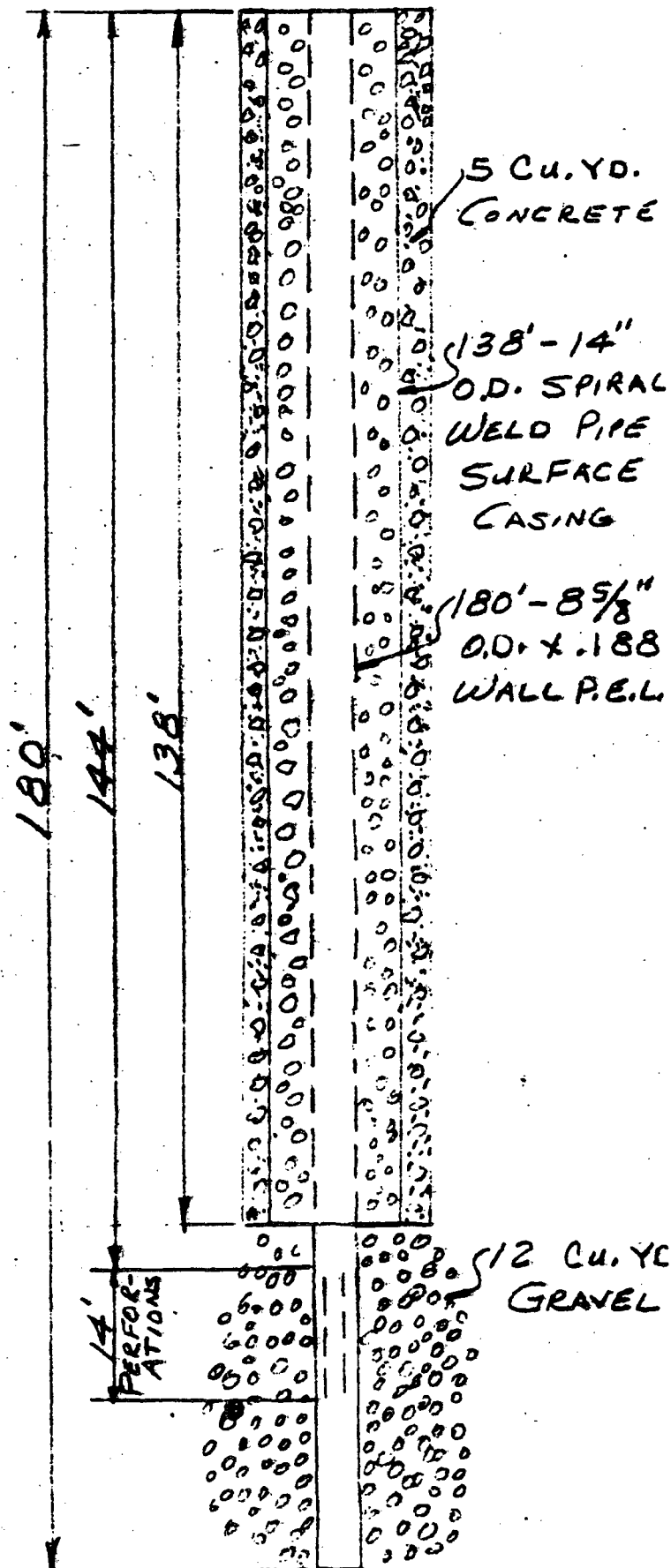
WATER WELL #7
ARTESIA PLANT
ARTESIA N. MEX.

Attachment 20 cont.

LOG

0' - 1' SOIL
1' - 4' ROCK
4' - 16' CALICHE
16' - 20' BOULDER
20' - 40' SANDY CLAY
40' - 70' RED CLAY
70' - 90' DRY SAND
90' - 144' RED CLAY
144' - 158' WATER SAND
158' - 174' SAND, GRAVEL
174' - 178' GYP ROCK
178' - 180' RED BED

DRILLED 3-16-60
COMPLETED 5-3-60
J.C. BELLATTI



LOG OF TEST HOLE #8

0'-1' SOIL
 1'-4' ROCK
 4'-16' CALICHE
 16'-40' SANDY CLAY
 40'-70' RED CLAY
 70'-95' SAND (WATER)
 95'-140' RED CLAY
 140'-162' SANDY CLAY
 162'-167' RED BED

STATIC HEAD 70'

LOG OF TEST HOLE #9

0'-1' SOIL
 1'-6' ROCK
 6'-15' CALICHE
 15'-22' ROCK
 22'-39' SANDY CLAY
 39'-48' CEMENTED GRAVEL
 48'-75' RED CLAY
 75'-85' SANDY CLAY & GRAVEL (WATER)
 85'-98' RED CLAY
 98'-108' SANDY CLAY
 108'-134' RED CLAY
 134'-140' SANDY CLAY
 140'-155' SAND & GRAVEL (WATER)
 155'-162' SANDY CLAY
 162'-167' GYPSUM & GRAVEL
 167'-178' SANDY CLAY
 178'-183' GYPSUM ROCK
 183'-188' RED BED

STATIC HEAD 58'

15 LOG OF TEST HOLE #10

0'-2'	SOIL
2'-10'	ROCK
10'-18'	SANDSTONE
18'-24'	SAND
24'-44'	SANDSTONE
44'-93'	SAND
93'-98'	SAND & GRAVEL
98'-120'	SAND, CLAY, & GRAVEL
120'-164'	SANDY CLAY
164'-166'	WATER SAND
166'-208'	SANDY CLAY
208'-220'	LIME ROCK
220'-271'	SANDY CLAY
271'-285'	COURSE SAND & GRAVEL
285'-290'	RED BED

LOG OF TEST HOLE #11

0'-3'	SOIL
3'-14'	CALICHE
14'-34'	SAND
34'-55'	SANDSTONE
55'-85'	SANDY CLAY
85'-87'	LIGHT CLAY
87'-118'	SANDY CLAY
118'-175'	SAND, CLAY, GRAVEL
175'-180'	SAND & GRAVEL
180'-186'	LIMESTONE
186'-190'	BLUE CLAY
190'-248'	SANDY CLAY
248'-260'	GRAVEL
260'-273'	SANDY CLAY
273'-287'	GYP SUM & GRAVEL
287'-292'	RED BED

LOG OF TEST HOLE #12

0'-3'	SOIL
3'-15'	CALICHE
15'-30'	SAND
30'-144'	SANDY CLAY
144'-162'	RED CLAY
162'-221'	SANDY CLAY
221'-224'	YELLOW CLAY
224'-238'	LIMESTONE
238'-243'	RED BED.

SMALL WATER SAND AT 175'
 STATIC HEAD 173'
 BAILED DRY IN 25 MINUTES

LOG OF TEST HOLE #14

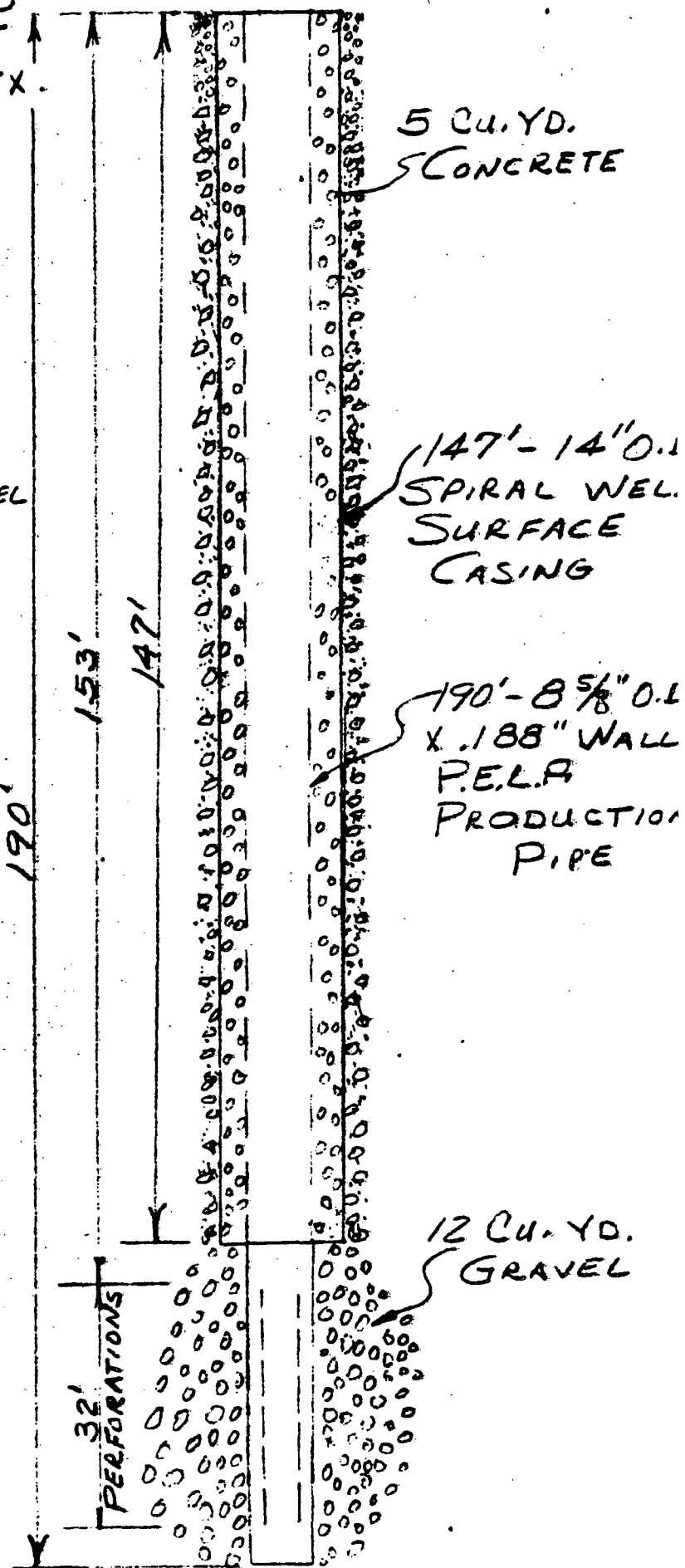
0'-1'	SOIL
1'-5'	ROCK
5'-20'	CALICHE
20'-30'	SAND
30'-40'	SAND & GRAVEL
40'-61'	SANDY CLAY
61'-65'	DRY SAND
65'-76'	SANDY CLAY
76'-98'	RED CLAY
98'-153'	SANDY CLAY
153'-160'	DRY SAND & GRAVEL
160'-171'	YELLOW CLAY
171'-180'	HARD LIMESTONE
180'-185'	RED BED.

WATER WELL #13
ARTESIA PLANT
ARTESIA NEW MEX.

LOG

0-1	SOIL
1-6	ROCK
6-30	SAND
30-40	SAND & GRAVEL
40-130	SANDY CLAY
130-134	DRY SAND
134-154	SANDY CLAY
154-160	WATER SAND & GRAVEL
160-178	GYP ROCK
178-180	WATER SAND
180-185	LIME ROCK (SOFT)
185-190	RED BED

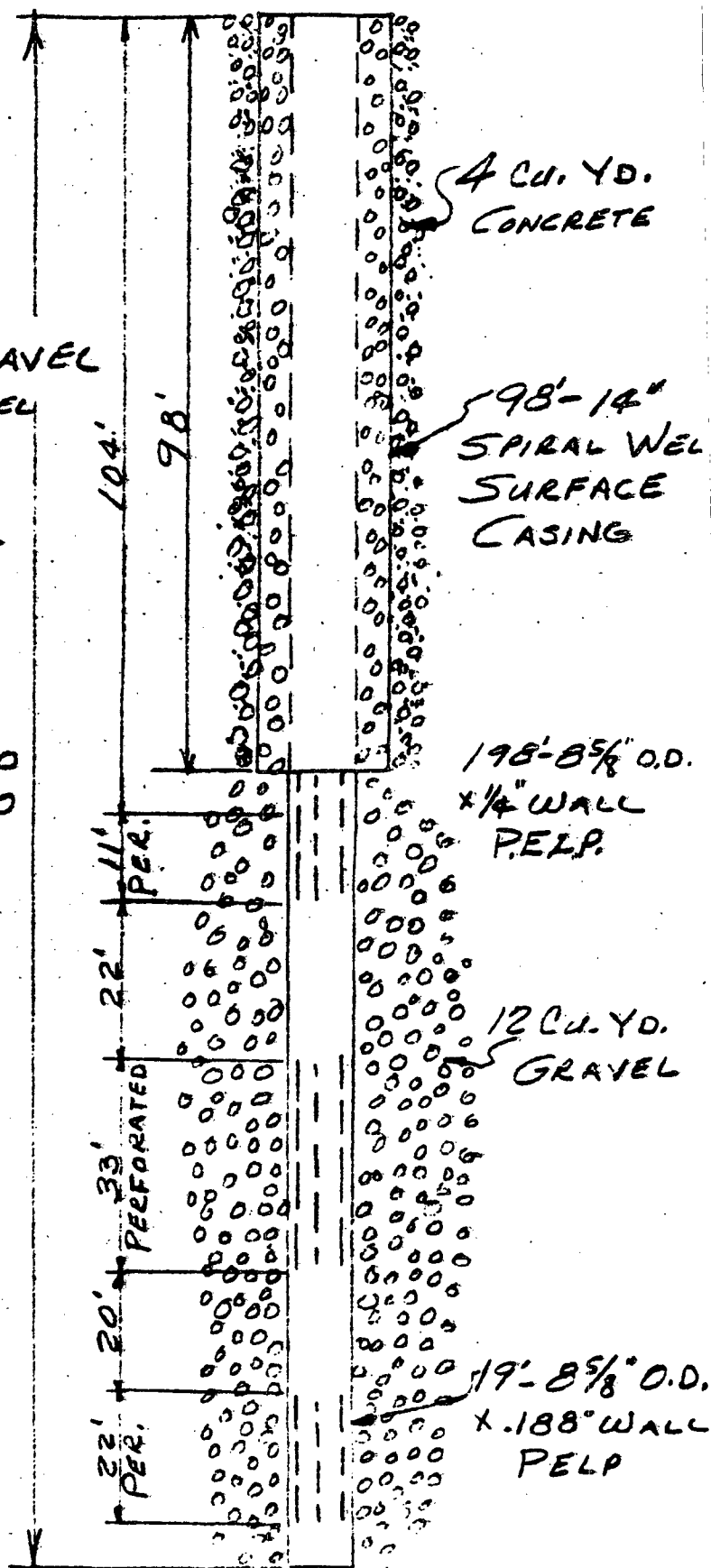
DRILLED 4-21-60
COMPLETED 4-29-60
J.C. BELLATTI



WATER WELL #15
ARTESIA PLANT
ARTESIA N. MEX.

LOG	
0 - 2	SOIL
2 - 15	CALICHE
15 - 20	DRY SAND
20 - 34	SANDSTONE
34 - 58	SANDY CLAY
58 - 62	DRY SAND
62 - 104	SANDY CLAY & GRAVEL
104 - 115	CEMENTED GRAVEL
115 - 137	SANDY CLAY
137 - 142	CEMENTED GRAVEL
142 - 170	LIME ROCK & GRAVEL
170 - 190	RED CLAY
190 - 212	LIMESTONE
212 - 217	RED CLAY

DRILLED - MAY 6, 1960
COMPLETED - MAY 13, 1960
J. C. BELLATTI



(16)

BY JCB DATE 8/31/49 SUBJECT LOGS OF TEST
CHKD. BY DATE HOLES 16, 17 & 18

Attachment 20 cont.
SHEET NO. OF
JOB NO.

TEST HOLE #16

0' - 1' SOIL
1' - 18' CALICHE
18' - 42' SANDY CLAY
42' - 65' SANDY CLAY & GRAVEL
65' - 78' RED CLAY
78' - 122' SAND CLAY
122' - 125' SAND (SMALL AMT. OF WATER)
125' - 135' SANDY CLAY
135' - 145' RED CLAY
145' - 165' SANDY CLAY
165' - 180' RED CLAY
180' - 186' SANDY CLAY
186' - 191' RED BED

TEST HOLE #17

0' - 1' SOIL
1' - 18' CALICHE
18' - 25' SAND
25' - 35' SANDY CLAY
35' - 45' CEMENTED GRAVEL
45' - 70' RED CLAY
70' - 83' SANDY CLAY
83' - 125' RED CLAY
125' - 178' SANDY CLAY
178' - 183' RED BED.

TEST HOLE #18

0' - 1' SOIL
1' - 15' CALICHE
15' - 37' SAND
37' - 40' SANDY CLAY
40' - 107' RED CLAY
107' - 120' SANDY CLAY
120' - 125' WATER SAND (APPROX. 10 GPM.)
125' - 150' SANDY CLAY
150' - 165' RED CLAY
165' - 170' RED BED

16

ARTESIA PLANT

LOG

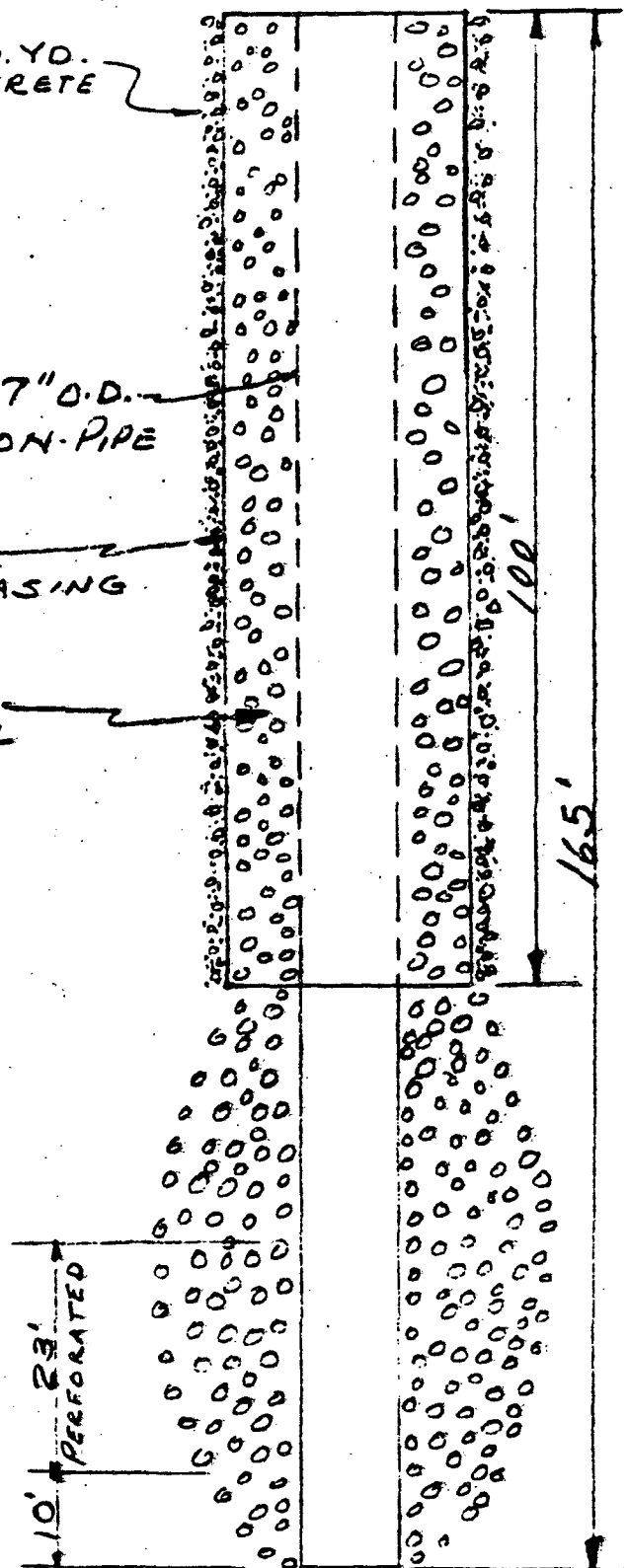
0'-2' SOIL
2'-20' CALICHE
20'-84' SANDY CLAY
84'-87' DRY SAND
87'-138' SANDY CLAY
138'-140' WATER SAND & GRAVEL
140'-185' SANDY CLAY
185'-190' RED BED

5 CU. YD.
CONCRETE

165' - 7" O.D.
PRODUCTION PIPE

100' - 16"
SURFACE CASING

12 CU. YD.
PEA GRAVEL



16

CHKD. BY DATE

ARTESIA PLANT

JOB NO.

Attachment 20 cont

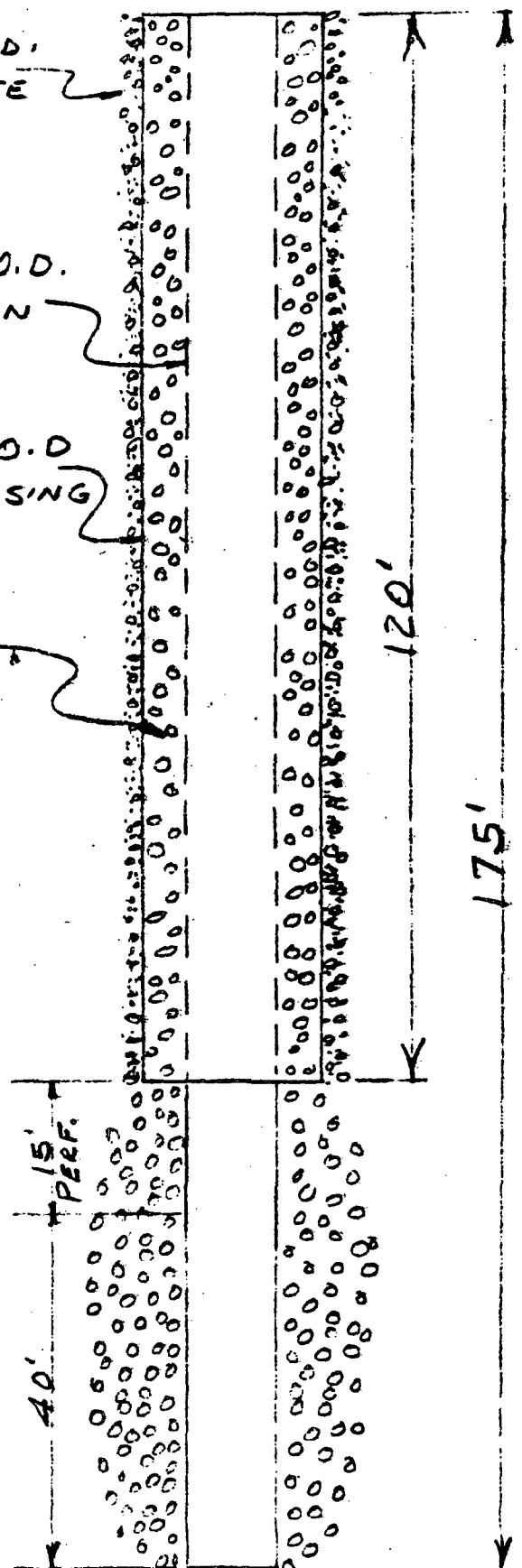
SHEET NO. OF

LOG

0-1' SOIL
 1'-18' CALICHE
 18'-92' SANDY CLAY
 92'-100' DRY SAND
 100'-126' SANDY CLAY 175'-7" O.D.
 126'-130' WATER SAND PRODUCTION
 130'-156' RED CLAY PIPE
 156'-163' BLUE CLAY
 163'-180' RED CLAY 120'-16" O.D.
 180'-191' SURFACE CASING
 191'-196'

5 CU. YD.
 CONCRETE

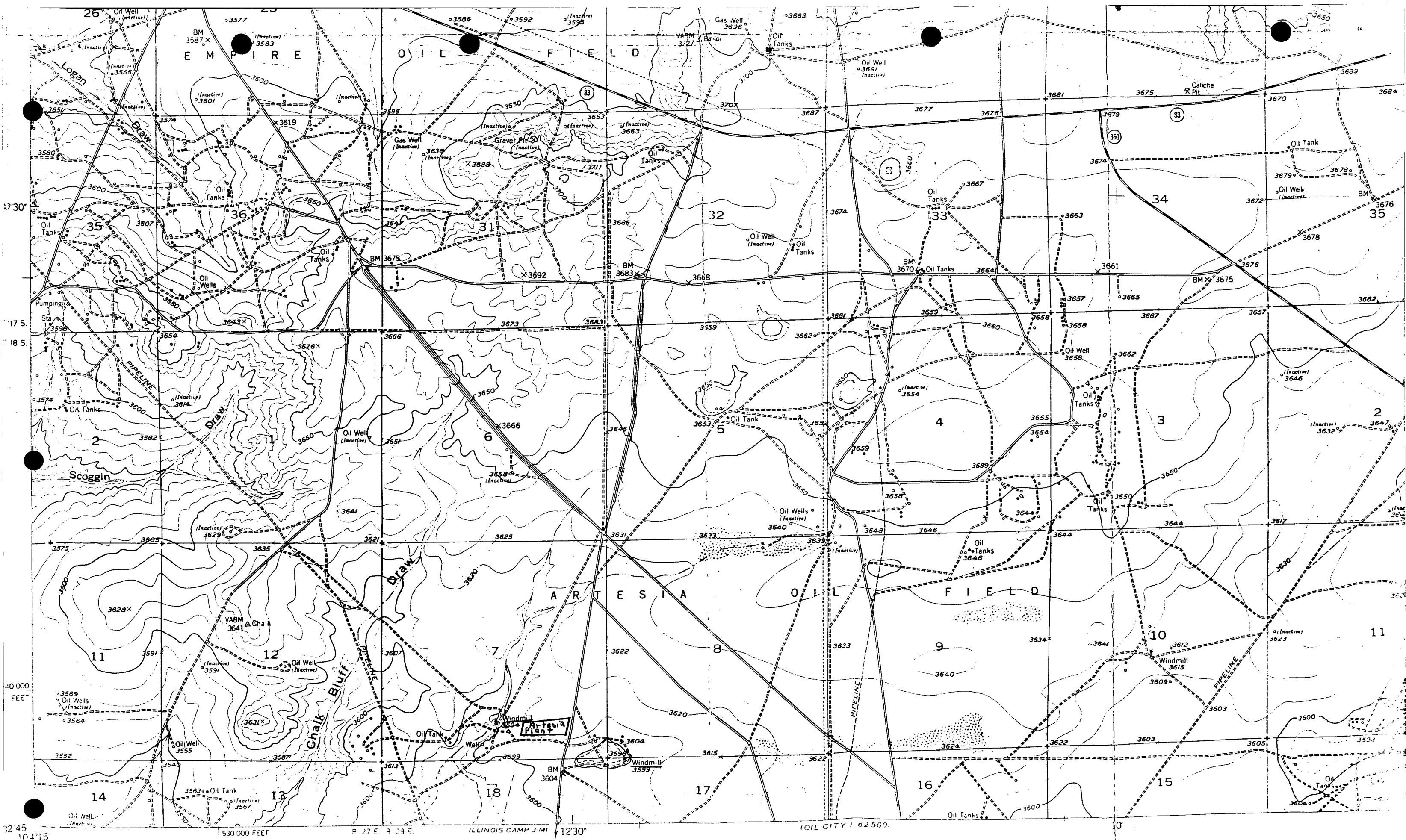
12 CU. YD.
 PEA GRAVEL



ARTESIA AREA WATER WELL ANALYSES (PPM)

Attachment 21

	Well #1	Well #2	Well #5	Well #7	Well #13	Well #15	Well #19	Well #20
Chloride (NaCl)	31	29	1053	29	44	27	23	22
Alkalinity (CaCO ₃)	181	198	109	159	144	121	149	152
Hardness (CaCO ₃)	154	215	1081	277	475	800	375	382
Calcium (Ca)	38	48	195	70	68	187	91	90
Magnesium (Mg)	14	14	145	26	73	81	36	38
Dissolved Solids	274	297	2274	325	496	804	393	393
Sulfates (SO ₄)	75	55	650	109	309	636	183	224
Silica (SiO ₂)	342	342	256	513	427	513	598	598
Bicarbonates (HCO ₃)	221	238	128	193	176	148	181	186
pH	7.8	7.6	7.1	7.9	7.5	7.3	7.7	7.4



Attachment 23-
LABORATORY ANALYSIS RESULTS SUMMARYSample of WaterSecured from Artesia PlantSecured by Operator 10-14-92Date 10-14-92Analysis No. L-109Artesia
WEST Windmill Water

Chlorides, ppm, NaCl 274

Chlorides, ppm, Cl 167

Alkalinity, ppm, CaCO₃ 352Hardness, ppm, CaCO₃ 515

Calcium, ppm, Ca 127

Magnesium, ppm, Mg 48

Dissolved Solids, ppm 540

Sulfates, ppm, Na₂SO₄ 32Sulfates, ppm, SO₄ 22Silica, ppm, SiO₂ 368Bicarbonates, ppm, HCO₃⁻ 430

Total Iron, ppm, Fe 0

pH 7.2

Salometer Reading —

% Salt —

lbs. Salt —

Remarks

Copies to:

R.E. Townsend

R.G. Stubbs

J.O. Woodson

Don Laird

Central File

LAB FILE

R. K. H.

**SOUTHWESTERN LABORATORIES***Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services*

1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-WCustomer No. 3355796Report No. 35197Report Date 3-22-84Date Received 2-29-84Report of tests on: **Water**Client: **Phillips Petroleum**Identification: **Artesia Upgrad. Windmill, East Windmill.**mg/L

Aluminum-----	Less Than	2
Arsenic-----	Less Than	0.05
Barium-----	Less Than	1
Boron-----		0.1
Cadmium-----	Less Than	0.01
Chromium-----	Less Than	0.05
Cobalt-----	Less Than	0.1
Copper-----	Less Than	0.1
Iron-----	Less Than	0.2
Lead-----	Less Than	0.05
Manganese-----	Less Than	0.05
Mercury-----	Less Than	0.002
Molybdenum-----	Less Than	1
Nickel-----	Less Than	0.5
Selenium-----	Less Than	0.01
Silver-----	Less Than	0.05
Zinc-----		0.13
Sulfate-----		17
Chloride-----		7
Fluoride-----		0.5
Nitrate-----		6.6
Cyanide-----		0.002
Phenols-----		0.001
Total Dissolved Solids @ 180° C-----		178

Technician: **KLH, GMB, JHB, RY**Copies 3 cc: **Phillips Petroleum Co.**
Attn: Mike Ford**SOUTHWESTERN LABORATORIES**

Attachment 24
LABORATORY ANALYSIS RESULTS SUMMARY

Sample of WATER
Secured from PECOS RIVER (NEAR ARTESIA N.M.)
Secured by M. FORD Date 2-29-84
Analysis No. L-250

Chlorides, ppm, NaCl

4,984

Chlorides, ppm, Cl

3,045

Alkalinity, ppm, CaCO₃

157

Hardness, ppm, CaCO₃

1,717

Calcium, ppm, Ca

424

Magnesium, ppm, Mg

159

Dissolved Solids, ppm

5,175

Sulfates, ppm, Na₂SO₄

3,840

Sulfates, ppm, SO₄

2,611

Silica, ppm, SiO₂

27

Bicarbonates, ppm, HCO₃

192

Total Iron, ppm, Fe

6

pH

8.3

Salometer Reading

4

% Salt

1.060

lbs. Salt

0.088

Remarks _____

Copies to:

W. R. Low

R. G. Stubb

~~M. D. Ford~~

CENTRAL FILES

LAB FILES

Analysis by PATRICK LEYVA

Checked by _____

Approved by _____



MATERIAL SAFETY DATA SHEET

("ESSENTIALLY SIMILAR" TO FORM OSHA-20)

WHERE APPLICABLE, THIS PRODUCT HAS BEEN REPORTED FOR THE EPA'S CHEMICAL SUBSTANCE INVENTORY.

SECTION I - IDENTIFICATION OF PRODUCT

MANUFACTURER'S NAME <u>OWNERS PETROLEUM COMPANY</u>		EMERGENCY TELEPHONE NUMBER	DURING BUSINESS HOURS (918) 661-3865
ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE) <u>BARTLESVILLE, OK 74004</u>		CAS NUMBER	OUTSIDE BUSINESS HOURS (918) 661-8118
TRADE NAME <u>Antifreeze</u>		CHEMICAL NAME <u>Ethylene glycol + other glycols</u>	
CHEMICAL FAMILY <u>Glycols</u>		CHEMICAL FORMULA <u>Mixture</u>	
DOT CLASSIFICATION <u>None</u>			

SECTION II - HAZARDOUS COMPONENTS OF MIXTURES

INGREDIENTS	% BY WT.	THRESHOLD LIMIT VALUE (UNITS)
<u>Ethylene Glycol</u>	<u>90</u>	<u>(approx.)</u>
<u>other glycols</u>	<u>10</u>	<u>(approx.)</u>
<u>Inhibitors and dye</u>	<u>2</u>	<u>(approx.)</u>

SECTION III - TYPICAL PHYSICAL DATA

APPEARANCE AND ODOR <u>Colored liquid.</u>	SPECIFIC GRAVITY <u>60°F/60°F 1.11-1.14</u>
BOILING POINT (°F) <u>330</u>	PERCENT VOLATILE (BY VOLUME) <u>Nil</u>
VAPOR PRESSURE <u>Very Low</u>	EVAPORATION RATE <u>(butyl acetate = 1) < 1</u>
VAPOR DENSITY (AIR) <u>> 1.0</u>	SOLUBILITY IN WATER <u>Complete</u>

SECTION IV - FIRE AND EXPLOSION - HAZARD DATA

FLASH POINT (METHOD) <u>250°F (Cleveland Open Cup)</u>	FLAMMABLE LIMITS (% BY VOLUME) <u>(For Ethylene Glycol)</u>	<u>LeI</u> <u>3.2</u>	<u>UeI</u>
FIRE EXTINGUISHING MEDIA <u>Water fog, CO₂, dry chemical, foam.</u>			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

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N.A. - Not Applicable

(SEE REVERSE SIDE)

FORM 10912-N 1-79

Page 50

- Controls all types of mineral deposits.
- Is not affected by normally encountered temperatures.
- Can be traced by chemical residuals.
- Completely soluble in brines at use concentrations.
- Not affected by low pH levels.
- Will not freeze.



PRINCIPAL USES

VISCO 950 is a liquid organic polyphosphate designed to control carbonate and sulfate deposits in oil and gas well equipment, water injection and salt water disposal systems.

FEEDING

VISCO 950 can be fed from the drum as supplied or in a dilution with fresh water. Stainless steel or plastic pumping equipment should be used.

A continuous feed is required. When feeding down the annulus, a continuous flush from the bleeder or flow line is recommended.

GENERAL DESCRIPTION

Color	Dark Brown
Odor	Bland
Pour Point	Below —20° F.
Flash Point	>170° F. (TOC)
Specific Gravity	1.33 at 60° F.
Density	11.0 Pounds per gallon
Viscosity	60 cps at 60° F.
Solubility	Completely soluble in most brines; insoluble in hydrocarbons.

DOSAGE

Dosage level of VISCO 950 will depend upon the severity of the deposition problem and the type of scale encountered. Normal dosages are as low as five to fifteen parts per million. However, calcium sulfate scales have been prevented with dosages as low as one or two parts per million.

HANDLING

No special precautions are necessary. Avoid prolonged contact with skin and clothing. In case of contact, flush with plenty of water. Do not take internally.

SHIPPING

Shipped in lined 55 gallon non-returnable steel drums.

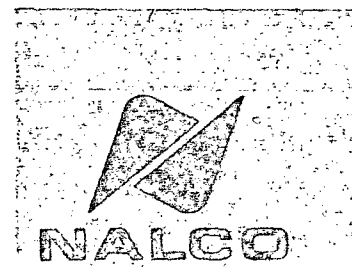
VISCO CHEMICALS

P.O. Box 87 • Sugar Land, Texas 77478

NALCO CHEMICAL COMPANY

180 N. MICHIGAN AVENUE • CHICAGO, ILLINOIS 60601

SUBSIDIARIES IN COLOMBIA, ITALY, MEXICO, SPAIN, VENEZUELA AND WEST GERMANY. 3 AFFILIATED COMPANIES: ALCHEM LIMITED (CANADA), ANIKEM PTY., LIMITED (SOUTH AFRICA), CATOLEUM PTY., LIMITED (AUSTRALIA), AND NALFLOC LIMITED (UNITED KINGDOM).





STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONY ANAYA
GOVERNOR

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

August 23, 1984

Mr. E. E. Clark
Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

Dear Mr. Clark:

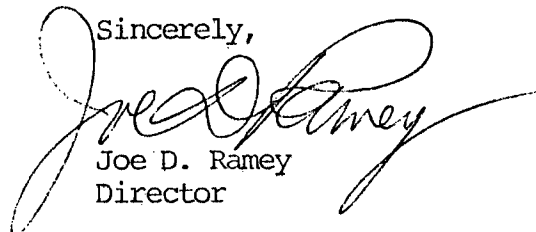
On August 13, 1984, we received your letter dated August 6, 1984, requesting an extension of time for the filing of a discharge plan for Phillips Petroleum's Artesia Plant Discharge Plan. In that letter you state that Phillips is in the process of developing a proposal to drill and complete a disposal well to eliminate the existing evaporation impoundment and needs additional time to complete preparation of the discharge plan including a timetable for completion of the disposal well.

In a follow-up phone conversation between Mr. Rodney Holsworth of your staff and Mr. David Boyer, OCD Hydrogeologist, on August 23, agreement was reached that the plan was to be received by OCD by September 7, 1984 instead of September 1, which is a Saturday in a three-day weekend. They also agreed that an extension of 180-days to operate without an approved discharge plan would be reasonable to allow OCD review, comment, Public Notice, and Phillips response to comments.

Pursuant to Section 3-106.A. of the New Mexico Water Quality Control Commission Regulations, and for good cause shown, Phillips is hereby granted an extension of time until September 7, 1984, to submit a discharge plan for OCD review, and a 180-day extension of time until March 6, 1985 to discharge without an approved discharge plan.

If you have any questions on this matter, or on what should be provided in the discharge plan, please contact Mr. Boyer at the above address, or at (505) 827-5812.

Sincerely,



Joe D. Ramey
Director

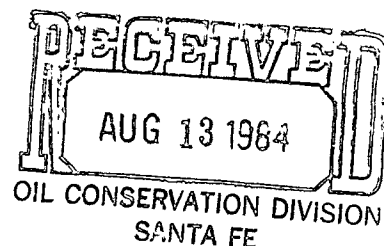
cc: Artesia Field Office



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

NATURAL RESOURCES GF JUP
Exploration and Production



August 6, 1984

Artesia Plant Discharge Plan

Mr. Joe D. Ramey, Director
New Mexico Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

On August 1, 1984, Rodney Holsworth spoke with David Boyer of your office regarding our Artesia Plant discharge plan. Rodney stated that we are in the process of developing the necessary paperwork to drill and complete a disposal well to eliminate the evaporation impoundment. The total time to complete this project is currently estimated to take 120 days, but a detailed timetable won't be available until late in August. I am therefore requesting that we be given an extension until September 1, 1984 to submit a detailed discharge plan including the timetable until completion of the disposal well.

Your consideration of our request is appreciated. Questions regarding this matter should be directed to Rodney Holsworth or Mike Ford of this office at (915) 367-1302.

Very truly yours,

E. E. Clark
Authorized Agent, Permian Basin Region

EEC:RDH:gpp



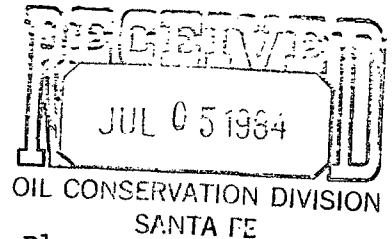
PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

July 2, 1984

Artesia Plant Discharge Plan



Mr. Joe D. Ramey, Director
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

This letter is written in response to your letter of May 10, 1984, regarding the discharge plan submitted for our Artesia Plant, and to notify you of the options we are evaluating in order to obtain an approvable discharge plan.

Two methods of wastewater treatment and disposal are being considered. These methods include the drilling and completion of a disposal well or the installation of an Electrodialysis Reversal (EDR) System. The EDR system will essentially recycle the wastewater generated at the plant.

Since both methods of wastewater treatment/disposal will have installation costs of over 500,000 dollars, we would request that the deadline for the submittal of the amended discharge plan be extended to August 1, 1984, so we may evaluate the economic effectiveness of each system.

Questions regarding this matter should be directed to Rodney Holsworth or Mike Ford of this office at (915) 367-1302.

Very truly yours,

for E. E. Clark

E. E. Clark
Manager, Permian Basin Region

EEC:MDF:ggp



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

May 10, 1984

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

Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

Attention: Mr. E. E. Clark

Gentlemen:

The discharge plan for your Artesia Plant located in Section 7, Township 18 South, Range 28 East, Eddy County, New Mexico, submitted April 12, 1984, is not approvable.

Total dissolved solids of the plant effluent measured 1984 mg/L and are to be disposed of in an open pit. Fresh water in the area generally indicates TDS in the range of 300-500 mg/L with the maximum being 1081. The two windmills show TDS of 540 and 178 mg/L. Open pit disposal of the effluent would appear to be a threat to the limited ground water in the area.

We will also need an analysis of the material from the molecular sieve and the sulfur catalyst which is disposed of on site.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

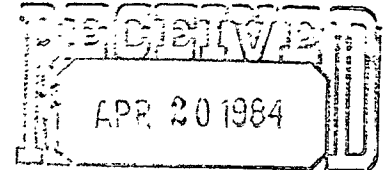


PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

April 12, 1984



OIL CONSERVATION DIVISION
SANTA FE

Mr. Joe D. Ramey, Director
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

As required by Part 3-106-C of the Water Quality Regulations, and your meeting on January 4, 1984, with R. G. Stubbs of this office, Phillips Petroleum Company submits the attached discharge plan for our Artesia Gasoline Plant, Eddy County, New Mexico.

Although we have already submitted a discharge plan for Artesia Plant, we felt that due to the amount of additional information requested and the time since the original plan was submitted, it would clarify matters if a new discharge plan was submitted containing all of the additional information requested.

If you have any questions regarding this matter, please contact R. G. Stubbs at (915) 367-1302.

E. E. Clark
Manager, Permian Basin Region

MDF:ggp

Attachment

Plan separate in file
APR



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1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

Acct. No. 3355796
File No. C-1950-X

Report No. 26897

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 1 Composite, Sampled 4-25-84

Total Available Chromium----- 3.0 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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1703 W. Industrial Avenue (915 - 683-3348) • P.O. Box 2150 • Midland, Texas 79701

Acct. No. 3355796

File No. C-1950-X

Report No. 26898

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: **Soil**

Client: **Phillips Petroleum Company**

Identification: **South Artesia Plant, Quad No. 2 Composite, Sampled 4-25-84**

EPA HAZARDOUS
WASTE NUMBER

CONTAMINANT

DETECTED, mg/L

EPA MAX. CONC.
LIMITS, mg/L

D007

Chromium

Less than 0.2

5.0

Technician: **SAM, KLH, GMB**

Copies **3cc Phillips Petroleum Company**
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Larry M. Burch



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1703 W. Industrial Avenue (915 - 683-3348) • P.O. Box 2150 • Midland, Texas 79701

Acct. No. 3355796

File No. C-1950-X

Report No. 26898

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 2 Composite, Sampled 4-25-84

Total Available Chromium----- 77 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Larry M. Bunch



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Acct. No. 3355796

File No. C-1950-X

Report No. 26899

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: South Artesia PLant, Quad No. 3 Composite, Sampled 4-25-84

EPA HAZARDOUS
WASTE NUMBER

D007

CONTAMINANT

Chromium

DETECTED, mg/L

Less than 0.2

EPA MAX. CONC.
LIMITS, mg/L

5.0

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Acct. No. 3355796

File No. C-1950-X

Report No. 26899

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 3 Composite, Sampled 4-25-84

Total Available Chromium----- 3.0 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Larry M. Bunch



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1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

Acct. No. 3355796

File No. C-1950-X

Report No. 26904

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Aretsia Plant, Quad Sampled

EPA HAZARDOUS
WASTE NUMBER

CONTAMINANT

DETECTED, mg/L

EPA, MAX. CONC.
LIMITS, mg/L

D007

Chromium

2.7

5.0

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

RECEIVED
OCCUPATIONAL DIVISION
MAY 2 PM 8 32

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Acct. No. 3355796

File No. C-1950-X

Report No. 26904

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 1, Sampled 4-25-84

Total Available Chromium----- 10.5 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Acct. No. 3355796

File No. C-1950-X

Report No. 26905

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 2, Sampled 4-25-84

EPA HAZARDOUS
WASTE NUMBER

CONTAMINANT

DETECTED, mg/L

EPA MAX. CONC.
LIMITS, mg/L

D007

Chromium

1.8

5.0

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Acct. No. 3355796

File No. C-1950-X

Report No. 26905

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 2, Sampled 4-25-84

Total Available Chromium----- 775 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Acct. No. 3355796

File No. C-1950-X

Report No. 26906

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 3, Sampled 4-25-84

EPA HAZARDOUS
WASTE NUMBER

D007

CONTAMINANT

Chromium

DETECTED, mg/L

1.0

EPA MAX. CONC.
LIMITS, mg/L

5.0

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Acct. No. 3355796

File No. C-1950-X

Report No. 26906

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 3, Sampled 4-25-84

Total Available Chromium----- 200 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Acct. No. 3355796
File No. C-1950-X

Report No. 26907

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 4, Sampled 4-25-84

<u>EPA HAZARDOUS WASTE NUMBER</u>	<u>CONTAMINANT</u>	<u>DETECTED, mg/L</u>	<u>EPA MAX. CONC. LIMITS, mg/L</u>
D007	Chromium	1.0	5.0

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

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Larry M. Bunch



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Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

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Acct. No. 3355796

File No. C-1950-X

Report No. 26907

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Sludge

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 4, Sampled 4-25-84

Total Available Chromium----- 180 p.p.m.

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

SOUTHWESTERN LABORATORIES



SOUTHWESTERN LABORATORIES

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Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

Acct. No. 3355796

File No. C-1950-X

Report No. 26897

Report Date 5-1-84

Date Received 4-26-84

Report of tests on: Soil

Client: Phillips Petroleum Company

Identification: South Artesia Plant, Quad No. 1 Composite, Sampled 4-25-84

EPA HAZARDOUS
WASTE NUMBER

D007

CONTAMINANT

Chromium

DETECTED, mg/L

Less than 0.2

EPA MAX. CONC.
LIMITS, mg/L

5.0

Technician: SAM, KLH, GMB

Copies 3cc Phillips Petroleum Company
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Larry M. Bunch

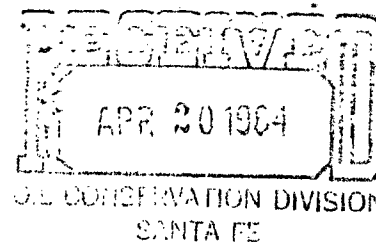


PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP
Permian Basin Region

April 12, 1984



Mr. Joe D. Ramey, Director
New Mexico Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

As required by Part 3-106-C of the Water Quality Regulations, and your meeting on January 4, 1984, with R. G. Stubbs of this office, Phillips Petroleum Company submits the attached discharge plan for our Artesia Gasoline Plant, Eddy County, New Mexico.

Although we have already submitted a discharge plan for Artesia Plant, we felt that due to the amount of additional information requested and the time since the original plan was submitted, it would clarify matters if a new discharge plan was submitted containing all of the additional information requested.

If you have any questions regarding this matter, please contact R. G. Stubbs at (915) 367-1302.

E. E. Clark
Manager, Permian Basin Region

MDF:ggp

Attachment

DISCHARGE PLAN
PHILLIPS PETROLEUM COMPANY
ARTESIA GASOLINE PLANT
SECTION 7, TOWNSHIP 18 SOUTH, RANGE 28 EAST, EDDY COUNTY

I. General Process Description

Artesia Plant's basic function is to remove the ethane and heavier hydrocarbon fractions from casinghead and gas well gas. The plant receives sour hydrocarbon gas streams from 5 and 750 psig gathering systems. The gas from the 5 psig system is compressed to 125 psig before going to a low pressure amine contactor where hydrogen sulfide and carbon dioxide in the gas stream is removed. Gas from the 750 psig system is sent directly to a high pressure amine contactor. Both amine contactors use monoethanolamine for the sweetening process. The hydrogen sulfide and carbon dioxide that is removed is sent to the plant's sulfur recovery unit. The sweet gas from the low pressure amine contactor is then compressed to 750 psig and commingled with the sweet gas from the high pressure amine contactor. The commingled gas stream is then sent to a molecular sieve dehydrator where the gas is dehydrated to a water content of less than 1 ppmv. From the dehydrator the gas stream flows to a turboexpander plant where it is cooled by propane refrigeration and expansion to a temperature of approximately -140°F. The turboexpander plant produces two hydrocarbon streams, the first being a liquid hydrocarbon stream comprised of approximately 85 percent of the ethane and all of the propane and heavier hydrocarbons that entered the plant. The liquid hydrocarbon stream has a vapor pressure of approximately 500 psig and is sent to four 13 '2" ID X 46' S/S, 550 psig MWP vessels for temporary storage before being delivered to a pipeline for sale.

The second hydrocarbon stream produced from the turboexpander plant is comprised primarily of methane gas. This gas stream is divided with a portion going to Arco's Empire Abo Unit for reinjection into the formation and the remainder being sold to Transwestern Pipeline. The Arco gas is compressed to 750 psig before leaving the plant, and the gas sold to Transwestern is compressed to 680 psig before leaving the plant.

Attachments 1 and 2 are a plot plan and process flow sheet of the plant.

II. Plant Water Systems

A. Raw Water

Artesia Plant receives its water from a total of six wells owned by the Caprock Water Company of Loco Hills, New Mexico. The wells are located in Sections 26 and 35, Township 16 South, Range 32 East, Lea County and are completed at a depth of approximately 900 feet. The wells supply an average of 2650 bbl./day of water to the plant. Attachment 3 is an analysis of this water. Attachment 4 shows the location of our raw water feed line and water storage tanks.

PRO,DISCHARGE

B. Potable Water

A small fraction of the raw water is chlorinated and used as potable water for the plant's office and control room.

C. Cooling Tower System

The cooling tower system is comprised of two open recirculating cooling towers. The smallest of these towers has a recirculation rate of 3400 gpm within an approximate raw water make up rate of 36 gpm. The larger of the two towers has a recirculating rate of 4400 gpm within an approximate raw water make up rate of 46 gpm. The raw water in these towers is recirculated until the impurities in the water are concentrated to approximately 5 times their inlet concentrations, producing 566 bbl./day of wastewater. Approximately 1.8 gal./day of Dearborns' Endcor 4607 (Attachment 5) and 1.24 gal./day of Dearborns' Endcor 4623 (Attachment 6) are being added on a continuous basis to the cooling tower water for scale and corrosion inhibition. Small quantities of sulfuric acid are also added to the cooling tower water when needed to maintain a pH of approximately 6.8 in the water. Dearcide 702 (Attachment 7) and 709 (Attachment 8) are being added to the cooling tower to control bacteria, algae, and fungus. Dearborn 863 (Attachment 8A), a dispersant, is added to the cooling tower as needed. Attachments 9 and 10 are simplified schematics of the cooling tower systems.

D. Boiler Water System

The boiler water system is comprised of a Zeolite water softener, two boilers (one process and one waste heat boiler in the sulfur plant) which produce 250 psig steam, and one boiler and three sulfur plant condensers which produce 50 psig steam. The raw make-up water to this system passes through the Zeolite softener which removes calcium and magnesium in the make-up water. The soft water from the Zeolite softener flows to a holding tank before being pumped into the boilers and sulfur plant condensers. The 250 psig steam is used to drive steam turbines, heat input to a glycol dehydration system, heat input for an amine reclaimer, and heat tracing for the sulfur plant sump. The 50 psig steam is used for heat tracing of lines and heat input for an amine reboiler and a stabilizer reboiler. All condensate produced is returned to the boiler feed water tank for reuse. Approximately .5 gal./day of Dearborn 66 (Attachment 11), .5 gal./day of Dearborn 244 (Attachment 12), 1.15 gal./day of Sludgtrol 651 (Attachment 13), and 1.78 gal./day of Steamate 2005 (Attachment 13A) are being added to the boiler water system on a continuous basis for corrosion and scale inhibition. Attachment 14 is a process flow sheet of the boiler water system.

Approximately 415 bbl./day of blowdown is generated by the boilers. This wastewater is piped to the open drain system's oil/water separator.

E. Engine Cooling System

An ethylene glycol based anti-freeze (Attachment 25) cooling system is used to cool all the engines at the plant. The plant is comprised of

three engine rooms: the Cooper engine room, the Clark engine room, and the White Superior engine room. The Cooper and Clark engine rooms each have their own jacket water pumps, above ground jacket water surge tanks, and air fin coolers. All of the engines in the White Superior room have individual self-contained coolings systems.

All the engines in the plant are tied into a buried coolant sump tank, located next to the White engine room (Attachment 1, #32). When an engine is being worked on, its coolant charge is drained to this tank and then pressured back into the engine when the work is completed.

III. Plant Drain and Disposal Systems

A. Engine Oil Drain System

All of the engines in the three main engine rooms are tied into a buried lube oil sump located next to the White engine room (Attachment 1, #31). The two portable compressor engines are tied into a lube oil sump located next to their skids. When an engine's lube oil is changed, the old lube oil charge is drained into the sumps. From the sumps the old lube oil is pumped to the slop oil tanks (Attachment 15).

B. Closed Drain System

The closed drain system is a pressure drain system constructed of buried, externally coated, schedule 40 steel pipe. This drain system empties into a buried API oil/water separator. The oil from this separator is pumped to the slop oil tanks. The water from the separator is pumped to the open drain systems' oil/water separator. Attachment 15 is a process flow sheet of this system.

C. Open Drain System

The open drain system is an atmospheric drain system constructed of buried, externally coated, schedule 40 steel pipe. This drain system empties into a below grade, internally coated, oil/water separator. The oil from this vessel is pumped to a slop oil tank. The water from this vessel is pumped to one of the 1,000 barrel holding tanks. Attachment 15 is a process flow sheet of this system.

D. Final Wastewater Disposal System

This system is comprised of two, 1,000 barrel, internally coated stock tanks and two interconnected evaporation pits. Approximately 1000 bbl./day of wastewater from the open drain oil/water separator and blowdown from the cooling towers flow into these tanks before flowing, by gravity, into an evaporation impoundment. If the evaporation impoundment becomes too full, provisions have been made to have the wastewater trucked to a wastewater disposal facility near Loco Hills, N.M. Attachment 15 is a process flow sheet of this system. Attachment 16 is a detailed chemical analysis of the wastewater flowing into this impoundment.

A sample of the water in the impoundment was sent to the Cooperative Extension Service at New Mexico State University to determine if this water could be used for agricultural purposes. The results of this analysis (Attachment 17) showed this water was safe for agricultural use. This, coupled with the detailed chemical analysis, clearly shows that this water is not produced water as outlined in the Commission's No Pit Order R-3221 and therefore, the evaporation ponds should not have to be dewatered and backfilled under this Order.

IV. Solid Waste Disposal

A. General Waste

The small amount of solid waste generated at the plant is handled in one of two ways. The spent paper products (i.e. paper towels, sacks etc.) are burned in a safe manner at the plant. The non-combustible items (i.e. pieces of pipe, concrete, etc.) are disposed of in an excavated ditch and then covered.

B. Spent Molecular Sieve

Approximately every 3 to 4 years the molecular sieve dehydrators at the plant are recharged. The spent molecular sieve (Attachment 18) is disposed of on site. Approximately 21,600 pounds of this material is disposed of each time the beds are recharged.

C. Spent Sulfur Catalyst

Approximately once every five years the catalyst in the sulfur recovery unit converter beds are recharged. The spent catalyst (Attachment 19) is disposed of on site. Approximately 20,500 pounds of this material is disposed of each time the beds are recharged.

V. Miscellaneous Information

A. Groundwater

A limited supply of groundwater is available in the Artesia Plant area. A total of 20 wells were drilled within four miles of the plant as possible water supply sources after the Artesia Plant was approved for construction. The majority of these wells were either dry holes or did not have the sufficient recharge volumes needed for plant operations. Attachment 20 contains the location and logs of the wells drilled. Analyses of the water encountered in these wells is contained in Attachment 21. As can be seen from the analyses, a wide variation in water quality, based upon total dissolved solids, was found in the area. There did not seem to be a relationship between the depth of the well and the quality of water found in the well. Total dissolved solids values ranged between 274 and 804 ppm with one exception, Well 15, in which this value was 2274 ppm.

There are currently two operating livestock water supply wells, pumped by windmills, within a quarter mile of the plant (location detailed in Attachment 22). The east well is completed at a depth of approximately

130 feet. The west well is completed at a shallower depth of approximately 85 feet. Water samples were obtained from both of these wells and analyzed (Attachment 23) in order to determine current groundwater quality in the plant area. A sample of water was also obtained from the Pecos River, which is approximately five miles west of the plant, and analyzed in order to determine surface water quality in the area (Attachment 24).

It is our opinion, from the analyses available, that our plant wastewater is of no lower quality than some of the groundwater in the area, and is of a considerably higher quality than surface water in the area.

B. Topography

Attachment 22 is a topographic map of the area surrounding Artesia Plant. As can be seen from this map, there are no bodies of water within a one mile radius of the plant.

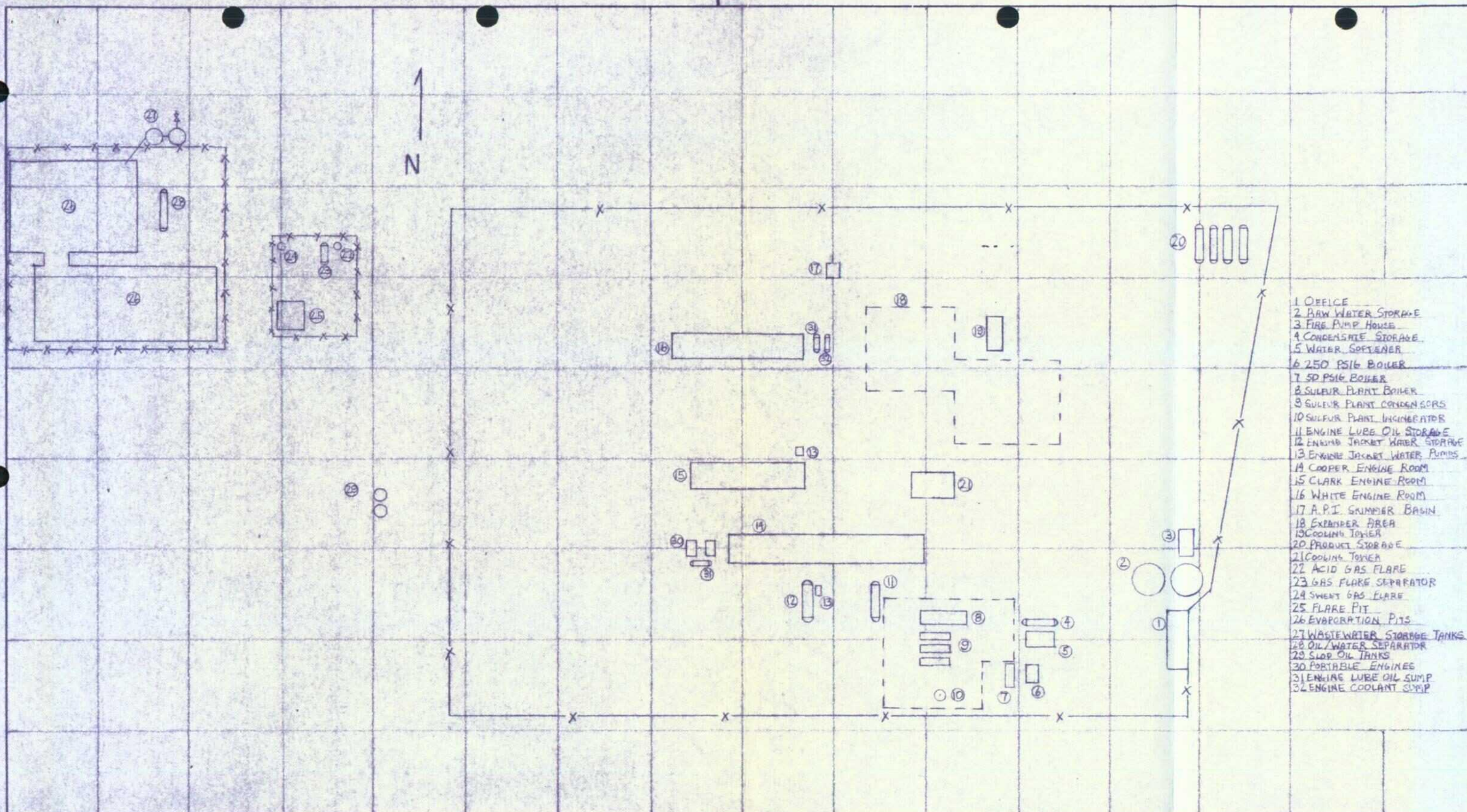
C. Flooding potential

None.

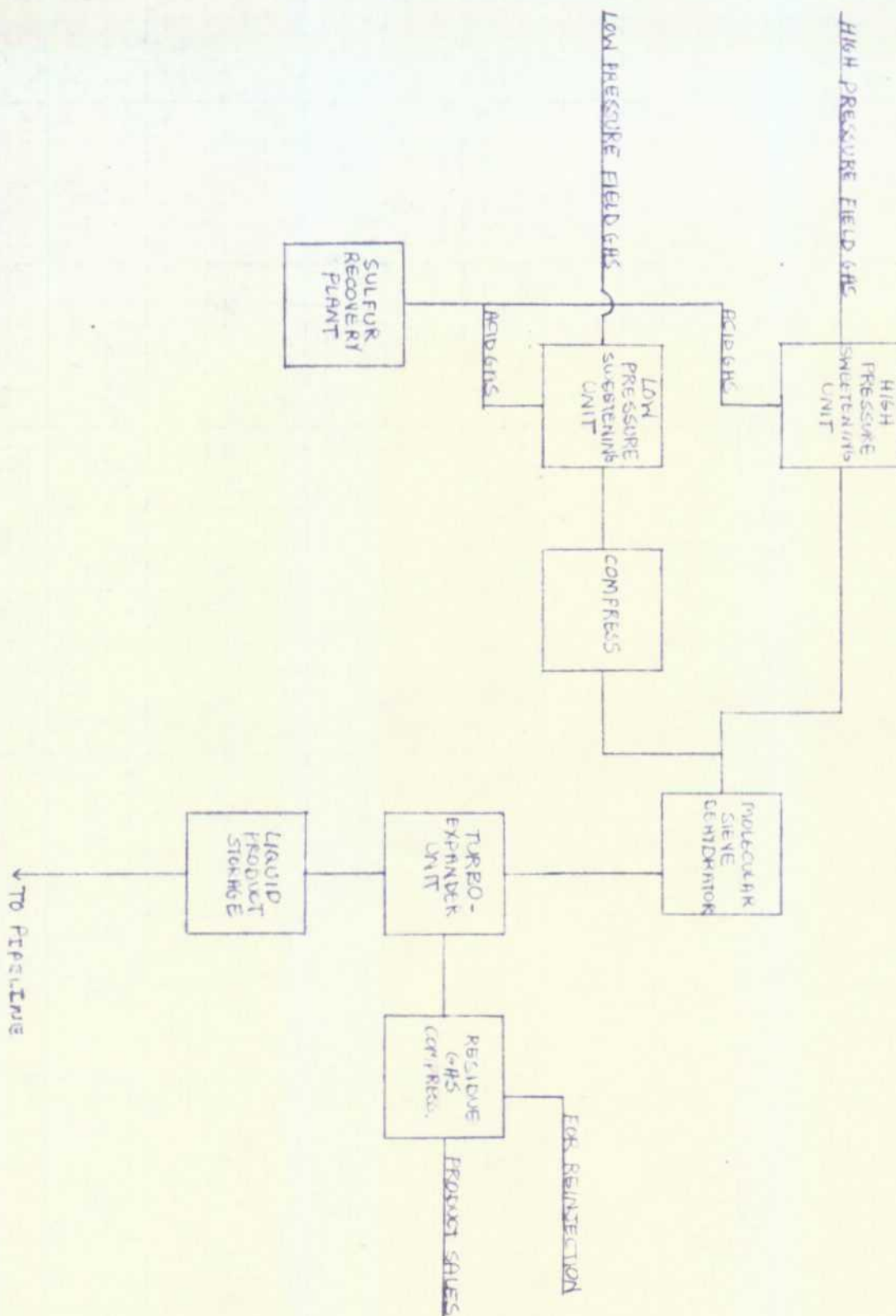
D. Wastewater Volume Measurement

The volume of wastewater being discharged is calculated by using standard cooling tower and boiler blowdown equations and the raw water make-up to the plant. The volume of wastewater discharged can also be tested periodically by shutting in the final disposal tanks and gauging them over a 24 hour period.

PRO,DISCHARGE4



NO.	REVISION	BY	DATE	FOR BIDS	FOR APPR	FOR CONST	DRAWN FORD 2-24-89	CHECKED	APP'D	BARTLESVILLE, OKLAHOMA	ARTESIA PLANT: PLOT PLAN ATTACHMENT 1		AFE NO.
		CHKD	APP'D										SCALE 1" = 100'
													UNLESS OTHERWISE NOTED
													DWG NO.
													SH NO.



NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div style="text-align: center;"> ARTESIA GASOLINE PLANT PROCESS FLOW ATTACHMENT 2 </div> </div>			JA NO.	FILE CODE
FOR APPR				AFE NO.	SCALE
FOR CONST				DWG NO.	
DRAWN <i>FORD</i>	<i>2/24/84</i>				SH NO.
CHECKED					
APP'D					



CONTINENTAL PRODUCTS OF TEXAS

100 Industrial Avenue
(915) 337-6531P. O. Box 3527
Odessa, Texas 79760ACI A&C Petroling
(915) 332-0528

Client: PHILLIPS PETROLEUM COMPANY

Plant: Artesia Plant

Page 1 of 2

Attention: Rita A. Johns ✓

Date Sampled 1-22-81 In 1-23-81 Out 1-26-81

ANALYSIS NO.			328		
SOURCE OF SAMPLE			Lab Fresh Water No Chlorine Res 12:17 Air Temp 46° F		
CONSTITUENT		METHOD	PPM	PPM	PPM
Temperature	°F	Thermometer	44°		
pH		Meter	7.0		
Alkalinity, Total	CaCO ₃	Titration			
Alkalinity, Phenolphthalein	CaCO ₃	Titration			
Hardness, Total	CaCO ₃	Titration			
Chloride	Cl	Titration	24		
Chlorine	Cl ₂	Colorimeter			
Sulfate	SO ₄	Turbidimeter	28		
Sulfate	S	Turbidimeter			
Sulfite	SO ₃	Titration			
Sulfide, Total	S	Titration			
Sulfide, Hydrogen	H ₂ S	Titration			
Ammonia	NH ₃	Nessler			
Bromide	Br	Colorimeter			
Cyanide	CN	Colorimeter	None		
Fluoride	F	Colorimeter	0.4		
Phosphorous	P ₂ O ₅	Colorimeter			
Phosphate, Ortho	PO ₄	Colorimeter			
Phosphate, Poly	PO ₃	Colorimeter			
Nitrate	NO ₃	Colorimeter	8.5		
Nitrite	NO ₂	Colorimeter			
Nitrogen	N	Kjeldahl			
Specific Conductance 27°C	mmhos	Wheatstone			
Total Dissolved Solids		Evaporation	332		
Total Residue		Evaporation			
Total Suspended Solids		Millipore			
Volatile Solids		Evaporation			
Settleable Solids		Stpl Sewage			
Color, PT-CO Units		Colorimeter			
Turbidity, Jackson Units		Turbidimeter			
Volatile Acids		Colorimeter			
Relative Stability		Turbidimeter			
Phenols		Colorimeter	0.14		
Disinfectants	DBS	Colorimeter			
Algaecides	OAC	Colorimeter			
Pesticides		Colorimeter			
Oil & Grease		Extraction			
Chlorinated Hydrocarbon					


↑
N



RAW WATER STORAGE

RAW WATER OFFICE

RAW WATER LINE
FROM CAPROCK WATER CO.

NO.	REVISION	BY	DATE	CHKD	APP'D
FOR BIDS	 PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA			JA NO	FILE CODE
FOR APPR				AFE NO	SCALE
FOR CONST	ARTESIA GASOLINE PLANT RAW WATER SUPPLY ATTACHMENT 4			DWG NO	
DRAWN				SH NO	
CHECKED					
APP'D					

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

• Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME

DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Cooling water treatment

TRADE NAME OR CODE IDENT.

ENDCOR 4607

• Section 2 – INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

Potassium hydroxide

< 10

• Section 3 – PHYSICAL DATA

MELTING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.3	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Straw color liquid	pH	12.2

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME	AUTO IGNITION TEMPERATURE
None	LOWER UPPER	

EXTINGUISHING MEDIA

☐ Water Fog☐ Foam☐ CO₂☐ Dry Chemical☐ Other

SPECIAL FIRE FIGHTING PROCEDURES

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions)

☒ Stable☐ Unstable

CONDITIONS TO AVOID

INCOMPATIBILITY (Materials to Avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION

☐ May Occur☒ Will Not Occur

CONDITIONS TO AVOID

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Not expected

INGESTION If ingested, do not induce vomiting. Immediately feed large quantities of water, citrus juice or dilute vinegar (1 teaspoonful in 1 glass of water). Contact physician.

SKIN OR EYE CONTACT

Will cause eye irritation and damage, and skin irritation. Wash from skin with water; remove contaminated clothing and wash before reuse. Flush eyes with clear water. Contact physician.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical exhaust is adequate.

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles or face shield

GLOVES (Specify Type)

Rubber or plastic

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Use industrial absorbent, bury or burn.

Flush spill area thoroughly with water.

WASTE DISPOSAL METHOD

May be used to neutralize acid waste, or use authorized chemical scavenger service.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

For industrial use only. Keep containers closed when not in use.

OTHER PRECAUTIONS

Freeze point, 17°F.

Shipping Name: DOT Water Treatment Compound, Liquid, Corrosive Material

IATA

Prepared By W. M. Morris

Date: 1/82 (Rev. 9/82)

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

• Section 1 — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME

DEARBORN CHEMICAL (U.S.), CHEMED CORPORATION

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Cooling water treatment

TRADE NAME OR CODE IDENT.

ENDCOR 4623

• Section 2 — INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

• Section 3 — PHYSICAL DATA

BOILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.17	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Pale yellow liquid	pH	approx. 7.0

• Section 4 — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME	AUTO IGNITION TEMPERATURE
None	LOWER UPPER	
EXTINGUISHING MEDIA	<input type="checkbox"/> Water Fog <input type="checkbox"/> Foam <input type="checkbox"/> CO ₂ <input type="checkbox"/> Dry Chemical <input type="checkbox"/> Other	
SPECIAL FIRE FIGHTING PROCEDURES		

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 — REACTIVITY DATA

STABILITY (Normal Conditions)	CONDITIONS TO AVOID
<input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	
INCOMPATIBILITY (Materials to Avoid)	

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
<input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	

(over)

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Not expected

INGESTION

Not for internal use

SKIN OR EYE CONTACT

Product may irritate skin on prolonged contact. Keep out of eyes. Wash skin with soap and water; flush eyes with clear water.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles

GLOVES (Specify Type)

Plastic or rubber

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Collect using industrial absorbent,

bury or burn. Flush area of spill with water.

WASTE DISPOSAL METHOD

Use sanitary landfill for disposal - product is not an EPA

Hazardous Waste.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

For industrial use only. Keep containers

closed when not in use.

OTHER PRECAUTIONS

Product freezes at 24°F.

Shipping Name: DOT Compound, Industrial Process Water Treating, Liquid

IATA

Prepared By

W. M. Morris

Date:

6/81

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET****• Section 1 – PRODUCT IDENTIFICATION**

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Cooling water Microbicide	EPA Reg. No. 4643-40	TRADE NAME OR CODE IDENT. DEARCIDE® 702

• Section 2 – INGREDIENTS	CAS No.	%	EXPOSURE CRITERIA
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.15	
2-Methyl-4-isothiazolin-3-one	2682-20-4	0.35	

• Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg approx.	212°F.	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.01	VAPOR PRESSURE @ 77 approx.	24 mmHg
VAPOR DENSITY (AIR = 1)	--	SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME By weight	94	EVAPORATION RATE, Butyl acetate	1 less than
APPEARANCE AND ODOR Pale amber to green liquid Mild aromatic odor		pH approx.	4.0

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER N/A UPPER	AUTO IGNITION TEMPERATURE N/A
---------------------------------------	---	----------------------------------

EXTINGUISHING MEDIA ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES If material is involved in a fire, use approved self-contained breathing apparatus. Use water spray to cool exposed containers.

UNUSUAL FIRE AND EXPLOSION HAZARD Toxic combustion products include sulfur dioxide and hydrogen chloride.

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID To avoid evaporation to dryness in shipping container, triple rinse drum with water, adding rinsate to treated system per EPA container handling instructions for all FIFRA regulated product
---	---

INCOMPATIBILITY (Materials to Avoid)
Do not allow concentrated product to boil.

HAZARDOUS DECOMPOSITION PRODUCTS HCl and oxides of sulfur.

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
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(over)

MATERIAL SAFETY DATA SHEET (Continued)

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT Maximum time weighted average (TWA) for 5-chloro-2-methyl-4-isothiazolin-3-one is 0.5 mg/m³ as mist or aerosol. Human skin sensitization is induced in 1/18 subjects @ 25 ppm active ingredient.

EFFECTS OF OVEREXPOSURE

INHALATION Avoid prolonged inhalation of fumes and mist. May cause irritation of mucous membranes of nose and throat. Remove to fresh air.

INGESTION Do NOT take internally. Do NOT induce vomiting. Drink a large quantity of milk, egg white, gelatin solution or if these are unavailable, drink large quantities of water. **AVOID ALCOHOL.** Call physician immediately. **NOTE TO PHYSICIAN:** Probable mucosal damage may contraindicate gastric lavage. Measures against circulatory shock, respiratory depression and convulsions may be necessary.

SKIN OR EYE CONTACT Prevent direct skin or eye contact. Direct contact with skin will cause severe irritation and burns. Material is a skin sensitizer at even low concentrations (see above). Wash skin with soap and water. **NOTE TO PHYSICIAN:** Use of sterile dressings over a bland bacteriostatic ointment for 4-5 days is suggested initially. If dermatitis reaction occurs, use wet soaks 3 or 4 times daily followed by corticosteroid ointment. For severe allergic reactions, use of an oral corticosteroid such as prednisone may be

EMERGENCY AND FIRST AID PROCEDURES considered for 6-7 days with decreasing dosages.

Eye contact: Contact will cause severe irritation and corneal damage. If contacted, flush eyes immediately with large amounts of water for 15 minutes. Contact a physician at once. Use of antibiotic ointment may be indicated.

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical exhaust is adequate for product in normal use.

RESPIRATORY PROTECTION (Specify Type)

Wear MESA/NIOSH approved respirator suitable for mist or high vapor concentrations as may be encountered in large spill.

EYE PROTECTION Wear splash-proof goggles and face shield (ANSI Z87.1, 1979)

GLOVES (Specify Type)

Impervious gloves

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

Impervious protective apron, eyewash facilities, emergency shower in vicinity of use.

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED Use industrial absorbent and transfer to suitable container for disposal using authorized chemical scavenger service. Flush area with water using suitable dike as required to control run-off.

WASTE DISPOSAL METHOD Product can be deactivated using 8 lb. calcium hypochlorite (65% active), 5 lb caustic soda in 10 gal. water. Deactivated product must be handled as corrosive material. If disposal of active product is required, authorized hazardous waste handling procedure is necessary. (see below)

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Store in ventilated area. Freeze point, 32°F. If frozen, agitate when thawed to mix.

OTHER PRECAUTIONS Triple rinse empty containers into system using the product and dispose of containers per EPA-DOT regulations referred to in Dearborn Technical Bulletin 51-104.

Shipping Name: DOT Water Treatment Compound, Liquid - Corrosive Material

IATA

Prepared By W. M. Morris

Date: 6/81 (revised 12/82)

CONFIDENTIAL

Attachment 8

MATERIAL SAFETY DATA SHEET

• Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.	EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047	

CHEMICAL NAME AND SYNONYMS Cooling water microbicide and slimicide	EPA Reg. No. 4643-16	TRADE NAME OR CODE IDENT. DEARCIDE® 709
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• Section 2 – INGREDIENTS

	CAS No.	%	EXPOSURE CRITERIA
Methylene bithiocyanate	6317-18-6	9.3	
Dimethylformamide	68-12-2	approx. 90.0	TLV: 20 ppm STEL

• Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg	307° F.	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	0.977	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)	2.51	SOLUBILITY IN H ₂ O, % BY WT.	Soluble at use conc.
% VOLATILES BY VOLUME	90.0	EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Light amber liquid, mildly sulfurous odor	pH of 1% aqueous solution	4.8

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) 135° F. TCC	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER @ 100° C. 2% UPPER 15%	AUTO IGNITION TEMPERATURE
EXTINGUISHING MEDIA <input type="checkbox"/> Water Fog <input checked="" type="checkbox"/> Foam <input checked="" type="checkbox"/> CO ₂ <input checked="" type="checkbox"/> Dry Chemical <input type="checkbox"/> Other		
SPECIAL FIRE FIGHTING PROCEDURES		

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
INCOMPATIBILITY (Materials to Avoid) Avoid strong alkali and halo-hydrocarbons; nitrates at elevated temperatures.	
HAZARDOUS DECOMPOSITION PRODUCTS None	
HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID

(over)

Section 6 - HEALTH HAZARD INFORMATION
EXPOSURE LIMIT

TWA: 10 ppm (skin)

EFFECTS OF OVEREXPOSURE

INHALATION

Inhalation may result in central nervous system toxic effects.

INGESTION Highly toxic if ingested. If ingested, do not induce vomiting, feed milk mixed with egg whites. Consult a physician immediately.

SKIN OR EYE CONTACT

May be absorbed with repeated prolonged contact. Irritating to skin; damaging to eyes. Remove from skin by immediate water flush. If eyes are affected, flush with water and get medical attention. Remove contaminated clothing and launder before reuse.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 - SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical exhaust is adequate.

RESPIRATORY PROTECTION (Specify Type)

Use respirator (vapor type) for prolonged exposure.

EYE PROTECTION

Goggles or face shield

GLOVES (Specify Type)

Chemical gloves

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Collect using industrial absorbent, bury or burn. Flush residue to sewer with plenty of water.

WASTE DISPOSAL METHOD Discard material through authorized scavenger service or incineration. Triple rinse empty containers into system using the product and dispose of containers per EPA-DOT regulations referred to in Dearborn Technical Bulletin 51-104.

• Section 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE Avoid extreme heat and keep container closed when not in use.

OTHER PRECAUTIONS Protect container from physical damage. Keep away from children. For industrial use only.

Shipping Name: DOT CORROSIVE -Water Treatment Compound, Liquid-Corrosive Material
IATA

Prepared By W. M. Morris

Date: 1/79 (revised 2/83)

Attachment 8A

MATERIAL SAFETY DATA SHEET

• Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Cooling water treatment		TRADE NAME OR CODE IDENT. DEARBORN® 863

• Section 2 – INGREDIENTS	CAS No.	%	EXPOSURE CRITERIA
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NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

• Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg approx.	212°F.	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.01	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME	10	EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Pale yellow liquid with a musty odor	pH	2.1

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
EXTINGUISHING MEDIA <input type="checkbox"/> Water Fog <input type="checkbox"/> Foam <input type="checkbox"/> CO ₂ <input type="checkbox"/> Dry Chemical <input type="checkbox"/> Other		
SPECIAL FIRE FIGHTING PROCEDURES		

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
INCOMPATIBILITY (Materials to Avoid)	Strong oxidizing agents

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
---	---------------------

(over)

• Section 6 -- HEALTH HAZARD INFORMATION
EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Avoid prolonged breathing of product. Remove to fresh air.

INGESTION

May be harmful if swallowed. If ingested, give water and induce vomiting by sticking finger down throat. Contact physician

SKIN OR EYE CONTACT

May cause skin and eye irritation on prolonged exposure. If eyes are affected, flush with water and consult a physician. Wash off skin with soap and water.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

Mechanical is adequate

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles or face shield

GLOVES (Specify Type)

Chemical gloves

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Collect using absorbent, bury or burn.

Flush area of spill with water.

WASTE DISPOSAL METHOD

Dispose through authorized scavenger service. Product is an EPA Hazardous Waste (corrosive).

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Keep from freezing. Freeze point, 0°F.

OTHER PRECAUTIONS

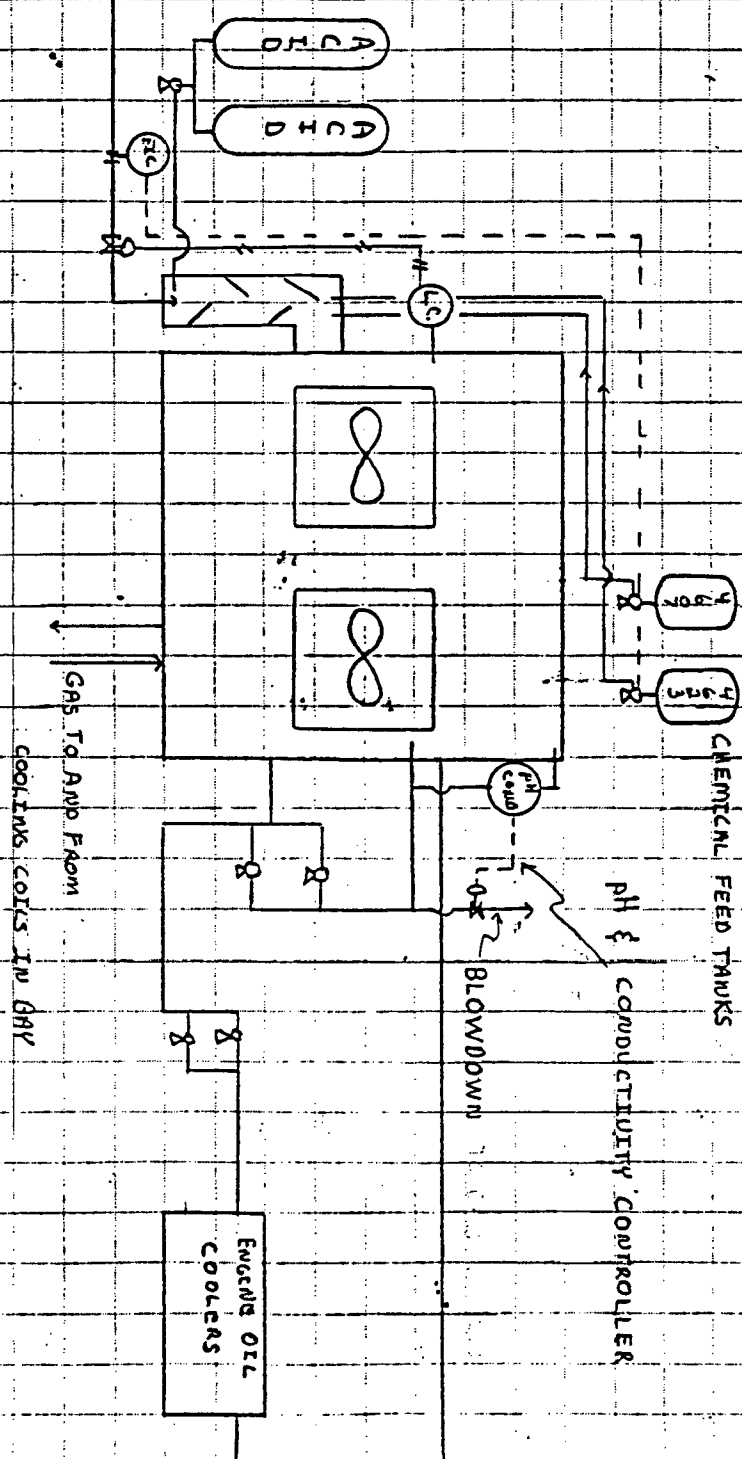
Keep out of reach of children. For industrial use only.

Shipping Name: DOT Compounds, Industrial Process Water Treating, Liquid
IATA

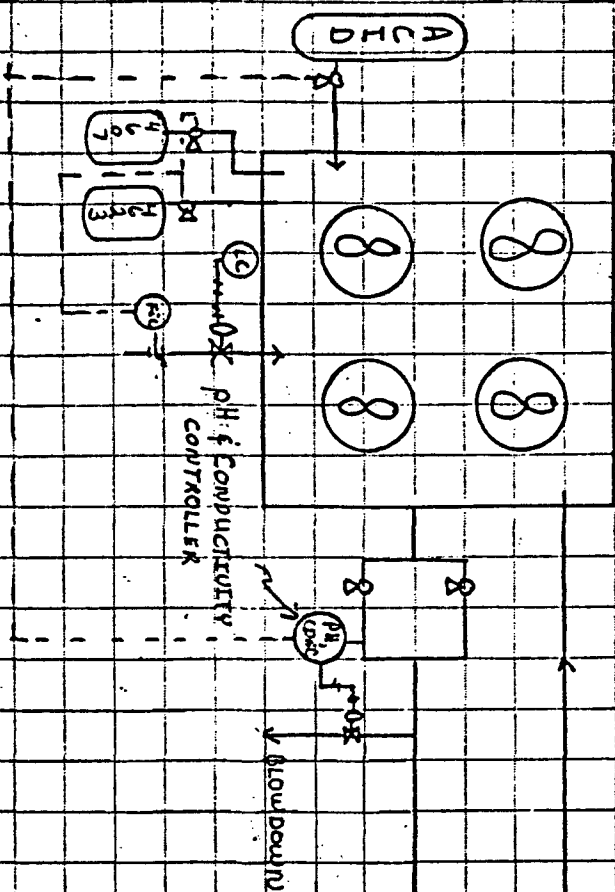
Prepared By W. M. Morris

Date: 6/78 (Revised 8/83)

ARTESIA PLANT - LARGE COOLING TOWER



ARTESIA PLANT - SMALL COOLING TOWER



- TO SEAT COOLERS ON STAGE TANKS
- STAGE COOLERS
- COOLING GAS COOLERS
- AMINE COOLERS
- REFRIGERANT CONDENSER
- REFRIGERANT SUB COOLER
- PRODUCT AIR-HEAT COOLERS

CONFIDENTIAL

MATERIAL SAFETY DATA SHEET

● **Section 1 – PRODUCT IDENTIFICATION**

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.		EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047		
CHEMICAL NAME AND SYNONYMS Catalyzed sodium sulfite		TRADE NAME OR CODE IDENT. DEARBORN® 66

● **Section 2 – INGREDIENTS** CAS No. % EXPOSURE CRITERIA

Sodium sulfite	7757-83-7	approx. 95
----------------	-----------	------------

● **Section 3 – PHYSICAL DATA**

BOILING POINT, 760mm Hg	Decomposes	MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1) Density	91 lbs/ft ³	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	approx. 12%
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR Reddish brown - mild odor (powder)		pH of 5% solution	9.3

● **Section 4 – FIRE AND EXPLOSION HAZARD DATA**

FLASH POINT (and Method Used) None	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
---------------------------------------	--	---------------------------

EXTINGUISHING MEDIA ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES Non-flammable

UNUSUAL FIRE AND EXPLOSION HAZARD None

● **Section 5 – REACTIVITY DATA**

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID Slowly oxidizes to sodium sulfate
---	--

INCOMPATIBILITY (Materials to Avoid) Being a reducing agent, may be expected to react strongly with strong oxidizers (chlorine, peroxides, etc.)

HAZARDOUS DECOMPOSITION PRODUCTS None

HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID
---	---------------------

MATERIAL SAFETY DATA SHEET (Continued)

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT TDC: oral - human LDLo 500 mg/kg

TLV: 30 m.p.p.c.f. (Nuisance particulate)

EFFECTS OF OVEREXPOSURE

INHALATION Not expected

INGESTION

If swallowed, possibly harmful by depression of blood pressure, gastric irritation, etc. Mild emetic and copious fluids suggested.

SKIN OR EYE CONTACT

For skin contact, wash off with water. Eye contact; very mildly alkaline, possibly irritant; flush with water.

EMERGENCY AND FIRST AID PROCEDURES

If swallowed, mild emetic and copious fluids suggested. For skin contact, wash off with water; for eyes, flush with water.

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

Use adequate respirator for dusting - 3M #8710 or equal has been suggested for similar use.

EYE PROTECTION

Goggles

GLOVES (Specify Type)

None required

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

None required.

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Sweep up spills and return to container if uncontaminated. Flush residue to drain with water. (Contaminated material may be taken to landfill.)

WASTE DISPOSAL METHOD

May mix with waste solutions of oxidizing agents to neutralize effects of both wastes, or dispose using chemical scavenger service. Destroy containers.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep containers closed and dry. Store in a dry place, away from strong oxidizers.

Use floating cover over solutions to avoid oxidation losses.

OTHER PRECAUTIONS

For industrial use only. Keep out of reach of children.

Shipping Name: DOT Compound Boiler Cleansing, Preserving, Scale Removing Dry - NOT RESTRICTED
IATA

Prepared By W. M. Morris

Date: 5/78 (Revised 6/80)

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

● Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME

DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Liquid water treatment

TRADE NAME OR CODE IDENT.

DEARBORN® 244

● Section 2 – INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet
is NOT a hazardous material within the
meaning of Title 29, Code of Federal
Regulations 1915, 1916, 1917.

● Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg approx.	212°F.	MELTING POINT	N/A
SPECIFIC GRAVITY (H ₂ O = 1)	1.21	VAPOR PRESSURE	No data
VAPOR DENSITY (AIR = 1)	No data	SOLUBILITY IN H ₂ O, % BY WT.	appreciable
% VOLATILES BY VOLUME	No data	EVAPORATION RATE, _____ = 1	No data
APPEARANCE AND ODOR Colorless liquid/no odor	pH		5.6

● Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
None	N/A	N/A

EXTINGUISHING

MEDIA N/A ☐ Water Fog ☐ Foam ☐ CO₂ ☐ Dry Chemical ☐ Other

SPECIAL FIRE FIGHTING PROCEDURES

None

UNUSUAL FIRE AND EXPLOSION HAZARD

None

● Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions)

CONDITIONS TO AVOID

☒ Stable ☐ Unstable

INCOMPATIBILITY (Materials to Avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION

CONDITIONS TO AVOID

☐ May Occur ☒ Will Not Occur

(over)

MATERIAL SAFETY DATA SHEET (Continued)

• Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION

Not expected

INGESTION

If ingested in large quantity, nausea or vomiting may occur. Drink milk or water to dilute and contact physician if discomfort persists.

SKIN OR EYE CONTACT

If in contact with skin, wash area with soap and water. If in eyes, use clear water to flush for several minutes. If irritation persists contact physician.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION Goggles

GLOVES (Specify Type) Plastic or rubber

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Use industrial absorbent and bury or incinerate. Flush area with water.

WASTE DISPOSAL METHOD

Use chemical scavenger service. Tender metal container to drum reconditioner. Remove labels.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Product is low toxic and non-hazardous.

Keep container closed. Freeze point, 10° F.

OTHER PRECAUTIONS

Shipping Name: DOT
IATA

NOT RESTRICTED - Compound Industrial Process Water Treating, Liquid

Prepared By W. M. Morris

Date: 9/25/78

CONFIDENTIAL**MATERIAL SAFETY DATA SHEET**

• Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME

DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.

EMERGENCY PHONE NO.

312/438-8241

ADDRESS

300 Genesee St., Lake Zurich, IL 60047

CHEMICAL NAME AND SYNONYMS

Boiler water treatment

TRADE NAME OR CODE IDENT.

SLUDGTROL® 651

• Section 2 – INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

NON - HAZARDOUS MATERIAL

The product identified in this Data Sheet is NOT a hazardous material within the meaning of Title 29, Code of Federal Regulations 1915, 1916, 1917.

• Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	1.08	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Brown liquid	pH	9.5

• Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used)	FLAMMABLE LIMITS in AIR, % by VOLUME	AUTO IGNITION TEMPERATURE
None	LOWER UPPER	
EXTINGUISHING MEDIA	<input type="checkbox"/> Water Fog	<input type="checkbox"/> Foam
	<input type="checkbox"/> CO ₂	<input type="checkbox"/> Dry Chemical
		<input type="checkbox"/> Other
SPECIAL FIRE FIGHTING PROCEDURES		

UNUSUAL FIRE AND EXPLOSION HAZARD

• Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions)	CONDITIONS TO AVOID
<input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	
INCOMPATIBILITY (Materials to Avoid)	

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
<input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	

(over)

• Section 6 -- HEALTH HAZARD INFORMATION
EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION Not expected

INGESTION Product may be harmful if ingested. Drink large amount of water or citrous juice to dilute and neutralize. Contact physician if discomfort occurs.

SKIN OR EYE CONTACT Wash off skin with water. Flush eyes with water for 15 minutes. Contact physician if irritation occurs.

EMERGENCY AND FIRST AID PROCEDURES

• Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS

RESPIRATORY PROTECTION (Specify Type)

EYE PROTECTION

Goggles

GLOVES (Specify Type)

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

• Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Collect spills with absorbent, bury or burn. Flush area with water.

WASTE DISPOSAL METHOD

Use scavenger service for disposal in landfill.

• Section 9 -- SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

closed when not in use. Freezes at 30° F. For industrial use only. Keep containers

OTHER PRECAUTIONS

Shipping Name: DOT Compd. Boiler Cleansing, Preserving, Scale Removing, Liquid
IATA

Prepared By W. M. Morris

Date: 12/80

CONFIDENTIAL

MATERIAL SAFETY DATA SHEET

● Section 1 – PRODUCT IDENTIFICATION

MANUFACTURER'S NAME DEARBORN CHEMICAL CO., Subsidiary, W. R. Grace & Co.	EMERGENCY PHONE NO. 312/438-8241
ADDRESS 300 Genesee St., Lake Zurich, IL 60047	
CHEMICAL NAME AND SYNONYMS Return line treatment	TRADE NAME OR CODE IDENT. STEAMATE® 2005

● Section 2 – INGREDIENTS

CAS No.

%

EXPOSURE CRITERIA

Cyclohexylamine	)	108-91-8		TWA 10 ppm (skin)
)			
Diethylamino ethanol	)	100-37-8	approx. 25	TWA 10 ppm "
)			
Morpholine	)	110-91-8		TWA 20 ppm "

- in aqueous solution

● Section 3 – PHYSICAL DATA

BOILING POINT, 760mm Hg		MELTING POINT	
SPECIFIC GRAVITY (H ₂ O = 1)	0.98	VAPOR PRESSURE	
VAPOR DENSITY (AIR = 1)		SOLUBILITY IN H ₂ O, % BY WT.	complete
% VOLATILES BY VOLUME		EVAPORATION RATE, _____ = 1	
APPEARANCE AND ODOR	Yellow liquid amine odor	pH	approx. 12.0

● Section 4 – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (and Method Used) 135°F. TCC	FLAMMABLE LIMITS in AIR, % by VOLUME LOWER UPPER	AUTO IGNITION TEMPERATURE
EXTINGUISHING MEDIA <input type="checkbox"/> Water Fog <input type="checkbox"/> Foam <input type="checkbox"/> CO ₂ <input type="checkbox"/> Dry Chemical <input type="checkbox"/> Other	SPECIAL FIRE FIGHTING PROCEDURES	

UNUSUAL FIRE AND EXPLOSION HAZARD

● Section 5 – REACTIVITY DATA

STABILITY (Normal Conditions) <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Unstable	CONDITIONS TO AVOID
INCOMPATIBILITY (Materials to Avoid)	
HAZARDOUS DECOMPOSITION PRODUCTS NO _x	
HAZARDOUS POLYMERIZATION <input type="checkbox"/> May Occur <input checked="" type="checkbox"/> Will Not Occur	CONDITIONS TO AVOID

(over)

MATERIAL SAFETY DATA SHEET (Continued)

● Section 6 -- HEALTH HAZARD INFORMATION

EXPOSURE LIMIT

Not established

EFFECTS OF OVEREXPOSURE

INHALATION Inhaling fumes will cause dizziness. Remove to fresh air.
Strongly alkaline.

INGESTION If ingested may cause convulsions. Drink large quantity of milk, egg whites, gelatin solution or if these are not available drink large quantity of water. Contact physician.

DO NOT INDUCE VOMITING

SKIN OR EYE CONTACT Possible skin sensitizer. May cause dermatitis. Harmful to eyes. Wash skin with soap and water. Wash eyes with clear water. Contact a physician.

EMERGENCY AND FIRST AID PROCEDURES

● Section 7 -- SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS Mechanical is usually adequate for normal conditions of use.

RESPIRATORY PROTECTION (Specify Type) If large amounts are handled or in case of emergency, use Wilson THGW gas mask, or equal.

EYE PROTECTION	Goggles or face mask	GLOVES (Specify Type)	Rubber
----------------	----------------------	-----------------------	--------

OTHER PROTECTIVE CLOTHING AND EQUIPMENT (Specify Type)

● Section 8 -- SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED Use industrial absorbent to collect, burn or bury. Flush area with water. Flush residues to drain with water.

WASTE DISPOSAL METHOD Incinerate or use authorized chemical scavenger service. Tender metal containers to drum reconditioners. Remove labels.

● Section 9 -- SPECIAL PRECAUTIONS

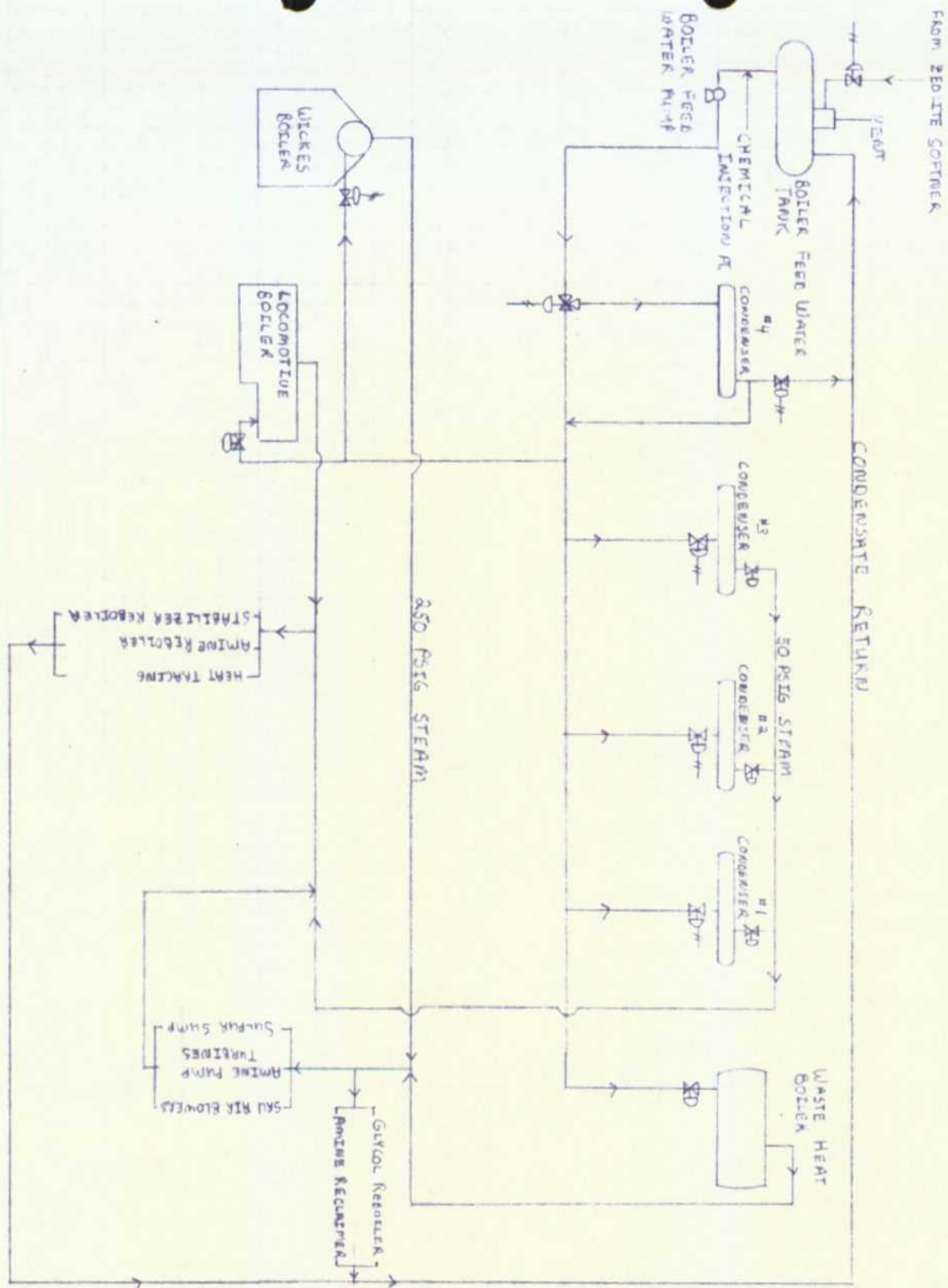
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE For industrial use only. Keep away from open flames. Close container when not in use. Freeze point, -46°F

OTHER PRECAUTIONS Protect container from physical damage. Keep away from reach of children. For industrial use only.

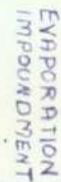
Shipping Name: DOT Boiler Compound, Liquid, Corrosive Material - CORROSIVE
IATA

Prepared By W. M. Morris

Date: 12/82



NO.	REVISION	BY	DATE	CHKD	APP'D	
FOR BIDS	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> PHILLIPS PETROLEUM COMPANY BARTLESVILLE, OKLAHOMA </div> <div style="text-align: center;"> ATESIA PLANT STEAM SYSTEM </div> </div>				JA NO.	FILE CODE
FOR APPR					AFE NO.	SCALE
FOR CONST					DWG NO.	SH NO.
DRAWN stubbs	ATTACHMENT #14					
CHECKED						
APP'D						

FORM 1779-S 8-81

**SOUTHWESTERN LABORATORIES***Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services*

1703 W. Industrial Avenue (915 - 683-3348) • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-W
Customer No. 3355796
Report No. 35020

Report Date 1-24-84Report of tests on: **Water**Date Received 12-21-83Client: **Phillips Petroleum**Identification: **Artesia Plant, Wastewater**

	mg/L
Aluminum-----Less Than	2
Arsenic-----Less Than	0.05
Barium-----Less Than	1
Boron-----	0.4
Cadmium-----Less Than	0.01
Chromium-----	0.14
Cobalt-----Less Than	0.1
Copper-----Less Than	0.1
Iron-----	0.3
Lead-----Less Than	0.05
Manganese-----	0.06
Mercury-----Less Than	0.002
Molybdenum-----Less Than	1
Nickel-----Less Than	0.5
Selenium-----Less Than	0.01
Silver-----Less Than	0.05
Zinc-----	0.06
Sulfate-----	357
Chloride-----	638
Fluoride-----	1.8
Nitrate-----	0.5
Cyanide-----Less Than	0.001
Phenols-----	0.060
Total Dissolved Solids @ 180° C-----	1984

Technician: **KLH, PCB, GMB**

Copies 3 cc: **Phillips Petroleum Co.**
Attn: Mike Ford

SOUTHWESTERN LABORATORIES



WATER ANALYSIS REPORT

(Test 1, Livestock; Test 2, Domestic; Test 3, Irrigation)

SOIL AND WATER TESTING LABORATORY

LAB NO. 2173 YOUR SAMPLE NO. _____
NAME Phillips Petroleum 40 S. Wallace DATE 4/31/83
ADDRESS 4061 Penbrook Odessa, TX 79762

pH 6.75
Total Soluble Salts:
EC x 10⁶ 1728 Parts per Million 1106 % .11
Total Dissolved Solids 1456 ppm* Other Analysis _____
Sodium (Na) 6.84 meq/l** _____ ppm* _____ ppm*
Hardness (CaCO₃ equivalent) 462 ppm* 27.0 grains _____ ppm* _____ ppm*
Sodium - Adsorption - Ratio (SAR) 3.18 Residual Sodium Carbonate (RSC) 0

REMARKS

Your water is classified as Satisfactory for livestock use.Your water ☒ exceeds ☐ is within the U.S. Public Health Department Standards for domestic use.

See below side for classification of irrigation water.

The U.S. Public Health Department recommends the following for domestic use water:

Hardness - up to 500 parts per million

Total dissolved solids - 500 parts per million with up to 1000 parts per million usable.

* ppm = parts per million

ppm x 2.7 = lbs. per acre-foot of water

** meq/l = milliequivalents per liter

meq/l of Na x 62 = lbs. of Na per acre-foot of water

NOTE: Some well waters should be checked for pathological organisms and for physiological effect.

EXPLANATION***

Salinity Hazard

- ☐ Low-Salinity Water (C1) can be used for irrigation with most crops in most soils with little likelihood that soil salinity will develop.
- ☐ Medium-Salinity Water (C2) can be used if a moderate amount of leaching occurs.
- ☒ High-Salinity Water (C3) cannot be used on soils with restricted drainage.
- ☐ Very-High-Salinity Water (C4) is not suitable for irrigation under ordinary conditions, but may be used occasionally under very special circumstances.

Sodium Hazard

- ☒ Low-Sodium Water (S1) can be used for irrigation on almost all soils with little danger of the development of harmful levels of sodium.
- ☐ Medium-Sodium Water (S2) will possibly cause a sodium hazard in fine-textured soils, under low-leaching conditions. This water can be used on coarse-textured soils with good permeability.
- ☐ High-Sodium Water (S3) may produce a sodium hazard and will require special soil management - good drainage, high leaching and possibly the use of chemical amendments such as gypsum.
- ☐ Very-High Sodium Water (S4) is usually unsatisfactory for irrigation purposes.

MSU Classification System

The system used by the University is based upon three classes of water, which take into account salinity and sodium hazard.

- ☐ Class 1 water is suitable for use for most crops under most conditions.
- ☒ Class 2 water can be used satisfactorily for most crops if care is taken to prevent the accumulation of soluble salt and sodium in the soil.

*** Refer to the enclosed "guides" for additional information:

Guide A-116 "The NMSU Irrigation Water Classification System"

Guide A-110 "Classification of Irrigation Waters"

Sincerely,

Charles R. Glover

Charles R. Glover
Extension Agronomist

Classification of Irrigation Water



Reviewed by
Charles Glover, Extension Agronomist

Guide A-110

The New Mexico State University Soil and Water Testing Laboratory classifies irrigation water by both the U.S. Salinity Laboratory system and the NMSU system. These systems are similar. After the samples are analyzed, the water is classified by both systems on the irrigation water analysis report.

Composition and concentration of dissolved chemicals in irrigation water determine its quality for irrigation use.

Characteristics of an irrigation water that are important in determining its quality are electrical conductivity (expressed as $EC \times 10^6$), sodium adsorption ratio (SAR), and often the bicarbonate concentration (HCO_3), which is expressed as residual sodium carbonate (RSC). These three characteristics are included along with pH in routine irrigation water analyses by the laboratory (figure 1).

Fig. 1. NMSU analysis report for irrigation water

pH	_____
Total Soluble Salts:	_____
$EC \times 10^6$	_____ Parts per million _____ or _____ %
Total Dissolved Solids _____ ppm* or _____ pounds per acre-foot of water	
Sodium (Na) _____ meq/l** or _____ pounds of Na per acre-foot of water	
Sodium Adsorption Ratio (SAR) _____	
Residual Sodium Carbonate (RSC) _____	

*ppm = parts per million

**meq/l = millequivalents per liter

Electrical Conductivity

The total concentration of soluble salts in irrigation water is expressed in terms of electrical conductivity, or $EC \times 10^6$. In general, waters with conductivity values below 750 are satisfactory for irrigation use. Waters with $EC \times 10^6$ in the range of 750 to 2250 can be used, with good management and favorable

drainage. Saline soil conditions will develop if drainage and leaching are inadequate. Use of waters with $EC \times 10^6$ values above 2250 is hazardous and frequently results in excess accumulation of salts in the soil.

Sodium Adsorption Ratio

The SAR value of irrigation water indicates the alkali hazard involved in use of the water for irrigation. This value measures the proportion of sodium to other chemicals in the water. In general, waters with SAR values of less than 10 are considered usable for irrigation.

Residual Sodium Carbonate

This value is another measure of the alkali hazard of irrigation water. Under New Mexico conditions, irrigation waters with an RSC value of less than 1 are considered suitable for most crops under most conditions. Waters with an RSC of 1 to 2.5 can be used for most crops if care is taken to prevent the accumulation of soluble salt and sodium in the soil. Waters with an RSC above 2.5 is generally unsatisfactory for crop production.

pH

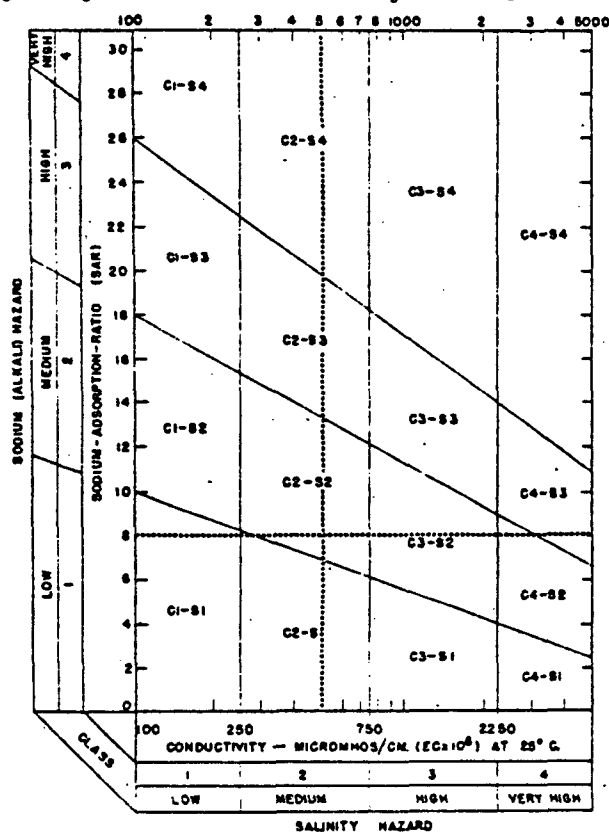
pH is the symbol for hydrogen ion concentration, a measure of acidity and alkalinity. pH 7 is the midpoint where a liquid is neither acid or alkaline; below pH 7 it is progressively more acid and above more alkaline.

A pH above 8.5 indicates a water high in soluble salts. Special irrigation and cropping practices may be required to use the water.

U.S. Salinity Laboratory Classification

This system uses the SAR and $EC \times 10^6$ values for classifying water. Figure 2 is a simplified diagram developed at that laboratory for use in the classification of irrigation waters. $EC \times 10^6$ values are shown across the bottom and top of the diagram. SAR values are shown along the left side.

Fig. 2. Diagram for the classification of irrigation waters*



Source: Agriculture Handbook 60, U.S. Dept of Agriculture

This figure can be used by finding the $EC \times 10^6$ value on the irrigation water analysis report. Find the same value along the bottom and top margin of the figure. Draw a line from the EC value on the bottom margin straight up to the same value on the top margin. Find the SAR value on the analysis report. Locate that value on the left margin of the diagram. Draw a line from this point across the diagram to the right margin. The area in which the two lines meet is the classification of your irrigation water.

Example: Assume an $EC \times 10^6$ value of 500 and an SAR value of 8. Drawing the lines at these points (dotted lines on diagram) we find the water is classified as C2-S2, or medium salinity—medium sodium.

Salinity Hazard

Low-salinity water (C1) can be used for irrigation with most crops in most soils with little likelihood that soil salinity will develop.

Medium-salinity water (C2) can be used if a moderate amount of leaching occurs.

High-salinity water (C3) cannot be used on soils with restricted drainage.

Very-high-salinity water (C4) is not suitable for irrigation under ordinary conditions, but it may be used occasionally under very special circumstances.

Sodium Hazard

Low-sodium water (S1) can be used for irrigation of almost all soils with little danger of development of harmful levels of sodium.

Medium-sodium water (S2) may cause an alkalinity problem in fine-textured soils, under low-leaching conditions. It can be used on coarse-textured soils with good permeability.

High-sodium water (S3) may produce an alkalinity problem. This water requires special soil management such as good drainage, heavy leaching, and possibly the use of chemical amendments such as gypsum.

Very-high-sodium water (S4) is usually unsatisfactory for irrigation purposes.

NMSU Classification System

The system developed at the University is based upon three classes of water which take into account salinity and sodium hazard:

- Class 1. Water is suitable for use on most crops under most conditions.
- Class 2. Water can be used satisfactorily for most crops if care is taken to prevent accumulation of soluble salts and sodium in the soil.
- Class 3. Water is generally unsatisfactory for crop production. Less salty water in Class 3 may be used as a supplemental source if the regular water is of good quality.

Reprinted 10/82

The NMSU Irrigation Water Classification System



Revised by - C. R. Glover, Extension Agronomist

Guide A-116

To farmers, water quality usually refers to the kind and amount of salts in the water and how they will affect crop production. Salts are present in varying amounts in all irrigation waters, and the way these salts influence the osmotic pressure of the soil solution determines the effect. The higher the concentration of dissolved salt, the greater the osmotic pressure of the solution. When the osmotic pressure is low, plant roots readily absorb water from moist soil. Plants have difficulty absorbing water when the osmotic pressure is high, even if the soil is thoroughly wet. Plants may actually wilt with their roots in water if there is a high concentration of salt in the soil. If the salt concentration is abnormally high, normal uptake of the water essential for good plant growth is impossible.

When salts go into solution, they separate into ions. There is considerable difference among the various cations and anions in their effects on soils and plants.

PRINCIPAL CATIONS

Calcium

Calcium (Ca), an essential plant nutrient, is found extensively in New Mexico soils as limestone (calcium carbonate) and as gypsum (calcium sulfate). Calcium carbonate is very slightly soluble in water, and calcium sulfate is moderately soluble. Irrigation waters coming from areas where gypsum is a major soil constituent are invariably high in calcium sulfate. The Pecos Valley, Tularosa Basin, and Estancia Valley are examples of such a condition.

For domestic purposes, waters high in calcium or magnesium, or both, are "hard" waters and are undesirable. For irrigation, hard waters are good waters; "soft" (sodium) waters are the undesirable ones. Calcium operates in the soil to help keep it in good physical condition, able to take water well and to be easily tilled.

Magnesium

Magnesium (Mg), another essential plant nutrient, is chemically similar to calcium in reactions. Found

abundantly in New Mexico well water, it is usually present in about half the concentration of calcium. In the Portales irrigated area, however, several irrigation waters contain more magnesium than calcium.

Sodium

Sodium (Na) is not generally considered an essential plant nutrient. It is found in varying amounts in almost all irrigation well waters in New Mexico. It is the most injurious of the cations commonly found in irrigation water. When the amount of sodium exceeds the amount of calcium plus magnesium in irrigation water, unfavorable physical conditions are likely to develop in soils to which such water is applied. Sodium adsorbed on the clay particles tends to disperse them and bring about the formation of "slick spots." Slick-spot soils take water slowly and, when dry, form hard clods that melt down when wetted and seal the soil surface. In addition to its effect on soil structure, sodium has a directly toxic effect on plants.

Improvement of sodium soils can be accomplished by exchanging the adsorbed sodium for calcium and then leaching the sodium salt out of the soil.

Potassium

Potassium (K) is an essential plant nutrient. Potassium-bearing rocks and minerals are common in New Mexico. It is a minor element, however, in most irrigation water in this state and is no longer included in routine analyses.

PRINCIPAL ANIONS

Sulfate

The sulfate (SO_4) ion is the dominant anion in most pump waters in New Mexico. The sulfate ion has no special harmful effects on soils or plants except as it increases the salinity of the soil solution.

Chloride

The chloride (Cl) ion is the next most common anion in well waters. The chloride ion has a directly toxic effect on some plants, aside from its effect on the salinity of the soil solution.

Carbonate

The carbonate (CO_3) ion is of minor importance in New Mexico irrigation water except in the southwestern part of the state.

Bicarbonate

The bicarbonate (HCO_3) ion is, like the carbonate ion, of minor importance in well water in New Mexico except in the southwestern area.

OTHER IONS

Boron, nitrates, silicates, and flourides are sometimes determined, in addition to the foregoing cations and anions. Of these, only boron and nitrates are of much importance in irrigation water. Nitrate analyses of selected irrigation waters have been made, but most of them, thus far, show only low levels of nitrate. Some Carlsbad waters contain considerable nitrates. A few boron analyses have been made which indicate that New Mexico waters do not contain amounts of boron that are considered harmful.

WATER QUALITY

There are several different ways of determining the quality of irrigation water. These include measuring the degree of acidity or alkalinity (pH) of the waters, weighing the salt content of a specified amount of water (total dissolved solids), determining electrical conductivity of a unit quantity of water, calculating the percentage of sodium of the cations present, determining "residual sodium carbonate," and calculating the "sodium-adsorption ratio." Weighing the dissolved salts and measuring electrical conductivity indicate the probable salt hazard from using the water. Determining the pH and calculating the sodium percentage, residual sodium carbonate, or sodium-adsorption ratio show the probable sodium hazard that would arise in the soil.

Electrical Conductivity

Ions in solution are capable of conducting an electric current. The more ions there are, the greater the conductivity of the solution. Estimates of the quantity of salts in solution can be made from electrical conductivity data. The results commonly are expressed in parts per million (ppm) of salt in the water. The higher the salt content of a water, the higher will be its electrical conductivity.

The values of electrical conductivity that are considered to represent satisfactory and harmful levels for New Mexico waters are given in tables 1, 2, and 3.

Residual Sodium Carbonate

Water containing more carbonate plus bicarbonate than calcium plus magnesium, on an equivalent basis,

has much of its calcium and perhaps, magnesium precipitated out of solution when it is applied to soil. As the soil dries out, after an irrigation, the salts become concentrated, and the least soluble ones tend to be precipitated. Removal of calcium and magnesium from solution automatically increases the sodium percentage of the soil solution, which, in turn, increases the rate of adsorption of sodium onto the soil particles. Water containing mostly chlorides and sulfates does not exhibit as marked a change in relative sodium content because of the greater solubility of these anions than of the carbonates and bicarbonates.

When the carbonate plus bicarbonate content exceeds the calcium plus magnesium content, the water is said to contain "residual sodium carbonate." The amount of residual sodium carbonate (RSC) in a water is calculated from the following formula:

$$\text{RSC} = (\text{CO}_3 + \text{HCO}_3) - (\text{Ca} + \text{Mg})$$

The potential sodium hazard in the soil from using water with little residual sodium carbonate is less than from water with a high level of residual sodium carbonate, under similar conditions.

Table 2 gives the values of residual sodium carbonate that are considered satisfactory and harmful in New Mexico waters.

Sodium-Adsorption Ratio

The sodium-adsorption ratio (SAR) is more reliable than the sodium percentage as an indicator of the effect of relative cation concentration on sodium accumulation in the soil. It is calculated from the following formula, where ion concentrations are expressed as milliequivalents per liter (meq./L):

$$\text{SAR} = \frac{\text{Na}}{\sqrt{\frac{\text{Ca} + \text{Mg}}{2}}}$$

The higher the SAR, the greater the potential sodium hazard from using the water. At a given sodium percentage, the SAR doubles when the cation concentration quadruples.

NMSU CLASSIFICATIONS

In New Mexico, local soil conditions and crops play a major part in determining whether irrigation water can be used with ordinary precautions or whether it must be handled with great care. Accordingly, three classification systems are proposed for groups of ground water areas in this state. Group I waters are those in the vicinity of Carlsbad, Artesia, and Roswell, in the Portales area, and in the Tularosa Basin. Group II waters are in the southwestern part of New Mexico, including Deming, Columbus, the Animas Valley, the Gila drainage, and nearby areas.

Group III waters are in the Estancia Valley, Lea County, the House area, the Bluewater area, and the Rio Grande Valley and include most of the other smaller areas in the state where well water is used for irrigation.

The classifications used in this guide are based on three classes of water. Class 1 water is suitable for use for most crops under most conditions. Class 2 water can be used satisfactorily for most crops if care is taken to prevent the accumulation of soluble salt and sodium in the soil. Class 3 water is generally unsatisfactory for crop production. The less salty water in Class 3 may be used as a supplemental source of water if the regular water is of better quality.

Group I

Most of the waters in Group I contain moderate amounts of salt, but all of these areas have some water with excessive salt concentrations. Sodium-adsorption ratios in a group of water samples taken several years ago averaged highest in the Roswell and lowest in the Artesia area. Only one water had any residual sodium carbonate.

A classification system for Group I water is presented in table 1.

Table 1. Quality classes for irrigation well waters from Group I areas

Class	Electrical Conductivity EC X 10 ⁶
1	0 - 1500
2	1500 - 4500
3	above - 4500

Group II

The irrigated areas in Group II include the Mimbres ground water basin, the Animas Valley, and scattered pump irrigated lands in the vicinity of Lordsburg, the Playas Valley, the Hachita Valley, and the Rodeo

area. The waters are generally low in salt, with moderate-to-high sodium percentages and moderate-to-high sodium-adsorption ratios. All of them contain residual sodium carbonate.

Sodium is the dominant cation, followed by calcium, and bicarbonate is often the dominant anion. Sodium percentage, sodium-adsorption ratio, residual sodium carbonate, and the carbonate-plus-bicarbonate content increase as the electrical conductivity increases. The main problem is the sodium hazard.

The classification system proposed for Group II waters is presented in table 3.

Table 2. Quality classes for irrigation well waters from Group II areas

Class	Electrical Conductivity EC X 10 ⁶	Residual Sodium Carbonate (meq./L)
1	0 - 750	0 - 1
2	750 - 2250	1 - 2.5
3	above - 2250	above - 2.5

Group III

The classification system proposed for Group III waters, which represent the remainder of the state's irrigation water, is presented in table 3. Generally, these waters have little or no sodium hazard.

Table 3. Quality classes for irrigation well waters from Group III areas

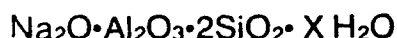
Class	Electrical Conductivity EC X 10 ⁶
1	0 - 1000
2	1000 - 3000
3	above - 3000

Molecular Sieve Type 4A

Product Information

Description

ZEOCHEM Molecular Sieve Type 4A is an alkali aluminosilicate; it is the sodium form of the Type A crystal structure. Type 4A has an effective pore opening of about 4 angstroms.

Chemical Formula:**Applications**

ZEOCHEM Molecular Sieve Type 4A is used to dehydrate most fluids. Applications include both static and dynamic drying. Static applications (non-regenerative) include drying of refrigerant gases, usage in desiccant packages, and in insulating glass units. Dynamic applications (regenerative) include drying of natural gas, LPG, air, inert gases, and solvents. ZEOCHEM Molecular Sieve Type 4A will adsorb molecules with a kinetic diameter of less than 4 angstroms and exclude those larger.

Regeneration

ZEOCHEM Molecular Sieve Type 4A can be regenerated by evacuating or purging, usually at elevated temperatures. The purge gas temperature must be sufficiently high to bring the molecular sieve to a level of 400 to 600°F, but not exceeding in any case 1000°F. Higher temperatures could cause physical alteration of the molecular sieve structure. The degree of regeneration depends on the temperature and humidity of the purge gas.

Typical Properties

Nominal pore diameter	4 angstroms
Type of crystal structure	cubic
Bulk density	47 lbs/cuft
Equilibrium water capacity (theoretical)	23% wt.
Water content (as shipped)	1.5% wt. (max.)
Heat of adsorption (max.)	1,800 BTU/lb H ₂ O
Specific heat (approx.)	0.23 BTU/lb/°F

Commercial bead sizes (nominal)

	$\frac{1}{16}$ "	$\frac{1}{8}$ "	
mesh	4×7	7×10	10×18
mm	3-5	2-3	1-2
crush strength, lbs.	18	9	4

ZEOCHEM Molecular Sieve 4A is available in powder form upon request.

Shipping Information

ZEOCHEM Molecular Sieve Type 4A beads are shipped in non-returnable drums as follows:

55 gal. steel drum containers
— 300 lb. net
23 gal. fiber drum containers
— 120 lb. net

5 gal. pails
— 25 lb. net

The information contained herein is based upon our testing and experience and is believed to be accurate. Since operating conditions may vary and since we do not control such conditions, we must DISCLAIM ANY WARRANTY, EXPRESS OR IMPLIED, with regard to results to be obtained from the use of our products or with regard to application of Zeochem technology.

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ZEOCHEM

P.O. Box 35940 Louisville, Kentucky 40232 Telephone 502-634-8384 Telex 204190

**S-201 ALUMINA
PRODUCT DATA****PRINCIPAL USES**

As a sulfur conversion catalyst used in natural gas plants, refineries and smelters having Claus process plants and other sulfur recovery type plants.

GRADES

3 x 6 mesh

For special sizing contact nearest Kaiser Chemical Sales Office.

TYPICAL CHEMICAL ANALYSIS

(Percent on Dry Basis)

SiO ₂	0.02
Fe ₂ O ₃	0.02
Na ₂ O	0.35
Loss on ignition	6.0
Al ₂ O ₃	93.6

TYPICAL PHYSICAL PROPERTIES

Form	Balls
Surface Area	325 m ² /gm
Bulk Density, packed	44 lbs/ft ³
Abrasion Loss	1.5
Crushing Strength	30 lbs. force
Sizing	+ 3 mesh—3%, -6 mesh—3%

SHIPPING INFORMATION

Container:

Bagged shipments in multiwall, moisture-proof bags. Also available in fiber or steel drums and by bulk pneumatic trucks and bulk hopper

Weight: Bagged:

100 pounds net

Fiber or Steel Drums:

300 pounds net

Shipping Point:

Baton Rouge, Louisiana

The information contained in this data sheet, to the best of our knowledge is true and accurate. Any recommendations or suggestions are made without warranty or guarantee, since the conditions of use are beyond our control. Nothing contained herein shall be construed to imply the permission, inducement, or recommendation to practice any invention covered by any patent owned by Kaiser Aluminum and Chemical Corporation or by others, without authority from the owner of the patent.

⊕ Indicates change or addition from previous issue.

LOG

0'-1'	SOIL
1'-22'	CALICHE & SAND
22'-80'	SANDY CLAY
80'-94'	DRY SAND
94'-98'	SANDY CLAY
98'-106'	WATER SAND (PRODUCTION PIPE
106'-112'	SANDY CLAY
112'-126'	WATER SAND (PERFORATED
126'-130'	SANDY CLAY
130'-135'	RED BED

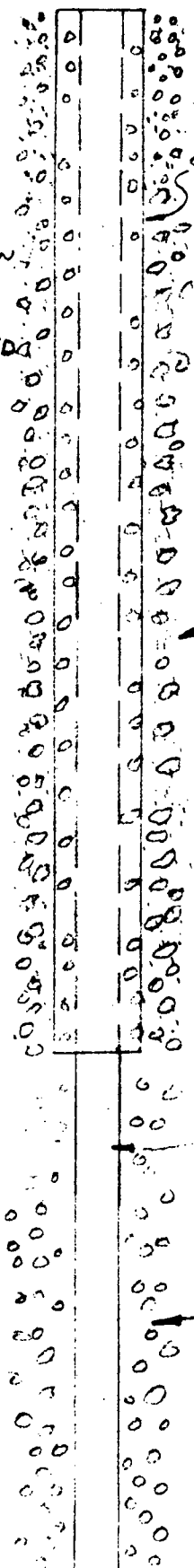
95'-12" SURFACE CASING

4 CU. YD. CONCRETE

MAX. TEST 30 GPM

5'135'-7" PRODUCTION PIPE

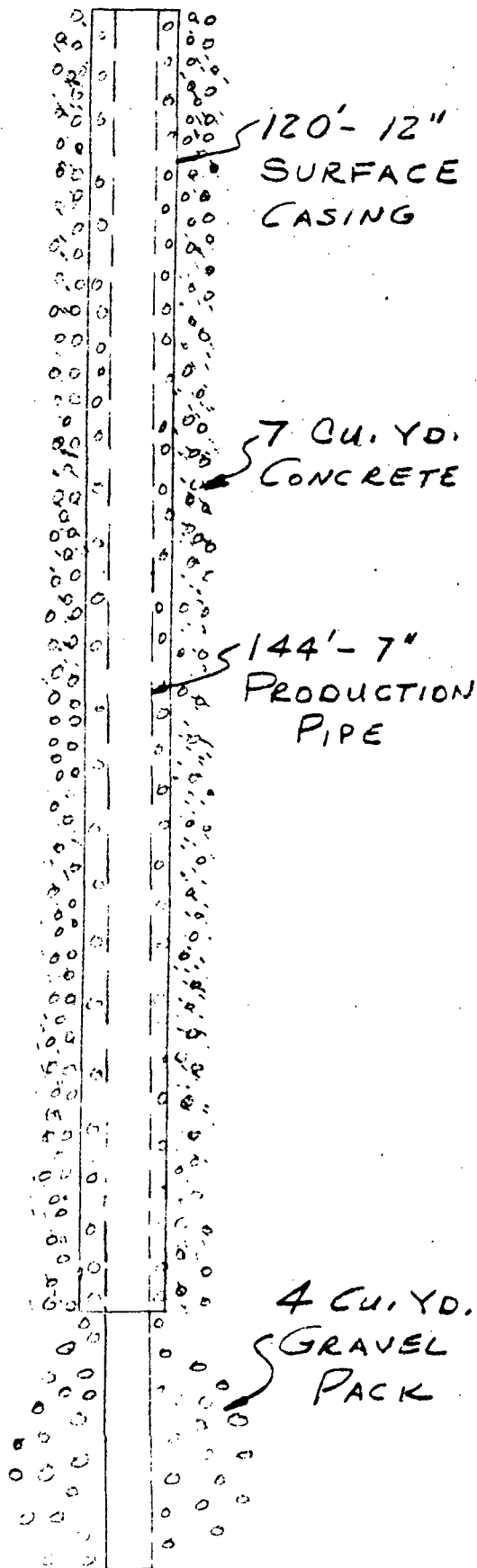
54 CU. YD. GRAVEL PACK



LOG

0'-2' SOIL
 2'-12' CALICHE
 12'-18' ROCK
 18'-28' CALICHE
 28'-60' SANDY CLAY
 60'-74' DRY SAND
 74'-96' SANDY CLAY
 96'-122' DRY SAND
 122'-126' SANDY CLAY
 126'-132' WATER SAND {PERFORATED
 132'-138' SANDY CLAY
 138'-144' RED BED

NO TEST



LOG OF TEST HOLE #3

0'-2'	SOIL
2'-12'	CALICHE
12'-23'	SAND ROCK
23'-40'	SANDY CLAY
40'-62'	SAND, GRAVEL, CLAY
62'-168'	SANDY CLAY
168'-172'	RED CLAY
172'-220'	RED CLAY
220'-234'	GYPSUM ROCK
234'-237'	SANDY CLAY
237'-254'	GYP ROCK
254'-274'	RED CLAY
274'-300'	GYP ROCK
No WATER	

LOG OF TEST HOLE #4

0'-1'	SOIL
1'-18'	CALICHE
18'-30'	SAND ROCK
30'-72'	CLAY
72'-134'	SANDY CLAY
134'-146'	DRY SAND
146'-165'	SANDY CLAY
165'-170'	RED BED

LOG OF TEST HOLE #5

0'-2'	SOIL
2'-14'	CALICHE
14'-22'	ROCK
22'-28'	SAND & CALICHE
28'-126'	SANDY CLAY
126'-135'	SAND & GRAVEL
135'-170'	SANDY CLAY
170'-174'	GYP SUM ROCK
174'-226'	SANDY CLAY
226'-254'	RED CLAY
254'-274'	SANDY CLAY
274'-278'	WATER SAND
278'-285'	SAND CLAY
285'-288'	SAND - WATER
288'-300'	RED BED
STATIC HEAD 270'	
5 GPM (ESTIMATED)	

NOTE: LOGS FOR TEST HOLES
No. 1, 2, & 6 WERE INCLUDED
IN REPORT #1

BY J.C.B.
CHKD. BY

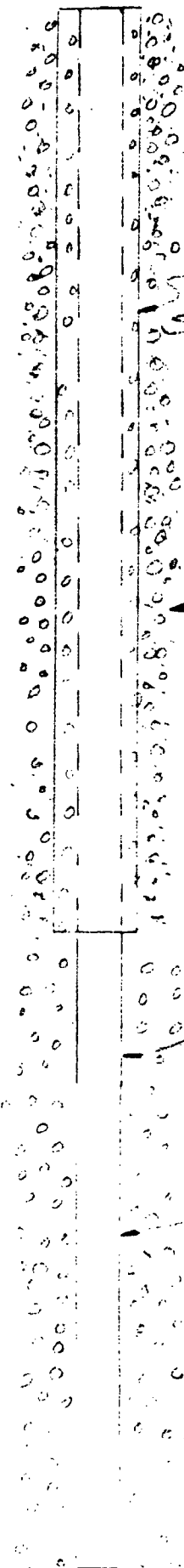
DATE 2/24/60
DATE

SUBJECT WATER WELL #6
EWSW SEC. 8 T-18-S-22-E
EDDY CO. NEW MEXICO
ARTESIA PLANT

Attachment 20 cont.
SHEET NO. OF
JOB NO.
AFE G-803

LOG

0'-1'	SOIL
1'-12'	CALICHE
12'-18'	ROCK
18'-30'	CALICHE
30'-60'	DRY SAND
60'-78'	SANDY CLAY
78'-96'	DRY SAND
96'-112'	WATER SAND { PERFORATED PRODUCTION PIPE
112'-132'	RED CLAY
132'-144'	ROCK
144'-150'	SAND
150'-151'	YELLOW CLAY
151'-156'	RED CLAY



90'-6"-16"
SURFACE CASING

4 CU. YD.
CONCRETE

156'-7"
PRODUCTION
PIPE

8 CU. YD.
GRAVEL PACK

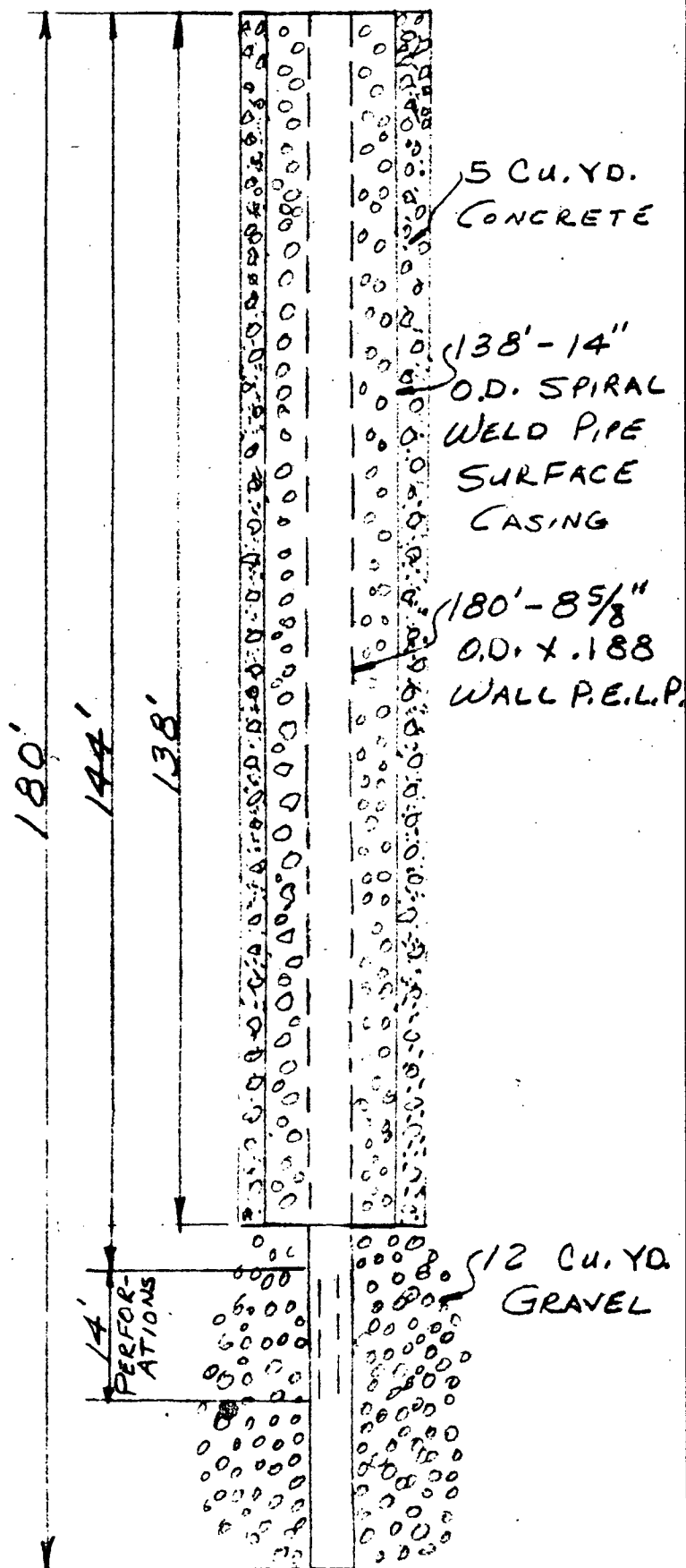
MAX. TEST 30 GPM

WATER WELL #7
ARTESIA PLANT
ARTESIA N. MEX.

LOG

0' - 1'	SOIL
1' - 4'	ROCK
4' - 16'	CALICHE
16' - 20'	BOULDER
20' - 40'	SANDY CLAY
40' - 70'	RED CLAY
70' - 90'	DRY SAND
90' - 144'	RED CLAY
144' - 158'	WATER SAND
158' - 174'	SAND, GRAVEL
174' - 178'	GYP ROCK
178' - 180'	RED BED

DRILLED 3-16-60
COMPLETED 5-3-60
J.C. BELLATTI



LOG OF TEST HOLE #8

0'-1' SOIL
 1'-4' ROCK
 4'-16' CALICHE
 16'-40' SANDY CLAY
 40'-70' RED CLAY
 70'-95' SAND (WATER)
 95'-140' RED CLAY
 140'-162' SANDY CLAY
 162'-167' RED BED

STATIC HEAD 70'

LOG OF TEST HOLE #9

0'-1' SOIL
 1'-6' ROCK
 6'-15' CALICHE
 15'-22' ROCK
 22'-39' SANDY CLAY
 39'-48' CEMENTED GRAVEL
 48'-75' RED CLAY
 75'-85' SANDY CLAY & GRAVEL (WATER)
 85'-98' RED CLAY
 98'-108' SANDY CLAY
 108'-134' RED CLAY
 134'-140' SANDY CLAY
 140'-155' SAND & GRAVEL (WATER)
 155'-162' SANDY CLAY
 162'-167' GYPSUM & GRAVEL
 167'-178' SANDY CLAY
 178'-183' GYPSUM ROCK
 183'-188' RED BED

STATIC HEAD 58'

(13) LOG OF TEST HOLE #10

0'-2'	SOIL
2'-10'	ROCK
10'-18'	SANDSTONE
18'-24'	SAND
24'-44'	SANDSTONE
44'-93'	SAND
93'-98'	SAND & GRAVEL
98'-120'	SAND, CLAY, & GRAVEL
120'-164'	SANDY CLAY
164'-166'	WATER SAND
166'-208'	SANDY CLAY
208'-220'	LIME ROCK
220'-271'	SANDY CLAY
271'-285'	COURSE SAND & GRAVEL
285'-290'	RED BED

LOG OF TEST HOLE #11

0'-3'	SOIL
3'-14'	CALICHE
14'-34'	SAND
34'-55'	SANDSTONE
55'-85'	SANDY CLAY
85'-87'	LIGHT CLAY
87'-118'	SANDY CLAY
118'-175'	SAND, CLAY, GRAVEL
175'-180'	SAND & GRAVEL
180'-186'	LIMESTONE
186'-190'	BLUE CLAY
190'-248'	SANDY CLAY
248'-260'	GRAVEL
260'-273'	SANDY CLAY
273'-287'	GYP SUM & GRAVEL
287'-292'	RED BED

LOG OF TEST HOLE #12

0'-3'	SOIL
3'-15'	CALICHE
15'-30'	SAND
30'-144'	SANDY CLAY
144'-162'	RED CLAY
162'-221'	SANDY CLAY
221'-224'	YELLOW CLAY
224'-238'	LIMESTONE
238'-243'	RED BED.

SMALL WATER SAND AT 175'

STATIC HEAD 173'

BAILED DRY IN 25 MINUTES

LOG OF TEST HOLE #14

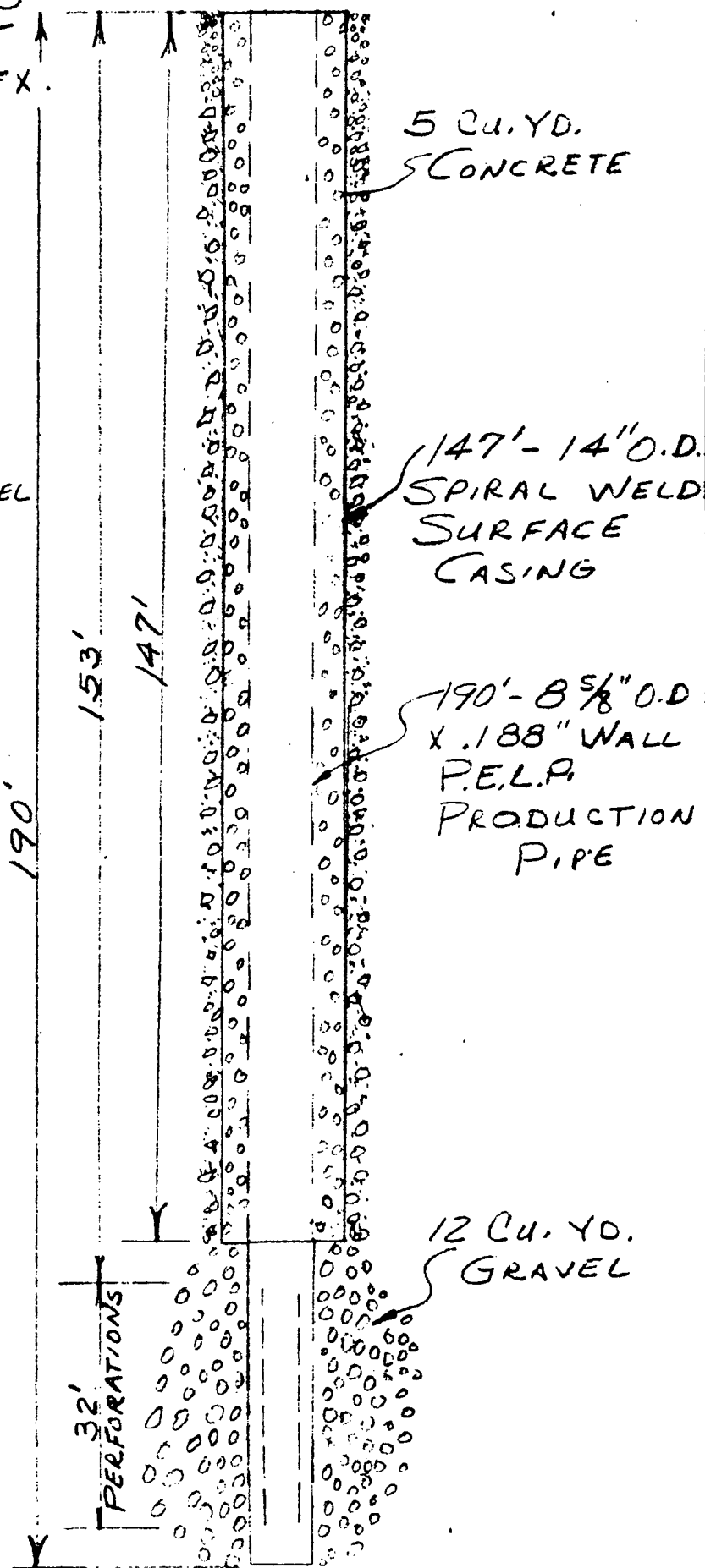
0'-1'	SOIL
1'-5'	ROCK
5'-20'	CALICHE
20'-30'	SAND
30'-40'	SAND & GRAVEL
40'-61'	SANDY CLAY
61'-65'	DRY SAND
65'-76'	SANDY CLAY
76'-98'	RED CLAY
98'-153'	SANDY CLAY
153'-160'	DRY SAND & GRAVEL
160'-171'	YELLOW CLAY
171'-180'	HARD LIMESTONE
180'-185'	RED BED.

WATER WELL #13
ARTESIA PLANT
ARTESIA NEW MEX.

LOG

0-1	SOIL
1-6	ROCK
6-30	SAND
30-40	SAND & GRAVEL
40-130	SANDY CLAY
130-134	DRY SAND
134-154	SANDY CLAY
154-160	WATER SAND & GRAVEL
160-178	GYP ROCK
178-180	WATER SAND
180-185	LIME ROCK (SOFT)
185-190	RED BED

DRILLED 4-21-60
COMPLETED 4-29-60
J.C. BELLATTI

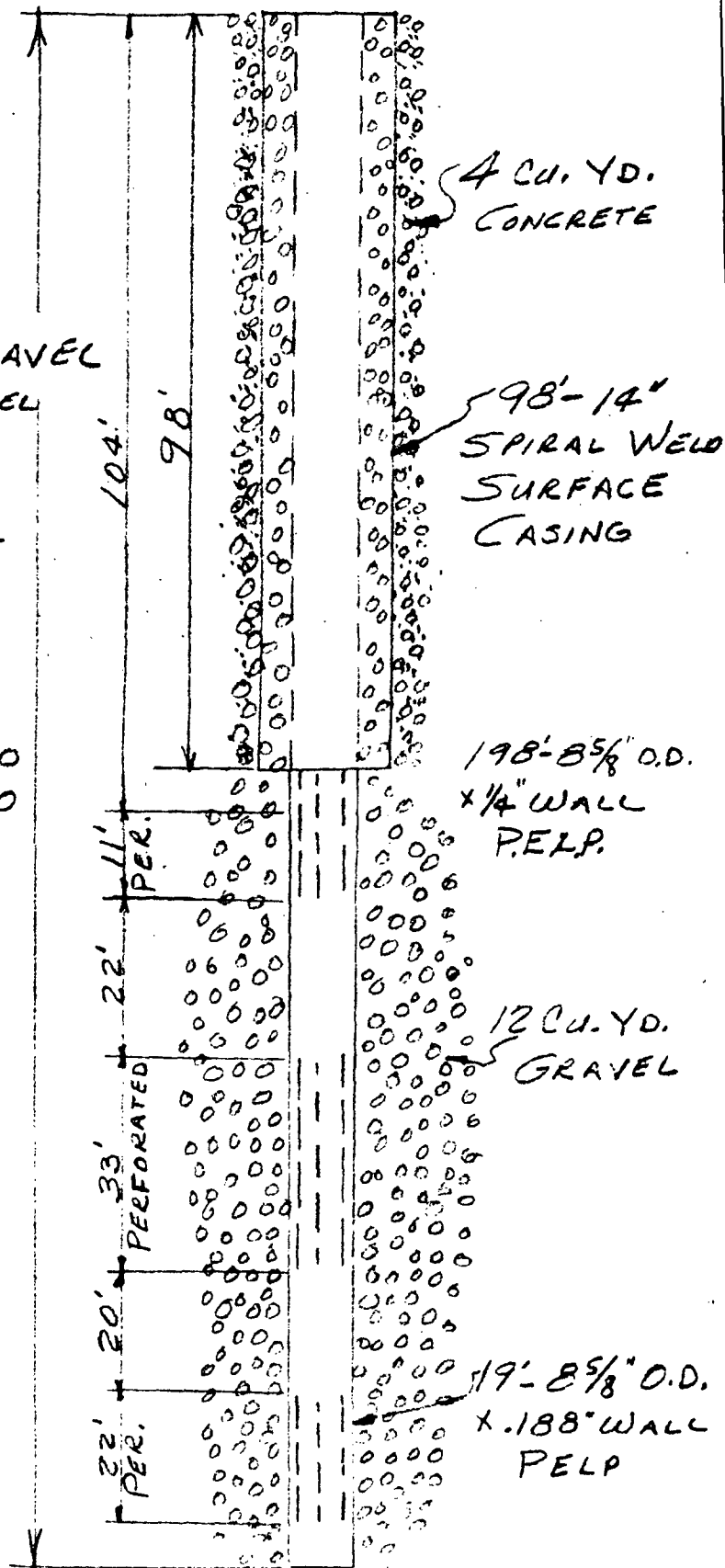


WATER WELL #15
ARTESIA PLANT
ARTESIA N. MEX.

LOG

0 - 2	SOIL
2 - 15	CALICHE
15 - 20	DRY SAND
20 - 34	SANDSTONE
34 - 58	SANDY CLAY
58 - 62	DRY SAND
62 - 104	SANDY CLAY & GRAVEL
104 - 115	CEMENTED GRAVEL
115 - 137	SANDY CLAY
137 - 142	CEMENTED GRAVEL
142 - 170	LIME ROCK & GRAVEL
170 - 190	RED CLAY
190 - 212	LIMESTONE
212 - 217	RED CLAY

DRILLED - MAY 6, 1960
COMPLETED - MAY 13, 1960
J. C. BELLATTI



TEST HOLE #16

0' - 1' SOIL
1' - 18' CALICHE
18' - 42' SANDY CLAY
42' - 65' SANDY CLAY & GRAVEL
65' - 78' RED CLAY
78' - 122' SAND CLAY
122' - 125' SAND (SMALL AMT. OF WATER)
125' - 135' SANDY CLAY
135' - 145' RED CLAY
145' - 165' SANDY CLAY
165' - 180' RED CLAY
180' - 186' SANDY CLAY
186' - 191' RED BED

TEST HOLE #17

0' - 1' SOIL
1' - 18' CALICHE
18' - 25' SAND
25' - 35' SANDY CLAY
35' - 45' CEMENTED GRAVEL
45' - 70' RED CLAY
70' - 83' SANDY CLAY
83' - 125' RED CLAY
125' - 178' SANDY CLAY
178' - 183' RED BED.

TEST HOLE #18

0' - 1' SOIL
1' - 15' CALICHE
15' - 37' SAND
37' - 40' SANDY CLAY
40' - 107' RED CLAY
107' - 120' SANDY CLAY
120' - 125' WATER SAND (APPROX. 10 GPM.)
125' - 150' SANDY CLAY
150' - 165' RED CLAY
165' - 170' RED BED

(16)

BY JCB. DATE 8/30/71 SUBJECT WATER WELL #19 Attachment 20 cont.
SHEET NO. OF
CHKD BY DATE JOB NO.

ARTESIA PLANT

LOG

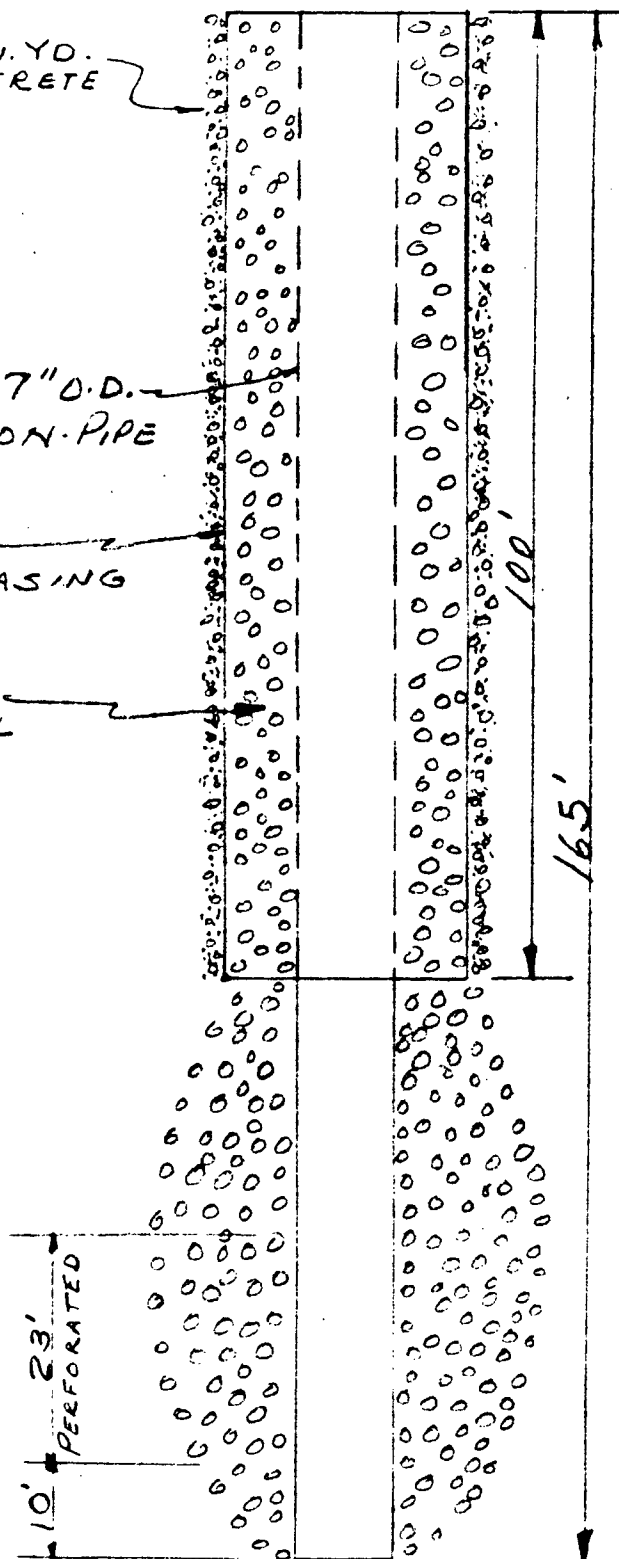
0'-2' SOIL
2'-20' CALICHE
20'-84' SANDY CLAY
84'-87' DRY SAND
87'-138' SANDY CLAY
138'-140' WATER SAND & GRAVEL
140'-185' SANDY CLAY
185'-190' RED BED

5 CU. YD.
CONCRETE

165' - 7" O.D.
PRODUCTION PIPE

100' - 16"
SURFACE CASING

12 CU. YD.
PEA GRAVEL

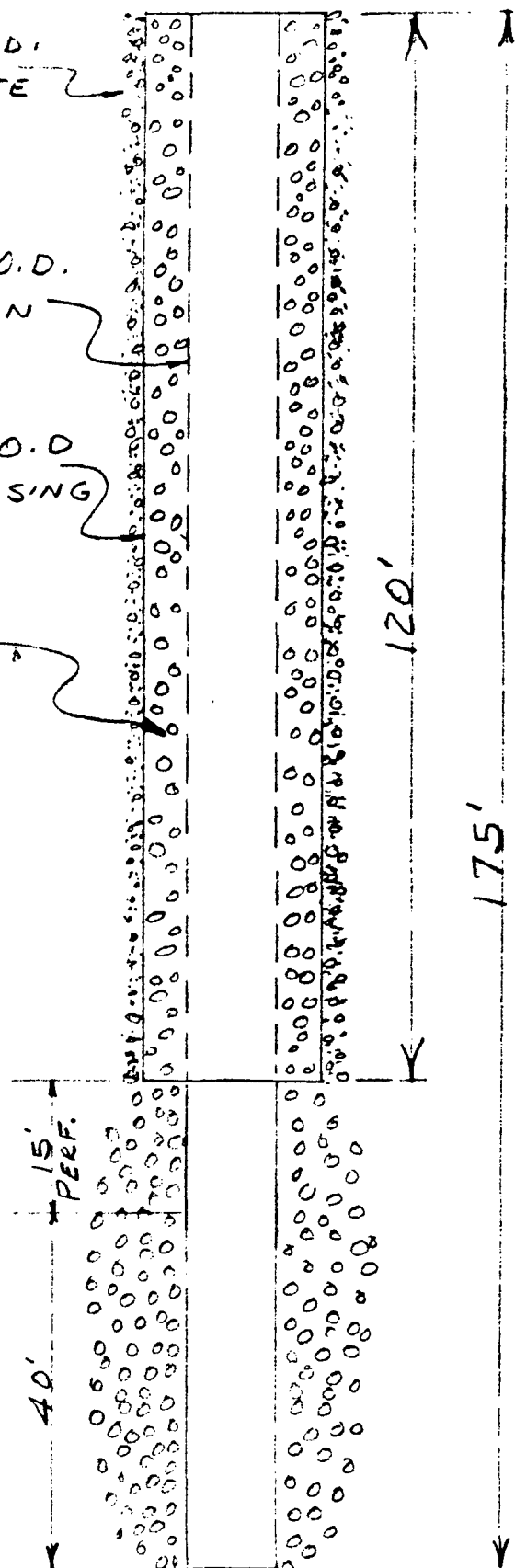


16

LOG

0 - 1' SOIL
1' - 18' CALICHE
18' - 92' SANDY CLAY
92' - 100' DRY SAND
100' - 126' SANDY CLAY 175' - 7" O.D.
126' - 130' WATER SAND PRODUCTION PIPE
130' - 156' RED CLAY
156' - 163' BLUE CLAY
163' - 180' RED CLAY 120' - 16" O.D.
180' - 191' SURFACE CASING
191' - 196'

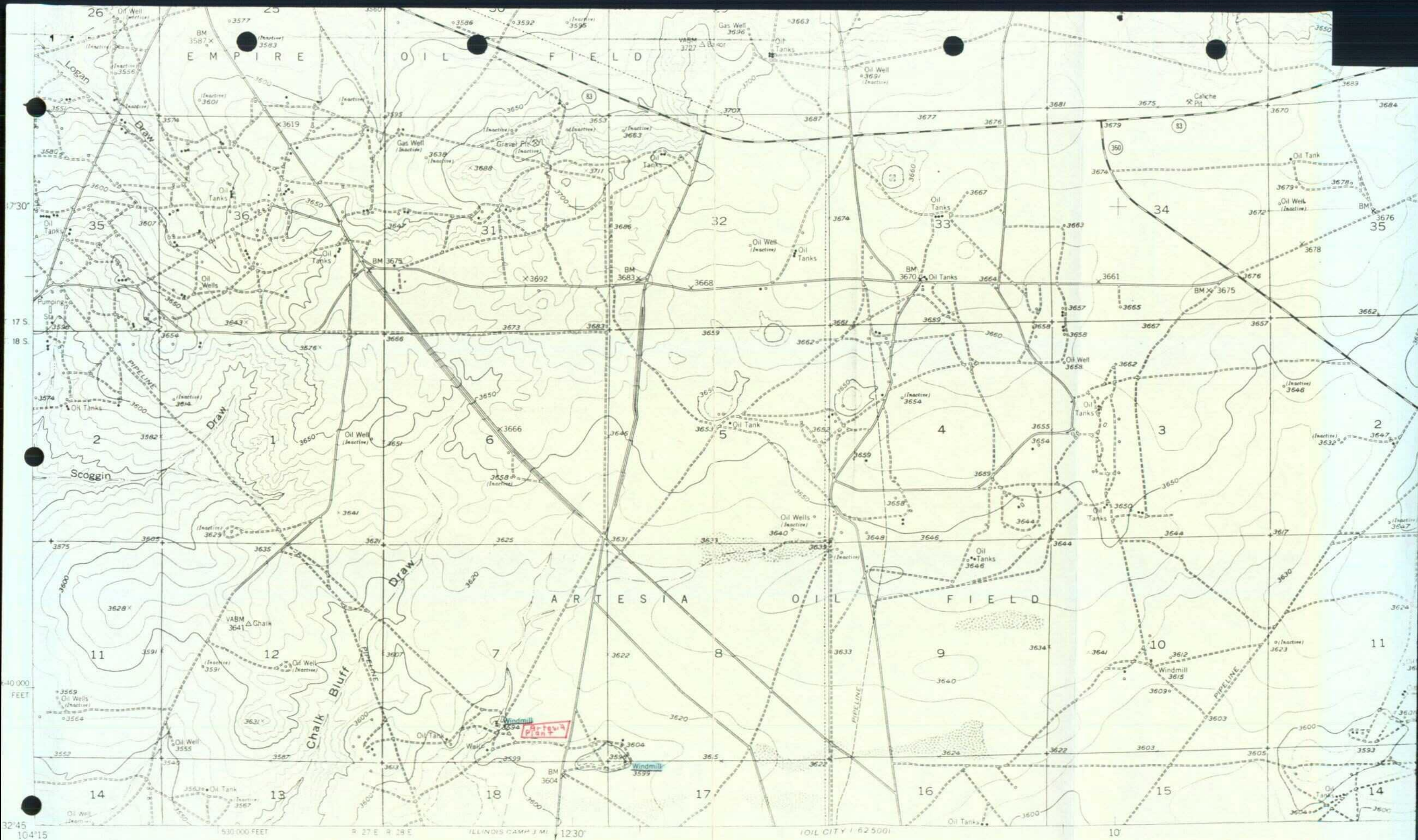
5 CU. YD.
CONCRETE
12 CU. YD.
PEA GRAVEL



ARTESIA AREA WATER WELL ANALYSES (PPM)

Attachment 21

	Well #1	Well #2	Well #5	Well #7	Well #13	Well #15	Well #19	Well #20
Chloride (NaCl)	31	29	1053	29	44	27	23	22
Alkalinity (CaCO ₃)	181	198	109	159	144	121	149	152
Hardness (CaCO ₃)	154	215	1081	277	475	800	375	382
Calcium (Ca)	38	48	195	70	68	187	91	90
Magnesium (Mg)	14	14	145	26	73	81	36	38
Dissolved Solids	274	297	2274	325	496	804	393	393
Sulfates (SO ₄)	75	55	650	109	309	636	183	224
Silica (SiO ₂)	342	342	256	513	427	513	598	598
Bicarbonates (HCO ₃)	221	238	128	193	176	148	181	186
pH	7.8	7.6	7.1	7.9	7.5	7.3	7.7	7.4



Mapped, edited, and published by the Geological Survey
Control by USGS and USC&GS

Attachment 22

SCALE 1:24000

1 MILE

Attachment 23
LABORATORY ANALYSIS RESULTS SUMMARYSample of WaterSecured from Artesia PlantSecured by Operator 10-14-92Date 10-14-92Analysis No. L-109Artesia
WEST Windmill Water

Chlorides, ppm, NaCl

274

Chlorides, ppm, Cl

167

Alkalinity, ppm, CaCO₃

352

Hardness, ppm, CaCO₃

515

Calcium, ppm, Ca

127

Magnesium, ppm, Mg

48

Dissolved Solids, ppm

540

Sulfates, ppm, Na₂SO₄

32

Sulfates, ppm, SO₄

22

Silica, ppm, SiO₂

368

Bicarbonates, ppm, HCO₃

430

Total Iron, ppm, Fe

0

pH

7.2

Salometer Reading

—

% Salt

—

lbs. Salt

—

Remarks

Copies to:

R.E. Townsend

R.G. Stubbs

J.O. Woodson

Don Laird

Central File

LAB File

Analyzed by

Rick Garrett

Checked by

**SOUTHWESTERN LABORATORIES***Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services*

1703 W. Industrial Avenue [915 - 683-3348] • P.O. Box 2150 • Midland, Texas 79701

File No. C-1950-W
Customer No. 3355796
Report No. 35197
Report Date 3-22-84
Date Received 2-29-84

Report of tests on: **Water**Client: **Phillips Petroleum**Identification: **Artesia Upgrad. Windmill, East Windmill**

	mg/L
Aluminum-----Less Than	2
Arsenic-----Less Than	0.05
Barium-----Less Than	1
Boron-----	0.1
Cadmium-----Less Than	0.01
Chromium-----Less Than	0.05
Cobalt-----Less Than	0.1
Copper-----Less Than	0.1
Iron-----Less Than	0.2
Lead-----Less Than	0.05
Manganese-----Less Than	0.05
Mercury-----Less Than	0.002
Molybdenum-----Less Than	1
Nickel-----Less Than	0.5
Selenium-----Less Than	0.01
Silver-----Less Than	0.05
Zinc-----	0.13
Sulfate-----	17
Chloride-----	7
Fluoride-----	0.5
Nitrate-----	6.6
Cyanide-----	0.002
Phenols-----Less Than	0.001
Total Dissolved Solids @ 180° C-----	178

Technician: **KLH, GMB, JHB, RY**

Copies 3 cc: **Phillips Petroleum Co.**
Attn: Mike Ford

SOUTHWESTERN LABORATORIES

Attachment 24
LABORATORY ANALYSIS RESULTS SUMMARY

Sample of WATER
Secured from PECOS RIVER (NEAR ARTESIA N.M.)
Secured by M. FORD Date 2-29-84
Analysis No. L-250

Chlorides, ppm, NaCl

4,984

Chlorides, ppm, Cl

3,045

Alkalinity, ppm, CaCO₃

157

Hardness, ppm, CaCO₃

1,717

Calcium, ppm, Ca

424

Magnesium, ppm, Mg

159

Dissolved Solids, ppm

5,175

Sulfates, ppm, Na₂SO₄

3,840

Sulfates, ppm, SO₄

2,611

Silica, ppm, SiO₂

27

Bicarbonates, ppm, HCO₃

192

Total Iron, ppm, Fe

6

pH

8.3

Salometer Reading

4

% Salt

1.060

lbs. Salt

0.088

Remarks

Copies to:

W. R. LOW

R. G. STUBBS

M. D. FORD

CENTRAL FILES

LAB FILES

Analysis by

PATRICK LEYVA

Checked by

Approved by



MATERIAL SAFETY DATA SHEET

("ESSENTIALLY SIMILAR" TO FORM OSHA-20)

WHERE APPLICABLE, THIS PRODUCT HAS BEEN REPORTED FOR THE EPA'S CHEMICAL SUBSTANCE INVENTORY.

SECTION I - IDENTIFICATION OF PRODUCT

MANUFACTURERS NAME <u>PHILLIPS PETROLEUM COMPANY</u>		EMERGENCY TELEPHONE NUMBER	DURING BUSINESS HOURS (918) 661-3865
ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE) BARTLESVILLE, OK 74004		OUTSIDE BUSINESS HOURS (918) 661-8118	
TRADE NAME <u>Antifreeze</u>		CAS NUMBER N.A.	
CHEMICAL FAMILY Glycols		CHEMICAL NAME Ethylene glycol + other glycols	
DOT CLASSIFICATION None		CHEMICAL FORMULA Mixture	

SECTION II - HAZARDOUS COMPONENTS OF MIXTURES

INGREDIENTS	% BY WT.	THRESHOLD LIMIT VALUE (UNITS)
Ethylene Glycol	90	(approx.)
other glycols	10	(approx.)
Inhibitors and dye	2	(approx.)

SECTION III - TYPICAL PHYSICAL DATA

APPEARANCE AND ODOR Colored liquid.	SPECIFIC GRAVITY 60°F/60°F 1.11-1.14
BOILING POINT (°F) 330	PERCENT VOLATILE (BY VOLUME) Nil
VAPOR PRESSURE Very Low	EVAPORATION RATE (<u>butyl acetate</u> = 1) < 1
VAPOR DENSITY (AIR) > 1.0	SOLUBILITY IN WATER Complete

SECTION IV - FIRE AND EXPLOSION - HAZARD DATA

FLASH POINT (METHOD) 250°F (Cleveland Open Cup)	FLAMMABLE LIMITS (% BY VOLUME) (For Ethylene Glycol)	Lel 3.2	Uel
FIRE EXTINGUISHING MEDIA Water fog, CO ₂ dry chemical, foam.			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

NO GUARANTY IS MADE AS TO THE ACCURACY OF ANY DATA OR STATEMENT CONTAINED HEREIN. WHILE THIS MATERIAL IS FURNISHED IN GOOD FAITH, NO WARRANTY EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE IS MADE. THIS MATERIAL IS OFFERED ONLY FOR YOUR CONSIDERATION, INVESTIGATION AND VERIFICATION AND PHILLIPS, INCLUDING ITS DIVISIONS, AFFILIATES AND SUBSIDIARIES, SHALL NOT IN ANY EVENT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH ITS PUBLICATION. LIKEWISE, NO STATEMENT MADE HEREIN SHALL BE CONSTRUED AS A PERMISSION OR RECOMMENDATION FOR THE USE OF ANY PRODUCT IN A MANNER THAT MIGHT INFRINGE EXISTING PATENTS.

N.A. - Not Applicable

(SEE REVERSE SIDE)

FORM 10912-N 1-79

Page 350

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE:

1977 ACGIH TLV is 100 ppm. For mists, 10mg/m³ for ethylene glycol.

EFFECTS OF OVEREXPOSURE:

EMERGENCY AND FIRST AID PROCEDURES:

If contact with eye, irrigate with water. If swallowed induce vomiting and see a physician. If contact with skin, wash with soap and water. If inhaled to the point that ill effects occur, remove to fresh air and see a physician.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE	STABLE	CONDITIONS TO AVOID:
		X	
INCOMPATIBILITY MATERIALS TO AVOID FOR PURPOSES OF TRANSPORT, HANDLING AND STORAGE ONLY: Oxidizing materials.			
HAZARDOUS DECOMPOSITION PRODUCTS:			
HAZARDOUS POLYMERIZATION	MAY OCCUR	WILL NOT OCCUR	CONDITIONS TO AVOID:
		X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Use proper protective equipment. Salvage if possible. Protect from ignition. Otherwise flush with water or soak up in absorbent. Add absorbent and shovel into drums. Large amounts may be pumped into containers. Keep out of water sources and sewers.

WASTE DISPOSAL (INSURE CONFORMITY WITH LOCAL DISPOSAL REGULATIONS):

Burn according to local, state and federal regulations or salvage.

SECTION VIII - PERSONAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: None normally needed. For levels up to 1% in air for 1/2 hour or less a full face mask, plus an organic vapor canister.			
VENTILATION	LOCAL EXHAUST	MECHANICAL (GENERAL)	OTHER
PROTECTIVE GLOVES:		EYE PROTECTION: Goggles if splashes could occur.	
OTHER PROTECTIVE EQUIPMENT:			

SECTION IX - HANDLING AND STORAGE PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:

Provide means of controlling leaks and spills. Protect from ignition.

OTHER PRECAUTIONS:



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONY ANAYA
GOVERNOR

February 20, 1984

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

Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

Attention: E. E. Clark

Gentlemen:

Please update any progress made in disposing of waste waters from your Artesia Gasoline Plant.

Before the discharge plan can be approved it will be necessary for you to furnish this office with the following additional information:

1. A description of the ground water in the area plus complete samples from nearby water wells.
2. Source of the water for your plant operations and analysis if different source than above.
3. Description of your treating process.
4. Description and drawing of your drain system.
5. Plat showing location of existing pits, plan for closure and description of how run-off from heavy rains will be diverted from the pit area.
6. Discussion of holding tanks, ie., are they above ground, volume, are lines in and out of tanks above ground.
7. Manufacturers sheet for all chemicals used in your treating process.

Page 2
Letter to Phillips Petroleum Company
February 20, 1984

8. What solid wastes are generated and how disposed.
9. What is used in engine cooling jackets and how disposed.

When this information is submitted, I should be in a position to approve your discharge plan.

Yours very truly,

JOE D. RAMEY
Director

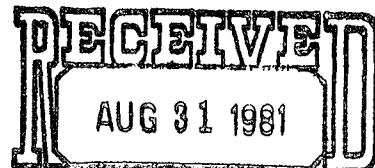
JDR/fd



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

EXPLORATION AND PRODUCTION GROUP



OIL CONSERVATION DIVISION
SANTA FE

August 26, 1981

Artesia Gasoline Plant
Waste Water Discharge Plan

Mr. Joe D. Ramey, Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

As required by Part 3-106-C of the Water Quality Control Commission Regulations and your letter of June 9, 1981, Phillips Petroleum Company submits the following proposed discharge plan for Artesia Gasoline Plant, Eddy County, New Mexico.

- 3-106-C-1. Quantity, quality and flow characteristics of the discharge;

An estimated 750 BPD of wastewater will be discharged. The water is composed of cooling tower blowdown, boiler blowdown, and produced water scrubbed from the inlet feed gas. An analysis of the existing surface discharge water is included as Attachment No. 1.

2. Location of the discharge and of any bodies of water, watercourses and ground water discharge sites within one mile of the outside perimeter of the discharge site, and existing or proposed wells to be used for monitoring;

Artesia Plant is located in Section 7, T-18-S, R-28-E, Eddy County, New Mexico. There are no known natural bodies of water within one mile of the plant. An above ground steel stock tank is located one quarter mile west of the plant, and a dry lake bed is located approximately one mile southwest of the plant. Since the normal discharge will not be in contact with the surface, well monitoring should not be required.

3. Depth to and TDS Concentration of the ground water most likely to be affected by the discharge;

The approximate ground water depth is 151 feet. TDS Concentration is approximately 400 ppm.

Date: 8-26-81
Page: 2

4. Flooding potential of the site;

None

5. Location and design of site(s) and method(s) to be available for sampling, and for measurement or calculation of flow;

The discharge water will be collected in holding tanks at Artesia Plant and then delivered by pipeline to an injection well. We propose to obtain from ARCO a suitable shut down well near our plant and recompleat the well for injection. A copy of our latest correspondence with ARCO is included as Attachment No. 2. We will install a flow meter on the injection line and samples can be obtained from the holding tanks.

6. Depth to and lithological description of the rock at base of alluvium below discharge site if such information is available;

Not applicable for this discharge method.

7. Any additional information;

This is a proposed plan. Construction will begin as soon as a well is selected and it is approved for disposal through the normal Oil Conservation Commission process.


Additional information is contained in Attachments 3 through 12. Included are a schematic diagram of the proposed flow, a descriptive text, a contingency plan, four (4) drawings which constitute a plot plan of the plant, a description of the present disposal system, a procedure for eliminating existing evaporation ponds, an area map showing the plant location, a property limits sketch, and a topographic map of the plant area.

If you have any questions regarding this matter, please contact Mr. A. B. Glasgow of this office (915) 367-1439.



E. E. Clark
Regional Manager

ABG/js
Attachments



ATTACHMENT NO. 1

Martin Water Laboratories, Inc.

P. O. BOX 1468
MONAHANS, TEXAS 79756
PH. 943-3234 OR 563-1040

WATER CONSULTANTS SINCE 1953
BACTERIAL AND CHEMICAL ANALYSES

709 W. INDIANA
MIDLAND, TEXAS 79701
PHONE 683-4521

To: Mr. A. B. Glasgow
4001 Pembrock
Odessa, Texas

Laboratory No. 881224
Sample received 8-17-81
Results reported 8-24-81

Company: Phillips Petroleum Company

Project: Artesia Plant in Eddy County, New Mexico

Subject: To make determinations listed on waste water from third pit (sample taken 1' below surface). Sampled by Erby L. Glary, Martin Water Labs., Inc. on 8-17-81.

DETERMINATION

MG/L

A. Human Health Standards

Arsenic, as As	0.009	0.1-0.5
Barium, as Ba	0.0	
Cadmium, as Cd	0.00	
Chromium, as Cr	0.12	0.05-0.1
Cyanide, as CN	0.0	
Fluoride, as F	2.2	1.5-2.0
Lead, as Pb	0.0	
Total Mercury, as Hg	0.00	
Nitrate, as N	0.0	
Selenium, as Se	0.00	
Silver, as Ag	0.00	

B. Other Standards for Domestic Water Supply

Chloride, as Cl	133	2-50
Copper, as Cu	0.00	
Iron, as Fe	0.04	
Manganese, as Mn	0.00	
Phenols	0.0	
Sulfate, as SO ₄	669	500-2000

DETERMINATION

Total Dissolved Solids

MG/L

1,638

Zinc, as Zn

0.15

pH

7.1

C. Standards for Irrigation Use

Aluminum, as Al

0.03

Boron, as B

0.0

Cobalt, as Co

0.00

Molybdenum, as Mo

0

Nickel, as Ni

0.0

Remarks: The undersigned certifies the above to be true and correct to the best of his knowledge and belief.

Waylan C. Martin, M.A.

ATTACHMENT NO. 2

August 20, 1981

Waste Water Disposal -
Artesia Plant

T. J. Spalding
ARCO Oil & Gas
Box 1610
Midland, Texas 79702

Dear Mr. Spalding:

As per your telephone conversations with A. B. Glasgow, we would like to formally request your Company's assistance in providing a suitable disposal well for Artesia Plant waste water.

It is to the mutual benefit of our companies that a solution be found since the curtailment of Artesia Plant's operations by the New Mexico Oil Conservation Commission would directly affect the Empire Abo Unit gas processed by the Plant.

If ARCO can provide a suitable shut down well, Phillips is prepared to ask for NMOCC permission to dispose, recomplate the well as required, install the injection pump and facilities, and operate the system.

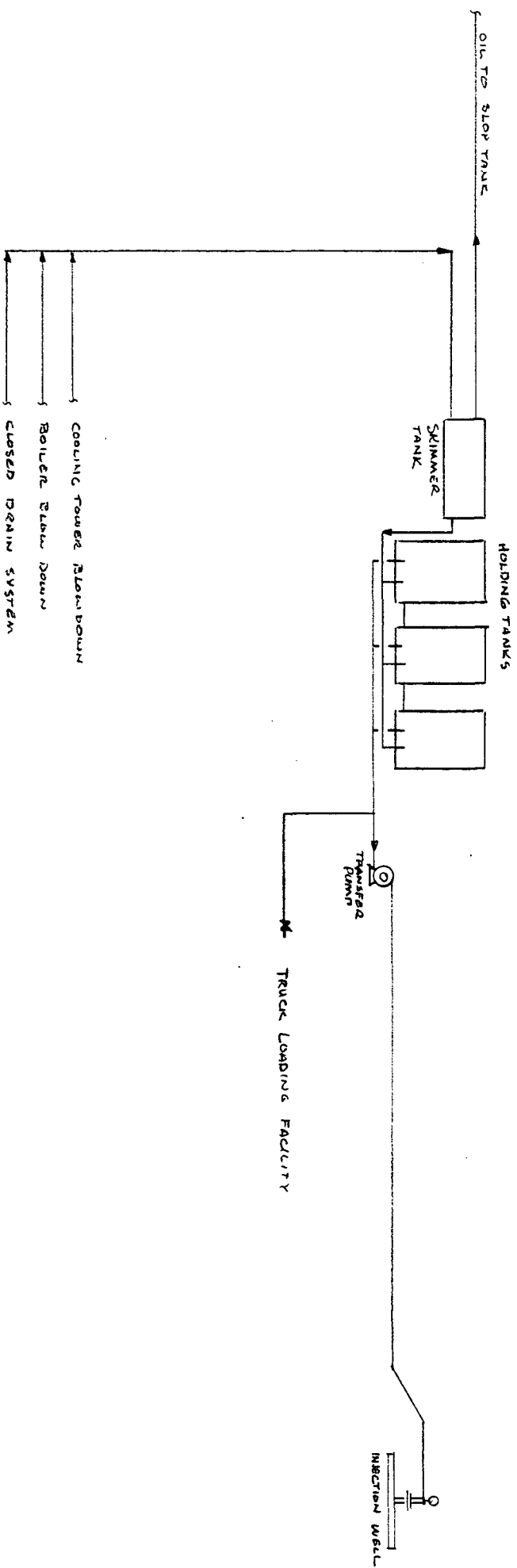
Please contact A. B. Glasgow at 367-1439 for any specifics you require concerning Artesia Plant waste water.

Yours very truly,



E. E. Clark
Regional Manager

ABG:js

[illegible]

ATTACHMENT NO. 4

PROPOSED WASTE WATER SYSTEM

The cooling tower blowdown will be taken from the circulation pump discharge and pressured to an elevated skimmer tank where any hydrocarbons will be skimmed off and diverted to a slop oil storage tank. The water will flow into one or more holding tanks and then transferred to an injection well.

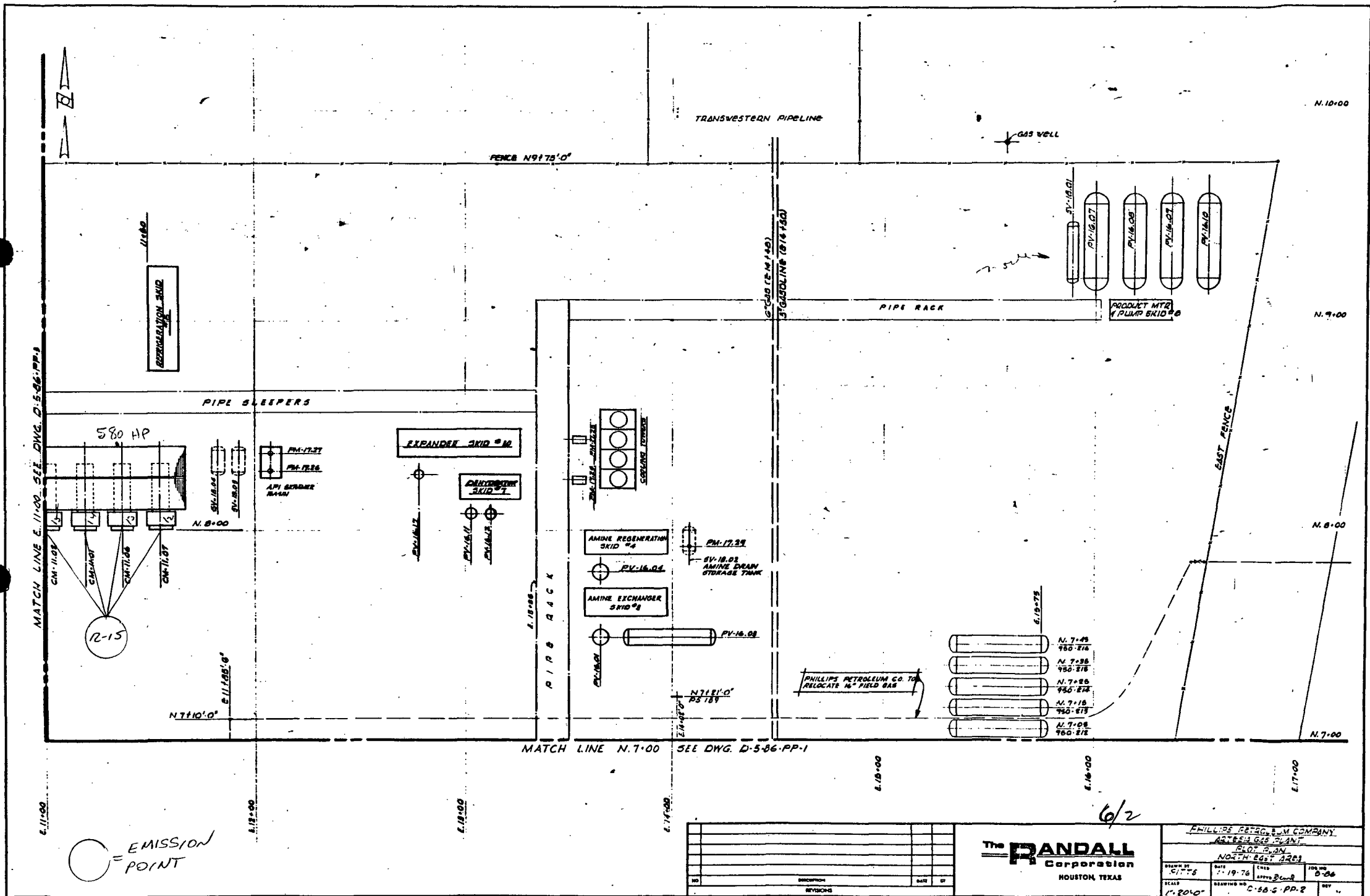
The boiler blowdown will be pressured from the boiler drum to the elevated skimmer tank along with the cooling tower blowdown.

The closed drain system consists of water pressured out of process vessels to the elevated skimmer tank along with the boiler and cooling tower blowdown.

ATTACHMENT NO. 5

CONTINGENCY PLAN

{ In the event that we are not able to get into the injection well, we will have approximately three days capacity in the holding tanks normally used. For emergency situations we will haul the water to an approved injection well in the Artesia or Loco Hills Area until we can get our system operational.



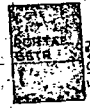
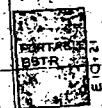
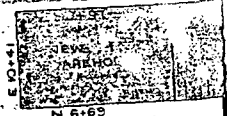
MATCH LINE N 7.00 SEE DWG. D-5-86-PP-3

N 60' 0"

N 6' 00"

N 7' 00' 00"

E 7' 00' 0"



APPROVED FOR CONSTRUCTION

NOTE: SHADED EQUIPMENT DENOTES EXISTING

REVISED PRINT DESTROY ALL PREVIOUS ISSUES

6/4

NO.	REVISIONS	DATE
1	GENERAL REVISION ADDED EXISTING EQUIPMENT	5/1/78
2	11' 00' R.L. FOR " "	5/1/78

The RANDALL Corporation
HOUSTON, TEXAS

PHILLIPS PETROLEUM COMPANY
ARTESIA GAS FIELD
PLOT PLAN
SOUTH-WEST AREA

DRAWN BY: REB DATE: 1-19-78 CHECKED BY: JCB
SCALE: 1" = 75'-0" DRAWING NO: D-5-86-PP-4

ATTACHMENT NO. 7

EXISTING DISPOSAL SYSTEM

The present disposal system consists of three evaporation and seepage ponds. The first pond 100' X 50' serves as a skimmer to hold any hydrocarbons and the water flows into a second pond 108' X 50' and on to the final pond 240' X 80' where the water either evaporates or seeps into the ground. All blow-down lines flow into an open drain system that gravity flows into the ponds.

ATTACHMENT NO. 8

ELIMINATION OF EVAPORATION PONDS

After the installation of holding tanks and completion of the injection well, all three of the existing ponds will be dewatered. Each pit will then be backfilled and leveled.

ATTACHMENT NO. 9

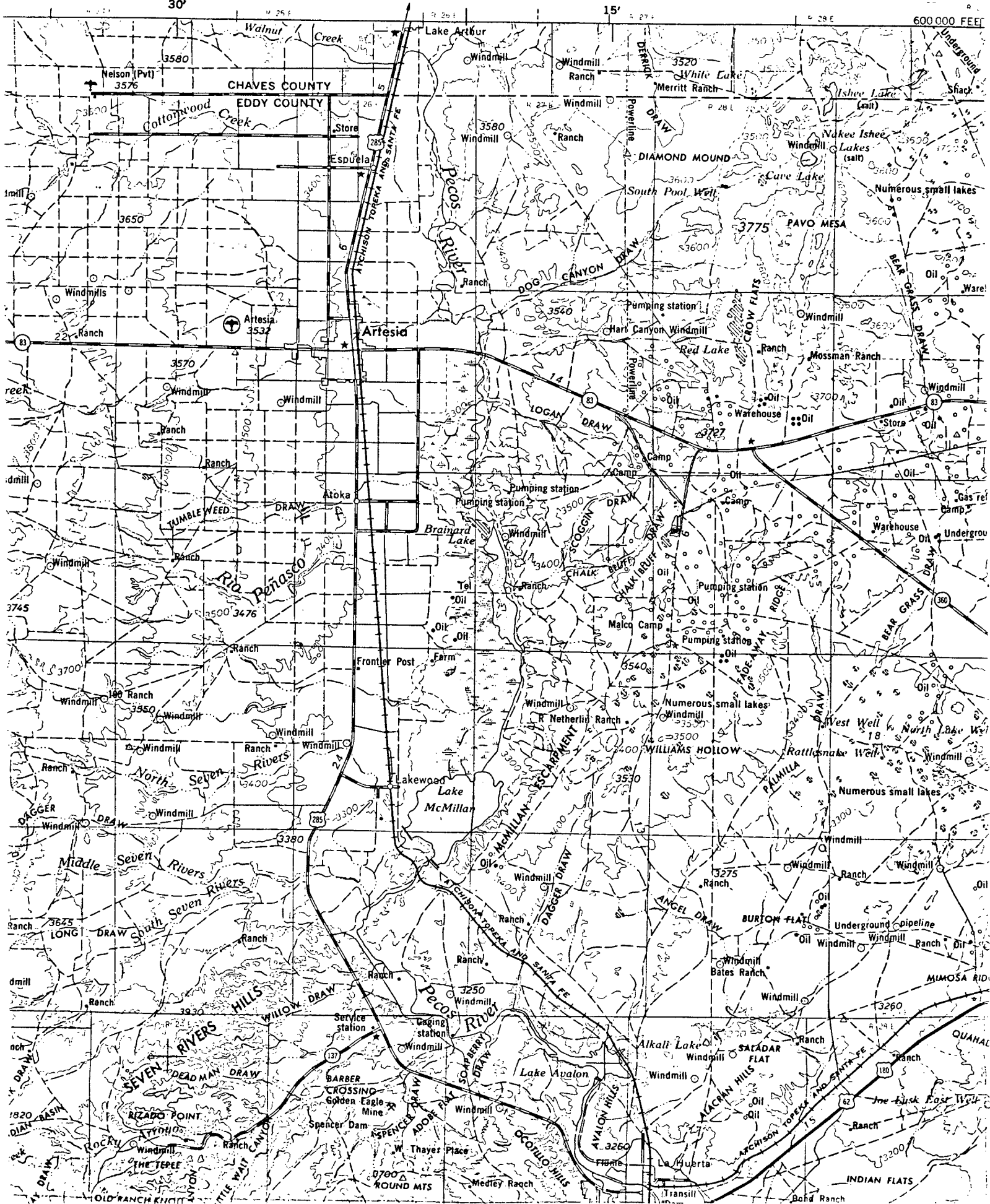
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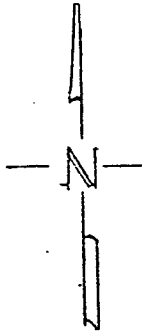
ROSWELL 33 MI.

30'

15'

600,000 FEET





SE/4, SECTION 7

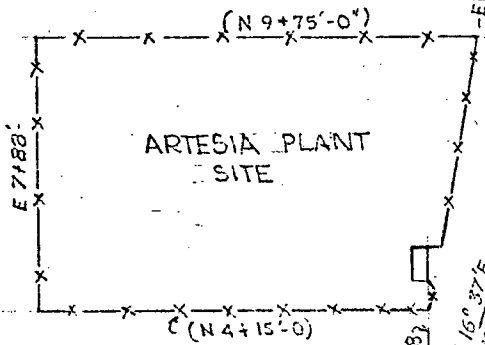
N 89° 46' W 2560'

S 1/2 OF SE/4 SEC 7 = 76.39 AC
CAMP TRACT. = 2.02

74.37

(S 0° 03')

1310'



(N 0° 50' E)

1300'

----- PROPERTY LINE

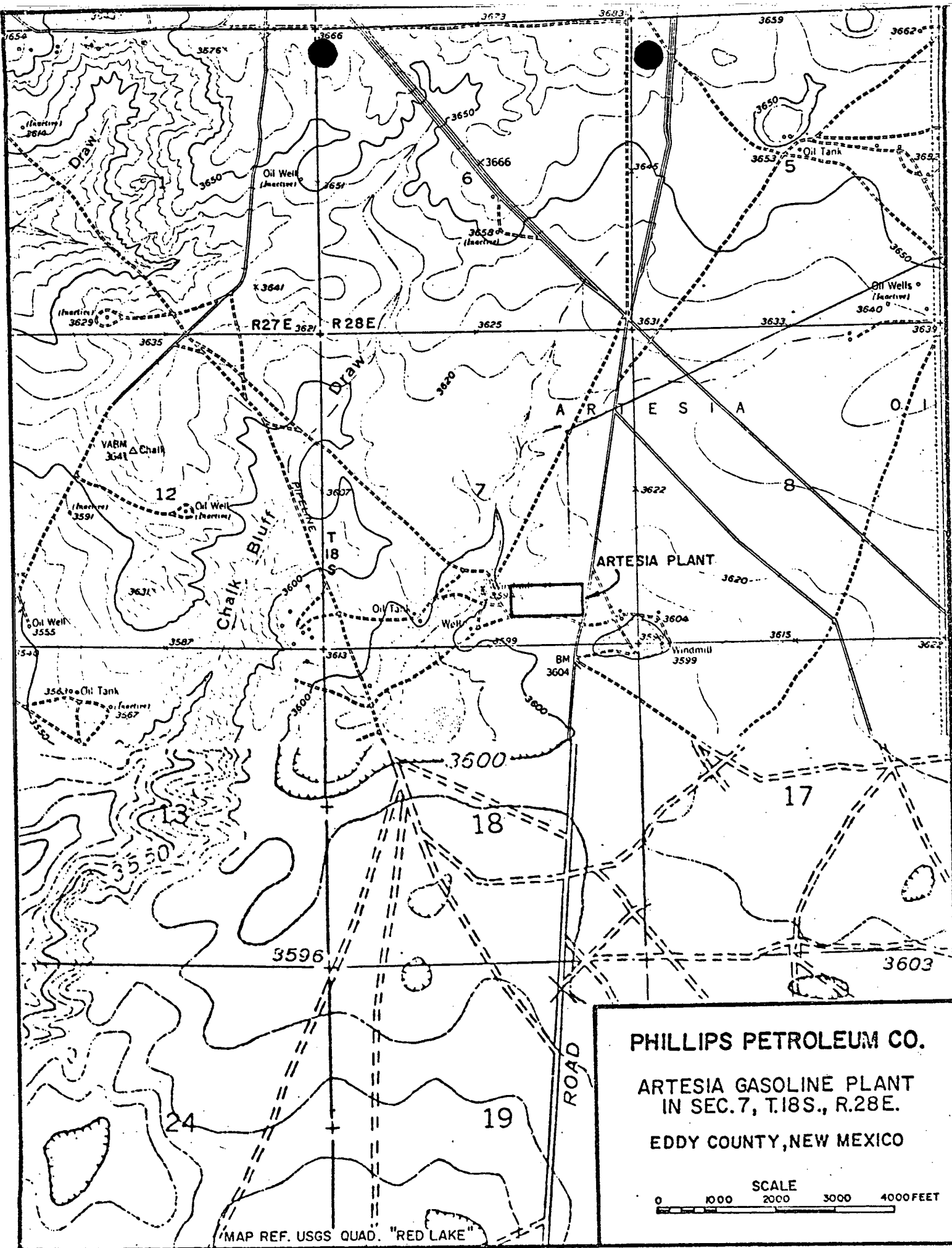
-x-x-x- FENCE LINE

BARTLESVILLE, OKLAHOMA

PRESENT PROPERTY AT ARTESIA PLANT
S/2, SE/4, SECTION 7, T18-S, R-28-E
EDDY COUNTY, NEW MEXICO

ODESSA

REVISION	BY	DATE	DRAWN KUCH	AFE. NO.	DWG. NO.
			CHECKED	SCALE 1" = 400'	SHEET NO.





STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR
LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

June 9, 1981

Phillips Petroleum Company
4001 Penbrook
Natural Resources Group
Odessa, Texas 79762

Attention: Mr. A. B. Glasgow

Re: Artesia Gasoline Plant
Discharge Plan

Gentlemen:

In response to your letter of May 27, 1981, requesting a 90 day time extension for Artesia Gasoline Plant Discharge Plan, the extension of time is hereby granted.

The extension of time was granted on the basis that Phillips Petroleum Company needs additional time to obtain accurate water analysis, consult a hydrologist and pursue the feasibility well injection disposal. The extension of time is hereby extended from May 28, 1981, to August 28, 1981.

If you have any questions regarding this matter, please call Oscar Simpson at 505-827-2534.

Sincerely,

JOE D. RAMEY
Division Director

JDR/OS/og



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

NATURAL RESOURCES GROUP
Exploration and Production



May 27, 1981

Artesia Gasoline Plant
Discharge Plan Extension

Mr. Joe D. Ramey
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

We are proceeding towards an environmental as well as economical solution to the waste water discharge problem at Artesia Plant. We respectfully request an additional 90 day extension in submitting a discharge plan so that we may obtain an accurate water analysis, consult a hydrologist to obtain ground water information, and continue to pursue injection possibilities.

If you have any questions regarding this matter, please contact Mr. A. B. Glasgow, 915-367-1439.

Yours very truly,

B. Z. Parker

for E. E. Clark, Manager
Permian Basin Region

ABG/lmp



PHILLIPS PETROLEUM COMPANY
BARTLESVILLE, OKLAHOMA 74004 918 661-6600

RECEIVED
APR 29 1981
OIL CONSERVATION DIVISION
SANTA FE

EXPLORATION AND PRODUCTION GROUP

April 27, 1981

State of New Mexico
Energy and Minerals Department
P. O. Box 2088
State Land Office Building
Santa Fe, NM 87501

Attention: Mr. R. L. Stamets

We are returning the Gasoline Plant Summary sheet with the changes for the Phillips plants. You will notice that the old Lee Plant is shutdown and the new cryogenic plant was started in April, 1981. The Lovington Plant has been shutdown and the gas is being processed at Lee Plant.

Sincerely,

L R Dodge

L. R. Dodge

Gas Settlements Section

203 Denton Bldg. - Ext. 5018 661-5013

LRD:bc - RC

Attachment

Elmer Anthony



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR
LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

March 3, 1981

Mr. E. E. Clark
Phillips Petroleum Company
4001 Penbrook
Odessa, Texas 79762

Dear Mr. Clark:

An extension for 90 days, in which to file a discharge plan for your Artesia Gasoline Plan, is hereby approved.

It is my understanding that you intend to dispose of your plant waters in an injection project in the area and need the additional time to work out the details.

Very truly yours,

JOE D. RAMEY
Division Director

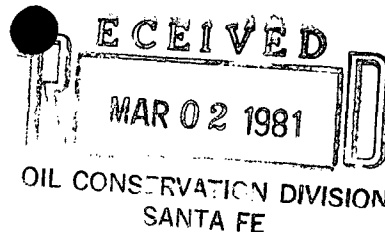
JDR/og



PHILLIPS PETROLEUM COMPANY

ODESSA, TEXAS 79762
4001 PENBROOK

NATURAL RESOURCES GROUP
Exploration and Production



February 25, 1981

Artesia Gasoline Plant--
Application for Discharge
Plan Approval

Mr. Joe D. Ramey, Director
New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Ramey:

Phillips Petroleum Company is preparing a discharge plan for Artesia gasoline plant as notified in your letter of October 28, 1980.

We are considering the feasibility of delivering the estimated 550 barrels per day of cooling tower and boiler blowdown water to a water injection unit in the Artesia area. As this seems to be the most economical solution for disposal of the discharge, we respectfully request an additional 90-day extension on submitting a discharge plan so that technical and contractual requirements can be finalized.

If you have any questions regarding this matter, please contact Mr. A. B. Glasgow, 915-367-1439.

Yours very truly,

E. E. Clark, Manager
Permian Basin Region

RAJ:ps



STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR
LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

October 28, 1980

Mr. Ben Ballard
Director of Environmental Control
10C4 PB
Phillips Petroleum Company
Bartlesville, Oklahoma 74004

Re: Request for Discharge Plan

Dear Mr. Ballard:

Under provisions of the regulations of the Water Quality Control Commission you are hereby notified that the filing of a discharge plan for Phillips' Artesia Plant (Section 7, Township 18 South, Range 28 East) is required. Discharge plans are defined in Section 1-101.1 of the regulations and a copy of the regulations is enclosed for your convenience.

This plan should cover all discharge of effluent at the plant site or adjacent to the plant site. Section 3-106A. of the regulations requires submittal of the discharge plan within 120 days of receipt of this notice unless an extension of this period is sought and approved.

The discharge plan should be prepared in accordance with Part 3 of the Regulations.

If there are any questions on this matter, please do not hesitate to call me or Thomas Parkhill at 827-3260. Mr. Parkhill has been assigned responsibility for review of all discharge plans.

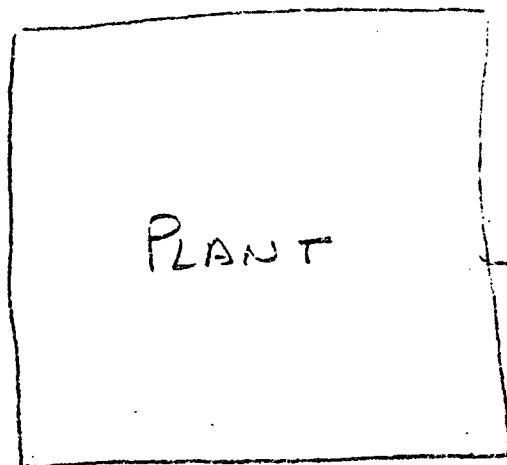
Yours very truly,

JOE D. RAMEY
Director

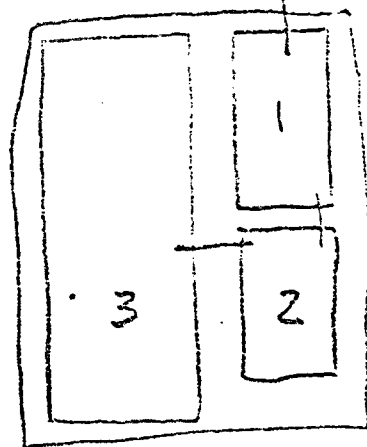
JDR/TP/fd
enc.

cc: Oil Conservation Division - Artesia
Phillips Petroleum Co., P. O. Drawer P, Artesia 88210

PHILLIPS PETROLEUM ARTESIA PLANT



ALL IN SE 1/4 SEC 7
T-18-S, R-28-E NMPM,
EDDY COUNTY N. MEXICO



Posted
11/25/79
#10

PIT: #1	108' X 50'	DEPTH OF 6'	NO LINING
#2	100' X 50'	DEPTH OF 6'	NO LINING
#3	240' X 50'	DEPTH OF 8'	NO LINING

11.3 MM GALLONS PER YEAR OF FLUIDS PLACED IN THE PITS.

WATER ANALYSIS ATTACHED



PHILLIPS PETROLEUM COMPANY

LABORATORY ANALYSIS RESULTS SUMMARY

Sample Waste WaterSecured from: Antecia Plant Waste Water P. in PITSecured by: David UnnerDate: 8/31/78Analysis No.: L 1047Chlorides, ppm, NaCl 171Chlorides, ppm, Cl 104Alkalinity, ppm CaCO₃ 311Hardness, ppm, CaCO₃ 371Calcium, ppm, Ca 106Magnesium, ppm, Mg. 26Dissolved Solids, ppm 1080Sulfates, ppm, Na₂SO₄ 765SO₄ 520Silica, ppm, SiO₂ 42Bicarbonates, ppm, HCO₃ 380Total Iron Fe ppm 0pH 6.3Solometer Reading 0% Salt -lbs. Salt -

Copies to:

C. FolsR. L. Linder(H) A. B. GormanJ. O. W. W. W.Don. Y. Y.Martin S. S.Central FileEast FileAnalysis by: David Unner

Checked by:

Approved by: