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REPORT OF FINDINGS
PHASE I INVESTIGATION
FOR
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA

 **DAMES & MOORE**

D & M Job No. 19503-001-007
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1.0 INTRODUCTION

This report presents the findings of an environmental assessment conducted at the Peoples Natural Gas (PNG) facility located in Council Bluffs, Iowa (Figure 1). This investigation was performed pursuant to the Scope of Work presented in Dames & Moore's proposal dated June 23, 1989.

The site is presently owned by PNG and Peterson Construction, Inc. Prior to its current ownership, the site was formerly used to manufacture town gas. Through information provided by the Council Bluffs Free Public Library it was learned that the gas manufacturing process began on-site in 1870 and ended in November 1930, as the transition to natural gas was completed. However, information also suggests that the coal gas equipment was maintained until at least 1949. From 1870 to 1882, the gasification method used at the plant was coal carbonization. The coal carbonization method consisted of cooking imported English Coal in ovens or retorts to produce gas and various gas by-products. These gases required treatment to remove tar, ammonia, "light oils" (i.e., xylene, toluene, ethylbenzene, and benzene), naphthalene, and sulfur compounds to make the gas suitable for various heating applications.

After 1882, the gas manufacturing process utilized oil rather than coal. The oil gas method cracked oil into gaseous hydrocarbons, tar and carbon to produce a high BTU-value gas. A variety of oil-based feedstocks were used in the production of oil gas including kerosene, diesel oil and bunker C fuel oil. Lighter oil feedstocks would typically yield less tar by-product than heavier oil feedstocks.

When economically feasible, by-product tars were distilled or refined into marketable chemicals or products such as creosote, road tars, fuels and various pitches. When it was not economically feasible to refine these by-products, the coal tar and other nuisance wastes were typically disposed as expediently as possible (e.g., tar well, disposal pit etc.).

Figure 2 illustrates the former plant layout, as it appeared in 1934.

2.0 POTENTIAL WASTES ASSOCIATED WITH COAL GASIFICATION

Typical wastes associated with the gas producing methods described above are as follows: spent oxide waste, tar residues, sludges, wastewater, ash and phenolic and ammonia compounds.

Spent oxide was a waste product that resulted from the removal of nitrogen-containing impurities from the manufactured gas, by absorbing them onto iron oxide. The iron oxide was typically mixed with wood chips, saw dust, corn cobs, slag or similar materials in absorber beds (also called purifiers or oxide boxes). These wastes generally contain high concentrations of sulfur and cyanide (ammonia was usually recovered and sold to nearby farmers for fertilizer), which are relatively stable due to the tight chemical bonding with iron. Spent oxide waste was typically utilized on site as fill material, and is characterized by the blue-grey color caused by the ferric and ferrocyanide compounds.

Ash, coal fines and clinkers were also typically disposed on site. These wastes are relatively inert.

The major types of chemicals associated with the tar sludges, tar residues and wastewater are base/neutral compounds or polynuclear aromatic hydrocarbons, light aromatic compounds (i.e., benzene, toluene, xylene and ethyl benzene), phenol and ammonia. Base/neutral compounds typically exhibit low volatility, low aqueous solubility, a strong tendency to adsorb to soil particles and sediments, and a moderate biodegradability. As a result of these properties, these compounds tend to be relatively immobile and persistent in the environment. Gas plant tars and sludges are primarily composed of base/neutral compounds which tend to be more dense than water. Therefore, movement of these tars is typically retarded by fine grained sediments or bedrock, and the materials tend to sink in the water column.

The light aromatic compounds in the wastes are moderately soluble and biodegradable, highly volatile, and their adsorption potential on soils and sediments is lower than the heavier tars and sludges. They are moderately soluble, environmentally persistent, and mobile in ground water.

Phenolic and ammonia compounds are highly soluble in water and tend to be very mobile in soil since they have low adsorption tendencies.

3.0 SCOPE OF WORK AND PURPOSE

The purpose of this investigation was to help characterize the extent of contamination associated with the former coal gas operation. To help accomplish this task, the following scope of work was performed: a review of previous investigations, an examination of published geologic and hydrogeologic information, and field and laboratory investigations.

The field and laboratory investigation consisted of 14 on-site soil borings to help estimate the vertical and horizontal extent of contaminated soils. The soils were visually characterized and monitored in the field to assess the presence of volatile organic vapors. Eleven soil samples were collected and chemically analyzed for the presence of contaminants typically associated with coal gas plant sites.

Four soil borings were completed as ground water monitor wells. One of the four wells was screened across the water table and the remaining three were screened below the water table to better characterize ground water quality and local ground water flow direction. Representative ground water samples were collected from all four monitor wells for chemical analysis.

4.0 PREVIOUS INVESTIGATIONS

In 1969, the Iowa State Highway Commission completed numerous soil borings in an area located immediately east of the PNG site. The soil investigation evaluated foundation conditions for a highway construction project. According to the study findings, the underlying soil consists of approximately 30 feet of clay overlying fine to coarse sand. Bedrock was found underlying the sand at approximately 100 feet below grade.

Also found during the highway commission investigation was an oil gasoline storage tank located approximately 11 feet below grade. The sand in the immediate vicinity of the tank was noted to emit a gasoline and oil-like odor, and the presence of "scum" was also observed.

No other known investigations have been conducted at or adjacent to the PNG site, prior to this investigation.

5.0 REGIONAL GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

The site is located approximately 2 miles east of the Missouri River on the floodplain. River bluffs, which form the eastern boundary of the flood plain, are located approximately 1/4 mile east of the site. The bluffs rise approximately 200 feet above the flood plain and consist primarily of loess deposits (wind blown silt). Other unconsolidated soils in the Council Bluffs area typically consist of glacial till overlain by approximately 30 feet of loess. In many areas the glacial till may be underlain by sand and gravel. Typically, the depth of unconsolidated deposits range from approximately 35 to 200 feet.

Pennsylvanian-aged bedrock underlies the unconsolidated deposits and consists of alternating beds of limestone and shale. The limestone units are water bearing, but due to the relatively impermeable nature of shale, the individual limestone units are confined, and therefore, the average aquifer yield is low. For this reason, few wells tap the bedrock aquifer.

The city of Council Bluffs acquires most of its water from the Missouri River. However, for supplemental and emergency purposes the city has two production wells located near North 25th Street and the river. Both wells are approximately 150 feet deep and are finished in the unconsolidated deposits atop bedrock. Other private wells in the area are located near the southeast corner of the city near Greenview and Highway 92.

According to the Iowa Geological Survey, the local ground water flow in the unconsolidated deposits as well as that in the bedrock aquifer is generally toward the Missouri River. The regional ground water gradient in the bedrock aquifer is predominately south.

6.0 FIELD AND LABORATORY INVESTIGATION

6.1 SOIL BORING AND MONITOR WELL LOCATIONS

Fourteen soil borings were advanced on-site at locations selected by Dames & Moore. Ground water monitor wells were installed in four of the fourteen boreholes. Soil boring and monitor well locations are shown in Figure 3. The location and depth of each soil boring were chosen to help define the vertical and horizontal extent of contamination.

6.2 DRILLING AND SAMPLING PROCEDURES

All field work was conducted between mid November and early December, 1989, utilizing truck mounted drilling equipment. All soil borings with the exception of the monitor well borings were advanced using 4 1/4 inch I.D. hollow stem augers; all monitor well borings were advanced using 6 1/4 inch I.D. hollow stem augers. Soil sampling was conducted in accordance with ASTM D 1586 "Penetration Test and Split Barrel Sampling of Soils".

Soil samples were taken at 2 1/2 to 5 foot intervals to the termination depth of the borings. Immediately following collection of the final sample from the bottom of each boring, the borehole was probed through the hollow stem auger to check for the presence of ground water. To minimize the potential for

contaminant migration within the borehole, all boreholes were grouted to the surface by the tremie method during auger withdrawal.

All augers, sampling equipment, and the rear of the drill rig were decontaminated by steam cleaning prior to the advancement of the first boring, between each boring thereafter, and upon completion of the last borehole. To further minimize the potential for cross contamination, split barrel samplers were also steam cleaned prior to the collection of each soil sample.

6.3 SOIL CLASSIFICATION

All soil samples were visually and manually classified in the field by a Dames & Moore Hydrogeologist, in accordance with ASTM D 2487 "Unified Soils Classification System" and "Recommended Practice for Visual and Manual Description of Soils".

6.4 FIELD CONTAMINATION DETECTION

During the field investigation, all soil samples were examined for obvious signs of contamination (e.g., staining, odor, physical appearance, etc.), and scanned for the presence of volatile organic vapors using a portable photoionization detector (PID), calibrated to 100 ppm isobutylene. Soil samples were scanned with the PID following three different methods. These methods include: 1) continually scanning the soil cuttings brought to the surface by the rotation of the hollow stem auger, 2) scanning fresh surfaces of the split barrel samples at each sampling interval, and 3) performing jar headspace analyses. Headspace readings were also taken from open boreholes immediately following hollow stem auger removal and after a period of approximately two hours, from the open boreholes that had been temporarily capped with aluminum foil. All readings were recorded and used to help locate subsequent borings.

6.5 SOIL SAMPLING AND CHEMICAL ANALYSIS

To help characterize the contamination found in on-site soils, eleven soil samples were collected from various on-site locations for the purpose of chemical analysis. All soil samples intended for chemical analysis were placed in labeled, laboratory-provided containers and maintained in iced coolers until delivery to the analytical laboratory (NET Midwest, Inc., Bartlett, Illinois). Chain-of-Custody procedures were strictly followed.

All eleven soil samples were chemically analyzed for the following parameters: Target Compound List volatile organic compounds (VOCs), Target Compound List base/neutral compounds, cyanide, total phenol, lead, arsenic, chromium, copper, nickel, and zinc. All laboratory analysis were performed pursuant to the methods described in EPA Publication: "Test Methods for Evaluating Solid Waste", SW-846, 3rd Edition, September 1986.

6.6 MONITOR WELL INSTALLATION

Four monitor wells were installed on site in accordance with Iowa state well construction standards. The locations of these wells are shown on Figure 3.

Monitor well MW-1 was the only well screened across the water table (the water table was encountered at approximately 16.5 feet below grade); all other monitor wells were screened below the water table in unconsolidated sand and gravel deposits.

Monitor well MW-1 was constructed as a borehole approximately 24 feet deep that was advanced through river alluvium and loess deposits comprised of silty clay. The well materials consisted of a 20 foot long, 2-inch diameter stainless steel screening and 2-inch diameter black iron riser pipe.

The well screen and riser pipes were placed in the borehole such that 2 feet of screen were set above the level of ground water and 8 feet were set below the level of ground water. The void space in the annulus surrounding the screen was filled with clean silica sand to a depth of approximately 2 feet above the top of the screen. Bentonite pellets were then placed into the annulus of the well to create a 1-foot bentonite seal above the sand. The remaining void space in the annulus was filled with a bentonite/cement grout to the ground surface. A locking protective steel casing was placed over the well and pushed into the earth with the drill rig until the top of the 2-foot well stick-up was just below the top of the protective casing. The casing was then grouted into place, and a rainwater runoff pad was created by mounding additional grout around the base of the casing. Finally, all well protective casings were locked and the cement allowed to cure before well development.

Because the remaining three monitor wells were screened below the silty clay in the underlying sand and gravel, all three wells were double cased to help prevent cross contamination. This installation procedure was accomplished by advancing each borehole to approximately 25 feet below grade (approximately 5 feet above the underlying sand and gravel) and filling each open borehole with



a cement/bentonite grout, after the hollow stem augers had been removed. Once the borehole(s) was filled with grout, 8-inch O.D. black iron casing was immediately installed in the borehole. The outer casing was installed so that the bottom of the casing rested at the bottom of the borehole, and the top of the casing extended approximately 6 inches above the ground surface. The cement/bentonite grout was allowed to cure for a period of at least 24 hours before the next phase of well construction commenced.

After the grout cured, the hardened slurry inside the casing was augered out until the silty clay was again encountered. Borehole advancement continued until a sufficient depth within the underlying sand and gravel was reached (approximately 44 feet below grade for MW-2, and approximately 43 feet below grade for MW-3 and MW-4). The method of monitor well construction was identical to that previously described for monitor well MW-1. Well construction details for all monitor wells are included in the appendix.

Prior to monitor well installation, all well materials, measuring devices, and the rear of the drill rig were thoroughly steam cleaned.

Following installation, all monitor wells were surveyed to the nearest 0.01 foot vertical by a licensed surveyor.

6.7 WATER LEVEL MEASUREMENTS

The depth to ground water was recorded in all monitor wells on December 2, 1989. Measurements, to an accuracy of 0.01 feet were obtained by using a chalked steel tape, referenced to the top of the surveyed inner casing. Survey elevations, and ground water measurements are shown on Table 1.

6.8 MONITOR WELL DEVELOPMENT AND SAMPLING

Each monitor well was developed using a pump to purge water from each well. Water was continuously pumped until the extracted ground water was relatively sediment free.

Prior to sample collection, field measurements of ground water elevation, conductivity, temperature and pH were recorded at each well. To obtain a representative ground water sample, dedicated stainless steel bailers were used to purge sufficient volumes of ground water from each well prior to sampling. Ground water stabilization tests were used to help determine when a sufficient amount of water had been purged. After the proper volume(s) of water had been

removed, ground water samples were collected and placed in labeled, laboratory provided containers. The containers were maintained in insulated ice-chests, and transported to the analytical laboratory (NET Midwest, Inc.) under refrigerated conditions. Chain-of-custody procedures were strictly followed. For quality control purposes, a field blank was also submitted to the analytical laboratory for chemical analysis.

6.9 GROUND WATER LABORATORY ANALYSES

The four ground water samples obtained from the on-site monitor wells were chemically analyzed for: Target Compound List VOCs, Target Compound List base/neutrals, cyanide, total phenol, pH, lead chromium, arsenic, copper, nickel and zinc. The field blank was chemically analyzed for VOCs only. All analyses were performed in accordance to protocols stated in the USEPA Publication, Test Methods for Evaluating Solid Waste, SW-846, 3rd Edition, September 1986.

7.0 FINDINGS

7.1 LOG OF BORING SHEETS

The log of boring sheets indicating the depths and descriptions of various soil strata, the penetration resistance, and water level information are presented in the Appendix. The depths shown as changes between the strata are approximate. The actual changes may be transitional, and the depths of the transitions are likely to vary horizontally.

Soil borings completed during this investigation indicate that topsoil and fill material consisting of brown silty clay, silty sand, clay with wood, bricks and slag material are generally present from the ground surface to depths of approximately 4 to 27 feet below grade. The thickest fill material was found in the vicinity of the former tar well located in the western parcel of the site (Figure 2, former tar well location; Figure 3, soil boring ST-5). However, the average depth of fill is approximately 17 feet below grade.

The fill material is underlain by brown silty clay with intermittent sand lenses to a depth of approximately 17 feet below grade. At 17 feet, an approximate 1-foot-thick layer of fine sand was encountered across the site. A silty clay underlies the ground surface to a depth of approximately 30 feet below grade, which was underlain by fine to medium grained sands. Figures 4 and 5 illustrate east-west and north-south cross sections, respectively. None of the on-site soil borings were advanced to bedrock.

7.2 FIELD CONTAMINATION DETECTION

Based on field observations and PID measurements, the highest levels of soil contamination were detected in the western parcel of the investigated area. The most visibly contaminated soils were detected in the immediate vicinity of the former tar well to a depth of approximately 50 feet below grade. Other areas near the tar well also exhibited visible evidence of contamination to approximately 30 feet below grade (ST-6, ST-8), and to at least 25 feet below grade near ST-11 and ST-12.

The eastern parcel contained significantly less visible evidence of contamination compared to that observed in the western parcel. The greatest evidence of visible contamination in the form of free product, was observed near the southwest corner of the property (ST-13) at approximately 20 feet below grade. Evidence of oxide waste was also observed in this borehole at

approximately 13 feet below grade, and was also observed in soil borings ST-6 and ST-10. Oxide waste was identified by the bluish colored soil.

7.3 SOIL ANALYTICAL RESULTS

Table 2 presents a summary of the analytical results for all eleven soil samples collected on-site. The complete analytical results are presented in the appendix. The analytical results of the soil samples generally substantiate the field observation, as elevated levels of contaminants were found predominantly in the western half of the site. Figure 6 presents a generalized delineation of soil contamination based on field observations and soil analytical results.

7.3.1 Volatile Organic Compounds (VOCs)

Concentrations of benzene, toluene, ethylbenzene and xylene were detected in three of the eleven soil samples collected on-site. All three soil samples were collected in the western parcel of the site from soil borings ST-5 (12.5 feet), ST-6 (12.5 feet) and ST-8 (20.0 feet). Of these three samples, soil sample ST-6 (12.5 feet) contained the highest concentrations for benzene, toluene and xylene at 116 ppm, 17 ppm and 96.8 ppm, respectively. Soil sample ST-5 (12.5 feet) contained the highest detected concentration for ethyl benzene at 48 ppm.

7.3.2 Base/Neutral Compounds

Of the eleven soil samples chemically analyzed, only five contained detectable concentrations of base/neutral compounds. Four of these samples (ST-5 at 12.5 feet, ST-6 at 12.5 feet, ST-8 at 20.0 feet and ST-14 at 15 feet) were collected from the western parcel, and one (ST-4 at 20 feet) was collected from the eastern parcel. Of the soil samples collected from the eastern parcel, only one compound, di-n-butylphthalate at 6 ppm, was detected in the subsurface at 20 feet below grade.

All of the soil samples collected from the western parcel contained elevated concentrations of base/neutral compounds that ranged from 201 ppm to 12,960 ppm (total sample concentrations). As expected, the sample that contained the highest base/neutral concentrations was collected from the soil boring located in the immediate vicinity of the former tar well, ST-5 at 12.5 feet. The soil samples that contained the next highest total base/neutral concentrations were ST-6 (12.5 feet) at 9,230 ppm and ST-8 (20.0 feet) at 2,387 ppm. Soil

sample ST-14 (15 feet) contained the lowest total base/neutral concentration at 201 ppm.

Of the various base/neutral compounds detected, naphthalene, phenanthrene, pyrene, acenaphthylene and fluoranthene appeared to be the most prevalent.

7.3.3 Cyanide, Total Phenols, Arsenic and pH

Total cyanide was detected in soil samples collected from borings ST-1 (25 feet), ST-5 (12.5 feet), ST-6 (12.5 feet), ST-13 (10 feet) and ST-14 (15 feet) at concentration ranging from 0.24 ppm to 8.0 ppm [detected in soil sample ST-14 (15 feet)].

Elevated levels of phenol were detected in soil samples ST-6 (12.5 feet) and ST-5 (12.5 feet) at 136 ppm and 22.2 ppm respectively.

Low to moderate levels of arsenic were detected in all eleven soil samples collected on-site. The concentrations ranged from .62 ppm to 6.2 ppm.

The pH of all soil samples was slightly basic, and ranged from 7.49 to 9.02.

7.3.4 Metals

All eleven soil samples contained detectable concentrations of all chemically analyzed metals. The concentrations detected for total chromium, copper and nickel were low. However, several concentrations of zinc, and two concentrations of lead appear to be elevated. The concentrations detected in soil sample ST-5 (12.5 feet) and those detected in soil sample ST-14 (15 feet), especially appear elevated: ST-5, 464 ppm lead and 456 ppm zinc; and ST-14, 49.2 ppm lead and 114 ppm zinc. The average naturally occurring concentration for both of these compounds, in the Council Bluffs, Iowa area is 20 ppm and 45 ppm, respectively.

7.4 GROUND WATER ANALYTICAL RESULTS

Table 3 presents a summary of the analytical results for all four ground water samples and one field blank. Complete analytical results are presented in the appendix.

7.4.1 Volatile Organic Compounds (VOCs)

Elevated concentrations of benzene, toluene, xylene, and ethylbenzene were detected only in monitor well MW-3. The concentrations of contaminants found in the MW-3 ground water samples were: benzene 6,310 ppb, ethylbenzene 2,410 ppb, toluene 234 ppb, and total xylene 1,840 ppb.

Monitor well MW-3 is approximately 43 feet deep and screened in the underlying sand and gravel deposits. The well is located near the western side of an existing old gas plant building, hydraulically down gradient of the former tar well.

7.4.2 Base/Neutral Compounds

Of the four ground water samples collected on-site, only two (MW-3 and MW-4) contained detectable concentrations of base/neutral compounds. In the MW-3 ground water sample, a total base/neutral concentration of 5,514 ppb was detected. Naphthalene was the most prevalent base/neutral compound present at 5,200 ppb. Monitoring well MW-4 also contained naphthalene at a concentration of 22.1 ppb. No other base/neutral compounds were detected in the MW-4 ground water sample.

7.4.3 Cyanide, Total Phenols, Arsenic and pH

Three ground water samples contained detectable concentrations of cyanide: MW-1 at 0.002 ppm, MW-3 at 0.493 ppm and MW-4 at 0.005 ppm. Only the MW-3 sample may be elevated, based on typical Class I aquifer cleanup objectives.

Phenol was detected in only one ground water sample (MW-3 at 0.109 ppm).

All detected concentrations of arsenic were low, ranging in concentrations from 0.001 ppm to 0.003 ppm for monitor wells MW-1, MW-2 and MW-3. Arsenic was not detected in monitor well MW-4.

The pH of all ground water samples ranged from 6.96 to 8.57, which is in a normal pH range.

7.4.4 Metals

Low levels of nickel and zinc were detected in ground water samples MW-1, MW-2 and MW-3, at concentrations ranging from 0.05 to 0.11 ppm and from 0.016 to

0.711 ppm, respectively. Low levels of copper and chromium were also detected in ground water samples MW-2 and MW-3, in addition to slightly elevated concentrations of lead. The concentrations of copper and chromium ranged from 0.05 to 0.06 ppm and from 0.022 to 0.033 ppm, respectively. The slightly elevated concentrations of lead were 0.06 ppm and 0.10 ppm, respectively.

No detectable concentrations of any analyzed metals were detected in ground water sample MW-4.

7.4.5 Analytical Results of Field Blank

Concentrations of benzene and toluene were detected at levels that were either at or slightly above the detection limit. Because elevated concentrations of these compounds were found in several samples collected on site, it is likely that the low concentrations detected in the field blank do not suggest a compromise of the reported analytical results.

8.0 SITE HYDROGEOLOGY

The uppermost water-bearing unit on site is composed of unconsolidated alluvium underlying the river alluvium and loess deposits.

The static ground water levels beneath this site were measured at approximately 17 feet below grade, as shown on Table 1. The ground water flow in this water table aquifer is believed to be to the south-southwest, as shown in Figure 7. This flow direction corresponds to the local topography and the flow direction of the Missouri River. The ground water gradient across the site is approximately 0.00085 foot/foot based on water level information from monitor wells MW-2, MW-3, and MW-4.

9.0 CONCLUSIONS

The following conclusions are based on the findings of this investigation.

- o The naturally-occurring site subsurface conditions appear to be comprised primarily of fine alluvial deposits (brown silty clay) to an approximate depth of 17 feet. This is underlain by approximately 1 foot of fine sand, which lies atop more silty clay that extends to at least 30 feet below the ground surface. Some fill material exists on-site to depths ranging from 4 to 27 feet in depth. The fill consists of brown silty clay, silty sand, clay, wood, bricks

and slag. Coarse-grained alluvial sediments underlie the entire site below approximately 30 feet in depth.

- o The highest concentrations of soil contamination were detected in the western parcel of the investigated area. The most visibly contaminated soils were detected in the immediate area surrounding the former tar well, to a depth of approximately 50 feet below the ground surface.
- o The eastern parcel contained less visible evidence of contamination compared to the western parcel. The worst visible contamination existed in the form of free product near the southwestern corner of the property, approximately 20 feet below the ground surface. Evidence of oxide waste was also identified in this portion of the property.
- o Of eleven soil samples collected on-site, volatile organic compounds (VOCs), (specifically benzene, toluene, ethylbenzene and xylene), were identified in three samples. These three samples were collected in the western portion of the site. The highest concentrations of benzene, toluene and xylene were found in ST-6 at 12.5 feet at 116, 17 and 96.8 parts per million (ppm), respectively. The highest concentration for ethylbenzene was detected in sample ST-5 at 12.5 feet at 48 ppm.
- o Of the eleven soil samples analyzed, five contained detectable levels of base/neutral compounds: four of these were from the western parcel, and one was from the eastern parcel. The four samples from the western parcel had total concentrations of base/neutral compounds ranging from 201 to 12,960 ppm. The highest concentrations of base/neutral compounds were found adjacent to the former tar well. Only one base/neutral compound was detected in the eastern parcel, di-n-butylphalate at 6 ppm. However, because the majority of samples collected within the eastern parcel were deep, it may be possible that some degree of soil contamination exists at shallower depths.
- o Elevated concentrations of lead and zinc were detected in soil samples ST-5 and ST-14.

- o Elevated concentrations of benzene, ethylbenzene, toluene and total xylenes were detected in the ground water collected from MW-3, at 6310, 2410, 234 and 1840 parts per billion (ppb), respectively. Of the base/neutral compounds, six were identified in the MW-3 sample at concentrations ranging from 37 to 5200 ppb, and naphthalene (a PNA) was detected in the MW-4 sample at 22.1 ppb. Monitoring wells 3 and 4 were both screened in the coarse-grained alluvium between 33 and 43 feet in depth.
- o Ground water samples from the four monitoring wells were also analyzed for certain metals, cyanide, arsenic, total phenols and Ph. Low levels of nickel and zinc were detected in samples MW-1, -2 and -3, and low levels of copper, lead and chromium were detected in MW-2 and -3. Of the other analytes, only cyanide was detected at a level believed to be of concern: MW-3 (0.493 ppm).
- o Ground water was found at an approximate depth of 17 feet on site. The ground water flow direction in the ground water table aquifer is believed to be south-southwest, corresponding to the local topography and flow direction of the nearby Missouri River.
- o Based on the analytical results of ground water sample MW-3, it is possible that VOC contamination has migrated off-site to the south/southwest.

TABLE 1

MONITORING WELL ELEVATION DATA
(feet)

WELL #	TOP OF RISER ELEVATION	TOP OF SCREEN ELEVATION	BOTTOM OF SCREEN ELEVATION	GROUND WATER ELEVATION
MW-1	986.25	971.25	961.25	869.08
MW-2	987.75	951.75	941.75	867.10
MW-3	985.44	950.44	940.44	966.88
MW-4	984.36	949.36	949.36	966.93

TABLE 2

**SUMMARY OF SOIL SAMPLES ANALYTICAL RESULTS
PEOPLES NATURAL GAS, COUNCIL BLUFFS, IOWA**

PARAMETERS	UNIT	St-1 25'	St-2 15'	St-2 35'	St-3 20'	St-4 20'	St-5 12.5'	St-6 12.5'	St-8 20'	St-9 15'	St-13 10'	St-14 15'
VOCs												
BENZENE	ug/g	ND	ND	ND	ND	ND	32.4	116	5.3	ND	ND	ND
ETHYL BENZENE	ug/g	ND	ND	ND	ND	ND	48.	31.5	14.2	ND	ND	ND
TOLUENE	ug/g	ND	ND	ND	ND	ND	35.6	147.	8.4	ND	ND	ND
XYLENES, TOTAL	ug/g	ND	ND	ND	ND	ND	26.6	96.8	16.5	ND	ND	ND

BASE/NEUTRAL SEMIVOLATILES												
ACENAPHTHENE	ug/g	ND	ND	ND	ND	ND	550.	ND	39	ND	ND	21
ACENAPHTHYLENE	ug/g	ND	ND	ND	ND	ND	1100.	630	270	ND	ND	11
ANTHRACENE	ug/g	ND	ND	ND	ND	ND	660.	590	130	ND	ND	19
BENZO (a) ANTHRACENE	ug/g	ND	ND	ND	ND	ND	270.	460	86	ND	ND	13
BENZO (b) FLUORANTHENE	ug/g	ND	ND	ND	ND	ND	ND	310.	32.	ND	ND	5.
BENZO (k) FLUORANTHENE	ug/g	ND	ND	ND	ND	ND	ND	420.	26.	ND	ND	7.
BENZO (a) PYRENE	ug/g	ND	ND	ND	ND	ND	150.	490.	44.	ND	ND	8.
CHRYSENE	ug/g	ND	ND	ND	ND	ND	260.	420.	82.	ND	ND	13.
DI-N-BUTYLPHTHALATE	ug/g	ND	ND	ND	ND	6	ND	ND	ND	ND	ND	ND
FLUORANTHENE	ug/g	ND	ND	ND	ND	ND	550.	910.	140.	ND	ND	26.
FLUORENE	ug/g	ND	ND	ND	ND	ND	810.	660.	160.	ND	ND	20.
NAPHTHALENE	ug/g	ND	ND	ND	ND	ND	4900.	2200.	760.	ND	ND	8.
PHENANTHRENE	ug/g	ND	ND	ND	ND	ND	2900.	1380.	420.	ND	ND	19.
PYRENE	ug/g	ND	ND	ND	ND	ND	810.	760.	180.	ND	ND	31.
DIBENZOFURAN	ug/g	ND	ND	ND	ND	ND	ND	ND	18.	ND	ND	ND

INORGANIC ANALYSIS												
CYANIDE, TOTAL	ug/g	0.31	ND	ND	ND	ND	3.2	8.	ND	ND	0.24	55.2
PHENOL	ug/g	0.9	1.62	ND	0.46	1.63	22.2	136.	0.76	ND	ND	0.92
ARSENIC	ug/g	5.9	6.2	1.7	4.3	2.	0.62	2.61	2.9	2.9	1.77	1.99
pH	ug/g	9.02	7.49	8.72	8.44	8.51	8.96	8.88	8.91	8.33	8.48	9.

TABLE 2 (continued)

PARAMETERS	UNIT	St-1 25'	St-2 15'	St-2 35'	St-3 20'	St-4 20'	St-5 12.5'	St-6 12.5'	St-8 20'	St-9 15'	St-13 10'	St-14 15'
METALS ANALYSIS												
CADMIUM	ug/g	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.74	0.97
CHROMIUM, TOTAL	ug/g	12.8	10.6	5.5	10.8	12.4	17.9	10.7	16.1	14.9	13.4	10.7
COPPER	ug/g	17.9	21.2	1.9	11.7	20.1	72.1	21.1	31.7	22.3	20.8	15.9
LEAD	ug/g	21.1	20.5	5.7	17.6	21.2	464.	26.7	28.3	24.1	17.4	49.2
NICKEL	ug/g	22.4	23.	9.5	18.4	22.8	15.4	20.5	26.2	29.7	21.8	14.9
ZINC	ug/g	64.8	63.5	22.2	47.	67.3	456	88.3	95.6	76.1	62.6	114

ug/g = parts per million

NA = Not Analyzed

ND = Not Detected

[pngtable.2]

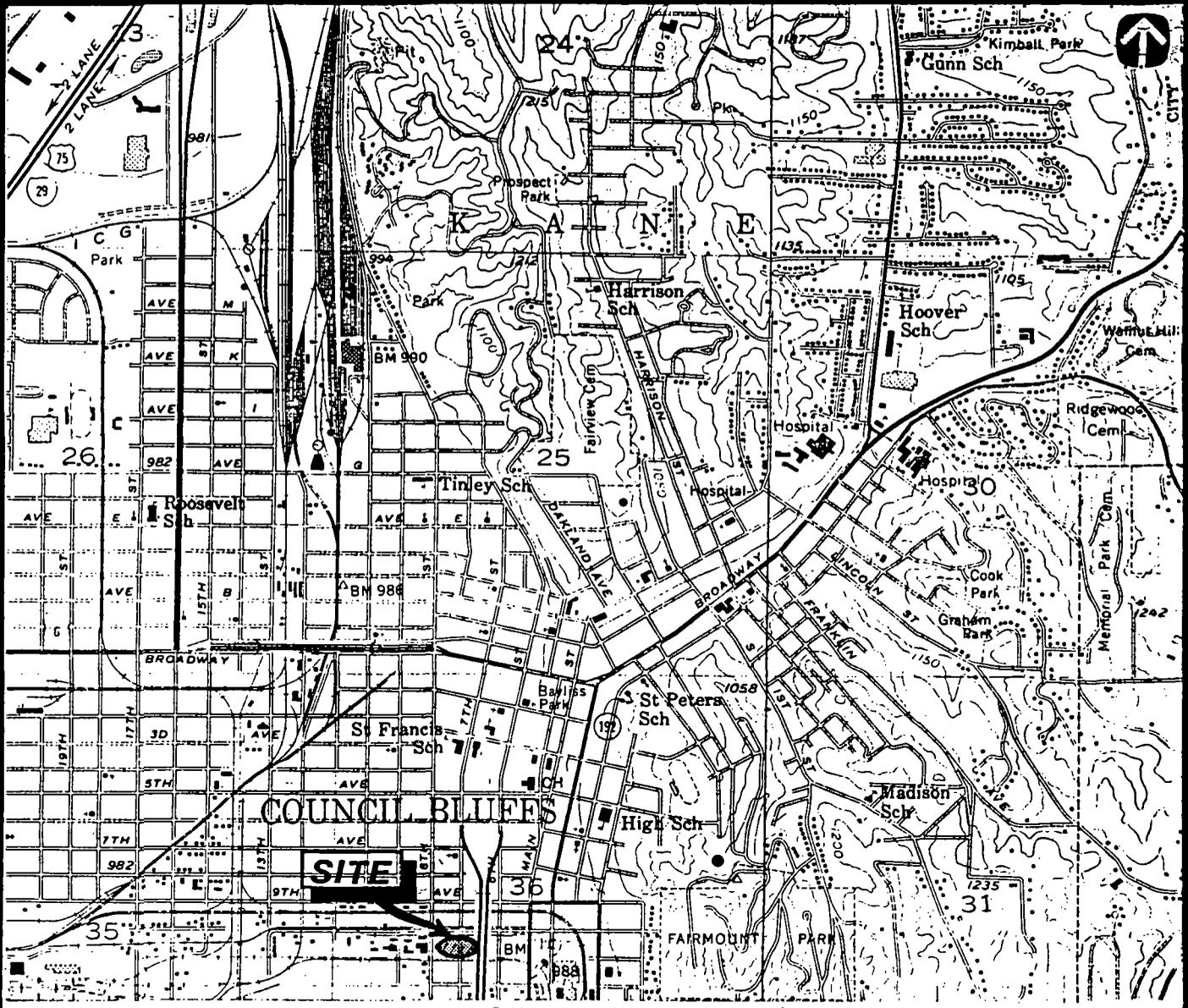
TABLE 3

SUMMARY OF ANALYTICAL RESULTS
FOR GROUNDWATER SAMPLES
PEOPLES NATURAL GAS, COUNCIL BLUFFS, IOWA

PARAMETER	UNITS	MW-1	MW-2	MW-3	MW-4	FIELD BLANK
VOLATILE ORGANIC COMPOUNDS						
BENZENE	ug/g	ND	ND	6310.	ND	1.0
ETHYLBENZENE	ug/g	ND	ND	2410.	ND	ND
TOLUENE	ug/g	ND	ND	234.	ND	1.5
XYLENES, TOTAL	ug/g	ND	ND	1840.	ND	ND
BASE/NEUTRAL SEMIVOLATILES						
ACENAPHTHENE	ug/l	ND	ND	83.	ND	NA
ACENAPHTHYLENE	ug/l	ND	ND	52.	ND	NA
ANTHRACENE	ug/l	ND	ND	97.	ND	NA
FLUORENE	ug/l	ND	ND	37.	ND	NA
NAPHTHALENE	ug/l	ND	ND	5200.	22.1	NA
PHENANTHRENE	ug/l	ND	ND	45.	ND	NA
INORGANIC ANALYSIS						
CYANIDE, TOTAL	mg/l	.002	ND	.493	.005	NA
PHENOL	mg/l	ND	ND	.109	ND	NA
ARSENIC	mg/l	.001	.003	.002	ND	NA
pH	mg/l	6.96	7.25	8.57	7.66	NA
METAL ANALYSIS						
CADMIUM	ug/l	ND	ND	ND	ND	NA
CHROMIUM, TOTAL	ug/l	ND	.022	.033	ND	NA
COPPER	ug/l	ND	.06	.05	ND	NA
LEAD	ug/l	ND	.06	.10	ND	NA
NICKEL	ug/l	.05	.05	.11	ND	NA
ZINC	ug/l	.016	.275	.711	ND	NA

ug/l = parts per billion
ND = Not Detected

mg/l = parts per million
NA = Not Analyzed



Scale 1:250,000

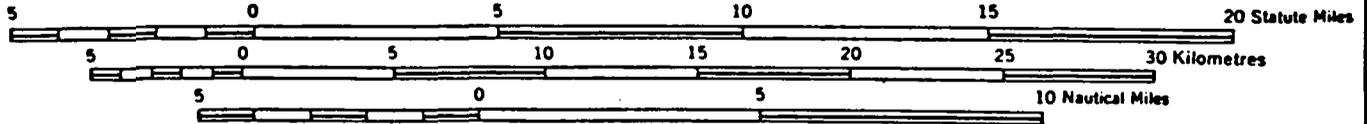


FIGURE 1.
SITE LOCATION MAP.
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA.

MAP REFERENCE:

PORTION OF U.S.G.S QUADRANGLE MAP
 7 1/2 MINUTE SERIES (TOPOGRAPHIC)
 COUNCIL BLUFFS NORTH, IOWA-NEBR. 1956
 PHOTOREVISED 1969 AND 1975

DAMES & MOORE



Exist Concrete-Line Creek

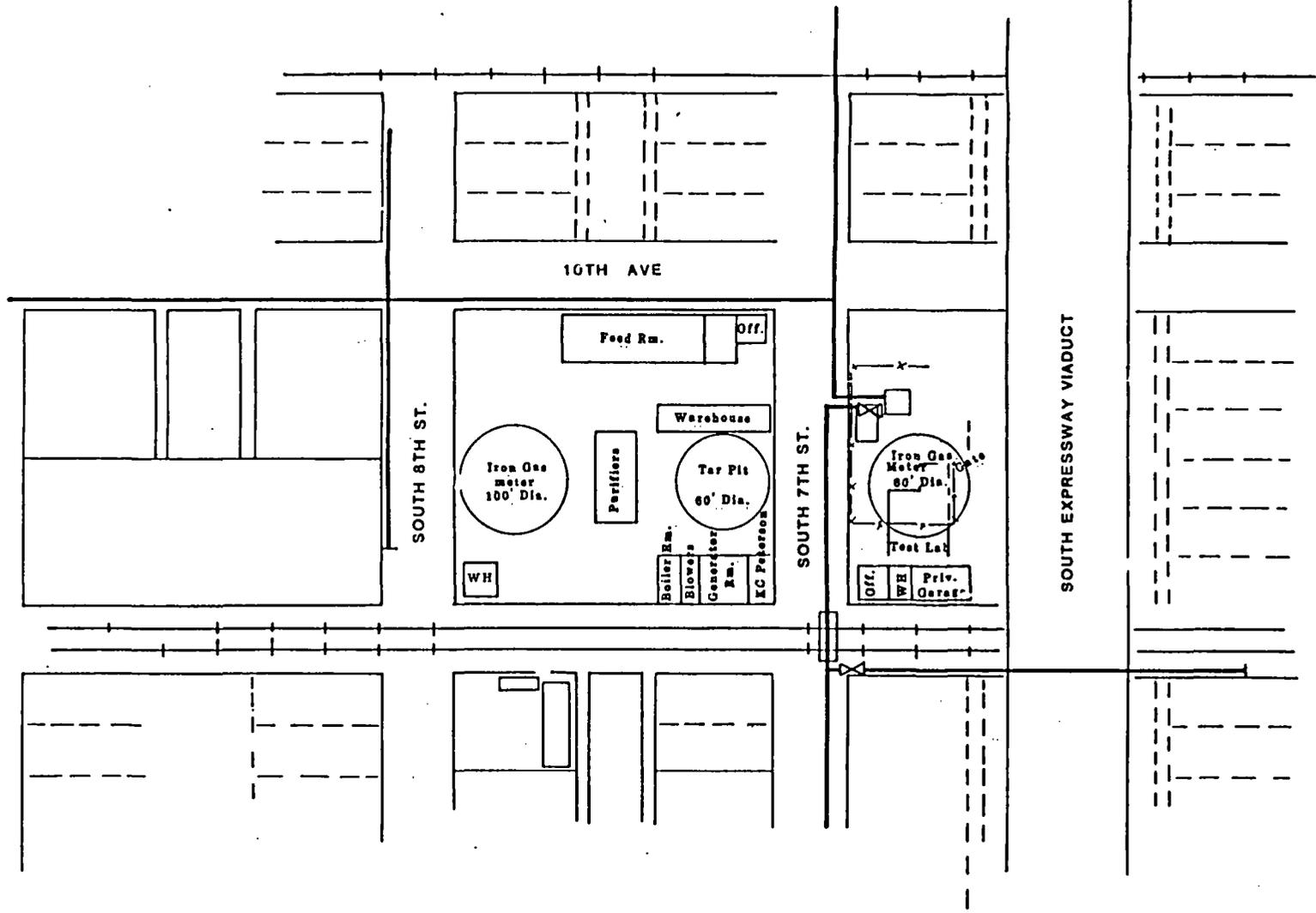
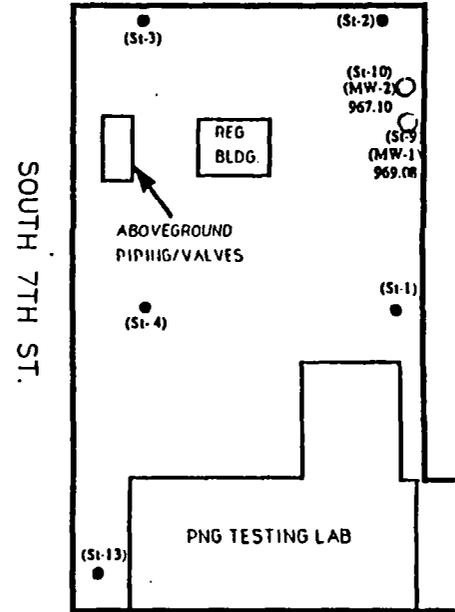
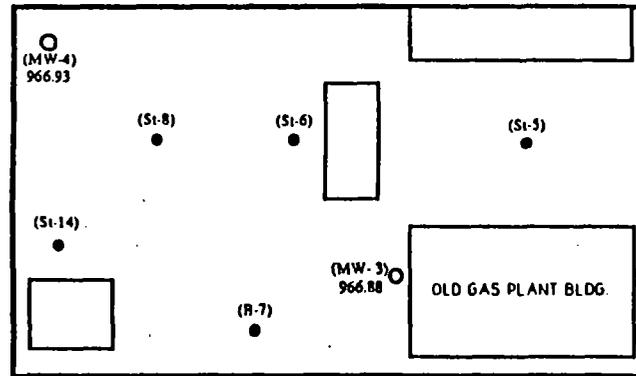


FIGURE 2
FORMER SITE LAYOUT (1934)
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA



10 AVE.



LEGEND

- Monitoring Well
- Boring

RAILROAD R.O.W.

FIGURE 3
SOIL BORING AND
MONITOR WELL LOCATIONS
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA

DAMES & MOORE

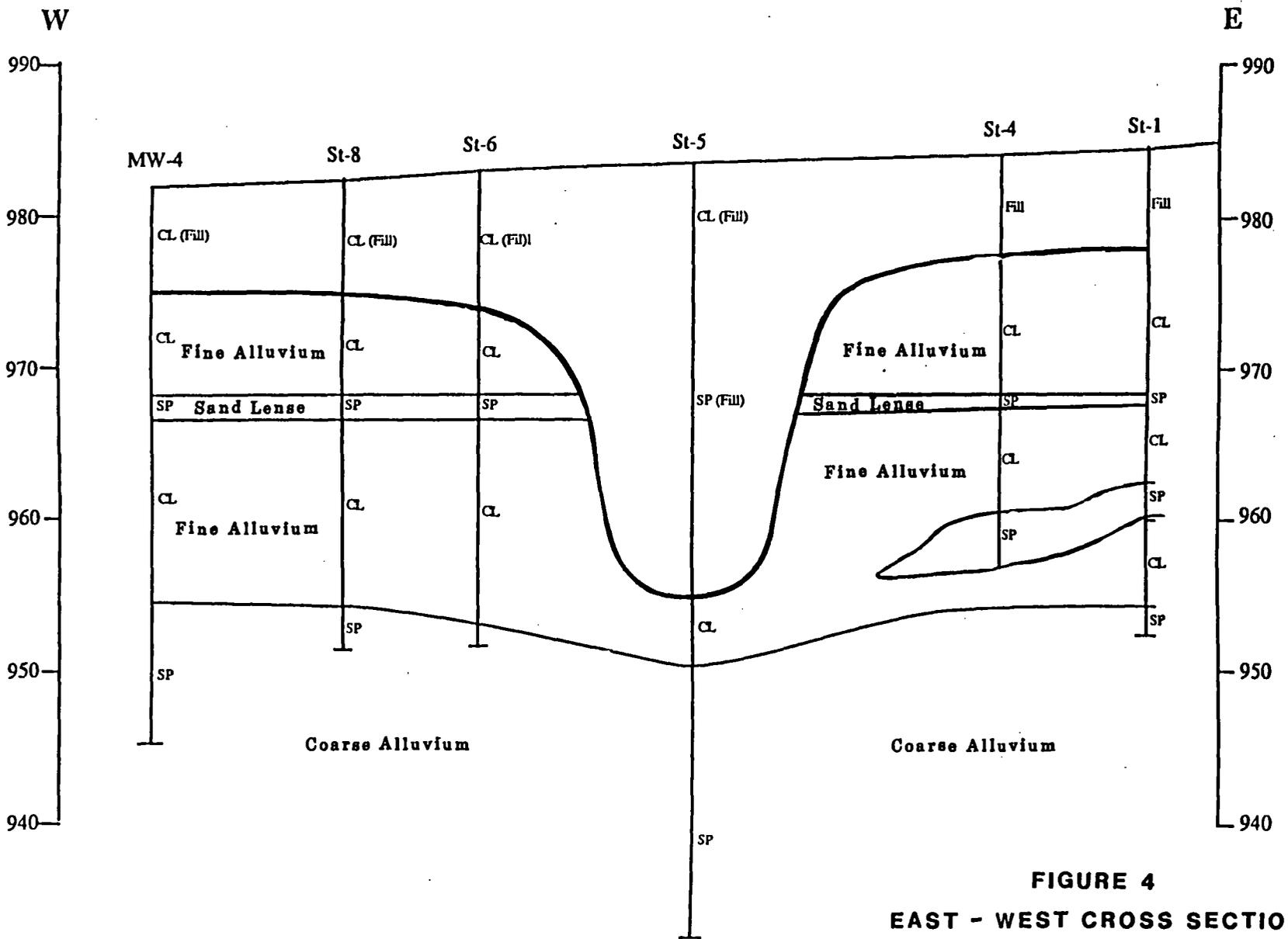


FIGURE 4
EAST - WEST CROSS SECTION
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA

SOUTH

NORTH

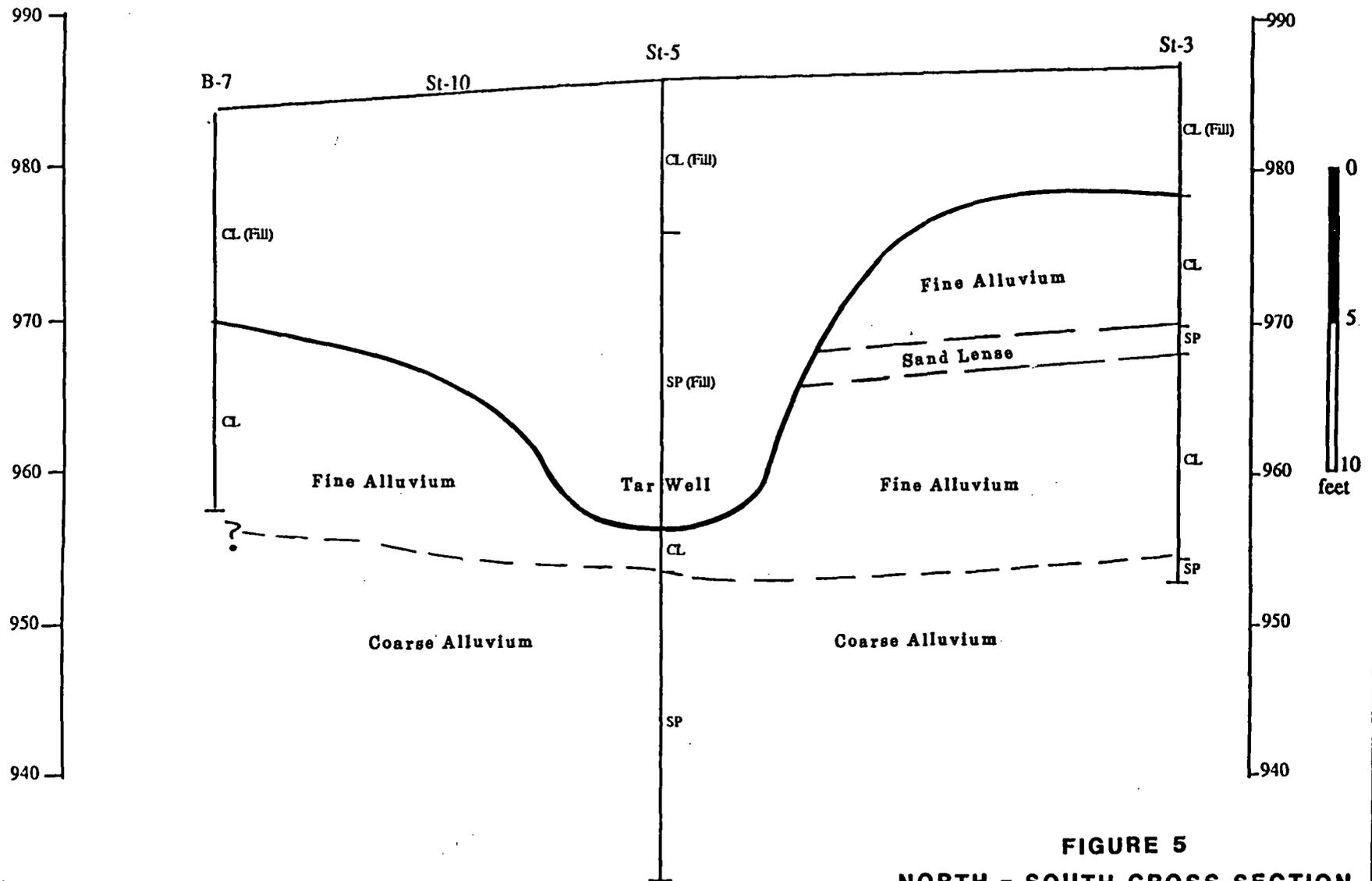
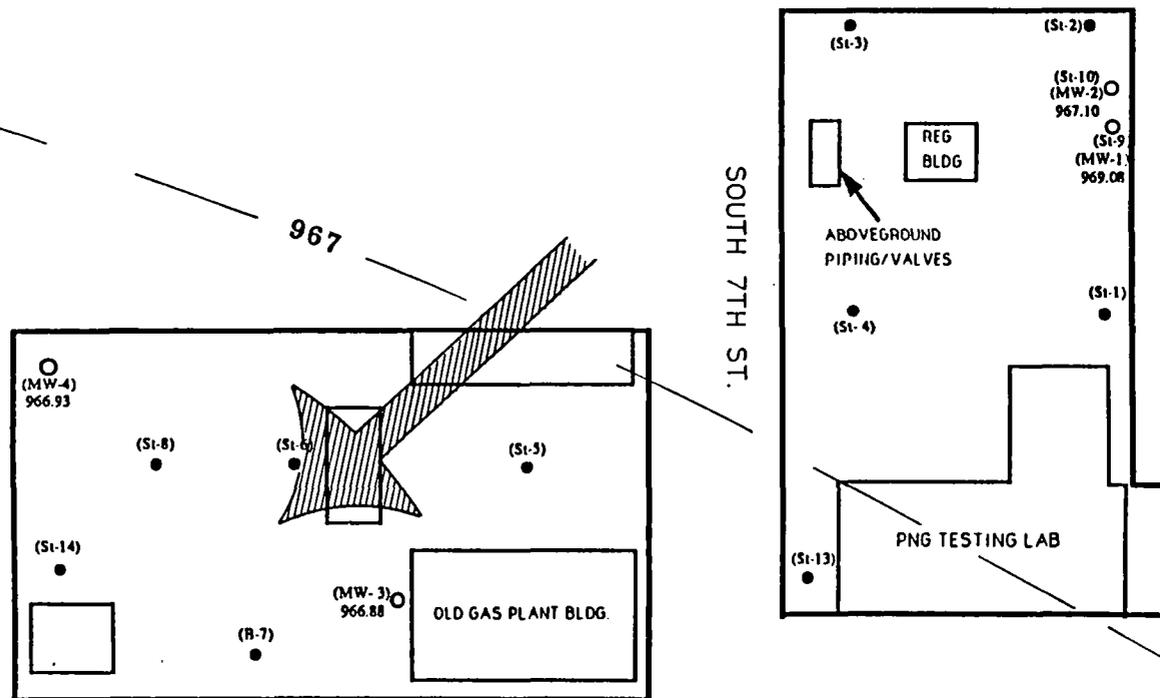


FIGURE 5
NORTH - SOUTH CROSS SECTION
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA

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LEGEND

- Monitoring Well
- Boring

RAILROAD R.O.W.

FIGURE 7
DIRECTION OF GROUNDWATER
FLOW IN UNDERLYING
UNCONSOLIDATED AQUIFER
PEOPLES NATURAL GAS
COUNCIL BLUFFS, IOWA

DAMES & MOORE

APPENDIX 'A'



NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

12 December 1989

Mr. Chris Haas
DAMES & MOORE
1900 Silverlake Road
New Brighton MN 55112

Dear Mr. Haas:

Enclosed are the analytical results for the soil samples received by NET Midwest on 16 November 1989. These samples were analyzed for metals, cyanide, phenol, volatile organics, and base-neutral extractables. The methods used for these analyses are found in the USEPA Publication: "Test Methods for Evaluating Solid Waste," SW-846, 3rd Edition, September 1986.

Volatile organic analyses (VOA) were performed using EPA Methods 8240 and 5030. Aliquots of the samples are placed in a sparging device. Internal standards and deuterium labelled surrogates are added to verify the analytical results and provide qualitative and quantitative references for every sample. The samples are then purged with helium and the volatile organics are transferred to the gas stream. The organics are removed from the gas stream with a Tenax/Silica Gel trap. When purging is complete, the trap is rapidly heated and the trapped organics transferred to the analytical chromatographic column of a gas chromatograph/mass spectrometer (GC/MS). As the individual components elute, complete mass spectra are collected and stored by a computer system. The data are then processed by custom computer programs and also evaluated manually to detect and quantify priority pollutants. Identifications are verified by comparison of the sample component mass spectrum and retention time to that of the standard component.

Continued.....



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Bartlett Division
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Fax: (708) 289-5445

Mr. Chris Haas
12 December 1989
Page Two

Base/Neutral compounds were analyzed using EPA Methods 8270 and 3540. Aliquots of the samples are extracted at a neutral pH with methylene chloride. The extracts are concentrated and analyzed by GC/MS using the same approach as the volatile organics.

Metals analyses were performed using the 6000 Series (ICP) and 7000 Series (atomic absorption) methods. Cyanide was analyzed using EPA Method 9010. Phenol was analyzed using EPA Method 9065.

If after reviewing these results you have any questions, please feel free to call. NET Midwest has been pleased to provide these analytical services for you.

Sincerely,

NET Midwest, Inc.

A handwritten signature in black ink, appearing to read "W. Mottashed", is written over the typed name.

William H. Mottashed
Division Manager

WHM/dab
Encls.



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ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95716

Sample Description: ST-1,25'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1135

Date Received: 11-16-89 1300

Cyanide, Total	0.31	ug/g
Phenol	0.90	ug/g
Solids, Total	73.34	%
Arsenic	5.9	ug/g
Chromium, Total	12.8	ug/g
Copper	17.9	ug/g
Lead	21.1	ug/g
Nickel	22.4	ug/g
Zinc	64.8	ug/g
Corrosivity (pH)	9.02	units

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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TESTING, INC.

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Bartlett Division
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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95716

Sample Description: ST-1,25'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1135

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95716

Sample Description: ST-1,25'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1135

Date Received: 11-16-89 1300

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ANALYTICAL REPORT

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New Brighton MN 55112

12-12-89

Sample No.: 95716

Sample Description: ST-1,25'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1135

Date Received: 11-16-89 1300

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<1.	ug/g
Acenaphthylene	<1.	ug/g
Anthracene	<1.	ug/g
Benzidine	<5.	ug/g
Benzo(a)anthracene	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Benzo(ghi)perylene	<1.	ug/g
Benzyl butyl phthalate	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Chrysene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g
Di-n-butylphthalate	<1.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Diethyl phthalate	<1.	ug/g

Results on a dry weight basis.

William H. Mottashed
Division Manager



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ANALYTICAL REPORT

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DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95716

Sample Description: ST-1,25'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1135

Date Received: 11-16-89 1300

Dimethyl phthalate	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
Di-n-octylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Fluorene	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
Hexachloroethane	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Isophorone	<1.	ug/g
Naphthalene	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Phenanthrene	<1.	ug/g
Pyrene	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
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ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95717

Sample Description: ST-2,15'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1515

Date Received: 11-16-89 1300

Cyanide, Total	<0.05	ug/g
Phenol	1.62	ug/g
Solids, Total	74.30	%
Arsenic	6.2	ug/g
Chromium, Total	10.6	ug/g
Copper	21.2	ug/g
Lead	20.5	ug/g
Nickel	23.0	ug/g
Zinc	63.5	ug/g
Corrosivity (pH)	7.49	units

Results on a dry weight basis.

William H. Mottashed
Division Manager



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Bartlett, IL 60103

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12-12-89

Sample No.: 95717

Sample Description: ST-2,15'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1515

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ENVIRONMENTAL
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Bartlett, IL 60103

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95717

Sample Description: ST-2,15'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1515

Date Received: 11-16-89 1300

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

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12-12-89

Sample No.: 95717

Sample Description: ST-2,15'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1515

Date Received: 11-16-89 1300

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<1.	ug/g
Acenaphthylene	<1.	ug/g
Anthracene	<1.	ug/g
Benzidine	<5.	ug/g
Benzo(a)anthracene	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Benzo(ghi)perylene	<1.	ug/g
Benzyl butyl phthalate	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Chrysene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g
Di-n-butylphthalate	<1.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Diethyl phthalate	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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1900 Silverlake Road
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12-12-89

Sample No.: 95717

Sample Description: ST-2,15'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-13-89 1515

Date Received: 11-16-89 1300

Dimethyl phthalate	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
Di-n-octylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Fluorene	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
Hexachloroethane	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Isophorone	<1.	ug/g
Naphthalene	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Phenanthrene	<1.	ug/g
Pyrene	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ENVIRONMENTAL
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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95718

Sample Description: ST-2,35'; Peoples Gas Site
[Coples Natural GAS, Council Bluff, IA

Date Taken: 11-13-89 1620

Date Received: 11-16-89 1300

Cyanide, Total	<0.05	ug/g
Phenol	<0.06	ug/g
Solids, Total	82.86	%
Arsenic	1.7	ug/g
Chromium, Total	5.50	ug/g
Copper	1.9	ug/g
Lead	5.7	ug/g
Nickel	9.5	ug/g
Zinc	22.2	ug/g
Corrosivity (pH)	8.72	units

Results on a dry weight basis.

William H. Mottashed
Division Manager



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Bartlett Division
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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95718

Sample Description: ST-2,35'; Peoples Gas Site
[Coples Natural GAS, Council Bluff, IA

Date Taken: 11-13-89 1620

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95718

Sample Description: ST-2,35'; Peoples Gas Site
[Coples Natural GAS, Council Bluff, IA

Date Taken: 11-13-89 1620

Date Received: 11-16-89 1300

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.


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New Brighton MN 55112

12-12-89

Sample No.: 95718

Sample Description: ST-2,35'; Peoples Gas Site
[Coples Natural GAS, Council Bluff, IA

Date Taken: 11-13-89 1620

Date Received: 11-16-89 1300

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<1.	ug/g
Acenaphthylene	<1.	ug/g
Anthracene	<1.	ug/g
Benzidine	<5.	ug/g
Benzo(a)anthracene	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Benzo(ghi)perylene	<1.	ug/g
Benzyl butyl phthalate	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Chrysene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g
Di-n-butylphthalate	<1.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Diethyl phthalate	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95718

Sample Description: ST-2,35'; Peoples Gas Site
[Coples Natural GAS, Council Bluff, IA

Date Taken: 11-13-89 1620

Date Received: 11-16-89 1300

Dimethyl phthalate	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
Di-n-octylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Fluorene	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
Hexachloroethane	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Isophorone	<1.	ug/g
Naphthalene	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Phenanthrene	<1.	ug/g
Pyrene	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95719

Sample Description: ST-3,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 0950

Date Received: 11-16-89 1300

Cyanide, Total	<0.05	ug/g
Phenol	0.46	ug/g
Solids, Total	78.91	%
Arsenic	4.3	ug/g
Chromium, Total	10.8	ug/g
Copper	11.7	ug/g
Lead	17.6	ug/g
Nickel	18.4	ug/g
Zinc	47.0	ug/g
Corrosivity (pH)	8.44	units

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95719

Sample Description: ST-3,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 0950

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95719

Sample Description: ST-3,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 0950

Date Received: 11-16-89 1300

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
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1900 Silverlake Road
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12-12-89

Sample No.: 95719

Sample Description: ST-3,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 0950

Date Received: 11-16-89 1300

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<1.	ug/g
Acenaphthylene	<1.	ug/g
Anthracene	<1.	ug/g
Benzidine	<5.	ug/g
Benzo(a)anthracene	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Benzo(ghi)perylene	<1.	ug/g
Benzyl butyl phthalate	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Chrysene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g
Di-n-butylphthalate	<1.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Diethyl phthalate	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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TESTING, INC.

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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95719

Sample Description: ST-3,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 0950

Date Received: 11-16-89 1300

Dimethyl phthalate	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
Di-n-octylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Fluorene	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
Hexachloroethane	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Isophorone	<1.	ug/g
Naphthalene	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Phenanthrene	<1.	ug/g
Pyrene	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g

Results on a dry weight basis.

William H. Mottashed
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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95720

Sample Description: ST-4, 20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1255

Date Received: 11-16-89 1300

Cyanide, Total	<0.05	ug/g
Phenol	1.63	ug/g
Solids, Total	81.99	%
Arsenic	2.0	ug/g
Chromium, Total	12.4	ug/g
Copper	20.1	ug/g
Lead	21.2	ug/g
Nickel	22.8	ug/g
Zinc	67.3	ug/g
Corrosivity (pH)	8.51	units

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ENVIRONMENTAL
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95720

Sample Description: ST-4, 20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1255

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95720

Sample Description: ST-4,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1255

Date Received: 11-16-89 1300

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

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12-12-89

Sample No.: 95720

Sample Description: ST-4, 20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1255

Date Received: 11-16-89 1300

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<1.	ug/g
Acenaphthylene	<1.	ug/g
Anthracene	<1.	ug/g
Benzidine	<5.	ug/g
Benzo(a)anthracene	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Benzo(ghi)perylene	<1.	ug/g
Benzyl butyl phthalate	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Chrysene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g
Di-n-butylphthalate	6.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Diethyl phthalate	<1.	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95720

Sample Description: ST-4,20'; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1255

Date Received: 11-16-89 1300

Dimethyl phthalate	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
Di-n-octylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Fluorene	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
Hexachloroethane	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Isophorone	<1.	ug/g
Naphthalene	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Phenanthrene	<1.	ug/g
Pyrene	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95721

Sample Description: ST-5,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1550

Date Received: 11-16-89 1300

Cyanide, Total	3.2	ug/g
Phenol	22.2	ug/g
Solids, Total	82.26	%
Arsenic	0.62	ug/g
Chromium, Total	17.9	ug/g
Copper	72.1	ug/g
Lead	464.	ug/g
Nickel	15.4	ug/g
Zinc	456.	ug/g
Corrosivity (pH)	8.96	units

Results on a dry weight basis.


William H. Mottashed
Division Manager



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TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-12-89

Sample No.: 95721

Sample Description: ST-5,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1550

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<50.	ug/g
Acrylonitrile	<50.	ug/g
Benzene	32.4	ug/g
Bromodichloromethane	<5.0	ug/g
Bromoform	<5.0	ug/g
Bromomethane	<50.	ug/g
Carbon tetrachloride	<5.0	ug/g
Chlorobenzene	<5.0	ug/g
Chloroethane	<50.	ug/g
2-Chloroethylvinyl ether	<5.0	ug/g
Chloroform	<5.0	ug/g
Chloromethane	<50.	ug/g
Dibromochloromethane	<5.0	ug/g
1,2-Dichlorobenzene	<5.0	ug/g
1,3-Dichlorobenzene	<5.0	ug/g
1,4-Dichlorobenzene	<5.0	ug/g
1,1-Dichloroethane	<5.0	ug/g
1,2-Dichloroethane	<5.0	ug/g
1,1-Dichloroethene	<5.0	ug/g
cis-1,2-Dichloroethene	<5.0	ug/g
trans-1,2-Dichloroethene	<5.0	ug/g
1,2-Dichloropropane	<5.0	ug/g
cis-1,3-Dichloropropene	<5.0	ug/g
trans-1,3-Dichloropropene	<5.0	ug/g
Ethyl benzene	48.0	ug/g

Results on a dry weight basis.

William H. Mottashed
Division Manager



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DAMES AND MOORE
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12-12-89

Sample No.: 95721

Sample Description: ST-5,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1550

Date Received: 11-16-89 1300

Methylene chloride	<25.	ug/g
1,1,2,2-Tetrachloroethane	<5.0	ug/g
Tetrachloroethene	<5.0	ug/g
Toluene	35.6	ug/g
1,1,1-Trichloroethane	<5.0	ug/g
1,1,2-Trichloroethane	<5.0	ug/g
Trichloroethene	<5.0	ug/g
Trichlorofluoromethane	<5.0	ug/g
Vinyl chloride	<50.	ug/g
Xylenes, Total	26.6	ug/g

Results on a dry weight basis.


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Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1550

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BASE/NEUTRAL COMPOUNDS

Acenaphthene	550.	ug/g
Acenaphthylene	1100.	ug/g
Anthracene	660.	ug/g
Benzidine	<500.	ug/g
Benzo(a)anthracene	270.	ug/g
Benzo(b)fluoranthene	<100.	ug/g
Benzo(k)fluoranthene	<100.	ug/g
Benzo(a)pyrene	150.	ug/g
Benzo(ghi)perylene	<100.	ug/g
Benzyl butyl phthalate	<100.	ug/g
Bis(2-chloroethyl)ether	<100.	ug/g
Bis(2-chloroethoxy)methane	<100.	ug/g
Bis(2-ethylhexyl)phthalate	<100.	ug/g
Bis(2chloroisopropyl)ether	<100.	ug/g
4-Bromophenyl phenyl ether	<100.	ug/g
2-Chloronaphthalene	<100.	ug/g
4-Chlorophenylphenyl ether	<100.	ug/g
Chrysene	260.	ug/g
Dibenzo(a,h)anthracene	<100.	ug/g
Di-n-butylphthalate	<100.	ug/g
1,2-Dichlorobenzene	<100.	ug/g
1,3-Dichlorobenzene	<100.	ug/g
1,4-Dichlorobenzene	<100.	ug/g
3,3'-Dichlorobenzidine	<200.	ug/g
Diethyl phthalate	<100.	ug/g

Results on a dry weight basis.


William H. Mottashed
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Sample No.: 95721

Sample Description: ST-5,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-14-89 1550

Date Received: 11-16-89 1300

Dimethyl phthalate	<100.	ug/g
2,4-Dinitrotoluene	<100.	ug/g
2,6-Dinitrotoluene	<100.	ug/g
Di-n-octylphthalate	<100.	ug/g
Fluoranthene	550.	ug/g
Fluorene	810.	ug/g
Hexachlorobenzene	<100.	ug/g
Hexachlorobutadiene	<100.	ug/g
Hexachlorocyclopentadiene	<100.	ug/g
Hexachloroethane	<100.	ug/g
Indeno(1,2,3-cd)pyrene	<100.	ug/g
Isophorone	<100.	ug/g
Naphthalene	4900.	ug/g
Nitrobenzene	<100.	ug/g
N-Nitrosodimethylamine	<100.	ug/g
N-Nitrosodiphenylamine	<100.	ug/g
N-Nitrosodi-n-propylamine	<100.	ug/g
Phenanthrene	2900.	ug/g
Pyrene	810.	ug/g
1,2,4-Trichlorobenzene	<100.	ug/g

Results on a dry weight basis.


William H. Mottashed
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DAMES AND MOORE
1900 Silverlake Road
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12-12-89

Sample No.: 95722

Sample Description: ST-6,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-15-89

Date Received: 11-16-89 1300

Cyanide, Total	8.0	ug/g
Phenol	136.	ug/g
Solids, Total	73.51	%
Arsenic	2.61	ug/g
Chromium, Total	10.7	ug/g
Copper	21.1	ug/g
Lead	26.7	ug/g
Nickel	20.5	ug/g
Zinc	88.3	ug/g
Corrosivity (pH)	8.88	units

Results on a dry weight basis.

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12-12-89

Sample No.: 95722

Sample Description: ST-6,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-15-89

Date Received: 11-16-89 1300

VOLATILE COMPOUNDS

Acrolein	<50.	ug/g
Acrylonitrile	<50.	ug/g
Benzene	116.	ug/g
Bromodichloromethane	<5.0	ug/g
Bromoform	<5.0	ug/g
Bromomethane	<50.	ug/g
Carbon tetrachloride	<5.0	ug/g
Chlorobenzene	<5.0	ug/g
Chloroethane	<50.	ug/g
2-Chloroethylvinyl ether	<5.0	ug/g
Chloroform	<5.0	ug/g
Chloromethane	<50.	ug/g
Dibromochloromethane	<5.0	ug/g
1,2-Dichlorobenzene	<5.0	ug/g
1,3-Dichlorobenzene	<5.0	ug/g
1,4-Dichlorobenzene	<5.0	ug/g
1,1-Dichloroethane	<5.0	ug/g
1,2-Dichloroethane	<5.0	ug/g
1,1-Dichloroethene	<5.0	ug/g
cis-1,2-Dichloroethene	<5.0	ug/g
trans-1,2-Dichloroethene	<5.0	ug/g
1,2-Dichloropropane	<5.0	ug/g
cis-1,3-Dichloropropene	<5.0	ug/g
trans-1,3-Dichloropropene	<5.0	ug/g
Ethyl benzene	31.5	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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12-12-89

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Date Taken: 11-15-89

Date Received: 11-16-89 1300

Methylene chloride	<25.	ug/g
1,1,2,2-Tetrachloroethane	<5.0	ug/g
Tetrachloroethene	<5.0	ug/g
Toluene	147.	ug/g
1,1,1-Trichloroethane	<5.0	ug/g
1,1,2-Trichloroethane	<5.0	ug/g
Trichloroethene	<5.0	ug/g
Trichlorofluoromethane	<5.0	ug/g
Vinyl chloride	<50.	ug/g
Xylenes, Total	96.8	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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12-12-89

Sample No.: 95722

Sample Description: ST-6,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-15-89

Date Received: 11-16-89 1300

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<200.	ug/g
Acenaphthylene	630.	ug/g
Anthracene	590.	ug/g
Benzidine	<1000.	ug/g
Benzo(a)anthracene	460.	ug/g
Benzo(b)fluoranthene	310.	ug/g
Benzo(k)fluoranthene	420.	ug/g
Benzo(a)pyrene	490.	ug/g
Benzo(ghi)perylene	<200.	ug/g
Benzyl butyl phthalate	<200.	ug/g
Bis(2-chloroethyl)ether	<200.	ug/g
Bis(2-chloroethoxy)methane	<200.	ug/g
Bis(2-ethylhexyl)phthalate	<200.	ug/g
Bis(2chloroisopropyl)ether	<200.	ug/g
4-Bromophenyl phenyl ether	<200.	ug/g
2-Chloronaphthalene	<200.	ug/g
4-Chlorophenylphenyl ether	<200.	ug/g
Chrysene	420.	ug/g
Dibenzo(a,h)anthracene	<200.	ug/g
Di-n-butylphthalate	<200.	ug/g
1,2-Dichlorobenzene	<200.	ug/g
1,3-Dichlorobenzene	<200.	ug/g
1,4-Dichlorobenzene	<200.	ug/g
3,3'-Dichlorobenzidine	<400.	ug/g
Diethyl phthalate	<200.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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12-12-89

Sample No.: 95722

Sample Description: ST-6,12.5; Peoples Gas Site
Peoples Natural Gas, Council Bluff, IA

Date Taken: 11-15-89

Date Received: 11-16-89 1300

Dimethyl phthalate	<200.	ug/g
2,4-Dinitrotoluene	<200.	ug/g
2,6-Dinitrotoluene	<200.	ug/g
Di-n-octylphthalate	<200.	ug/g
Fluoranthene	910.	ug/g
Fluorene	660.	ug/g
Hexachlorobenzene	<200.	ug/g
Hexachlorobutadiene	<200.	ug/g
Hexachlorocyclopentadiene	<200.	ug/g
Hexachloroethane	<200.	ug/g
Indeno(1,2,3-cd)pyrene	<200.	ug/g
Isophorone	<200.	ug/g
Naphthalene	2200.	ug/g
Nitrobenzene	<200.	ug/g
N-Nitrosodimethylamine	<200.	ug/g
N-Nitrosodiphenylamine	<200.	ug/g
N-Nitrosodi-n-propylamine	<200.	ug/g
Phenanthrene	1380.	ug/g
Pyrene	760.	ug/g
1,2,4-Trichlorobenzene	<200.	ug/g

Results on a dry weight basis.

William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
Suite 302
New Brighton MN 55112

12-13-89

Sample No.: 95766

Sample Description: ST-8, 20'
People's Gas/CB, IA Project

Date Taken: 11-16-89 1530

Date Received: 11-17-89 1600

Cyanide, Total	<0.2	ug/g
Phenol	0.76	ug/g
Solids, Total	65.97	%
Arsenic	2.9	ug/g
Chromium, Total	16.1	ug/g
Copper	31.7	ug/g
Lead	28.3	ug/g
Nickel	26.2	ug/g
Zinc	95.6	ug/g
Corrosivity (pH)	8.91	units

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
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New Brighton MN 55112

12-13-89

Sample No.: 95766

Sample Description: ST-8, 20'
People's Gas/CB, IA Project

Date Taken: 11-16-89 1530

Date Received: 11-17-89 1600

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/g
Vinyl chloride	<10.	ug/g
Bromomethane	<10.	ug/g
Chloroethane	<10.	ug/g
1,1-Dichloroethene	<1.0	ug/g
Carbon disulfide	<1.0	ug/g
Acetone	<10.	ug/g
Methylene chloride	<5.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
Vinyl acetate	<10.	ug/g
2-Butanone	<10.	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
Chloroform	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
Benzene	5.3	ug/g
Carbon tetrachloride	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
2-Chloroethylvinyl ether	<10.	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
4-Methyl-2-pentanone	<10.	ug/g
Toluene	8.4	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
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People's Gas/CB, IA Project

Date Taken: 11-16-89 1530

Date Received: 11-17-89 1600

cis-1,3-Dichloropropene	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Dibromochloromethane	<1.0	ug/g
2-Hexanone	<10.	ug/g
Tetrachloroethene	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Ethylbenzene	14.2	ug/g
meta & para-Xylene	10.6	ug/g
Bromoform	<1.0	ug/g
Styrene	<1.0	ug/g
ortho-Xylene	5.9	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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12-13-89

Sample No.: 95766

Sample Description: ST-8, 20'
People's Gas/CB, IA Project

Date Taken: 11-16-89 1530

Date Received: 11-17-89 1600

B/N TARGET COMPOUNDS

Aniline	<10.	ug/g
Bis(2-chloroethyl) ether	<10.	ug/g
1,3-Dichlorobenzene	<10.	ug/g
1,4-Dichlorobenzene	<10.	ug/g
1,2-Dichlorobenzene	<10.	ug/g
Benzyl alcohol	<10.	ug/g
Hexachloroethane	<10.	ug/g
N-Nitrosodi-n-propylamine	<10.	ug/g
Bis(2chloroisopropyl) ether	<10.	ug/g
Nitrobenzene	<10.	ug/g
N-Nitrosodimethylamine	<10.	ug/g
Isophorone	<10.	ug/g
Bis(2-chloroethoxy) methane	<10.	ug/g
1,2,4-Trichlorobenzene	<10.	ug/g
Naphthalene	760.	ug/g
4-Chloroaniline	<10.	ug/g
Hexachlorobutadiene	<10.	ug/g
2-Methylnaphthalene	<10.	ug/g
2-Chloronaphthalene	<10.	ug/g
3-Nitroaniline	<50.	ug/g
2-Nitroaniline	<50.	ug/g
4-Nitroaniline	<50.	ug/g
Acenaphthylene	270.	ug/g
Dimethyl phthalate	<10.	ug/g
Acenaphthene	39.	ug/g

Results on a dry weight basis.


William H. Mottashed
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Sample No.: 95766

Sample Description: ST-8, 20'
People's Gas/CB, IA Project

Date Taken: 11-16-89 1530

Date Received: 11-17-89 1600

Fluorene	160.	ug/g
4-Chlorophenylphenyl ether	<10.	ug/g
Dibenzofuran	18.	ug/g
Diethyl phthalate	<10.	ug/g
N-Nitrosodiphenylamine	<10.	ug/g
Hexachlorocyclopentadiene	<10.	ug/g
2,6-Dinitrotoluene	<10.	ug/g
2,4-Dinitrotoluene	<10.	ug/g
4-Bromophenyl phenyl ether	<10.	ug/g
Hexachlorobenzene	<10.	ug/g
Phenanthrene	420.	ug/g
Anthracene	130.	ug/g
Di-n-butylphthalate	<10.	ug/g
Fluoranthene	140.	ug/g
Pyrene	180.	ug/g
Benz(a)anthracene	86.	ug/g
Chrysene	82.	ug/g
Benzidine	<50.	ug/g
3,3'-Dichlorobenzidine	<20.	ug/g
Butyl benzyl phthalate	<10.	ug/g
Bis(2-ethylhexyl)phthalate	<10.	ug/g
Benzo(b)fluoranthene	32.	ug/g
Benzo(k)fluoranthene	26.	ug/g
Benzo(a)pyrene	44.	ug/g
Indeno(1,2,3-cd)pyrene	<10.	ug/g
Dibenzo(a,h)anthracene	<10.	ug/g

Results on a dry weight basis.


William H. Mottashed
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DAMES & MOORE
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New Brighton MN 55112

12-13-89

Sample No.: 95766

Sample Description: ST-8, 20'
People's Gas/CB, IA Project

Date Taken: 11-16-89 1530

Date Received: 11-17-89 1600

Benzo(ghi)perylene

<10.

ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
Suite 302
New Brighton MN 55112

12-13-89

Sample No.: 95767

Sample Description: ST-9, 15'
People's Gas/CB, IA Project

Date Taken: 11-17-89 0930

Date Received: 11-17-89 1600

Cyanide, Total	<0.2	ug/g
Phenol	<0.1	ug/g
Solids, Total	73.95	%
Arsenic	2.9	ug/g
Chromium, Total	14.9	ug/g
Copper	22.3	ug/g
Lead	24.1	ug/g
Nickel	29.7	ug/g
Zinc	76.1	ug/g
Corrosivity (pH)	8.33	units

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
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1900 Silver Road
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New Brighton MN 55112

12-13-89

Sample No.: 95767

Sample Description: ST-9, 15'
People's Gas/CB, IA Project

Date Taken: 11-17-89 0930

Date Received: 11-17-89 1600

VOLATILE TARGET COMPOUNDS

Chloromethane	<10.	ug/g
Vinyl chloride	<10.	ug/g
Bromomethane	<10.	ug/g
Chloroethane	<10.	ug/g
1,1-Dichloroethene	<1.0	ug/g
Carbon disulfide	<1.0	ug/g
Acetone	<10.	ug/g
Methylene chloride	<5.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
Vinyl acetate	<10.	ug/g
2-Butanone	<10.	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
Chloroform	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
Benzene	<1.0	ug/g
Carbon tetrachloride	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
2-Chloroethylvinyl ether	<10.	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
4-Methyl-2-pentanone	<10.	ug/g
Toluene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
Suite 302
New Brighton MN 55112

12-13-89

Sample No.: 95767

Sample Description: ST-9, 15'
People's Gas/CB, IA Project

Date Taken: 11-17-89 0930

Date Received: 11-17-89 1600

cis-1,3-Dichloropropene	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Dibromochloromethane	<1.0	ug/g
2-Hexanone	<10.	ug/g
Tetrachloroethene	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Ethylbenzene	<1.0	ug/g
meta & para-Xylene	<1.0	ug/g
Bromoform	<1.0	ug/g
Styrene	<1.0	ug/g
ortho-Xylene	<1.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
Suite 302
New Brighton MN 55112

12-13-89

Sample No.: 95767

Sample Description: ST-9, 15'
People's Gas/CB, IA Project

Date Taken: 11-17-89 0930

Date Received: 11-17-89 1600

B/N TARGET COMPOUNDS

Aniline	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
Benzyl alcohol	<1.	ug/g
Hexachloroethane	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
Isophorone	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g
Naphthalene	<1.	ug/g
4-Chloroaniline	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
2-Methylnaphthalene	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
3-Nitroaniline	<5.	ug/g
2-Nitroaniline	<5.	ug/g
4-Nitroaniline	<5.	ug/g
Acenaphthylene	<1.	ug/g
Dimethyl phthalate	<1.	ug/g
Acenaphthene	<1.	ug/g

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
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12-13-89

Sample No.: 95767

Sample Description: ST-9, 15'
People's Gas/CB, IA Project

Date Taken: 11-17-89 0930

Date Received: 11-17-89 1600

Fluorene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Dibenzofuran	<1.	ug/g
Diethyl phthalate	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Phenanthrene	<1.	ug/g
Anthracene	<1.	ug/g
Di-n-butylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Pyrene	<1.	ug/g
Benz(a)anthracene	<1.	ug/g
Chrysene	<1.	ug/g
Benzidine	<5.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Butyl benzyl phthalate	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES & MOORE
1900 Silver Road
Suite 302
New Brighton MN 55112

12-13-89

Sample No.: 95767

Sample Description: ST-9, 15'
People's Gas/CB, IA Project

Date Taken: 11-17-89 0930

Date Received: 11-17-89 1600

Benzo(ghi)perylene

<1.

ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96568

Sample Description: St-13,10 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1230

Date Received: 12-04-89 1000

Cyanide, Total	0.24	ug/g
Phenol	<0.05	ug/g
Solids, Total	78.97	%
Arsenic	1.77	ug/g
Cadmium	0.74	ug/g
Chromium, Total	13.4	ug/g
Copper	20.8	ug/g
Lead	17.4	ug/g
Nickel	21.8	ug/g
Zinc	62.6	ug/g
Corrosivity (pH)	8.48	units

Results on a dry weight basis.

W. Mottashed
William H. Mottashed
Division Manager



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ENVIRONMENTAL
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Bartlett Division
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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96568

Sample Description: St-13,10 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1230

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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Bartlett, IL 60103

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96568

Sample Description: St-13,10 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1230

Date Received: 12-04-89 1000

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96568

Sample Description: St-13,10 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1230

Date Received: 12-04-89 1000

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<1.	ug/g
Acenaphthylene	<1.	ug/g
Anthracene	<1.	ug/g
Benzidine	<5.	ug/g
Benzo(a)anthracene	<1.	ug/g
Benzo(b)fluoranthene	<1.	ug/g
Benzo(k)fluoranthene	<1.	ug/g
Benzo(a)pyrene	<1.	ug/g
Benzo(ghi)perylene	<1.	ug/g
Benzyl butyl phthalate	<1.	ug/g
Bis(2-chloroethyl)ether	<1.	ug/g
Bis(2-chloroethoxy)methane	<1.	ug/g
Bis(2-ethylhexyl)phthalate	<1.	ug/g
Bis(2chloroisopropyl)ether	<1.	ug/g
4-Bromophenyl phenyl ether	<1.	ug/g
2-Chloronaphthalene	<1.	ug/g
4-Chlorophenylphenyl ether	<1.	ug/g
Chrysene	<1.	ug/g
Dibenzo(a,h)anthracene	<1.	ug/g
Di-n-butylphthalate	<1.	ug/g
1,2-Dichlorobenzene	<1.	ug/g
1,3-Dichlorobenzene	<1.	ug/g
1,4-Dichlorobenzene	<1.	ug/g
3,3'-Dichlorobenzidine	<2.	ug/g
Diethyl phthalate	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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Bartlett Division
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Bartlett, IL 60103

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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96568

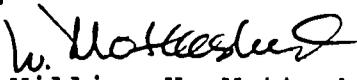
Sample Description: St-13,10 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1230

Date Received: 12-04-89 1000

Dimethyl phthalate	<1.	ug/g
2,4-Dinitrotoluene	<1.	ug/g
2,6-Dinitrotoluene	<1.	ug/g
Di-n-octylphthalate	<1.	ug/g
Fluoranthene	<1.	ug/g
Fluorene	<1.	ug/g
Hexachlorobenzene	<1.	ug/g
Hexachlorobutadiene	<1.	ug/g
Hexachlorocyclopentadiene	<1.	ug/g
Hexachloroethane	<1.	ug/g
Indeno(1,2,3-cd)pyrene	<1.	ug/g
Isophorone	<1.	ug/g
Naphthalene	<1.	ug/g
Nitrobenzene	<1.	ug/g
N-Nitrosodimethylamine	<1.	ug/g
N-Nitrosodiphenylamine	<1.	ug/g
N-Nitrosodi-n-propylamine	<1.	ug/g
Phenanthrene	<1.	ug/g
Pyrene	<1.	ug/g
1,2,4-Trichlorobenzene	<1.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96569

Sample Description: St-14,15 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1530

Date Received: 12-04-89 1000

Cyanide, Total	55.2	ug/g
Phenol	0.92	ug/g
Solids, Total	70.60	%
Arsenic	1.99	ug/g
Cadmium	0.97	ug/g
Chromium, Total	10.7	ug/g
Copper	15.9	ug/g
Lead	49.2	ug/g
Nickel	14.9	ug/g
Zinc	114.	ug/g
Corrosivity (pH)	9.00	units

Results on a dry weight basis.


William H. Mottashed
Division Manager



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NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96569

Sample Description: St-14,15 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1530

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/g
Acrylonitrile	<10.	ug/g
Benzene	<1.0	ug/g
Bromodichloromethane	<1.0	ug/g
Bromoform	<1.0	ug/g
Bromomethane	<10.	ug/g
Carbon tetrachloride	<1.0	ug/g
Chlorobenzene	<1.0	ug/g
Chloroethane	<10.	ug/g
2-Chloroethylvinyl ether	<1.0	ug/g
Chloroform	<1.0	ug/g
Chloromethane	<10.	ug/g
Dibromochloromethane	<1.0	ug/g
1,2-Dichlorobenzene	<1.0	ug/g
1,3-Dichlorobenzene	<1.0	ug/g
1,4-Dichlorobenzene	<1.0	ug/g
1,1-Dichloroethane	<1.0	ug/g
1,2-Dichloroethane	<1.0	ug/g
1,1-Dichloroethene	<1.0	ug/g
cis-1,2-Dichloroethene	<1.0	ug/g
trans-1,2-Dichloroethene	<1.0	ug/g
1,2-Dichloropropane	<1.0	ug/g
cis-1,3-Dichloropropene	<1.0	ug/g
trans-1,3-Dichloropropene	<1.0	ug/g
Ethyl benzene	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



NATIONAL ENVIRONMENTAL TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
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12-29-89

Sample No.: 96569

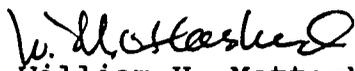
Sample Description: St-14,15 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1530

Date Received: 12-04-89 1000

Methylene chloride	<5.0	ug/g
1,1,2,2-Tetrachloroethane	<1.0	ug/g
Tetrachloroethene	<1.0	ug/g
Toluene	<1.0	ug/g
1,1,1-Trichloroethane	<1.0	ug/g
1,1,2-Trichloroethane	<1.0	ug/g
Trichloroethene	<1.0	ug/g
Trichlorofluoromethane	<1.0	ug/g
Vinyl chloride	<10.	ug/g
Xylenes, Total	<1.0	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96569

Sample Description: St-14,15 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1530

Date Received: 12-04-89 1000

BASE/NEUTRAL COMPOUNDS

Acenaphthene	21.	ug/g
Acenaphthylene	11.	ug/g
Anthracene	19.	ug/g
Benzidine	<25.	ug/g
Benzo(a)anthracene	13.	ug/g
Benzo(b)fluoranthene	5.	ug/g
Benzo(k)fluoranthene	7.	ug/g
Benzo(a)pyrene	8.	ug/g
Benzo(ghi)perylene	<5.	ug/g
Benzyl butyl phthalate	<5.	ug/g
Bis(2-chloroethyl) ether	<5.	ug/g
Bis(2-chloroethoxy) methane	<5.	ug/g
Bis(2-ethylhexyl) phthalate	<5.	ug/g
Bis(2chloroisopropyl) ether	<5.	ug/g
4-Bromophenyl phenyl ether	<5.	ug/g
2-Chloronaphthalene	<5.	ug/g
4-Chlorophenylphenyl ether	<5.	ug/g
Chrysene	13.	ug/g
Dibenzo(a,h)anthracene	<5.	ug/g
Di-n-butylphthalate	<5.	ug/g
1,2-Dichlorobenzene	<5.	ug/g
1,3-Dichlorobenzene	<5.	ug/g
1,4-Dichlorobenzene	<5.	ug/g
3,3'-Dichlorobenzidine	<10.	ug/g
Diethyl phthalate	<5.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ENVIRONMENTAL
TESTING, INC.

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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96569

Sample Description: St-14,15 Boring
Peoples Natural Gas, CB; Ia

Date Taken: 12-01-89 1530

Date Received: 12-04-89 1000

Dimethyl phthalate	<5.	ug/g
2,4-Dinitrotoluene	<5.	ug/g
2,6-Dinitrotoluene	<5.	ug/g
Di-n-octylphthalate	<5.	ug/g
Fluoranthene	26.	ug/g
Fluorene	20.	ug/g
Hexachlorobenzene	<5.	ug/g
Hexachlorobutadiene	<5.	ug/g
Hexachlorocyclopentadiene	<5.	ug/g
Hexachloroethane	<5.	ug/g
Indeno(1,2,3-cd)pyrene	<5.	ug/g
Isophorone	<5.	ug/g
Naphthalene	8.	ug/g
Nitrobenzene	<5.	ug/g
N-Nitrosodimethylamine	<5.	ug/g
N-Nitrosodiphenylamine	<5.	ug/g
N-Nitrosodi-n-propylamine	<5.	ug/g
Phenanthrene	19.	ug/g
Pyrene	31.	ug/g
1,2,4-Trichlorobenzene	<5.	ug/g

Results on a dry weight basis.


William H. Mottashed
Division Manager



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ENVIRONMENTAL
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Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

29 December 1989

Mr. Chris Haas
DAMES & MOORE
1900 Silverlake Road
New Brighton MN 55112

Dear Mr. Haas:

Enclosed are the analytical results for the samples received by NET Midwest on 04 December 1989. These samples were analyzed for cyanide, heavy metals, volatile organics, and base-neutral extractables. The methods used for these analyses are found in the USEPA Publication: "Test Methods for Evaluating Solid Waste," SW-846, 3rd Edition, September 1986.

Volatile organic analyses (VOA) were performed using EPA Methods 8240 and 5030. Aliquots of the samples are placed in a sparging device. Internal standards and deuterium labelled surrogates are added to verify the analytical results and provide qualitative and quantitative references for every sample. The samples are then purged with helium and the volatile organics are transferred to the gas stream. The organics are removed from the gas stream with a Tenax/Silica Gel trap. When purging is complete, the trap is rapidly heated and the trapped organics transferred to the analytical chromatographic column of a gas chromatograph/mass spectrometer (GC/MS). As the individual components elute, complete mass spectra are collected and stored by a computer system. The data are then processed by custom computer programs and also evaluated manually to detect and quantify priority pollutants. Identifications are verified by comparison of the sample component mass spectrum and retention time to that of the standard component.

Continued.....



NATIONAL
ENVIRONMENTAL
TESTING, INC.

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Bartlett Division
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Fax: (708) 289-5445

Mr. Chris Haas
29 December 1989
Page Two

Base/Neutral compounds were analyzed using EPA Methods 8270 and 3540. Aliquots of the samples are extracted at a neutral pH with methylene chloride. The extracts are concentrated and analyzed by GC/MS using the same approach as the volatile organics.

Metals analyses were performed using the 6000 Series (ICP) and 7000 Series (atomic absorption) methods. Cyanide was analyzed using EPA Method 9010.

If after reviewing these results you have any questions, please feel free to call. NET Midwest has been pleased to provide these analytical services for you.

Sincerely,

NET Midwest, Inc.


William H. Mottashed
Division Manager

WHM/dab
Encls.



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ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
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Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96563

Sample Description: MW-1; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

Cyanide, Total	0.002	mg/L
pH	6.96	units
Phenol	<0.002	mg/L
Arsenic	0.001	mg/L
Cadmium	<0.005	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Nickel	0.05	mg/L
Zinc	0.016	mg/L

William H. Mottashed
Division Manager



NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96563

Sample Description: MW-1; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

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DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96563

Sample Description: MW-1; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	<1.0	ug/L

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12-29-89

Sample No.: 96563

Sample Description: MW-1; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<10.	ug/L
Acenaphthylene	<10.	ug/L
Anthracene	<10.	ug/L
Benzidine	<50.	ug/L
Benzo(a)anthracene	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Benzyl butyl phthalate	<10.	ug/L
Bis(2-chloroethyl) ether	<10.	ug/L
Bis(2-chloroethoxy) methane	<10.	ug/L
Bis(2-ethylhexyl) phthalate	<10.	ug/L
Bis(2chloroisopropyl) ether	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Chrysene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Diethyl phthalate	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96563

Sample Description: MW-1; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

Fluoranthene	<10.	ug/L
Fluorene	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
Hexachloroethane	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Isophorone	<10.	ug/L
Naphthalene	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
N-Nitrosodiphenylamine	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Phenanthrene	<10.	ug/L
Pyrene	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96564

Sample Description: MW-2; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

Cyanide, Total	<0.001	mg/L
pH	7.25	units
Phenol	<0.002	mg/L
Arsenic	0.003	mg/L
Cadmium	<0.005	mg/L
Chromium, Total	0.022	mg/L
Copper	0.06	mg/L
Lead	0.06	mg/L
Nickel	0.05	mg/L
Zinc	0.275	mg/L

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12-29-89

Sample No.: 96564

Sample Description: MW-2; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

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1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96564

Sample Description: MW-2; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	<1.0	ug/L


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Sample No.: 96564

Sample Description: MW-2; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<10.	ug/L
Acenaphthylene	<10.	ug/L
Anthracene	<10.	ug/L
Benزيدine	<50.	ug/L
Benzo(a)anthracene	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Benzyl butyl phthalate	<10.	ug/L
Bis(2-chloroethyl) ether	<10.	ug/L
Bis(2-chloroethoxy) methane	<10.	ug/L
Bis(2-ethylhexyl) phthalate	<10.	ug/L
Bis(2chloroisopropyl) ether	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Chrysene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Diethyl phthalate	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96564

Sample Description: MW-2; East Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 0830

Date Received: 12-04-89 1000

Fluoranthene	<10.	ug/L
Fluorene	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
Hexachloroethane	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Isophorone	<10.	ug/L
Naphthalene	<10.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
N-Nitrosodiphenylamine	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Phenanthrene	<10.	ug/L
Pyrene	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L

William H. Mottashed
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Bartlett, IL 60103

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96565

Sample Description: MW-3; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1130

Date Received: 12-04-89 1000

Cyanide, Total	0.493	mg/L
pH	8.57	units
Phenol	0.109	mg/L
Arsenic	0.002	mg/L
Cadmium	<0.005	mg/L
Chromium, Total	0.033	mg/L
Copper	0.05	mg/L
Lead	0.10	mg/L
Nickel	0.11	mg/L
Zinc	0.711	mg/L

William H. Mottashed
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Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96565

Sample Description: MW-3; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1130

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	6310.	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	2410.	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	234.	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

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ANALYTICAL REPORT

Mr. Chris Haas
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1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96565

Sample Description: MW-3; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1130

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	1840.	ug/L

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12-29-89

Sample No.: 96565

Sample Description: MW-3; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1130

Date Received: 12-04-89 1000

BASE/NEUTRAL COMPOUNDS

Acenaphthene	83.	ug/L
Acenaphthylene	52.	ug/L
Anthracene	97.	ug/L
Benzidine	<50.	ug/L
Benzo(a)anthracene	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Benzyl butyl phthalate	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Chrysene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Diethyl phthalate	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

William H. Mottashed
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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96565

Sample Description: MW-3; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1130

Date Received: 12-04-89 1000

Fluoranthene	<10.	ug/L
Fluorene	37.	ug/L
Hexachlorobenzene	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
Hexachloroethane	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Isophorone	<10.	ug/L
Naphthalene	5200.	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
N-Nitrosodiphenylamine	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Phenanthrene	45.	ug/L
Pyrene	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L

William H. Mottashed
Division Manager



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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96566

Sample Description: MW-4; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1055

Date Received: 12-04-89 1000

Cyanide, Total	0.005	mg/L
pH	7.66	units
Phenol	<0.002	mg/L
Arsenic	<0.001	mg/L
Cadmium	<0.005	mg/L
Chromium, Total	<0.005	mg/L
Copper	<0.01	mg/L
Lead	<0.04	mg/L
Nickel	<0.01	mg/L
Zinc	<0.005	mg/L

W. Mottashed
William H. Mottashed
Division Manager



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TESTING, INC.

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Bartlett Division
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Bartlett, IL 60103

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96566

Sample Description: MW-4; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1055

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	<1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	<1.0	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

William H. Mottashed
Division Manager



NATIONAL
ENVIRONMENTAL
TESTING, INC.

NET Midwest, Inc.
Bartlett Division
850 West Bartlett Road
Bartlett, IL 60103

Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96566

Sample Description: MW-4; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1055

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	<1.0	ug/L

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96566

Sample Description: MW-4; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1055

Date Received: 12-04-89 1000

BASE/NEUTRAL COMPOUNDS

Acenaphthene	<10.	ug/L
Acenaphthylene	<10.	ug/L
Anthracene	<10.	ug/L
Benzidine	<50.	ug/L
Benzo(a)anthracene	<10.	ug/L
Benzo(b)fluoranthene	<10.	ug/L
Benzo(k)fluoranthene	<10.	ug/L
Benzo(a)pyrene	<10.	ug/L
Benzo(ghi)perylene	<10.	ug/L
Benzyl butyl phthalate	<10.	ug/L
Bis(2-chloroethyl)ether	<10.	ug/L
Bis(2-chloroethoxy)methane	<10.	ug/L
Bis(2-ethylhexyl)phthalate	<10.	ug/L
Bis(2chloroisopropyl)ether	<10.	ug/L
4-Bromophenyl phenyl ether	<10.	ug/L
2-Chloronaphthalene	<10.	ug/L
4-Chlorophenylphenyl ether	<10.	ug/L
Chrysene	<10.	ug/L
Dibenzo(a,h)anthracene	<10.	ug/L
Di-n-butylphthalate	<10.	ug/L
1,2-Dichlorobenzene	<10.	ug/L
1,3-Dichlorobenzene	<10.	ug/L
1,4-Dichlorobenzene	<10.	ug/L
3,3'-Dichlorobenzidine	<20.	ug/L
Diethyl phthalate	<10.	ug/L
Dimethyl phthalate	<10.	ug/L
2,4-Dinitrotoluene	<10.	ug/L
2,6-Dinitrotoluene	<10.	ug/L
Di-n-octylphthalate	<10.	ug/L

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96566

Sample Description: MW-4; West Side Of Site
Peoples Natural Gas, CB; IA

Date Taken: 12-02-89 1055

Date Received: 12-04-89 1000

Fluoranthene	<10.	ug/L
Fluorene	<10.	ug/L
Hexachlorobenzene	<10.	ug/L
Hexachlorobutadiene	<10.	ug/L
Hexachlorocyclopentadiene	<10.	ug/L
Hexachloroethane	<10.	ug/L
Indeno(1,2,3-cd)pyrene	<10.	ug/L
Isophorone	<10.	ug/L
Naphthalene	22.1	ug/L
Nitrobenzene	<10.	ug/L
N-Nitrosodimethylamine	<10.	ug/L
N-Nitrosodiphenylamine	<10.	ug/L
N-Nitrosodi-n-propylamine	<10.	ug/L
Phenanthrene	<10.	ug/L
Pyrene	<10.	ug/L
1,2,4-Trichlorobenzene	<10.	ug/L

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96567

Sample Description: Field Blank
Peoples Natural Gas, CB; Ia

Date Taken: 12-02-89 1000

Date Received: 12-04-89 1000

VOLATILE COMPOUNDS

Acrolein	<10.	ug/L
Acrylonitrile	<10.	ug/L
Benzene	1.0	ug/L
Bromodichloromethane	<1.0	ug/L
Bromoform	<1.0	ug/L
Bromomethane	<10.	ug/L
Carbon tetrachloride	<1.0	ug/L
Chlorobenzene	<1.0	ug/L
Chloroethane	<10.	ug/L
2-Chloroethylvinyl ether	<1.0	ug/L
Chloroform	<1.0	ug/L
Chloromethane	<10.	ug/L
Dibromochloromethane	<1.0	ug/L
1,2-Dichlorobenzene	<1.0	ug/L
1,3-Dichlorobenzene	<1.0	ug/L
1,4-Dichlorobenzene	<1.0	ug/L
1,1-Dichloroethane	<1.0	ug/L
1,2-Dichloroethane	<1.0	ug/L
1,1-Dichloroethene	<1.0	ug/L
cis-1,2-Dichloroethene	<1.0	ug/L
trans-1,2-Dichloroethene	<1.0	ug/L
1,2-Dichloropropane	<1.0	ug/L
cis-1,3-Dichloropropene	<1.0	ug/L
trans-1,3-Dichloropropene	<1.0	ug/L
Ethyl benzene	<1.0	ug/L
Methylene chloride	<5.0	ug/L
1,1,2,2-Tetrachloroethane	<1.0	ug/L
Tetrachloroethene	<1.0	ug/L
Toluene	1.5	ug/L
1,1,1-Trichloroethane	<1.0	ug/L

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ANALYTICAL REPORT

Mr. Chris Haas
DAMES AND MOORE
1900 Silverlake Road
New Brighton MN 55112

12-29-89

Sample No.: 96567

Sample Description: Field Blank
Peoples Natural Gas, CB; Ia

Date Taken: 12-02-89 1000

Date Received: 12-04-89 1000

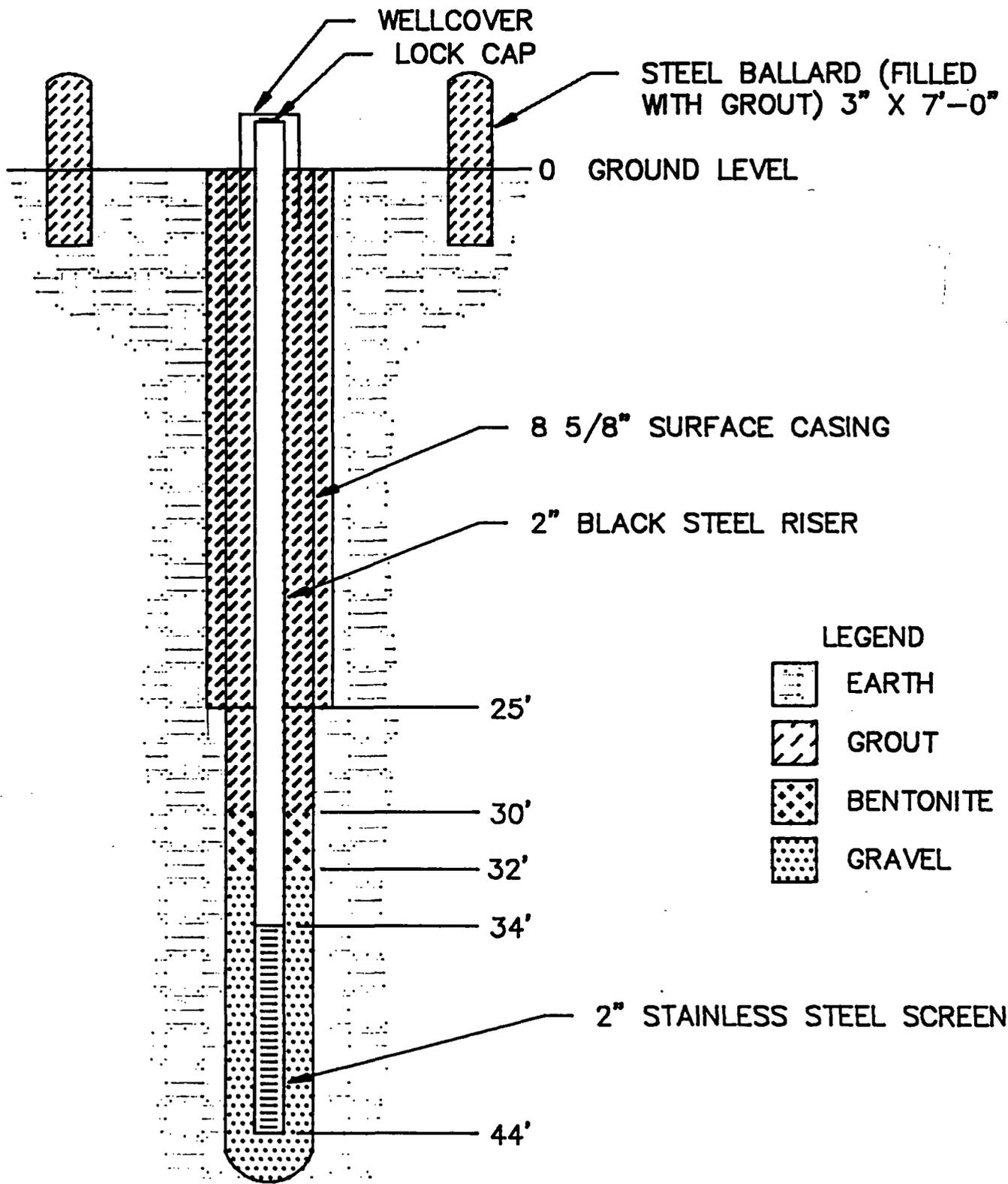
VOLATILE COMPOUNDS

1,1,2-Trichloroethane	<1.0	ug/L
Trichloroethene	<1.0	ug/L
Trichlorofluoromethane	<1.0	ug/L
Vinyl chloride	<10.	ug/L
Xylenes, Total	<1.0	ug/L

William H. Mottashed
Division Manager

APPENDIX 'B'

APPENDIX 'C'



LEGEND

-  EARTH
-  GROUT
-  BENTONITE
-  GRAVEL

WELL CONSTRUCTION
FOR MONITOR WELL #2

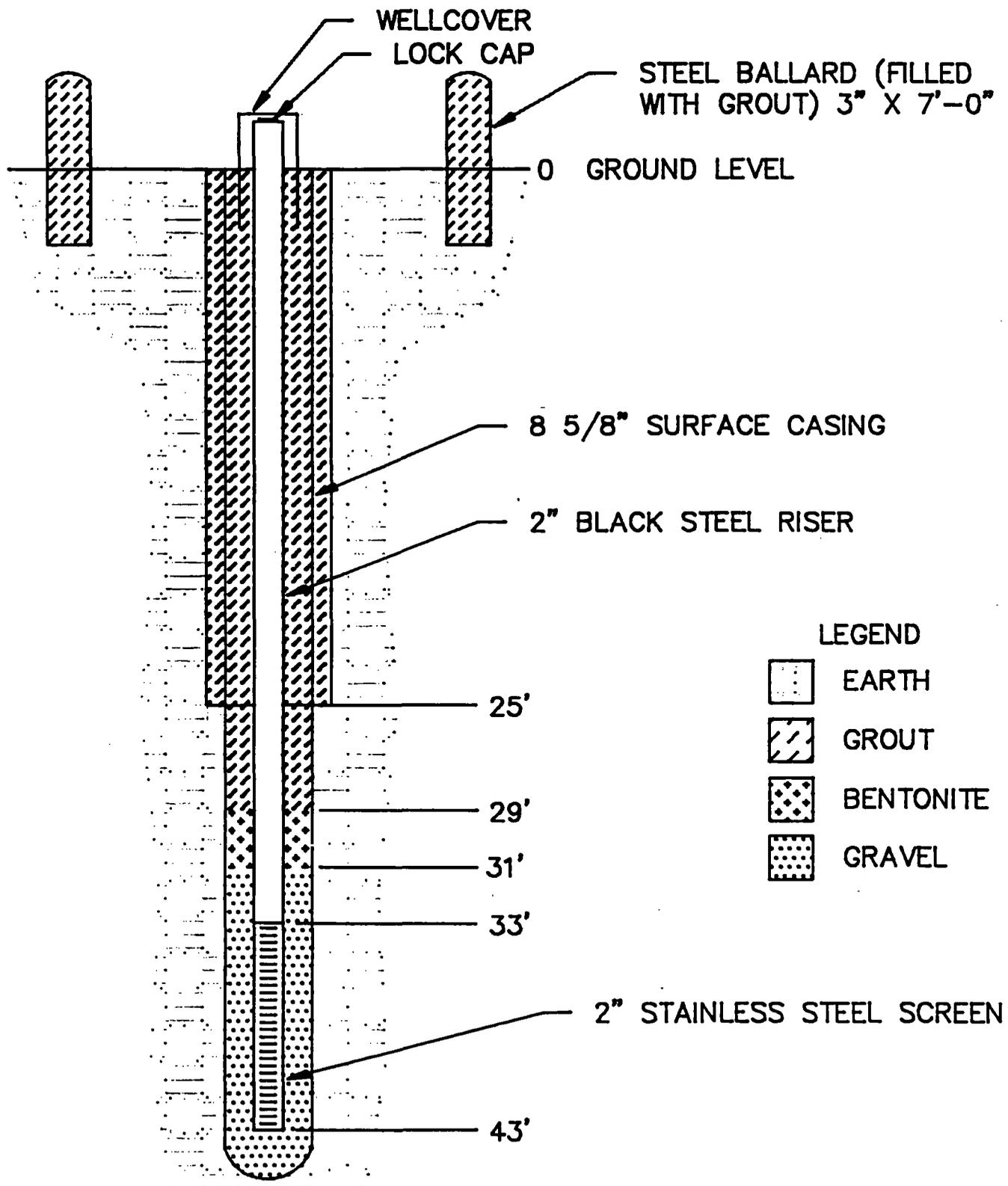


GEOTECHNICAL
SERVICES INC.

PROJECT

PEOPLES NATURAL GAS
COUNCIL BLUFFS, IA.

JOB NO.	JZG017	DRAWN	HRS
DATE	12-14-89	APPROVED	
REVISION		DWG. NO.	JZG017
SCALE	NOTED	SHEET	1 OF 2

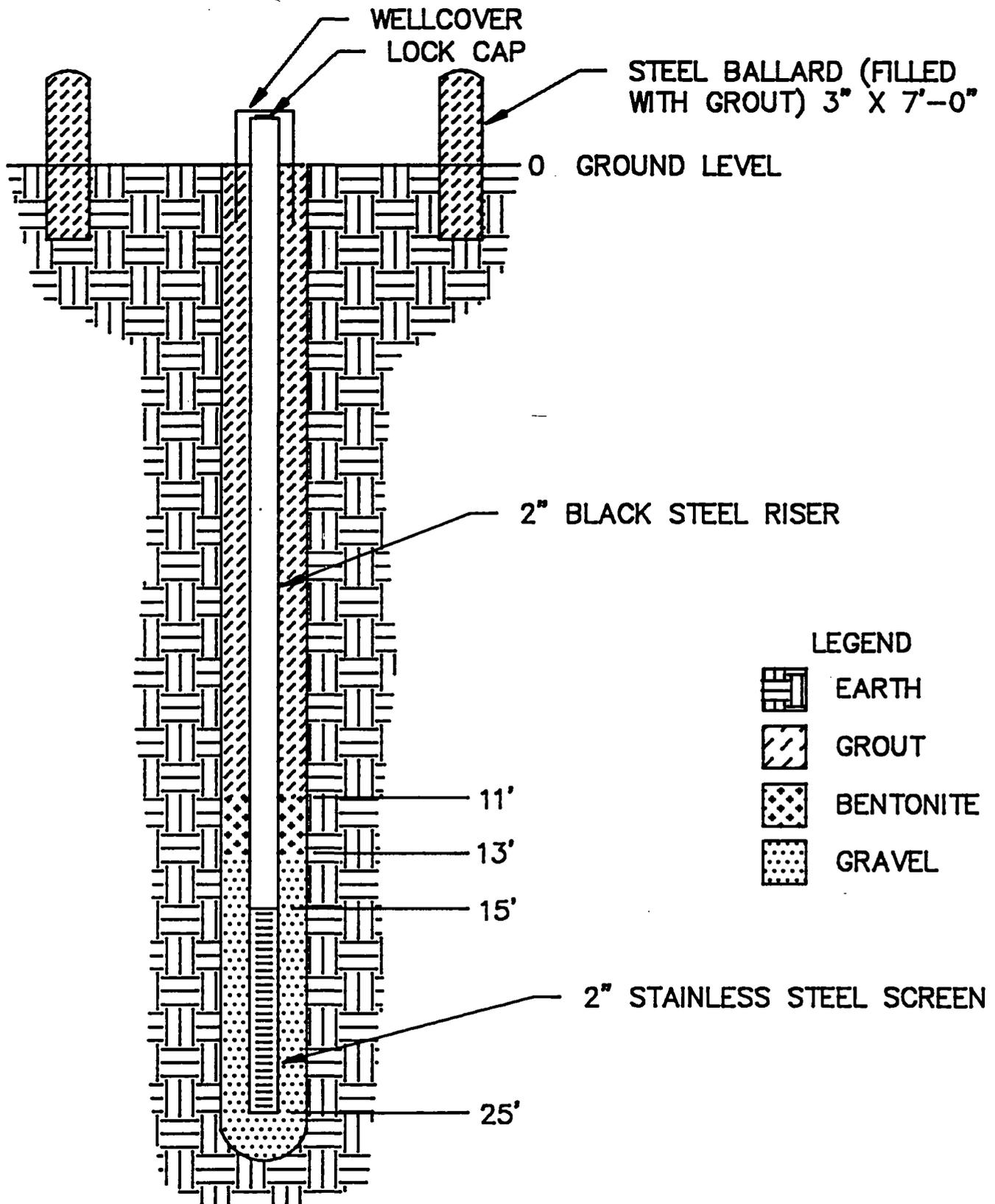


LEGEND

-  EARTH
-  GROUT
-  BENTONITE
-  GRAVEL

WELL CONSTRUCTION
FOR MONITOR WELL #3 & 4

 GEOTECHNICAL SERVICES INC.	PROJECT	PEOPLES NATURAL GAS COUNCIL BLUFFS, IA.	JOB NO. JZG017	DRAWN HRS
			DATE 12-14-89	APPROVED
			REVISION	DWG. NO. JZG017
			SCALE: NOTED	SHEET 2 OF 2



WELL CONSTRUCTION
FOR MONITOR WELL #1

 GEOTECHNICAL SERVICES INC.	PROJECT	JOB NO. JZG017	DRAWN HRS
	PEOPLES NATURAL GAS COUNCIL BLUFFS, IA.	DATE 1-11-90	APPROVED
		REVISION	DWG. NO. JZG017A
		SCALE: NONE	SHEET 1 OF 2

APPENDIX 'D'

PID FIELD DATA SHEET

Project Number: _____ Date: 11/13/89
 Location: _____ Auger Steam Cleaned? Y N
 Weather Conditions: Sunny, Windy Split-Spoon cleaned between
 Calibration: yes samples? Y N
 Boring ID: St-2 Method _____

Depth of Sample	Auger Cuttings (ppm)	Split Spoon (ppm)	Head Space Analysis (ppm)	Notes
2.5	0	0	0.8	
5	0	2	4.6	
7.5	0	0	7.5	Ferro cyanide odor
10	0	0	9.2	
12.5	0	0	27.1	
15	n/a	16.8	20.5	Naphalene smell
17.5	n/a	5.2	84	Strong odor
20	n/a	7	97	Stong odor
22.5		5.3	92	Strong odor

Project Number: _____ Date: _____
 Location: _____ Auger Steam Cleaned? Y N
 Weather Conditions: _____ Split-Spoon cleaned between
 Calibration: _____ samples? Y N
 Boring ID: _____ Method: _____

Depth of Sample	Auger Cuttings (ppm)	Split Spoon (ppm)	Head Space Analysis (ppm)	Notes
25		12	82	Strong Odor
27.5	n/a	11	47.2	Odor not Strong
30	4	1.5	40	Sp Sand-fine
35	-	.5	25	Sp Sand-fine
40	-	2.5	37	Sp Sand-fine

PID FIELD DATA SHEET

Project Number: _____ Date: 11/14 /89
 Location: Iowa Auger Steam Cleaned? Y N
 Weather Conditions: Sunny Split-Spoon cleaned between
 Calibration: Yes samples? Y N
 Boring ID: St-5 Method: _____

Depth of Sample	Auger Cuttings (ppm)	Split Spoon (ppm)	Head Space Analysis (ppm)	Notes
<u>2.5</u>	<u>58.6</u>	<u>4.2</u>	<u>84.9</u>	<u>Oil odor</u>
<u>5</u>	<u>19.6</u>	<u>n/a</u>	<u>31.5</u>	<u>Strong odor</u>
<u>7.5</u>	<u>46</u>	<u>n/a</u>	<u>346</u>	<u>Strong odor</u>
<u>10</u>	<u>73</u>	<u>n/a</u>	<u>130</u>	<u>Strong odor</u>
<u>12.5</u>	<u>25</u>	<u>n/a</u>	<u>57</u>	<u>Strong odor</u>
<u>15</u>	<u>n/a</u>	<u>n/a</u>	<u>134</u>	<u>Strong odor</u>
<u>20</u>	<u>n/a</u>	<u>n/a</u>	<u>110</u>	<u>Strong odor</u>
<u>25</u>	<u>n/a</u>	<u>n/a</u>	<u>265</u>	<u>Strong odor</u>
<u>30</u>	<u>n/a</u>	<u>n/a</u>	<u>1900</u>	<u>Strong odor</u>

Project Number: _____ Date: _____
 Location: _____ Auger Steam Cleaned? Y N
 Weather Conditions: _____ Split-Spoon cleaned between
 Calibration: _____ samples? Y N
 Boring ID: _____ Method: _____

Depth of Sample	Auger Cuttings (ppm)	Split Spoon (ppm)	Head Space Analysis (ppm)	Notes
<u>35</u>	<u>n/a</u>	<u>n/a</u>	<u>503</u>	<u>Lt. staining</u>
<u>40</u>	<u>n/a</u>	<u>78</u>	<u>1283</u>	<u>Lt. staining</u>
<u>45</u>	<u>n/a</u>	<u>203</u>	<u>1043</u>	<u>Lt. staining</u>
<u>50</u>	<u>n/a</u>	<u>91</u>	<u>648</u>	<u>Lt. staining</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

PID
~~Field~~ Field Data Sheet

MW-2

St-10

Project Number: _____ Date: 11/27/89
 Location: _____ Auger Steam Cleaned? N
 Weather Conditions: Over cast / windy Split-Spoon Cleaned between
 Calibration: yes samples? N
 Boring ID: St-10 Method: HSA

Depth of Sample	Auger Cuttings (ppm)	Split-Spoon (ppm)	Head Space Analysis (ppm)	Notes
5	0	1.2	0	0-4 Sand + Rubble 4-5 ft clay
10	0	0	0	Clay
15	0	0	15	Clay sh. odor
20	-	2.9	2.9	Sand 18"
25	-	-	-	-
Installed Bin casing to 25 ft grouted in place				

Location: St-11 MW-3 Date: 11/28/89
 Weather Conditions: _____ Auger Steam Cleaned? Y N
 Calibration: _____ Split-Spoon Cleaned between
 Boring I.D.: _____ samples? Y N
 Method: _____

Depth of Sample	Auger Cuttings (ppm)	Split-Spoon (ppm)	Head Space Analysis (ppm)	Notes
5	0	0	5	Rubble w/ clay sh. odor
10	-	16	70	F.P. ~ 7 ft strong odor
15	-	-	99	Red clay stained black sm sh.
20	-	-	137	Fast clay strong
25	-	-	557	-
Installed Bin casing				

PIL
~~Field~~ Field Data Sheet

Project Number: _____
 Location: _____
 Weather Conditions: Sunny, Cool
 Calibration: Yes
 Boring ID: ST-12

Date: 11/28/89
 Auger Steam Cleaned? Y N
 Split-Spoon Cleaned between samples? Y N
 Method: HSA

Depth of Sample	Auger Cuttings (ppm)	Split-Spoon (ppm)	Head Space Analysis (ppm)	Notes
5	-	5	7.5	1-3 clay deposits 2-5 fine clay
10	-	2	14.2	clay nod strong odor
15	-	-	31	"
20	-	-	38	"
25	-	-	5	sand N.B.

Location: 12/1/89
 Weather Conditions: Sunny
 Calibration: _____
 Boring I.D.: ST-13

Date: _____
 Auger Steam Cleaned? Y N
 Split-Spoon Cleaned between samples? Y N
 Method: _____

Depth of Sample	Auger Cuttings (ppm)	Split-Spoon (ppm)	Head Space Analysis (ppm)	Notes
2 1/2	0	1	33	Fill
5	-	7.2	87	Grey siltstone bedding
7 1/2	-	27	68	F.P. siltstone
10	22	-	90	Grey F.P. strong odor
12 1/2	-	330	460	Grey F.P. "
15	-	714	714 907	Grey F.P. "
20	-	500	637	clay "
25	-	18	137	clay strong smell
30	-	22	94	sand at 30'

APPENDIX 'E'

GROUND WATER FIELD SAMPLING FORM

Site/Facility Name: _____
 Name of well: MW-1
 Unique well #: _____
 Address: _____

Date: 12/2/89
 Weather: Cold, windy
 Sampler name: C-H
 & affiliation: D+M
 Other Personnel: _____

Location (T,S,R): T _____ S _____ R _____
 Owner name: Peoples

X Condition of well- locked? yes no
 damage? yes no If yes explain: _____

X Diameter: 2 inches
 Depth to water: 17.17 ft., measuring from _____ using m-scope (#1 or #2)
tape & chalk
 other: _____

Total depth: 23 ft.; info from: ~~sounding~~ previous records

Volume of water in casing: 21 gallons
 Dedicated pump? yes no If no, purge method: bailer pump
 Time purge start: 8:15
 Pump rate: _____ gallons/minute (or method used to measure purge: Bailer)
 Time stop: _____
 Total # gallons evacuated: 3 gallons
 Total # well volumes evacuated: 3 volumes
 Purge water retained? yes (no) If yes, containment method: _____

Stabilization Tests (field measurements):

	Trials	Time	pH	Temperature	Conductivity
16a	1	8:15	7.08	55.2	1257
26a	2	8:22	7.09	48.2	1195
36	3	8:28	7.09	47.1	1340
	4				
	5				
	6				

Tolerance Limits:
 pH=+/-0.26
 T=+/-0.5 degrees C
 C=+/-50 ug/cm

Purge, stabilization, etc. performed by: C H

Time sampled: 8:30 am
 Sample method: pump bailer
 Parameters sampled for: _____
 Filtered? yes no If yes, parameters: _____
 Notes about sample (color, turbidity, etc.): 5151 10-2-89

Chain of Custody done? yes no If yes, c of c form #: _____
 Splits done? yes no If yes, parameters: _____
 Affiliation of splitee: _____

Duplicates? yes no If yes, parameters: _____

GROUND WATER FIELD SAMPLING FORM

Site/Facility Name: _____
 Name of well: NW-2
 Unique well #: _____
 Address: _____

Date: ___/___/___
 Weather: _____
 Sampler name: _____
 & affiliation: _____
 Other Personnel: _____

Location (T,S,R): T ___ S ___ R ___
 Owner name: _____

Condition of well- locked? yes no
 damage? yes no If yes explain: _____

Diameter: _____ inches
 Depth to water: 20.65 ft., measuring from _____ using m-scope (#1 or #2)
tape & chalk
 other: _____

Total depth: _____ ft.; ~~info from~~ sounding previous records

Volume of water in casing: 4 gallons
 Dedicated pump? yes no If no, purge method: bailer pump
 Time purge start: _____
 Pump rate: _____ gallons/minute (or method used to measure purge: _____)
 Time stop: _____
 Total # gallons evacuated: _____ gallons
 Total # well volumes evacuated: _____ volumes
 Purge water retained? yes no If yes, containment method: _____

Stabilization Tests (field measurements):

	Trials	Time	pH	Temperature	Conductivity
<u>4 gals</u>	1	<u>7:00</u>	<u>7.14</u>	<u>52.5</u>	<u>1807</u>
<u>8 gals</u>	2	<u>9:10</u>	<u>7.14</u>	<u>48.5</u>	<u>1683</u>
<u>12 gals</u>	3	<u>9:20</u>	<u>7.13</u>	<u>48.4</u>	<u>1652</u>
	4				
	5				
	6				

Tolerance Limits:
 pH=+/-0.26
 T=+/-0.5 degrees C
 C=+/-50 ug/cm

Purge, stabilization, etc. performed by: _____

Time sampled: 9:30
 Sample method: pump bailer
 Parameters sampled for: _____
 Filtered? yes no If yes, parameters: _____
 Notes about sample (color, turbidity, etc.): _____

Chain of Custody done? yes no If yes, c of c form #: _____
 Splits done? yes no If yes, parameters: _____
 Affiliation of splitee: _____

Duplicates? yes no If yes, parameters: _____

GROUND WATER FIELD SAMPLING FORM

Site/Facility Name: _____
 Name of well: MW-3
 Unique well #: _____
 Address: _____

Date: ___/___/___
 Weather: _____
 Sampler name: _____
 & affiliation: _____
 Other Personnel: _____

Location (T,S,R): T ___ S ___ R ___
 Owner name: _____

X Condition of well- locked? yes no
 X damage? yes no If yes explain: _____

Diameter: _____ inches
 Depth to water: 18.56 ft., measuring from _____ using m-scope (#1 or #2)
 tape & chalk
 other: _____

Total depth: _____ ft.; ~~info from~~-sounding previous records

Volume of water in casing: _____ gallons
 Dedicated pump? yes no If no, purge method: bailer pump
 Time purge start: _____
 Pump rate: _____ gallons/minute (or method used to measure purge: _____)
 Time stop: _____
 Total # gallons evacuated: _____ gallons
 Total # well volumes evacuated: _____ volumes
 Purge water retained? yes no If yes, containment method: _____

Stabilization Tests (field measurements):

Trial	Time	pH	Temperature	Conductivity
1	11:00	8.8	66.2	920
2	11:10	8.19	52.1	803
3	11:20			
4				
5				
6				

Tolerance Limits:
 pH=+/-0.26
 T=+/-0.5 degrees C
 C=+/-50 ug/cm

Purge, stabilization, etc. performed by: _____

Time sampled: 11:30
 Sample method: pump bailer
 Parameters sampled for: _____
 Filtered? yes no If yes, parameters: _____
 Notes about sample (color, turbidity, etc.): _____

Chain of Custody done? yes no If yes, c of c form #: _____
 Splits done? yes no If yes, parameters: _____
 Affiliation of splitee: _____

Duplicates? yes no If yes, parameters: _____

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-1	See Plan	96.91	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL LOG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88		
				DRILLING METHOD	TOTAL DEPTH		
18.0'				4 1/2" hollow stem augers	30.0'		
DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
			Dark Brown	Damp	CL	6" gravel, silty clay, occasional gravel, fill, stiff.	
	D-1						
5			Brown			Silty clay, stiff, iron and carbon stains, occasional gravel.	5
	D-2						
		1/12					
10		1.5/2	Grayish Brown		CL with fine sand	Very stiff, silty clay with sand, iron and carbon stains, occasional gravel.	10
	D-3						
		0/1.9					
15		3.3/2.5				Blocky streaks, occasional calcite, iron & carbon concretions, very stiff, silty clay with some fine sand, no odor.	15
	D-5						
		11.5/4.8					
20				Saturated		Little more silt, slight odor.	20
	D-6						
		11/3.5					
25			Tan-Brown		SP with silt	Silty clay, fine sand, iron and carbon stains, occasional gravel.	25
	D-8				CL	Stiff, silty clay, iron and carbon stains, occasional fine sand, no odor.	
		8/3					
		0/0					
30	D-9				SP	Fine sand, poorly sorted, occasional carbon stains, no odor.	30
		0/0					
35						Bottom of Hole @ 30.0' Note: Alluvial setting.	35



Geotechnical Services Inc.

Project		PEOPLES NATURAL GAS	
Location		Council Bluffs, Iowa	
Job No.	3ZG017	Date	11-13-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-2	See Plan	96.41	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88		
17.5'				DRILLING METHOD	TOTAL DEPTH		
				4½" hollow stem augers	41.5'		
DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
	U-1	0/8	Dark Brown	Damp	CL	Coarse gravel 1', dark brown fill 1', stiff, silty clay, iron and carbon stains, occasional gravel, no odor.	
5	U-2	2/4.6					5
	U-3	0/7.5					
10	U-4	0/9.2	Gray Green				10
	U-5	0/27.1					
15	U-6	16.8/30.5					15
	U-7	5.2/84		Saturated			
20	U-8	7/97					20
	U-9	5.3/92					
25	U-10	12/82					25
	U-11	11/47.2					
30	D-1	1.5/40			SP	Fine sand, iron and carbon stains, poorly sorted, slight odor.	30
35	D-2	.5/25					35

	Project PEOPLES NATURAL GAS	
	Location Council Bluffs, Iowa	
	Job No. 3ZG017	Date 11-13-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-2	See Plan	96.41	100	RE	MAL		
DEP. Ft.	SAMPLE NO. & TYPE	HNu READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
40	D-3	2.5/37	Gray Green	Saturated	SP	Fine sand, iron and carbon stains, poorly sorted, slight odor.	40
45						Bottom of Hole @ 41.5'.	45
50							50
55							55
60							60
65							65
70							70
75							75



**Geotechnical
Services Inc.**

Project		PEOPLES NATURAL GAS	
Location		Council Bluffs, Iowa	
Job No.	Date	32G017	11-13-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-3	See Plan	96.41'	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88		
15.0'				4 1/2" hollow stem augers	32.5'		
DEP. FT.	SAMPLE NO. & TYPE	HNu READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. FT.
			Dark Brown	Damp	CL	Coarse gravel 8", dark brown organic fill 1 1/2', silty clay, stiff, iron and carbon stains, no odor, occasional gravel, pin holes.	
	U-1	0/27.5					
5		0/0	Grayish Brown			Stiff, silty clay, blocky streaks, pinholes iron and carbon stains, no odor.	5
	U-2	0/0					
	U-3	0/0					
10		0/0				Little more fine sand @ 10.5', organics at 12.0'.	10
	U-4	0/0					
	U-5	0/0					
15		0/0		Saturated	SP w/clay	Fine sand with silt and clay.	15
	U-6	0/0					
	U-7	0/23	Brown		CL	Fat clay with little silt, iron and carbon stains, very stiff.	
20		0/0					20
	U-8	0/0					
	U-9	0/0				More fine sand.	
25		0/0					25
	U-10	0/0					
	U-11	0/0					
30		0/0			SP	Fine sand, poorly sorted, some silt, iron and carbon stains.	30
		0/0					
35						Bottom of Hole @ 32.5'	35



Geotechnical Services Inc.

Project		PEOPLES NATURAL GAS	
Location		Council Bluffs, Iowa	
Job No.	3ZG017	Date	11-14-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
ST-4	See Plan	96.76	100	RE	MAL

WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88
				DRILLING METHOD	TOTAL DEPTH
15.5'				4½" hollow stem augers	25.0'

DEP. Ft.	SAMPLE NO. & TYPE	H _N READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
			Dark Brown	Damp	CL	8" road gravel, 1' dark brown fill, organics, silty clay, stiff, iron and carbon stains.	
	U-1	0/0					
5						Very stiff, silty clay, iron and carbon stains, occasional gravel, occasional calcite concretions, occasional organics, no odor.	5
	U-2	0/0					
			Grayish Brown				
	U-3	0/0					
10							10
	U-4	0/0					
		.2/0					
	U-5						
15							15
	U-6	.5/0		Saturated	SP		Fine sand with some silt.
		0/0			CL	Fat clay, blocky streaks, little silt, occasional organics, occasional calcite concretions.	
	U-7						
20							20
	U-8	0/0					
		0/0			SP with some silt	Fine sand, poorly sorted, little silt.	
25							25
		0/0					
		0/0				Bottom of Hole @ 25.0'.	
30							30
35							35

	Project PEOPLES NATURAL GAS	
	Location Council Bluffs, Iowa	
	Job No. 3ZG017	Date 11-14-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-5	See Plan	95.05	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Asphalt	GEO - 88		
5.0'				4½" hollow stem augers	50.0'		
DEP. Ft.	SAMPLE NO. & TYPE	HNu READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
		4.2/84.9	Black	Damp	CL	4" asphalt, junk fill, silty, sandy, gravel, clay with wood and brick etc.	
5		-/31.5		Saturated		Free product in sample D-2	5
		-/346			SP	Fine - medium sand and tar (free product).	
10		-/130					10
		-/57			SP with Clay	Silty clay, sand, fill, bricks, cobbles, etc. strong odor.	
15		-/134	Grayish Brown				15
		-/110			CL	Clay with some silt, occasional gravel, strong odor.	
20							20
		-/265			SP	Fine sand, little silt, poorly sorted.	
25							25
		-/1900					
30							30
		-/503					
35							35



Geotechnical Services Inc.

Project PEOPLES NATURAL GAS	
Location Council Bluffs, Iowa	
Job No. 3ZG017	Date 11-14-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-5	See Plan	95.05	100.0	RE	MAL		
DEP. Ft.	SAMPLE NO. & TYPE	HNu READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
40	D-14	78/1283	Grayish Brown	Saturated	SP	Fine sand, poorly sorted, little silt, strong odor	-
45	D-15						40
50	D-16						45
55	D-17						50
60						Bottom of Hole @ 50.0'	60
65							65
70							70
75							75



Geotechnical Services Inc.

Project PEOPLES NATURAL GAS	
Location Council Bluffs, Iowa	
Job No. 3ZG017	Date 11/14/89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-6	See Plan	95.45	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88		
30.0'				4½" hollow stem augers	31.5'		
DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
			Tan-Brown	Damp	CL	8" fill gravel, 1' dark brown silty clay fill, bricks, gravel, clinkers etc.	
	U-1	1/12	Gray Brown				
5		2.5/4				Fill, strong odor, discolored.	5
	U-2						
		-14.7					
	U-3		Bluish Gray			Stiff, silty clay, occasional organics, occasional fine sand, blocky streaks, tar in sample.	10
10		86/90					10
	D-1						
		124/380					
	U-4						
15		-1575					15
	U-5		Grayish Brown w/Red Mottles			Very stiff, fat clay, product, occasional calcite concretions, iron and carbon stains, strong odor.	
		13/114					
	U-6		No Mottles				
20		9/210					20
	U-7						
		9/69.5					
	U-8						
25		5/57.5					25
	U-9					Little more fine sand @ 26.0'.	
		6/87.1					
	U-10						
30		0/49.2					30
	U-11			Saturated	SP	Fine sand, poorly sorted, little silt, contamination.	
35						Bottom of Hole @ 31.5'	35



Geotechnical Services Inc.

Project PEOPLES NATURAL GAS	
Location Council Bluffs, Iowa	
Job No. 3ZG017	Date 11-15-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-8	See Plan	95.10	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88		
				DRILLING METHOD	TOTAL DEPTH		
12.0'				4½" hollow stem augers	31.5'		
DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
	D-1	-/-	Dark Brown	Damp	CL	8" coarse gravel, 1' black fill, bricks wood etc. 2-4' concrete.	
5	D-2	-/50	Black			Slag, silty clay, product, sand and gravel, fill, stiff.	5
	D-3	-/280			CL	Stiff, silty clay, occasional gravel, fine sand, occasional organics, gross contamination.	
10	D-4	-/97					10
	D-5	-/141.7		Saturated			
15	D-6	-/604			SP	Fine sand, poorly sorted, dense, some silt, occasional gravel.	15
	D-7	-/142			CL	Very stiff, silty clay, iron and carbon stains, strong odor, gross contamination.	
20	D-8	-/91.7					20
	D-9	/79					
25	D-10	/68.8			SP	Fine sand, little silt, dense, slight contamination.	25
30							30
35						Bottom of Hole @ 31.5'	35



Geotechnical Services Inc.

Project		PEOPLES NATURAL GAS	
Location		Council Bluffs, Iowa	
Job No.	3ZG017	Date	11-16-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-9	See Plan	96.61	100	RE	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88		
16.5'				4 1/2" hollow stem augers	31.5'		
DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
			Dark Brown	Damp	CL	8" gravel, 1'dark silty clay fill, fill-gravel, bricks, wood etc. Stiff, silty clay, iron and carbon stains, slight odor, occasional gravel, occasional organics. Very stiff.	
	D-1	-/0	Brown		SP		
5		-/0			CL		5
	D-2	-/0					
	D-3	-/0	Gray				
10		-/0					10
	D-4	-/0					
	D-5	-/3.1					
15		-/2.5					15
	D-6	-/0					
	D-7	-/0		Saturated	SP with clay	Fine sand, poorly sorted, some silty clay, iron and carbon stains. Silty clay with some fine sand, very stiff.	
20		-/0					20
	D-8	-/0					
		-/-					
25							25
	D-9						
30							30
	D-10						
35						Bottom of Hole @ 31.5' Bottom of Well @ 23.0'	35



Geotechnical Services Inc.

Project	PEOPLES NATURAL GAS
Location	Council Bluffs, Iowa
Job No.	3ZG017
Date	11-17-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-10	See Plan	96.61	100	JA	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL FIG.		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	Mobile B-57		
18.0'				6½" hollow stem augers	26.5'		
DEP. Ft.	SAMPLE NO. & TYPE	H _N READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
5		1.2/0	Brown-Greenish Brown	Damp	CL	8" gravel, 1' fine fill sand, silty clay fill, iron and carbon stains, occasional gravel, no odor, occasional fine sand, occasional organics.	5
	U-1		Dark Brown-Gray			Very stiff, less sand @ 6.0'.	
10		0/0					10
	U-2						
15		0/15	Bluish-Brown with Black Mottles			Very stiff, silty clay, blocky streaks, iron and carbon stains, slight odor, occasional fine sand.	15
	U-3						
20		3.9/2.9		Saturated	SP	Fine-medium sand with some silt and clay, iron and carbon stains, slight odor.	20
	U-4				CL	Very stiff, silty clay, iron and carbon stains, occasional fine sand.	
25							25
	U-5						
30						Bottom of Hole @ 26.5'	30
35							35



Geotechnical Services Inc.

Project		PEOPLES NATURAL GAS	
Location		Council Bluffs, Iowa	
Job No.	Date	3ZG017	11-27-89

Also MW-3

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-11	See Plan	95.05	100	JA	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	Mobile B-57		
8.0'				DRILLING METHOD	TOTAL DEPTH		
				6 1/2" hollow stem augers	26.5'		
DEP. Ft.	SAMPLE NO. & TYPE	H _{Nu} READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
5	U-1	0/5	Dark Brown	Damp	CL	8" gravel, sandy, gravelly, silty clay, bricks, glass, wood etc., fill.	5
10	U-2	16/70	Dark Gray	Saturated	CL	Very stiff, silty clay, iron and carbon stains, free product, occasional gravel and sand.	10
15	U-3	-/99					15
20	U-4	-/137		Saturated	SP	Fine-medium sand with silt and clay, iron and carbon stains.	20
25	U-5	-/557			CL	Very stiff, silty clay, gross contamination occasional gravel and fine sand.	25
30							30
35						Bottom of Hole @ 26.5'	35



Geotechnical Services Inc.

Project PEOPLES NATURAL GAS	
Location Council Bluffs, Iowa	
Job No. 3ZG017	Date 11-28-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-12	See Plan	95.35	100	JA	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL LOG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	Mobile B-57		
18.0'				DRILLING METHOD	TOTAL DEPTH		
				6½" hollow stem augers	25.0'		
DEP. Ft.	SAMPLE NO. & TYPE	H _{Nu} READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
5	U-1	5/7.5	Dark Brown	Damp	CL	8" road gravel, sand, silty, gravel, clay, brick, glass, wood, etc (fill).	5
10	U-2	2/14.2	Bluish Gray		CL	Very stiff, silty clay, iron and carbon stains, occasional sand and gravel, occasional organics.	10
15	U-3	-/31					15
20	U-4	-/38			SP	Fine-medium sand.	20
25	U-5	-/5			CL	Very stiff, silty clay, iron and carbon stains, occasional organics, shell fragments, free product.	25
30							30
35						Bottom of Hole @ 25.0'	35



Geotechnical Services Inc.

Project		PEOPLES NATURAL GAS	
Location		Council Bluffs, Iowa	
Job No.	Date	3ZG017	11-28-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER		
ST-13	See Plan	95.05	100	MO	MAL		
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG		
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	Mobile B-57		
28.0'				DRILLING METHOD	TOTAL DEPTH		
				4 1/2" hollow stem augers	31.5'		
DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
	U-1	1/3.3	Gray with Red Mottles	Damp	CL	8" gravel, silty, sandy, gravelly, clay fill iron and carbon stains, cinders, etc.	
5	U-2	7.2/87	Dark Gray			Contamination, odor, slight sheen on sample.	5
	U-3	27/68			CL	Stiff, silty clay, occasional sand and gravel, strong odor, occasional organics.	10
10	U-4	-/90					
	U-5	330/460			SP with clay	Fine sand with silty clay, strong odor, carbon stains, sheen on sample.	15
15	U-6	714/907					15
	U-7	500/632	Brown with gray mottles		CL	Very stiff, silty clay, iron and carbon stains, occasional fine sand, occasional organics, blocky streaks, pin holes.	20
25	U-8	18/137					25
	U-9	22/194		Saturated	SP	Fine-medium sand, slight odor, iron and carbon stains.	30
30							
35						Bottom of Hole @ 31.5'	35



Geotechnical Services Inc.

Project PEOPLES NATURAL GAS	
Location Council Bluffs, Iowa	
Job No. 3ZG017	Date 12-1-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
B-7	See Plan	95.05	100	RE	MAL
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILLING
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO - 88
7.0'				DRILLING METHOD	
				6" continuous flight augers	
				TOTAL DEPTH	
				25.0'	

DEP. Ft.	SAMPLE NO. & TYPE	HNu READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
5			Dark Brown	Saturated	CL	8" gravel, silty clay fill, gravel, bricks etc.	5
10			Black	Saturated		Slag, clay, gravel, strong odor, free product.	10
15					CL	Very stiff, fat silty clay, strong odor, occasional gravel, calcite concretions.	15
20			Gray with Brown Mottles				20
25							25
30						Bottom of Hole @ 25.0'	30
35							35

	Project PEOPLES NATURAL GAS
	Location Council Bluffs, Iowa
	Job No. 3ZG017 Date 11-16-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
ST-14	See Plan	96.26	100	MO	MAL

WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL RIG
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	Mobile B-57
7.0'				4 1/2" hollow stem augers	31.5'

DEP. Ft.	SAMPLE NO. & TYPE	HNU READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
5	U-1		Dark Brown	Damp	CL	8" gravel, silty, sandy gravelly clay (fill) cinders, bricks, etc.	5
10				Saturated			10
15	U-2				CL	Stiff, silty clay, iron and carbon stains, gross contamination.	15
20	U-3				SP w/CL	Fine sand with silt and clay.	20
25	U-4				CL		25
30	U-5						30
35	U-6				SP	Fine-medium sand, with occasional silt and clay with gravel.	35
						Bottom of Hole @ 31.5'	

	Project	PEOPLES NATURAL GAS
	Location	Council Bluffs, Iowa
	Job No.	3ZG017
	Date	12-1-89

BORING LOG

DRILL HOLE NO.	LOCATION OF DRILL HOLE	ELEVATION	DATUM	DRILLER	LOGGER
MW-1	See Plan			R. Epply	M. Lohnes
WATER LEVEL OBSERVATIONS				TYPE OF SURFACE	DRILL FIG
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	HOURS	Gravel	GEO 88
16.5'				DRILLING METHOD	
				6 1/2" hollow stem augers	
				TOTAL DEPTH	
				24.0'	

DEP. Ft.	SAMPLE NO. & TYPE	HN _u READING	COLOR	MOIST	BASIC SOIL TYPE	GEOLOGIC DESCRIPTION & OTHER REMARKS	DEP. Ft.
			Dark Brown	Dmap	CL	8" gravel, 1' sandy silty clay fill, gravel, bricks, wood, etc.	
					SP		
	D-1	4	Brown		CL	Stiff, silty clay, iron and carbon stains, slight odor, occasional gravel, occasional organics Very stiff @ 7.0'	5
	D-2	2					
	U-1		Gray				
	U-2						
	U-3						
	U-4						
	U-5			Saturated	SP		
	U-6				CL w/SP		Fine sand, poorly sorted, some silt and clay, iron and carbon stains — — — — Silty clay with some fine sand, very stiff
						Bottom of Hole @ 24.0'	25
							30
							35



Geotechnical Services Inc.

Project	Peoples Natural Gas		
Location	Council Bluffs, Iowa		
Job No.	3ZG017	Date	11/17/89