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ADDENDUM TO PHASE I HYDROGEOLOGIC EVALUATION MAVERIK REFINERY AND TANK FARM KIRTLAND, NEW MEXICO FOR MAVERIK COUNTRY STORES, INC.

Dames & Moore

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EXECUTIVE SUMMARY

This addendum report to the Dames & Moore Phase I Report "Hydrogeologic Evaluation, Maverik Refinery and Tank Farm" (February 1988), presents the results of Rounds 1 and 2 comprehensive water quality sampling, water level measurements and data analyses thereof, to complete the Phase I Hydrogeologic Investigation at the Maverik Refinery and Tank Farm, Kirtland, New Mexico. Background details of this investigation are presented in the February 1988 Phase I Report.

This addendum report includes Rounds 1 and 2 water quality data and water level elevation data and the evaluation thereof, for confirmation of the following: (1) Significant subsurface contamination from Maverik's Tank Farm is present in the west-southwest corner in the shallow silty-sand zone above the gravel aquifer. Movement of the organic compounds off-site has not been significant and will be reduced even further since the on-site construction in March 1988 and operation of a 350-foot long product interceptor trench. (2) The Farmer's Mutual and West Side Irrigation Ditches influence significantly the ground water quality and rate and direction of ground water movement near the Tank Farm. When the ditches are full and ditch seepage results, recharge and aquifer flushing occur. When dry, the ditches serve as hydarulic sinks and receive ground water inflow. (3) Biodegradation of organic compounds by bacteria on-site (and possibly off-site to the southwest) has been documented based on additional inorganic water quality data obtained in Round 2.

Rounds 1 and 2 water quality data results confirm that significant concentrations of the typical refinery-related volatile organics benzene, toluene, xylene, ethylbenzene and DCA are found in only one of the six wells located in the upper silty-sand zone in the southwest corner of the refinery and along the Westside Irrigation Ditch which parallels the west boundary of the refinery. Only trace levels (1.1 to 1.6 ug/l, i.e., parts per billion) of DCA and xylene have been detected once downstream in the Westside Irrigation Ditch.

Rounds 1 and 2 water quality data verified trace levels of benzene, ethylbenzene or xylene in 4 of 10 off-site wells at concentrations far below New Mexico drinking water standards. DCA was found in three other off-site wells, only one of which at 16 ug/l, dropping to 7.7 ug/l in Round 2, exceeded the New Mexico drinking water standard of 10 ug/l for this compound.

Based on both Rounds 1 and 2 sampling and the EID sampling conducted during the spring of 1987, ground water contamination by refinery-related organics appears to be confined to the upper portion of the alluvial aquifer over a 200 to 400 foot area in an east-west direction and about 1,800 to 2,000 feet downgradient (southwest) of the south-west corner of the tank farm. The low concentrations of the contaminants, their characteristics, the hydrogeologic setting, and the non-use of water for drinking water purposes from private wells in the contaminated area, all lead to the conclusion that the releases from the tank farm do not pose a threat to human health and the environment.

As agreed to by Maverik and the EID, the on-site interceptor trench product capture and cleanout will continue, while periodic water quality monitoring at critical sites and the Phase II detailed on-site hydrogeologic investigation and contaminant remediation are completed in 1988.

ADDENDUM TO
PHASE I HYDROGEOLOGIC EVALUATION
MAVERIK REFINERY AND TANK FARM
KIRTLAND, NEW MEXICO
FOR MAVERIK COUNTRY STORES, INC.,

INTRODUCTION

This addendum report presents the final results of Rounds 1 and 2 comprehensive sampling analysis and completes the Phase I hydrogeologic evaluation at the Maverik Refinery and Tank Farm in Kirtland, New Mexico. Hydrogeologic and water quality conditions were evaluated both on-site and approximately one mile downgradient (south) of the refinery property boundaries. The general site location map and detailed plot plan showing the sample sites and water level elevation measuring points (monitor wells, private wells, well points, staff gauges), are included on Plates 1 and 2, respectively.

PURPOSE AND SCOPE

The purpose of the Phase I study was to perform a hydrogeologic evaluation to define the extent and characteristics of ground water contamination from the Maverik Tank Farm. Phase I data and study results are presented in part in the first Dames & Moore report (February 1988) and are finalized in this addendum report. The Phase I study scope is detailed in the February 1988 Dames & Moore report.

The Round 2 water quality sampling and water level measurements were necessary to complete the Phase I study, to verify the Round 1 water quality data and preliminary conclusions, and to evaluate the extent to which the irrigation ditch flows impact the ground water levels and contaminant flow rates and directions. Round 2 sampling included the same comprehensive parameter analyses and same sample and monitor sites as Round 1. The exception was that three surface water sites could not be sampled in Round 2 since they were dry.

GROUND WATER AND SURFACE WATER LEVELS

Water level elevation data and water level changes from Round 1 to Round 2 confirm the significant impact that the irrigation ditches have on ground water levels and flow directions. As presented in Appendix A (Plate A-1 and Table A-1), major water level declines were observed in the northern part of the study area near the Farmer's Mutual Irrigation Ditch and along the Westside Irrigation Ditch during Round 2 when there was no irrigation flow or subsequent seepage to the ground water. The largest ground water level decline of 5.65 feet occurred in monitor well 1 (MW-1), the well closest to and as observed in Round 1, most significantly impacted by seepage from the Farmer's Mutual Irrigation Ditch.

The hydraulic gradient in the northern and eastern parts of the study area decreased from about 0.01 ft/ft in November 1987 to about 0.008 ft/ft in February 1988, three months after irrigation flows in and seepage from both ditches had stopped.

Other wells in the northern part of the study area also showed significant water level declines during Round 2 when there was no irrigation flow. These declines were measured in MW-2 at 2.07 feet, in MW-11 at 1.69 feet, in W-1 at 2.19 feet, in C. Curley's well at 3.17 feet, in R. Madrid's well at 5.25 feet and in four other private wells to the northeast (Table A-1). The declines resulted from the absence of irrigation water seepage from the Farmer's Mutual Irrigation Ditch and the Westside Irrigation Ditch.

Ground water flow into the Westside Irrigation Ditch was observed in the area between sample sites SW-5 and SW-3. This ditch functions as a hydraulic sink and receives ground water when it is not full with irrigation water. When it is full, the ditch serves as a ground water recharge source and localized shallow ground water divide.

Much less pronounced ground water level declines from 0.12 to 1.04 feet were observed in wells to the south and southwest. These wells (MW-4, MW-5, MW-6, MW-7, MW-8 and W-1) are downgradient and close to the Westside Irrigation Ditch. Although these declines were not as significant as those declines to the north and east, they still demonstrate that the ground water table along the Westside Irrigation Ditch had declined from the lack of recharge from irrigation water seepage.

Ground water levels upgradient and farther from the irrigation ditches and to the southeast rose slightly (from 0.14 feet to 0.75 feet in MW-3 and the R. Neff, P. Pickard, R. Eshome, G. Nelson wells). These water level elevation increases in the four private wells may have been due to reduced pumpage or natural ground water recharge in this area.

Water levels also rose in well points 2 and 3, although the increases were small. The water level rise in well point 2 to the southwest was only +0.25 feet, although the surrounding monitor wells (MW-4, MW-5 and MW-6) all showed water level declines. The water level rise to the southeast in well point 3 was measured at +1.56 feet while the water level rise in nearby MW-3 was only 0.14 feet. Well points were completed in the upper 3 to 4 feet and monitor conditions in the upper subsurface zone that may differ from the monitor wells and neaarby private wells completed in the deeper saturated aquifer zone.

WATER QUALITY EVALUATIONS

SURFACE WATER QUALITY

ROUND 2 SAMPLING CONDITIONS

Only three of the six surface water quality sample sites sampled in Round 1 could be sampled again in Round 2 in late February 1988. This was due to the fact that the Farmer's Mutual Irrigation Ditch (SW-1) and Westside Irrigation Ditch (SW-4 and SW-5) had not been flowing since late November and early December 1987, respectively. The surface water quality samples that were

taken in February 1988 were taken along the southern part of the Westside Irrigation Ditch at SW-2 and SW-3 and at Virginia Murray's drainage ditch (SW-6). These samples were not surface waters but were actually ground water inflows into the ditch. Sample sites SW-1 and SW-4 were dry, and only refinery product was observed at SW-5.

INORGANIC CONSTITUENTS

The concentrations of the major ions found in the waters in the Farmer's Mutual and the Westside Irrigation Ditch for Rounds 1 and 2 are presented for comparison in Table 2 and Plates B-1 through B-6. The percentage concentrations of the cations and anions for Round 2 are presented in the Piper diagram, Plate B-11. The Round 2 water quality results at sites SW-2, SW-3 and SW-6 were nearly identical to Round 1 results. These waters are high in calcium, sodium and potassium, sulfate and bicarbonate.

The water quality improved at the southernmost downgradient site SW-3, but worsened considerably at SW-2, due to increases in sulfate and chloride levels. The water quality changes from Round 1 to Round 2 reflect the change from the better quality irrigation water quality to the poorer quality ground water, and are similar to the water quality changes observed in the nearby monitor wells. As a result of irrigation water seepage to the ground water when the ditches are full, and ground water inflow to the ditches when they are dry, the water quality in the ditches typically will be similar to the surrounding ground water quality.

ORGANIC COMPOUNDS

At the time of Round 2 sampling, pooled refinery product and ground water seepage were observed in the Westside Irrigation Ditch along an approximate 350-foot length, from sample site SW-4 to about 50 feet south of the large tank in the southwest corner (Plate 2). As a result, a 350-foot long interceptor trench was constructed on-site in March 1988 to parallel the Westside Irrigation Ditch along this contaminated zone. The trench intercepts the refinery tank farm product and prevents it from moving off-site into the

Westside Irrigation Ditch. The interceptor trench was constructed about one foot below the water table and has been effective in collecting product. The product that is collected in the trench is pumped to the adjacent 2.4 million gallon storage tank. The product and water eventually will be disposed of at a proper waste disposal facility, or if feasible, shipped to a refinery for re-refining.

Round 1 and Round 2 organic water quality data are presented for comparison in Table 3 and Plates B-6 through B-10. Round 1 data showed that water quality samples at SW-4, SW-5 and SW-2 were impacted by tank farm product (Table 3). Visual observation of product during Round 2 at sites SW-4 and SW-5 also verified contamination in the Westside Irrigation Ditch. However, no organic contaminants were detected farther downstream at SW-2 or SW-3, and as in Round 1, no organic contaminants were detected in Virginia Murray's drainage ditch (SW-6).

Contamination of the Westside Irrigation Ditch appears to be restricted to a 350-foot length. The contamination has been and will continue to be significantly reduced with the construction and removal of product from the on-site interceptor trench.

GROUND WATER QUALITY

BACKGROUND WATER QUALITY

Round 2 data confirm that ground waters near the irrigation ditches are recharged by seepage of irrigation waters from the ditches when they are full. Specifically, upgradient well MW-1 north of the tank farm and Virginia Murray's well (W-2) to the west of the tank farm monitor ground waters most heavily impacted by irrigation water seepage from the ditches. These two wells are not impacted by Maverik's refinery tank farm and intercept the best quality ground water in the area. Lack of recharge from the inactive irrigation ditches at the time of Round 2 sampling resulted in higher TDS levels at MW-1 and W-2, at 537 mg/l and 640 mg/l, respectively. In contrast, Round 1 TDS levels for MW-1 and W-2, during active irrigation flows, measured only 360 mg/l and 600 mg/l, respectively.

Comparison of Round 1 and Round 2 data shows that the TDS concentration at MW-1 increased more than it did at W-2. MW-1 is closer to and was, therefore, during Round 1 sampling more heavily impacted by seepage of good quality irrigation waters from the Farmer's Mutual Irrigation Ditch.

No organic constituents were detected in the Round 2 samples at MW-1 or W-2 (Table 3). The detection of benzene in MW-1 at 0.53 ug/l in the Round 1 sampling analysis is not representative for this well. The absence of benzene in the Round 1 MW-1 duplicate sample as well as in the Round 2 sample, verify that benzene is not present in MW-1.

INORGANIC CONSTITUENTS

On-Site

Both Round 1 and Round 2 inorganic water quality analytical results verify that the five on-site monitor wells (MW-2, MW-10, MW-11, MW-12 and W-3) intercept ground waters of much poorer quality than the ground waters at background monitor well sites MW-1 and W-2. However, these on-site monitor wells intercept ground waters of similar or slightly better quality than in the downgradient off-site monitor wells. As at the background wells, the ground water quality at the five on-site monitor wells in Round 2 was poorer than in Round 1. Total dissolved solids (TDS) levels increased from Round 1 to Round 2 by as much as 1,485 mg/l at MW-10.

Increased TDS levels in the on-site monitor wells were primarily the result of increases in sulfate, chloride and sodium, with slight increases in calcium and bicarbonate. These increases resulted from the lack of good quality irrigation water recharge from the ditches to the aquifer. Rounds 1 and 2 ground water quality data are summarized by the concentration contour maps in Appendix B, Plates B-1 through B-4.

The manganese concentration contour map (Plate B-5) is included, although manganese is not considered a primary ion. However, as will be discussed later, it is significant with respect to its correlation with the organic contamination and bacterial biodegration.

Off-Site

The isoconcentration maps (Plates B-1 through B-4) for TDS and the major ions sodium, chloride and sulfate, for Rounds 1 and 2 sampling, are consistent. The maps show that near the tank farm, the highly mineralized zones of the alluvial aquifer extend about 1,500 feet to 1,700 feet east-west and about 2,500 feet to 2,700 feet north-south. The lack of recharge of good quality irrigation waters to the ground waters during Round 2 sampling, resulted in increased concentrations of these constituents. The concentration contour lines were expanded accordingly, primarily to the north and to a lesser extent to the east and west.

The Round 1 and Round 2 data indicate that the water quality in the off-site monitor wells is fairly stable (Table 2). The major exceptions were MW-8 and MW-9 southwest of the tank farm. These wells are in the major ground water discharge zone. Sulfate and sodium concentrations increased from Round 1 to Round 2. These increases probably resulted from mineralized ground water discharge in this area and the lack of irrigation water seepage to the ground water. These monitor wells are close to the Westside Irrigation Ditch, and during irrigation flows would be strongly influenced by seepage of good quality irrigation waters.

The Round 2 water quality data for off-site monitor wells MW-4, MW-5 and MW-6, located southwest of the irrigation ditches, showed slight improvement from Round 1. The TDS levels decreased by 130 mg/l to 160 mg/l. The lower TDS levels were primarily due to decreased levels of chloride, sodium and calcium. Lower water table conditions and less ground water contact with the upper mineralized zone of the aquifer during Round 2 sampling could account for the improvement in the water quality in this area.

The most significant improvement in ground water quality off-site was at MW-13 where TDS levels dropped from 3,700 mg/l (during Round 1) to 1,850 mg/l (during Round 2). Less dramatic declines in TDS levels were observed to the south of MW-13 about 300 feet at well W-1. TDS levels decreased from 2,300 mg/l to 2,140 mg/l. These declines in TDS were primarily due to large decreases in sulfate, chloride and sodium, with slight decreases in calcium levels. Well W-1 is a deep (58.8 feet deep) private well that penetrates the gravel zone and MW-13 is a shallow (5-feet deep) stainless steel well point that monitors the upper silty sand zone. Both wells are in a localized, well-defined ground water discharge zone where evaporite deposits cover the ground surface.

The better quality waters at W-1 and MW-13 at the time of Round 2 sampling may have resulted from less discharge of highly mineralized ground waters in this major ground water discharge zone. As previously discussed, a lower water table condition resulting in less ground water contact with the upper mineralized zone would result in better water quality.

The Piper diagram in Appendix B (Plate B-11) summarizes and compares the percentages of the major ions found at the ground water quality sample sites for Round 2. Both Round 1 and Round 2 water quality data indicate extreme variability in the ground water quality throughout the area. Both rounds of water quality data indicate that the ground water is predominately a sodium-sulfate type.

Rounds 1 and 2 water quality data demonstrate that the off-site ground water quality in this area is poor. Sulfate levels in the off-site monitor wells (except for W-2 a background water quality well) approached or exceeded the New Mexico drinking water standard of 600 mg/l. Sulfate levels for Round 2 for the off-site wells ranged from 545 mg/l at MW-5 to 1,510 mg/l at MW-9 (Plate B-4).

In summary, the concentrations of the major ions, chloride, sodium, sulfate and calcium are stable in 7 of the 10 off-site monitor wells (Table 2). The exceptions, as previously discussed, are wells W-1, MW-9 and MW-13 which are located southwest of the tank farm in the major ground water discharge area.

ORGANIC COMPOUNDS

On-Site

The five volatile organic constituents found on-site during Round 1 sampling were also found during Round 2 sampling, and include benzene, toluene, xylene, ethylbenzene and DCA. As with Round 1 analytical results, these constituents were found at very high levels only in the on-site shallow MW-12 completed in the upper silty sand above the deeper gravel aquifer.

As noted in our previous Phase I report (February 1988), volatilization and biodegradation along with some adsorption are probably the primary mechanisms tending to reduce concentrations of benzene, toluene, xylene and ethylbenzene in water and soils. Because of these active mechanisms, persistence of these compounds is probably not great.

The DCA which has been detected in ground water at and downgradient from the tank farm appears to have resulted from a leaded gasoline spill in the southwest corner of the tank farm, north of the large 2.4 million gallon tank. As discussed in our February 1988 report, DCA is a 2-carbon alkyl halide, has a low molecular weight, but a high density, a high vapor pressure, is highly soluble in water and has a high affinity for the water rather than an organic liquid phase. Because of its low potential for being sorbed onto soil particles it is quite mobile and is often found at the leading edge of ground water contaminant plumes resulting from leaded gasoline spills. The primary removal mechanism of DCA from soil and water is probably volatilization.

Although DCA is dense (specific gravity of 1.25 gm/cm^3), DCA should only be expected in the dissolved state rather than as a separate phase, and is not likely to be found at significant concentration in the lower parts of an aquifer. This was verified by both Rounds 1 and 2 data by comparing the extremely high levels of DCA in shallow monitor well MW-12 (450 ug/l and 2,400 ug /l) to the very low levels of DCA in the deeper adjacent monitor well MW-11 (1.0 ug/l and 4.6 ug/l).

The Round 2 data for the on-site deeper well W-3 is highly suspect. Well W-3 is about 40 feet southeast of MW-12 and is believed to be open to both the upper shallow contaminated zone and the deeper zone. Round 1 results for W-3 indicated DCA <1.0 ug/l but Round 2 results indicated that the DCA level increased to 30 ug/l. In addition, trace levels of ethylbenzene and xylene were found in W-3 in Round 1 but not in Round 2. This wide variability in the water quality may be due to the well construction. Well W-3 is probably open through the highly contaminated upper 17-foot zone, to its total depth of 21 feet. Its construction is not known, as it is an older steel-cased 8-inch diameter well that had been constructed prior to the Phase I study. The water sample collected at well W-3 was bailed from the bottom of the well through a drop pipe. The sample should primarily represent the water quality at the bottom of W-3. However, due to the likelihood of continuous perforated casing in W-3, the water samples are likely a mixture of both shallow highly contaminated and deeper uncontaminated ground waters.

The Round 1 and Round 2 water quality data results for the organic compounds were comparable in that DCA was the only organic contaminant found at detectable levels at enough sites (on-site at W-3, MW-10, MW-11 and MW-12), for which isoconcentration plots could be completed (Plate B-6). Round 2 DCA levels on-site measured 4.6 ug/l at MW-11, 30 ug/l at W-3, 1.3 ug/l at MW-10 and as previously discussed, 2,400 ug/l at MW-12. Higher DCA levels at MW-11 versus MW-10 and higher DCA levels in Round 2 in comparison to the Round 1 concentrations probably reflect the absence of localized dilution from irrigation water seepage out of the Westside Irrigation Ditch.

Round 1 and Round 2 water quality analytical results verified high concentrations of organic contaminants in the shallow silty-sand zone on-site at MW-12. Although the sample taken in Round 1 was contaminated because a drop pipe was not used in sampling, the Round 2 sample was not contaminated. A drop pipe was used in Round 2 and the oil and grease analysis did not indicate the presence of product in the water sample.

The Round 2 water quality data from MW-12 showed increased levels of organic compounds. In addition to the large increases in DCA levels in MW-12, total xylene increased from 3,000 ug/l to 10,000 ug/l, ethylbenzene increased from 1,300 ug/l to 1,500 ug/l, toluene increased from 2,000 ug/l to 20,000 ug/l and benzene increased from 19,000 ug/l to 24,000 ug/l.

No other organic contaminants were detected in MW-11 or W-3 during Round 2, although trace levels of xylene, ethylbenzene and/or benzene had been detected in Round 1. Round 1 and Round 2 data verify that the significant contamination is on-site near MW-12 and within the upper 17 feet in the silty sand zone above the gravel zone monitored by MW-11.

A low sulfate level of 16 mg/l measured at shallow MW-12 on-site in Round 1 was verified by the correspondingly low sulfate level of 9 mg/l measured in Round 2. The explanation for the low sulfate levels at MW-12 (as well as the elevated manganese levels at six monitor well sites, discussed later) may be that the organic compounds are being oxidized while the oxidizing agents (NO_3^-, MnO_2, $Fe(OH)_3$ and SO_4^{-2}) are reduced. As presented in Freeze and Cherry (1979), the redox processes that consume organic matter and reduce inorganic compounds in ground water include sulfate reduction in the later phase of the redox processes. This is defined by the equation:

$$CH_2O + 1/2\ SO_4^{2-} = 1/2\ HS^- + HCO_3^- + 1/2\ H^+$$

The redox processes in a ground water zone where organic matter exists, result from the action of bacterial microorganisms. The main source of energy for the bacteria in the ground water zone is the oxidation of organic matter.

Many metals as well as carbon, nitrogen, sulfur and phosphorus compounds comprise the essential nutrients for bacterial growth.

Manganese (IV) reduction is one of the earlier redox processes that consumes organic matter. This process is defined by the equation (Freeze and Cherry (1979):

$$CH_2O + 2MnO_2(s) + 3H^+ = 2M_n^{2+} + HCO_3- + 2H_2O$$

This process typically occurs before sulfate reduction. This would explain why elevated manganese levels were found in three of the on-site monitor wells where organic constituents were found (including MW-12). With the exception of MW-12, where the redox reactions have proceeded further due to the presence of more organic matter, sulfate levels are still elevated.

Manganese concentrations were elevated above 1.0 mg/l at a total of four on-site monitor wells sites (MW-2, MW-10, MW-11 and MW-12). Of these 4 sites, MW-2 was the only site at which no refinery contamination has been detected. Significant refinery contamination has been detected at MW-12 and only trace levels of DCA were found at MW-10 and MW-11.

As mentioned, the monitor wells with the highest manganese levels were not necessarily those with the highest levels of organic compounds. MW-12 had a manganese concentration of 3.6 mg/l, whereas MW-10, with a DCA level of only 1.3 mg/l, had a higher manganese level of 5.20 mg/l.

The low DCA and lower organic constituent levels at MW-10 and MW-11 where elevated manganese concentrations were detected may reflect the later redox process of manganese reduction where organic matter may have been partially consumed by bacteria and manganese dioxide (2MnO2) reduced to manganese (2Mn+2).

Based on the manganese levels at MW-1 and W-2, the background concentration for manganese in this area is about 0.01 to 0.03 mg/l. The New Mexico level for manganese in drinking water is 0.2 mg/l. Although manganese has a recommended concentration limit in drinking water, the limit is to mainly provide acceptable esthetic and taste characteristics, Freeze and Cherry (1979).

Off-Site

Off-site, organic contaminant levels decreased from Round 1 to Round 2. In both rounds the levels were extremely low. The slightly lower concentrations of the organic contaminants off-site during Round 2 versus Round 1 are believed to be due to the absence of ground water recharge from seepage from the irrigation ditches. Such recharge, present during Round 1, increased ground water levels and flow rates, thereby flushing contaminants away from the tank farm.

Xylene, ethylbenzene and/or benzene were found at or just above detection levels and only in nearby off-site monitor wells MW-13, W-1 and W-2 in Round 1. Only xylene was present and only in MW-13 in Round 2.

MW-13 and W-1 are located directly to the southwest and within 200 feet of the tank farm boundaries. W-2 is located farther west (see Plate 2). Total xylene and ethylbenzene at MW-13 for Round 1 were measured at 2.23 ug/l and 0.54 ug/l, respectively. Only total xylene was detected at 1.68 ug/l at MW-13 in Round 2. Ethylbenzene was detected at 0.89 ug/l at W-1 in Round 1 as was benzene at 1.0 ug/l at W-2. Neither of these compounds were found above detection limits in W-1 or W-2 in Round 2.

Based on the concentration contour plot for DCA of 10 ppb (the New Mexico MCL for drinking water), the area impacted by the tank farm is about 200 to 400 feet in an east-west direction and 1,800 to 2,000 feet in a north-south direction (Plate B-6). The area impacted off-site appears to decrease slightly when the irrigation ditches are not flowing and flushing contaminants off-site. The only ground water off-site that exceeded the drinking water standard of 10 ppb of DCA was at MW-6. DCA levels were measured at MW-6 at 16.0 ug/l during Round 1 but at only 7.7 ug/l for Round 2. Elevated manganese levels in this well of 2.3 mg/l probably reflect bacterial biodegradation and the reduction of manganese. This well is located approximately 1,200 feet southwest of the Maverik tank farm property boundary.

As discussed in the February 1988 report and as the data from Rounds 1 and 2 continue to confirm the results of the New Mexico EID 1985 and 1987 water quality data, ground water contamination off-site in private wells to the southwest is limited to DCA contamination at very low levels and in a

Very low levels of DCA were also detected in Round 2 at off-site monitor wells MW-8 and MW-13 at 1.1 ug/l and 1.9 ug/l, respectively. These wells also had elevated manganese levels of 2.7 mg/l and 1.9 mg/l, respectively.

Although organic lead (TOL) has been detected at very low concentrations in both Rounds 1 and 2, the results are not considered to be significant. This is based on the fact that the analysis for TOL is difficult and that the TOL values were low and fluctuated considerably from Round 1 to Round 2. In addition, the highest TOL levels for both Rounds 1 and 2 were at monitor well MW-12 on-site (at 0.02 and 0.06 mg/l, respectively).

TOL levels at MW-6, MW-7 and MW-11 for Round 1 were 0.004 mg/l, 0.02 mg/l and 0.007 mg/l, with detection limits of 0.002 mg/l, 0.02 mg/l and 0.004 mg/l, respectively. TOL was then detected at 7 additional sites in Round 2, but also at very low concentrations (sites MW-2, MW-3, MW-4, MW-5, MW-9, and MW-10 and at well W-3). The TOL levels at these sites averaged only 0.004 mg/l and ranged from 0.002 mg/l at MW-7 to 0.009 mg/l at MW-10.

Organic lead (primarily tetraethyl) is a relatively high molecular weight, dense, 8-carbon compound which has a very low water solubility, probably a high affinity for an organic phase, and has a high potential for being adsorbed by soils and sediments. While organic lead would not be highly mobile, it would be highly persistent, slowly degrading to other organic and eventually to inorganic compounds.

As discussed in the February 1988 report and as the data from Rounds 1 and 2 continue to confirm the results of the New Mexico EID 1985 and 1987 water quality data, ground water contamination off-site in private wells to the southwest is limited to DCA contamination at very low levels and in a limited number of wells.

CONCLUSIONS

The Phase I hydrogeologic and water quality investigation consists of the work presented in the Dames & Moore report (February 1988) and the data and evaluation presented herein of two rounds of comprehensive water quality data at the Maverik Refinery and Tank Farm near Kirtland, New Mexico. This work has confirmed the following major findings:

1. Significant concentrations of the typical refinery-related volatile organics benzene, toluene, xylene, ethylbenzene and 1,2-dichloroethane (DCA) have only been found in one of six monitor wells installed in the upper silty-sand zone at the refinery tank farm. Significant biodegradation of organic compounds appears to be occurring on-site, particularly in the shallow zone at the highly contaminated monitor well on-site.

2. Benzene, xylene or ethylbenzene have only been found in 3 of 10 off-site monitor wells at concentrations just above detection limits and far below New Mexico drinking water standards for these compounds. DCA was found in four other off-site monitor wells, only one of which, with DCA levels ranging from 7.7 to 16 ug/l, exceeded the New Mexico drinking water standard of 10 ug/l.

3. In more than 25 off-site private wells tested by the NMEID or Dames & Moore, DCA has only been found in two wells, benzene in another and ethylbenzene in yet another. The concentrations were below New Mexico's drinking water standards for all of these compounds. These wells are utilized for irrigation or stock-watering purposes rather than for drinking water.

4. Product seepage from contamination of the western part of the tank farm to the Westside Irrigation Ditch has been confirmed. However, even under no and low-flow conditions which existed during sampling, off-site downstream contamination of this water body has not been significant. Construction and pumpage at the on-site interceptor trench has reduced and should eventually eliminate product migration off-site to the Westside Irrigation Ditch.

5. The shallow silty sand alluvial zone on-site that has been significantly impacted by the tank farm, has not impacted the deeper gravel zone. Very low levels of contaminants are observed in the deeper monitor wells and private wells downgradient from the tank farm. This is a result of high permeability, recharge from the irrigation ditches, high flow rates and apparent lithologic separation of the gravel zone from the upper silty-sand zone. The private wells average about 20 feet in depth and are generally open through at least

15 feet of saturated, highly permeable gravels, cobbles and sands. The ground water flow velocity through the coarse alluvial aquifer has been estimated at 3 ft/day to the southwest toward the San Juan River.

6. Contamination of the shallow alluvial aquifer and Westside Irrigation Ditch from the tank farm appears to have occurred over an area about 200 to 400 feet wide in an east-west direction and about 1,800 to 2,000 feet long in a north-south direction toward the San Juan River. The areal extent of organic contamination off-site appears to increase slightly with the recharge and resultant on-site aquifer flushing from seepage of irrigation ditch waters. Ground water quality is strongly influenced by the direction of and flows in the irrigation ditches. Off-site contamination appears to be restricted to a more permeable alluvial (gravel, cobble, sand) zone that trends northeast to southwest to the San Juan River.

7. The low concentrations of the contaminants detected off-site, both during and after irrigation ditch flows, their characteristics, the hydrogeologic setting, and the non-use of water from private wells in the contaminated area for drinking water purposes, all verify that the releases from the tank farm do not pose a threat to human health and the environment.

REFERENCES

Dames & Moore, February 1988. Phase I Hydrogeologic Evaluation, Maverik Refinery and Tank Farm, Kirtland, New Mexico.

Freeze, R.A., and Cherry, J.A., 1979. Groundwater. Prentice-Hall, Inc.

TABLE 1

SAMPLE ROUNDS 1 AND 2 LABORATORY WATER QUALITY PARAMETERS

HALOGENATED VOLATILE ORGANICS EPA METHOD 601	INORGANIC PARAMETERS	EPA METHOD
Bromoform	pH	150.1
Carbon tetrachloride	Specific Conductance @ 25C	120.1/9050
Chlorobenzene	Total Dissolved Solids	160.1
Chloroethane	Fluoride	340.2
Chloroform	Chloride	300.0
Dibromochloromethane	Nitrate + Nitrite as N	353.2
Bromodichloromethane	Sulfate	300.0
1,1-Dichloroethane	Total Alkalinity as $CaCO_3$	310.1/403
1,2-Dichloroethane	Bicarbonate Alkalinity	310.1/403
1,1-Dichloroethene	Carbonate Alkalinity as $CaCO_3$	310.1/403
1,2-Dichloropropane	Ammonia as N	350.1
cis-1,3-Dichloropropene		
trans-1,3-Dichloropropene		
Bromoethane		
Chloromethane		
Methylene chloride		
1,1,2,2-Tetrachloroethane		
Tetrachloroethene		
trans-1,2-Dichloroethene		
1,1,1-Trichloroethane		
1,1,2-Trichloroethane		
Trichloroethene		
Vinyl chloride		
1,1,2-Trichloro-2,2,1-trifluoroethane		
1,2-Dibromoethane (EDB)		

AROMATIC VOLATILE ORGANICS EPA METHOD 602	METALS PARAMETERS	
Benzene	Calcium	200.7
Chlorobenzene	Iron	200.7
Ethylbenzene	Magnesium	200.7
Toluene	Manganese	200.7
1,2-Dichlorobenzene	Potassium	200.7
1,3-Dichlorobenzene	Sodium	200.7
1,4-Dichlorobenzene	Total Organic Lead	ENSECO Special
m-Xylene		
o & p-Xylene(s)		

Note: For detail of methodology see ENSECO's (RMAL) attached report (Appendix B)

TABLE 2

SAMPLE ROUNDS 1 AND 2: LABORATORY RESULTS FOR MAJOR IONS
FOR MAVERIK COUNTRY STORES, REFINERY TANK FARM, KIRTLAND, NEW MEXICO

(Round 1 Sampled November 10-27, 1987)
(Round 2 Sampled February 22-24, 1988)

Sample Site Designation[1]	pH (field)	TDS (mg/l)	Sulfate mg/l	Chloride mg/l	Sodium mg/l	Calcium mg/l	as $CaCO_3$ mg/l	Iron mg/l	Manganese mg/l
NM MCL	6-9	1,000	600	250	NA	NA	NA	1.0	0.2
EPA MCL	6.5-8.5	500	250	250	NA	NA	NA	0.3	.05
Wells									
On-Site									
MW1	9.64;7.51	360;537	176;198	26;33	44;50	44;112	34;159	<.05[2]	- ;.013
MW2	7.75;6.63	1,360;2,000	526;955	67;101	243;334	152;268	309;365	<.05	- ;1.10*
MW10	7.66;8.22	1,240;2,725	568;1,640	46;191	250;578	126;196	153;271	<.05	- ;5.20*
MW11	7.85;7.80	1,250;1,470	592;615	45;184	234;263	138;186	267;242	<.05	- ;1.0*
MW12[3]	6.74;7.25	1,200;1,310	16;9	321;360	222;239	148;133	508;541	.13;.09	- ;3.6
W-3	- ;7.72	- ;960	- ;387	- ;50	- ;207	- ;103	- ;363	- ;<.05	- ;.28*
Off-Site									
MW3	7.78;7.16	1,620;1,730	670;713	97;138	349;377	148;167	215;387	<.05	- ;.64*
MW4	7.46;7.31	1,540;1,380	654;601	87;73	337;294	142;131	332;332	<.05	- ;.78*
MW5	7.85;7.19	1,250;1,190	499;545	68;61	258;244	129;142	397;301	<.05	- ;.76*
MW6	7.51;7.18	2,130;2,000	843;960	288;260	386;361	230;267	367;324	<.05	- ;2.3*
MW7	7.66;7.03	1,400;1,510	558;675	126;169	256;266	152;205	166;320	<.05	- ;.48*
MW8	7.41;7.00	950;1,230	401;605	67;65	166;174	159;193	273;256	<.05	- ;2.7*
MW9	7.11;7.08	1,520;2,160	863;1,510	43;81	146;357	324;396	372;250	<.05	- ;.11
MW13	8.14;8.36	3,700;1,850	1,980;920	257;82	666;370	364;219	419;581	.39;.12	- ;1.90*
R. Ball Well (W-1)	7.96;8.63	2,300;2,140	433;610	1,170;527	1,020;696	25;15	221;289	<.10;<.05	- ;.02
V. Murray Well (W-2)	8.06;8.55	600;640	114;97	43;37	147;126	42;28	368;297	.31;<.05	- ;.03
Farmer's Mutual Irrigation Ditch									
SW1[3]	8.5	400	136	16	29	86	159	<.05; -	-
West Side Irrigation Ditch									
SW4[3]	7.28	790	147	29	40	113	253	.12; -	-
SW5[3]	-	-	-	-	-	-	-	-	-
SW2	7.6;7.41	1,120;1,210	476;550	49;50	159;190	162;147	277;274	<.05	- ;.55*
SW3	8.05;8.16	1,400;1,200	602;550	77;52	223;205	178;146	297;253	.06;.13	- ;.16*
V. Murray's Drainage Ditch									
SW6	7.28;7.95	-	-	-	-	-	-	-	-

MW11 & MW12 (Composite of Cuttings): Analyzed for EP Toxicity for 8 RCRA metals and sulfide and cyanide reactivity. Only barium detected at 0.94 mg/l.

Footnotes:

(1) Data from Rounds 1 and 2 presented for each sample site in the first and second columns, respectively. Where Round 1 results = Round 2 results, column 2 left blank. —Indicates not analyzed.

(2) The values indicated as less than (<) are detection limits only, and not actual concentrations.

(3) Sample sites SW-4 and SW-5 (and MW-12 in Round 1 only) were contaminated with product and not representative of the water itself. SW-4 and SW-5, and SW-1 which was dry, were not sampled for Round 2.

* Exceeds New Mexico MCL For Drinking Water.

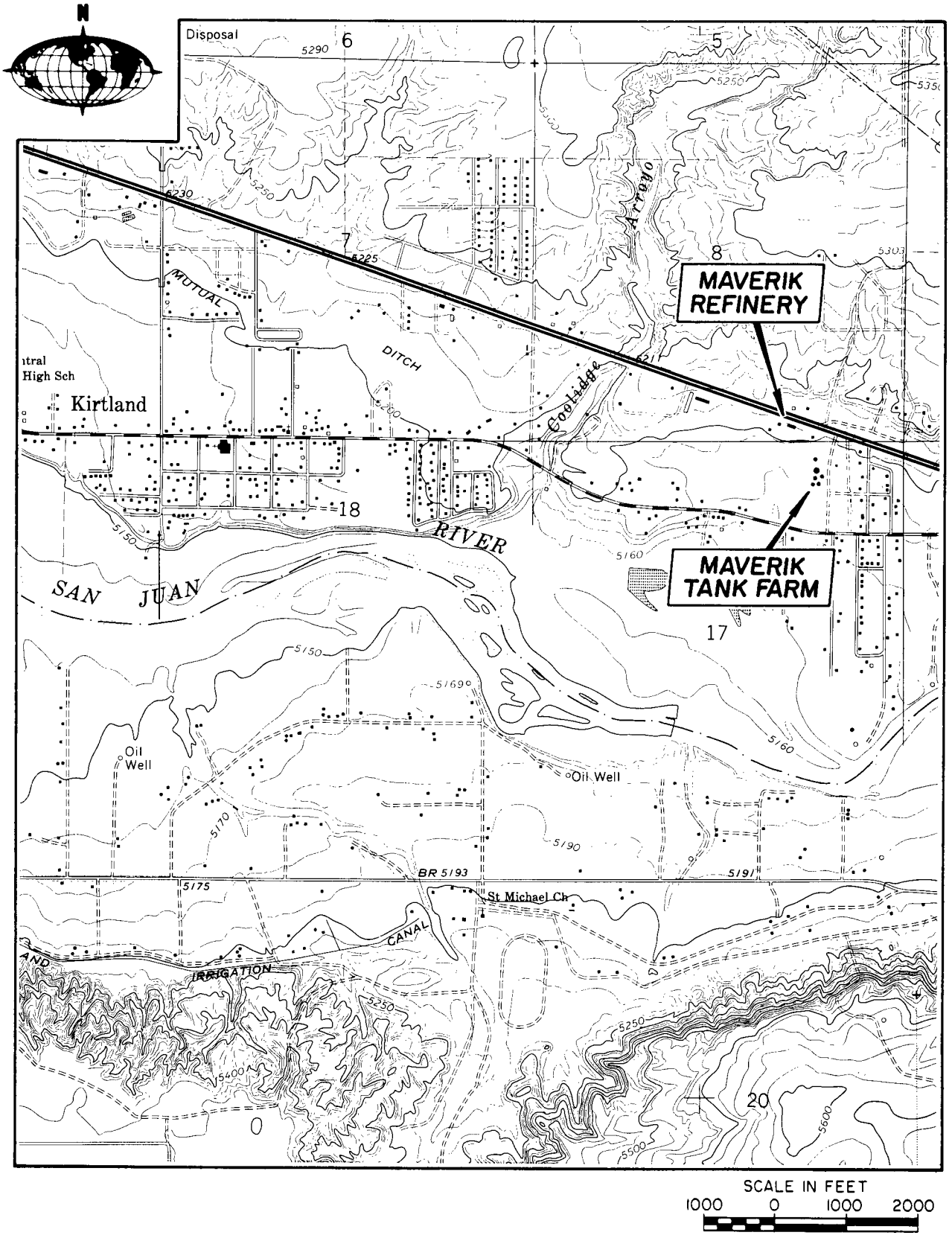
TABLE 3

SAMPLE ROUNDS 1 AND 2: LABORATORY RESULTS FOR DETECTED ORGANIC CONSTITUENTS
FOR MAVERIK COUNTRY STORES, REFINERY TANK FARM, KIRTLAND, NEW MEXICO

(Round 1 Sampled November 10-27, 1987)
(Round 2 Sampled February 22-24, 1988)

Sample Site Designation[1]	1-2 DCA (ug/l)	Total Xylene (ug/l)	Ethylbenzene (ug/l)	Toluene (ug/l)	Benzene (ug/l)	Total Organic Lead mg/l
NM MCL	10	620	750	750	10	NA
EPA MCL	5	NA	NA	2,000	5	NA
Wells						
On-Site						
MW1	< 1	< 0.5	< 0.5	< 0.5	0.53[2];<0.5	<0.01;<0.002
MW2	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.004
MW10	3.2;1.3	< 0.5	< 0.5	< 0.5	< 0.5	0.02;0.009
MW11	1.0;4.6	< 0.5	< 0.5	< 0.5	0.81;3.8;<0.5?	0.007;0.004
MW12[4,5]	450.*;2,400*	3,000.*;10,000*	1,300.*;1,500*	2,000.*;20,000*	19,000.* ;24,000*	0.02;0.06
W-3	< 1;30*?	5.8;<0.5	1.3;<0.5	< 0.5	< 0.5	- ;0.002
Off-Site						
MW3	< 1	< 0.5	< 0.5	< 0.5	< 0.5	<0.01;0.005
MW4	< 1	< 0.5	< 0.5	< 0.5	< 0.5	<0.002;0.003
MW5	< 1	< 0.5	< 0.5	< 0.5	< 0.5	<0.02;0.002
MW6	16*;7.7	< 0.5	< 0.5	< 0.5	< 0.5	0.004;0.005
MW7	< 1	< 0.5	< 0.5	< 0.5	< 0.5	0.02;0.002
MW8	2.8;1.1	< 0.5	< 0.5	< 0.5	< 0.5	<0.02;<0.004
MW9	8.3;8.6	< 0.5	< 0.5	< 0.5	< 0.5	<0.01;0.004
MW13	< 1;1.9	2.23;1.68	0.54;<0.50	< 0.5	< 0.5	<0.01;<0.004
R. Ball Well (W-1)	< 1	< 0.5	0.89;<0.5	< 0.5	< 0.5	<0.02;<0.002
V. Murray Well (W-2)	< 1	< 0.5	< 0.5	< 0.5	1.0;<0.5	<0.01;<0.002
Farmer's Mutual Irrigation Ditch						
SW1[4]	< 1	< 0.5	< 0.5	< 0.5	< 0.5	
West Side Irrigation Ditch						
SW4[4,5]	<10	61	<10	<10	<10	
SW5[4,5]	<250	57,000*	2,500*	470	<250	
SW2	1.1;<1.0	1.6;<0.5	< 0.5	< 0.5	< 0.5	<0.002;0.002
SW3	< 1	< 0.5	< 0.5	< 0.5	< 0.5	<0.01;<0.004
V. Murray's Drainage Ditch						
SW6	< 1	< 0.5	< 0.5	< 0.5	< 0.5	-

Footnotes:
(1) Data from Rounds 1 and 2 presented for each sample site in the first and second columns, respectively. Where Round 1 results = Round 2 results, column 2 left blank. - Indicates not analyzed.
(2) Benzene was not detected in a blind duplicate of this sample in Round 1.
(3) The values indicated as less than (<) are detection limits only, and not actual concentrations.
(4) Sample sites SW-4 and SW-5 (and MW-12 in Round 1 only) were contaminated with product and not representative of the water itself. SW-4 and SW-5, and SW-1 which was dry, were not sampled for Round 2.
(5) Volatile organics in samples for SW-4 and SW-5 were analyzed using GC/MS methods in Round 1, and for MW-12 in Rounds 1 and 2. All other samples were analyzed using GC methods.
* Exceeds New Mexico MCL for drinking water.
? Data Questionable



VICINITY MAP

REFERENCE
U.S.G.S. QUADRANGLE ENTITLED
"KIRTLAND, NEW MEXICO" – 1966,
PHOTOREVISED 1979.

Dames & Moore

PLATE 1

T. 29 N., R. 14 W.

SECTION 9 | SECTION 16
SECTION 8 | SECTION 17

N

COUNTY ROAD 6251
COUNTY ROAD 6257
COUNTY ROAD 6261
COUNTY ROAD 6255
COUNTY ROAD 6259
COUNTY ROAD 6256
COUNTY ROAD 6263
COUNTY ROAD 6271
COUNTY ROAD 6275

550
489

HIGHWAY

SAN JUAN RIVER

ROBERT MADRID
D. YORK JR.
DONALD HOWELL
CHARLES HILL
VIRGIL LUCERO
VERNONE PLUMER
R. J. TRAC
ERNEST MCLEMORE
J. LEROY FLACK
EVERETT GRAY
RONALD NEFF
ROBERT EDSOM
PAUL PICKARD
ORA CURLEY
IRENE B. HULL
RAYMOND HOUGH % DON REED
ED L. FARRIS
JOHN GIVENS
GEORGE NELSON
ROBERT BALL
ROBERT H. WALKER
AGNES JACKSON
ROLAND JACKSON
CHARLES GRUBBS
WM. H. WALKER
MELVIN JOHNSON % HARRY SMOOSE
MELVIN STONE
ETTA MAE JACKSON
BLOOMFIELD TRUSTEES % VIRGINIA L. MURRAY
VIRGINIA L. MURRAY
JAY BLOOMFIELD

MW1
MW2
MW3
MW4
MW5
MW6
MW7
MW8
MW9
MW10
MW11
MW12
MW13
W1
W2
W3
WP1
WP2
WP3
WP4
WP5
SW1
SW2
SW3
SW4
SW5
SW6
ST1
ST2
ST3
ST4
ST5

TANK FARM
WESTSIDE IRRIGATION DITCH
FARMER'S MUTUAL IRRIGATION DITCH
INTERCEPTOR TRENCH
DRAINAGE DITCH
REFINERY
MAVERIK STORE
APPROXIMATE PROPERTY BOUNDARY
U.S.
NEW MEXICO
MARSH

LEGEND

- PRIVATE WELL LOCATION
- EXISTING WELL LOCATION SAMPLED (W1 – W3)
- WELL POINT LOCATION (WP1 – WP5)
- MONITOR WELL LOCATION (MW1 – MW13)
- STAFF GAUGE LOCATION (ST1 – ST5)
- SURFACE WATER SAMPLE SITE LOCATION (SW1 – SW6, ROUND 2 SW2, 3 & 6 ONLY)
- INTERCEPTOR TRENCH LOCATION

200 0 200 400
SCALE IN FEET

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2–083–171, SHEET NUMBERS D–3–17–1 AND D–3–17–4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

SITE SAMPLING LOCATION MAP
ROUNDS 1 AND 2
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO

Dames & Moore

PLATE 2

APPENDIX A

WATER LEVEL ELEVATION DATA FOR LOCAL PRIVATE WATER WELLS, MONITOR WELLS AND SURFACE WATER SITES: ROUNDS 1 AND 2

APPENDIX A

ROUNDS 1 AND 2
WATER LEVEL ELEVATION DATA
FOR LOCAL PRIVATE WATER WELLS, MONITOR WELLS AND SURFACE WATER SITES

An electric water level probe was used during Round 1 (November 22-27, 1987) and Round 2 (February 24-25, 1988) to obtain static water levels to within 0.01 foot at the 13 monitor well sites, at the 5 well points and at the 19 to 21 private water wells accessible for measuring during Rounds 1 and 2 sampling, respectively. These sites are located on Plate A-1. Two private wells measured in Round 1 were not accessible in Round 2. Well casing measuring point elevations, ground surface elevations and Rounds 1 and 2 water level elevations are presented in Table A-1. The well depths and screened intervals are included in Table D-1 of the February 1988 report.

The Westside Irrigation Ditch was in use through late October 1987 but was not in use during Rounds 1 and 2 water level data reconnaissance. Consequently, the water level elevation measurements in the ditch primarily reflect the ground water level elevation in mid-November 1987 and late February 1988. Except for similar water level measurements at staff gauges ST-3 and ST-4 where there is significant ground water inflow along the Westside Irrigation Ditch, surface water levels to the north in the irrigation ditches and in the San Juan River declined from Round 1 to Round 2.

Both the Round 1 and Round 2 water level elevation data show that the water level elevations in MW-11 and MW-12, the two nested wells, located 33.5 feet apart, are essentially the same, and that there is no significant vertical hydraulic gradient from the upper silty-clayey sand zone to the deeper gravel zone. Based on the exact water level elevation data, the shallow zone had a slightly higher hydraulic potential. This can be accounted for by the horizontal distance between the wells and the horizontal hydraulic gradient. Consequently, any vertical hydraulic gradient that may exist is very small and not significant with respect to impacting vertical downward movement of contaminants to the deeper gravel zone.

As discussed in detail in the text and as summarized in Table A-1 and Plate A-1, significant ground water level declines from Round 1 to Round 2 of up to 5.65 feet were measured in the northern part of the study area. Ground water levels remained fairly stable in the southern part of the study area where the ground water levels are not as severely impacted by the Farmer's Mutual and Westside Irrigation Ditch.

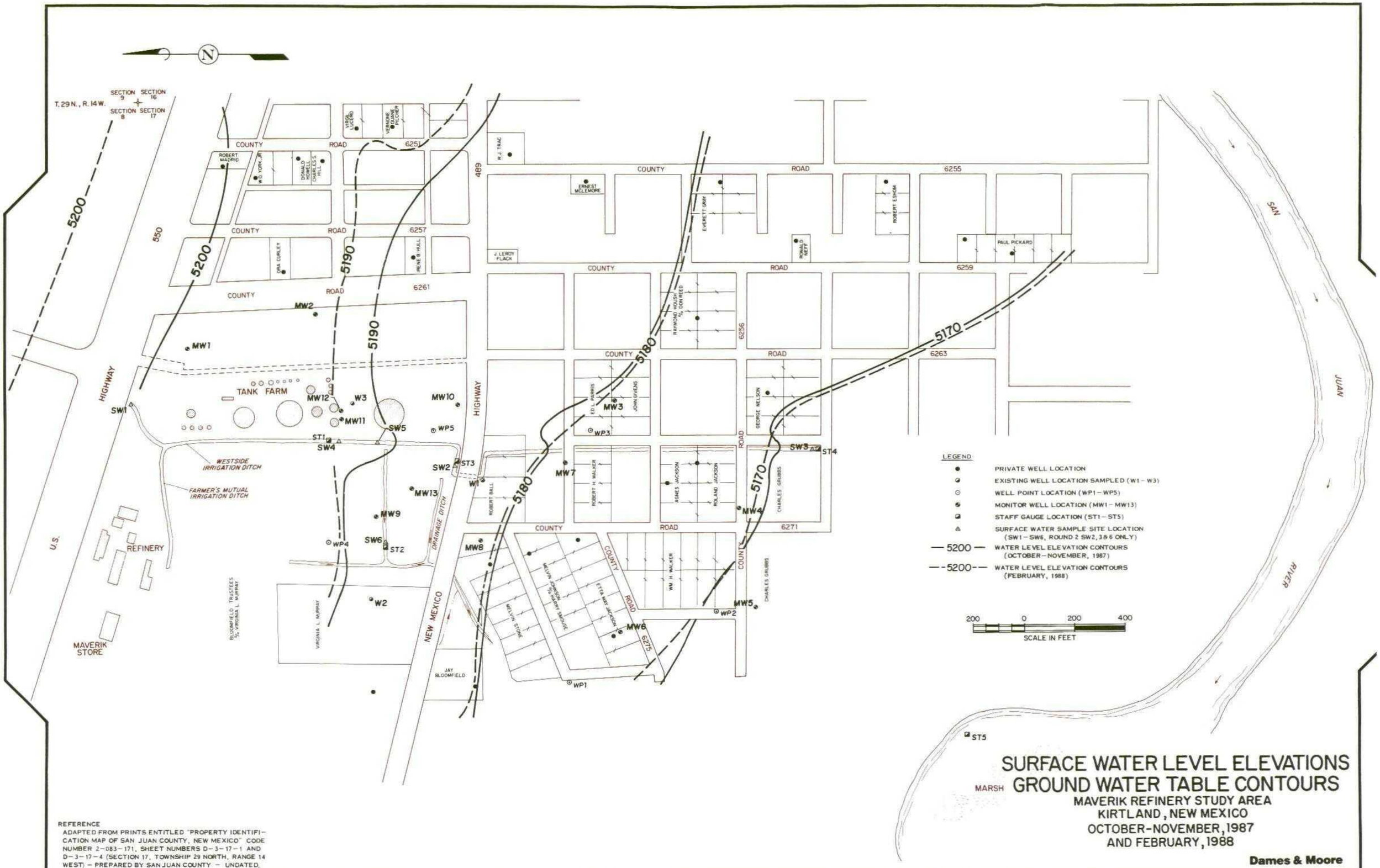
Water level elevations at all of the ground water and surface water sites will continue to be collected, with the next round of measurements scheduled for October 1988 during Round 3 water quality sampling.

TABLE A-1

WATER LEVEL ELEVATION DATA[1]
(Maverik Country Stores, Refinery Tank Farm, Kirtland, New Mexico)

Site Designation	Depth to[1] Water From Measuring Point (ft) Round 1	Round 2	Measuring Point Elevation (ft)		Water Level Elevation (ft) Round 1	Round 2	Water Level Change[4] (ft)	Ground Surface Elevation (ft)
Surface Water Sites								
Westside Irrigation Ditch								
Staff Gauge 1	3.90	Dry	5194.65		5190.75	-----	-----	-----
Staff Gauge 2	0.90	1.91	5186.60		5185.70	5184.69	-1.11	-----
Staff Gauge 3	2.70	2.71	5186.22		5183.52	5183.51	-0.01	-----
Staff Gauge 4	2.83	2.84	5171.59		5168.76	5168.75	-0.01	-----
San Juan River								
Staff Gauge 5	3.70	4.08	-----		-----	-----	-0.38	-----
Monitor Well Sites			Steel Casing	PVC Casing				
MW-1	8.15	13.8	5207.79	5207.24	5199.09	5193.44	-5.65	5205.75
MW-2	3.85	5.92	5197.10	5196.93	5193.08	5191.01	-2.07	5195.25
MW-3	3.40[3]	3.26	5183.00	5181.46	5179.6	5179.74	+0.14	5181.06
MW-4	6.71[3]	6.44	5178.41	5177.10	5171.7	5170.66	-1.04	5176.14
MW-5	5.72	5.84	5175.62	5175.09	5169.37	5169.25	-0.12	5173.67
MW-6	4.37	4.41	5176.40	5176.01	5172.03	5171.6	-0.43	5174.23
MW-7	5.13[3]	4.93	5183.71	5182.84	5178.58	5177.91	-0.67	5181.73
MW-8	4.09	4.27	5186.00	5185.87	5181.78	5181.6	-0.18	5184.02
MW-9	2.51	3.43	5191.39	5191.22	5188.71	5187.79	-0.92	5189.53
MW-10	2.70	3.43	5189.80	5189.30	5186.6	5185.87	-0.73	5187.47
MW-11	5.89	7.58	5197.26	5197.15	5191.26	5189.57	-1.69	5194.97
MW-12	4.86	6.35	5196.66	5196.19	5191.33	5189.84	-1.49	5194.80
MW-13	0.34	0.56	5187.76	N.A.	5187.42	5187.20	-0.22	5187.56
W-3	5.10	6.78	5196.40	N.A.	5191.30	5189.62	-1.68	5194.62
Well Drive Point Sites								
WP1	-	2.79	5175.61		-----	5172.82	-----	5175.07
WP2	3.65[2]	3.4	5173.43		5169.78	5170.03	+0.25	5173.30
WP3	3.0 [2]	1.44	5180.92		5177.92	5179.48	+1.56	5180.79
WP4	1.36	Dry	5193.19		5191.83	-----	-----	5193.11
WP5	0.34	1.35	5189.54		5189.20	5188.19	-1.01	5189.23
Private Wells (Inventoried)								
William Walker	No Access	No Access	5177.21		-----	-----	-----	
E.M. Jackson (House)	4.0	3.83	5175.73		5171.73	5171.9	+0.17	
(Field)	3.5	3.64	5175.85		5172.35	5172.21	-0.14	
H. Smouse	No Access	No Access	(Build. Locked)		-----	-----	-----	
M. Stone	No Access	No Access	-----		-----	-----	-----	
J. Bloomfield	8.06	No Access	5188.10		5180.04	-----	-----	
V. Murray (Corral)W-2	3.2	4.27	5191.69		5188.49	5187.42	-1.07	
(House)	3.55	5.74	-----		-----	-----	-2.19	
R. Ball W-1	2.33	2.53	5184.73		5182.40	5182.20	-0.20	
A. Jackson	No Access	No Access	5177.12		-----	-----	-----	
R. Jackson (Field)	4.95	4.63	5178.02		5173.07	5173.39	+0.32	
R. Housh	No Access	No Access	-----		-----	-----	-----	
R. Neff	5.22	4.47	5179.53		5174.31	5175.06	+0.75	
P. Pickard (Shed)	9.25	8.68	5180.14		5170.89	5171.46	+0.57	
(House)	No Access	No Access	5180.15		-----	-----	-----	
R. Eshome	6.65	5.98	5179.76		5173.11	5173.78	+0.67	
G. Nelson	7.50	7.07	5178.40		5170.90	5171.33	+0.43	
E. Mclemore	1.59	1.97	5186.15		5184.56	5184.18	-0.36	
E. Grey	No Access	No Access	-----		-----	-----	-----	
I. Hull	4.49	4.98	5194.32		5189.83	5189.34	-0.49	
C. Curley	4.68	7.85	5199.95		5195.27	5192.1	-3.17	
R. Madrid	8.23	13.48	5208.89		5200.66	5195.41	-5.25	
W. York	8.80	11.25	5206.05		5197.25	5194.8	-2.45	
C. Hill	6.40	9.47	5202.54		5196.14	5193.07	-3.07	
D. Pilcher	6.61	8.85	5201.51		5194.90	5192.66	-2.24	
D. Howell	8.18	No Access	5204.53		5196.35	-----	-----	
R. Tracey	1.63	2.39	5190.32		5188.69	5187.93	-0.76	
V. Lucero	7.33	9.94	5200.16		5192.83	5190.22	-2.61	

(1) Measured November 22 - 27, 1987, for Round 1; and February 24-25, 1988 for Round 2, except where footnote (2) designated
(2) Measured October 30, 1987
(3) Measured from the top of the steel casing, for Round 1 only.
(4) A negative number indicates a water level decline from Round 1 to Round 2. Round 1 measurements were taken immediately after irrigation ditch flows ceased. Round 2 measurements were taken about 3 months later, just prior to irrigation ditch flow start-up.



SURFACE WATER LEVEL ELEVATIONS GROUND WATER TABLE CONTOURS

MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
OCTOBER-NOVEMBER, 1987
AND FEBRUARY, 1988

Dames & Moore

REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) - PREPARED BY SAN JUAN COUNTY - UNDATED.

PLATE A-1

APPENDIX B

FIELD AND LABORATORY WATER QUALITY DATA FOR ROUNDS 1 AND 2 SAMPLING AND ANALYSES, AND QA/QC FOR ROUND 2

APPENDIX B

FIELD AND LABORATORY WATER QUALITY DATA FOR ROUNDS 1 AND 2
SAMPLING AND ANALYSES AND QA/QC FOR ROUND 2

WATER QUALITY SAMPLING

After purging the monitor wells with a teflon bailer and purging the three existing wells (W-1, W-2 and W-3) with a centrifugal pump, ground water and surface water samples were collected, preserved and analyzed in accordance with EPA guidance. Field measurements for pH, conductivity and temperature were measured by Dames & Moore at the time the water quality samples were collected. A Beckman No. 21 digital pH meter and an Amber Science, Inc. No. 605 electric conductivity meter were used and calibrated using solution standards of pH 4.0 and 10.0 buffer solutions and potassium chloride solutions of 718 umhos/cm and 6680 umhos/cm, respectively. Bottom samples were collected after 3 to 5 casing volumes of water had been removed, using a teflon bailer with an end ball valve lowered to the bottom of the wells.

Drop pipes were installed in monitor wells MW-12 and MW-13 and well W-3 prior to Round 2 sampling. These consist of 1-inch diameter PVC pipe that extends above the water table down into the 2-inch PVC casing and below the upper oil phase. The drop pipes block out contact of the teflon bailer with the product when the bailer is lowered. These were installed after a free oil phase had been detected in these monitor wells during Round 1 sampling. Such a phase was present only in monitor wells MW-12 and MW-13, and well W-3. The water quality samples from both Rounds 1 and 2 were sampled from below the upper oil phase. However, the Round 1 sample from monitor well 12 had been contaminated with product because the drop pipe had not yet been installed. This contamination of MW-12 in Round 1 was confirmed with RMAL. There was no contamination in Round 2.

Sample bottles, with appropriate preservatives (as detailed in RMAL's report, herein), were shipped directly to the site by RMAL. All samples were iced immediately after collection and shipped to RMAL on the day of collection via overnight courier. Chain-of-custody documentation was maintained.

LABORATORY ANALYSIS

RMAL conducted the analysis on the water quality samples for both Round 1 and Round 2. A listing of the major inorganic and organic parameters for Rounds 1 and 2 are included in Table B-2 and are presented in columns for comparative purposes. The detailed report from RMAL for Round 2 analyses is also included in this appendix.

WATER QUALITY ANALYSES

Round 2 water quality analyses included the same comprehensive list of analytes as Round 1 with the addition of manganese. RMAL conducted analyses for 26 halogenated volatile organics, 9 aromatic volatile organics, total organic lead, 6 metals and 11 common ions and indicator parameters. The specific parameters are listed in Table 1 along with the analytical methods used. GC methods (601 and 602) were used to detect volatile organics in all water samples with the exception of one ground water sample (MW-12). Because of the presence of significant levels of volatiles a GC/MS method (624) was employed for the MW-12 sample.

Sample sites SW-1 and SW-4 could not be sampled during Round 2 sampling since they were dry. Sample sites SW-2 and SW-3 were not sampled as they consisted only of ground water inflow and site SW-5 was not sampled since it consisted entirely of product.

All water samples were analyzed for the full suite of parameters listed on Table 1. As with the Round 1 sampling, field OVA readings taken directly above the bottom of the ditch at sites SW-4 and SW-5 measured greater than 1,000 ppm volatile organics. As discussed in the text, elevated OVA readings were measured from SW-4 south along a 350-foot length of the Westside Irrigation Ditch.

ROCKY MOUNTAIN ANALYTICAL LABORATORY QA/QC PROGRAM

All analyses were conducted within approved holding times except for MW-11 and its duplicate. Consequently, this well was resampled and reanalyzed for the volatile organics in March 1988. Ion balances, detailed in RMAL's report, were all within the acceptance limits of ± 5 percent except for MW-10 with a percentage difference of -5.4. This difference was probably the result of high levels of sodium and sulfate.

Round 2 accuracy and precision of Laboratory Control Samples and Surrogate Control Samples for the organic compounds found on-site were within acceptance limits.

Two trip blanks were analyzed for volatile organics. Methylene chloride was detected in Round 2 in one sample at 11 ug/l and in the other at 8.3 ug/l and in Round 1 at 11 ug/l and 9 ug/l. Laboratory contamination with this compound is very common and these levels are acceptable. No detections of this compound were made in any of the water samples or the equipment blank.

As in Round 1, an equipment blank was analyzed in Round 2 for the entire suite of parameters. No organics were detected and the concentrations of inorganics detected were in the range expected of the distilled water used to flush the equipment.

A duplicate of the sample from MW-11 was subjected to the full suite of analyses in Round 2. The relative percent difference for benzene between the two samples was not within acceptable limits. The benzene levels in the first two MW-11 samples were 25 ug/l and 3.8 ug/l. A third sample, taken about one month later, before irrigation flow began in the Westside Irrigation Ditch, did not indicate the presence of benzene in MW-11 above the 0.5 ug/l detection limit.

As indicated by RMAL in their "Overview," DCA was detected at 30 ug/l at W-3 in Round 2, whereas it was not detected in Round 1. We know of no explanation for this change. The wide range in concentrations of several volatile organics for MW-12 from Round 1 to Round 2 may be due to dilution impacts from the irrigation ditch waters at the time of Round 1 sampling.

TABLE B-1

FIELD WATER QUALITY DATA ROUNDS 1 AND 2 SAMPLING[1,2]
(Maverik Country Stores, Inc., Kirtland, New Mexico)

Sample Site Designation	Conductivity (umhos/cm)		pH		Temperature °C		Flow CFS		Remarks	
Ground Water	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
MW-1	400	595	9.64	7.51	15.3	14.9			No oil or sheen noted in glass bailer	Same Conditions
MW-2	1,100	2,000	7.75	6.63	14.2	9.7			No oil or sheen noted in glass bailer	Same Conditions
MW-3	1,080	1,700	7.78	7.16	12.0	8.9			No oil or sheen noted in glass bailer	Same Conditions
MW-4	1,510	1,500	7.46	7.31	14.1	10.8			No oil or sheen noted in glass bailer	Same Conditions
MW-5	1,310	1,340	7.85	7.19	15.5	10.8			No oil or sheen noted in glass bailer	Same Conditions
MW-6	1,880	2,050	7.51	7.18	12.1	7.9			No oil or sheen noted in glass bailer	Slight odor, yellow particulates
MW-7	1,060	1,600	7.66	7.03	13.5	11.0			No oil or sheen noted in glass bailer	Same Conditions
MW-8	1,060	1,210	7.41	7.00	14.8	12.0			No oil or sheen noted in glass bailer	Same Conditions
MW-9	1,400	2,200	7.11	7.08	13.3	13.9			No oil or sheen noted in glass bailer	Same Conditions
MW-10	1,280	3,600	7.66	8.22	12.5	9.1			No oil or sheen noted in glass bailer	Same Conditions
MW-11	1,050	2,050	7.85	7.80	14.5	15.3			No oil or sheen noted in glass bailer	Same Conditions
MW-12	1,510	2,010	6.74	7.25	17.0	12.2			Yellow sheen, odoriferous	Same Conditions
MW-13	2,300	2,600	8.14	8.36	8.1	8.6			Yellow sheen, no odor, multi-colored	Same Conditions
Ball Well (W-1)	3,500	3,400	7.96	8.63	14.3	13.5			No oil or sheen noted in glass bailer	Same Conditions
V. Murray Well (W-2)	700	840	8.06	8.55	12.9	13.0			No oil or sheen noted in glass bailer	Same Conditions
On-Site Steel Well (W-3)	-	1,500	-	7.72	-	14.3			Yellow sheen, odoriferous	Same Conditions
Surface Water	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
SW-1 Farmers Mutual Irrigation Ditch (Upstream)	280	-[3]	8.5	-[3]	6.5	-[3]	46,675gpm	Dry	No distinct oil or sheen noted	Same Conditions
SW-2 West Irrigation Ditch (at Hwy 489)	1,080	1,800	7.60	7.41	10.0	8.9	<5gpm	1-2gpm	No distinct oil or sheen noted	Same Conditions. Ground water inflow only.
SW-3 West Irrigation Ditch (Downstream)	1,210	1,620	8.05	8.16	6.8	8.3	5gpm	2-3gpm	No distinct oil or sheen noted	Same Conditions. Ground water inflow only.
SW-4 West Irrigation Ditch (Across from Tank Farm)	565	-[3]	7.28	-[3]	7.8	-[3]	<5gpm	Dry	Distinct oil and sheen noted	Dry
SW-5 West Irrigation Ditch (Across from Tank Farm)	Upper surface layer too contaminated to lower probes through for field tests.[3]						<5gpm	Ponded	Distinct oil and sheen noted	Same Conditions. Pooled product. Highly contaminated and not sampled for Round 2.
SW-6 V. Murray's Ditch (West of Tank Farm)	3,080	3,150	7.28	7.95	14.2	15.4	<2gpm	<0.5gpm	Distinct oil and sheen noted	No distinct oil or sheen

(1) Round 1 Data
(2) Round 2 Data
(3) - Indicates no sample collected, where dry or not representative of the surface water.

TABLE B-2
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-1		MW-1	
DATE SAMPLED	11-11-87		2-22-88	
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		44.0		112.0
Magnesium (Mg)		6.4		17.0
Sodium (Na)		44.0		50.0
Potassium (K)	<	5.0	<	5.0
Iron (Fe)	<	.05	<	.05
Manganese (Mn)		*		.013
Ammonia (as N)	<	.1	<	.1
Chloride (Cl)		26.0		33.0
Sulfate (SO4)		176.		198.
Fluoride (F)		.4		.3
Nitrate and Nitrite (as N)		.2		.7
Total Alkalinity		20.4		159.0
Bicarbonate Alkalinity		20.4		159.0
Carbonate Alkalinity		5.0		*
Bicarbonate (HCO3)		24.9		193.9
Carbonate (CO3)		3.0		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		15.3		*
Field pH		9.64		7.51
Lab pH (units)		8.60		7.85
Field Conductivity (umhos/cm		400.0		595.0
Lab Conductivity (umhos/cm)		497.0		755.0
Total Dissolved Solids(mg/l)		360.0		537.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene		.53	<	.50
Ethylbenzene	<	.50	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene	<	.50	<	.50
Total Xylene		*		*
1,2 Dichloroethane	<	1.00	<	1.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.010	<	.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 2)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-2	MW-2
DATE SAMPLED	11-11-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	152.0	268.0
Magnesium (Mg)	25.0	43.0
Sodium (Na)	243.0	334.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	1.100
Ammonia (as N)	< .1	< .1
Chloride (Cl)	67.0	101.0
Sulfate (SO4)	526.	955.
Fluoride (F)	.4	.3
Nitrate and Nitrite (as N)	.4	< .1
Total Alkalinity	309.0	365.0
Bicarbonate Alkalinity	309.0	365.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	376.7	445.0
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	14.2	*
Field pH	7.75	6.63
Lab pH (units)	7.65	7.63
Field Conductivity (umhos/cm	1100.0	2000.0
Lab Conductivity (umhos/cm)	1770.0	2500.0
Total Dissolved Solids(mg/l)	1360.0	2000.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .004	.004

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 3)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		MW-3		MW-3
DATE SAMPLED		11-11-87		2-22-88
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		148.0		167.0
Magnesium (Mg)		21.0		24.0
Sodium (Na)		349.0		377.0
Potassium (K)	<	5.0	<	5.0
Iron (Fe)	<	.05	<	.05
Manganese (Mn)		*		.640
Ammonia (as N)	<	.1	<	.1
Chloride (Cl)		97.0		138.0
Sulfate (SO4)		670.		713.
Fluoride (F)		.8		.8
Nitrate and Nitrite (as N)		.2		.3
Total Alkalinity		214.8		387.0
Bicarbonate Alkalinity		214.8		387.0
Carbonate Alkalinity	<	5.0		*
Bicarbonate (HCO3)		261.9		471.8
Carbonate (CO3)	<	3.0		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		12.0		*
Field pH		7.78		7.16
Lab pH (units)		7.53		7.58
Field Conductivity (umhos/cm		1080.0		1700.0
Lab Conductivity (umhos/cm)		2160.0		2300.0
Total Dissolved Solids(mg/l)		1620.0		1730.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene	<	.50	<	.50
Ethylbenzene	<	.50	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene	<	.50	<	.50
Total Xylene		*		*
1,2 Dichloroethane	<	1.00	<	1.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.010		.005

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 4)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-4	MW-4
DATE SAMPLED	11-10-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	142.0	131.0
Magnesium (Mg)	20.0	19.0
Sodium (Na)	337.0	294.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	.780
Ammonia (as N)	< .1	< .1
Chloride (Cl)	87.0	73.0
Sulfate (SO4)	654.	601.
Fluoride (F)	.8	.7
Nitrate and Nitrite (as N)	.3	.2
Total Alkalinity	332.0	332.0
Bicarbonate Alkalinity	332.0	332.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	404.8	404.8
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	14.1	*
Field pH	7.46	7.31
Lab pH (units)	7.44	7.84
Field Conductivity (umhos/cm	1510.0	1500.0
Lab Conductivity (umhos/cm)	2060.0	1920.0
Total Dissolved Solids(mg/l)	1540.0	1380.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .002	.003

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 5)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-5	MW-5
DATE SAMPLED	11-10-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	129.0	142.0
Magnesium (Mg)	20.0	22.0
Sodium (Na)	258.0	244.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	.760
Ammonia (as N)	< .1	< .1
Chloride (Cl)	68.0	61.0
Sulfate (SO4)	499.	545.
Fluoride (F)	.8	.7
Nitrate and Nitrite (as N)	.2	.3
Total Alkalinity	397.0	301.0
Bicarbonate Alkalinity	397.0	301.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	484.0	367.0
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	15.5	*
Field pH	7.85	7.19
Lab pH (units)	7.42	7.60
Field Conductivity (umhos/cm	1310.0	1340.0
Lab Conductivity (umhos/cm)	1730.0	1700.0
Total Dissolved Solids(mg/l)	1250.0	1190.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .020	.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 6)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-6	MW-6
DATE SAMPLED	11-11-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	230.0	267.0
Magnesium (Mg)	33.0	37.0
Sodium (Na)	386.0	361.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	2.300
Ammonia (as N)	< .1	< .1
Chloride (Cl)	288.0	260.0
Sulfate (SO4)	843.	960.
Fluoride (F)	.6	.5
Nitrate and Nitrite (as N)	< .1	< .1
Total Alkalinity	367.0	324.0
Bicarbonate Alkalinity	367.0	324.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	447.5	395.0
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	12.1	*
Field pH	7.51	7.18
Lab pH (units)	7.42	7.53
Field Conductivity (umhos/cm	1880.0	2050.0
Lab Conductivity (umhos/cm)	2870.0	2700.0
Total Dissolved Solids(mg/l)	2130.0	2000.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	16.00	7.70
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	.004	.005

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 7)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-7	MW-7
DATE SAMPLED	11-11-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	152.0	205.0
Magnesium (Mg)	22.0	29.0
Sodium (Na)	256.0	266.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	.480
Ammonia (as N)	< .1	< .1
Chloride (Cl)	126.0	169.0
Sulfate (SO4)	558.	675.
Fluoride (F)	.6	.5
Nitrate and Nitrite (as N)	.7	1.0
Total Alkalinity	166.2	320.0
Bicarbonate Alkalinity	166.2	320.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	202.6	390.2
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	13.5	*
Field pH	7.66	7.03
Lab pH (units)	7.40	7.64
Field Conductivity (umhos/cm	1060.0	1600.0
Lab Conductivity (umhos/cm)	1840.0	2100.0
Total Dissolved Solids(mg/l)	1400.0	1510.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	.020	.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 8)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-8	MW-8
DATE SAMPLED	11-23-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	159.0	193.0
Magnesium (Mg)	21.0	26.0
Sodium (Na)	166.0	174.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	2.700
Ammonia (as N)	< .1	< .1
Chloride (Cl)	67.0	65.0
Sulfate (SO4)	401.	605.
Fluoride (F)	.7	.6
Nitrate and Nitrite (as N)	< .1	< .1
Total Alkalinity	273.0	256.0
Bicarbonate Alkalinity	273.0	256.0
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	332.9	312.1
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	14.8	*
Field pH	7.41	7.00
Lab pH (units)	7.52	7.61
Field Conductivity (umhos/cm	1060.0	1210.0
Lab Conductivity (umhos/cm)	1500.0	1640.0
Total Dissolved Solids(mg/l)	950.0	1230.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	2.80	1.10
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .020	< .004

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 9)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-9	MW-9
DATE SAMPLED	11-23-87	2-22-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	324.0	396.0
Magnesium (Mg)	29.0	41.0
Sodium (Na)	146.0	357.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	.110
Ammonia (as N)	< .1	< .1
Chloride (Cl)	43.0	81.0
Sulfate (SO4)	863.	1510.
Fluoride (F)	1.0	.8
Nitrate and Nitrite (as N)	< .1	< .1
Total Alkalinity	372.0	250.0
Bicarbonate Alkalinity	372.0	250.0
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	453.6	304.8
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	13.3	*
Field pH	7.11	7.08
Lab pH (units)	7.59	7.71
Field Conductivity (umhos/cm	1400.0	2200.0
Lab Conductivity (umhos/cm)	1850.0	3000.0
Total Dissolved Solids(mg/l)	1520.0	2160.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	8.30	8.60
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .010	.004

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 10)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-10	MW-10
DATE SAMPLED	11-23-87	2-23-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	126.0	196.0
Magnesium (Mg)	22.0	41.0
Sodium (Na)	250.0	578.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	< .05	< .05
Manganese (Mn)	*	5.200
Ammonia (as N)	< .1	< .1
Chloride (Cl)	46.0	191.0
Sulfate (SO4)	568.	1640.
Fluoride (F)	.8	.7
Nitrate and Nitrite (as N)	< .1	< .1
Total Alkalinity	153.0	271.0
Bicarbonate Alkalinity	153.0	271.0
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	186.5	330.4
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	12.5	*
Field pH	7.66	8.22
Lab pH (units)	7.74	7.70
Field Conductivity (umhos/cm	1280.0	3600.0
Lab Conductivity (umhos/cm)	1640.0	3720.0
Total Dissolved Solids(mg/l)	1240.0	2725.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	3.20	1.30
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .020	.009

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 11)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		MW-11		MW-11		MW-11
DATE SAMPLED		11-11-87		2-23-88		3-23-88
INORGANIC PARAMETERS (mg/L except as noted)						
Calcium (Ca)		138.0		186.0		*
Magnesium (Mg)		21.0		28.0		*
Sodium (Na)		234.0		263.0		*
Potassium (K)	<	5.0	<	5.0		*
Iron (Fe)	<	.05	<	.05		*
Manganese (Mn)		*		1.000		*
Ammonia (as N)	<	.1	<	.1		*
Chloride (Cl)		45.0		184.0		*
Sulfate (SO4)		592.		615.		*
Fluoride (F)		.5		.5		*
Nitrate and Nitrite (as N)	<	.1	<	.1		*
Total Alkalinity		267.0		242.0		*
Bicarbonate Alkalinity		267.0		242.0		*
Carbonate Alkalinity	<	5.0		*		*
Bicarbonate (HCO3)		325.5		295.1		*
Carbonate (CO3)	<	3.0		*		*
FIELD AND LABORATORY MEASUREMENTS						
Temperature (Degrees C)		14.5		*		*
Field pH		7.85		7.80		*
Lab pH (units)		7.80		7.62		*
Field Conductivity (umhos/cm		1050.0		2050.0		*
Lab Conductivity (umhos/cm)		1720.0		2120.0		*
Total Dissolved Solids(mg/l)		1250.0		1470.0		*
VOLATILE ORGANICS DETECTED (ug/L)						
Benzene		.81		25.00+	<	.50
Ethylbenzene	<	.50	<	.50	<	.50
Toluene	<	.50	<	.50	<	.50
m-Xylene	<	.50	<	.50	<	.50
o,p-Xylene	<	.50	<	.50	<	.50
Total Xylene		*		*		*
1,2 Dichloroethane		1.00		4.60	<	.50
TOTAL ORGANIC LEAD (mg/L)						
Total Organic Lead		.007	<	.004		*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 12)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		MW-12		MW-12
DATE SAMPLED		11-27-87		2-23-88
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		148.0		133.0
Magnesium (Mg)		42.0		39.0
Sodium (Na)		222.0		239.0
Potassium (K)	<	5.0	<	5.0
Iron (Fe)		.13		.09
Manganese (Mn)		*		3.600
Ammonia (as N)	<	.1	<	.1
Chloride (Cl)		321.0		360.0
Sulfate (SO4)		16.		9.
Fluoride (F)		.3		.3
Nitrate and Nitrite (as N)	<	.1	<	.1
Total Alkalinity		508.0		541.0
Bicarbonate Alkalinity		508.0		541.0
Carbonate Alkalinity		*		*
Bicarbonate (HCO3)		619.4		659.6
Carbonate (CO3)		*		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		17.0		*
Field pH		6.74		7.25
Lab pH (units)		6.99		7.05
Field Conductivity (umhos/cm		1510.0		2010.0
Lab Conductivity (umhos/cm)		1930.0		2070.0
Total Dissolved Solids(mg/l)		1200.0		1310.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene		19000.00		24000.00
Ethylbenzene		1300.00		1500.00
Toluene		2000.00		20000.00
m-Xylene		*		*
o,p-Xylene		*		*
Total Xylene		3000.00		10000.00
1,2 Dichloroethane		450.00		2400.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.020		.060

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 13)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	MW-13	MW-13
DATE SAMPLED	11-27-87	2-24-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	364.0	219.0
Magnesium (Mg)	105.0	47.0
Sodium (Na)	666.0	370.0
Potassium (K)	24.0	< 5.0
Iron (Fe)	.39	.12
Manganese (Mn)	*	1.900
Ammonia (as N)	.5	.5
Chloride (Cl)	257.0	82.0
Sulfate (SO4)	1980.	920.
Fluoride (F)	1.0	.8
Nitrate and Nitrite (as N)	.3	< .1
Total Alkalinity	419.0	581.0
Bicarbonate Alkalinity	419.0	581.0
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	510.9	708.4
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	8.1	*
Field pH	8.14	8.36
Lab pH (units)	7.89	8.11
Field Conductivity (umhos/cm	2300.0	2600.0
Lab Conductivity (umhos/cm)	4300.0	2650.0
Total Dissolved Solids(mg/l)	3700.0	1850.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	.54	< .50
Toluene	< .50	< .50
m-Xylene	1.40	1.10
o,p-Xylene	.83	.58
Total Xylene	*	*
1,2 Dichloroethane	< .50	1.90
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .010	< .004

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 14)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		MW-1DUP		MW-11DUP
DATE SAMPLED		11-11-87		2-23-88
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		44.0		182.0
Magnesium (Mg)		6.2		28.0
Sodium (Na)		43.0		277.0
Potassium (K)	<	5.0	<	5.0
Iron (Fe)	<	.05		.19
Manganese (Mn)		*		1.200
Ammonia (as N)	<	.1	<	.1
Chloride (Cl)		25.0		171.0
Sulfate (SO4)		178.		615.
Fluoride (F)		.4		.5
Nitrate and Nitrite (as N)		.2	<	.1
Total Alkalinity		16.8		254.0
Bicarbonate Alkalinity		16.8		254.0
Carbonate Alkalinity		15.0		*
Bicarbonate (HCO3)		20.5		309.7
Carbonate (CO3)		9.0		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		*		*
Field pH		*		*
Lab pH (units)		9.01		7.64
Field Conductivity (umhos/cm		*		*
Lab Conductivity (umhos/cm)		488.0		2130.0
Total Dissolved Solids(mg/l)		360.0		1470.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene	<	.50		3.80
Ethylbenzene	<	.50	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene	<	.50	<	.50
Total Xylene		*		*
1,2 Dichloroethane	<	1.00		3.60
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.020		.003

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 15)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	W-1		W-1	
DATE SAMPLED	11-20-87		2-23-88	
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		25.0		15.0
Magnesium (Mg)		3.8		2.6
Sodium (Na)		1020.0		696.0
Potassium (K)	<	5.0	<	5.0
Iron (Fe)	<	.10	<	.05
Manganese (Mn)		*		.021
Ammonia (as N)		.3	<	.1
Chloride (Cl)		1170.0		527.0
Sulfate (SO4)		433.		610.
Fluoride (F)		1.0		1.2
Nitrate and Nitrite (as N)	<	.1	<	.1
Total Alkalinity		221.0		289.0
Bicarbonate Alkalinity		221.0		289.0
Carbonate Alkalinity		*		*
Bicarbonate (HCO3)		269.5		352.4
Carbonate (CO3)		*		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		14.3		*
Field pH		7.96		8.63
Lab pH (units)		8.38		8.39
Field Conductivity (umhos/cm		3500.0		3400.0
Lab Conductivity (umhos/cm)		4520.0		3360.0
Total Dissolved Solids(mg/l)		2300.0		2140.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene	<	.50	<	.50
Ethylbenzene	<	.89	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene	<	.50	<	.50
Total Xylene		*		*
1,2 Dichloroethane	<	1.00	<	1.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.020	<	.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 16)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		W-2		W-2
DATE SAMPLED		11-23-87		2-24-88
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		42.0		28.0
Magnesium (Mg)		28.0		26.0
Sodium (Na)		147.0		126.0
Potassium (K)		13.0		7.0
Iron (Fe)		.31	<	.05
Manganese (Mn)		*		.032
Ammonia (as N)		.9		.7
Chloride (Cl)		43.0		37.0
Sulfate (SO4)		114.		97.
Fluoride (F)		.4		.2
Nitrate and Nitrite (as N)	<	.1	<	.1
Total Alkalinity		368.0		297.0
Bicarbonate Alkalinity		368.0		297.0
Carbonate Alkalinity		*		*
Bicarbonate (HCO3)		448.7		362.1
Carbonate (CO3)		*		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		12.9		*
Field pH		8.06		8.55
Lab pH (units)		8.24		8.25
Field Conductivity (umhos/cm		700.0		840.0
Lab Conductivity (umhos/cm)		895.0		845.0
Total Dissolved Solids(mg/l)		600.0		640.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene		1.00	<	.50
Ethylbenzene	<	.50	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene	<	.50	<	.50
Total Xylene		*		*
1,2 Dichloroethane	<	1.00	<	1.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.010	<	.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 17)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	W-3	W-3
DATE SAMPLED	11-27-87	2-23-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	*	103.0
Magnesium (Mg)	*	22.0
Sodium (Na)	*	207.0
Potassium (K)	*	6.0
Iron (Fe)	*	< .05
Manganese (Mn)	*	.280
Ammonia (as N)	*	9.8
Chloride (Cl)	*	50.0
Sulfate (SO4)	*	387.
Fluoride (F)	*	.4
Nitrate and Nitrite (as N)	*	1.1
Total Alkalinity	*	363.0
Bicarbonate Alkalinity	*	363.0
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	*	442.6
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	*	*
Field pH	*	7.72
Lab pH (units)	*	7.81
Field Conductivity (umhos/cm	*	1500.0
Lab Conductivity (umhos/cm)	*	1550.0
Total Dissolved Solids(mg/l)	*	960.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	1.30	< .50
Toluene	< .50	< .50
m-Xylene	2.60	< .50
o,p-Xylene	3.20	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	30.00+
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	*	.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 18)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		SW-1	SW-1
DATE SAMPLED		11-10-87	0- 0- 0
INORGANIC PARAMETERS (mg/L except as noted)			
Calcium (Ca)		86.0	*
Magnesium (Mg)		13.0	*
Sodium (Na)		29.0	*
Potassium (K)	<	5.0	*
Iron (Fe)	<	.05	*
Manganese (Mn)		*	*
Ammonia (as N)	<	.1	*
Chloride (Cl)		16.0	*
Sulfate (SO4)		136.	*
Fluoride (F)		.3	*
Nitrate and Nitrite (as N)		.3	*
Total Alkalinity		159.0	*
Bicarbonate Alkalinity		159.0	*
Carbonate Alkalinity	<	5.0	*
Bicarbonate (HCO3)		193.9	*
Carbonate (CO3)	<	3.0	*
FIELD AND LABORATORY MEASUREMENTS			
Temperature (Degrees C)		6.5	*
Field pH		8.50	*
Lab pH (units)		8.12	*
Field Conductivity (umhos/cm		280.0	*
Lab Conductivity (umhos/cm)		581.0	*
Total Dissolved Solids(mg/l)		400.0	*
VOLATILE ORGANICS DETECTED (ug/L)			
Benzene	<	.50	*
Ethylbenzene	<	.50	*
Toluene	<	.50	*
m-Xylene	<	.50	*
o,p-Xylene	<	.50	*
Total Xylene		*	*
1,2 Dichloroethane	<	1.00	*
TOTAL ORGANIC LEAD (mg/L)			
Total Organic Lead	<	.002	*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 19)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		SW-2		SW-2
DATE SAMPLED		11-10-87		2-24-88
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		162.0		147.0
Magnesium (Mg)		26.0		25.0
Sodium (Na)		159.0		190.0
Potassium (K)	<	5.0	<	5.0
Iron (Fe)	<	.05	<	.05
Manganese (Mn)		*		.550
Ammonia (as N)	<	.1		.2
Chloride (Cl)		49.0		50.0
Sulfate (SO4)		476.		550.
Fluoride (F)		.4		.5
Nitrate and Nitrite (as N)		1.5		.7
Total Alkalinity		277.0		274.0
Bicarbonate Alkalinity		277.0		274.0
Carbonate Alkalinity	<	5.0		*
Bicarbonate (HCO3)		337.7		334.1
Carbonate (CO3)	<	3.0		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		10.0		*
Field pH		7.60		7.41
Lab pH (units)		7.64		7.82
Field Conductivity (umhos/cm		1080.0		1800.0
Lab Conductivity (umhos/cm)		1480.0		1680.0
Total Dissolved Solids(mg/l)		1120.0		1210.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene	<	.50	<	.50
Ethylbenzene	<	.50	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene		1.60	<	.50
Total Xylene		*		*
1,2 Dichloroethane		1.10	<	1.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.002		.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 20)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	SW-3	SW-3
DATE SAMPLED	11-10-87	2-24-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	178.0	146.0
Magnesium (Mg)	32.0	26.0
Sodium (Na)	223.0	205.0
Potassium (K)	< 5.0	< 5.0
Iron (Fe)	.06	.13
Manganese (Mn)	*	.160
Ammonia (as N)	< .1	< .1
Chloride (Cl)	77.0	52.0
Sulfate (SO4)	602.	550.
Fluoride (F)	.6	.5
Nitrate and Nitrite (as N)	1.0	.5
Total Alkalinity	297.0	253.0
Bicarbonate Alkalinity	297.0	253.0
Carbonate Alkalinity	< 5.0	*
Bicarbonate (HCO3)	362.1	308.5
Carbonate (CO3)	< 3.0	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	6.8	*
Field pH	8.05	8.16
Lab pH (units)	8.00	8.19
Field Conductivity (umhos/cm	1210.0	1620.0
Lab Conductivity (umhos/cm)	1830.0	1650.0
Total Dissolved Solids(mg/l)	1400.0	1200.0
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< 1.00	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	< .010	< .004

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 21)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		SW-4	SW-4
DATE SAMPLED		11-10-87	0- 0- 0
INORGANIC PARAMETERS (mg/L except as noted)			
Calcium (Ca)		113.0	*
Magnesium (Mg)		17.0	*
Sodium (Na)		40.0	*
Potassium (K)	<	5.0	*
Iron (Fe)		.12	*
Manganese (Mn)		*	*
Ammonia (as N)	<	.0	*
Chloride (Cl)		29.0	*
Sulfate (SO4)		147.	*
Fluoride (F)		.3	*
Nitrate and Nitrite (as N)	<	.1	*
Total Alkalinity		253.0	*
Bicarbonate Alkalinity		253.0	*
Carbonate Alkalinity	<	5.0	*
Bicarbonate (HCO3)		308.5	*
Carbonate (CO3)	<	3.0	*
FIELD AND LABORATORY MEASUREMENTS			
Temperature (Degrees C)		7.8	*
Field pH		7.28	*
Lab pH (units)		7.29	*
Field Conductivity (umhos/cm		565.0	*
Lab Conductivity (umhos/cm)		790.0	*
Total Dissolved Solids(mg/l)		790.0	*
VOLATILE ORGANICS DETECTED (ug/L)			
Benzene		*	*
Ethylbenzene		*	*
Toluene		*	*
m-Xylene		*	*
o,p-Xylene		*	*
Total Xylene		*	*
1,2 Dichloroethane		10.00	*
TOTAL ORGANIC LEAD (mg/L)			
Total Organic Lead		.300	*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 22)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	SW-5	SW-5
DATE SAMPLED	11-10-87	0- 0- 0
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	*	*
Magnesium (Mg)	*	*
Sodium (Na)	*	*
Potassium (K)	*	*
Iron (Fe)	*	*
Manganese (Mn)	*	*
Ammonia (as N)	*	*
Chloride (Cl)	*	*
Sulfate (SO4)	*	*
Fluoride (F)	*	*
Nitrate and Nitrite (as N)	*	*
Total Alkalinity	*	*
Bicarbonate Alkalinity	*	*
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	*	*
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	*	*
Field pH	*	*
Lab pH (units)	*	*
Field Conductivity (umhos/cm	*	*
Lab Conductivity (umhos/cm)	*	*
Total Dissolved Solids(mg/l)	*	*
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< 250.00	*
Ethylbenzene	2500.00	*
Toluene	470.00	*
m-Xylene	*	*
o,p-Xylene	*	*
Total Xylene	*	*
1,2 Dichloroethane	< 250.00	*
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	*	*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 23)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	SW-6	SW-6
DATE SAMPLED	11-10-87	2-24-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	*	*
Magnesium (Mg)	*	*
Sodium (Na)	*	*
Potassium (K)	*	*
Iron (Fe)	*	*
Manganese (Mn)	*	*
Ammonia (as N)	*	*
Chloride (Cl)	*	*
Sulfate (SO4)	*	*
Fluoride (F)	*	*
Nitrate and Nitrite (as N)	*	*
Total Alkalinity	*	*
Bicarbonate Alkalinity	*	*
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	*	*
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	14.2	*
Field pH	7.28	7.95
Lab pH (units)	*	*
Field Conductivity (umhos/cm	3080.0	3150.0
Lab Conductivity (umhos/cm)	*	*
Total Dissolved Solids(mg/l)	*	*
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< .50	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	*	*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 24)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION		EQBLK		EQBLK
DATE SAMPLED		11-23-87		2-23-88
INORGANIC PARAMETERS (mg/L except as noted)				
Calcium (Ca)		5.5		3.6
Magnesium (Mg)		.5		.6
Sodium (Na)		2.5		5.6
Potassium (K)	<	5.0	<	5.0
Iron (Fe)	<	.05	<	.05
Manganese (Mn)		*		.021
Ammonia (as N)	<	.0	<	.1
Chloride (Cl)	<	3.0	<	3.0
Sulfate (SO4)	<	5.	<	5.
Fluoride (F)	<	.1	<	.1
Nitrate and Nitrite (as N)	<	.0	<	.1
Total Alkalinity	<	5.0	<	5.0
Bicarbonate Alkalinity		*	<	5.0
Carbonate Alkalinity		*		*
Bicarbonate (HCO3)		*	<	6.1
Carbonate (CO3)		*		*
FIELD AND LABORATORY MEASUREMENTS				
Temperature (Degrees C)		*		*
Field pH		*		*
Lab pH (units)		5.17		5.14
Field Conductivity (umhos/cm		*		*
Lab Conductivity (umhos/cm)		2.0		2.0
Total Dissolved Solids(mg/l)	<	10.0	<	10.0
VOLATILE ORGANICS DETECTED (ug/L)				
Benzene	<	.50	<	.50
Ethylbenzene	<	.50	<	.50
Toluene	<	.50	<	.50
m-Xylene	<	.50	<	.50
o,p-Xylene	<	.50	<	.50
Total Xylene		*		*
1,2 Dichloroethane	<	.50	<	1.00
TOTAL ORGANIC LEAD (mg/L)				
Total Organic Lead	<	.020		.002

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 25)
MAVERIK-KIRTLAND WATER QUALITY

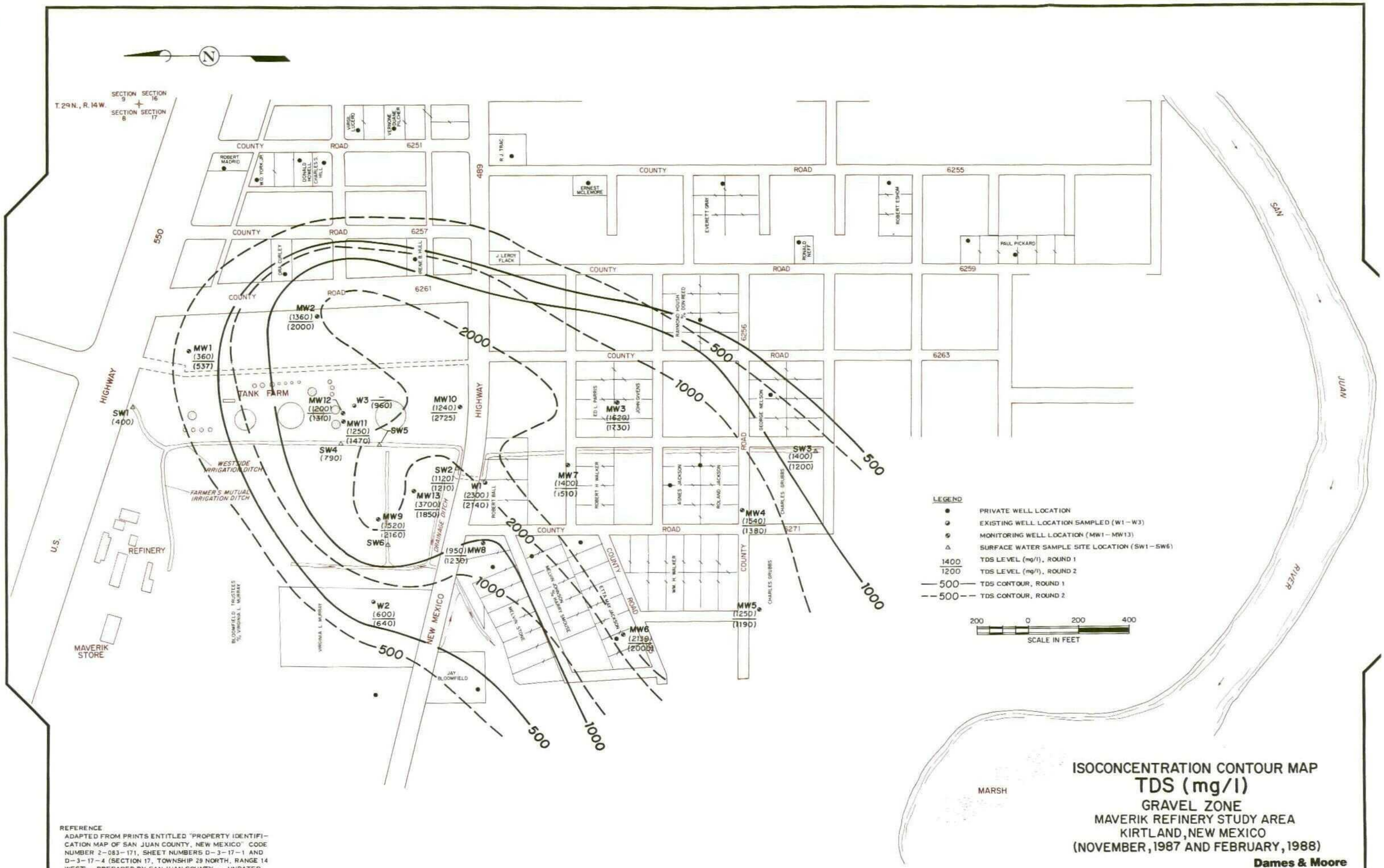
SAMPLE IDENTIFICATION	TB-007	TB-017
DATE SAMPLED	11-23-87	2-23-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	*	*
Magnesium (Mg)	*	*
Sodium (Na)	*	*
Potassium (K)	*	*
Iron (Fe)	*	*
Manganese (Mn)	*	*
Ammonia (as N)	*	*
Chloride (Cl)	*	*
Sulfate (SO4)	*	*
Fluoride (F)	*	*
Nitrate and Nitrite (as N)	*	*
Total Alkalinity	*	*
Bicarbonate Alkalinity	*	*
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	*	*
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	*	*
Field pH	*	*
Lab pH (units)	*	*
Field Conductivity (umhos/cm	*	*
Lab Conductivity (umhos/cm)	*	*
Total Dissolved Solids(mg/l)	*	*
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< .50	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	*	*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

TABLE B-2 (Cont. 26)
MAVERIK-KIRTLAND WATER QUALITY

SAMPLE IDENTIFICATION	TB-016	TB-023
DATE SAMPLED	11-11-87	2-24-88
INORGANIC PARAMETERS (mg/L except as noted)		
Calcium (Ca)	*	*
Magnesium (Mg)	*	*
Sodium (Na)	*	*
Potassium (K)	*	*
Iron (Fe)	*	*
Manganese (Mn)	*	*
Ammonia (as N)	*	*
Chloride (Cl)	*	*
Sulfate (SO4)	*	*
Fluoride (F)	*	*
Nitrate and Nitrite (as N)	*	*
Total Alkalinity	*	*
Bicarbonate Alkalinity	*	*
Carbonate Alkalinity	*	*
Bicarbonate (HCO3)	*	*
Carbonate (CO3)	*	*
FIELD AND LABORATORY MEASUREMENTS		
Temperature (Degrees C)	*	*
Field pH	*	*
Lab pH (units)	*	*
Field Conductivity (umhos/cm	*	*
Lab Conductivity (umhos/cm)	*	*
Total Dissolved Solids(mg/l)	*	*
VOLATILE ORGANICS DETECTED (ug/L)		
Benzene	< .50	< .50
Ethylbenzene	< .50	< .50
Toluene	< .50	< .50
m-Xylene	< .50	< .50
o,p-Xylene	< .50	< .50
Total Xylene	*	*
1,2 Dichloroethane	< .50	< 1.00
TOTAL ORGANIC LEAD (mg/L)		
Total Organic Lead	*	*

<: Less than given detection limits.
*: Parameter value not determined.
@: At least one sample used in statistical summary is below detection limit.
#: All samples are below detection limit.
+: Data questionable
DUP: Indicates duplicate sample

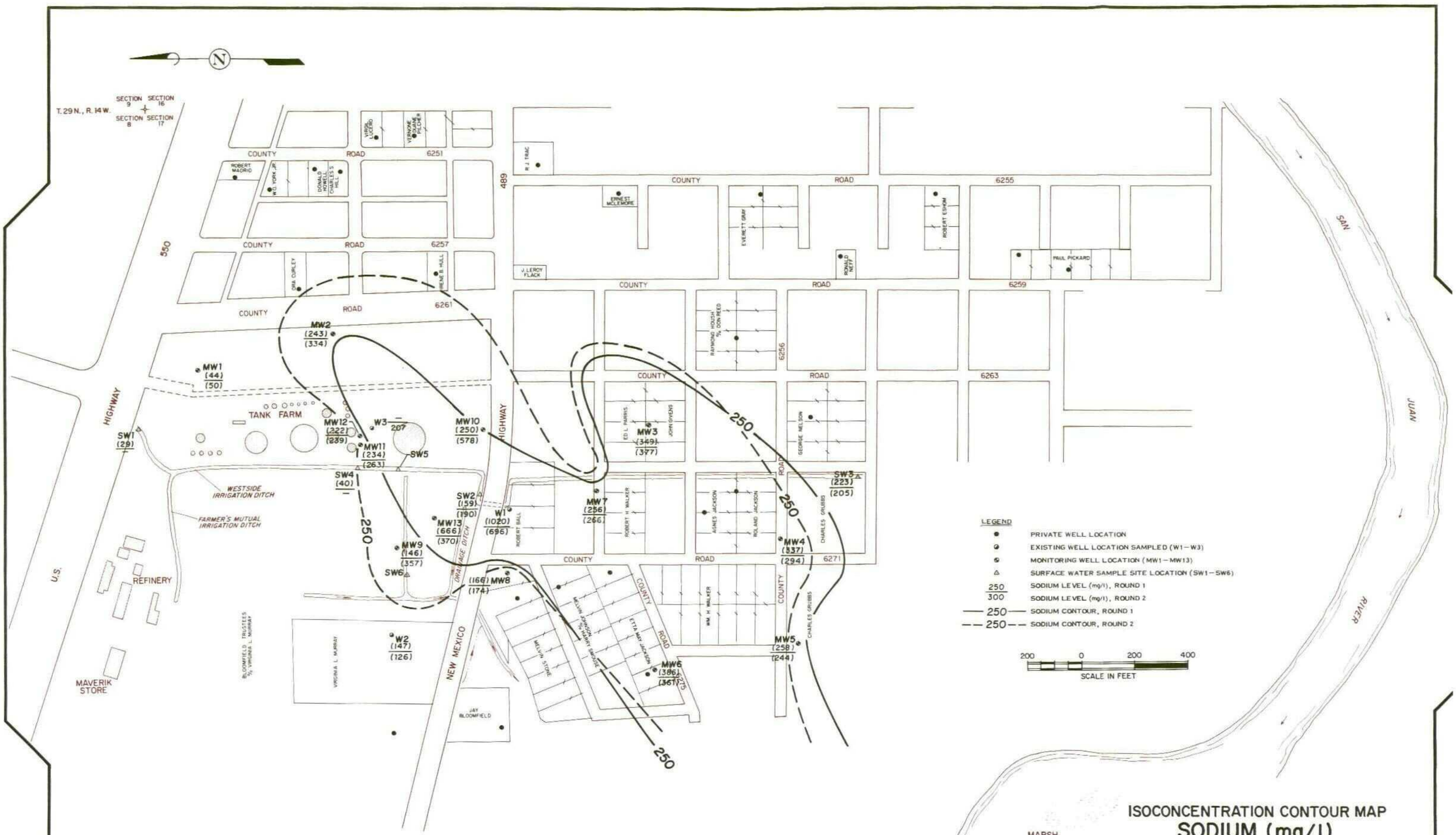


REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

ISOCONCENTRATION CONTOUR MAP
TDS (mg/l)
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-1

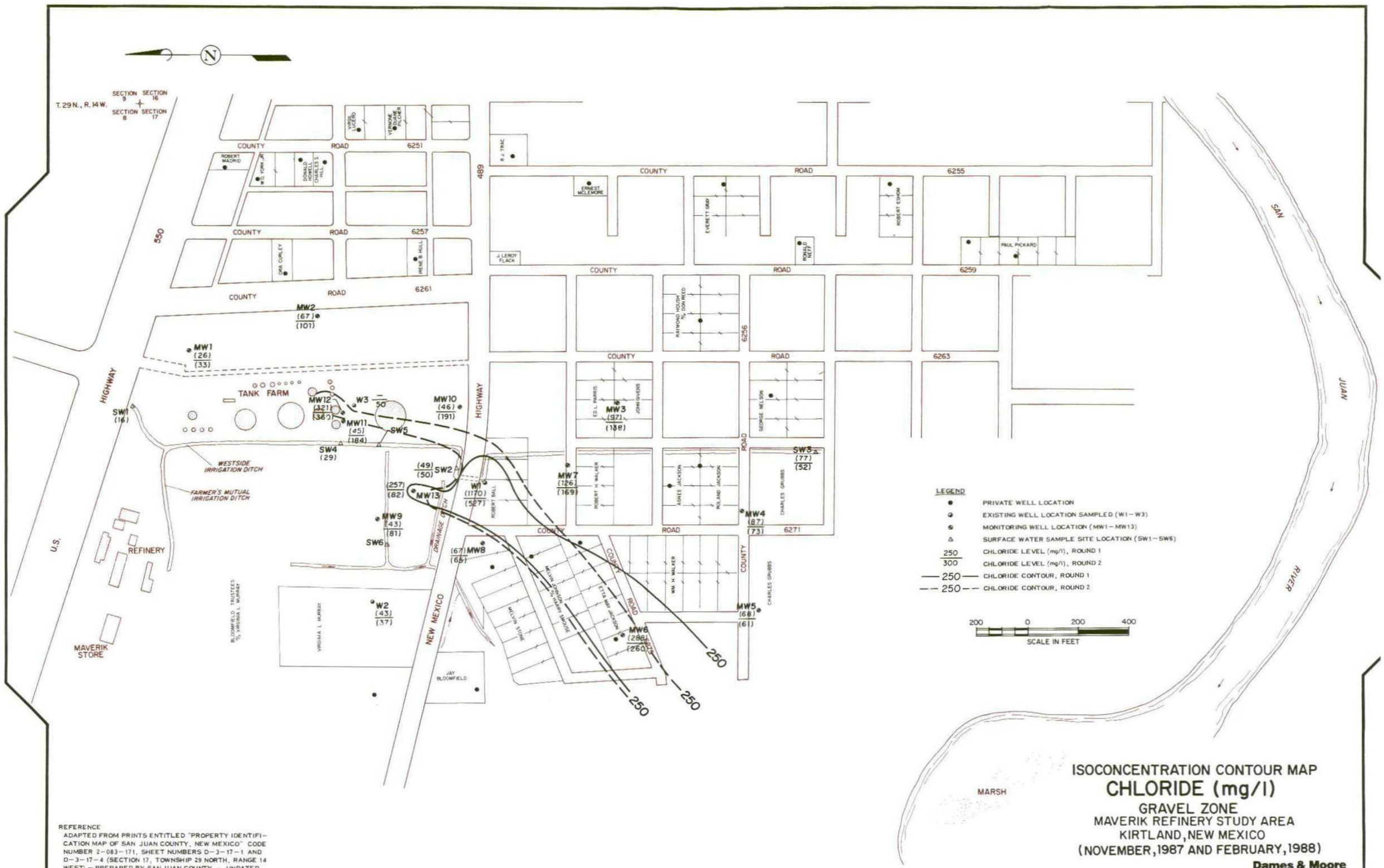


REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

ISOCONCENTRATION CONTOUR MAP
SODIUM (mg/l)
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-2



REFERENCE
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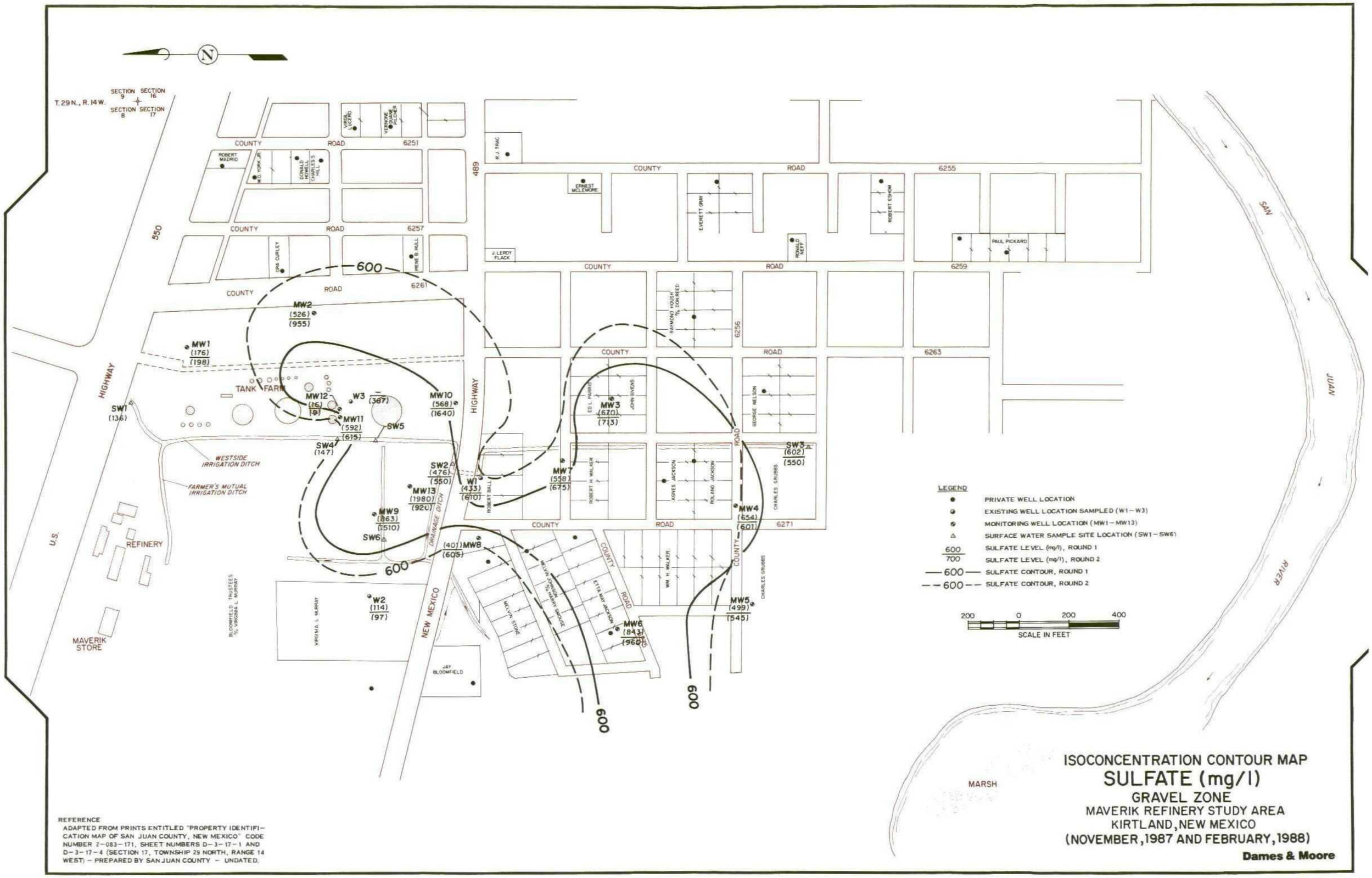
ISOCONCENTRATION CONTOUR MAP
CHLORIDE (mg/l)
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-3



REFERENCE
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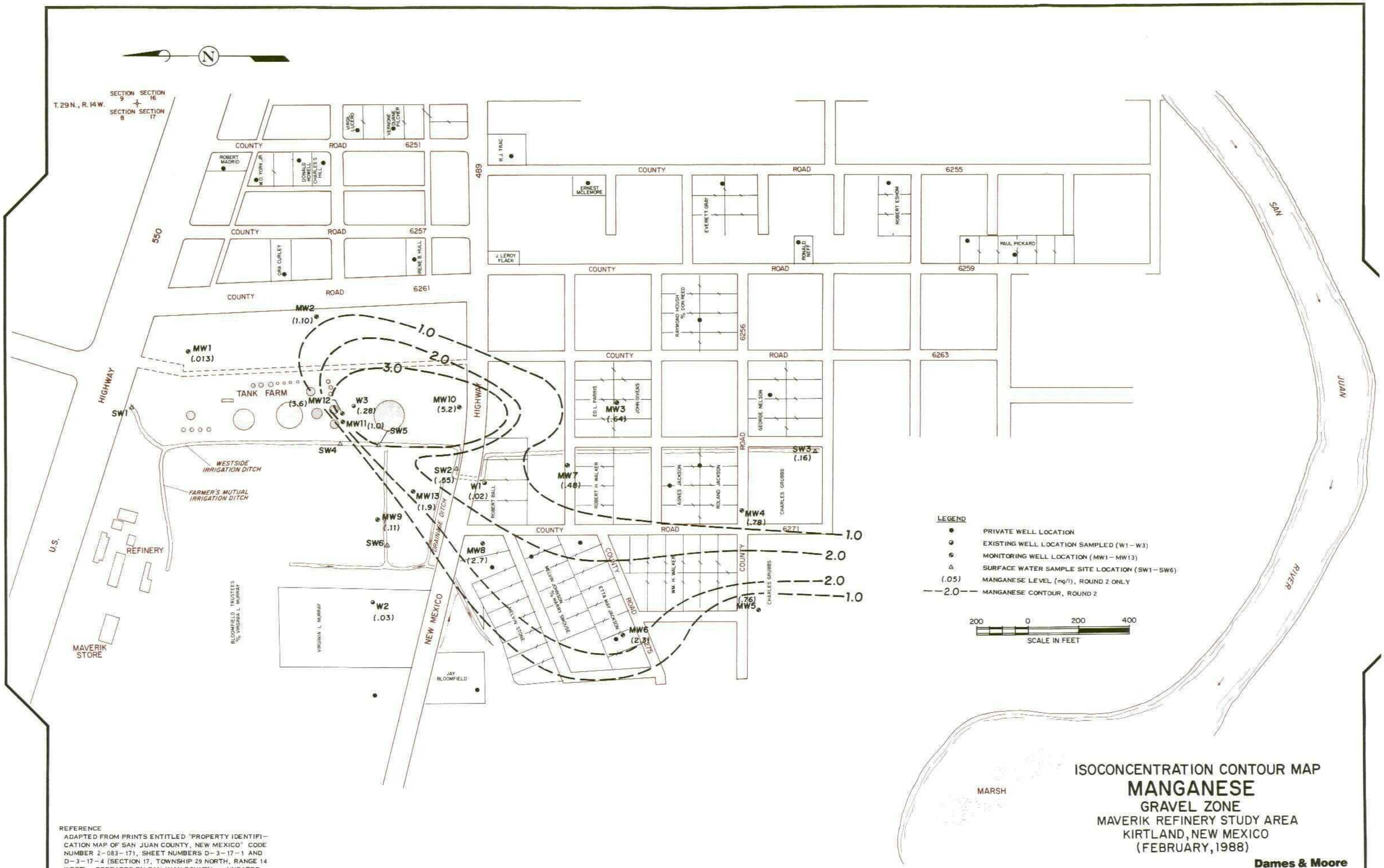
ISOCONCENTRATION CONTOUR MAP
SULFATE (mg/l)
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-4



REFERENCE
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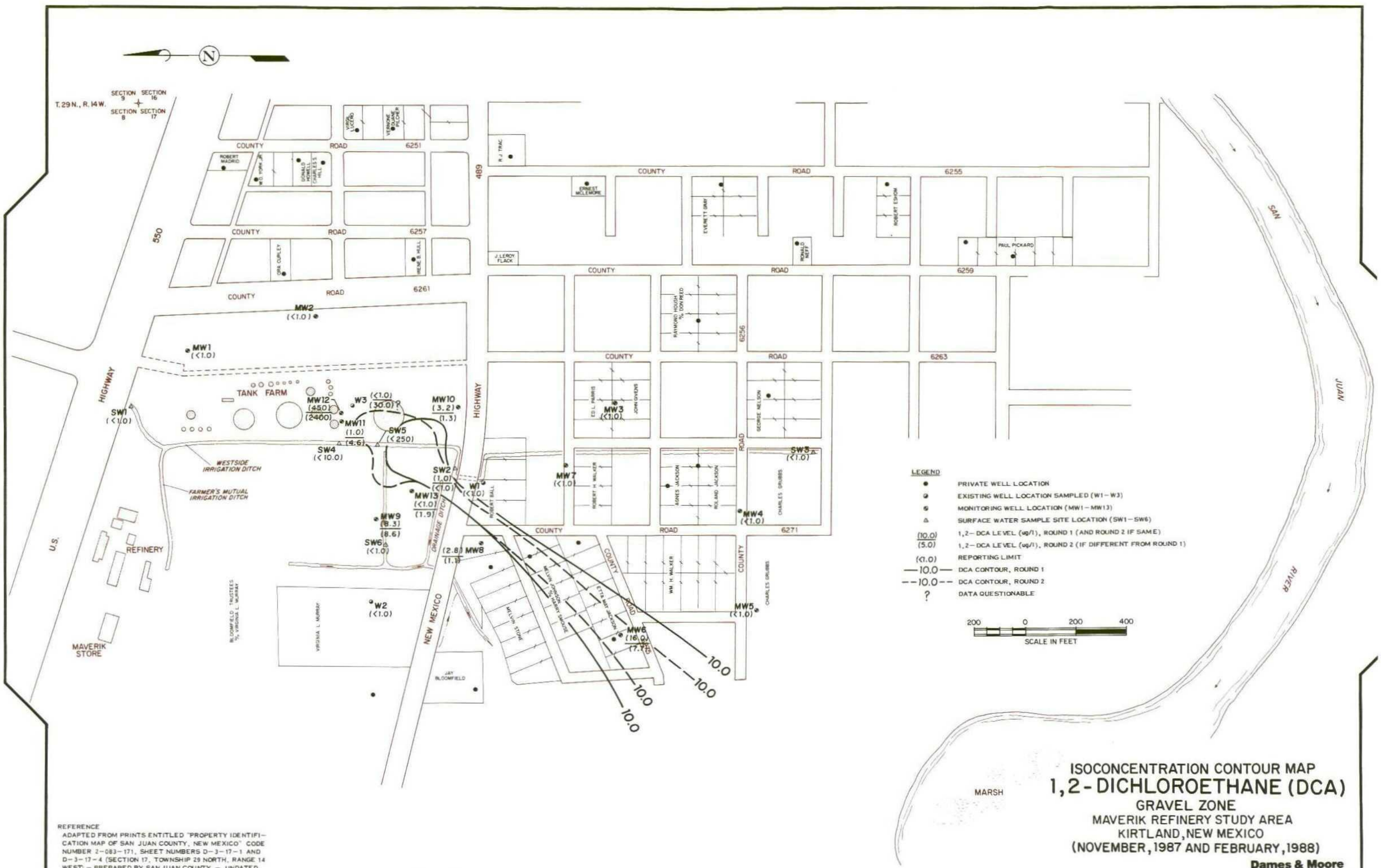
ISOCONCENTRATION CONTOUR MAP
MANGANESE
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(FEBRUARY, 1988)

Dames & Moore

PLATE B-5

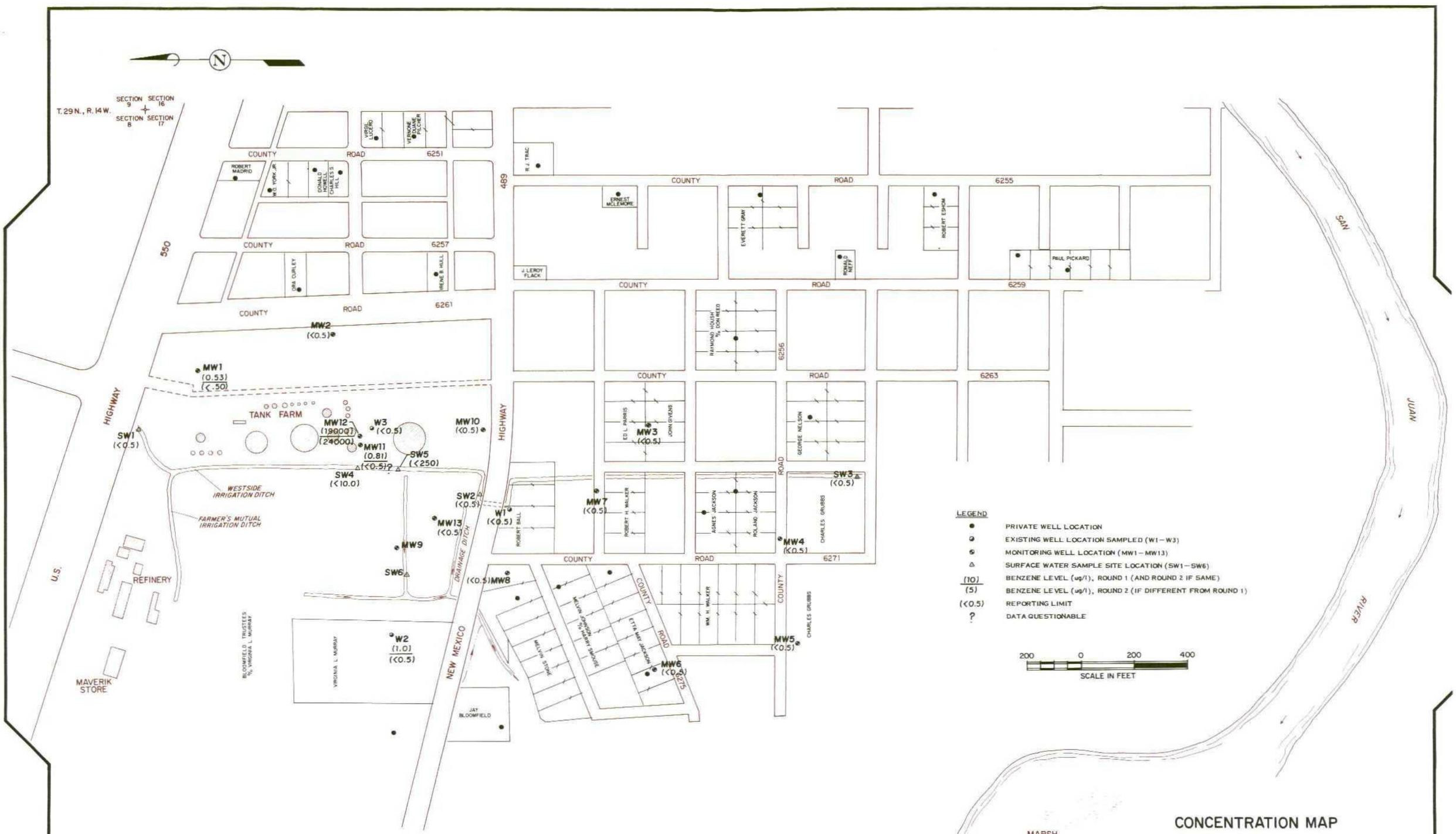


REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2–083–171, SHEET NUMBERS D–3–17–1 AND D–3–17–4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

ISOCONCENTRATION CONTOUR MAP
1,2-DICHLOROETHANE (DCA)
GRAVEL ZONE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-6

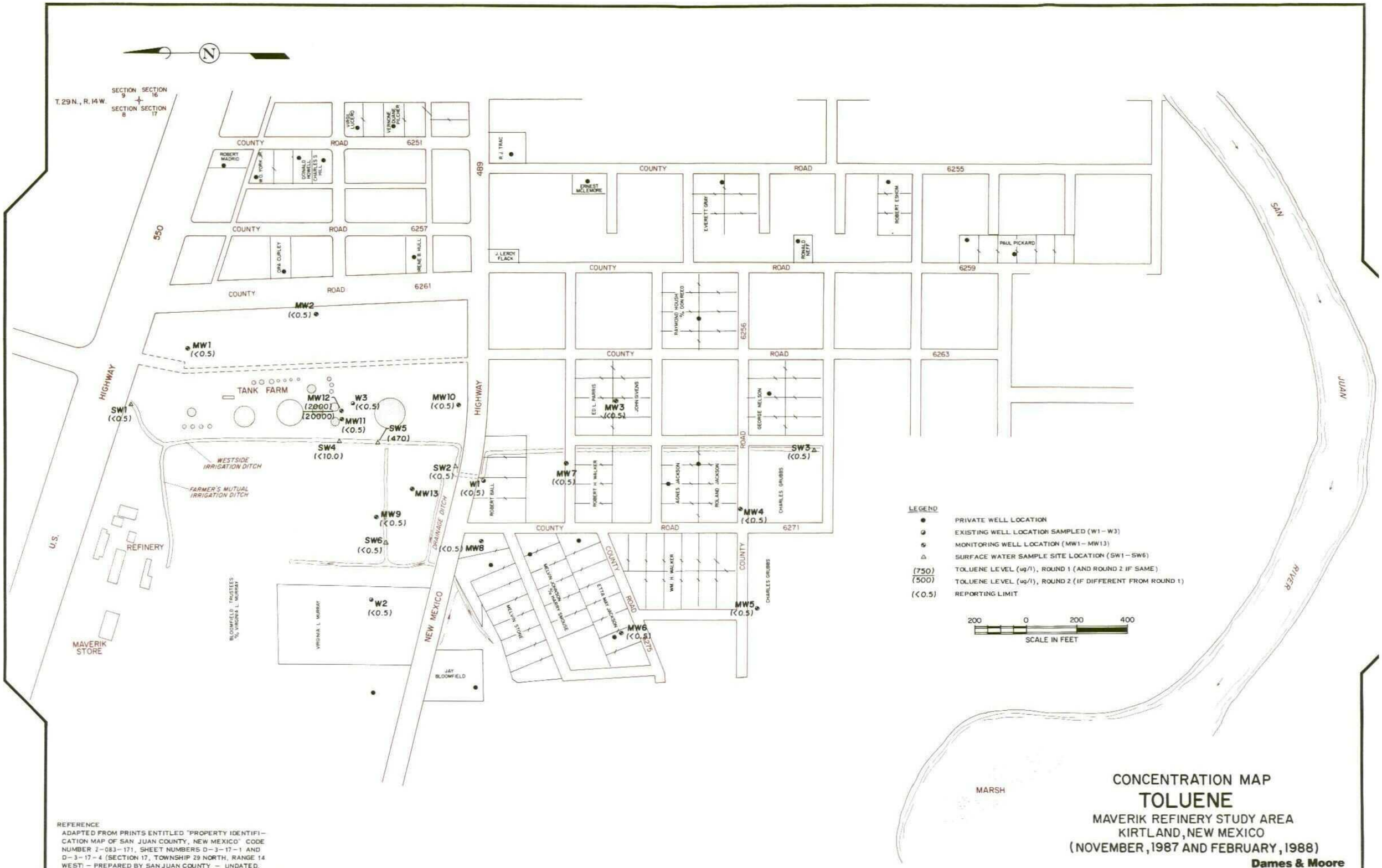


REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

CONCENTRATION MAP
BENZENE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-7

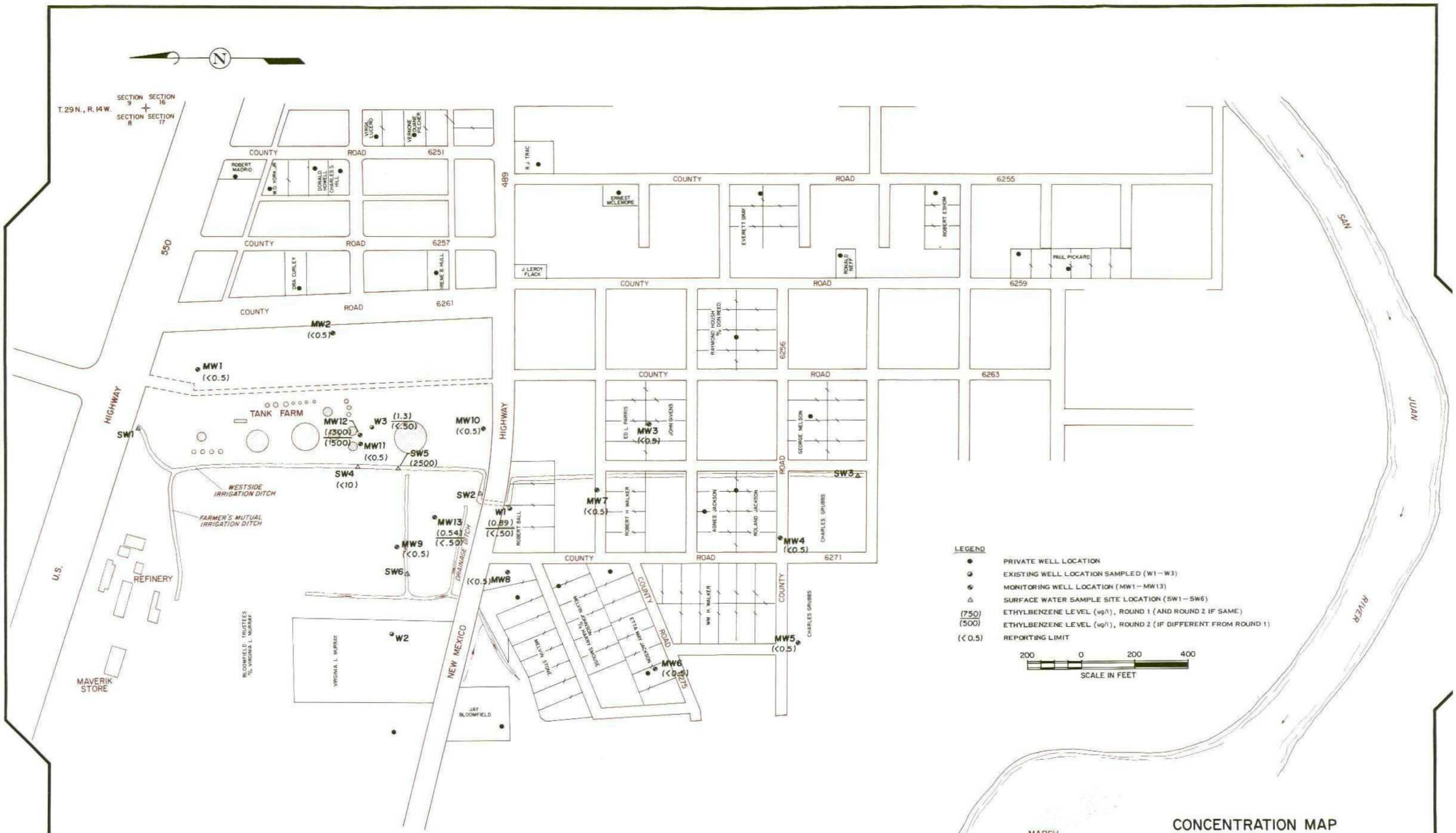


REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

CONCENTRATION MAP
TOLUENE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-8

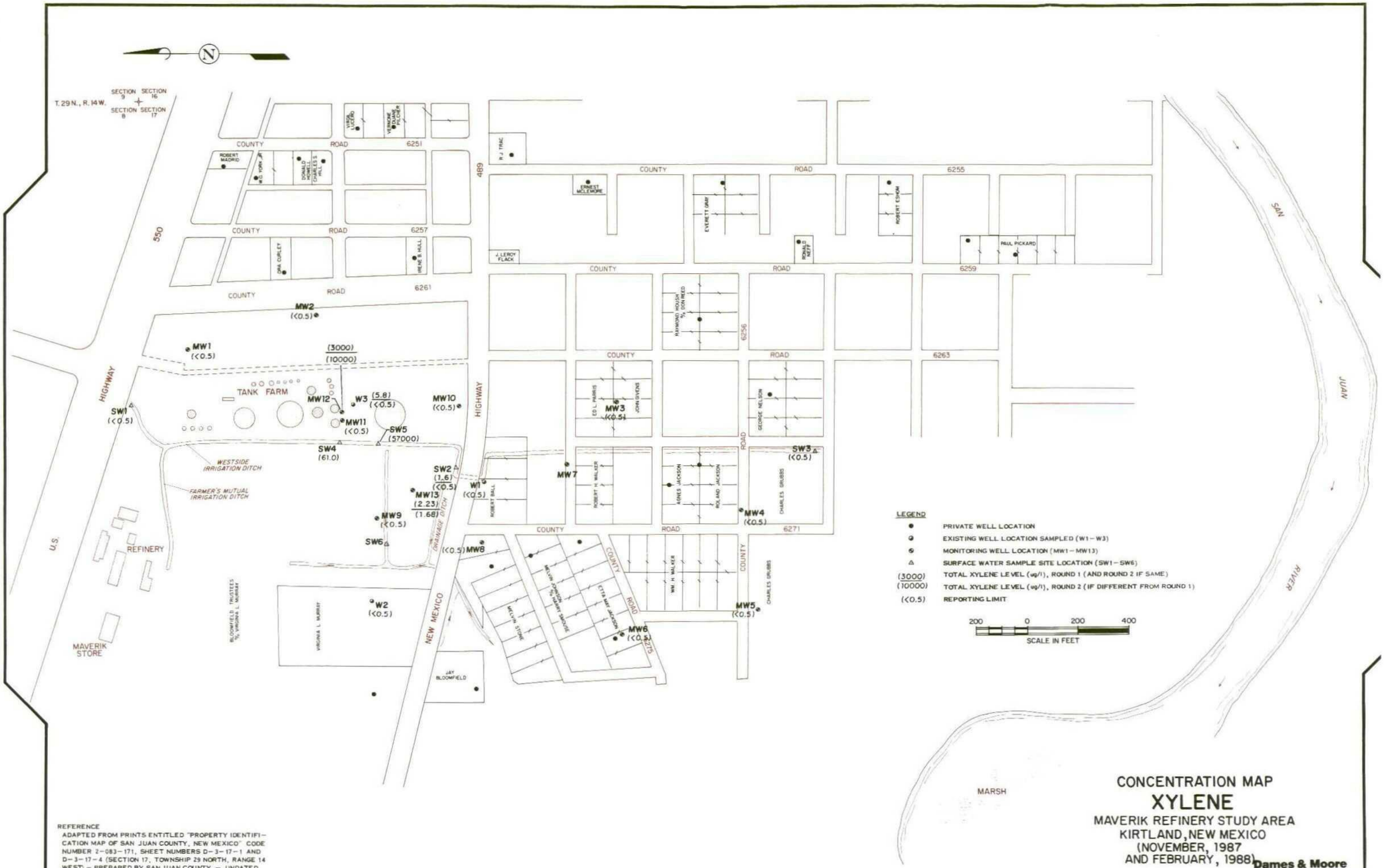


REFERENCE
ADAPTED FROM PRINTS ENTITLED "PROPERTY IDENTIFICATION MAP OF SAN JUAN COUNTY, NEW MEXICO" CODE NUMBER 2-083-171, SHEET NUMBERS D-3-17-1 AND D-3-17-4 (SECTION 17, TOWNSHIP 29 NORTH, RANGE 14 WEST) – PREPARED BY SAN JUAN COUNTY – UNDATED.

CONCENTRATION MAP
ETHYLBENZENE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987 AND FEBRUARY, 1988)

Dames & Moore

PLATE B-9



REFERENCE
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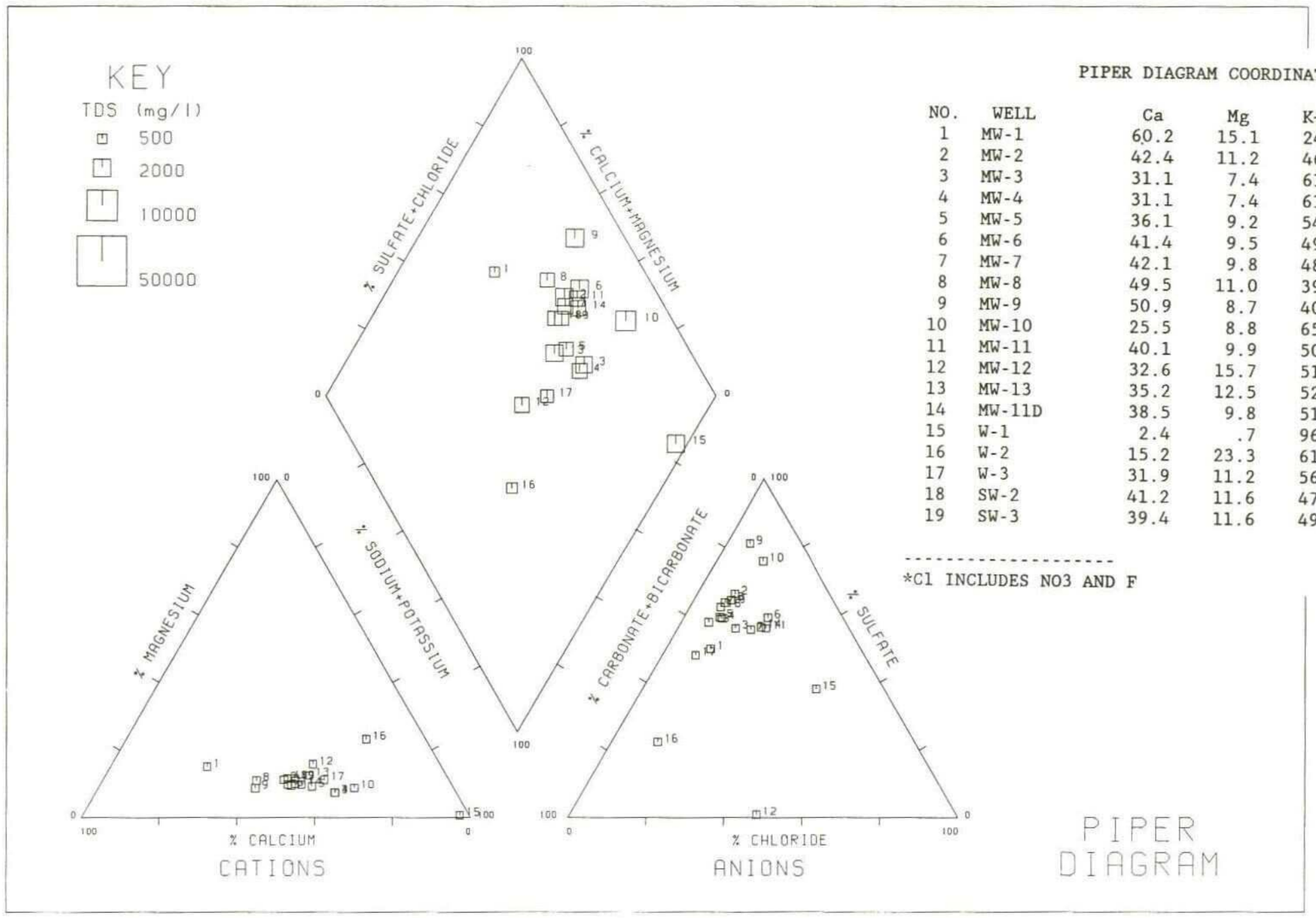
CONCENTRATION MAP
XYLENE
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO
(NOVEMBER, 1987
AND FEBRUARY, 1988)

Dames & Moore

PLATE B-10



PIPER DIAGRAM COORDINATES-IN PERCENT

NO.	WELL	Ca	Mg	K+Na	SO4	Cl*	CO3+HCO3
1	MW-1	60.2	15.1	24.8	49.9	11.6	38.5
2	MW-2	42.4	11.2	46.4	66.2	9.5	24.3
3	MW-3	31.1	7.4	61.6	56.0	14.9	29.2
4	MW-4	31.1	7.4	61.5	58.9	9.9	31.2
5	MW-5	36.1	9.2	54.7	59.3	9.2	31.5
6	MW-6	41.4	9.5	49.2	59.1	21.8	19.1
7	MW-7	42.1	9.8	48.1	55.6	19.0	25.3
8	MW-8	49.5	11.0	39.5	64.3	9.5	26.1
9	MW-9	50.9	8.7	40.4	81.1	6.0	12.9
10	MW-10	25.5	8.8	65.8	75.9	12.1	12.0
11	MW-11	40.1	9.9	50.0	56.0	22.8	21.2
12	MW-12	32.6	15.7	51.7	.9	48.1	51.1
13	MW-13	35.2	12.5	52.3	57.8	7.1	35.1
14	MW-11D	38.5	9.8	51.7	56.3	21.3	22.3
15	W-1	2.4	.7	96.9	38.0	44.7	17.3
16	W-2	15.2	23.3	61.5	22.4	11.7	65.9
17	W-3	31.9	11.2	56.9	48.1	8.6	43.3
18	SW-2	41.2	11.6	47.2	62.3	7.9	29.8
19	SW-3	39.4	11.6	49.0	63.6	8.3	28.1

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*Cl INCLUDES NO3 AND F

PIPER DIAGRAM
ROUND 2
WATER QUALITY DATA
MAVERIK REFINERY STUDY AREA
KIRTLAND, NEW MEXICO

Dames & Moore

PLATE B-11

FILE _____ BY _____ DATE _____ CHECKED BY _____ DATE _____

Rocky Mountain
Analytical Laboratory

Enseco

ANALYTICAL RESULTS

FOR

DAMES & MOORE

MARCH 16, 1988

Reviewed by: Jeanne B Howbert
Jeanne B. Howbert

Michael P. Phillips
Michael P. Phillips, Ph.D.

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

I. OVERVIEW

On February 23 and 25, 1988, Enseco-Rocky Mountain Analytical Laboratory received 23 samples from Dames & Moore. A complete listing of tests requested, by sample, is given in Section III.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

I. Overview
II. Sample Description Information
III. Analytical Tests Assigned
IV. Analytical Results
V. Quality Control Report
VI. Description of Analytical Methodology

In general, the data compared well with the results from the November, 1987 round of sampling. 1,2-Dichloroethane is detected at 30 ug/L in W-3 this round whereas it was not detected in the November, 1987 round. The concentrations of the volatile compounds in MW-12 have fluctuated somewhat. The benzene value in MW-11 is 25 ug/L and the value in the duplicate sample is 3.8 ug/L. MW-11 and its duplicate were reanalyzed outside the holding times for methods 601 and 602. The 601 results compare well with the original results; however, no benzene was detected in either of the reanalyzed samples. It is conceivable that the 602 compounds degraded before reanalysis was performed; however, this is improbable for samples of a groundwater matrix. If resampling MW-11 is feasible, we will be happy to reanalyze the sample.

II. SAMPLE DESCRIPTION INFORMATION

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned a unique five digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the five digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

SAMPLE DESCRIPTION INFORMATION

for

DAMES AND MOORE

RMAL Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
65703-001-00	MW-1	Groundwater	02/22/88	02/23/88
65703-002-00	MW-2	Groundwater	02/22/88	02/23/88
65703-003-00	MW-3	Groundwater	02/22/88	02/23/88
65703-004-00	MW-4	Groundwater	02/22/88	02/23/88
65703-005-00	MW-5	Groundwater	02/22/88	02/23/88
65703-006-00	MW-6	Groundwater	02/22/88	02/23/88
65703-007-00	MW-7	Groundwater	02/22/88	02/23/88
65703-008-00	MW-8	Groundwater	02/22/88	02/23/88
65703-009-00	MW-9	Groundwater	02/22/88	02/23/88
65703-010-00	MW-10	Groundwater	02/23/88	02/24/88
65703-011-00	MW-11	Groundwater	02/23/88	02/24/88
65703-012-00	MW-12	Groundwater	02/23/88	02/24/88
65703-013-00	W-3	Groundwater	02/23/88	02/24/88
65703-014-00	ROBERT BALL WELL **W-1**	Groundwater	02/23/88	02/24/88
65703-015-00	MW-11 DUPLICATE	Groundwater	02/23/88	02/24/88
65703-016-00	EQUIPMENT BLANK	Groundwater	02/23/88	02/24/88
65703-017-00	TRIP BLANK	Water	02/23/88	02/24/88
65703-018-00	SW-3	Groundwater	02/24/88	02/25/88
65703-019-00	SW-2	Groundwater	02/24/88	02/25/88
65703-020-00	V. MURRAY DITCH **SW-6**	Groundwater	02/24/88	02/25/88
65703-021-00	MW-13	Groundwater	02/24/88	02/25/88
65703-022-00	V. MURRAY WELL **W-2**	Groundwater	02/24/88	02/25/88
65703-023-00	TRIP BLANK	Water	02/24/88	02/25/88

IV. ANALYTICAL RESULTS

The analytical results for this project are presented in the following data tables. The results are presented by sample, by test, with tests reported in the following order: GC/MS, Chromatography, Metals and Inorganics.

Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content. All data is "blank corrected", i.e. the level of contamination, if any, found in the laboratory blank is subtracted from the analytical result before it is reported.

In addition, surrogate recovery data is presented for all GC/MS analyses. The surrogate recovery is an indication of the affect of the sample matrix on the performance of the method. The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is given in Section V.

The analytical data reported are subject to the following limitations of the analytical methodology:

GC/MS

Volatile Organics

a) The cis- and trans-isomers of dichloroethylene cannot be distinguished using EPA Method 624. All dichloroethylene present is reported as trans-dichloroethylene.

Chromatography

Methods 601 and 8010

a) Dichlorodifluoromethane (Freon 12) and vinyl chloride coelute under the specified analytical conditions. All data are reported as a combined value for the two compounds.

b) Dibromochloromethane, cis-1,3-dichloropropene and 1,1,2-trichloroethane are unresolved. The three compounds are reported as a single combined value.

c) Tetrachloroethene and 1,1,2,2-tetrachloroethane coelute and are reported as a combined result.

Method 602 and 8020

a) The ortho and para isomers of xylene coelute and are reported as a single concentration value.

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-1

Laboratory ID: 65703-001 Enseco ID: 65703-001

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-1

Laboratory ID: 65703-001 Enseco ID: 65703-001

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-1

Laboratory ID: 65703-001 Enseco ID: 65703-001

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	112	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	17	mg/L	0.1	200.7	03/07/88
Manganese	0.013	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	50	mg/L	0.05	200.7	03/07/88
Total Organic Lead	N.D.	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-1

Laboratory ID: 65703-001 Enseco ID: 65703-001

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.85	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	755	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	537	mg/L	10	160.1	02/26/88
Fluoride	0.3	mg/L	0.1	340.2	03/01/88
Chloride	33	mg/L	3	300.0	03/01/88
Nitrate + Nitrite as N	0.7	mg/L	0.1	353.2	02/25/88
Sulfate	198	mg/L	5	300.0	03/01/88
Total Alkalinity as CaCO3	159	mg/L	5	310.1/403	03/09/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	9.2	meq/L	0.1	104C	03/10/88
Total Anions	8.3	meq/L	0.3	104C	03/10/88
% Difference	5.0	%	2	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-2

Laboratory ID: 65703-002 Enseco ID: 65703-002

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-2

Laboratory ID: 65703-002 Enseco ID: 65703-002

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-2

Laboratory ID: 65703-002 Enseco ID: 65703-002

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	268	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	43	mg/L	0.1	200.7	03/07/88
Manganese	1.1	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	334	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.004	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

Sample: 65703-002

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-2

Laboratory ID: 65703-002 Enseco ID: 65703-002

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.63	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	2500	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	2000	mg/L	10	160.1	02/26/88
Fluoride	0.3	mg/L	0.1	340.2	03/01/88
Chloride	101	mg/L	3	300.0	03/09/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	955	mg/L	5	300.0	03/09/88
Total Alkalinity as CaCO3	365	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	31.4	meq/L	0.1	104C	03/10/88
Total Anions	30.0	meq/L	0.3	104C	03/10/88
% Difference	2.3	%	0.1	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-3

Laboratory ID: 65703-003 Enseco ID: 65703-003

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-3

Laboratory ID: 65703-003 Enseco ID: 65703-003

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-3

Laboratory ID: 65703-003 Enseco ID: 65703-003

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	167	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	24	mg/L	0.1	200.7	03/07/88
Manganese	0.64	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	377	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.005	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-3

Laboratory ID: 65703-003 Enseco ID: 65703-003

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.58	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	2300	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	1730	mg/L	10	160.1	02/26/88
Fluoride	0.8	mg/L	0.1	340.2	03/01/88
Chloride	138	mg/L	3	300.0	03/09/88
Nitrate + Nitrite as N	0.3	mg/L	0.1	353.2	02/25/88
Sulfate	713	mg/L	5	300.0	03/09/88
Total Alkalinity as CaCO3	387	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	26.7	meq/L	0.1	104C	03/10/88
Total Anions	26.5	meq/L	0.3	104C	03/10/88
% Difference	0.3	%	0.1	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-4

Laboratory ID: 65703-004 Enseco ID: 65703-004

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-4

Laboratory ID: 65703-004 Enseco ID: 65703-004

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-4

Laboratory ID: 65703-004 Enseco ID: 65703-004

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	131	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	19	mg/L	0.1	200.7	03/07/88
Manganese	0.78	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	294	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.003	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-4

Laboratory ID: 65703-004 Enseco ID: 65703-004

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.84	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	1920	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	1380	mg/L	10	160.1	02/26/88
Fluoride	0.7	mg/L	0.1	340.2	03/01/88
Chloride	73	mg/L	3	300.0	03/09/88
Nitrate + Nitrite as N	0.2	mg/L	0.1	353.2	02/25/88
Sulfate	601	mg/L	5	300.0	03/09/88
Total Alkalinity as CaCO3	332	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	20.9	meq/L	0.1	104C	03/10/88
Total Anions	21.3	meq/L	0.3	104C	03/10/88
% Difference	0.9	%	0.1	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-5

Laboratory ID: 65703-005 Enseco ID: 65703-005

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-5

Laboratory ID: 65703-005 Enseco ID: 65703-005

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-5

Laboratory ID: 65703-005 Enseco ID: 65703-005

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	142	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	22	mg/L	0.1	200.7	03/07/88
Manganese	0.76	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	244	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.002	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

Sample: 65703-005

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-5

Laboratory ID: 65703-005 Enseco ID: 65703-005

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.60	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	1700	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	1190	mg/L	10	160.1	02/26/88
Fluoride	0.7	mg/L	0.1	340.2	03/01/88
Chloride	61	mg/L	3	300.0	03/01/88
Nitrate + Nitrite as N	0.3	mg/L	0.1	353.2	02/25/88
Sulfate	545	mg/L	5	300.0	03/01/88
Total Alkalinity as CaCO3	301	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	19.5	meq/L	0.1	104C	03/08/88
Total Anions	19.1	meq/L	0.3	104C	03/08/88
% Difference	1.0	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-6

Laboratory ID: 65703-006 Enseco ID: 65703-006

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	7.7	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-6

Laboratory ID: 65703-006 Enseco ID: 65703-006

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-6

Laboratory ID: 65703-006 Enseco ID: 65703-006

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	267	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	37	mg/L	0.1	200.7	03/07/88
Manganese	2.3	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	361	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.005	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-6

Laboratory ID: 65703-006 Enseco ID: 65703-006

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.53	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	2700	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	2000	mg/L	10	160.1	02/26/88
Fluoride	0.5	mg/L	0.1	340.2	03/01/88
Chloride	260	mg/L	3	300.0	03/01/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	960	mg/L	5	300.0	03/01/88
Total Alkalinity as CaCO3	324	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	32.1	meq/L	0.1	104C	03/08/88
Total Anions	33.8	meq/L	0.3	104C	03/08/88
% Difference	2.6	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

Sample: 65703-006

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-7

Laboratory ID: 65703-007 Enseco ID: 65703-007

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-7

Laboratory ID: 65703-007 Enseco ID: 65703-007

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-7

Laboratory ID: 65703-007 Enseco ID: 65703-007

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	205	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	29	mg/L	0.1	200.7	03/07/88
Manganese	0.48	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	266	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.002	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-7

Laboratory ID: 65703-007 Enseco ID: 65703-007

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.64	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	2100	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	1510	mg/L	10	160.1	02/26/88
Fluoride	0.5	mg/L	0.1	340.2	03/01/88
Chloride	169	mg/L	3	300.0	03/01/88
Nitrate + Nitrite as N	1.0	mg/L	0.1	353.2	02/25/88
Sulfate	675	mg/L	5	300.0	03/01/88
Total Alkalinity as CaCO3	320	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	24.2	meq/L	0.1	104C	03/08/88
Total Anions	25.3	meq/L	0.3	104C	03/08/88
% Difference	2.3	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-8

Laboratory ID: 65703-008 Enseco ID: 65703-008

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	1.1	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-8

Laboratory ID: 65703-008 Enseco ID: 65703-008

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-8

Laboratory ID: 65703-008 Enseco ID: 65703-008

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	193	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	26	mg/L	0.1	200.7	03/07/88
Manganese	2.7	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	174	mg/L	0.05	200.7	03/07/88
Total Organic Lead	N.D.	mg/L	0.004	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-8

Laboratory ID: 65703-008 Enseco ID: 65703-008

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.61	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	1640	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	1230	mg/L	10	160.1	02/26/88
Fluoride	0.6	mg/L	0.1	340.2	03/01/88
Chloride	65	mg/L	3	300.0	03/01/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	605	mg/L	5	300.0	03/01/88
Total Alkalinity as CaCO3	256	mg/L	5	310.1/403	02/23/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	19.3	meq/L	0.1	104C	03/08/88
Total Anions	19.6	meq/L	0.3	104C	03/08/88
% Difference	0.6	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-9

Laboratory ID: 65703-009 Enseco ID: 65703-009

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	8.6	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-9

Laboratory ID: 65703-009 Enseco ID: 65703-009

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88 Analyzed: 02/26/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-9

Laboratory ID: 65703-009 Enseco ID: 65703-009

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	396	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	41	mg/L	0.1	200.7	03/07/88
Manganese	0.11	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	357	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.004	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-9

Laboratory ID: 65703-009 Enseco ID: 65703-009

Matrix: Groundwater Sampled: 02/22/88 Received: 02/23/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.71	units	0.01	150.1	02/23/88
Specific Conductance @ 25C	3000	umhos/cm	1	120.1/9050	02/23/88
Total Dissolved Solids	2160	mg/L	10	160.1	02/26/88
Fluoride	0.8	mg/L	0.1	340.2	03/01/88
Chloride	81	mg/L	3	300.0	03/01/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	1510	mg/L	5	300.0	03/01/88
Total Alkalinity as CaCO3	250	mg/L	5	310.1/403	03/09/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	38.7	meq/L	0.1	104C	03/10/88
Total Anions	38.7	meq/L	0.3	104C	03/10/88
% Difference	0	%	0.1	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-10

Laboratory ID: 65703-010 Enseco ID: 65703-010

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	1.3	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-10

Laboratory ID: 65703-010 Enseco ID: 65703-010

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-10

Laboratory ID: 65703-010 Enseco ID: 65703-010

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	196	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	41	mg/L	0.1	200.7	03/07/88
Manganese	5.2	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	578	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.009	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-10

Laboratory ID: 65703-010 Enseco ID: 65703-010

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.70	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	3720	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	2725	mg/L	10	160.1	02/26/88
Fluoride	0.7	mg/L	0.1	340.2	03/01/88
Chloride	191	mg/L	3	300.0	03/02/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	1640	mg/L	5	300.0	03/09/88
Total Alkalinity as CaCO3	271	mg/L	5	310.1/403	03/09/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	38.3	meq/L	0.1	104C	03/10/88
Total Anions	42.7	meq/L	0.3	104C	03/10/88
% Difference	5.4	%	0.1	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-11

Laboratory ID: 65703-011 Enseco ID: 65703-011

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	4.6	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-11

Laboratory ID: 65703-011 Enseco ID: 65703-011

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	25	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-11

Laboratory ID: 65703-011 Enseco ID: 65703-011

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	186	mg/L	0.1	200.7	03/15/88
Iron	N.D.	mg/L	0.05	200.7	03/15/88
Magnesium	28	mg/L	0.1	200.7	03/15/88
Manganese	1.0	mg/L	0.005	200.7	03/15/88
Potassium	N.D.	mg/L	5	200.7	03/15/88
Sodium	263	mg/L	0.05	200.7	03/15/88
Total Organic Lead	N.D.	mg/L	0.004	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-11

Laboratory ID: 65703-011 Enseco ID: 65703-011

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.62	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	2120	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	1470	mg/L	10	160.1	02/26/88
Fluoride	0.5	mg/L	0.1	340.2	03/01/88
Chloride	184	mg/L	3	300.0	03/02/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	615	mg/L	5	300.0	03/09/88
Total Alkalinity as CaCO3	242	mg/L	5	310.1/403	03/09/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	23.0	meq/L	0.1	104C	03/10/88
Total Anions	23.1	meq/L	0.3	104C	03/10/88
% Difference	0.1	%	0.1	104C	03/10/88

N.D. = Not detected

Approved by: Lindsay Breyer

HAZARDOUS SUBSTANCE LIST (HSL)
VOLATILE ORGANICS
EPA METHOD 624

Client Name: DAMES AND MOORE

Client ID: MW-12

Laboratory ID: 65703-012 Enseco ID: 65703-012

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 03/01/88

Parameter	Result	Units	Reporting Limit
Acetone	N.D.	ug/L	3500
Benzene	24000	ug/L	700
Bromoform	N.D.	ug/L	700
Bromomethane	N.D.	ug/L	1400
2-Butanone	N.D.	ug/L	3500
Carbon disulfide	N.D.	ug/L	700
Carbon tetrachloride	N.D.	ug/L	700
Chlorobenzene	N.D.	ug/L	700
Dibromochloromethane	N.D.	ug/L	700
Chloroethane	N.D.	ug/L	1400
2-Chloroethyl vinyl ether	N.D.	ug/L	1400
Chloroform	N.D.	ug/L	700
Chloromethane	N.D.	ug/L	1400
Bromodichloromethane	N.D.	ug/L	700
1,1-Dichloroethane	N.D.	ug/L	700
1,2-Dichloroethane	2400	ug/L	700
1,1-Dichloroethene	N.D.	ug/L	700
1,2-Dichloropropane	N.D.	ug/L	700
cis-1,3-Dichloropropene	N.D.	ug/L	700
trans-1,3-Dichloropropene	N.D.	ug/L	700
Ethylbenzene	1500	ug/L	700
2-Hexanone	N.D.	ug/L	1400
Methylene chloride	N.D.	ug/L	3500
4-Methyl-2-pentanone	N.D.	ug/L	1400
Styrene	N.D.	ug/L	700
1,1,2,2-Tetrachloroethane	N.D.	ug/L	700
Tetrachloroethene	N.D.	ug/L	700
Toluene	20000	ug/L	700
trans-1,2-Dichloroethene	N.D.	ug/L	700
1,1,1-Trichloroethane	N.D.	ug/L	700
1,1,2-Trichloroethane	N.D.	ug/L	700

N.D. = Not detected

HAZARDOUS SUBSTANCE LIST (HSL)
VOLATILE ORGANICS (CONT.)
EPA METHOD 624

Client Name: DAMES AND MOORE

Client ID: MW-12

Laboratory ID: 65703-012 Enseco ID: 65703-012

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 03/01/88

Parameter	Result	Units	Reporting Limit
Trichloroethene	N.D.	ug/L	700
Vinyl acetate	N.D.	ug/L	1400
Vinyl chloride	N.D.	ug/L	1400
Total Xylenes	10000	ug/L	700
Surrogate			
Toluene-D8	102	%	-
Bromofluorobenzene(BFB)	97	%	-
1,2-Dichloroethane-D4	96	%	-

N.D. = Not detected

Reported by: Julie Niermann Approved by: Jeffrey Lowry

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-12

Laboratory ID: 65703-012 Enseco ID: 65703-012

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	133	mg/L	0.1	200.7	03/07/88
Iron	0.09	mg/L	0.05	200.7	03/07/88
Magnesium	39	mg/L	0.1	200.7	03/07/88
Manganese	3.6	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	239	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.060	mg/L	0.004	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-12

Laboratory ID: 65703-012 Enseco ID: 65703-012

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.05	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	2070	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	1310	mg/L	10	160.1	03/10/88
Fluoride	0.3	mg/L	0.1	340.2	03/01/88
Chloride	360	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	9	mg/L	5	300.0	03/02/88
Total Alkalinity as CaCO3	541	mg/L	5	310.1/403	02/24/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	20.2	meq/L	0.1	104C	03/08/88
Total Anions	21.2	meq/L	0.3	104C	03/08/88
% Difference	2.2	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-12

Laboratory ID: 67011-001 Enseco ID: 67011-001

Matrix: Water Sampled: 02/23/88 Received: 04/04/88

Authorized: 04/04/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Oil & Grease	3	mg/L	1	413.1	04/07/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: W-3

Laboratory ID: 65703-013 Enseco ID: 65703-013

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	30	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: W-3

Laboratory ID: 65703-013 Enseco ID: 65703-013

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: W-3

Laboratory ID: 65703-013 Enseco ID: 65703-013

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	103	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	22	mg/L	0.1	200.7	03/07/88
Manganese	0.28	mg/L	0.005	200.7	03/07/88
Potassium	6	mg/L	5	200.7	03/07/88
Sodium	207	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.002	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: W-3

Laboratory ID: 65703-013 Enseco ID: 65703-013

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.81	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	1550	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	960	mg/L	10	160.1	03/10/88
Fluoride	0.4	mg/L	0.1	340.2	03/01/88
Chloride	50	mg/L	3	300.0	03/02/88
Nitrate + Nitrite as N	1.1	mg/L	0.1	353.2	02/25/88
Sulfate	387	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	363	mg/L	5	310.1/403	02/24/88
Ammonia as N	9.8	mg/L	0.1	350.1	02/26/88
Total Cations	16.8	meq/L	0.1	104C	03/08/88
Total Anions	16.8	meq/L	0.3	104C	03/08/88
% Difference	0	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: ROBERT BALL WELL

Laboratory ID: 65703-014 Enseco ID: 65703-014

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: ROBERT BALL WELL

Laboratory ID: 65703-014 Enseco ID: 65703-014

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: ROBERT BALL WELL

Laboratory ID: 65703-014 Enseco ID: 65703-014

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	15	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	2.6	mg/L	0.1	200.7	03/07/88
Manganese	0.021	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	696	mg/L	0.05	200.7	03/07/88
Total Organic Lead	N.D.	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: ROBERT BALL WELL

Laboratory ID: 65703-014 Enseco ID: 65703-014

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	8.39	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	3360	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	2140	mg/L	10	160.1	03/10/88
Fluoride	1.2	mg/L	0.1	340.2	03/01/88
Chloride	527	mg/L	3	300.0	03/02/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	610	mg/L	5	300.0	03/02/88
Total Alkalinity as CaCO3	289	mg/L	5	310.1/403	02/24/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	31.2	meq/L	0.1	104C	03/08/88
Total Anions	33.4	meq/L	0.3	104C	03/08/88
% Difference	3.3	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: MW-11 DUPLICATE

Laboratory ID: 65703-015 Enseco ID: 65703-015

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	3.6	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-11 DUPLICATE

Laboratory ID: 65703-015 Enseco ID: 65703-015

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	3.8	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-11 DUPLICATE

Laboratory ID: 65703-015 Enseco ID: 65703-015

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	182	mg/L	0.1	200.7	03/07/88
Iron	0.19	mg/L	0.05	200.7	03/07/88
Magnesium	28	mg/L	0.1	200.7	03/07/88
Manganese	1.2	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	277	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.003	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-11 DUPLICATE

Laboratory ID: 65703-015 Enseco ID: 65703-015

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.64	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	2130	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	1470	mg/L	10	160.1	02/26/88
Fluoride	0.5	mg/L	0.1	340.2	03/01/88
Chloride	171	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	615	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	254	mg/L	5	310.1/403	02/24/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	23.4	meq/L	0.1	104C	03/08/88
Total Anions	22.7	meq/L	0.3	104C	03/08/88
% Difference	1.6	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: EQUIPMENT BLANK

Laboratory ID: 65703-016 Enseco ID: 65703-016

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: EQUIPMENT BLANK

Laboratory ID: 65703-016 Enseco ID: 65703-016

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: EQUIPMENT BLANK

Laboratory ID: 65703-016 Enseco ID: 65703-016

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	3.6	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	0.6	mg/L	0.1	200.7	03/07/88
Manganese	0.021	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	5.6	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.002	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: EQUIPMENT BLANK

Laboratory ID: 65703-016 Enseco ID: 65703-016

Matrix: Groundwater Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	5.14	units	0.01	150.1	02/24/88
Specific Conductance @ 25C	2	umhos/cm	1	120.1/9050	02/24/88
Total Dissolved Solids	N.D.	mg/L	10	160.1	02/26/88
Fluoride	N.D.	mg/L	0.1	340.2	03/01/88
Chloride	N.D.	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	02/25/88
Sulfate	N.D.	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	N.D.	mg/L	5	310.1/403	02/24/88
Ammonia as N	N.D.	mg/L	0.1	350.1	02/25/88
Total Cations	0.4	meq/L	0.1	104C	03/08/88
Total Anions	N.D.	meq/L	0.3	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: TRIP BLANK

Laboratory ID: 65703-017 Enseco ID: 65703-017

Matrix: Water Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	8.3	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: TRIP BLANK

Laboratory ID: 65703-017 Enseco ID: 65703-017

Matrix: Water Sampled: 02/23/88 Received: 02/24/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: SW-3

Laboratory ID: 65703-018 Enseco ID: 65703-018

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: SW-3

Laboratory ID: 65703-018 Enseco ID: 65703-018

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: SW-3

Laboratory ID: 65703-018 Enseco ID: 65703-018

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	146	mg/L	0.1	200.7	03/07/88
Iron	0.13	mg/L	0.05	200.7	03/07/88
Magnesium	26	mg/L	0.1	200.7	03/07/88
Manganese	0.16	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	205	mg/L	0.05	200.7	03/07/88
Total Organic Lead	N.D.	mg/L	0.004	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: SW-3

Laboratory ID: 65703-018 Enseco ID: 65703-018

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	8.19	units	0.01	150.1	02/25/88
Specific Conductance @ 25C	1650	umhos/cm	1	120.1/9050	02/25/88
Total Dissolved Solids	1200	mg/L	10	160.1	02/29/88
Fluoride	0.5	mg/L	0.1	340.2	03/06/88
Chloride	52	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	0.5	mg/L	0.1	353.2	03/03/88
Sulfate	550	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	253	mg/L	5	310.1/403	02/25/88
Ammonia as N	N.D.	mg/L	0.1	350.1	03/03/88
Total Cations	18.3	meq/L	0.1	104C	03/08/88
Total Anions	18.0	meq/L	0.3	104C	03/08/88
% Difference	0.9	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: SW-2

Laboratory ID: 65703-019 Enseco ID: 65703-019

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: SW-2

Laboratory ID: 65703-019 Enseco ID: 65703-019

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: SW-2

Laboratory ID: 65703-019 Enseco ID: 65703-019

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	147	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	25	mg/L	0.1	200.7	03/07/88
Manganese	0.55	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	190	mg/L	0.05	200.7	03/07/88
Total Organic Lead	0.002	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: SW-2

Laboratory ID: 65703-019 Enseco ID: 65703-019

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	7.82	units	0.01	150.1	02/25/88
Specific Conductance @ 25C	1680	umhos/cm	1	120.1/9050	02/25/88
Total Dissolved Solids	1210	mg/L	10	160.1	02/29/88
Fluoride	0.5	mg/L	0.1	340.2	03/06/88
Chloride	50	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	0.7	mg/L	0.1	353.2	03/03/88
Sulfate	550	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	274	mg/L	5	310.1/403	02/25/88
Ammonia as N	0.2	mg/L	0.1	350.1	03/03/88
Total Cations	17.7	meq/L	0.1	104C	03/08/88
Total Anions	18.4	meq/L	0.3	104C	03/08/88
% Difference	2.0	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: V. MURRAY DITCH

Laboratory ID: 65703-020 Enseco ID: 65703-020

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: V. MURRAY DITCH

Laboratory ID: 65703-020 Enseco ID: 65703-020

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/27/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Michael Hoffman Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-13

Laboratory ID: 65703-021 Enseco ID: 65703-021

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/29/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	1.1	ug/L	0.50
o & p-Xylene(s)	0.58	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: MW-13

Laboratory ID: 65703-021 Enseco ID: 65703-021

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	219	mg/L	0.1	200.7	03/07/88
Iron	0.12	mg/L	0.05	200.7	03/07/88
Magnesium	47	mg/L	0.1	200.7	03/07/88
Manganese	1.9	mg/L	0.005	200.7	03/07/88
Potassium	N.D.	mg/L	5	200.7	03/07/88
Sodium	370	mg/L	0.05	200.7	03/07/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: MW-13

Laboratory ID: 65703-021 Enseco ID: 65703-021

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	8.11	units	0.01	150.1	02/26/88
Specific Conductance @ 25C	2650	umhos/cm	1	120.1/9050	02/26/88
Total Dissolved Solids	1850	mg/L	10	160.1	03/03/88
Fluoride	0.8	mg/L	0.1	340.2	03/06/88
Chloride	82	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	03/03/88
Sulfate	920	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	581	mg/L	5	310.1/403	02/26/88
Ammonia as N	0.5	mg/L	0.1	350.1	03/03/88
Total Cations	30.9	meq/L	0.1	104C	03/08/88
Total Anions	33.1	meq/L	0.3	104C	03/08/88
% Difference	3.4	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: V. MURRAY WELL

Laboratory ID: 65703-022 Enseco ID: 65703-022

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/29/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	N.D.	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: V. MURRAY WELL

Laboratory ID: 65703-022 Enseco ID: 65703-022

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/29/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

METALS PARAMETERS
DISSOLVED METALS

Client Name: DAMES AND MOORE

Client ID: V. MURRAY WELL

Laboratory ID: 65703-022 Enseco ID: 65703-022

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
Calcium	28	mg/L	0.1	200.7	03/07/88
Iron	N.D.	mg/L	0.05	200.7	03/07/88
Magnesium	26	mg/L	0.1	200.7	03/07/88
Manganese	0.032	mg/L	0.005	200.7	03/07/88
Potassium	7	mg/L	5	200.7	03/07/88
Sodium	126	mg/L	0.05	200.7	03/07/88
Total Organic Lead	N.D.	mg/L	0.002	Enseco	03/09/88

N.D. = Not detected

Approved by: Will Pratt

INORGANIC PARAMETERS

Client Name: DAMES AND MOORE

Client ID: V. MURRAY WELL

Laboratory ID: 65703-022 Enseco ID: 65703-022

Matrix: Groundwater Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88

Parameter	Result	Units	Reporting Limit	Analytical Method	Analyzed
pH	8.25	units	0.01	150.1	02/25/88
Specific Conductance @ 25C	845	umhos/cm	1	120.1/9050	02/25/88
Total Dissolved Solids	640	mg/L	10	160.1	03/10/88
Fluoride	0.2	mg/L	0.1	340.2	03/06/88
Chloride	37	mg/L	3	300.0	03/03/88
Nitrate + Nitrite as N	N.D.	mg/L	0.1	353.2	03/03/88
Sulfate	97	mg/L	5	300.0	03/03/88
Total Alkalinity as CaCO3	297	mg/L	5	310.1/403	02/25/88
Ammonia as N	0.7	mg/L	0.1	350.1	03/03/88
Total Cations	9.2	meq/L	0.1	104C	03/08/88
Total Anions	9.0	meq/L	0.3	104C	03/08/88
% Difference	1.3	%	0.1	104C	03/08/88

N.D. = Not detected

Approved by: Lindsay Breyer

HALOGENATED VOLATILE ORGANICS

EPA METHOD 601

Client Name: DAMES AND MOORE

Client ID: TRIP BLANK

Laboratory ID: 65703-023 Enseco ID: 65703-023

Matrix: Water Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/29/88

Parameter	Result	Units	Reporting Limit
Bromoform	N.D.	ug/L	5.0
Carbon tetrachloride	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	2.0
Chloroethane	N.D.	ug/L	5.0
Chloroform	N.D.	ug/L	0.50
Dibromochloromethane	N.D.	ug/L	1.0
Bromodichloromethane	N.D.	ug/L	1.0
1,1-Dichloroethane	N.D.	ug/L	0.50
1,2-Dichloroethane	N.D.	ug/L	1.0
1,1-Dichloroethene	N.D.	ug/L	0.50
1,2-Dichloropropane	N.D.	ug/L	1.0
cis-1,3-Dichloropropene	N.D.	ug/L	2.0
trans-1,3-Dichloropropene	N.D.	ug/L	0.50
Bromomethane	N.D.	ug/L	5.0
Chloromethane	N.D.	ug/L	5.0
Methylene chloride	11	ug/L	5.0
1,1,2,2-Tetrachloroethane	N.D.	ug/L	1.0
Tetrachloroethene	N.D.	ug/L	0.50
trans-1,2-Dichloroethene	N.D.	ug/L	0.50
1,1,1-Trichloroethane	N.D.	ug/L	0.50
1,1,2-Trichloroethane	N.D.	ug/L	1.0
Trichloroethene	N.D.	ug/L	1.0
Vinyl chloride	N.D.	ug/L	1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	N.D.	ug/L	1.0
1,2-Dibromoethane (EDB)	N.D.	ug/L	2.0

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: TRIP BLANK

Laboratory ID: 65703-023 Enseco ID: 65703-023

Matrix: Water Sampled: 02/24/88 Received: 02/25/88

Authorized: 02/23/88 Analyzed: 02/29/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Cindy Ingram Approved by: Susan Brillante

V. QUALITY CONTROL REPORT

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of duplicate Laboratory Control Samples (LCS) at frequent, well-defined intervals. An LCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the LCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate LCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For Organic analyses an additional control measure is taken in the form of a Surrogate Control Sample (SCS). The SCS is a control sample spiked with surrogate standards which is analyzed with every analytical lot. The recovery of the SCS is charted in exactly the same manner as described for the LCS, and provides a daily check on the performance of the method.

Accuracy for LCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for LCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\text{Measured Concentration LCS1} - \text{Measured Concentration LCS2}}{(\text{Measured Concentration LCS1} + \text{Measured Concentration LCS2})/2}$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, LCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report. The test codes assigned are defined in Section VI., Analytical Methodology.

QC LOT ASSIGNMENT REPORT
GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS	QC Lot Number SCS
65703-012-00	Reagent Water	VOA	VOA 018AW	VOA 018CW

LABORATORY CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Analyte	Concentration Spiking	Concentration Measured LCS1	Concentration Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: VOA on Reagent Water QC Lot: VOA 018AW Concentration Units: (ug/L)								
1,1-Dichloroethene	50.0	41.3	41.5	83	83	61-145	0.5	14
Trichloroethene	50.0	53.5	52.6	107	105	71-120	1.7	14
Chlorobenzene	50.0	55.0	54.8	110	110	75-130	0.4	13
Toluene	50.0	49.1	49.0	98	98	76-125	0.2	13
Benzene	50.0	51.7	51.7	103	103	76-127	0.0	11

SURROGATE CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Analyte	Concentration Spiking	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Test: VOA on Reagent Water				
QC Lot: VOA 018CW				
Concentration Units: (ug/L)				
Toluene-D8	50.0	51.2	102	88-110
Bromofluorobenzene (BFB)	50.0	51.1	102	86-115
1,2-Dichloroethane-D4	50.0	47.0	94	76-114

QC LOT ASSIGNMENT REPORT
GAS CHROMATOGRAPHY

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS	QC Lot Number SCS
65703-001-00	Reagent Water	601	601 128AW	601 128AW
65703-001-00	Reagent Water	602	602 133AW	602 133AW
65703-002-00	Reagent Water	601	601 128AW	601 128AW
65703-002-00	Reagent Water	602	602 133AW	602 133AW
65703-003-00	Reagent Water	601	601 128AW	601 128AW
65703-003-00	Reagent Water	602	602 133AW	602 133AW
65703-004-00	Reagent Water	601	601 128AW	601 128AW
65703-004-00	Reagent Water	602	602 133AW	602 133AW
65703-005-00	Reagent Water	601	601 128AW	601 128AW
65703-005-00	Reagent Water	602	602 133AW	602 133AW
65703-006-00	Reagent Water	601	601 128AW	601 128AW
65703-006-00	Reagent Water	602	602 133AW	602 133AW
65703-007-00	Reagent Water	601	601 128AW	601 128AW
65703-007-00	Reagent Water	602	602 133AW	602 133AW
65703-008-00	Reagent Water	601	601 128AW	601 128AW
65703-008-00	Reagent Water	602	602 133AW	602 133AW
65703-009-00	Reagent Water	601	601 128AW	601 128AW
65703-009-00	Reagent Water	602	602 133AW	602 133AW
65703-010-00	Reagent Water	601	601 133AP	601 133AP
65703-010-00	Reagent Water	602	602 143AP	602 143AP
65703-011-00	Reagent Water	601	601 133AP	601 133AP
65703-011-00	Reagent Water	602	602 143AP	602 143AP
65703-013-00	Reagent Water	601	601 133AP	601 133AP
65703-013-00	Reagent Water	602	602 143AP	602 143AP
65703-014-00	Reagent Water	601	601 133AP	601 133AP
65703-014-00	Reagent Water	602	602 143AP	602 143AP
65703-015-00	Reagent Water	601	601 133AP	601 133AP
65703-015-00	Reagent Water	602	602 143AP	602 143AP
65703-016-00	Reagent Water	601	601 133AP	601 133AP
65703-016-00	Reagent Water	602	602 143AP	602 143AP
65703-017-00	Reagent Water	601	601 133AP	601 133AP
65703-017-00	Reagent Water	602	602 143AP	602 143AP
65703-018-00	Reagent Water	601	601 133AP	601 133AP
65703-018-00	Reagent Water	602	602 143AP	602 143AP
65703-019-00	Reagent Water	601	601 133AP	601 133AP
65703-019-00	Reagent Water	602	602 143AP	602 143AP
65703-020-00	Reagent Water	601	601 133AP	601 133AP
65703-020-00	Reagent Water	602	602 143AP	602 143AP
65703-021-00	Reagent Water	601	601 129AW	601 129AW
65703-021-00	Reagent Water	602	602 134AW	602 134AW
65703-022-00	Reagent Water	601	601 129AW	601 129AW
65703-022-00	Reagent Water	602	602 134AW	602 134AW

QC LOT ASSIGNMENT REPORT
GAS CHROMATOGRAPHY (cont.)

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS	QC Lot Number SCS
65703-023-00	Reagent Water	601	601 129AW	601 129AW
65703-023-00	Reagent Water	602	602 134AW	602 134AW

LABORATORY CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Limits	Precision(RPD) LCS	Limits
Test: 601 on Reagent Water QC Lot: 601 128AW Concentration Units: (ug/L)								
Chloromethane	20	14.7	14.3	74	72	59-140	2.8	25
Bromomethane	20	10.8	10.7	54#	54#	58-141	0.9	25
Vinyl chloride	20	12.5	12.0	63#	60#	68-132	4.1	25
Chloroethane	20	17.4	16.6	87	83	77-123	4.7	25
Methylene chloride	20	18.9	18.5	94	93	77-123	2.1	20
Trichlorofluoromethane	20	17.9	17.4	89	87	66-134	2.8	25
1,1-Dichloroethene	20	18.5	18.0	93	90	63-137	2.7	20
1,1-Dichloroethane	20	21.0	20.2	105	101	84-116	3.9	20
trans-1,2-Dichloroethene	20	20.0	19.8	100	99	64-136	1.0	20
Chloroform	20	20.0	19.7	100	98	75-125	1.5	20
1,1,2-Trichloro-1,2,2-trifluor	20	15.7	15.6	79	78	67-134	0.6	20
1,2-Dichloroethane	20	19.6	19.9	98	99	72-129	1.5	20
1,1,1-Trichloroethane	20	16.6	16.2	83	81	71-129	2.4	20
Carbon tetrachloride	20	18.7	18.9	93	94	68-131	1.1	20
Bromodichloromethane	20	19.5	19.5	98	98	76-124	0.0	20
1,2-Dichloropropane	20	21.1	20.4	106	102	74-126	3.4	20
trans-1,3-Dichloropropene	20	19.5	19.4	98	97	64-136	0.5	20
Trichloroethene	20	20.1	19.9	101	99	77-123	1.0	20
1,1,2-Trichloroethane	60	72.8	74.2	121	124	69-132	1.9	20
Dibromochloromethane	60	72.8	74.2	121	124	69-132	1.9	20
cis-1,3-Dichloropropene	60	72.8	74.2	121	124	69-132	1.9	20
1,2-Dibromoethane (EDB)	20	21.8	23.0	109	115	74-127	5.4	20
Bromoform	20	21.4	23.5	107	118	74-127	9.4	20
1,1,2,2-Tetrachloroethane	40	45.7	44.9	114	112	60-140	1.8	20
Tetrachloroethene	40	45.7	44.9	114	112	60-140	1.8	20
Chlorobenzene	20	21.5	21.0	108	105	72-128	2.4	20
1,3-Dichlorobenzene	20	24.3	21.5	122	108	50-150	12.2	20
1,2-Dichlorobenzene	20	23.9	20.9	119	104	70-130	13.4	20
1,4-Dichlorobenzene	20	24.7	21.9	123	109	70-130	12.0	20
Test: 601 on Reagent Water QC Lot: 601 129AW Concentration Units: (ug/L)								
Chloromethane	20	13.6	12.8	68	64	59-140	6.1	25
Bromomethane	20	10.3	9.66	52#	48#	58-141	6.4	25
Vinyl chloride	20	12.2	11.1	61#	56#	68-132	9.4	25
Chloroethane	20	16.6	15.5	83	78	77-123	6.9	25
Methylene chloride	20	19.0	17.7	95	88	77-123	7.1	20

= Recovery outside standard QC limits.

LABORATORY CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: 601 on Reagent Water QC Lot: 601 129AW Concentration Units: (ug/L)								
Trichlorofluoromethane	20	17.8	16.9	89	84	66-134	5.2	25
1,1-Dichloroethene	20	18.4	17.1	92	86	63-137	7.3	20
1,1-Dichloroethane	20	20.5	19.8	103	99	84-116	3.5	20
trans-1,2-Dichloroethene	20	19.7	18.7	98	93	64-136	5.2	20
Chloroform	20	20.2	19.5	101	98	75-125	3.5	20
1,1,2-Trichloro-1,2,2-trifluor	20	15.2	14.8	76	74	67-134	2.7	20
1,2-Dichloroethane	20	19.5	18.9	98	94	72-129	3.1	20
1,1,1-Trichloroethane	20	16.1	15.7	81	79	71-129	2.5	20
Carbon tetrachloride	20	19.0	17.9	95	89	68-131	6.0	20
Bromodichloromethane	20	19.5	19.5	98	98	76-124	0.0	20
1,2-Dichloropropane	20	20.7	19.1	103	96	74-126	8.0	20
trans-1,3-Dichloropropene	20	19.9	19.9	99	99	64-136	0.0	20
Trichloroethene	20	20.1	19.3	101	97	77-123	4.1	20
1,1,2-Trichloroethane	60	76.6	73.2	128	122	69-132	4.5	20
Dibromochloromethane	60	76.6	73.2	128	122	69-132	4.5	20
cis-1,3-Dichloropropene	60	76.6	73.2	128	122	69-132	4.5	20
1,2-Dibromoethane (EDB)	20	23.1	24.5	116	123	74-127	5.9	20
Bromoform	20	21.1	23.1	106	116	74-127	9.0	20
1,1,2,2-Tetrachloroethane	40	47.4	44.6	119	112	60-140	6.1	20
Tetrachloroethene	40	47.4	44.6	119	112	60-140	6.1	20
Chlorobenzene	20	21.9	20.6	109	103	72-128	6.1	20
1,3-Dichlorobenzene	20	24.0	22.3	120	112	50-150	7.3	20
1,2-Dichlorobenzene	20	23.2	21.0	116	105	70-130	10.0	20
1,4-Dichlorobenzene	20	24.5	23.3	123	117	70-130	5.0	20
Test: 601 on Reagent Water QC Lot: 601 133AP Concentration Units: (ug/L)								
Chloromethane	20	15.8	15.8	79	79	59-140	0.0	25
Bromomethane	20	11.3	11.2	57#	56#	58-141	0.9	25
Vinyl chloride	20	11.9	11.6	60#	58#	68-132	2.6	25
Chloroethane	20	17.0	17.1	85	86	77-123	0.6	25
Methylene chloride	20	18.0	18.9	90	94	77-123	4.9	20
Trichlorofluoromethane	20	17.7	18.3	88	92	66-134	3.3	25
1,1-Dichloroethene	20	17.9	18.4	89	92	63-137	2.8	20
1,1-Dichloroethane	20	19.8	20.4	99	102	84-116	3.0	20
trans-1,2-Dichloroethene	20	19.3	19.7	97	98	64-136	2.1	20
Chloroform	20	19.6	19.8	98	99	75-125	1.0	20

= Recovery outside standard QC limits.

LABORATORY CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: 601 on Reagent Water QC Lot: 601 133AP Concentration Units: (ug/L)								
1,1,2-Trichloro-1,2,2-trifluor	20	15.5	16.3	78	82	67-134	5.0	20
1,2-Dichloroethane	20	21.1	21.3	106	107	72-129	0.9	20
1,1,1-Trichloroethane	20	16.5	16.7	83	83	71-129	1.2	20
Carbon tetrachloride	20	18.2	18.8	91	94	68-131	3.2	20
Bromodichloromethane	20	18.7	18.8	93	94	76-124	0.5	20
1,2-Dichloropropane	20	19.5	19.7	98	98	74-126	1.0	20
trans-1,3-Dichloropropene	20	18.2	18.3	91	92	64-136	0.5	20
Trichloroethene	20	20.0	20.2	100	101	77-123	1.0	20
1,1,2-Trichloroethane	60	75.7	81.8	126	136#	69-132	7.7	20
Dibromochloromethane	60	75.7	81.8	126	136#	69-132	7.7	20
cis-1,3-Dichloropropene	60	75.7	81.8	126	136#	69-132	7.7	20
1,2-Dibromoethane (EDB)	20	18.4	18.6	92	93	74-127	1.1	20
Bromoform	20	19.9	20.2	99	101	74-127	1.5	20
1,1,2,2-Tetrachloroethane	40	39.7	44.8	99	112	60-140	12.1	20
Tetrachloroethene	40	39.7	44.8	99	112	60-140	12.1	20
Chlorobenzene	20	20.4	23.2	102	116	72-128	12.8	20
1,3-Dichlorobenzene	20	17.4	18.1	87	91	50-150	3.9	20
1,2-Dichlorobenzene	20	17.1	18.8	86	94	70-130	9.5	20
1,4-Dichlorobenzene	20	17.3	17.9	87	89	70-130	3.4	20
Test: 602 on Reagent Water QC Lot: 602 133AW Concentration Units: (ug/L)								
Benzene	20	16.4	16.4	82	82	77-123	0.0	20
Toluene	20	17.6	17.6	88	88	77-123	0.0	20
Chlorobenzene	20	18.5	18.3	93	92	81-119	1.1	20
Ethylbenzene	20	18.3	18.1	92	91	63-137	1.1	20
m-Xylene	20	19.2	18.8	96	94	77-123	2.1	20
o & p-Xylene(s)	40	38.2	37.4	96	93	77-123	2.1	20
1,3-Dichlorobenzene	20	19.9	19.1	99	96	77-123	4.1	20
1,2-Dichlorobenzene	20	19.4	18.5	97	93	63-137	4.7	20
1,4-Dichlorobenzene	20	20.0	19.4	100	97	70-130	3.0	20

= Recovery outside standard QC limits.

LABORATORY CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Limits	Precision(RPD) LCS	Limits
Test: 602 on Reagent Water QC Lot: 602 134AW Concentration Units: (ug/L)								
Benzene	20	16.3	16.3	82	82	77-123	0.0	20
Toluene	20	17.4	17.3	87	87	77-123	0.6	20
Chlorobenzene	20	18.6	18.4	93	92	81-119	1.1	20
Ethylbenzene	20	18.3	18.1	92	91	63-137	1.1	20
m-Xylene	20	19.4	19.1	97	96	77-123	1.6	20
o & p-Xylene(s)	40	38.2	37.7	96	94	77-123	1.3	20
1,3-Dichlorobenzene	20	20.1	19.6	101	98	77-123	2.5	20
1,2-Dichlorobenzene	20	19.3	18.7	97	93	63-137	3.2	20
1,4-Dichlorobenzene	20	20.2	20.0	101	100	70-130	1.0	20
Test: 602 on Reagent Water QC Lot: 602 143AP Concentration Units: (ug/L)								
Benzene	20	16.3	17.0	82	85	77-123	4.2	20
Toluene	20	17.4	18.1	87	91	77-123	3.9	20
Chlorobenzene	20	18.3	18.9	92	94	81-119	3.2	20
Ethylbenzene	20	17.6	18.2	88	91	63-137	3.4	20
m-Xylene	20	17.6	18.2	88	91	77-123	3.4	20
o & p-Xylene(s)	40	35.8	36.8	90	92	77-123	2.8	20
1,3-Dichlorobenzene	20	18.0	18.0	90	90	77-123	0.0	20
1,2-Dichlorobenzene	20	17.6	17.4	88	87	63-137	1.1	20
1,4-Dichlorobenzene	20	17.9	18.3	89	92	70-130	2.2	20

SURROGATE CONTROL SAMPLE REPORT
GAS CHROMATOGRAPHY

Analyte	Concentration Spiking	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Test: 601 on Reagent Water QC Lot: 601 128AW Concentration Units: (ug/L)				
Bromochloromethane	30	23.9	80	20-160
Test: 601 on Reagent Water QC Lot: 601 129AW Concentration Units: (ug/L)				
Bromochloromethane	30	27.2	91	20-160
Test: 601 on Reagent Water QC Lot: 601 133AP Concentration Units: (ug/L)				
Bromochloromethane	30	31.8	106	20-160
Test: 602 on Reagent Water QC Lot: 602 133AW Concentration Units: (ug/L)				
a,a,a-Trifluorotoluene	30	28.8	96	20-160
Test: 602 on Reagent Water QC Lot: 602 134AW Concentration Units: (ug/L)				
a,a,a-Trifluorotoluene	30	31.0	103	20-160
Test: 602 on Reagent Water QC Lot: 602 143AP Concentration Units: (ug/L)				
a,a,a-Trifluorotoluene	30	34.4	115	20-160

QC LOT ASSIGNMENT REPORT
INORGANICS - METALS

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS
65703-001-00	Reagent Water	ICPD	ICPD227AA
65703-001-00	Reagent Water	ICPD	ICPD227AA
65703-002-00	Reagent Water	ICPD	ICPD227AA
65703-002-00	Reagent Water	ICPD	ICPD227AA
65703-003-00	Reagent Water	ICPD	ICPD227AA
65703-003-00	Reagent Water	ICPD	ICPD227AA
65703-004-00	Reagent Water	ICPD	ICPD227AA
65703-004-00	Reagent Water	ICPD	ICPD227AA
65703-005-00	Reagent Water	ICPD	ICPD227AA
65703-005-00	Reagent Water	ICPD	ICPD227AA
65703-006-00	Reagent Water	ICPD	ICPD227AA
65703-006-00	Reagent Water	ICPD	ICPD227AA
65703-007-00	Reagent Water	ICPD	ICPD227AA
65703-007-00	Reagent Water	ICPD	ICPD227AA
65703-008-00	Reagent Water	ICPD	ICPD227AA
65703-008-00	Reagent Water	ICPD	ICPD227AA
65703-009-00	Reagent Water	ICPD	ICPD227AA
65703-009-00	Reagent Water	ICPD	ICPD227AA
65703-010-00	Reagent Water	ICPD	ICPD227AA
65703-010-00	Reagent Water	ICPD	ICPD227AA
65703-011-00	Reagent Water	ICPD	ICPD236AA
65703-011-00	Reagent Water	ICPD	ICPD236AA
65703-012-00	Reagent Water	ICPD	ICPD227AA
65703-012-00	Reagent Water	ICPD	ICPD227AA
65703-013-00	Reagent Water	ICPD	ICPD227AA
65703-013-00	Reagent Water	ICPD	ICPD227AA
65703-014-00	Reagent Water	ICPD	ICPD227AA
65703-014-00	Reagent Water	ICPD	ICPD227AA
65703-015-00	Reagent Water	ICPD	ICPD227AA
65703-015-00	Reagent Water	ICPD	ICPD227AA
65703-016-00	Reagent Water	ICPD	ICPD227AA
65703-016-00	Reagent Water	ICPD	ICPD227AA
65703-018-00	Reagent Water	ICPD	ICPD227AA
65703-018-00	Reagent Water	ICPD	ICPD227AA
65703-019-00	Reagent Water	ICPD	ICPD227AA
65703-019-00	Reagent Water	ICPD	ICPD227AA
65703-021-00	Reagent Water	ICPD	ICPD227AA
65703-021-00	Reagent Water	ICPD	ICPD227AA
65703-022-00	Reagent Water	ICPD	ICPD227AA
65703-022-00	Reagent Water	ICPD	ICPD227AA

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: ICPD on Reagent Water QC Lot: ICPD227AA Concentration Units: (mg/L)								
Aluminum	2.0	2.04	2.03	102	101	75-125	0.5	20
Antimony	0.5	0.52	0.51	104	102	75-125	1.9	20
Arsenic	2.0	1.93	1.91	97	96	75-125	1.0	20
Barium	2.0	2.02	2.01	101	101	75-125	0.5	20
Beryllium	0.05	0.049	0.048	98	96	75-125	2.1	20
Cadmium	0.05	0.052	0.048	104	96	75-125	8.0	20
Calcium	100	105	104	105	104	75-125	1.0	20
Chromium	0.2	0.22	0.22	110	110	75-125	0.0	20
Cobalt	0.5	0.50	0.49	100	98	75-125	2.0	20
Copper	0.25	0.27	0.27	108	108	75-125	0.0	20
Iron	1.0	1.03	1.02	103	102	75-125	1.0	20
Lead	0.5	0.51	0.50	102	100	75-125	2.0	20
Magnesium	50	48.3	47.9	97	96	75-125	0.8	20
Manganese	0.5	0.52	0.52	104	104	75-125	0.0	20
Nickel	0.5	0.54	0.53	108	106	75-125	1.9	20
Potassium	50	51.2	47.9	102	96	75-125	6.7	20
Silver	0.05	0.047	0.047	94	94	75-125	0.0	20
Sodium	100	103	101	103	101	75-125	2.0	20
Tin	0.5	0.53	0.53	106	106	75-125	0.0	20
Vanadium	0.5	0.50	0.50	100	100	75-125	0.0	20
Zinc	0.5	0.54	0.54	108	108	75-125	0.0	20
Test: ICPD on Reagent Water QC Lot: ICPD236AA Concentration Units: (mg/L)								
Aluminum	2.0	2.03	2.04	101	102	75-125	0.5	20
Antimony	0.5	0.54	0.53	108	106	75-125	1.9	20
Arsenic	2.0	1.91	1.94	96	97	75-125	1.6	20
Barium	2.0	2.01	2.02	101	101	75-125	0.5	20
Beryllium	0.05	0.049	0.049	98	98	75-125	0.0	20
Cadmium	0.05	0.050	0.052	100	104	75-125	3.9	20
Calcium	100	108	108	108	108	75-125	0.0	20
Chromium	0.2	0.19	0.19	95	95	75-125	0.0	20
Cobalt	0.5	0.49	0.50	98	100	75-125	2.0	20
Copper	0.25	0.27	0.27	108	108	75-125	0.0	20
Iron	1.0	1.04	1.03	104	103	75-125	1.0	20
Lead	0.5	0.49	0.49	98	98	75-125	0.0	20
Magnesium	50	48.9	49.0	98	98	75-125	0.2	20

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: ICPD on Reagent Water QC Lot: ICPD236AA Concentration Units: (mg/L)								
Manganese	0.5	0.52	0.52	104	104	75-125	0.0	20
Nickel	0.5	0.52	0.52	104	104	75-125	0.0	20
Potassium	50	51.8	52.1	104	104	75-125	0.6	20
Silver	0.05	0.045	0.045	90	90	75-125	0.0	20
Sodium	100	103	103	103	103	75-125	0.0	20
Tin	0.5	0.53	0.54	106	108	75-125	1.9	20
Vanadium	0.5	0.49	0.50	98	100	75-125	2.0	20
Zinc	0.5	0.52	0.53	104	106	75-125	1.9	20

QC LOT ASSIGNMENT REPORT
INORGANICS - NON-METALS

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS
65703-001-00	Reagent Water	ALK	ALK 289AA
65703-001-00	Reagent Water	CL	CL 214AA
65703-001-00	Reagent Water	COND	COND266AA
65703-001-00	Reagent Water	F	F 135AA
65703-001-00	Reagent Water	NH3	NH3 149AC
65703-001-00	Reagent Water	NO3	NO3 201AF
65703-001-00	Reagent Water	PH	PH 334AA
65703-001-00	Reagent Water	SO4	SO4 200AA
65703-001-00	Reagent Water	TDS	TDS 140AA
65703-002-00	Reagent Water	ALK	ALK 271AA
65703-002-00	Reagent Water	CL	CL 214AA
65703-002-00	Reagent Water	COND	COND266AA
65703-002-00	Reagent Water	F	F 135AA
65703-002-00	Reagent Water	NH3	NH3 149AC
65703-002-00	Reagent Water	NO3	NO3 201AF
65703-002-00	Reagent Water	PH	PH 334AA
65703-002-00	Reagent Water	SO4	SO4 209AA
65703-002-00	Reagent Water	TDS	TDS 145AA
65703-003-00	Reagent Water	ALK	ALK 271AA
65703-003-00	Reagent Water	CL	CL 214AA
65703-003-00	Reagent Water	COND	COND266AA
65703-003-00	Reagent Water	F	F 135AA
65703-003-00	Reagent Water	NH3	NH3 150AC
65703-003-00	Reagent Water	NO3	NO3 202AF
65703-003-00	Reagent Water	PH	PH 334AA
65703-003-00	Reagent Water	SO4	SO4 209AA
65703-003-00	Reagent Water	TDS	TDS 145AA
65703-004-00	Reagent Water	ALK	ALK 271AA
65703-004-00	Reagent Water	CL	CL 214AA
65703-004-00	Reagent Water	COND	COND266AA
65703-004-00	Reagent Water	F	F 135AA
65703-004-00	Reagent Water	NH3	NH3 150AC
65703-004-00	Reagent Water	NO3	NO3 202AF
65703-004-00	Reagent Water	PH	PH 334AA
65703-004-00	Reagent Water	SO4	SO4 209AA
65703-004-00	Reagent Water	TDS	TDS 145AA
65703-005-00	Reagent Water	ALK	ALK 271AA
65703-005-00	Reagent Water	CL	CL 206AA
65703-005-00	Reagent Water	COND	COND266AA
65703-005-00	Reagent Water	F	F 135AA
65703-005-00	Reagent Water	NH3	NH3 150AC
65703-005-00	Reagent Water	NO3	NO3 202AF

QC LOT ASSIGNMENT REPORT
INORGANICS - NON-METALS (cont.)

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS
65703-005-00	Reagent Water	PH	PH 334AA
65703-005-00	Reagent Water	SO4	SO4 200AA
65703-005-00	Reagent Water	TDS	TDS 145AA
65703-006-00	Reagent Water	ALK	ALK 271AA
65703-006-00	Reagent Water	CL	CL 206AA
65703-006-00	Reagent Water	COND	COND266AA
65703-006-00	Reagent Water	F	F 135AA
65703-006-00	Reagent Water	NH3	NH3 150AC
65703-006-00	Reagent Water	NO3	NO3 202AF
65703-006-00	Reagent Water	PH	PH 334AA
65703-006-00	Reagent Water	SO4	SO4 200AA
65703-006-00	Reagent Water	TDS	TDS 145AA
65703-007-00	Reagent Water	ALK	ALK 271AA
65703-007-00	Reagent Water	CL	CL 206AA
65703-007-00	Reagent Water	COND	COND266AA
65703-007-00	Reagent Water	F	F 135AA
65703-007-00	Reagent Water	NH3	NH3 150AC
65703-007-00	Reagent Water	NO3	NO3 202AF
65703-007-00	Reagent Water	PH	PH 334AA
65703-007-00	Reagent Water	SO4	SO4 200AA
65703-007-00	Reagent Water	TDS	TDS 145AA
65703-008-00	Reagent Water	ALK	ALK 271AA
65703-008-00	Reagent Water	CL	CL 206AA
65703-008-00	Reagent Water	COND	COND266AA
65703-008-00	Reagent Water	F	F 135AA
65703-008-00	Reagent Water	NH3	NH3 150AC
65703-008-00	Reagent Water	NO3	NO3 202AF
65703-008-00	Reagent Water	PH	PH 334AA
65703-008-00	Reagent Water	SO4	SO4 200AA
65703-008-00	Reagent Water	TDS	TDS 145AA
65703-009-00	Reagent Water	ALK	ALK 289AA
65703-009-00	Reagent Water	CL	CL 206AA
65703-009-00	Reagent Water	COND	COND266AA
65703-009-00	Reagent Water	F	F 135AA
65703-009-00	Reagent Water	NH3	NH3 150AC
65703-009-00	Reagent Water	NO3	NO3 202AF
65703-009-00	Reagent Water	PH	PH 334AA
65703-009-00	Reagent Water	SO4	SO4 200AA
65703-009-00	Reagent Water	TDS	TDS 145AA
65703-010-00	Reagent Water	ALK	ALK 289AA
65703-010-00	Reagent Water	CL	CL 207AA
65703-010-00	Reagent Water	COND	COND267AA

QC LOT ASSIGNMENT REPORT

INORGANICS - NON-METALS (cont.)

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS
65703-010-00	Reagent Water	F	F 135AA
65703-010-00	Reagent Water	NH3	NH3 149AC
65703-010-00	Reagent Water	NO3	NO3 201AF
65703-010-00	Reagent Water	PH	PH 336AA
65703-010-00	Reagent Water	SO4	SO4 209AA
65703-010-00	Reagent Water	TDS	TDS 145AA
65703-011-00	Reagent Water	ALK	ALK 289AA
65703-011-00	Reagent Water	CL	CL 207AA
65703-011-00	Reagent Water	COND	COND267AA
65703-011-00	Reagent Water	F	F 135AA
65703-011-00	Reagent Water	NH3	NH3 149AC
65703-011-00	Reagent Water	NO3	NO3 201AF
65703-011-00	Reagent Water	PH	PH 336AA
65703-011-00	Reagent Water	SO4	SO4 209AA
65703-011-00	Reagent Water	TDS	TDS 145AA
65703-012-00	Reagent Water	ALK	ALK 273AA
65703-012-00	Reagent Water	CL	CL 208AA
65703-012-00	Reagent Water	COND	COND267AA
65703-012-00	Reagent Water	F	F 135AA
65703-012-00	Reagent Water	NH3	NH3 149AC
65703-012-00	Reagent Water	NO3	NO3 201AF
65703-012-00	Reagent Water	PH	PH 336AA
65703-012-00	Reagent Water	SO4	SO4 201AA
65703-012-00	Reagent Water	TDS	TDS 156AA
65703-013-00	Reagent Water	ALK	ALK 273AA
65703-013-00	Reagent Water	CL	CL 207AA
65703-013-00	Reagent Water	COND	COND267AA
65703-013-00	Reagent Water	F	F 135AA
65703-013-00	Reagent Water	NH3	NH3 151AC
65703-013-00	Reagent Water	NO3	NO3 201AF
65703-013-00	Reagent Water	PH	PH 336AA
65703-013-00	Reagent Water	SO4	SO4 202AA
65703-013-00	Reagent Water	TDS	TDS 156AA
65703-014-00	Reagent Water	ALK	ALK 273AA
65703-014-00	Reagent Water	CL	CL 207AA
65703-014-00	Reagent Water	COND	COND267AA
65703-014-00	Reagent Water	F	F 136AA
65703-014-00	Reagent Water	NH3	NH3 149AC
65703-014-00	Reagent Water	NO3	NO3 201AF
65703-014-00	Reagent Water	PH	PH 336AA
65703-014-00	Reagent Water	SO4	SO4 201AA
65703-014-00	Reagent Water	TDS	TDS 156AA

QC LOT ASSIGNMENT REPORT
INORGANICS - NON-METALS (cont.)

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS
65703-015-00	Reagent Water	ALK	ALK 273AA
65703-015-00	Reagent Water	CL	CL 208AA
65703-015-00	Reagent Water	COND	COND267AA
65703-015-00	Reagent Water	F	F 136AA
65703-015-00	Reagent Water	NH3	NH3 149AC
65703-015-00	Reagent Water	NO3	NO3 201AF
65703-015-00	Reagent Water	PH	PH 336AA
65703-015-00	Reagent Water	SO4	SO4 202AA
65703-015-00	Reagent Water	TDS	TDS 145AA
65703-016-00	Reagent Water	ALK	ALK 273AA
65703-016-00	Reagent Water	CL	CL 208AA
65703-016-00	Reagent Water	COND	COND267AA
65703-016-00	Reagent Water	F	F 136AA
65703-016-00	Reagent Water	NH3	NH3 149AC
65703-016-00	Reagent Water	NO3	NO3 201AF
65703-016-00	Reagent Water	PH	PH 336AA
65703-016-00	Reagent Water	SO4	SO4 202AA
65703-016-00	Reagent Water	TDS	TDS 145AA
65703-018-00	Reagent Water	ALK	ALK 275AA
65703-018-00	Reagent Water	CL	CL 208AA
65703-018-00	Reagent Water	COND	COND268AA
65703-018-00	Reagent Water	F	F 138AA
65703-018-00	Reagent Water	NH3	NH3 157AC
65703-018-00	Reagent Water	NO3	NO3 209AC
65703-018-00	Reagent Water	PH	PH 338AA
65703-018-00	Reagent Water	SO4	SO4 202AA
65703-018-00	Reagent Water	TDS	TDS 149AA
65703-019-00	Reagent Water	ALK	ALK 275AA
65703-019-00	Reagent Water	CL	CL 208AA
65703-019-00	Reagent Water	COND	COND268AA
65703-019-00	Reagent Water	F	F 138AA
65703-019-00	Reagent Water	NH3	NH3 157AC
65703-019-00	Reagent Water	NO3	NO3 209AC
65703-019-00	Reagent Water	PH	PH 338AA
65703-019-00	Reagent Water	SO4	SO4 202AA
65703-019-00	Reagent Water	TDS	TDS 149AA
65703-021-00	Reagent Water	ALK	ALK 277AA
65703-021-00	Reagent Water	CL	CL 208AA
65703-021-00	Reagent Water	COND	COND270AA
65703-021-00	Reagent Water	F	F 138AA
65703-021-00	Reagent Water	NH3	NH3 157AC
65703-021-00	Reagent Water	NO3	NO3 209AC

QC LOT ASSIGNMENT REPORT
INORGANICS - NON-METALS (cont.)

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS
65703-021-00	Reagent Water	PH	PH 341AA
65703-021-00	Reagent Water	SO4	SO4 202AA
65703-021-00	Reagent Water	TDS	TDS 150AA
65703-022-00	Reagent Water	ALK	ALK 275AA
65703-022-00	Reagent Water	CL	CL 208AA
65703-022-00	Reagent Water	COND	COND268AA
65703-022-00	Reagent Water	F	F 138AA
65703-022-00	Reagent Water	NH3	NH3 157AC
65703-022-00	Reagent Water	NO3	NO3 209AC
65703-022-00	Reagent Water	PH	PH 338AA
65703-022-00	Reagent Water	SO4	SO4 202AA
65703-022-00	Reagent Water	TDS	TDS 156AA

LABORATORY CONTROL SAMPLE REPORT

INORGANICS - NON-METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: ALK on Reagent Water QC Lot: ALK 271AA Concentration Units: (mg/L)								
Total Alkalinity as CaCO3	158	162	162	103	103	90-110	0.0	20
Test: ALK on Reagent Water QC Lot: ALK 273AA Concentration Units: (mg/L)								
Total Alkalinity as CaCO3	158	165	160	104	101	90-110	3.1	20
Test: ALK on Reagent Water QC Lot: ALK 275AA Concentration Units: (mg/L)								
Total Alkalinity as CaCO3	158	158	160	100	101	90-110	1.3	20
Test: ALK on Reagent Water QC Lot: ALK 277AA Concentration Units: (mg/L)								
Total Alkalinity as CaCO3	158	162	161	103	102	90-110	0.6	20
Test: ALK on Reagent Water QC Lot: ALK 289AA Concentration Units: (mg/L)								
Total Alkalinity as CaCO3	158	156	158	99	100	90-110	1.3	20
Test: CL on Reagent Water QC Lot: CL 206AA Concentration Units: (mg/L)								
Chloride	20	19.4	20.1	97	101	92-108	3.5	10

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - NON-METALS

Analyte	Concentration Spiking	Concentration Measured LCS1	Concentration Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: CL on Reagent Water QC Lot: CL 207AA Concentration Units: (mg/L)								
Chloride	20	18.9	19.0	94	95	92-108	0.5	10
Test: CL on Reagent Water QC Lot: CL 208AA Concentration Units: (mg/L)								
Chloride	20	19.5	19.1	98	96	92-108	2.1	10
Test: CL on Reagent Water QC Lot: CL 214AA Concentration Units: (mg/L)								
Chloride	20	18.6	18.7	93	93	92-108	0.5	10
Test: COND on Reagent Water QC Lot: COND266AA Concentration Units: (umhos/cm)								
Specific Conductance @ 25C	1680	1590	1600	95	95	95-105	0.6	5
Test: COND on Reagent Water QC Lot: COND267AA Concentration Units: (umhos/cm)								
Specific Conductance @ 25C	1680	1670	1680	99	100	95-105	0.6	5
Test: COND on Reagent Water QC Lot: COND268AA Concentration Units: (umhos/cm)								
Specific Conductance @ 25C	1680	1650	1680	98	100	95-105	1.8	5

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - NON-METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: NH3 on Reagent Water QC Lot: NH3 151AC Concentration Units: (mg/L)								
Ammonia as N	4.1	4.21	4.23	103	103	93-107	0.5	10
Test: NH3 on Reagent Water QC Lot: NH3 157AC Concentration Units: (mg/L)								
Ammonia as N	4.1	4.32	4.16	105	101	93-107	3.8	10
Test: NO3 on Reagent Water QC Lot: NO3 201AF Concentration Units: (mg/L)								
Nitrate as N	3.5	3.56	3.52	102	101	91-109	1.1	20
Test: NO3 on Reagent Water QC Lot: NO3 202AF Concentration Units: (mg/L)								
Nitrate as N	3.5	3.52	3.51	101	100	91-109	0.3	20
Test: NO3 on Reagent Water QC Lot: NO3 209AC Concentration Units: (mg/L)								
Nitrate as N	3.5	3.50	3.48	100	99	91-109	0.6	20
Test: PH on Reagent Water QC Lot: PH 334AA Concentration Units: (Units)								
pH	9.1	9.06	9.03	100	99	98-102	0.3	5

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - NON-METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: PH on Reagent Water QC Lot: PH 336AA Concentration Units: (Units)								
pH	9.1	8.91	8.93	98	98	98-102	0.2	5
Test: PH on Reagent Water QC Lot: PH 338AA Concentration Units: (Units)								
pH	9.1	8.89	8.88	98	98	98-102	0.1	5
Test: PH on Reagent Water QC Lot: PH 341AA Concentration Units: (Units)								
pH	9.1	8.99	8.99	99	99	98-102	0.0	5
Test: SO4 on Reagent Water QC Lot: SO4 200AA Concentration Units: (mg/L)								
Sulfate	100	98.5	97.9	99	98	93-107	0.6	15
Test: SO4 on Reagent Water QC Lot: SO4 201AA Concentration Units: (mg/L)								
Sulfate	100	97.2	96.8	97	97	93-107	0.4	15
Test: SO4 on Reagent Water QC Lot: SO4 202AA Concentration Units: (mg/L)								
Sulfate	100	95.9	97.5	96	98	93-107	1.7	15

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - NON-METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: SO4 on Reagent Water QC Lot: SO4 209AA Concentration Units: (mg/L)								
Sulfate	100	92.7	93.4	93	93	93-107	0.8	15
Test: TDS on Reagent Water QC Lot: TDS 140AA Concentration Units: (mg/L)								
Total Dissolved Solids	1270	1220	1230	96	97	90-110	0.8	10
Test: TDS on Reagent Water QC Lot: TDS 145AA Concentration Units: (mg/L)								
Total Dissolved Solids	1270	1240	1260	98	99	90-110	1.6	10
Test: TDS on Reagent Water QC Lot: TDS 149AA Concentration Units: (mg/L)								
Total Dissolved Solids	1270	1160	1250	91	98	90-110	7.5	10
Test: TDS on Reagent Water QC Lot: TDS 150AA Concentration Units: (mg/L)								
Total Dissolved Solids	1270	1230	1280	97	101	90-110	4.0	10
Test: TDS on Reagent Water QC Lot: TDS 156AA Concentration Units: (mg/L)								
Total Dissolved Solids	1360	1230	1270	90	93	90-110	3.2	10

LABORATORY CONTROL SAMPLE REPORT
INORGANICS - NON-METALS

Analyte	Concentration Spiking	Measured LCS1	Measured LCS2	Accuracy(%) LCS1	Accuracy(%) LCS2	Accuracy(%) Limits	Precision(RPD) LCS	Precision(RPD) Limits
Test: COND on Reagent Water QC Lot: COND270AA Concentration Units: (umhos/cm)								
Specific Conductance @ 25C	1680	1670	1660	99	99	95-105	0.6	5
Test: F on Reagent Water QC Lot: F 135AA Concentration Units: (mg/L)								
Fluoride	9.4	8.63	8.70	92	93	88-112	0.8	15
Test: F on Reagent Water QC Lot: F 136AA Concentration Units: (mg/L)								
Fluoride	12	11.3	11.6	94	97	88-112	2.6	15
Test: F on Reagent Water QC Lot: F 138AA Concentration Units: (mg/L)								
Fluoride	9.4	9.42	9.54	100	101	88-112	1.3	15
Test: NH3 on Reagent Water QC Lot: NH3 149AC Concentration Units: (mg/L)								
Ammonia as N	4.1	4.22	4.28	103	104	93-107	1.4	10
Test: NH3 on Reagent Water QC Lot: NH3 150AC Concentration Units: (mg/L)								
Ammonia as N	4.1	4.20	4.16	102	101	93-107	1.0	10

ION BALANCE RESULTS
for sample #e5703-01

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	112.000	5.5888
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	17.000	1.3991
K	ND	0.0000
Na	50.000	2.1750
NH4	ND	0.0000
TOTAL	179.000	9.1629

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	33.000	0.930e
F	0.300	0.0158
SO4	198.000	4.1184
Alk	95.400	3.1800
NO2+NO3	0.700	0.050[illegible]
TOTAL	327.400	8.2948

SUMMARY

% DIFFERENCE = 4.973
CATIONS + ANIONS (mg/L) = 50[illegible].400
TDS =537.000
HARDNESS = 349.700
CALCULATED THEORETICAL CONDUCTIVITY =10[illegible].6548
MEASURED CONDUCTIVITY = 755.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.40e
MEASURED CONDUCTIVITY/TDS RATIO = 1.40e

ND - Not Detected

ION BALANCE RESULTS
for sample #a5703-02

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	268.000	13.3732
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	43.000	3.5389
K	ND	0.0000
Na	334.000	14.5290
NH4	ND	0.0000
TOTAL	645.000	31.4411

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	101.000	2.8482
F	0.300	0.0158
SO4	955.000	19.8640
Alk	219.000	7.3000
NO2+NO3	ND	0.0000
TOTAL	1275.300	30.0280

SUMMARY

% DIFFERENCE = 2.299
CATIONS + ANIONS (mg/L) =1920.300
TDS =%2000.000
HARDNESS = 846.300
CALCULATED THEORETICAL CONDUCTIVITY =3840.2525
MEASURED CONDUCTIVITY =2500.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.536
MEASURED CONDUCTIVITY/TDS RATIO = 1.250

ND - Not Detected

ION BALANCE RESULTS
for sample #e5703-03

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	167.000	8.3333
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	24.000	1.9752
K	ND	0.0000
Na	377.000	16.3995
NH4	ND	0.0000
TOTAL	568.000	26.7080

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	138.000	3.9916
F	0.800	0.0421
SO4	713.000	14.8304
Alk	232.200	7.7400
NO2+NO3	0.300	0.0214
TOTAL	1084.300	26.5255

SUMMARY

% DIFFERENCE = 0.343
CATIONS + ANIONS (mg/L) =1652.300
TDS =%1730.000
HARDNESS = 515.900
CALCULATED THEORETICAL CONDUCTIVITY =3251.3743
MEASURED CONDUCTIVITY =2300.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.414
MEASURED CONDUCTIVITY/TDS RATIO = 1.329

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-04

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	131.000	6.5369
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	19.000	1.5637
K	ND	0.0000
Na	294.000	12.7870
NH4	ND	0.0000
TOTAL	444.000	20.9876

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	73.000	2.0586
F	0.700	0.0368
SO4	601.000	12.5008
Alk	199.200	6.6400
NO2+NO3	0.200	0.0143
TOTAL	874.100	21.2505

SUMMARY

% DIFFERENCE =-0.85
CATIONS + ANIONS (mg/L) =1318.100
TDS =%1380.000
HARDNESS = 405.400
CALCULATED THEORETICAL CONDUCTIVITY =2566.3018
MEASURED CONDUCTIVITY =1920.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.337
MEASURED CONDUCTIVITY/TDS RATIO = 1.391

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-05

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	142.000	7.0858
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	22.000	1.8106
K	ND	0.0000
Na	244.000	10.6140
NH4	ND	0.0000
TOTAL	408.000	19.5104

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	61.000	1.7203
F	0.700	0.0369
SO4	545.000	11.3360
Alk	180.600	6.0200
NO2+NO3	0.300	0.0214
TOTAL	787.600	19.1344

SUMMARY

% DIFFERENCE = 0.978
CATIONS + ANIONS (mg/L) =1195.600
TDS =%1190.000
HARDNESS = 445.200
CALCULATED THEORETICAL CONDUCTIVITY =2357.1875
MEASURED CONDUCTIVITY =1700.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.387
MEASURED CONDUCTIVITY/TDS RATIO = 1.429

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-06

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	267.000	13.3233
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	37.000	3.0451
K	ND	0.0000
Na	361.000	15.7035
NH4	ND	0.0000
TOTAL	665.000	32.0719

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	260.000	7.3320
F	0.500	0.0263
SO4	960.000	19.9680
Alk	194.400	6.4800
NO2+NO3	ND	0.0000
TOTAL	1414.900	33.8063

SUMMARY

% DIFFERENCE =-2.633
CATIONS + ANIONS (mg/L) =2079.900
TDS =%2000.000
HARDNESS = 819.200
CALCULATED THEORETICAL CONDUCTIVITY =4184.1473
MEASURED CONDUCTIVITY =2700.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.550
MEASURED CONDUCTIVITY/TDS RATIO = 1.350

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-07

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	205.000	10.2295
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	29.000	2.3867
K	ND	0.0000
Na	266.000	11.5710
NH4	ND	0.0000
TOTAL	500.000	24.1871

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	169.000	4.7658
F	0.500	0.0263
SO4	675.000	14.0400
Alk	192.000	6.4000
NO2+NO3	1.000	0.0714
TOTAL	1037.500	25.3035

SUMMARY

% DIFFERENCE =-2.256
CATIONS + ANIONS (mg/L) =1537.500
TDS =%1510.000
HARDNESS = 631.400
CALCULATED THEORETICAL CONDUCTIVITY =3090.7543
MEASURED CONDUCTIVITY =2100.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.472
MEASURED CONDUCTIVITY/TDS RATIO = 1.391

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-08

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	193.000	9.6307
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	26.000	2.1398
K	ND	0.0000
Na	174.000	7.5690
NH4	ND	0.0000
TOTAL	393.000	19.3395

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	65.000	1.8330
F	0.600	0.0316
SO4	605.000	12.5840
Alk	153.600	5.1200
NO2+NO3	ND	0.0000
TOTAL	824.200	19.5686

SUMMARY

% DIFFERENCE =-0.589
CATIONS + ANIONS (mg/L) =1217.200
TDS =%1230.000
HARDNESS = 589.100
CALCULATED THEORETICAL CONDUCTIVITY =2439.8691
MEASURED CONDUCTIVITY =1640.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.488
MEASURED CONDUCTIVITY/TDS RATIO = 1.333

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-09

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	396.000	19.7604
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	41.000	3.3743
K	ND	0.0000
Na	357.000	15.5295
NH4	ND	0.0000
TOTAL	794.000	38.6642

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	81.000	2.2842
F	0.600	0.0316
SO4	1510.000	31.4080
Alk	150.000	5.0000
NO2+NO3	ND	0.0000
TOTAL	1741.600	38.7238

SUMMARY

% DIFFERENCE =-0.077
CATIONS + ANIONS (mg/L) =2535.600
TDS =%2160.000
HARDNESS =1158.100
CALCULATED THEORETICAL CONDUCTIVITY =5038.6482
MEASURED CONDUCTIVITY =3000.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.680
MEASURED CONDUCTIVITY/TDS RATIO = 1.389

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-10

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	196.000	9.7804
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	41.000	3.3743
K	ND	0.0000
Na	578.000	25.1430
NH4	ND	0.0000
TOTAL	815.000	38.2977

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	191.000	5.3862
F	0.700	0.0369
SO4	1530.000	31.8240
Alk	162.600	5.4200
NO2+NO3	ND	0.0000
TOTAL	1884.300	42.6670

SUMMARY

% DIFFERENCE =-5.397
CATIONS + ANIONS (mg/L) =2699.300
TDS =%2725.000
HARDNESS = 658.100
CALCULATED THEORETICAL CONDUCTIVITY =5215.1060
MEASURED CONDUCTIVITY =3720.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.402
MEASURED CONDUCTIVITY/TDS RATIO = 1.365

ND - Not Detected

ION BALANCE RESULTS
for sample #c5703-11

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	186.000	9.2614
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	28.000	2.3044
K	ND	0.0000
Na	263.000	11.4405
NH4	ND	0.0000
TOTAL	477.000	23.0063

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	184.000	5.1888
F	0.500	0.0263
SO4	615.000	12.7920
Alk	152.400	5.0800
NO2+NO3	ND	0.0000
TOTAL	951.900	23.0871

SUMMARY

% DIFFERENCE =-0.132
CATIONS + ANIONS (mg/L) =1428.900
TDS =%1470.000
HARDNESS = 579.800
CALCULATED THEORETICAL CONDUCTIVITY =2892.2208
MEASURED CONDUCTIVITY =2120.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.364
MEASURED CONDUCTIVITY/TDS RATIO = 1.442

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-12

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	133.000	6.6367
Fe+2	ND	0.0000
Fe+3	0.090	0.0048
Mg	39.000	3.2097
K	ND	0.0000
Na	239.000	10.39e5
NH4	ND	0.0000
TOTAL	411.090	20.2477

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	360.000	10.1520
F	0.300	0.0158
SO4	9.000	0.1872
Alk	324.600	10.8200
NO2+NO3	ND	0.0000
TOTAL	693.900	21.1750

SUMMARY

% DIFFERENCE =-2.238
CATIONS + ANIONS (mg/L) =1104.990
TDS =%1540.000
HARDNESS = 492.400
CALCULATED THEORETICAL CONDUCTIVITY =2357.8134
MEASURED CONDUCTIVITY =2070.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.139
MEASURED CONDUCTIVITY/TDS RATIO = 1.344

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-13

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	103.000	5.1397
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	22.000	1.8106
K	6.000	0.1536
Na	207.000	9.0045
NH4	9.800	0.6997
TOTAL	347.800	16.8081

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	50.000	1.4100
F	0.400	0.0210
SO4	387.000	8.0496
Alk.	217.800	7.2e00
NO2+NO3	1.100	0.0785
TOTAL	656.300	16.8192

SUMMARY

% DIFFERENCE =-0.033
CATIONS + ANIONS (mg/L) =1004.100
TDS =792.000
HARDNESS = 347.700
CALCULATED THEORETICAL CONDUCTIVITY =1994.8178
MEASURED CONDUCTIVITY =1550.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.287
MEASURED CONDUCTIVITY/TDS RATIO = 1.957

ND - Not Detected

ION BALANCE RESULTS
for sample #c5703-14

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	15.000	0.7485
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	2.600	0.2140
K	ND	0.0000
Na	696.000	30.2760
NH4	ND	0.0000
TOTAL	713.600	31.2385

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	527.000	14.8614
F	1.200	0.0631
SO4	610.000	12.6860
Alk	173.400	5.7800
NO2+NO3	ND	0.0000
TOTAL	1311.600	33.3925

SUMMARY

% DIFFERENCE =-3.333
CATIONS + ANIONS (mg/L) =2025.200
TDS =%1740.000
HARDNESS = 48.160
CALCULATED THEORETICAL CONDUCTIVITY =3980.0185
MEASURED CONDUCTIVITY =3360.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.185
MEASURED CONDUCTIVITY/TDS RATIO = 1.931

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-15

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	182.000	9.0818
Fe+2	ND	0.0000
Fe+3	0.190	0.0102
Mg	28.000	2.3044
K	ND	0.0000
Na	277.000	12.0495
NH4	ND	0.0000
TOTAL	487.190	23.4459

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	171.000	4.8222
F	0.500	0.0263
SO4	615.000	12.7929
Alk	152.400	5.0800
NO2+NO3	ND	0.0000
TOTAL	938.900	23.7205

SUMMARY

% DIFFERENCE = 1.571
CATIONS + ANIONS (mg/L) =1426.090
TDS =%1470.000
HARDNESS = 569.800
CALCULATED THEORETICAL CONDUCTIVITY =2882.9143
MEASURED CONDUCTIVITY =2130.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.353
MEASURED CONDUCTIVITY/TDS RATIO = 1.449

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-16

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	3.600	0.1796
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	0.600	0.0494
K	ND	0.0000
Na	5.600	0.2436
NH4	ND	0.0000
TOTAL	9.800	0.4726

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	ND	0.0000
F	ND	0.0000
SO4	ND	0.0000
Alk	ND	0.0000
NO2+NO3	ND	0.0000
TOTAL	0.000	0.0000*

SUMMARY

% DIFFERENCE =%100.000*
CATIONS + ANIONS (mg/L) = 9.800
TDS = 1.000
HARDNESS = 11.460
CALCULATED THEORETICAL CONDUCTIVITY = 28.0563
MEASURED CONDUCTIVITY = 2.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO =14.028
MEASURED CONDUCTIVITY/TDS RATIO = 2.000

ND - Not Detected
* - TOTAL meq/L are below limit of quantification and should be viewed as semi-quantitative.

ION BALANCE RESULTS
for sample #65703-18

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	146.000	7.2854
Fe+2	ND	0.0000
Fe+3	0.130	0.0070
Mg	26.000	2.1398
K	ND	0.0000
Na	205.000	8.9175
NH4	ND	0.0000
TOTAL	377.130	18.3497

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	52.000	1.4664
F	0.500	0.0263
SO4	550.000	11.4400
Alk	151.800	5.0600
NO2+NO3	0.500	0.0357
TOTAL	754.800	18.0284

SUMMARY

% DIFFERENCE = 0.883
CATIONS + ANIONS (mg/L) =1131.930
TDS =%1200.000
HARDNESS = 471.600
CALCULATED THEORETICAL CONDUCTIVITY =2248.4183
MEASURED CONDUCTIVITY =1650.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.363
MEASURED CONDUCTIVITY/TDS RATIO = 1.375

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-19

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	147.000	7.3353
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	25.000	2.0575
K	ND	0.0000
Na	190.000	8.2650
NH4	0.200	0.0143
TOTAL	362.200	17.6721

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	50.000	1.4100
F	0.500	0.0263
SO4	550.000	11.4400
Alk	164.400	5.4800
NO2+NO3	0.700	0.0500
TOTAL	765.600	18.4063

SUMMARY

% DIFFERENCE =-2.035
CATIONS + ANIONS (mg/L) =1127.800
TDS =%1210.000
HARDNESS = 470.000
CALCULATED THEORETICAL CONDUCTIVITY =2230.4253
MEASURED CONDUCTIVITY =1680.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.328
MEASURED CONDUCTIVITY/TDS RATIO = 1.388

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-21

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	219.000	10.9281
Fe+2	ND	0.0000
Fe+3	0.120	0.0064
Mg	47.000	3.8681
K	ND	0.0000
Na	370.000	16.0950
NH4	0.500	0.0357
TOTAL	636.620	30.9333

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	82.000	2.3124
F	0.800	0.0421
SO4	920.000	19.1360
Alk	348.600	11.6200
NO2+NO3	ND	0.0000
TOTAL	1351.400	33.1105

SUMMARY

% DIFFERENCE =-3.399
CATIONS + ANIONS (mg/L) =1988.020
TDS =%1850.000
HARDNESS = 740.200
CALCULATED THEORETICAL CONDUCTIVITY =3887.5870
MEASURED CONDUCTIVITY =2650.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.467
MEASURED CONDUCTIVITY/TDS RATIO = 1.432

ND - Not Detected

ION BALANCE RESULTS
for sample #65703-22

CATION ANALYSIS

ELEMENT	mg/L	meq/L
Ca	28.000	1.3972
Fe+2	ND	0.0000
Fe+3	ND	0.0000
Mg	26.000	2.1398
K	7.000	0.1792
Na	126.000	5.4810
NH4	0.700	0.0500
TOTAL	187.700	9.2472

ANION ANALYSIS

ELEMENT	mg/L	meq/L
Cl	37.000	1.0434
F	0.200	0.0105
SO4	97.000	2.0176
Alk	178.200	5.9400
NO2+NO3	ND	0.0000
TOTAL	312.400	9.0115

SUMMARY

% DIFFERENCE = 1.291
CATIONS + ANIONS (mg/L) = 500.100
TDS =%1180.000
HARDNESS = 176.600
CALCULATED THEORETICAL CONDUCTIVITY = 993.0290
MEASURED CONDUCTIVITY = 845.0000
THEORETICAL/MEASURED CONDUCTIVITY RATIO = 1.175
MEASURED CONDUCTIVITY/TDS RATIO = 0.716

ND - Not Detected

Rocky Mountain Analytical Laboratory

4955 Yarrow Street, Arvada, CO 80002 (303) 421-6611

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CHAIN OF CUSTODY

JH

RMAL Client: Dames & Moore, SLC
RMAL Project No.: 65703
Sampling Co.: Dames & Moore
Sampling Personnel: Larry Bardwell
Project Name/No.: Kirtland N.M. Century 4 Corner
Sampling Site: Wells

Date	Time	Sample ID/Description	Type	No. Containers	Parameters	Remarks RMA #
2/22	1045	MW-1	Groundwater	7	GC VOA's organics lead metals Ion Balance	01
2/22	1000	MW-2	"	7	"	02
2/22	1130	MW-3	"	7	"	03
2/22	1230	MW-4	"	7	"	04
2/22	1330	MW-5	"	7	"	05
2/22	1430	MW-6	"	7	"	06
2/22	1515	MW-7	"	7	"	07
2/22	1600	MW-8	"	7	"	08
						~~09~~
2/22	1645	MW-9	"	7	"	09

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Larry Bardwell	2/22 1705		2/22 1200				

Method of Shipment:	Shipped by: (Signature)	Delivered by: (Signature)	Received for Laboratory by: (Signature)	Date / Time
Fed-X				2/23/88 856

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Rocky Mountain Analytical Laboratory
4955 Yarrow Street, Arvada, CO 80002 (303) 421-6611

A DIVISION OF ENSECO INCORPORATED

CHAIN OF CUSTODY

RMAL Client Dames & Moore, SLC
RMAL Project No. 65703 Add on 10-16
Sampling Co. Dames Moore
Sampling Personnel Larry Bardwell
Project Name/No. Conoco 4 Corners Gravenich, Kirtland N.M. 1988
Sampling Site

Date	Time	Sample ID/Description	Type	No. Containers	Parameters	Remarks	RMA #
2/23	0930	MW-10 GC	Groundwater	7	VOA's Ion Balance, metals, organic Lead		10
2/23	1030	MW-11 GC	"	7	"		11
2/23	1200	MW-12 MS	"	7	"		12
2/23	1400	MW-3 GC	"	7	"		13
2/23	1500	Robert Bell well GC	"	7	"		14
2/23	1030	MW-11 Duplicate GC	"	7	"		15
2/23	1600	Equipment Blank GC	D-I H_2O	7	"		16
		Trip blank GC	40ml VOA	1			17

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Larry Bardwell	2/24/88 1700	Fed X would not sign LB	2/23 1705				
Method of Shipment:		**Shipped by: (Signature)**		**Delivered by: (Signature)**		**Received for Laboratory by: (Signature)**	**Date / Time**
Fed-X							2/24/88 0915

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Rocky Mountain Analytical Laboratory

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CHAIN OF CUSTODY

RMAL Client Dames & Moore

Sampling Co. "

Project Name/No. Caribou 4 Corners, Maverick, Kirtland N.M.

RMAL Project No. 65703 Addon 18-23

Sampling Personnel Larry Bardwell

Sampling Site

Date	Time	Sample ID/Description	Type	No. Containers	Parameters	Remarks RMAL#
2/24	1300	SW-3	Surface W.	7	Voas, Tons, Metals organic Lead	601/602 18
2/24	1200	SW-2	"	7	"	601/602 19
2/24	1400	V. Murray Ditch	"	3 *	Voas Just	601/602 20
2/24	1430	MW-13	Ground water	4	Voas & [redacted] #2 Bottle	601/602 21
2/24	1530	V. Murray Well	Ground Water	7	Voas, Tons, Metals, Organic Lead	601/602 22
		Trip Blank		1 tabs		601/602 23

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Larry Bardwell	2/24 1700	Fed-X would not sign.	2/24 1705				
Method of Shipment: Fed. X		Shipped by: (Signature)		Delivered by: (Signature)		Received for Laboratory by: (Signature)	Date / Time 2/25/88 1002

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New

Rocky Mountain Analytical Laboratory
4955 Yarrow Street, Arvada, CO 80002 (303) 421-6611

A DIVISION OF ENSECO INCORPORATED

CHAIN OF CUSTODY

RMAL Client Dames & Moore, SLC
RMAL Project No. ~~65734~~ 65703
Sampling Co. D & M
Sampling Personnel Larry Bardwell
Project Name/No. Carbon 4 Coring Trailer, Kirtland N.M
Sampling Site

Date	Time	Sample ID/Description	Type	No. Containers	Parameters	Remarks RMAL #
1/25/88	1130	MW-13	Grab Water	3	Ion Balance Metals Organic Lead	#21

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
Larry Bardwell	1/25 1615						
Method of Shipment: Fed-X		Shipped by: (Signature)		Received by: (Signature)		Received for Laboratory by: (Signature)	Date / Time 1/26/88 1014

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ANALYTICAL RESULTS

FOR

DAMES AND MOORE

MARCH 30, 1988

Rocky Mountain
Analytical Laboratory

Enseco

ANALYTICAL RESULTS

FOR

DAMES AND MOORE

MARCH 30, 1988

Reviewed by: Jeanne B. Howbert

Jeanne B. Howbert

Michael P. Phillips

Michael P. Phillips, Ph.D.

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

I. OVERVIEW

On March 24, 1988, Enseco-Rocky Mountain Analytical Laboratory received one water sample from Dames and Moore. A complete listing of tests requested, by sample, is given in Section III.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

I. Overview
II. Sample Description Information
III. Analytical Tests Assigned
IV. Analytical Results
V. Quality Control Report
VI. Description of Analytical Methodology

Standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

SAMPLE DESCRIPTION INFORMATION

for

DAMES AND MOORE

RMAL Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
65928-001-00	MW-11	Groundwater	03/23/88	03/24/88

AROMATIC VOLATILE ORGANICS

EPA METHOD 602

Client Name: DAMES AND MOORE

Client ID: MW-11

Laboratory ID: 65928-001 Enseco ID: 65928-001

Matrix: Groundwater Sampled: 03/23/88 Received: 03/24/88

Authorized: 03/24/88 Analyzed: 03/28/88

Parameter	Result	Units	Reporting Limit
Benzene	N.D.	ug/L	0.50
Chlorobenzene	N.D.	ug/L	0.50
Ethylbenzene	N.D.	ug/L	0.50
Toluene	N.D.	ug/L	0.50
1,2-Dichlorobenzene	N.D.	ug/L	0.50
1,3-Dichlorobenzene	N.D.	ug/L	0.50
1,4-Dichlorobenzene	N.D.	ug/L	0.50
m-Xylene	N.D.	ug/L	0.50
o & p-Xylene(s)	N.D.	ug/L	0.50

N.D. = Not detected

Reported by: Helmer Morse Approved by: Susan Brillante

QC LOT ASSIGNMENT REPORT
GAS CHROMATOGRAPHY

Laboratory Sample Number	QC Matrix	Test	QC Lot Number LCS	QC Lot Number SCS
65928-001-00	Reagent Water	602	602 125AL	602 125AL

Rocky Mountain Analytical Laboratory

4955 Yarrow Street, Arvada, CO 80002 (303) 421-6611

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CHAIN OF CUSTODY

RMAL Client: Maverik Country Stores Inc.
RMAL Project No.: 65928
Sampling Co.: Dames & Moore
Sampling Personnel: Terry Vandell
Project Name/No.: Kirtland New Mexico
Sampling Site: Monitor Well 11

Date	Time	Sample ID/Description	Type	No. Containers	Parameters	Remarks
03-23-88	1300 PM	Monitor Well 11 / Well	Water	3	VOA's	

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time	Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Date / Time
TD Vandell	03 23 88	Fed X					
Method of Shipment:		**Shipped by: (Signature)**		**Delivered by: (Signature)**		**Received for Laboratory by: (Signature)**	**Date / Time**
Fed Express							9:57

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VI. ANALYTICAL METHODOLOGY

Enseco - Rocky Mountain Analytical Laboratory performs analytical services according to methods approved by EPA and other regulatory agencies, whenever possible.

Methods for metals and organic compounds are primarily derived from three sources of EPA methods, 1) the methods promulgated in 40 CFR 136 for priority pollutants, 2) the methods published in SW-846 and 3) methods developed by the EPA-EMSL/LV for Superfund investigations, as well as several documents published by the EPA and Enseco - Rocky Mountain Analytical Laboratory in 1984 and 1985. These methods all use the same generic technology as summarized below:

- Metals: acid digestion followed by analyses by ICP supported by graphite furnace AA
- Volatile Organics: purge and trap GC/MS or purge and trap GC with a selective detector.
- Semivolatile (base/neutral and acid) organics: solvent extraction followed by capillary column GC/MS, and
- Pesticides/Herbicides: solvent extraction, followed by gas chromatography.

Exact method references are given in the following tables.

ANALYTICAL METHODOLOGY - INORGANIC TESTS

Test	Description	Methodology	Reference
ICP	Trace Metals	ICP Emission Spectroscopy	200.7(1)/6010(2)
FSB	Antimony	Furnace Atomic Absorption	204.2(1)/7041(2)
FAS	Arsenic	Furnace Atomic Absorption	206.2(1)/7060(2)
FCD	Cadmium	Furnace Atomic Absorption	213.2(1)/7131(2)
FPB	Lead	Furnace Atomic Absorption	239.2(1)/7421(2)
FSE	Selenium	Furnace Atomic Absorption	270.2(1)/7740(2)
FAG	Silver	Furnace Atomic Absorption	272.2(1)/7761(2)
FTL	Thallium	Furnace Atomic Absorption	279.2(1)/7841(2)
CVHG	Mercury	Cold Vapor Atomic	245.1(1)/7471(2)
CR + 6	Chromium (VI)	Colorimetric	312B(3)
IC CL	Chloride	Ion Chromatography	300.0(1)
BURCL	Chloride	Manual Titrimetric	325.3(1)
METF	Fluoride	Electrode	340.2(1)
IC SO4	Sulfate	IC	300.0(1)
SPESO4	Sulfate	Manual Turbidimetric	375.4(1)
METALK	Alkalinity, Total	Titrimetric	310.1(1)
METACK	Alkalinity, Forms	Titrimetric	403(3)
TECNOXT	Nitrate+Nitrite as N	Cd Reduction Colorimetric	353.2(1)
METPH	pH	Meter	150.1(1)/9045(2)
CELSP	Specific Conductance @ 25°C	Bridge	120.1(1)
BALTDS	Total Dissolved Solids	Gravimetric, 180°C	160.1(1)
BALTSS	Total Suspended Solids	Gravimetric, 105°C	160.2(1)
BALTS	Total Solids	Gravimetric, 105°C	160.3(1)
BALTVS	Total Volatile Solids	Gravimetric, 550°C	160.4(1)
TECO P	Ortho-Phosphate as P	Two Reagent Colorimetric	365.3(1)
TECT P	Total Phosphorus as P	Digestion-Colorimetric	365.3(1)
ICP	Total Phosphorus as P	Digestion-ICP/AES	200.7(1)
ICP	Silica as SiO_2	ICP/AES	200.7(1)
SPESI02	Silica as SiO_2	Colorimetric	370.1(1)
METBOD	Biochemical Oxygen Demand	Dilution Bottle-D.O. probe	405.1(1)
METCOD	Chemical Oxygen Demand	Micro Colorimetric	410.4(1)
TOCTOC	Total Organic Carbon	UV Oxidation-IR	415.2(1)
METNH3	Ammonia as N	Electrode	350.3(1)
TECNH3	Ammonia as N	Automated Colorimetric	350.1(1)
METTKN	Total Kjeldahl Nitrogen as N	Digestion-Electrode	351.4(1)
TECTKN	Total Kjeldahl Nitrogen as N	Digestion-Colorimetric	351.2(1)
TOXTOX	Total Organic Halogen	Combustion-Titrimetric	9020(2)
TONO1	Total Organic Nitrogen	Calculation (TKN-NH_3)	-
BAL O&G	Oil and Grease	Freon Extraction-Gravimetric	413.1(1)
IR AO&G	Oil and Grease	Freon Extraction-IR	413.2(1)
TECCN F	Cyanide Amendable to Chlorination	Chlorination-Distillation-Colorimetric	335.1(1)
TECCN W	Weak & Dissolved Cyanide	Distillation-Colorimetric	412H(3)
TECCN T	Total Cyanide	Distillation-Colorimetric	335.2(1)/9010(2)
STEPHEN	Phenolics	Distillation-Colorimetric	420.1(1)
COLIF F	Fecal Coliform	Membrane Filter	909C(3)
COLIF T	Total Coliform	Membrane Filter	909A(3)

ANALYTICAL METHODOLOGY - INORGANIC TESTS (CONT.)

Test	Description	Methodology	Reference
IC BR	Bromide	Ion Chromatography	300.0(1)
POTCL2R	Residual Chlorine	Amperometric	330.2(1)
NESCOLR	Color	Pt-Co Colorimetric	110.2(1)
ICPHAR	Hardness as $CaCo_3$	Calculation	200.7(1)/314A(3)
TECNO2	Nitrite as N	Colorimetric	354.1(1)
SPES	Sulfide	Colorimetric	376.2(1)/9030(2)
BURSO3	Sulfite	Titrimetric	377.1(1)
SPEMBAS	MBAS (Surfactants)	Colorimetric	425.1(1)
SPETURB	Turbidity	Turbidimeter	180.1(1)
Gross Alpha		Proportional Counter	703(3)
Gross Beta		Proportional Counter	703(3)
Radium 226		Separation - Counter	705(3)
Radium 228		Separation - Counter	707(3)
Uranium		Fluorimetric	D2907.75(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 2nd Edition, 1984.
(3) "Standard Methods for the Examination of Water and Wastewater", 15th Edition, 1980.
(4) "Annual Book of ASTM Standards", Part 31, Water, 1980.

ANALYTICAL METHODOLOGY - ORGANIC TESTS

Test	Description	Methodology	Reference
VOA	Volatile Organics	Purge & Trap, GC/MS	624(1)/8240(2)
BNA	Semivolatile Organics	Extraction, GC/MS	625(1)/8270(2)
DXN	Dioxin	Extraction, GC/MS	613(1)/8280(2)
601	Halogenated Volatile Organics	Purge & Trap GC/Hall	601(1)/8010(2)
THM	Trihalomethanes	Purge & Trap GC/Hall	601(1)/8010(2)
602	Aromatic Volatile Organics	Purge & Trap GC/PID	602(1)/8020(2)
OCP	Organochlorine Pesticides	Extraction, GC/ECD	608(1)/8080(2)
OPP	Organophosphate Pesticides	Extraction, GC/FPD	614(1)/8140(2)
619	Triazine Pesticides	Extraction, GC/NPD	619(1)
LC CARB	Carbamate and Urea Pesticides	Extraction, HPLC	632(1)
PCB	PCB's	Extraction, GC/ECD	608(1)/8080(2)
HRB	Phenoxyacid Herbicides	Extraction, GC/ECD	615(1)/8150(2)
603	Acrolein & Acrylonitrile	Purge & Trap GC/FID	603(1)/8030(2)
604	Phenols	Extraction, GC/FID	604(1)/8040(2)
605	Benzidines	Extraction, HPLC	605(1)/8050(2)
606	Phthalate Esters	Extraction, GC/FID	606(1)/8060(2)
607	Nitrosamines	Extraction, GC/NPD	607(1)
609	Nitroaromatics & Cyclic Ketones	Extraction, GC/NPD	609(1)/8090(2)
PNA	Polynuclear Aromatic Hydrocarbons	Extraction, HPLC	610(1)/8310(2)
611	Haloethers	Extraction, GC/ECD	611(1)
612	Chlorinated Hydrocarbons	Extraction, GC/ECD	612(1)/8120(2)
GD FID	Hydrocarbon Scan	Extraction, GC/FID	D3328-78(3)
GC BPD	Boiling Point Determination	Extraction, GC/FID	D2887-84(4)

References

(1) Code of Federal Regulations, Chapter 40, Part 136 (40 CFR 136).
(2) SW-846, 2nd Edition, 1984.
(3) "Annual Book of ASTM Standards", Volume 11.01, 1985.
(4) "Annual Book of ASTM Standards", Volume 05.02, 1984.

GUIDELINES FOR SAMPLE BOTTLES AND PRESERVATIVES

D = DISSOLVED (FILTERED) T = TOTAL (UNFILTERED)

Number	Parameters	Container	Preservatives
1D	Cl, Cl_2, F, Tot. Alk., CO_3 Alk., HCO_3 Alk., OH Alk., pH, Sp. Cond., TDS, Ortho-PO_4, SiO_2, Br, Cr+6, NO_2, SO_3, MBAS, Color, SO_4, Ion Balance	500 mL poly	4°C
1T	pH, TSS, TS, TVS, BOD, Residual Cl_2, Turbidity, MBAS	500 mL poly	4°C
2	Tot. P, COD, TOC, NH_3, TKN, TON Phenolics, NO_3+NO_2, Ion Balance	16 oz. glass	2 mL 50% Sul. Acid, 4°
3	Oil & Grease	1 L glass	4 mL 50% Sul. Acid, 4°
4T	Metals in wastewater, Hardness	500 mL poly	5 mL 50% Nitric Acid
4D	Metals in groundwater, Ion Balance, Hardness	500 mL poly	5 mL 50% Nitric Acid
5	Alpha, Beta, Ra226, Ra228, U	1 L poly (no Ra228) 1/2 gal. poly (with Ra228)	10 mL 50% Nitric Acid 20 mL 50% Nitric Acid
6	Free CN, Total CN	500 mL poly	2 mL 50% NaOH, 4°C
7	Sulfide	250 mL poly	1 mL 1N zinc acetate 1 mL 50% NaOH, 4°C
8	Fecal or Total Coliform	4 1/2 oz. Sterile poly	4°C
10	THM	Three 40 mL glass vials	100 uL Sodium thiosulfate, 4°C
11	VOA, Purgeable Organics (may use Bottle #33)	Three 40 mL glass vials	4°C
12	Base Neutral/Acid Compounds	Two 1 L glass	4°C
13	Pesticides/PCBs	Two 1 L glass	4°C
14	Herbicides	1 L glass	4°C
15	TOX	1 L glass-quad 8 oz. glass-single	4°C
21	Bulk Water Analysis	1/2	4°C
	Wastes, Sludges, Soils	16 oz. widemouth glass jar	4°C
31	Wastes, Sluages, Soils	32 oz. widemouth glass jar	4°C
32	Soils for Metals, Inorganics	4 oz. widemouth plastic	4°C
33	VOA in Soils, Sludges	7 oz. glass jar	4°C
34	Soils for Metals, Inorganics	16 oz. widemouth plastic	4°C

INSTRUCTIONS

Safety:

BE CAREFUL! Preservatives are highly corrosive. Do not wash bottles. To avoid contamination, do not mix contents of bottles or interchange caps.

Filtering:

Groundwaters
Filter for the following bottles: 1, 2, 4, 5, 6, 7, 15

Surface Waters and Industrial Waste Waters
DO NOT FILTER unless Dissolved Parameters are specifically requested.

Bulk Water
RMAL will filter and preserve if requested.

Bottle Codes:

T=Total (unfiltered). D=Dissolved (filtered).

Notes:

1) Use a separate sample label for each individual bottle.

2) Do not use dry ice for preservative. Place ice in plastic bag provided or use Blue-Ice packs.

3) Fill #11 bottles (vials) completely. Leave no air bubbles. To check, turn upside down. Label each vial.

4) Samples must arrive at the lab within 24 hours of sampling for the following parameters:

   Total Coliform
   Fecal Coliform
   pH
   Specific Conductivity
   Hexavalent Chromium
   Residual Chlorine
   Sulfite
   BOD
   Color
   MBAS
   Nitrate
   Nitrite
   Ortho-Phosphate
   Turbidity