ORIGINAL (Red)

Christiana Metals Corporation
BISHOP TUBE FACILITY
Frazer, Pennsylvania

Results of Implementation of Groundwater Remediation Work Plan Phase I

Submitted To:
The Pennsylvania Department of Environmental Resources

January 1990

BCM
Engineers, Planners, Scientists
and Laboratory Services

REPORT

ORIGINAL (Red)

RESULTS OF IMPLEMENTATION OF GROUNDWATER REMEDIATION WORK PLAN PHASE I

FOR

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

JANUARY 1990

BCM PROJECT NO. 00-6471-01

PREPARED BY

(b) (4) [redacted]

GCR:

GEOLOGIST

(b) (4) [redacted]

SENIOR GEOLOGIST

(b) (4) [redacted]

VICE PRESIDENT

4598y

BCM

Engineers, Planners, Scientists and Laboratory Services
One Plymouth Meeting • Plymouth Meeting, PA 19462 • Phone: (215) 825-3800

BCM

ORIGINAL (Red)

CONTENTS

EXECUTIVE SUMMARY v

1.0 INTRODUCTION 1

1.1 Background 1
1.2 Objectives 2

2.0 GEOLOGIC SETTING 4

2.1 Geology/Hydrogeology 4
2.2 Soils 5

3.0 METHODS OF INVESTIGATION 6

3.1 Test Borings and Soil Sampling 6
3.2 Monitoring Well Installation 7
3.3 Groundwater Sampling 8

4.0 RESULTS OF INVESTIGATION 10

4.1 Soil Sample Analytical Results 10
4.2 Groundwater Sample Analytical Results 11

4.2.1 August 29 and 30, 1989, Sample Analytical Results 11
4.2.2 September 28, 1989, Sample Analytical Results 12

4.3 Hydrogeologic Analysis 12

5.0 DISCUSSION OF RESULTS 14

5.1 Soil Sampling Results 14
5.2 Groundwater Sampling Results 14
5.3 Hydrogeology 16

6.0 CONCLUSIONS 17

7.0 RECOMMENDATIONS 18

8.0 REFERENCES 19

BCM

ORIGINAL (Red)

CONTENTS (Continued)

APPENDICES

Appendix A Test Boring Logs and Well Drilling Logs
Appendix B Health and Safety Plan
Appendix C Field Data Sheets
Appendix D Chain of Custody Documentation
Appendix E Laboratory Analytical Data Sheets
Appendix F BCM Interoffice Correspondence documenting soil sample analytical procedures for samples obtained from Borings B-5 and B-6

TABLES

Table 1 Summary of OVA Soil Sample Head Space Analyses

Table 2 Summary of Soil Boring and Stream Bed Elevations

Table 3 Summary of Monitoring Well Elevation Survey

Table 4 Summary of August 1989 Soil Sample Analytical Results

Table 5 Summary of Soil QA/QC Sample Analytical Results

Table 6 Summary of August 29 and 30, 1989 Groundwater Sample Analytical Results

Table 7 Summary of August 29 and 30, 1989 Groundwater QA/QC Sample Analytical Results

Table 8 Summary of September 1989 Groundwater Sample Analytical Results

Table 9 Summary of September 28, 1989 Groundwater QA/QC Sample Analytical Results

Table 10 Summary of Monitoring Well Construction Details and Monitored Aquifer

Table 11 Summary of Groundwater Elevations

Table 12 Vertical Flow Gradient Computations

BCM

CONTENTS (Continued)

FIGURES

Figure 1 Site Location Map

Figure 2 Site Plan

Figure 3 Schematic Unconsolidated Aquifer Monitoring Well Construction Diagram

Figure 4 Schematic Rock Aquifer Monitoring Well Construction Diagram

Figure 5 Shallow Groundwater Elevation Contour Map - August 29 and 30, 1989

Figure 6 Shallow Groundwater Elevation Contour Map - September 28, 1989

Figure 7 Isopleth Map of Total VOCs in Groundwater - August 29 and 30, 1989

Figure 8 Isopleth Map of Total VOCs in Groundwater - September 28, 1989

BCM

EXECUTIVE SUMMARY

BCM Engineers Inc. (BCM) implemented Phase I: Additional Investigations of the June 1989 Groundwater Remediation Work Plan from July through September 1989 for the Christiana Metals Corporation (Christiana) at its Bishop Tube Facility in Frazer, Pennsylvania. The investigation included the completion of eight soil borings, analysis of soil samples, installation of seven monitoring wells, and sampling of the monitoring wells for the presence of volatile organic compounds (VOCs). The results of the investigation determined the presence of VOCs in every groundwater monitoring well sample collected except the upgradient well sample. Each well contained one or more VOCs in concentrations exceeding the primary drinking water maximum contaminant levels (MCLs) established by the U.S. Environmental Protection Agency (EPA). The VOC contaminant plume in groundwater extends to the northeast from the apparent source areas where an aboveground solvent storage tank and a degreaser tank are located. Soil sample analytical results indicated the presence of VOCs in soil apparently caused by upward migration of volatilized VOCs from the contaminated groundwater into the soils.

BCM recommends that additional investigation be implemented to determine the downgradient (offsite) and vertical extent of the plume in the aquifer and to determine proposed groundwater cleanup levels. BCM also recommends proceeding with Phase II: Aquifer Testing to expedite remediation of the highest levels of VOC-contamination detected in onsite groundwater.

BCM

1.0 INTRODUCTION

This report presents the results of implementation of Phase I: Additional Investigations of the June 1989 Groundwater Remediation Work Plan for the delineation of volatile organic compound (VOC) contamination in soil and groundwater at Christiana Metals Corporation's Bishop Tube Facility in Frazer, Pennsylvania. The report describes monitoring well installation and soil boring activities, describes sampling activities, discusses the results of the investigation, and provides conclusions and recommendations for additional activities.

1.1 BACKGROUND

In 1981, BCM performed an investigation of the impact of closed waste impoundments on surface water and groundwater at the Bishop Tube plant site in Frazer, Pennsylvania (BCM, 1981) (Figure 1). With the approval of the Pennsylvania Department of Environmental Resources (PADER), four shallow monitoring wells were installed at that time. The results of the study were presented in a 1981 BCM report which documented groundwater fluoride levels (maximum concentration 23.1 milligrams per liter (mg/l) in excess of the drinking water standard of 2.0 mg/l in one well.

In 1987, elevated concentrations of fluoride were detected in shallow groundwater collected at a sump within the plant. Due to an inadvertent connection between the sump and the plant's NPDES-permitted non-contact cooling water discharge, the discharge exceeded the permitted average monthly limit of 10.0 mg/l for fluoride. Bishop Tube has been pumping the sump water to storage for offsite hauling and treatment.

In cooperation with PADER, the July 1987 Work Plan (BCM, 1987) was developed to install additional monitoring wells, collect soil samples in the vicinity of the abandoned waste impoundments, and collect and analyze water samples from the monitoring wells and the adjacent stream. The purpose of the investigation was to update the 1981 study and extend the effort to include other possible groundwater contaminants, such as the degreasing agents used at the plant. PADER's approval of the Work Plan was obtained prior to commencing the project.

In May 1988, BCM presented a report entitled Groundwater Quality Investigation to Bishop Tube (BCM, 1988). The work described in the May 1988 report was conducted in accordance with BCM's PADER-approved, July 1987 Work Plan. The investigation included installing and sampling 5 groundwater monitoring wells, MW-5, MW-6, MW-7, MW-8, and MW-9, at the locations shown in Figure 2, to complement the four existing wells at the site. Five soil borings were drilled and samples were retained for laboratory analysis, and five stream samples were collected and analyzed. The soil boring locations and the stream sampling locations are also shown on Figure 2.

The May 1988 report concluded that Bishop Tube was the apparent source of trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) contamination in groundwater. Data evaluation revealed areas with some metals contamination. The metals contamination in soils appears to be associated with plant operations at the former infiltration basins on the plant site.

Christiana Metals Corporation (Christiana), the former parent company of Bishop Tube, authorized BCM to continue with the next phase of this project by preparing a work plan to delineate the extent of TCE and TCA-bearing groundwater and to develop mitigation measures. The draft Work Plan was prepared by BCM and submitted to PADER during a meeting between representatives of PADER, BCM, and Christiana on July 26, 1988. During this meeting, PADER requested that Bishop Tube conduct quarterly monitoring in the vicinity of the east end of the plant where the cooling water discharges to the stream. This monitoring was requested to document levels of fluoride in groundwater which were anticipated to decrease with time as a result of improvements made in the company's pickle liquor handling practices, the presumed source of the fluoride.

Prior to submission of a Revised Work Plan addressing the PADER requests concerning quarterly monitoring, BCM conducted a soil vapor survey (SVS) in October 1988 along the north side of the facility as proposed in the July 1988 Draft Work Plan. The results of the SVS indicated the presence of low levels of soil contamination (TCE, PCE, and trans-1-2- dichloroethene) within areas of limited lateral extent adjacent to the aboveground Solvent Storage tank, loading area, and concrete storage pad.

BCM's revised Draft Groundwater Remediation Work Plan, dated May 31, 1989, was submitted to Christiana for review and comment. The final Groundwater Remediation Work Plan (Work Plan) was submitted to PADER in June 1989 (BCM, 1989). The final Work Plan, proposed the installation of seven additional groundwater monitoring wells (five shallow wells and two deep wells) numbered MW-10 through MW-16. Also proposed were five soil borings along the north side of the facility in areas identified during the SVS as containing low levels of VOC contamination. During implementation of the Work Plan, three additional soil borings were added to the work scope and were drilled adjacent to the degreaser tank located inside the plant. All soil borings and well locations are shown on Figure 2. The Work Plan also proposed the quarterly groundwater monitoring to be conducted at the east end of the plant and in the vicinity of the NPDES-permitted cooling water discharge.

1.2 OBJECTIVES

The primary objective of this study was to characterize VOC contamination in groundwater and provide recommendations for additional investigations and/or remedial activities. Specific objectives of the study were as follows:

BCM

- Determination of potential source area(s) of VOC contamination in the groundwater
- Document shallow and bedrock aquifer water qualities
- Document groundwater flow directions
- Document soil quality in potential source areas
- Implement a quarterly groundwater monitoring program at the east end of the plant and in the NPDES-permitted cooling water discharge area and present the results of the first quarterly sampling results.

BCM

2.0 GEOLOGIC SETTING

2.1 GEOLOGY/HYDROGEOLOGY

The Bishop Tube site is located close to the northern base of South Valley Hills. There are two formations in the area, the Wissahickon Formation, a muscovite schist with minor quartz and feldspar and the Conestoga Formation, a crystalline limestone. The Pennsylvania Geological Survey (BERG, 1981) identifies the contact between the Wissahickon and Conestoga Formations to be on the south side of the plant.

The Wissahickon Formation is a medium-to-coarse-grained, banded rock, which is characterized by large amounts of mica and considerable amounts of feldspar. The primary porosity of the rock itself is relatively low. However, abundant secondary porosity structures (joints) within the rock provide openings for the storage and circulation of water. Generally, the size and frequency of joint structures decrease with depth, which in turn, reduce the water-yielding capacity of the formation. The planes of schistosity within the Wissahickon Formation may contain water, but they are generally subcapillary in size and do not yield it freely.

Competent rock belonging to the Wissahickon Formation was encountered in MW-1 on the south side of the plant. A thin and highly weathered zone of the Wissahickon Formation is present beneath most of the northern portion of the site immediately overlying the Conestoga Formation. The Wissahickon Formation encountered on the north side of the plant appears to be colluvium which has migrated downslope from the Wissahickon Formation outcrop on the south side of the plant. The colluvium is thickest on the eastern side of the plant in the vicinity of the stream.

The Conestoga Formation, a dolomitic and shaley limestone, is part of the limestone group that supplies the largest springs in southeastern Pennsylvania. The Conestoga Formation has low primary porosity and, therefore, groundwater migration is mainly through secondary porosity which results from the development of dissolution channels and fractures in the rock. Wells drilled in this rock have yields ranging from less than one gallon per minute (gpm) to 300 gpm (HALL, 1973), depending on the number and size of solution channels or fractures intersected by the well.

The monitoring wells and borings installed at the site indicate that approximately 10 to 20 feet of overburden is present throughout much of the site. Bishop Tube personnel reported that the southwest corner of the lower portion of the plant is set into the limestone and blasting of the rock was required to construct the plant foundation in this area.

The fill and underlying weathered schist are thickest at the northeast corner of the plant in the vicinity of MW-9. The varying amount of overburden soil and fill is probably due to the site's location on a moderately steep slope and the necessity for cut and fill grading during construction of the plant.

A zone of weathered rock, commonly called saprolite exists on top of bedrock throughout much of the area. The saprolite has a lower permeability than the overlying material as evidenced by the presence of perched water at the overburden/saprolite interface. The yields of shallow monitoring wells completed in the perched water zone are typically 0.5 to 1 gpm while wells completed in fractured bedrock below the saprolite generally yield more than 15 gpm.

2.2 SOILS

Soils in the vicinity of the Bishop Tube site are categorized as belonging to the Manor Loam and Conestoga Silt Loam soil units (SCS, 1963).

The Manor Loam is a very fine sandy loam soil and is characteristically found above the Wissahickon Formation. The Manor Loam is a well-drained soil that is moderately permeable and has a moderately low moisture capacity. The Manor Loam is easily eroded from slopes, which explains why it is mainly found on level to gently sloping areas.

The Conestoga Silt Loam covers most of the area immediately north of the plant. This soil unit consists of a well-drained silt loam surface soil and a fine, sandy, clay subsoil. It is moderate in available moisture capacity and has a moderately rapid permeability.

BCM

3.0 METHODS OF INVESTIGATION

3.1 TEST BORINGS AND SOIL SAMPLING

Eight soil test borings were drilled at Bishop Tube from August 1 through 18, 1989. Five of the soil borings were installed along the north side of the plant, and three of the borings were installed within the plant in the vicinity of the finished product degreaser tank (Figure 2).

Soil borings along the north side of the plant were drilled with 4.25-inch inside diameter (ID), hollow stem augers. Soil test borings installed inside the plant were installed with 3.25-inch ID hollow stem augers. During test boring drilling, soil samples were collected with 2-inch outside diameter (OD), high carbon steel, split barrel (split-spoon) samplers. A lithologic description of the soil contained in each splitbarrel was recorded by a geologist. Test boring logs providing soil classification, depth to water, boring dimensions, drilling equipment, backfilling methods, and other data are provided in Appendix A.

Representative samples from each split-barrel were placed in glass jars and sealed for the purpose of conducting head space analysis measurements of the relative concentration of VOCs in each sample jar air space. This test provided qualitative information on the relative levels of VOCs in the sampled soil. Following a 10- to 15-minute waiting period to allow any VOCs present in the soil to volatilize into the headspace between the soil sample and the jar lid, each jar was opened and an organic vapor detector (OVA) flame ionization detector probe was inserted into the sample jar head space to remove and analyze a sample of the accumulated vapor. The results of the head space analyses were recorded in the field logbook and are summarized in Table 1.

Selected split-barrel soil samples from each test boring were collected for laboratory analyses. Soil samples were removed from the split-barrel by the onsite geologist using a properly decontaminated stainless steel hand trowel and placed in laboratory cleaned and properly labelled sample jars. All field duplicate samples were composited in properly decontaminated stainless steel mixing bowls. Aliquots of soil for VOC analyses were not composited. Aliquots of soil for VOC analyses were removed from the split-barrel and placed in the proper sample container immediately upon opening the split-barrel soil sampler. All soil samples and field quality assurance/quality control (QA/QC) samples were collected, handled, stored, and transported as specified in the PADER- approved QA/QC Plan and Reporting Deliverables (QA/QC Plan) document contained in Appendix B of the June 1989 Groundwater Remediation Work Plan.

All sampling equipment was decontaminated as specified in the QA/QC Plan. All samples were placed in a chilled environment and transported by the sampler to the BCM Laboratory in Norristown, Pennsylvania.

All onsite work was conducted in accordance with BCM's site-specific Health and Safety Plan, contained in Appendix B.

All soil borings were advanced to the surface of bedrock or auger refusal, whichever was encountered first. Upon encountering one of these conditions, the augers were removed from the borehole and, if the boring was not to be used as a monitoring well location, a 90 percent neat cement/10 percent powdered bentonite grout was pressure tremied from the bottom of the borehole to ground surface. All soil cuttings were then placed in sealed 55-gallon drums for subsequent disposal.

Ground surface elevations and horizontal locations of all boring locations were surveyed by a Pennsylvania-licensed surveyor, and are presented in Table 2. In addition, the vertical elevations of the three stream sampling locations sampled as part of earlier investigation activities were also surveyed and are also presented in Table 2.

3.2 MONITORING WELL INSTALLATION

Seven groundwater monitoring wells were installed on or in the vicinity of the Bishop Tube site from August 2 through 8, 1989. A total of 16 groundwater monitoring wells are now incorporated into the groundwater monitoring well network associated with the hydrogeological investigation being conducted at the Bishop Tube site. Of the seven new monitoring wells installed as part of this investigation, four were installed to monitor the shallow unconsolidated aquifer present in the weathered shist and soil and three were installed to monitor the deeper limestone rock aquifer. Four of the monitoring wells were incorporated into two well clusters, located across the Consolidated Railroad (Conrail) railroad tracks to the north of the site. Each of the well clusters consists of one deep well completed in the Conestoga aquifer and one shallow monitoring well completed immediately above the contact between the overlying unconsolidated soil aquifer and the underlying limestone rock aquifer.

Each of the deep rock aquifer monitoring wells was constructed inside an 6-inch boring drilled using air percussion drilling techniques. The shallow monitoring wells were installed inside 6.25-inch borings drilled with hollow stem augers. Well drilling logs for each monitoring well are presented in Appendix A. Schematic as-built monitoring well diagrams are presented in Figures 3 and 4 for the shallow and deep monitoring wells, respectively.

Generally, each monitoring well was constructed with approximately 10 feet of 4-inch ID, threaded flush joint, 20-slot (0.020 inch), Schedule 40 PVC screen, and 4-inch ID, threaded flush joint, Schedule 40 PVC casing (riser). After inserting the screen and casing, a sand pack of No. 1 Jessie Morie silica sand was installed in the annular space from the bottom of the borehole to approximately two feet above the screen. An approximately 2-foot thick bentonite pellet seal was installed immediately above the sand pack. The bentonite seal was moistened with water if it was above the static water level and allowed to sit undisturbed for approximately 10 minutes to allow the bentonite to expand and seal the borehole.

Following installation of the bentonite seal, a grout consisting of 90-percent neat cement/10-percent bentonite was pressure grouted via a tremie from the top of the bentonite seal to the ground surface. A locking, protective steel casing was installed from approximately 3 feet below ground surface to approximately 2 feet above ground surface, and concrete collars were installed around each protective casing. At selected wells, vehicle access requirements necessitated installation of flush-mounted protective steel casings with locking caps.

The rock monitoring wells MW-13 and MW-15 were constructed using a double casing technique. A 10-inch diameter borehole was drilled through overburden and into competent rock. A 6-inch ID steel casing was installed in the borehole and the annulus around the casing was tremie grouted with a cement/bentonite. A 6-inch diameter borehole was drilled through the steel casing to the desired well completion depth in rock.

Following the installation of all the monitoring wells, each well was developed for approximately 1 hour with either a centrifugal or submersible pump. Well development water was placed in sealed 55-gallon drums for subsequent disposal by Christiana. All downhole well development equipment was properly decontaminated prior to its insertion into each well.

All soil and rock cuttings generated during the drilling of each well were placed in sealed 55-gallon drums for subsequent disposal by Christiana.

All monitoring wells were surveyed by a Pennsylvania-licensed surveyor. The horizontal location of each well was surveyed to the nearest 0.01 foot and the elevations of ground surfaces, inner PVC casings, and outer steel casings, were surveyed to the nearest 0.01 foot above mean sea level. Table 3 presents a summary of the monitoring well elevations.

BCM

3.3 GROUNDWATER SAMPLING

As specified in the Work Plan, all new groundwater monitoring wells (MW-10 through MW-16) and groundwater monitoring wells MW-2 and MW-3 were sampled twice. In addition, previously existing groundwater monitoring wells MW-1 and MW-4 through MW-9 were sampled once during the first round of groundwater sampling to initiate the PADER-required quarterly groundwater monitoring program in the pickle liquor handling area. The first round of groundwater sampling was conducted on August 29 and 30, 1989. The second round of groundwater sampling was conducted on September 28, 1989.

Prior to collecting groundwater samples, total well depth and depths to the top of the water columns were measured and recorded, and the volume of water in each well was calculated and recorded. All wells, except MW-13 and MW-15, were purged of a minimum of approximately three well volumes prior to groundwater sampling with either a peristaltic pump or PVC bailer. Approximately two well volumes of groundwater were purged from wells MW-13 and MW-15 prior to sample collection.

During the pumping of each well, the pH, specific conductance, and temperature of the groundwater were measured. Field data sheets are provided in Appendix C. All purge water was placed in sealed 55-gallon drums for subsequent disposal by Christiana. All downhole purging equipment was decontaminated in accordance with the QA/QC Plan contained in Appendix B of the Work Plan.

Groundwater sampling was conducted using laboratory cleaned, dedicated, 2-inch outside diameter (OD) Teflon bailers. Groundwater samples were collected, handled, stored, and transported in accordance with QA/QC protocols contained in Appendix B of the Work Plan. All Chain-of-Custody documentation is provided in Appendix D of this report. Quality Control samples, trip blanks, field blanks, and duplicates were collected and submitted for analyses according to the protocols outlined in the QA/QC document referenced above.

All groundwater samples collected during both rounds of groundwater sampling were submitted to the BCM Laboratory in Norristown, Pennsylvania, for analysis.

BCM

4.0 RESULTS OF INVESTIGATION

4.1 SOIL SAMPLE ANALYTICAL RESULTS

A total of 24 discrete soil samples were collected during the period from August 1 through 18, 1989. In addition, two duplicate soil samples, four field blank samples, and three trip blank samples were collected and submitted for laboratory analyses. All samples were analyzed for purgeable halocarbon volatile organic compounds (VOCs) by gas chromatography (GC). Laboratory analytical results for all compounds detected at or above their respective analytical method detection limits are summarized in Table 4. All quality control trip blank and field blank analytical results are summarized in Table 5. Laboratory analytical data sheets are contained in Appendix E.

VOCs detected in soil samples collected at Bishop Tube included the following:

- Bromodichloromethane
- Chloroform
- 1,1-Dichloroethane
- 1,2-Dichloroethane
- trans-1,2-Dichloroethene
- Tetrachloroethene (PCE)
- 1,1,1-Trichloroethane (TCA)
- Trichloroethene (TCE)

Methylene chloride, detected in many of the soil samples, was also detected in field blank and trip blank samples. Methylene chloride is a common laboratory contaminant and does not appear to be attributable to onsite soil conditions. Total VOC concentrations detected in the soil samples ranged from below the method detection limit in samples MW-10A (1.5) and MW-12 (1.5) to a high of greater than 85.5 milligrams per kilogram (mg/kg) in soil sample B-5 (3.5).

It should be noted that the VOC levels in the six samples from borings B-5 and B-6 were unable to be quantified by the laboratory and were reported at levels greater than the maximum instrument detection limit for each of the analyses. Reanalysis of the samples was attempted; however, the results of the reanalysis were anomalously low, suggesting that most of the VOC contaminants in the sample had volatilized out of the soil sample prior to the reanalysis. A description of the procedures utilized by the laboratory to analyze these samples is provided in a BCM interoffice correspondence contained in Appendix F.

BCM

4.2 GROUNDWATER SAMPLE ANALYTICAL RESULTS

The groundwater sampling program conducted at Bishop Tube consisted of two separate rounds of monitoring well sampling. The first round of groundwater sampling was conducted on August 29 and 30, 1989, and included collecting samples from monitoring wells MW-1 through MW-16. The second round of groundwater sampling was conducted on September 28, 1989, and included obtaining samples from monitoring wells MW-2 and MW-3 and MW-10 through MW-16.

All groundwater samples obtained in the first round in August were analyzed for pH and specific conductance. Groundwater samples collected from wells MW-1 through MW-9 were also analyzed for fluoride, nitrate, chromium, copper, and nickel to satisfy the quarterly groundwater monitoring requirements in the NPDES-permitted cooling water discharge area at the east end of the plant. All groundwater samples and QA/QC samples were analyzed for VOCs. Laboratory analytical results for all compounds detected at or above their respective analytical method detection limits are presented in the following tables: August 29 and 30 groundwater samples in Table 6, August 29 and 30 QA/QC samples in Table 7, September 28 groundwater samples in Table 8, and September 28 QA/QC samples in Table 9.

Where applicable, the Maximum Contaminant Levels (MCLs) established by the U.S. Environmental Protection Agency (EPA) for the respective contaminants in drinking water are listed on the tables. All laboratory analytical data sheets are presented in Appendix E.

4.2.1 August 29 and 30, 1989, Sample Analytical Results

VOCs detected in the groundwater samples collected on August 29 and 30 included the following:

- Chloroethane
- 1,1 Dichloroethane
- 1,2 Dichloroethane
- 1,1 Dichloroethene
- Methylene Chloride
- Tetrachloroethene (PCE)
- trans-1,2-Dichloroethene
- 1,1,1-Trichloroethane (TCA)
- Trichloroethene (TCE)
- Vinyl Chloride

Total VOC concentrations ranged from not detected above the method detection limit of 1 microgram per liter (ug/l) in background monitoring well MW-1 to a high of 202,607 ug/l in well MW-3. Each well in which VOC compounds were detected contained one or more VOC compounds at levels above the MCLs established for the respective VOC in drinking water. No VOCs were detected in the QA/QC blanks.

Fluoride concentrations ranged from less than 0.1 mg/l in MW-1 to a high of 14.1 mg/l in MW-4. Fluoride was above its MCL of 4.0 mg/l in monitoring wells MW-4, MW-5, MW-6, and MW-7.

Nitrate concentrations ranged from a low of 0.099 mg/l in MW-5 to a high of 7.13 mg/l in MW-4. Nitrate was not detected above its MCL of 10 mg/l in any of the wells.

The low (more acidic) pH of 5.83 standard units (S.U.) was detected in sample MW-7 and the high (more basic) pH of 7.34 S.U. was detected in sample MW-13. A secondary MCL has been established for pH and ranges from 6.5-8.5. pH was below (more acidic) the secondary MCL in monitoring wells MW-1, MW-4, and MW-7.

Specific conductance ranged from 95 micromhos (umhos) in MW-1 to 4,600 umhos in MW-5. No MCL has been established for specific conductance in drinking water.

Chromium levels ranged from below the method detection limit of 0.01 mg/l to 0.220 mg/l in sample MW-7. The MCL for chromium in drinking water is 0.05 mg/l and was exceeded in monitoring well MW-7.

Copper levels ranged from below the method detection limits of 0.02 mg/l to a high of 0.035 mg/l in sample MW-1. Copper has a secondary MCL of 1.0 mg/l which was not exceeded in any of the samples.

Nickel levels ranged from below the method detection limits of 0.04 mg/l to a high of 0.269 mg/l in MW-4. An MCL has not been established for nickel in drinking water.

4.2.2 September 28, 1989, Sample Analytical Results

The VOCs detected in the groundwater samples collected on September 28 were the same as those detected in the August 29 and 30 samples with the exceptions that 1,2-dichloroethane was not detected in the September samples, and chloroform, undetected in the August samples, was detected in the September analyses. Total VOC concentrations ranged from a low of 348 ug/l in sample MW-10A to a high of 684,890 ug/l in sample MW-3. Selected VOCs were detected in all the samples at levels above their respective MCLs. TCE and methylene chloride were detected in all field QA/QC samples.

4.3 HYDROGEOLOGIC ANALYSIS

The results of the groundwater investigation indicate that two aquifers are present at the site and have both been impacted by VOC contamination. The shallow aquifer occurs in the unconsolidated soil and saprolite unit and a deeper aquifer occurs in the Conestoga Limestone. A summary of the monitoring well construction details and the monitored aquifers is presented in Table 10.

Water table elevation measurements were obtained prior to each groundwater sampling event. A summary of the measured groundwater elevations is presented in Table 11. Groundwater flow in both aquifers is to the north-northeast and is shown in Figures 5 and 6. The lateral gradients are approximately 0.15 ft/ft in the area of the highest levels of groundwater contamination

The shallow and deep aquifers are evidenced by the difference in elevation of the water table observed at well clusters at the site. Wells monitoring shallow groundwater at each cluster generally have higher water table elevations than wells monitoring groundwater occurrence in the bedrock aquifer at each cluster. The elevation difference between the two aquifers indicates that the aquifers are not in equilibrium.

The vertical hydraulic gradients were determined at well cluster locations where wells exist that monitor the two different aquifers. An analysis of vertical gradients is summarized in Table 12. The results of this determination indicate that a downward vertical gradient exists at three of the four well cluster locations. Well cluster MW-15/MW-16 indicated an upward vertical gradient.

The upward vertical gradient at well cluster MW-15/MW-16 may be resulting from the void encountered in MW-15 during drilling. The void maybe connected to areas hydraulically upgradient of the well and the water levels being measured in the well may be representative of hydraulic conditions in the upgradient areas.

Well cluster MW-13/MW-14, located hydraulically downgradient of the site, and approximately 250 feet west of well cluster MW-15/MW-16, had a downward hydraulic gradient. The discrepancy between the vertical hydraulic gradients prevents a determination of groundwater gradients in the offsite area. This discrepancy also emphasizes the heterogeneities present in the fractured and solution channel-bearing limestone aquifer.

ORIGINAL (Red)

5.0 DISCUSSION OF RESULTS

The results of the soil and groundwater investigation indicate that elevated levels of VOCs are present in onsite soils and in onsite and offsite groundwater.

5.1 SOIL SAMPLING RESULTS

The soil sample analytical results indicate that VOC contamination is present in nearly all soils at the site. Generally, the detected levels of VOC contamination increased with increasing depth, suggesting that VOCs may have migrated upward into the soils after volatilizing from VOC contaminated groundwater.

The highest levels of VOCs detected in soils by headspace and laboratory analyses were in Borings B-5, B-6, B-10, B-11, and B-12. Borings B-5 and B-6 were drilled adjacent to the aboveground solvent storage tank. The locations of these soil borings were selected based on the results of the soil vapor survey (SVS) that was conducted in this area in October 1988. The soil sample analyses support the findings of the SVS which identified the tank as a potential source for the VOC contamination in soil and groundwater.

Borings B-10, B-11, and B-12 were drilled in the vicinity of the degreaser inside the building. Samples B-11 (6.5) and B-12 (4.5) contained the highest levels of total VOCs detected in soil in this study (3,367 and 157 mg/kg, respectively). These soil sample analytical results indicate that the degreaser tank is a likely source of VOC contamination in groundwater and soil at this site.

5.2 GROUNDWATER SAMPLING RESULTS

The groundwater sample analytical results indicate the presence of VOCs in groundwater in all wells except the background well (MW-1). Specific VOCs were detected in all wells at levels above their respective MCLs. The downgradient extent and the vertical extent of the contaminant plume have not been determined. The VOC contaminant plume appears to trend to the northeast and originates from the aboveground solvent storage tank and degreaser tank areas. The VOC contaminant plume is shown in Figures 7 and 8 for the August 29 and 30 and the September 28 sampling events, respectively.

The VOC plume appears to be oriented slightly to the east of the groundwater flow direction which is to the north northeast. The difference between groundwater flow direction and contaminant distribution may be the result of heterogeneities in the Conestoga

ORIGINAL (Red)

Limestone aquifer. The Conestoga Limestone aquifer has numerous dissolution channels and fractures which act as the primary conduits for groundwater flow in the aquifer. The orientation of these conduits in the rock strata will effect the groundwater and contaminant flow direction.

The most prevalent VOCs detected in groundwater were TCE and TCA and their degradation products. TCE was consistently the VOC detected at the highest levels in the well samples followed in concentration by TCA and trans-1,2-dichloroethene. TCE and TCA are both heavier than water and will tend to sink in the aquifer when released as product. Trans-1,2-dichloroethene is slightly lighter than water and will tend to float on water when released as product. TCE, TCA, and trans-1, 2-dichloroethene have relatively low solubilities ranging from approximately 0.1 percent (TCE) to 0.63 percent (trans-1,2-dichloroethene).

The highest levels of VOCs detected in groundwater in both aquifers in both sampling events were at the well cluster MW-2/MW-3 which is located adjacent to the aboveground solvent storage tank. Monitoring well MW-2 monitors the uppermost portion of the Conestoga Limestone aquifer and monitoring well MW-3 monitors the unconsolidated aquifer above it. The results of both sampling rounds indicated that the shallow aquifer contains significantly higher levels of VOCs than the deeper limestone aquifer. Three other well clusters are situated in the vicinity of the plant and are at greater distances from the potential source area. Sample analytical results from well clusters MW-15/MW-16 and MW-8/MW-9 determined that the deep wells monitoring the rock aquifer have higher levels of VOCs than the shallow wells monitoring the unconsolidated aquifer. These results are consistent with the concept that the contaminants have migrated into the deeper rock aquifer and impacted the downgradient well clusters MW-15/MW-16 and MW-8/MW-9.

The well cluster MW-13/MW-14 showed inconsistent results between the two sampling rounds. The deep well (MW-13) monitoring the rock aquifer contained higher levels of total VOCs than the shallow well (MW-14) monitoring the unconsolidated aquifer in the August sampling. Lower levels of total VOCs were detected in the deep well than in the shallow well in the September sampling. These results suggest that the samples may have been mislabeled. The VOC levels in these wells will be confirmed by samp- ling and analyses to be conducted in subsequent phases of the investi- gation.

The results of the quarterly monitoring of groundwater wells in the vicinity of the NPDES-permitted cooling water discharge area detected fluoride and chromium at levels above their respective MCLs in selected wells. Continued quarterly monitoring of these wells will determine if the levels of these contaminants will decrease with time as expected by the repair of the sump in the shop, the suspected source area for these contaminants in groundwater.

ORIGINAL (Red)

The secondary MCL for pH was exceeded in MW-1, MW-4, and MW-7. MW-1 is situated hydraulically upgradient of the site and monitors the rock aquifer. MW-1 contained the lowest pH measurement which indicates that groundwater in the Wissahickon Formation may be naturally more acidic than groundwater in the Conestoga Formation.

5.3 HYDROGEOLOGY

The information obtained from the hydrogeologic investigation indicates that contaminated groundwater is apparently migrating from the above-ground solvent storage tank and degreaser tank areas towards the north-east. The analysis of vertical hydraulic gradients indicates that a downward vertical hydraulic gradient exists in the vicinity of the source areas at the plant. This analysis concurs with the groundwater analytical results from the offsite well clusters which document the presence of higher levels of VOCs in the Conestoga Limestone aquifer than in the unconsolidated aquifer. This analysis further indicates that contamination appears to be entering the limestone aquifer in the vicinity of the source areas and is migrating to the northeast through the rock aquifer. Lower levels of VOC contamination exist in the shallow aquifer and are migrating offsite to the northeast.

The release of TCE or TCA solvent product into the aquifer may have resulted in the occurrence of a discrete body of solvent product in the aquifer. These solvents are more dense than water and have relatively low solubilities, which will cause the body of solvent to migrate downward in the aquifer as it solubilizes. The primary control over flow in the limestone aquifer is the occurrence of solution channels and fractures; therefore, the rate of migration of the solvent product (dense non-aqueous phase liquid or DNAPL) or the dissolved solvent in groundwater will be primarily controlled by the occurrence and interconnection of fractures and solution channels in the vicinity of the source areas. No estimates on the rate of migration of the contaminant plume can be developed without conducting aquifer testing.

BCM

6.0 CONCLUSIONS

The results of the Phase I investigation determined that VOCs are present in groundwater at levels above their respective MCLs for drinking water. A VOC contaminant plume exists in the groundwater extending to the northeast from the plant. The apparent sources of the VOC contaminant plume are the aboveground solvent storage tank and the degreaser tank. VOC contamination exists in both the shallow unconsolidated soil aquifer and the deeper (Conestoga Formation) aquifer. The depth and downgradient extent of the contamination in the aquifer can not be determined without additional aquifer characterization.

Soil sample analytical results indicate the presence of VOCs in soil in the vicinity of the aboveground solvent storage tank and the degreaser. In general, the highest levels of soil contamination are found at depth near the groundwater surface indicating that the volatilized VOCs may have migrated upward into the soil from contaminated groundwater. The highest levels of VOC contamination in soils was observed in borings drilled adjacent to the aboveground solvent storage tank and degreaser tank.

Fluoride and chromium were detected above their respective MCLs in groundwater in the vicinity of the NPDES-permitted cooling water discharge location. Continued quarterly monitoring of groundwater quality in this area will enable an evaluation of the effectiveness of repairing the sump, the suspected source of the fluoride contamination in groundwater.

BCM

7.0 RECOMMENDATIONS

BCM recommends that additional investigations be conducted and that Phase II - Aquifer Testing be implemented to enable Christiana to proceed with remediation of onsite VOC contamination in groundwater. The additional investigations should include the following:

- Conducting a tracer test on the solvent handling areas to characterize the integrity of the solvent handling apparatus (i.e. storage tank, piping, and degreaser tank)

- Conducting a well records search in the vicinity of the site to identify potential groundwater users and downgradient water quality

- Implementing a drilling and sampling investigation to delineate downgradient (offsite) and vertical extent of VOC contamination in the aquifer.

- Incorporating the results of the above tasks into an investigation of possible risk-based cleanup levels applicable to this site

BCM recommends that Christiana proceed with Phase II: Aquifer Testing of the June 1989 Groundwater Remediation Work Plan to expedite remediation of the highest levels of VOC contamination detected in onsite groundwater concurrent with the additional investigations defined above.

BCM

8.0 REFERENCES

BCM Engineers Inc., 1989. Christiana Metals Corporation, Bishop Tube Facility, Frazer, Pennsylvania, Groundwater Remediation Work Plan. June.

--- 1988. Bishop Tube Company, Frazer, Pennsylvania, Groundwater Quality Investigation. May.

--- 1987. Bishop Tube Company, Frazer, Pennsylvania, Proposed Work Plan for a Groundwater Quality Investigation. July.

--- 1981. Bishop Tube Company, Frazer, Pennsylvania, Hydrogeologic Investigation. October.

Berg, Thomas M. and Christine M. Dodge, 1981. Atlas of Preliminary Geologic Quadrangle Maps of Pennsylvania. Pennsylvania Geological Survey, Harrisburg, Pennsylvania.

Hall, George M., 1973. Groundwater in Southeastern Pennsylvania. Pennsylvania Geological Survey, Harrisburg, Pennsylvania. 255pp.

Soil Conservation Service, 1963. Soil Survey Chester and Delaware Counties, Pennsylvania. United States Department of Agriculture, Washington, D.C. 124pp.

BCM

ORIGINAL (Red)

TABLES

BCM

ORIGINAL (Red)

TABLE 1

SUMMARY OF OVA SOIL SAMPLE HEAD SPACE ANALYSES*

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample I.D.**		Reading (PPM)***
MW-10	(0-2)	140
	(2-4)	30
B-5	(0-2)	90
	(2-4)	>1000
	(4-6)	>1000
	(6-8)	300
B-6	(0-2)	600
	(2-4)	---
	(4-6)	120
B-7	(0-2)	1
	(4-6)	8
	(10-12)	60
B-8	(0-2)	NIR
and	(4-6)	NIR
MW-11	(8-10)	2
	(12-14)	NIR
	(14-16)	NIR
	(16-17.5)	NIR
MW-12	(0-2)	NIR
	(2-4)	NIR
	(4-6)	NIR
	(6-8)	NIR
	(8-10)	NIR
	(12-14)	NIR
	(14-16)	NIR
	(16-18)	NIR
	(18-20)	NIR

BCM

TABLE 1 (Continued)

Sample I.D.**		Reading (PPM)***
B-9	(0-2)	2
	(6-8)	1
	(10-12)	300
	(12-14)	20
	(20-22)	2
MW-14	(5-7)	NIR
	(10-12)	NIR
B-10	(0-2)	10
	(3-5)	8
	(5-7)	6
	(9-11)	NIR
	(11-13)	NIR
	(13-15)	NIR
B-11	(0-2)	250
	(3-5)	>1000
	(5-7)	>1000
	(9-11)	160
	(13-15)	>1000
	(15-17)	>1000
B-12	(3-5)	>1000
	(5-7)	>1000
	(7-9)	45

Notes:

* = Summarized from Field Log Book
** = Boring Number (depth of sample in feet)
*** = All readings obtained using portable flame ionization vapor analyzer
NIR = No Instrument Response

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 2

SUMMARY OF SOIL BORING AND STREAM BED ELEVATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Boring/Stream Location	Elevation (in feet, referenced to NGVD 1929)
B-5	384.48
B-6	384.35
B-7	384.05
B-9	383.07
Stream 1	358.50
Stream 2	368.90
Stream 3	378.20

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01).

BCM

TABLE 3

SUMMARY OF MONITORING WELL ELEVATION SURVEY *

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well No.	Elevation (feet)[a] Ground	Top Inner Casing	Top Outer Casing
MW-1	423.86	424.21	424.66
MW-2	384.00	384.37	384.72
MW-3	383.94	384.66	385.04
MW-4	386.74	387.08	387.52
MW-5	387.24	387.89	388.45
MW-6	387.48	388.48	388.64
MW-7	396.96	398.69	399.20
MW-8	388.09	384.14	384.31
MW-9	382.81	NM[b]	384.10
MW-10	384.56	383.87	384.54
MW-11	384.00	383.42	384.03
MW-12	383.15	382.46	383.15
MW-13	373.45	374.83	375.21
MW-14	373.18	374.30	375.08
MW-15	367.94	369.68	370.07
MW-16	367.91	369.80	370.20

Notes:

NM = Not measured.
a. Elevations are references to the NGVD 1929.
b. MW-9 was not constructed with an inner casing. This well is an open rock well. Depth to water was measured from the top of the steel casing.
* Well Elevations Surveyed by James M. Stewart, Inc.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 4

SUMMARY OF AUGUST 1989 SOIL SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	MW-10A[a] 1.5 08/01/89 923863	B-5[a] 1.5 08/01/89 923864	B-5[a] 3.5 08/01/89 923865	B-5[a] 4.5 08/01/89 923866	B-5[a] 6.5 08/01/89 923867	B-6[a] 1.5 08/01/89 923868	B-6[a] 5.5 08/01/89 923869
Volatile Organic Compounds (VOCs)								
Bromodichloromethane	mg/kg	<0.0114	<0.0141	>4.0	>0.1	>0.5	<0.115	<0.118
1,1-Dichloroethane	mg/kg	<0.0114	<0.0141	>1.0	>1.0	>1.0	>3.0	>0.7
1,2-Dichloroethane	mg/kg	<0.0114	<0.0141	<0.116	>0.116	<0.116	<0.115	<0.118
1,1-Dichloroethene	mg/kg	<0.0114	>0.2	>20	>20	>3.0	>10	>10
Methylene Chloride	mg/kg	<0.0114	<0.0141	>0.5[b]	>1.0[b]	>0.1[b]	>0.2[b]	>0.1[b]
1,1,1-Trichloroethane	mg/kg	<0.0114	>0.0141	>40	>50	>4.0	>5.0	>5.0
Trichloroethene (TCE)	mg/kg	<0.0114	>2.0	>20	>10	>8.0	>10	>10
Total VOCs	mg/kg	ND	>2.2	>85.5	>82.2	>16.7	>28.2	>25.8

TABLE 4 (Continued)

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	MW-11 1.5 08/02/89 924150	MW-11 9.5 08/02/89 924151	B-7 1.5 08/02/89 924152	B-7 10.5 08/02/89 924153	B-7(Dup) 10.5A 08/02/89 924154	B-7 13.0 08/02/89 924155
Volatile Organic Compounds (VOCs)							
Chloroform	mg/kg	<0.0116	<0.0117	<0.0116	<0.0119	<0.0117	0.582
1,1-Dichloroethene	mg/kg	<0.0116	<0.0117	<0.0116	0.0705	0.0420	0.0481
Methylene Chloride	mg/kg	0.0301[c]	0.0281[c]	0.0337[c]	0.0311[c]	0.0350[c]	<0.0134
1,1,1-Trichloroethane	mg/kg	<0.0116	<0.0117	<0.0116	<0.0119	<0.0117	0.728
Trichloroethene (TCE)	mg/kg	<0.0116	0.0223	<0.0116	<0.0119	0.219	0.781
Total VOCs		0.0301	0.0504	0.0337	0.1016	0.2960	2.139

TABLE 4 (Continued)

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	MW-12 1.5 08/03/89 924156	MW-12 7.5 08/03/89 924157	MW-12 15.0 08/03/89 924158	B-9 1.5 08/03/89 924159	B-9 7.5 08/03/89 924160	B-9(Dup) 7.5A 08/03/89 924161	B-9 10.5 08/03/89 924162
Volatile Organic Compounds (VOCs)								
Chloroform	mg/kg	<0.0115	<0.0124	0.0237	<0.0118	<0.0117	<0.0115	0.0763
Methylene Chloride	mg/kg	<0.0115	<0.0124	<0.0158	<0.0118	<0.0117	<0.0115	0.0157[c]
trans-1,2-Dichloroethene	mg/kg	<0.0115	<0.0124	<0.0158	0.0662	0.0653	0.229	0.0182
1,1,1-Trichloroethane	mg/kg	<0.0115	<0.0124	0.117	<0.0118	<0.0117	<0.0115	<0.0121
Trichloroethene (TCE)	mg/kg	<0.0115	0.0136	0.758	0.0225	<0.0117	0.0311	0.0702
Total VOCs		ND	0.0136	0.8987	0.0887	0.0653	0.2601	0.1804

TABLE 4 (Continued)

Sampling Location: Sample Depth: Sampling Date: BCM Sample Number:	Units	B-10 1.5 08/18/89 926125	B-10 6.5 08/18/89 926126	B-11 1.5 08/18/89 926127	B-11 6.5 08/18/89 926128	B-12 4.5 08/18/89 926129	B-12 6.5 08/18/89 926130
Volatile Organic Compounds (VOCs)							
1,1-Dichloroethene	mg/kg	<0.0117	<0.0116	<0.0119	39.8	<1.15	<0.0605
Methylene Chloride	mg/kg	<0.0117	<0.0116	<0.0119	1.44	<1.15	0.357
Tetrachloroethene (PCE)	mg/kg	<0.0117	<0.0116	<0.0119	10.2	<1.15	<0.0605
1,1,1-Trichloroethane	mg/kg	<0.0117	<0.0116	<0.0119	36.0	<1.15	<0.0605
Trichloroethene (TCE)	mg/kg	1.03	<0.0116	0.0226	3280	157	6.99
Total VOCs		1.03	<0.0116	0.0226	3367	157	7.347

Notes:

ND = None detected.

a. Peak areas for these samples were outside of the calibration curve, consequently, a quantitative value could not be determined (see Appendix F).

b. Compound also detected in the field blank dated 08/01/89.

c. Compound also detected in the trip blank dated 08/01/89. This trip blank is associated with the 08/02/89 samples.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 5

SUMMARY OF SOIL QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: Sampling Date: BCM Sample Number:	Units	Trip Blank 07/31/89 923870	Field Blank 08/01/89 923871	Trip Blank 08/01/89 924163	Field Blank 08/02/89 924164	Field Blank 08/03/89 924165	Trip Blank 08/17/89 926131	Field Blank 08/17/89 926132
Volatile Organic Compounds (VOCs)[a]								
Methylene chloride	ug/l	<1.0	5.6	2.1	<1.0	<1.0	<1.0	<1.0

Notes:

a. With the exception of methylene chloride, no other VOCs were detected in these samples.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 6

SUMMARY OF AUGUST 29 AND 30, 1989 GROUNDWATER SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-1 Unfiltered 08/29/89 927566	MW-1 Filtered 08/29/89 927571	MW-2 Unfiltered 08/30/89 927720	MW-3 Unfiltered 08/30/89 927721	MW-4 Unfiltered 08/29/89 927567	MW-4 Filtered 08/29/89 927572
Volatile Organic Compounds (VOCs)								
1,1-Dichloroethane	ug/l	NL	<1.0	NT	157	14.0	11.2	NT
1,2-Dichloroethane	ug/l	5.0	<1.0	NT	1,050 *	<10.0	<1.0	NT
1,1-Dichloroethene	ug/l	7.0	<1.0	NT	611 *	103 *	5.5	NT
Methylene Chloride	ug/l	NL	<1.0	NT	10.9	<10.0	<1.0	NT
Tetrachloroethene (PCE)	ug/l	NL	<1.0	NT	85.6	124	24.9	NT
trans-1,2-Dichloroethene	ug/l	NL	<1.0	NT	685	236	316	NT
1,1,1-Trichloroethane	ug/l	200	<1.0	NT	17,300 *	3,130 *	18.9	NT
Trichloroethene (TCE)	ug/l	5.0	<1.0	NT	36,100 *	199,000 *	1110 *	NT
Vinyl Chloride	ug/l	2.0	<1.0	NT	<10.0	<10.0	42.2 *	NT
Total VOCs[d]		NL	ND	NT	56,000	202,607	1,529	NT
Inorganic and Physical Parameters								
Fluoride	mg/l	2.0-4.0[a]	<0.1	NT	NT	NT	14.1 *	NT
Nitrate	mg/l	10.0	0.789	NT	NT	NT	7.13	NT
pH-field	Stnd.Units	6.5-8.5[b]	5.93 *	NT	NT	NT	6.28 *	NT
Specific Conductance	umhos	NL	95	NT	NT	NT	500	NT
Metals								
Chromium	mg/l	0.05	NT	<0.01	NT	NT	NT	0.011
Copper	mg/l	1.0[b]	NT	0.035	NT	NT	NT	0.027
Nickel	mg/l	NL	NT	<0.04	NT	NT	NT	0.269

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-5 Unfiltered 08/29/89 927568	MW-5 Filtered 08/29/89 927573	MW-6 Unfiltered 08/29/89 927569	MW-6 Filtered 08/29/89 927574	MW-7 Unfiltered 08/29/89 927570	MW-7 Filtered 08/29/89 927575
Volatile Organic Compounds (VOCs)								
Chloroethane	ug/l	NL	3.3	NT	<1.0	NT	<1.0	NT
1,1-Dichloroethane	ug/l	NL	16.6	NT	9.9	NT	1.3	NT
1,1-Dichloroethene	ug/l	7.0	<1.0	NT	6.5	NT	<1.0	NT
Tetrachloroethene (PCE)	ug/l	NL	<1.0	NT	<1.0	NT	<1.0	NT
trans-1,2-Dichloroethene	ug/l	NL	18.5	NT	82.4	NT	49.3	NT
1,1,1-Trichloroethane	ug/l	200	<1.0	NT	70.1	NT	2.5	NT
Trichloroethene (TCE)	ug/l	5.0	<1.0	NT	526 *	NT	78.9 *	NT
Vinyl Chloride	ug/l	2.0	4.2 *	NT	8.7 *	NT	<1.0	NT
Total VOCs[d]	ug/l	NL	42.6	NT	704	NT	132	NT
Inorganic and Physical Parameters								
Fluoride	mg/l	2.0-4.0[a]	9.56 *	NT	8.02 *	NT	5.66 *	NT
Nitrate	mg/l	10.0	0.099	NT	1.67	NT	2.21	NT
pH-field	Stnd. Units	6.5-8.5[b]	6.62	NT	6.58	NT	5.83 *	NT
Specific Conductance	umhos	NL	4,600	NT	710	NT	250	NT
Metals								
Chromium	mg/l	0.05	NT	<0.01	NT	0.01	NT	0.220*
Copper	mg/l	1.0[b]	NT	0.022	NT	0.021	NT	<0.02
Nickel	mg/l	NL	NT	0.090	NT	<0.04	NT	0.251

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-8 Unfiltered 08/29/89 927714	MW-8 Filtered 08/29/89 927717	MW-8A[c] Unfiltered 08/29/89 927715	MW-8A[c] Filtered 08/29/89 927718	MW-9 Unfiltered 08/29/89 927716	MW-9 Filtered 08/29/89 927719
Volatile Organic Compounds (VOCs)								
Chloroethane	ug/l	NL	16.6	NT	<1.0	NT	<1.0	NT
1,1-Dichloroethane	ug/l	NL	3.2	NT	2.8	NT	20.6	NT
1,1-Dichloroethene	ug/l	7.0	37.7 *	NT	<1.0	NT	63.3 *	NT
Methylene Chloride	ug/l	NL	1.6	NT	1.1	NT	2.4	NT
Tetrachloroethene (PCE)	ug/l	NL	9.3	NT	9.2	NT	14.9	NT
trans-1,2-Dichloroethene	ug/l	NL	803	NT	798	NT	482	NT
1,1,1-Trichloroethane	ug/l	200	399 *	NT	395 *	NT	621 *	NT
Trichloroethene (TCE)	ug/l	5.0	2,860 *	NT	2,750 *	NT	4,130 *	NT
Vinyl Chloride	ug/l	2.0	86.8 *	NT	60.8 *	NT	14.4	NT
Total VOCs[d]	ug/l	NL	4,217	NT	4,008	NT	5,349	NT
Inorganic and Physical Parameters								
Fluoride	mg/l	2.0-4.0[a]	1.11	NT	1.02	NT	2.57	NT
Nitrate	mg/l	10.0	0.327	NT	0.121	NT	0.106	NT
pH-field	Stnd. Units	6.5-8.5[b]	6.91	NT	6.91	NT	6.98	NT
Specific Conductance	umhos	NL	440	NT	440	NT	450	NT
Metals								
Chromium	mg/l	0.05	NT	0.012	NT	<0.01	NT	<0.01
Copper	mg/l	1.0[b]	NT	<0.02	NT	<0.02	NT	<0.02
Nickel	mg/l	NL	NT	<0.04	NT	<0.04	NT	<0.04

TABLE 6 (Continued)

Sampling Location: Sample ID: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-10 Unfiltered 08/30/89 927722	MW-11 Unfiltered 08/30/89 927723	MW-12 Unfiltered 08/30/89 927724	MW-13 Unfiltered 08/30/89 927576	MW-14A Unfiltered 08/29/89 927577	MW-14B[c] Unfiltered 08/29/89 927578	MW-15 Unfiltered 08/29/89 927579	MW-16 Unfiltered 08/29/89 927580
Volatile Organic Compounds (VOCs)										
Chloroethane	ug/l	NL	<1.0	<10.0	<10.0	<1.0	<1.0	<1.0	<1.0	18.6
1,1-Dichloroethane	ug/l	NL	1.4	900	12.8	33.6	8.9	7.3	53.8	419
1,2-Dichloroethane	ug/l	5.0	<1.0	103 *	<10.0	<1.0	<1.0	<1.0	<1.0	41.8 *
1,1-Dichloroethene	ug/l	7.0	<1.0	600 *	<1.0	<10.0	16.6 *	13.2 *	564 *	140 *
Methylene Chloride	ug/l	NL	<1.0	15.0	14.8	<1.0	<1.0	<1.0	1.8	<1.0
Tetrachloroethene (PCE)	ug/l	NL	<1.0	32.1	14.7	23.5	<1.0	<1.0	39.3	7.4
trans-1,2-Dichloroethene	ug/l	NL	4.6	1,970	85.9	110	12.5	10.6	570	169
1,1,1-Trichloroethane	ug/l	200	84.2	20,700 *	540 *	3,470 *	287 *	323 *	7,800 *	2,340 *
Trichloroethene (TCE)	ug/l	5.0	93.8 *	17,100 *	3,940 *	10,600 *	666 *	751 *	44,400 *	4,580 *
Vinyl Chloride	ug/l	2.0	<1.0	<10.0	<10.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs[d]	ug/l	NL	184	41,420	4,608	14,401	991	1,105	53,429	7,716
Physical Parameters										
pH-field	Stnd.Units	6.5-8.5[b]	NT	NT	NT	7.34	6.95	6.95	7.13	7.18
Specific Conductance	umhos	NL	NT	NT	NT	380	430	430	610	380

Notes:

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
ND = None detected.
NL = No USEPA MCL is listed.
NT = Not tested as part of this study.
* = Compound detected above USEPA MCL.
a. The MCL for fluoride ranges from 2 mg/l, the secondary MCL, to 4 mg/l. This range of values depends on the average air temperature of the region.
b. This value is a secondary MCL.
c. Sample is a duplicate of the previous sample.
d. Total VOC values are rounded as appropriate.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 7

SUMMARY OF AUGUST 29 AND 30, 1989, GROUNDWATER QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: Sampling Date: BCM Sample Number:	Units	Trip Blank 08/29/89 927581	Field Blank 08/29/89 927582	Trip Blank 08/30/89 927725	Field Blank 08/30/89 927726
Volatile Organic Compounds		ND	ND	ND	ND

Notes:

ND = No compounds detected.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

TABLE 8

SUMMARY OF SEPTEMBER 28, 1989, GROUNDWATER SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sampling Location: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-2 09/28/89 930389	MW-3 09/28/89 930390	MW-10A 09/28/89 930391	MW-10B[a] 09/28/89 930392
Volatile Organic Compounds (VOCs)						
1,1-Dichloroethane	ug/l	NL	157	<1,000	4.3	6.3
1,1-Dichloroethene	ug/l	7.0	1,190 *	<1,000	2.6	4.9
Methylene Chloride[b]	ug/l	NL	152	2,160	2.8	<1.0
Tetrachloroethene (PCE)	ug/l	NL	102	<1,000	<1.0	1.0
trans-1,2-Dichloroethene	ug/l	NL	623	<1,000	9.9	14.2
1,1,1-Trichloroethane	ug/l	200	16,500 *	2,730 *	84.4	112
Trichloroethene (TCE)[c]	ug/l	5.0	48,900 *	680,000 *	244 *	227 *
Vinyl Chloride	ug/l	2.0	<100	<1,000	<1.0	1.5
Total VOCs[d]	ug/l	NL	67,624	684,890	348	367

TABLE 8 (Continued)

Sampling Location: Sampling Date: BCM Sample Number:	Units	USEPA MCL	MW-11 09/28/89 930393	MW-12 09/28/89 930394	MW-13 09/28/89 930395	MW-14 09/28/89 930396	MW-15 09/28/89 930397	MW-16 09/28/89 930398
Volatile Organic Compounds (VOCs)								
Chloroethane	ug/l	NL	<100	<1.0	<10.0	<10.0	<1.0	5.7
Chloroform	ug/l	100	<100	<1.0	<10.0	<10.0	4.9	<1.0
1,1-Dichloroethane	ug/l	NL	711	12.0	<10.0	35.9	66.4	265
1,1-Dichloroethene	ug/l	7.0	884 *	53.1 *	22.6 *	229 *	789 *	103 *
Methylene Chloride[b]	ug/l	NL	237	<1.0	19.2	16.7	<1.0	<1.0
Tetrachloroethene (PCE)	ug/l	NL	<100	7.5	<10.0	31.3	97.6	3.0
trans-1,2-Dichloroethene	ug/l	NL	2,170	69.5	12.3	140	446	110
1,1,1-Trichloroethane	ug/l	200	19,600 *	425 *	490 *	3,930 *	10,100 *	1,320 *
Trichloroethene (TCE)[c]	ug/l	5.0	15,500 *	3,150 *	863 *	13,800 *	116,000 *	1,144 *
Vinyl chloride	ug/l	2.0	<100	15.6 *	<10.0	<10.0	<1.0	<1.0
Total VOCs[d]		NL	39,102	3,733	1,407	18,183	127,504	2,951

Notes:

USEPA MCL = United States Environmental Protection Agency Maximum Contaminant Level.
NL = No USEPA MCL is listed.
* = Compound detected above USEPA MCL.
a. MW-10B is a duplicate of MW-10A.
b. The method blank contained 2.8 ug/l of methylene chloride. This is equivalent to 28 ug/l, 280 ug/l, and 2800 ug/l in samples where the method detection limit was <10.0 ug/l, <100 ug/l, and <1,000 ug/l, respectively. Methylene chloride was also detected in the trip and field blanks at 1.2 ug/l.
c. TCE was detected in the trip and field blank at 12.7 and 3.5 ug/l, respectively.
d. Total VOC values are rounded off to at least three significant figures.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 9

SUMMARY OF SEPTEMBER 28, 1989, GROUNDWATER QA/QC SAMPLE ANALYTICAL RESULTS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Sample ID: Sampling Date: BCM Sample Number:	Units	Trip Blank 09/28/89 930399	Field Blank 09/28/89 930400
Volatile Organic Compounds (VOCs)			
Methylene chloride[a]	ug/l	1.2	1.2
Trichloroethene (TCE)	ug/l	12.7	3.5

Notes:

a. The method blank contained 2.4 ug/l of methylene chloride.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 10

SUMMARY OF MONITORING WELL CONSTRUCTION DETAILS
AND MONITORED AQUIFERS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well Identification	Depth to base of Well*	Depth to Top of Rock*	Depth of Monitored Interval*	Elevation of Top of Rock (AMSL)	Monitored Aquifer
MW-1	48	---	28-48	---	Rock
MW-2	24	13	15-24	371.00	Rock
MW-3	13.5	13	8-13.5	370.94	Unconsolidated
MW-4	20	9	7-20	377.74	Rock
MW-5	20	---	10-20	---	Unconsolidated
MW-6	20.66	---	10.66-20.66	---	Unconsolidated
MW-7	19.8	---	9.8-19.8	---	Unconsolidated
MW-8	18	---	8-18	---	Unconsolidated
MW-9**	63	26	46-63	356.81	Rock
MW-10	15	4	5-15	380.56	Rock
MW-11	16	17	6-16	367.00	Unconsolidated
MW-12	21	20	8-21	363.15	Unconsolidated
MW-13	37	15	27-37	358.45	Rock
MW-14	15	15	5-15	358.18	Unconsolidated
MW-15	78	21	68-78	346.94	Rock
MW-16	21	17	7-21	350.91	Unconsolidated

Notes:

* = Feet below grade.
** = MW-9 is an open rock well.
AMSL = Above mean sea level.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 11

SUMMARY OF GROUNDWATER ELEVATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

Well No.	Depth to Groundwater (feet)[a] 8/29/89 & 8/30/89	9/28/89	Groundwater Elevation(feet)[b] 8/29/89 & 8/30/89	9/28/89
MW-1	13.25	NM	410.96	NM
MW-2	6.35	7.77	378.02	376.60
MW-3	6.10	7.51	378.56	377.15
NW-4	10.71	NM	376.37	NM
MW-5	12.10	NM	375.79	NM
MW-6	16.22	NM	372.26	NM
MW-7	12.62	NM	386.07	NM
MW-8	13.73	NM	370.41	NM
MW-9	15.45	NM	368.65	NM
MW-10	2.52	2.79	381.35	381.08
MW-11	9.01	8.64	374.41	374.78
MW-12	8.63	10.11	373.83	372.35
MW-13	10.32	13.29	364.51	361.54
MW-14	9.12	8.45	365.18	365.68
MW-15	*	*	*	*
MW-16	7.18	5.55	362.62	364.25

Notes:

* = An accurate water level measurement not available because the water level is above the casing.

NM = Not measured.

a. Depth to water measured from the top of the inner well casing with electronic depth to water probes in all wells except MW-9 which is an open rock well and measurement was from top of protective steel casing.

b. Elevations are referenced to the NGVD 1929.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

TABLE 12

VERTICAL FLOW GRADIENT COMPUTATIONS

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

	Well Depth (feet)	Depth to Center of Monitored Interval (feet)	Water Table Elevation (AMSL) 8/29/89 & 8/30/89	9/28/89
CLUSTER MW-2/MW-3				
MW-2	24	19.50	378.02	376.60
MW-3	13.5	10.75	378.56	377.15
Difference		8.75	-0.54	-0.55
Vertical Gradient 8/29/89 & 8/30/89:			-0.54/8.75 =	-0.0617
Vertical Gradient 9/28/89:			-0.55/8.75 =	-0.0628
CLUSTER MW-8/MW-9				
MW-9	63	54.5	368.65	NM
MW-8	18	13	370.41	NM
Difference		41.5	-1.76	
Vertical Gradient 8/29/89 & 8/30/89:			-1.76/41.5 =	-0.0424

BCM

TABLE 12 (Continued)

	Well Depth (feet)	Depth to Center of Monitored Interval (feet)	Water Table Elevation (AMSL) 8/29/89 & 8/30/89	9/28/89
CLUSTER MW-13/MW-14				
MW-13	37	32	364.51	361.54
MW-14	15	10	365.18	365.68
Difference		22	-0.67	-4.14
Vertical Gradient 8/29/89 & 8/30/89:			-0.67/22 =	-0.030
Vertical Gradient 9/28/89:			-4.14/22 =	-0.188
CLUSTER MW-15/MW-16				
MW-15*	78	73	369.68	369.68
MW-16	21	14	362.62	364.25
Difference		59	+7.06	+5.43
Vertical Gradient 8/29/89 & 8/30/89:			+7.06/59 =	+0.119
Vertical Gradient 9/28/89:			+5.43/59 =	+0.092

Notes:

* = Groundwater surface in MW-15 is above the casing. Reported groundwater elevation is actually the elevation of the top of the inner casing.

AMSL = Above mean sea level.

Source: BCM Engineers Inc. (BCM Project No. 00-6471-01)

BCM

FIGURES

BCM

CHRISTIANA METALS CORP.

BCM Project No. 00-6471-01

0 2000 Feet

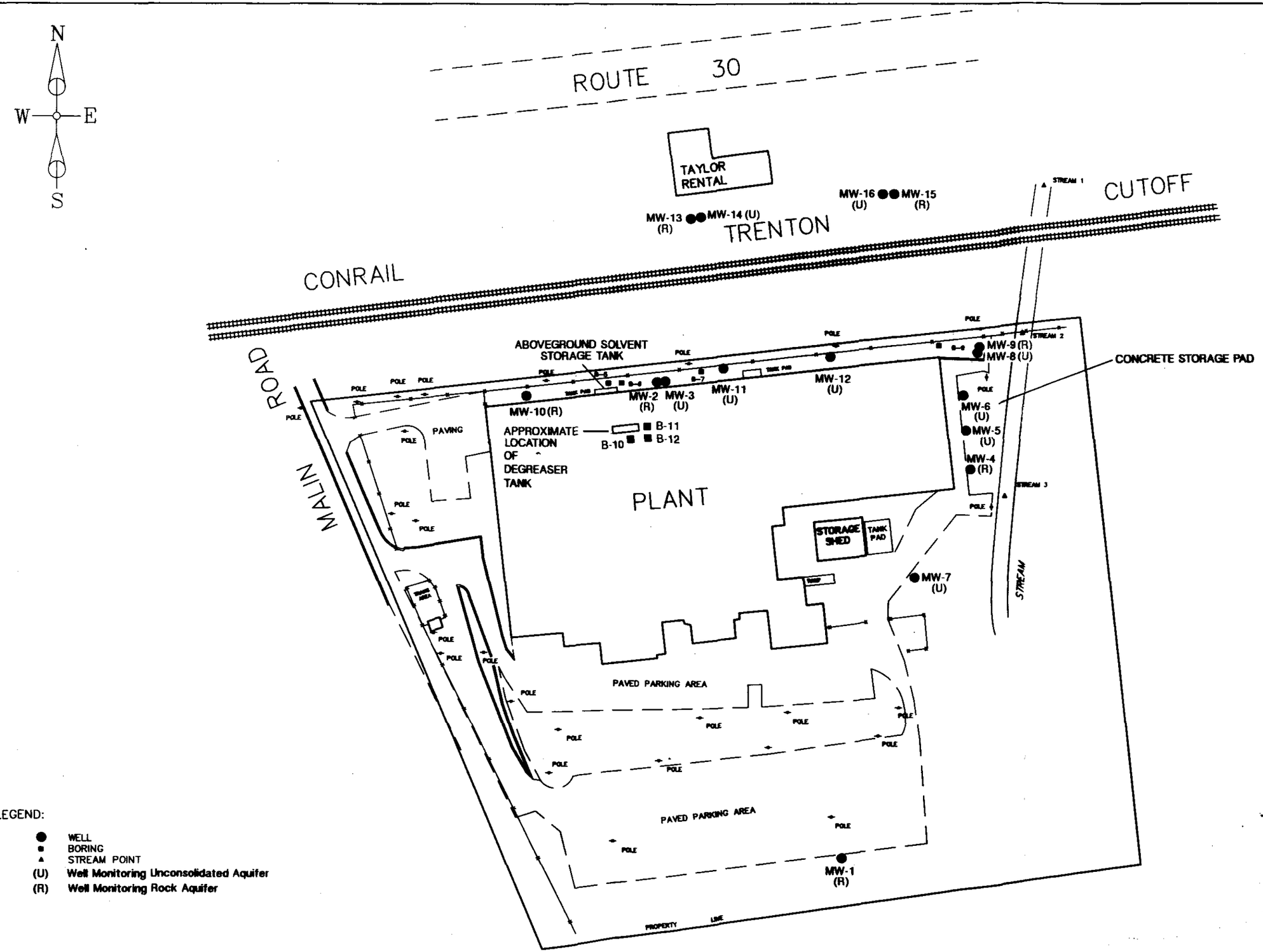
North

Figure 1

Site Location Map

BCM

CHRISTIANA METALS

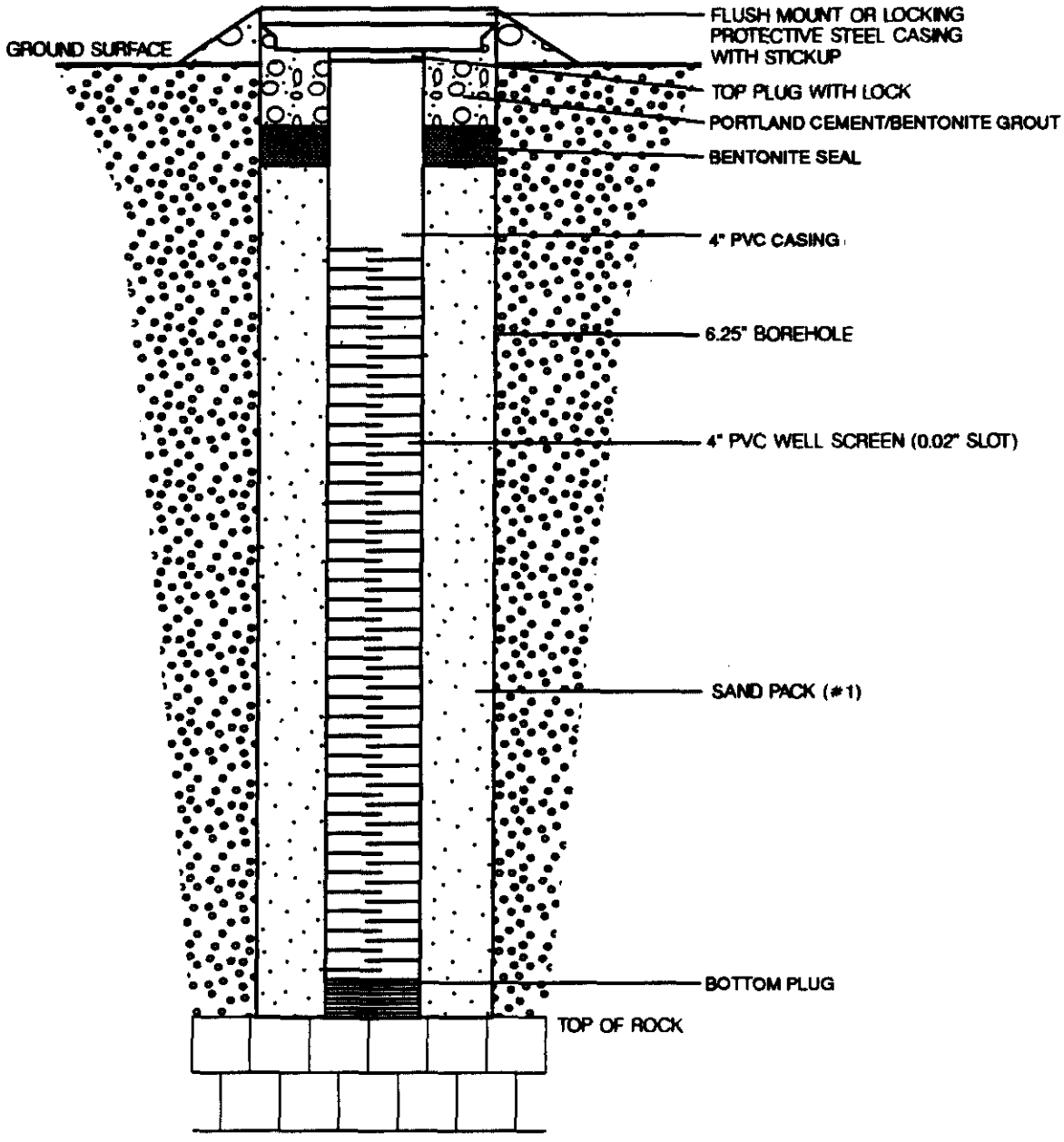


Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

Figure 2
SITE PLAN

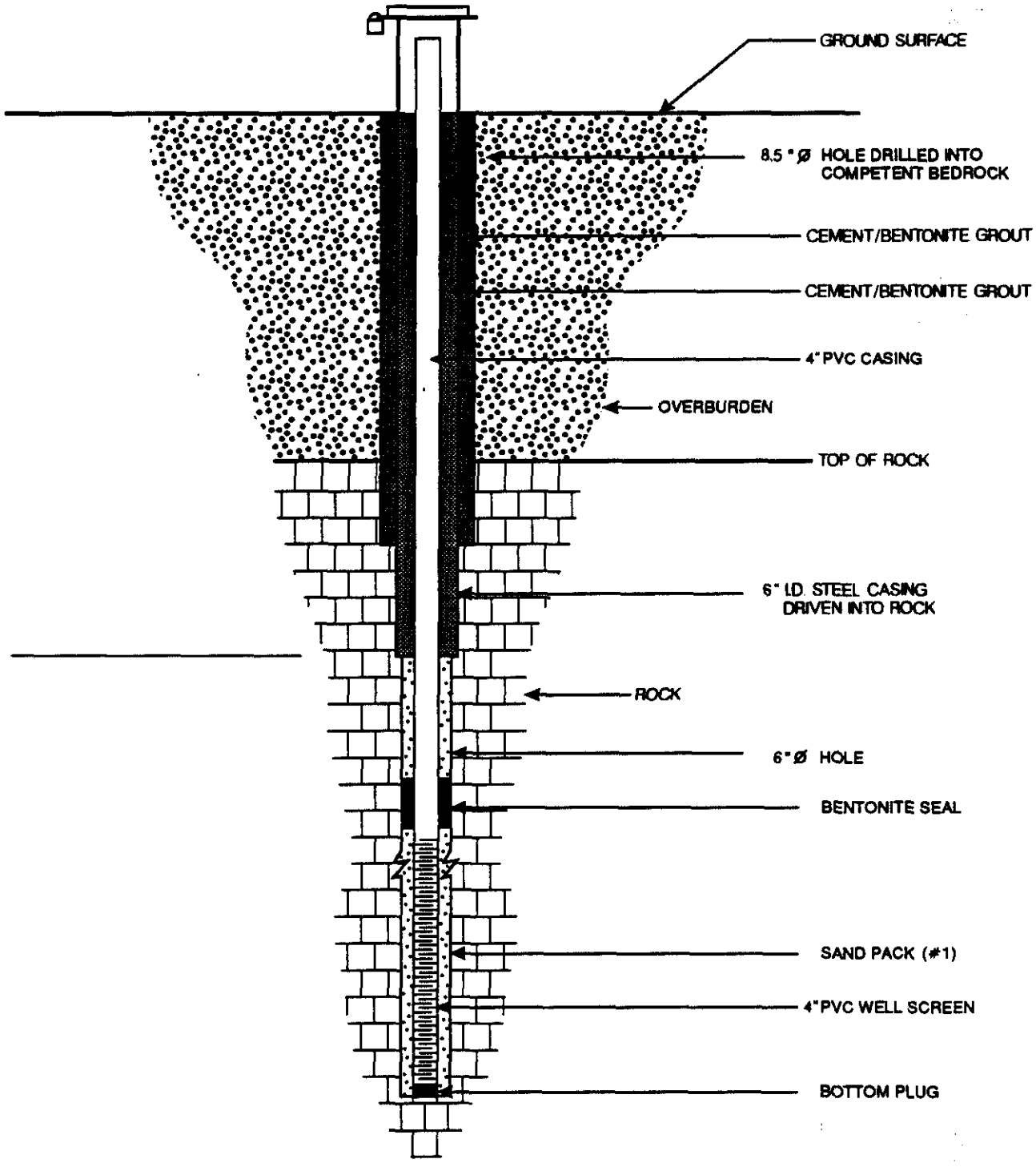
ORIGINAL (Red)



NOT TO SCALE

BCM Project No. 00-6471-01

Figure 3
Schematic Unconsolidated Aquifer Monitoring Well Construction Diagram



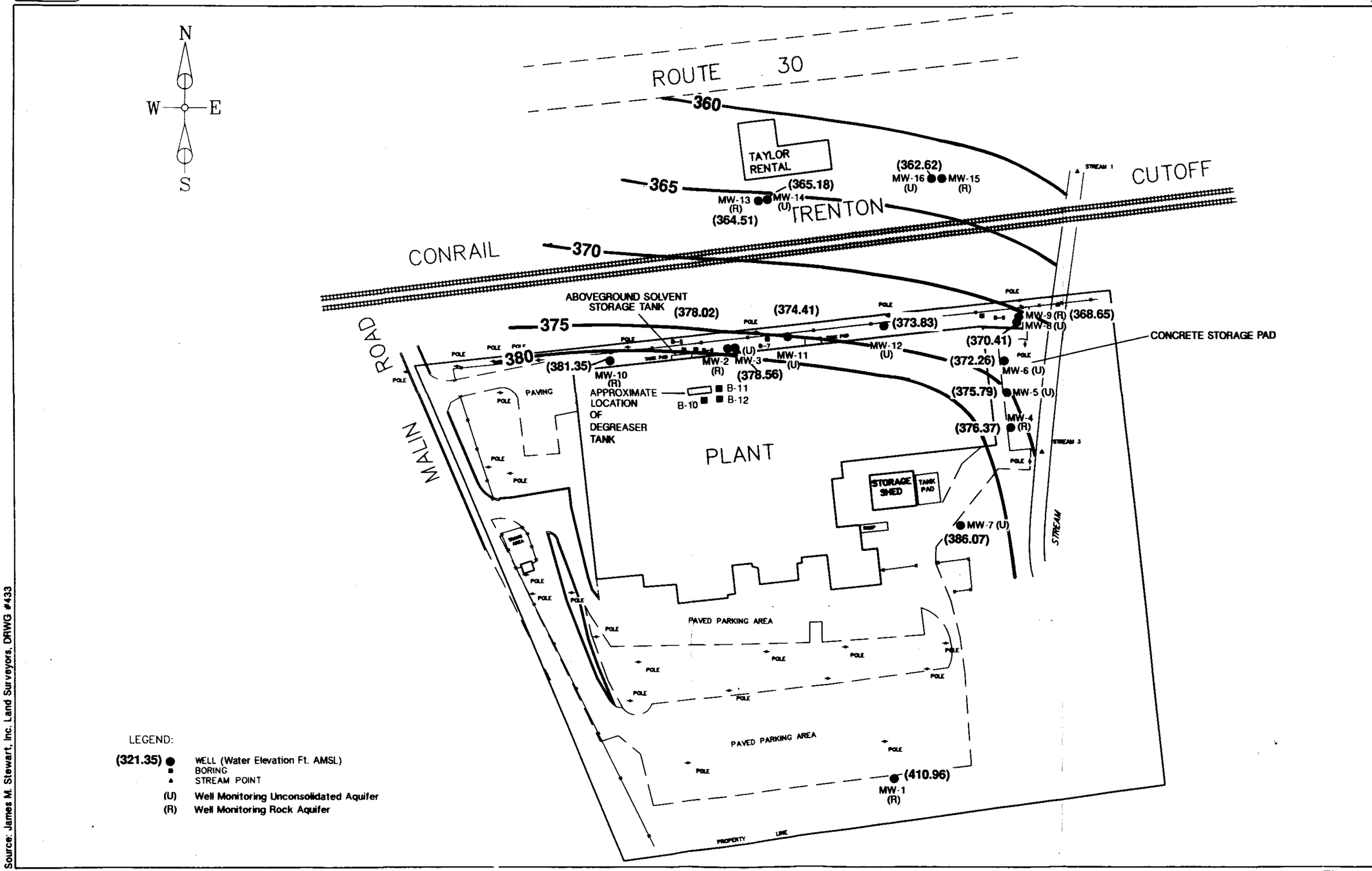
NOT TO SCALE

BCM Project No. 00-6471-01

Figure 4
Schematic Rock Aquifer Monitoring Well Construction Diagram

BCM

CHRISTIANA METALS



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

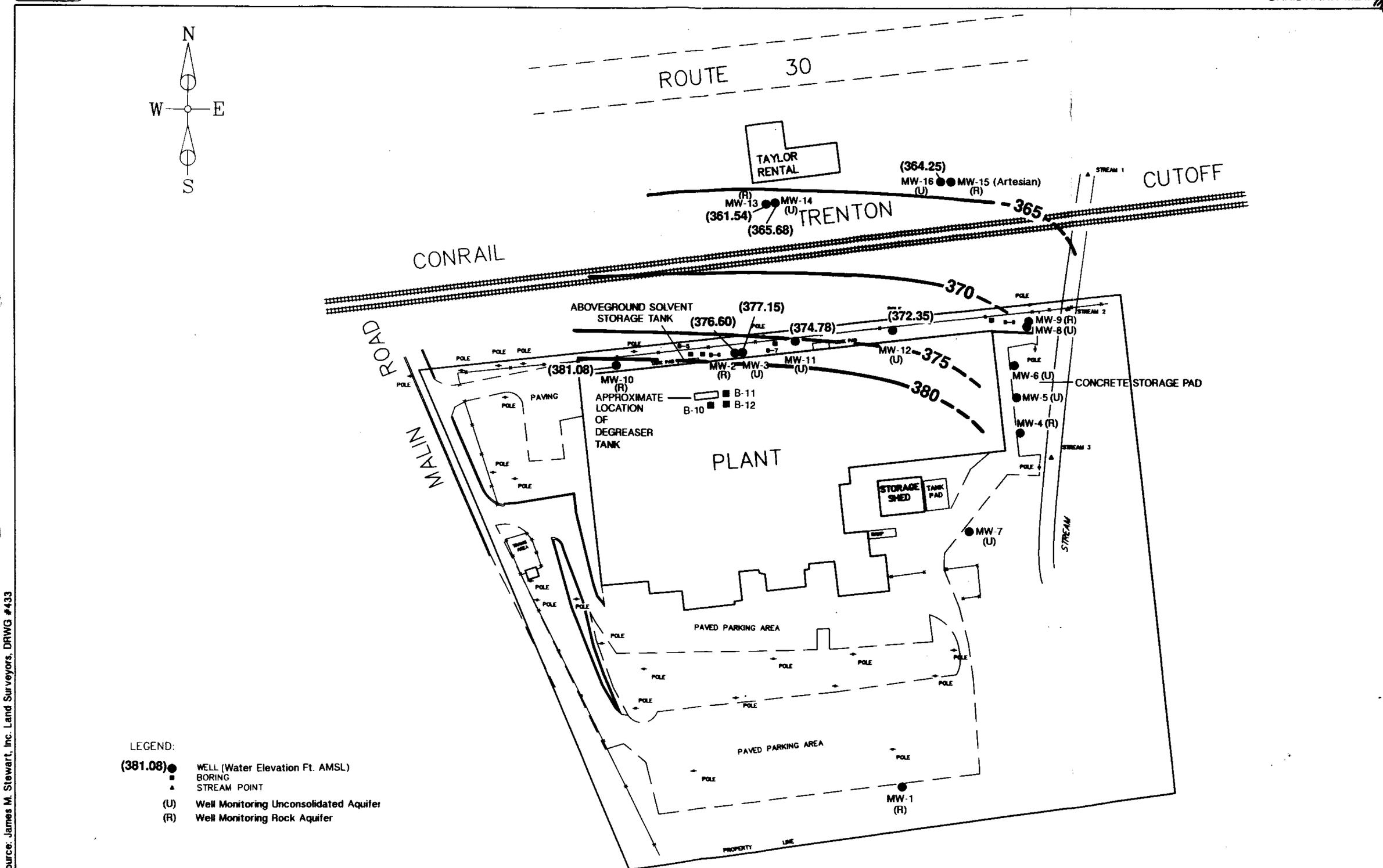
Figure 5

Shallow Groundwater Elevation Contour Map•August 29 and 30, 1989

BCM

CHRISTIANA METAL

ORIGINAL (Red)



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

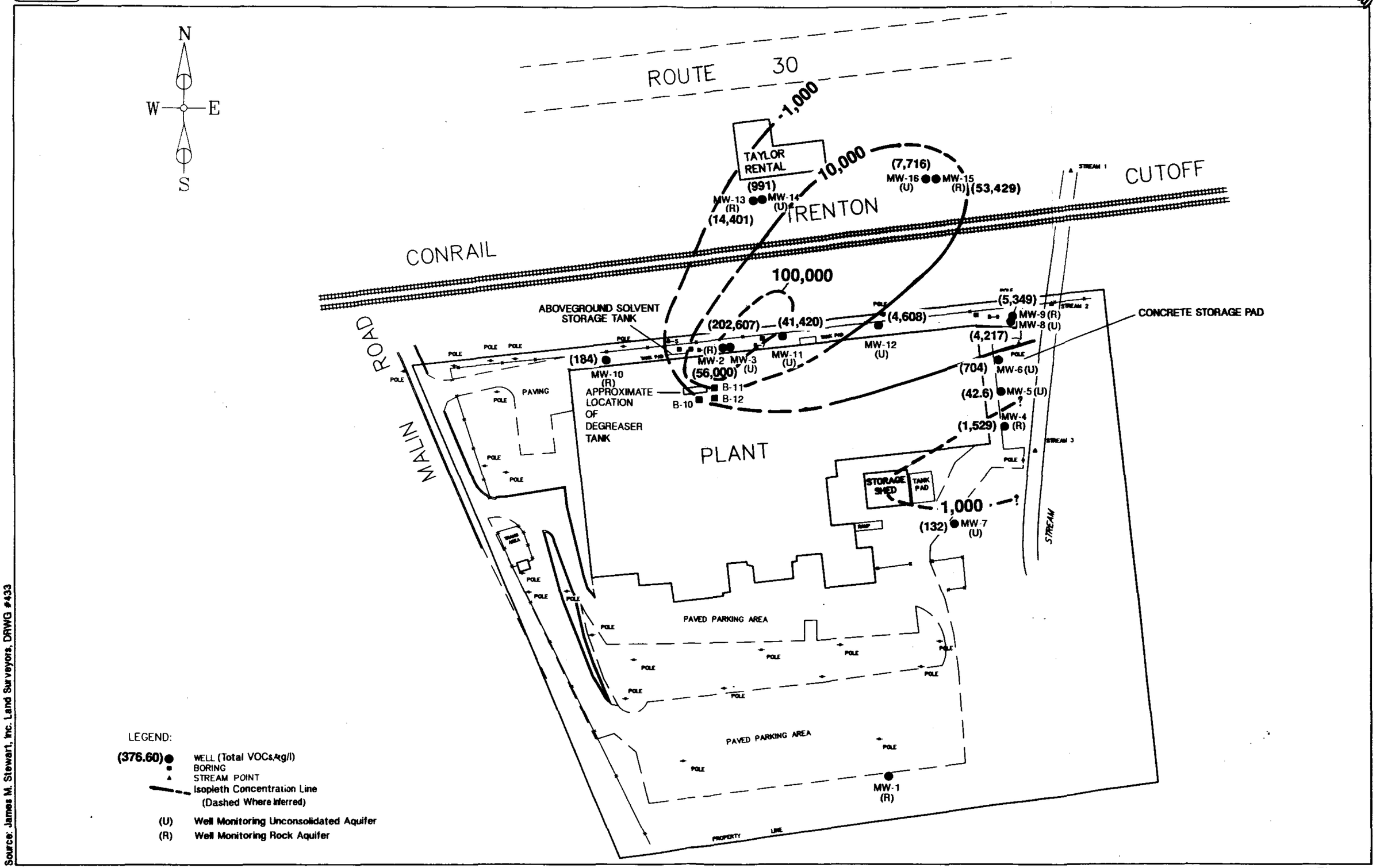
Figure 6

Shallow Groundwater Elevation Contour Map-September 28, 1989

BCM

CHRISTIANA METALS

ORIGINAL (RED)



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

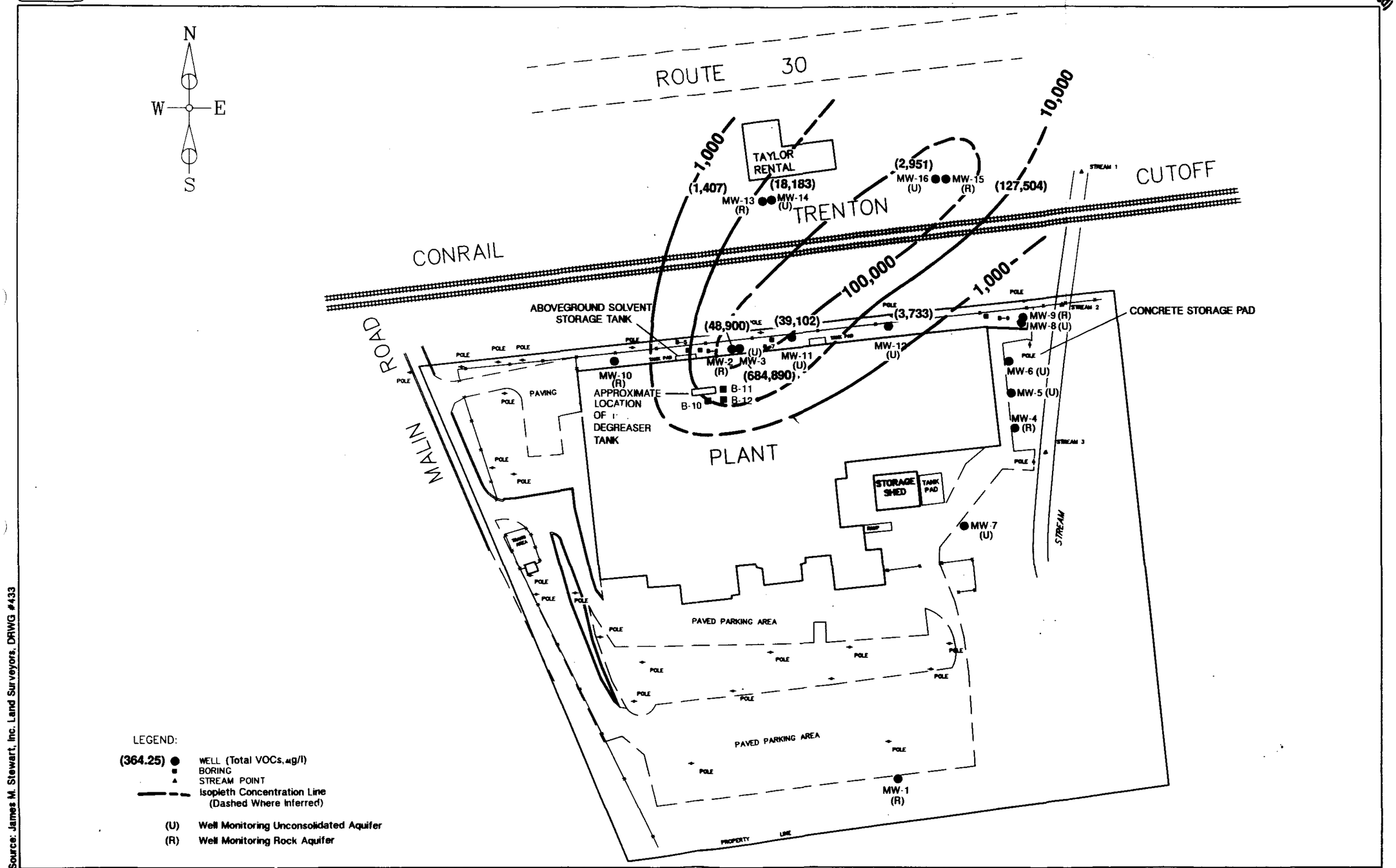
Figure 7

Isopleth Map of Total VOCs in Groundwater August 29 and 30, 1989

BCM

CHRISTIANA METAL (Red)

ORIGINAL



Source: James M. Stewart, Inc. Land Surveyors, DRWG #433

BCM Project No. 00-6471-01

Figure 8

Isopleth Map of Total VOCs in Groundwater September 28,1989

BCM

ORIGINAL (Red)

APPENDIX A

TEST BORING LOGS AND WELL DRILLING LOGS

ORIGINAL (Red)

BCM TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-5

PROJECT: Christiana Metals Corp. Groundwater Investigation

PROJECT NO: 00-6471-01

BORING LOCATION: ~~Adjacent to above ground TCE~~ tank along fire land

DATE(S) DRILLED: 8/1/89

DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.

DRILLING METHOD: Hollow Stem Auger

BORING DIAMETER: 6.25"

SAMPLING METHOD: 2" O.D. Split-Spoon

TOTAL DEPTH: 8'

BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted

LOGGED BY: (b) (4) [redacted]

DEPTH TO STATIC WATER: 4.4 FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	14,9,10,11	14"	FILL: Limestone gravel and sand
1-6'	2-4'	6,5,4,6	16"	CLAYEY SAND (SC): Fine, some very fine sand; little to some angular carbonate and schist clasts (1/8-1/2"); poorly sorted; orange brown, grey-blue; matrix, moderately plastic; clasts, dry.
	4-6'	2,2,2,2	12"	
6-8'	6-8'	2,3,2,1	10"	SILTY SAND (SM): Fine sand, some very fine sand, trace medium sand, trace carbonate and schist fragments (1/8-1/4:); poorly sorted; grey-brown matrix, brown to blue clasts, moist.
8'				END OF BORING. Limestone bedrock.

BCM TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-6

PROJECT: Christiana Metals Corp. Groundwater Investigation

PROJECT NO: 00-6471-01

BORING LOCATION: 10' from B-5, adjacent to above ground TCE tank along fire lane

DATE(S) DRILLED: 8/1/89

DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.

DRILLING METHOD: Hollow Stem Auger

BORING DIAMETER: 6.25"

SAMPLING METHOD: 2" O.D. Split-Spoon

TOTAL DEPTH: 8.5'

BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted

LOGGED BY: (b) (4) [redacted]

DEPTH TO STATIC WATER: 4.7 FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	12,9,9,8	12"	FILL: Limestone gravel and sand.
1-6'	2-4'	2,2,3,3	0"	CLAYEY SAND (SC): Fine, some very fine sand; little to some angular carbonate and schist fragments (1/8-1/2")' poorly sorted; orange-brown moderately plastic; matrix, grey-blue clasts; dry.
	4-6'	2,2,3,2	12"	
6-8.5'	6-8'	2,6,6,4	14"	SILTY SAND (SM): Fine sand, little very fine sand, trace mica; trace carbonate clasts (1/2-1"); yellow-brown matrix, grey-blue clasts; wet.
8.5'				END OF BORING. Limestone bedrock

BCM TEST BORING LOG

SHEET 1 OF 1	
BORING NO: B-7	
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
BORING LOCATION: Adjacent to stairs at middle of plant along fire lane	DATE(S) DRILLED: 8/2/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. Split-Spoon	TOTAL DEPTH:
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted	
LOGGED BY: (b) (4) [redacted]	DEPTH TO STATIC WATER: 8.0' FT. BELOW GRADE
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	9,11,12,11	18"	FILL: Limestone gravel and sand
1-11'	2-4'	7,7,7,13	0"	CLAYEY SAND (SC): Fine, some to little very fine sand, trace medium to coarse sand, little, angular carbonate clasts (1/8-1/2") trace angular schist fragments (1/8-1/4"); yellow-brown matrix, blue-grey to brown clasts, dry.
	4-5'	8,10,9,7	14"	
	6-8'	6,8,7,8	0"	
	8-10'	3,5,7,7	16"	
11-13.5'	10-12'	2,3,2,2	24"	SILTY SAND (SM): Fine, some very fine sand, trace angular schist clasts (1/8-1/4"), trace mica; dark grey; wet.
13.5-14.5"	12-14'	1,3,31,7	18"	SILTY GRAVEL (GM): Angular, pebble to cobble (1/4-1") size carbonate clasts, little medium to fine sand; clasts blue-grey; wet.
14.5'				END OF BORING. Limestone bedrock

BCM TEST BORING LOG

SHEET 1 OF 1	
BORING NO: B-9	
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
BORING LOCATION: At end of plant building along fire lane	DATE(S) DRILLED: 8/3/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. Split-Spoon	TOTAL DEPTH: 21'
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted	
LOGGED BY: (b) (4) [redacted]	DEPTH TO STATIC WATER: 14' FT. BELOW GRADE
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-1'	0-2'	8,5,5,5	12"	FILL: Limestone gravel and sand
1-9'	6-8'	3,4,8,8	16"	CLAYEY SILT (ML): Some very fine sand, little very angular 1/8-1/2" schist clasts; yellow-brown matrix, yellow-brown to red clasts; dry.
9-13'	10-12'	2,3,4,4	12"	SILTY CLAY (CL): Little very fine sand, trace very weathered schist clasts (1/8") yellow-brown matrix, very plastic; micaceous; moist.
	12-14'	8,12,12,10	18"	
13-16'				SILTY GRAVEL (GM): Very angular carbonate clasts (>1"); little to some very fine sand, trace very coarse sand; yellow-brown matrix, blue-grey clasts; dry.
	14-16'	9,7,5,7	0"	
16-21'	20-22'	3,7,6,9	24"	SAND (SM): Coarse to very coarse; micaceous, weathered muscoite schist grains, angular clasts of carbonate (1/2"); brown matrix; wet.
21'				END OF BORING. Limestone Bedrock

BCM TEST BORING LOG

SHEET 1 OF	
BORING NO:	B-10
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
BORING LOCATION: Inside of plant, adjacent to south side of degreaser	DATE(S) DRILLED: 8/18/89
DRILLING CONTRACTOR: J.E. Fritts and Associates	DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 3.25" / SAMPLING METHOD: 2" O.D. Split-Spoon	TOTAL DEPTH: 15'
BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted	
LOGGED BY: E[redacted] (b) (4)	DEPTH TO STATIC WATER: N/A FT. BELOW GRADE
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-5'	1-3'	4,12,12,21	18"	CLAYEY SILT (ML): Little fine to medium sand, trace angular schist clasts (1/8"); yellow-brown, moderately plastic matrix, white to grey clasts; dry.
	3-5"	7,7,6,7	24"	
5-14.5'				SAND (SM): Fine, some medium, little very fine sand, trace coarse sand, micaceous; red-brown; wet; weathered schistose gruz.
14.5'-15'				LIMESTONE: Angular clasts (1/2-1") of blue-grey limestone.
15'				END OF BORING

BCM TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-11

PROJECT: Christiana Metals Corp. Groundwater Investigation

PROJECT NO: 00-6471-01

BORING LOCATION: Inside of plant, adjacent to northeast corner of degreaser

DATE(S) DRILLED: 8/18/89

DRILLING CONTRACTOR: J.E. Fritts and Associates

DRILLING METHOD: Hollow-Stem Auger

BORING DIAMETER: 3.25"

SAMPLING METHOD: 2" O.D. Split-Spoon

TOTAL DEPTH:

BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted

LOGGED BY: [redacted] (b) (4) [redacted]y

DEPTH TO STATIC WATER: N/A FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
0-6.5'	1-3'	18,20,19,18	18"	CLAYEY SILT (ML): Some medium sand, little fine to very fine sand; trace angular schist clasts (1/8-1/2"); yellow-brown moderately plastic matrix, red-brown clasts; dry.
	3-5'	7,10,7,10,	18"	
	5-7'	4,4,4,8	12"	
6.5-14'	7-9'	7,6,4,4	0"	SAND (SM): Medium, some fine sand, little very fine sand, angular schist clasts (1/8-1/2"); micaceous, yellow brown to red-brown; wet at 7'.
	9-11'	1,1/12, 1	6"	
14'	13-15'	1/18,2	6"	END OF BORING. Limestone bedrock.

BCM TEST BORING LOG

SHEET 1 OF 1

BORING NO: B-12

PROJECT: Christiana Metals Corp. Groundwater Investigation

PROJECT NO: 00-6471-01

BORING LOCATION: Inside of plant, adjacent to southeast corner of degreaser

DATE(S) DRILLED: 8/18/89

DRILLING CONTRACTOR: J.E. Fritts and Associates

DRILLING METHOD: Hollow-Stem Auger

BORING DIAMETER: 3.25"

SAMPLING METHOD: 2" O.D. Split-Spoon

TOTAL DEPTH:

BACKFILL MATERIAL AND METHOD: Type I Portland Cement and Bentonite (10%); Pressure Grouted

LOGGED BY: (b) (4) [redacted]

DEPTH TO STATIC WATER: N/A FT. BELOW GRADE

REMARKS:

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY	CLASSIFICATION
	1-3'	7,9,10,15	0"	
0-6.5'	3-5'	13,14,17,15	12"	CLAYEY SILT (ML): Some fine sand, little to trace angular schist clasts (1/8-3/4" yellow-)brown moderately plastic matrix, red-brown clasts; dry.
	5-7'	3,4,4,4	12"	
6.5-9'	7-9'	4,4,3,4	18"	SAND (SM): Medium, some fine sand, little very fine sand; micaceous; red-brown; wet at 7'.
9'				END OF BORING

BCM WELL DRILLING LOG

WELL NO:	MW-10	SHEET 1 OF: 1	
PROJECT:	Christiana Metals Corp. Groundwater Investigation	PROJECT NO:	00-6471-01
WELL LOCATION:	Adjacent to west end of plant along F.L.	DATE(S) DRILLED	8/4/89
DRILLING CONTRACTOR:	C.S. Garber and Sons, Inc.	DRILLING METHOD	Air Percussion
BORING DIAMETER:	8.5"	SAMPLING METHOD:	N/A
SAMPLE INTERVAL:	N/A		
LOGGED BY:	[redacted] (b)	TOTAL DEPTH:	15'
SCREEN SIZE AND MATERIAL:	0.020" slot, 4" I.D. schedule 40 PVC	SCREENED INTERVAL:	5-15'
CASING SIZE AND MATERIAL:	4" I.D. schedule 40 PVC	CASED INTERVAL:	0-5'
GRAVEL PACK SIZE:	Jessie Morie #1 silica sand	PACKED INTERVAL:	4-15'
GROUT TYPE:	Type I Portland Cement and Bentonite (10%)	GROUTED INTERVAL:	0-3'
GROUTING METHOD:	Pressure grout	BENTONITE SEAL:	3-4'
DEVELOPMENT METHOD:	Centrifugal pump	TIME: 30 mins.	ESTIMATED YIELD: 25 gpm
STATIC WATER DEPTH:	2.6'	DATE: 8/10/89	REFERENCE: Top of PVC

REMARKS: A hollow-stem auger rig equipped with a 2-inch O.D. split-spoon completed the first four feet of the hole.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-1'	0-2'	18,12,9,14	18"	FILL: Limestone gravel and sand.
1-4'	2-4'	9,9,8,10	12"	SILTY SAND (SM): Fine, some very fine sand, little clay, trace to little angular carbonate clasts (1/8-1/4"); grey brown matrix, moderately plastic, orange-brown to grey clasts; dry.
4-15'				Limestone
15'				END OF BORING. Limestone bedrock.

WELL DRILLING LOG

BCM

WELL NO:	MW-11
SHEET 1 OF:	1
PROJECT: Christiana Metals Corp. Groundwater Investigation	PROJECT NO: 00-6471-01
WELL LOCATION: Adjacent to midpoint of plant along fire lane	DATE(S) DRILLED 8/2/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. split-spoon	SAMPLE INTERVAL: 4'
LOGGED BY: (b [redacted]	TOTAL DEPTH: 16'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC	SCREENED INTERVAL: 6-16'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC	CASED INTERVAL: 0-6'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand	PACKED INTERVAL: 4-16'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)	GROUTED INTERVAL: 0-2'
GROUTING METHOD: Pressure grout	BENTONITE SEAL: 2-4'
DEVELOPMENT METHOD: Centrifugal pump / TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 9.4' / DATE: 8/10/89	REFERENCE: Top of PVC
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-1'	0-2'	3,7,12,14	14"	FILL: Limestone gravel and sand.
	4-6'	6,10,11,13	18"	CLAYEY SAND (SC): Fine, some very fine sand, little silt, trace weathered angular schist clasts (1/8-1/4"), yellow-brown moderately plastic matrix; gray-blue clasts; dry.
1-10'	8-10'	3,6,5,6	20"	
10-15.5'	10-12'	3,2,1,2	2"	SILTY SAND (ML): Fine, some very fine sand, micaceous, trace schist clasts (1/8") grey-black; wet at 13'.
	12-14'	3,4,3,2	12"	
15.5-17'	14-16'	1,1,2,4	12"	CLAYEY SILT (CL): Trace very fine sand, trace angular schist clasts (1/2-1") yellow-brown matrix, grey-brown clasts, wet.
	16-18'	4,31/3"	12"	
17'				END OF BORING. Limestone bedrock.

WELL DRILLING LOG

WELL NO:	MW-12
SHEET 1 OF:	2
PROJECT: Christiana Metals Corp. Groundwater Investigation Adjacent to east end of plant along	PROJECT NO: 00-6471-01
WELL LOCATION: fire lane	DATE(S) DRILLED: 8/3/89
DRILLING CONTRACTOR: C.S. Garber and Sons, Inc.	DRILLING METHOD: Hollow-Stem Auger
BORING DIAMETER: 6.25" / SAMPLING METHOD: 2" O.D. split-spoon	SAMPLE INTERVAL: Continuous
LOGGED BY: (b) (4) [redacted]	TOTAL DEPTH: 21'
SCREEN SIZE AND MATERIAL: 0.020" slot, 4" I.D. schedule 40 PVC	SCREENED INTERVAL: 8-21'
CASING SIZE AND MATERIAL: 4" I.D. schedule 40 PVC	CASED INTERVAL: 0-8'
GRAVEL PACK SIZE: Jessie Morie #1 silica sand	PACKED INTERVAL: 6-21'
GROUT TYPE: Type I Portland Cement and Bentonite (10%)	GROUTED INTERVAL: 0-4'
GROUTING METHOD: Pressure grouted	BENTONITE SEAL: 4-6'
DEVELOPMENT METHOD: Centrifugal pump / TIME: 1 hour	ESTIMATED YIELD: <1 gpm
STATIC WATER DEPTH: 9.2' / DATE: 8/10/89	REFERENCE: Top of PVC
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-1'	0-2'	12,11,10,10	14"	FILL: Gravel and sand
1-7'	2-4'	5,8,8,12	18"	CLAYEY SILT (ML): Some very fine sand, trace angular schist clasts (1/8-1/2") yellow-brown matrix, blue-grey clasts; dry.
	4-6'	5,6,5,6	8"	
	6-8'	2,3,3,5	14"	
7-8.5'	8-10'	8,14,9,3	18"	SILTY CLAY (CL): Trace very fine sand, trace angular schist clasts (1/8"); yellow-brown, very plastic matrix; moist.
8.5-10'	10-12'	1/24"	24"	CLAYEY GRAVEL (GC): angular schist clasts (1/2-1"); little very fine sand; micaceous; yellow-brown moderately plastic matrix; dry.

WELL NO. MW-12

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (in.)	CLASSIFICATION
10-21'	12-14'	4,1,2,8	24"	SAND (SM): Medium, some coarse sand, little fine sand, trace clay and silt, trace angular schist clasts (1/8-1/4"), micaceous, gray-brown; wet; weathered schistose grains.
	14-16'	2,3,10,17	24"	
	16-18'	2/24"	2"	
	18-20'	1,7,1/12"	24"	
	20-22'	50/0"	0"	Augered to 21'.
21'				END OF BORING. Limestone bedrock.

BCM WELL DRILLING LOG

WELL NO:	MW-13
SHEET	1 OF: 1
PROJECT:	Christiana Metals Corp. Groundwater Investigation
PROJECT NO:	00-6471-01
WELL LOCATION:	Offsite at west end of Taylor Rental
DATE(S) DRILLED	8/7/89
DRILLING CONTRACTOR:	C.S. Garber and Sons, Inc.
DRILLING METHOD	Air Percussion
BORING DIAMETER:	8.5"
SAMPLING METHOD:	N/A
SAMPLE INTERVAL:	N/A
LOGGED BY:	[redacted]
TOTAL DEPTH:	37'
SCREEN SIZE AND MATERIAL:	0.020" slot, 4" I.D. schedule 40 PVC
SCREENED INTERVAL:	27-37'
CASING SIZE AND MATERIAL:	4" I.D. schedule 40 PVC
CASED INTERVAL:	0-27'
GRAVEL PACK SIZE:	Jessie Morie #1 silica sand
PACKED INTERVAL:	25-37'
GROUT TYPE:	Type I Portland Cement and Bentonite (10%)
GROUTED INTERVAL:	0-23'
GROUTING METHOD:	Pressure grouted
BENTONITE SEAL:	23-25'
DEVELOPMENT METHOD:	Submersible pump
TIME:	1 hour
ESTIMATED YIELD:	<1 gpm
STATIC WATER DEPTH:	10.0'
DATE:	8/10/89
REFERENCE:	Top of PVC

REMARKS: For description of lithology from 0-15' see log for MW-14.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-15'				Overburden (see MW-14 log)
15-37'				Limestone bedrock: void from 27-28' (first water)
37'				END OF BORING

WELL DRILLING LOG

WELL NO:	MW-14
SHEET	1 OF:
PROJECT:	Christiana Metals Corp. Groundwater Investigation
PROJECT NO:	00-6471-01
WELL LOCATION:	Offsite adjacent to MW-13 at west end of Taylor Rental
DATE(S) DRILLED	8/7/89
DRILLING CONTRACTOR:	C.S. Garber and Sons, Inc.
DRILLING METHOD	Hollow-Stem Auger
BORING DIAMETER:	6.25"
SAMPLING METHOD:	2" O.D. split-spoon
SAMPLE INTERVAL:	5'
LOGGED BY:	(b) (4) [redacted]
TOTAL DEPTH:	15'
SCREEN SIZE AND MATERIAL:	0.020" slot, 4" I.D. schedule 40 PVC
SCREENED INTERVAL:	5-15'
CASING SIZE AND MATERIAL:	4" I.D. schedule 40 PVC
CASED INTERVAL:	0-5'
GRAVEL PACK SIZE:	Jessie Morie #1 silica sand
PACKED INTERVAL:	3-15'
GROUT TYPE:	Type I Portland Cement and Bentonite (10%)
GROUTED INTERVAL:	0-2'
GROUTING METHOD:	Pressure grouted
BENTONITE SEAL:	2-3'
DEVELOPMENT METHOD:	Centrifugal pump
TIME:	1 hour
ESTIMATED YIELD:	<1 gpm
STATIC WATER DEPTH:	15.0'
DATE:	8/10/89
REFERENCE:	Top of PVC
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-10'	5-7'	4,8,10,12	6"	CLAYEY SILT (ML): Some very fine sand, little angular schist clasts (1/8-1/4") yellow-brown matrix, moderately plastic; dry.
10-15'	10-12'	2,1,1,3	12"	SAND (SM): Medium, some fine sand, little silt to clay, moderate to low plasticity; brown-grey; wet.
	15-17'	50/0"		
15'				END OF BORING. Limestone bedrock.

BCM WELL DRILLING LOG

WELL NO:	MW-15
SHEET	1 OF: 1
PROJECT:	Christiana Metals Corp. Groundwater Investigation
PROJECT NO:	00-6471-01
WELL LOCATION:	Offsite at east end of Taylor Rental
DATE(S) DRILLED	8/7/89
DRILLING CONTRACTOR:	C.S. Garber and Sons, Inc.
DRILLING METHOD	Air Percussion
BORING DIAMETER:	8.5"
SAMPLING METHOD:	N/A
SAMPLE INTERVAL:	N/A
LOGGED BY:	(b) (4) [redacted]
TOTAL DEPTH:	78'
[redacted] AND MATERIAL:	0.020" slot, 4" I.D. schedule 40 PVC
SCREENED INTERVAL:	68-78'
CASING SIZE AND MATERIAL:	4" I.D. schedule 40 PVC
CASED INTERVAL:	0-68'
GRAVEL PACK SIZE:	Jessie Morie #1 silica sand
PACKED INTERVAL:	66-78'
GROUT TYPE:	Type I Portland Cement and Bentonite (10%)
GROUTED INTERVAL:	0-64'
GROUTING METHOD:	Pressure grouted with tremmie
BENTONITE SEAL:	64-66''
DEVELOPMENT METHOD:	Submersible pump
TIME:	1 hour
ESTIMATED YIELD:	2-3 gpm
STATIC WATER DEPTH:	0.04'
DATE:	8/10/89
REFERENCE:	Top of PVC

REMARKS: For description of lithology see log for MW-16.

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-21'				Overburden (see MW-16 log).
21-78'				Limestone bedrock: void at 68 to 69-feet (first water).
78'				END OF BORING

BCM WELL DRILLING LOG

WELL NO:	MW-16
SHEET	1 OF: 1
PROJECT:	Christiana Metals Corp. Groundwater Investigation
PROJECT NO:	00-6471-01
WELL LOCATION:	Offsite adjacent to MW-15 at east end of Taylor Rental
DATE(S) DRILLED	8/8/89
DRILLING CONTRACTOR:	C.S. Garber and Sons, Inc.
DRILLING METHOD	Hollow-Stem Auger
BORING DIAMETER:	6.25"
SAMPLING METHOD:	2" O.D. split-spoon
SAMPLE INTERVAL:	5'
LOGGED BY:	(b) (4) [redacted]
TOTAL DEPTH:	21'
SCREEN SIZE AND MATERIAL:	0.020" slot, 4" I.D. schedule 40 PVC
SCREENED INTERVAL:	7-21'
CASING SIZE AND MATERIAL:	4" I.D. schedule 40 PVC
CASED INTERVAL:	0-7'
GRAVEL PACK SIZE:	Jessie Morie #1 silica sand
PACKED INTERVAL:	5-21'
GROUT TYPE:	Type I Portland Cement and Bentonite (10%)
GROUTED INTERVAL:	0-3'
GROUTING METHOD:	Pressure grouted
BENTONITE SEAL:	3-5'
DEVELOPMENT METHOD:	Centrifugal pump
TIME:	1 hour
ESTIMATED YIELD:	<1 gpm
STATIC WATER DEPTH:	7.5'
DATE:	8/10/89
REFERENCE:	Top of PVC
REMARKS:	

LITHOLOGIC INTERVAL	SAMPLE INTERVAL	SPOON BLOWS	RECOVERY (IN.)	CLASSIFICATION OF MATERIALS
0-10.5'	5-7'	4,7,18,15	18"	CLAYEY SILT (CL): Trace angular schist clasts (1/8-1/4"); damp; grey mottling.
10.5-15'	10-12'	1,2,1,3	20"	CLAYEY SILT (CL): Trace very fine sand, highly plastic; orange-grey mottling; wet.
15-17'	15-17'	1/24"(W.O.H.)	24"	SILTY SAND (SM): Trace to little angular schist clasts (1/8-1/2"); brown-grey; wet.
17-21'	20-22'	1,2,1,1	18"	LIMESTONE BEDROCK: Weathered limestone.
21'				END OF BORING

BCM

APPENDIX B

HEALTH AND SAFETY PLAN

BCM

HEALTH AND SAFETY PLAN

FOR

CHRISTIANA METALS CORPORATION
BISHOP TUBE FACILITY
FRAZER, PENNSYLVANIA

JUNE 27, 1989

BCM PROJECT NO. 00-6471-01

PREPARED BY:

(b) (4) [redacted]

SENIOR HEALTH AND SAFETY SPECIALIST

AND

(b) (4) [redacted]

HEALTH AND SAFETY DIRECTOR

BCM

1.0 BACKGROUND

SITE: Bishop Tube Facility

LOCATION: Frazer, Pennsylvania

PROJECT DESCRIPTION: Groundwater Investigation

PROPOSED STARTUP DATE: 7/6/89 PROJECTED LENGTH OF WORK: 3 weeks

FACILITY DESCRIPTION: The facility is a redraw mill that fabricates speciality items in the stainless steel tubing field.

Unusual Features (containers, buildings, underground tanks, dikes, power lines, terrain, etc.)

Underground and overhead utilities and close proximity to railroad power lines.

Status: (X) Active
( ) Inactive

Overall Hazard is: (See Section 2.2)

High: ____ Moderate: X
Low : ____ Unknown : ____

Site History (worker or non-worker injury; complaints from public; previous agency action):

In May of 1988, BCM performed a groundwater quality investigation at the Bishop Tube facility. Results of the investigation indicate that Bishop Tube is the apparent source of trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) contamination.

BCM

2.0 SCOPE OF WORK

BCM Engineers Inc. (BCM) has been retained by Christiana Metals Corporation to perform additional investigative tasks at the Bishop Tube facility located in Frazer, Pennsylvania. The purpose of the investigation is to further delineate soil and groundwater contamination. BCM will oversee the installation of five groundwater monitoring wells. Three shallow monitoring wells will be installed on the north side of the plant with a cluster of two wells, one shallow and one deep installed on the northeast side of the facility close to the small stream and one cluster of a deep and shallow well approximately midway in front of the plant. All shallow wells will be drilled using hollow stem augers and the deep wells drilled utilizing air rotary. Soil sampling will be performed continuously using split spoon samplers. In addition, BCM will perform groundwater sampling of all existing and newly installed monitoring wells.

2.1 PERSONNEL INVESTIGATING SITE

Name:	Position:
(b) (4) [redacted]	Project Geologist
(b) (4) [redacted]	Field Geologist

BCM

2.2 HAZARD EVALUATION

The following substances have been detected in groundwater samples collected at the site. The primary hazards of each are identified.

Chemical	OSHA PEL ACGIH TLV ACGIH STEL NIOSH IDLH	Primary Hazards
CHLOROFORM CAS: 67-66-3	PEL: 2 ppm TLV: 10 ppm STEL: None IDLH: None CA	Poison to humans by ingestion and inhalation. Human central nervous system (CNS) effects and systemic effects.
CHLOROETHANE (ETHYL CHLORIDE) CAS: 75-00-3	PEL: 1,000 ppm TLV: 1,000 ppm STEL: None IDLH: 20,000 ppm	Moderately toxic by ingestion and inhalation routes. An irritant to skin, eyes, and mucous membranes.
1,1 DICHLOROETHANE CAS: 75-34-3	PEL: 100 ppm TLV: 200 ppm STEL: 250 ppm IDLH: None	Moderate toxicity by ingestion. Explosive when exposed to heat. Dangerous when heated to decomposition; it emits phosgene fumes. Colorless liquid.
1,2 DICHLOROETHANE (ETHYLENE DICHLORIDE) CAS: 107-06-2	PEL: 1 ppm TLV: 10 ppm STEL: 2 ppm IDLH: None CA	Toxic by ingestion, inhalation, and skin absorption. Strong irritant to eyes and skin. A carcinogen. Colorless liquid. Flammable, dangerous fire risk, explosive limits in air 6-16%.
1,1-DICHLOROETHYLENE (VINYLIDENE CHLORIDE) CAS: 75-35-4	PEL: 1 ppm TLV: 5 ppm STEL: 20 ppm IDLH: None	Poison by inhalation and injestion. An experimental carcinogen and mutagen by skin contact, inhalation, and other routes. A dangerous fire hazard when exposed to heat and flames.

BCM

Hazard Evaluation
Continued (Page 2)

Chemical	OSHA PEL ACGIH TLV ACGIH STEL NIOSH IDLH	Primary Hazards
1,2 DICHLOROETHENE CAS: 540-59-0	PEL: 200 ppm TLV: 200 ppm STEL: None IDLH: 4,000 ppm	Toxic by inhalation, ingestion, and skin contact; irritant. Narcotic in high concentrations. Flammable, dangerous fire risk.
METHYLENE CHLORIDE CAS: 75-09-2	PEL: 500 ppm TLV: 175 ppm STEL: None IDLH: None CA	Moderately toxic by inhalation and other routes; poison by ingestion and intervenous routes. Blood and central nervous system (CNS) effects by inhalation. An eye and skin irritant. A suspect *human carcinogen*. Narcotic, dizziness, nausea, dermatitis.
TETRACHLOROETHENE (PCE) CAS: 127-18-4	PEL: 25 ppm TLV: 50 ppm STEL: 200 ppm IDLH: None	Toxic by inhalation, ingestion, or repeated skin contact. Exposure to high concentrations can cause irritation to eyes, nose, and throat. Colorless liquid.
1,1,1-TRICHLOROETHANE (METHYL CHLOROFORM) CAS: 75-55-6	PEL: 350 ppm TLV: 350 ppm STEL: 450 ppm IDLH: 1,000 ppm	Toxic by inhalation. A moderate skin and severe eye irritant. CNS effects. Narcotic in high concentrations. Colorless liquid.
TRICHLOROETHENE (TCE) CAS: 79-01-6	PEL: 50 ppm TLV: 50 ppm STEL: 200 ppm IDLH: None CA	Non-flammable. CNS depressant. Skin and eye irritant. Chloroform-like odor. Suspect animal carcinogen. Toxic by inhalation.

BCM

Hazard Evaluation
Continued (Page 3)

Chemical	OSHA PEL ACGIH TLV ACGIH STEL NIOSH IDLH	Primary Hazards
TRICHLOROFLUOROMETHANE CAS: 75-69-4	PEL: 1,000 ppm (ceil) TLV: 1,000 ppm (ceil) STEL: None IDLH: 4,500 ppm	High concentrations cause narcosis and anesthesia. Dangerous when heated to decomposition; it emits toxic fumes.
VINYL CHLORIDE CAS: 75-01-4	PEL: 1 ppm TLV: 5 ppm STEL: 5 ppm IDLH: None CA	A human brain carcinogen. A severe irritant by inhalation to skin, eyes and mucous membranes. Causes skin burns by rapid evaporation and consequent freezing.

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit for an 8-hour time-weighted average.

ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value for an 8-hour time-weighted average.

ACGIH STEL = American Conference of Governmental Industrial Hygienists Short Term Exposure Limit for a 15-minute time-weighted average.

NIOSH IDLH = National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health Concentration

CA = NIOSH has identified numerous chemicals that they recommend shall be treated as potential human carcinogens.

NOTE: Material Safety Data Sheets can be obtained by request from the BCM Information Center upon contacting the BCM Safety Department.

The following additional hazards are expected onsite:

Caution must be given to overhead and underground utilities

BCM

2.3 PERSONNEL PROTECTIVE EQUIPMENT

LEVEL OF PROTECTION

B ( ) C ( ) D (X) Location/Activity: SHALLOW MONITORING WELL INSTALLATION

The drilling of all shallow wells will be initiated at Level D respiratory protection wilth the associated dermal protection. See Section 2.4 for action level requirements.

B ( ) C (X) D ( ) Location/Activity: DEEP MONITORING WELL INSTALLATION

The drilling of both deep wells will be initiated at Level C respiratory protection with the associated dermal protection. Level C is required due to the potential release of volatile organic compounds caused by air rotary drilling. A downgrade to Level D respiratory protection will be permitted if the action level is not exceeded. See Section 2.4 for action level requirements.

B ( ) C ( ) D (X) Location/Activity: MONITORING WELL SAMPLING

The level of protection to be utilized during monitoring well sampling will be directly dependant on the level used to install the wells. However, it is anticipated that Level D will be utilized during sampling with continuous monitoring of the workers' breathing zone. See Section 2.4 for action level requirments.

B ( ) C (X) D ( ) Location/Activity: DECONTAMINATION OF HEAVY EQUIPMENT

Heavy equipment that comes in contact with potentially contaminated materials must be decontaminated at Level C respiratory and dermal protection. If volatile organic concentrations are not detected above the set action levels, decontamination will be performed using a splash shield with dermal protection.

BCM

RESPIRATOR ( ) N/A

(X) Full-Face Respirator (Level C) (MSA Cartridge GMC-H)

( ) Half-Face Respirator (MSA Cartridge _____)

( ) Self-Contained Breathing Apparatus

( ) Escape Mask

( ) Airline Respirator

NOTE: GMC-H = organic vapor/acid gas/high efficiency particulate filter
See Attachment A for respirator inspection check list and positive negative fit test/procedures.

CLOTHING ( ) N/A

( ) Tyvek Coverall

( ) Fully Encapsulating Suit

(X) Polycoated Tyvek Coverall

( ) Chemical-Resistant Splash Suit

( ) Saranex Coverall

( ) Other _____

NOTE: _____

HAND PROTECTION ( ) N/A

(X) Undergloves Latex
Type

(X) Overgloves Nitrile
Type

( ) Gloves _____
Type

( ) Other _____

FOOT PROTECTION ( ) N/A

(X) Safety Workboots/Shoes

( ) Heavy Outer Boots

(X) Disposable Overboots

( ) Other _____

BCM

HEAD, EYE, & HEARING ( ) N/A

(X) Hard Hat

( ) Chemical Splash Goggles

(X) Hearing Protection (as needed)

(X) Safety Glasses (NIOSH or ANSI approved)

(X) Face Shield (Decontamination)

NOTE: Safety glasses must be worn if eye protection is not afforded by a full-face respirator.

2.4 MONITORING EQUIPMENT ( ) N/A

(X) Photoionization Detector (HNu PI-101)

(X) Flame Ionization Detector (Century Organic Vapor Analyzer)

(X) Combustible Gas/Oxygen/Hydrogen Sulfide Meter (MSA Model 361)

( ) Radiation Meter (Ludlum Model 3 Survey Meter)

( ) Detector Tubes (Type - _____)

( ) Other: _____

NOTE: Real-time monitoring of volatile organics will be performed using an HNu PI-101 photoionization detector or an OVA 128 flame ionization detector. At any time if sustained organic concentrations exceed 5 ppm above background levels in the workers' breathing zone during Level D activities, an upgrade to Level C will be warranted. If sustained volatile organic concentrations exceed 50 ppm above background levels in the workers' breathing zone for Level C activities, an upgrade to Level B will be warranted. Monitoring will also be performed using the MSA 361 O_2/LEL/H_2S meter during drilling activities. If concentrations detected exceed 25 percent of the LEL, all work will stop and the site conditions re-evaluated. In addition, a background reading will be collected with each instrument. A background area is defined as an area free of site-generated airborne contaminants. This area will be located upwind of the work area. All instruments will be calibrated and operated in accordance with manufacturer's specifications.

BCM

3.0 DECONTAMINATION PROCEDURES

Personnel and equipment leaving the Exclusion Zone (work area) shall be thoroughly decontaminated. The minimum Level C decontamination protocol shall be used with the following decontamination stations:

1. Equipment drop
2. Glove wash
3. Glove rinse
4. Boot wash
5. Boot rinse
6. Protective clothing removal
7. Respirator removal

NOTE: The above wash and rinse stations may be eliminated if a total disposable outfit is utilized; however, protective clothing removal shall be performed as stated above.

Clothing known to be contaminated should be contained and left onsite for proper disposal along with decontamination solutions. All equipment coming in contact with contaminated soil or groundwater must be properly decontaminated before leaving the site. See Attachment B for respirator sanitizing procedures.

The following decontamination equipment is required:

Tubs, buckets, brushes, liquinox, sprayer, and trash bags.

3.1 EQUIPMENT

Heavy equipment that comes in contact with contaminated materials must be cleaned by approved means before leaving the site. Heavy equipment decontamination shall be performed by the Contractor at the designated washdown station using approved means (water and/or steam). Level C personal protection will be used while decontaminating the equipment. Section 2.3 lists the dermal protection to be utilized for this task.

BCM

4.0 GENERAL WORK REQUIREMENTS

All BCM personnel must comply with the following requirements:

1. Satisfy the medical surveillance requirements as listed in 29 CFR Part 1910.120 Hazardous Waste Operations and Emergency Response, Final Rule

2. Receive appropriate safety training (29 CFR Part 1910.120)

3. Complete 3 days of prior fieldwork under a qualified supervisor

4. Review the HASP, and are fully aware of the requirements in the plan

5. Dressed out in accordance with the task-specific plans

6. No eating, drinking, smoking, or gum or tobacco chewing is allowed in the work zone

7. Wash hands and face before leaving the work area. Individuals will shower, as soon as possible, after leaving the job site at the end of the day

8. Contact with contaminated surfaces or surfaces suspected of being contaminated should be avoided while the worker is unprotected. In the event that protective clothing is ripped or torn, work is to stop and the protective clothing removed and replaced as soon as possible. In the event of direct skin contact, the affected area is to be washed immediately with soap and water

9. Any person under a physician's care, taking medication, or those who experience allergic reactions must inform the Health and Safety Officer

All personnel entering areas requiring Level B or C protection shall:

1. Be respirator fit-tested (within previous 6 months). Documentation must be provided to show respirator size, model, and manufacturer.

2. Be cleanly shaven

3. Have been trained in the level of respiratory protection being used at the site

4. Work in a minimum of a two-person team with a line of sight to a third person (Level B)

BCM

4.1 CONTRACTOR

This provision imposes upon the contractor the responsibility for the health and safety of his employees and others while performing work on the site.

- The contractor shall satisfy all federal, state, and local statutes, regulations and ordinances regarding health and safety, including the most recent OSHA standards which are specifically referenced.

- Contractor shall review the HASP and attend a safety briefing given by BCM and sign the Approval/Sign Off format found in the back of the HASP prior to site entry.

- Contractors shall supply the necessary safety equipment (as outlined by this Health and Safety Plan [HASP]) for their crews. BCM is not responsible for contractor safety equipment.

BCM

5.0 SITE ENTRY AND EXIT PROCEDURES

Startup

1. Team briefing to review intended daily operations and safety procedure update
2. Daily check of all monitoring and safety equipment
3. Personnel dress out and team proceeds to the work area

Shutdown

1. All personnel exit from the work zone and decontaminate
2. Ensure that the work area and all equipment are secured

BCM

6.0 VISITOR PROTOCOL

All visitors who proceed downrange in the Work Area must comply with the following requirements and those set forth in Section 4.0.

1. Visitors must have reviewed the site-specific HASP and must agree to comply with the guidelines set forth in this plan

2. Visitors will be limited to Level D work areas

3. Visitors must be escorted by onsite personnel

BCM

7.0 HEAT EXPOSURE

7.1 HEAT STRESS

Heat stress is a major hazard, especially for workers wearing protective clothing. Depending on the ambient conditions and the work being performed, heat stress can occur very rapidly - within as little as 15 minutes. The key to preventing excessive heat stress is educating personnel on the hazards associated with working in heat and the benefits of implementing proper controls and work practices.

7.1.1 Heat Rash

Heat rash (prickly heat) may result from continuous exposure to heat or humid air where the skin remains wet due to lack of evaporation, sweat ducts become plugged, and a skin rash appears. This uncomfortable rash can be prevented by resting in a cool place during breaks and by good daily personal hygiene.

7.1.2 Heat Cramps

Heat cramps are muscular spasms, usually in abdomen or limbs due to loss of salt following profuse sweating. The drinking of large quantities of water tends to dilute the body's fluids, while the body continues to lose salt.

First Aid:

1. Apply warm moist heat and pressure to reduce pain

2. Give electrolyte drinks by mouth

7.1.3 Heat Exhaustion

Caution: Persons with heart problems or on a "low sodium" diet who work in hot environments should consult a physician about what to do under these conditions.

Heat exhaustion is a result of overexertion in hot or warm weather. It is highly possible for an onsite worker to experience heat exhaustion due to the use of worker protective coveralls, boots, gloves, and respiratory protection, even if ambient temperatures are mild.

BCM

Symptoms:

1. Pale, clammy skin
2. Profuse perspiration
3. Weakness
4. Headache
5. Nausea

First Aid:

1. Get victim into shade or cooler place
2. Immediately remove any protective clothing
3. Victim should drink plenty of fluids
4. Victim should lie down with feet raised
5. Fan and cool victim with wet compresses
6. If vomiting occurs, transport to hospital
7. Victim should rest for a few days

Prevention:

1. If possible, schedule work for early morning or evening during warm weather
2. Work in shifts; limit downrange time of personnel and follow with frequent breaks
3. Have cool liquids at Exclusion Zone border for downrange personnel to continuously replace body fluids
4. The HSO or designee should continually monitor personnel for signs of heat stress

7.1.4 Heat Stroke

The body's temperature control system that causes sweating stops functioning correctly in the case of heat stroke. Brain damage and death may occur if body core temperature is extremely elevated and is not reduced.

BCM

Symptoms:

1. Flushed, hot dry skin
2. High body core temperature ($\geq$105°F)
3. Dizziness
4. Nausea
5. Headache
6. Rapid pulse
7. Unconsciousness

First Aid:

Immediately take precautions to cool body core temperature by removing clothing and sponging body with alcohol, or cool water, or placing in tub of cold water until temperature is lowered sufficiently (102°F). Stop cooling and observe victim for 10 minutes. Once temperature remains lowered, dry person off. Use fans or air conditioning, if available. Do not give the victim stimulants. Transfer to medical facility.

BCM

8.0 DRILLING SAFETY

The drilling contractor is required to comply with all local, state, and federal regulations regarding the safe operation of a drill rig. The following items serve as guidelines for drilling operations.

1. Prior to drilling, adequate site clearing and leveling should be performed to accommodate the drill rig and supplies and provide a safe working area.

2. Overhead and buried utilities must be located prior to start-up of drilling activities.

3. All onsite personnel should stand clear of the drill rig immediately prior to and during starting of the engine.

4. Organic vapor monitoring will be conducted continuously in the workers breathing zone during drilling operations.

5. If Level B (Airline respirators) is utilized, particular attention should be given to the airline hose in order to ensure that workers do not trip on the hose and that the hose does not become entangled or severed from moving parts.

6. Immediately following the completion of drilling operations, the entire work area will be monitored to determine if vapor concentrations have returned to background levels. If elevated levels are detected, the source will be determined and the appropriate action will be taken.

BCM

9.0 EMERGENCY CONTINGENCY PLAN

If an incident occurs that requires declaring an emergency, all personnel will assemble at the decontamination station for further instruction. Arrangement for decontamination, evacuation, and/or transport will be made at that time. The client and the appropriate BCM personnel will be notified of the incident as soon as is practicable.

9.1 NOTIFICATION/REPORTING PROCEDURES

In the event of an emergency, Russell Levering will be notified as soon as possible as to the nature of the incident (vapor release, injury, etc.), and emergency services will be notified as needed (see Section 9.6 - Contingency Contacts).

9.2 UNEXPECTED VAPOR RELEASES

In the event that airborne contaminants migrate from the work zone and potentially endanger unprotected personnel or the community, all onsite activities will cease until the release is brought under control.

9.3 PERSONNEL INJURY

In the event of an injury, all personnel will assemble at the decontamination station. If the injured person is immobile, one or more persons should remain nearby to provide any necessary first aid. If medical help is needed, the Project Geologist will summon the appropriate assistance as outlined below, or transport as necessary. The extent of decontamination of any injured personnel, and those coming to his or her aid, is a judgement that must be made on a case-by-case basis.

While onsite activity is in progress, it is recommended that at least one qualified person will be available at all times to administer first aid, including CPR.

If an eye or skin injury is chemical in nature (e.g., overexposure), the following first aid procedures are to be instituted:

- Eye Exposure - If contaminated solids or liquids gets into the eyes, wash eyes immediately for 15 minutes at the emergency eye wash station (Contamination Reduction Zone) using large amounts of water and occasionally lifting the lower and upper eye lids. Obtain medical attention immediately.

- Skin Exposure - If contaminated solid or liquid gets on the skin, promptly wash the contaminated skin using soap or mild detergent and water. If solids or liquids penetrate the clothing, remove the clothing immediately and wash the skin using soap or mild detergent and water. Obtain medical attention immediately.

BCM

9.4 EVACUATION PLAN

In the event of an onsite evacuation, the following plan will be put into effect:

- A signal consisting of five 1-second blasts of vehicle or air horn will be used.
- All personnel will immediately evacuate downwind areas and report to the decontamination station for further instruction.

9.5 SPILL PREVENTION AND RESPONSE

In the event of a leak or a spill, the area will be cordoned off and the spill contained and cleaned up by authorized personnel. All materials will be disposed of in a proper manner.

BCM

9.6 CONTINGENCY CONTACTS

Agency	Contact	Phone Number
Fire Department	Paoli Fire Department	(215) 644-1224
Police Department	Paoli Area Police Dept.	(215) 647-1440
Health Department	Health Department	(215) 344-6160
Poison Control Center	Poison Control	(215) 386-2100
Hospital Emergency Room	Paoli	(215) 648-1043
Ambulance	Paoli Fire Department	(215) 953-0800
State Agency Hotline	PADER	(215) 270-1900
Drilling Contractor	C.S. Garber & Sons, Inc.- Dennis Stoudt	(215) 367-2861
State Police	West Chester Barracks	(215) 692-2290
Onsite Coordinator	(b) (4) [redacted]	Onsite
Primary Plant Contact	Russell Levering	(215) 647-3450
Secondary Plant Contact	George Meyer	(215) 647-3450
BCM Contact	(b) (4) [redacted]	(215) 825-3800

Directions to Hospital (Emergency Route)

Paoli Hospital

Depart facility turning onto Route 30 east. Follow Route 30 East approximately 2 to 3 miles. Paoli Hospital is located on the left hand side of Route 30.

BCM

ATTACHMENT A

BCM

ATTACHMENT A

MSA ULTRATWIN
INSPECTION CHECKLIST PRIOR TO FIELD USE

1. Exhalation Valve - pull off plastic cover and check valve for debris or for tears in the neoprene valve (which could cause leakage).

2. Inhalation Valves (two) - screw off cartridges and visually inspect neoprene valves for tears. Make sure that the inhalation valves and cartridge receptacle gaskets are in place.

3. Make sure a protective cover lens is attached to the lens.

4. Make sure you have the right cartridge.

5. Make sure that the facepiece harness is not damaged. The serrated portion of the harness can fragment which will prevent proper face seal adjustment.

6. Make sure the speaking diaphragm retainer ring is hand tight.

7. Don the respirator and perform a negative pressure test.

POSITIVE/NEGATIVE FIT TEST PROCEDURES

The respirator must be subjected to the following tightness test before each use:

Test respirator for leakage using a positive pressure method. Lightly place palm over exhalation valve cover. Gently exhale. A slight positive pressure should build up inside the respirator. If any leakage is detected around the facial seal, readjust head harness straps and repeat test until there is no leakage. If other facial seal leakage is detected, the condition must be investigated and corrected before another test is made. A negative pressure test may also be performed on certain types of respirators. Lightly place palms over cartridges or filter holders. Gently inhale and the facepiece should collapse against the face. The respirator must pass the tightness tests before the respirator is used. The respirator will not furnish protection unless all inhaled air is drawn through suitable cartridges or filters.

BCM

ATTACHMENT B

BCM

ATTACHMENT B

PROCEDURE FOR CLEANING AND DISINFECTING RESPIRATORS

1. Remove cartridges (if of the air-purifying type) and put in container provided.

2. Remove regulator of airline respirator.

3. Remove any gross contamination with water and paper towels, taking care not to scratch the plastic lens.

4. Mix 70 ml of concentrated cleaning solution into 3 gallons of water in the bucket provided.

5. Soak respirator in solution for about 10 minutes (remove regulator if airline respirator).

6. Dip respirator into rinse bucket several times.

7. Rinse respirator with copious amounts of fresh water from the eye wash station.

8. Shake excess water from respirator, dry with paper towels, ensure that exhalation valve is clean, dry, and operable, and place into new plastic bag.

BCM

HEALTH AND SAFETY PLAN
APPROVAL/SIGN-OFF FORMAT

I have read, understood, and agree with information set forth in this Health and Safety Plan and discussed in the Personnel Health and Safety briefing.

(b) (4) [redacted]

M. Douglas Mueller Director, Health and Safety	(b) (4) [redacted]	Date
(b) (4) [redacted] Senior Health and Safety Specialist	Signature	7/10/89 Date
(b) (4) [redacted] Project Manager	Signature	Date
(b) (4) [redacted] Field Geologist	Signature	Date

Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date

BCM

ORIGINAL (Red)

APPENDIX C

FIELD DATA SHEETS

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

DAY)

Client CHRISTIANA METALS
Date 8-29-89
Location FRAZER, PA.
Project No. 64710
Contact Person
Phone No.
Sampling Team (b) (4) [redacted]
Weather OVERCAST 80's
Reason for Sampling 1ST ROUND

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 1	13.25' TO PVC	48'	4"	24 gals	75 gals	HOMELITE PUMP	5.93	95	18°C	11:40	TEFLON BAILER	HNU-NIR CLEAR 10 gpm
MW 4	10.71 TO PVC	20'	4"	6.5 gals	45 gals		6.28	500	18°C	1215		HNU-NIR TAN CLEARS ~6 gpm
MW 5	12.10' TO PVC	20'	4"	5.5 gals	16 gals	PVC BAILER	6.62	4600	19°C	120		HNU .5 ppm OILSHEEN BLACK, SILTY BAIL DRY 3X
MW 6	16.22' TO PVC	20.5'	4"	3 gals	10 gals	PVC BAILER	6.58	710	17°C	1250		HNU-NIR DARK BROWN SILTY BAIL DRY 3X
MW 7	12.62' TO PVC	20'	4"	5 gals	15 gals		6.83	250	17°C	155		HNU-20ppm BROWN SILTY BAIL DRY 3X <½ gpm
MW 13	10.32' TO PVC	37'	4"	18.7 gals	[redacted] gals 40-	HOMELITE PUMP	7.34	380	18°C	3:25		TAN HNU-18ppm CLEARS PUMPED DRY 3X <½ gpm

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client: CHRISTIANA METALS — DAY 2 — Date: 8-29-89
Location: FRAZER, Pa. — Project No.:
Contact Person: — Phone No.:
Sampling Team: (b) (4) [redacted] — Weather: OVERCAST 80's
Reason for Sampling: 1ST ROUND

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 14A *	9.12' TO PVC	17'	4"	5.5 gals	16 gals	PVC BAILER	6.95	430	18°C	3:00	TEFLON BAILER	BROWN SILTY HNU - .5 ppm BAIL DRY 3X
MW 15 ✓	ARTESIAN	78'	4"	55 gals	90 gals	HOMELITE PUMP	7.13	610	18°C	3:30		TAN CLEARS SILTY HNU-9 ppm <1 gpm
MW 16	7.18' TO PVC	21'	4"	9.7 gals	30 gals	PVC BAILER	7.18	380	18°C	4:30		TAN SILTY HNU - 5 ppm <1 gpm

* DUPLICATE TAKEN AT MW-14A, LABELLED MW-14B

Day 2

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client: Christiana Metals
Location: Malvern Pa.
Contact Person: [redacted] (b) (4)
Sampling Team:
Reason for Sampling:

Date: 8/30/89
Project No.: 6471-01
Phone No.:
Weather: Partly Cloudy 80±5 - to Sunny

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery	
MW 9	15.45 T.O.S.	63'	6"		275 gallons	Homelite Pump	6.98	450	21°C	13:10	Teflon Bailer	Orangish 15 gpm	no reading on H-Nu
MW 8	13.73 TO PVC	20'	4"	4.3 gallons	14 gallons	PVC Bailer	6.91	440	23°C	13:40		Greenish Muddy 1 gpm poor yield	No reading on H-Nu
* MW 12	8.63 TO PVC	21'	4"	8.6 gallons	25 gallons	PVC Bailer	6.95	500	21°C	14:40		Brown Muddy poor yield	no read. in well
* MW 11	9.01 TO PVC	16'	4"	4.8 gallons	15 gallons	PVC Bailer	6.98	650	21°C	15:30		Brown Poor yield	no reading in well
MW 3	6.10 TO PVC	14'	4"	5.5 gallons	17 gallons	PVC Bailer	7.14	400	21°C	16:15		Clear to muddy fair yield	Zeroed H-Nu no reading in well
MW 2	6.35 TO PVC	21'	4"	10.2 gallons	31 gallons	Homelite Pump	6.88	500	22°C	16:00	Teflon Bailer	Clear 1 gpm	0-20 scale H-Nu read 10

Dupe on this well Marked 8a

6.99
.7
4.893

7.90
.7
5.510

21.00
6.35
14.65
.7
10.255

* H-Nu was picking up whatever they were welding inside building. We could smell it.

MW-12 on 0-20 scale the H-Nu was reading the air around us at 3, when put in well needle went to 4.

MW-11 - on 0-20 scale the H-Nu was reading 2, when well was opened needle jumped to 11 then went down and held between 7 + 8. Purge water

Day 2

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client: Christiana Metals
Date: 8/30/89
Location: Malvern Pa.
Project No.: 6478-01
Contact Person: [redacted]
Phone No.:
Sampling Team: (b) (4)
Weather: Partly Cloudy 80's to Sunny
Reason for Sampling:

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery	
MW 10	2.52 To PVC	15'	4"	8.7 gallons	110 gallons	Homelite pump	7.01	470	22°C	16:30	Teflon Bailer	muddy to clear 25 gpm	operative no reading purged water reading was 22

12.48
.7
8.736

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client CHRISTIANA METALS
Location FRAZER, PA
Contact Person
Phone No.
Sampling Team (b) (4) [redacted]
Reason for Sampling 2ND ROUND

Date 9-28-89
Project No. 6471-01
Weather SUNNY 70'S

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 13	13.29' TO PVC	37'	4"	16.6 gal	50 gals	KECK PUMP				1230	DEDICATED TEFLON BAILER	BROWN SILTY FAIR YIELD
MW 14	8.45' TO PVC	17'	4"	6 gals	18 gals	PVC BAILER				1240		CLEAR W/ A TAN TINT PUMPED DRY 3x
MW 15	ARTESIAN TO PVC	78'	4"	55 gals	110 gals	TANAKA PUMP				1350		CLEAR <1 gpm
MW 16	5.55' TO PVC	21'	4"	10.8 gals	33 gals	~~PUMP~~ KECK PUMP				1345		TAN, TURBID CLEARS SOME ~1.5 gpm
MW 10A	2.79' TO PVC	15'	4"	8.5 gals	55 gals	TANAKA PUMP				1422		TAN COLOR CLEAR ~15 gpm
MW 12	10.11' TO PVC	21'	4"	7.6 gals	23 gals	KECK PUMP				1450		TAN, TURBID CLEARS SOME ~1.5 gpm

- DUPLICATED TAKEN AT MW-10A, LABELLED MW-10B
- FIELD BLANK TAKEN BEFORE MW-15 WAS SAMPLED

BETZ CONVERSE MURDOCH INC
GROUNDWATER SAMPLING FIELD DATA SHEET

Client CHRISTIANA METALS
Location FRAZER PA.
Contact Person
Sampling Team (b) (4) [redacted]
Reason for Sampling 2ND ROUND

Date 9/28/89
Project No. 6471-01
Phone No.
Weather SUNNY 70'S

Well	Depth to GW w/reference	Well Depth	Well Diameter	Well Volume	Evacuate Volume	Evacuate Method	Groundwater pH	Groundwater Cond.	Groundwater Temp.	Sampling Time	Sampling Method	Well Yield-Recovery
MW 11	8.64' TO PVC	16'	4"	5.2gal	18gal	P/C BAILER				1455	DEDICATED TEFLON BAILER	BROWN TURBID 1 AIR LIFT
MW 2	7.77' TO PVC	21'	4"	9.2gal	28gal	TANAKA PUMP				1520	↓	TAN TURBID CLEARS SOME ~1 GPM
MW 3	7.51' TO PVC	14'	4"	4.5gal	14gal	PVC BAILER				1540	↓	BROWN TURBID BAILS DRY

ORIGINAL (Red)

BCM

ORIGINAL (Red)

APPENDIX D

CHAIN-OF-CUSTODY DOCUMENTATION

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 647147

PROJECT NAME Christian Bros

SAMPLERS.

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	W.M. VOAS	TYPE	FIELD ANALYSES	REMARKS/ ANALYSES
					Empties		14			VOCs by method 602
	7/31/89	5:16		X	Trip Blanks		2			
	7/31/89	5:16		X	Field Water Blanks		4			
	8/1/89	1405		X	MW-10A-1.5	1	1			
	8/1/89	1430		X	B-5-1.5	1	1			
	8/1/89	1445		X	B-5-3.5	1	1			
	8/1/89	1450		X	B-5-4.5	1	1			
	8/1/89	1500		X	B-5-6.5	1	1			
	8/1/89	1550		X	B-6-1.5	1	1			
	8/1/89	1620		X	B-6-5.5	1	1			
	8/1/89	1405		X	Field Blank	1	1			
	7/31/89	—		X	Trip Blank	1	1			

***NOTE ANY KNOWN OR SUSPECTED HAZARDS * All samples contain high concentrations of TCE + TCA (100 to >1000 ppm)

Empties dispatched by:	Date/Time 8/1/89 1408	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
Relinquished by: (SIGNATURE)	Date/Time 8/1/89 1810	Received for Laboratory by (SIGNATURE)	Date/Time 8/1/89 1810	(Shipping/Receiving) Remarks Airbill Number:	

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 64

PROJECT NAME: E Christiana Metals

SAMPLERS: Eric Schmidt

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	TYPE	FIELD ANALYSES	REMARKS/ ANALYSES
	8/1/89	1820		X	Trip Blank	1	X			
	8/1/89	1820		X	Field Blank	1	X			

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

Empties dispatched by:	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
Gillian	8/1/89 1826	[signature]			

Relinquished by: (SIGNATURE)	Date/Time	Received for Laboratory by (SIGNATURE)	Date/Time	(Shipping/Receiving) Remarks Airbill Number:
[signature]	8/3/89 1830	Gillian	8/3/89 1830	

CUSTODY SEALS INTACT (Y,N,NA)

(b) (4) redacted

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO.	PROJECT NAME
6471-07	Christiana ~~Brothers~~ FS Metals

SAMPLER (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	µM VOAs									TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
					Empties	24	x									S					
	8/1/89	1820		x	Trip Blanks	2	x									S					
	8/1/89	1820		x	Field Blank Water Rinsates	4	x									S					
	8/2/89	1110		x	MW-11-1.5	1	x									S					
	8/2/89	1130		x	MW-11-9.5	1	x									S					
	8/2/89	0805		x	B-7-1.5	1	x									S					
	8/2/89	0855		x	B-7-10.5	1	x									S					
	8/2/89	0855		x	B-7-10.5A	1	x									S					
	8/2/89	0910		x	B-7-13	1	x									S					
	8/3/89	0915		x	MW-12-1.5	1	x									S					
	8/3/89	0945		x	MW-12-7.5	1	x									S					
	8/3/89	1020		x	MW-12-15	1	x									S					
	8/3/89	1445		x	B-9-1.5	1	x									S					
	8/3/89	1455		x	B-9-7.5	1	x									S					
	8/3/89	1455		x	B-9-7.5A	1	x									S					
	8/3/89	1510		x	B-9-10.5	1	x									S					
	8/1/89	1820		x	Trip Blank	1	x									AQ					
	8/2/89	1045		x	Field Blank	1	x									AQ					

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

Empties dispatched by:	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
[signature]	8/1/89 1825	(b) (4) [redacted]			

Relinquished by: (SIGNATURE)	Date/Time	Received for Laboratory by (SIGNATURE)	Date/Time	(Shipping/Receiving) Remarks
[signature]	8/3/89 1830	[signature]	8/3/89 1830	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 8544-03

PROJECT NAME GE Moorestown

SAMPLERS. [signature]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	Amber Qt (unfiltered)	Clear Gl. Qt (Filtered)	Pl Qt (unfiltered)	Pl. Pt. (Filtered HNO3)	Pl. Pt. (Filtered H2SO4)	40ml VOA	40ml VOA 12 vial			TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
	8/17/89	1630		X	MW-5	9	2	1	1	2	1	2				AQ					samples contain free phase "6 oil" *
	8/17/89	1730		X	MW-7	9	2	1	1	2	1	2				AQ					samples contain free phase "6 oil" **
	8/17/89	1600		X	Field Blank	5	2	1				2				AQ					
	8/16/89	1400		X	Trip Blank	5	2	1				2				AQ					
	8/17/89	1800		X	Lab QA/QC (MW-7)	9	4	3				2				AQ					
	8/17/89	1530		X	MW-6 - Free Prod	1							1			O					Viscosity sample

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

* the filtered plastic pint sample for MW-5 was not filtered due to free phase, sample is in separate amber qt.

** the filtered plastic pint sample for MW-7 is filtered.

Empties dispatched by:	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
[signature]	8-16-89 3:00	(b) (4) [redacted]	(b) (4) [redacted]	8/17/89 1900	(b) (4) [redacted]

Relinquished by: (SIGNATURE)	Date/Time	Received for (SIGNATURE)	Date/Time	(Shipping/Receiving) Remarks
(b) (4) [redacted]	8/18/89 0900	(b) (4) [redacted]	8-18-89 8:51am	Airbill Number:
			CUSTODY SEALS INTACT (Y,N,NA)	

[redacted] file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO.	PROJECT NAME
	Christina Metals

SAMPLERS.

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	W/M VOA	TYPE	FIELD ANALYSES	REMARKS/ ANALYSES
					Empties	16	24			
					[illegible] Blank	1	1			
					[illegible]	2	2			
	8/18/84	1315		X	B-10-1.5	1	1	S		
	8/18/84	1330		X	B-10-6.5	1	1	S		
	8/18/84	1515		X	B-11-1.5	1	1	S		
	8/18/84	1530		X	B-11-6.5	1	1	S		
	8/18/84	1730		X	B-12-4.5	1	1	S		
	8/18/84	1745		X	B-12-6.5	1	1	S		
	8/18/84	1830		X	Field Blank	1	1	S		

***NOTE ANY KNOWN OR SUSPECTED HAZARDS: B-11 & B-12 samples pegged OVA at >1000 ppm (TCE)

Empties dispatched by:	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
[illegible]	8/18/84 1430				

Relinquished by: (SIGNATURE)	Date/Time	Received for Laboratory by (SIGNATURE)	Date/Time	(Shipping/Receiving) Remarks
[illegible]	8/18/84 1445	[illegible]	8/18/84 1440	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO.: 6471-CV

PROJECT NAME: CHRISTIANA METALS

SAMPLERS: (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOAs	Acid Volatile	Acid Hydrocarbons	Base Neutral Hydrocarbons						TYPE	FIELD ANALYSES pH	FIELD ANALYSES Sp.C.	REMARKS/ ANALYSES Temp °C
	8/29/94	1:40		X	MW-1	5	2	1	1	1						AQ	5.83	935	18
		2:15			MW-4	5	2	1	1	1							6.22	500	18
					MW-5	5	2	1	1	1							6.62	1000	19
		0			MW-6	5	2	1	1	1								710	17
					MW-7	5	2	1	1	1								320	17
					[illegible]	2	2	-	-	-								280	18
		3:00			MW-14A	2	2	-	-	-							6.95	430	18
		3:00			MW-14B	2	2	-	-	-							6.95	430	18
		3:30			MW-15	2	2	-	-	-							7.13	610	18
		4:30			MW-16	2	2	-	-	-							7.12	520	17
		1130			FIELD BLANK	2	2	-	-	-									
					TRIP BLANK	2	2	-	-	-									

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

Empties disposed by:	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
(b) (4) [redacted]	8-29-94 1430	(b) (4) [redacted]			
[redacted]	8/29/94 1705	Received for Laboratory by (SIGNATURE): (b) (4) [redacted]	Date/Time: 8/29/94 1710	(Shipping/Receiving) Remarks: Airbill Number:	

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

PROJ NO.	PROJECT NAME
6471-01	Christiana Metals

SAMPLERS. A. Hannon / M. Ippolito

KEY
AQ-Aqueous
S-Solid
A-Air
L-Liquid
O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA's Sn-matter	HNO3 PL.PT. filter	H2SO4 PL.PT.	UNfixed PL.PT.					TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
	8/30/89	1600		X	MW-[redacted]2 (A-H)	2	2								AQ					
		1615		X	MW-3	2	2								AQ					
		1340		X	MW-8	5	2	1	1	1					AQ					
		1340		X	MW-8a	5	2	1	1	1					AQ					
		1310		X	MW-9	5	2	1	1	1					AQ					
		1630		X	MW-10	2	2								AQ					
		1530		X	MW-11	2	2								AQ					
	8/30/89	1440		X	MW-12	2	2								AQ					
	8/30/89	—			Trip Blank	2	2								AQ					
	8/30/89	1340		—	Field Blank	2	2								AQ					

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

Empties dispatched by:	Date/Time	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
[illegible]	8/31/89 10 A. [redacted]			

Relinquished by: (SIGNATURE)	Date/Time	Received for Laboratory by (SIGNATURE)	Date/Time	(Shipping/Receiving) Remarks
[redacted]	8/30/89 1730	[illegible]	8/30/89 1735	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to [redacted] file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

M

CHAIN OF CUSTODY RECORD

ORDER NUMBER _____

PROJ NO. 0471-01

PROJECT NAME: CHRISTIANA [illegible]

SAMPLERS: (b) (4) [redacted]

KEY: AQ-Aqueous, S-Solid, A-Air, L-Liquid, O-Other

BCM NUMBER (Lab Only)	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS										TYPE	FIELD ANALYSES				REMARKS/ ANALYSES
	1/27/[illegible]	[illegible]			[illegible]		2														
					[illegible]		4														
					TRIP BLANK		2														
	9/29/[illegible]	[illegible]20		X	MW-2	2	2									AQ					
		[illegible]			MW-3	2	2														
		1422			MW-10A	2	2														
		[illegible]			MW-11	2	2														
		1450			MW-12	2	2														
		1230			MW-13	2	2														
		1240			MW-14	2	2														
		1350			MW-15	2	2														
		[illegible]			MW-16	2	2														
		1422			MW-10B	2	2														
		1347			FIELD BLANK	2	2														
					TRIP BLANK		2														

***NOTE ANY KNOWN OR SUSPECTED HAZARDS

Empties dispatched by:	Date/Time	Received by: (SIGNATURE)	Relinquished by: (SIGNATURE)	Date/Time	Received by: (SIGNATURE)
(b) (4) [redacted]	9/28/89 10:47	[illegible]			

Relinquished by: (SIGNATURE)	Date/Time	Received for Laboratory by (SIGNATURE)	Date/Time	(Shipping/Receiving) Remarks
[illegible]	9/29/[illegible] 1620	[illegible]	[illegible]	Airbill Number:

CUSTODY SEALS INTACT (Y,N,NA)

Distribution: Original to Lab file; Yellow to Project Manager; Pink to Sampler; Gold to be retained by Sampler in field.

BCM

ORIGINAL (Red)

APPENDIX E

LABORATORY ANALYTICAL DATA SHEETS

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923863
Location : MW-10A-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0114	mg/kg	
1,3-Dichlorobenzene	< 0.0114	mg/kg	
1,4-Dichlorobenzene	< 0.0114	mg/kg	
Bromoform	< 0.0114	mg/kg	
Carbon Tetrachloride	< 0.0114	mg/kg	
Chlorobenzene	< 0.0114	mg/kg	
Dibromochloromethane	< 0.0114	mg/kg	
Bromodichloromethane	< 0.0114	mg/kg	
Chloroethane	< 0.0114	mg/kg	
Chloroform	< 0.0114	mg/kg	
1,1-Dichloroethane	< 0.0114	mg/kg	
1,2-Dichloroethane	< 0.0114	mg/kg	
1,1-Dichloroethene	< 0.0114	mg/kg	
1,2-Dichloropropane	< 0.0114	mg/kg	
Cis-1,3-Dichloropropene	< 0.0114	mg/kg	
Trans-1,3-Dichloropropene	< 0.0114	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0114	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0114	mg/kg	
Methylene Chloride	< 0.0114	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0114	mg/kg	
Tetrachloroethene (PCE)	< 0.0114	mg/kg	
Trans-1,2-Dichloroethene	< 0.0114	mg/kg	
1,1,1-Trichloroethane	< 0.0114	mg/kg	
1,1,2-Trichloroethane	< 0.0114	mg/kg	
Trichloroethene (TCE)	< 0.0114	mg/kg	
Trichlorofluoromethane	< 0.0114	mg/kg	
Vinyl Chloride	< 0.0114	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	88.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923863
Location : MW-10A-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

ORIGINAL (Red)

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923864
Location : B-5-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/18/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0141	mg/kg	
1,3-Dichlorobenzene	< 0.0141	mg/kg	
1,4-Dichlorobenzene	< 0.0141	mg/kg	
Bromoform	< 0.0141	mg/kg	
Carbon Tetrachloride	< 0.0141	mg/kg	
Chlorobenzene	< 0.0141	mg/kg	
Dibromochloromethane	< 0.0141	mg/kg	
Bromodichloromethane	< 0.0141	mg/kg	
Chloroethane	< 0.0141	mg/kg	
Chloroform	< 0.0141	mg/kg	
1,1-Dichloroethane	< 0.0141	mg/kg	
1,2-Dichloroethane	< 0.0141	mg/kg	
1,1-Dichloroethene	> 0.2	mg/kg	
1,2-Dichloropropane	< 0.0141	mg/kg	
Cis-1,3-Dichloropropene	< 0.0141	mg/kg	
Trans-1,3-Dichloropropene	< 0.0141	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0141	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0141	mg/kg	
Methylene Chloride	< 0.0141	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0141	mg/kg	
Tetrachloroethene (PCE)	< 0.0141	mg/kg	
Trans-1,2-Dichloroethene	< 0.0141	mg/kg	
1,1,1-Trichloroethane	< 0.0141	mg/kg	
1,1,2-Trichloroethane	< 0.0141	mg/kg	
Trichloroethene (TCE)	> 2	mg/kg	
Trichlorofluoromethane	< 0.0141	mg/kg	
Vinyl Chloride	< 0.0141	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	70.7	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923864
Location : B-5-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923865
Location : B-5-3.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.116	mg/kg	
1,3-Dichlorobenzene	< 0.116	mg/kg	
1,4-Dichlorobenzene	< 0.116	mg/kg	
Bromoform	< 0.116	mg/kg	
Carbon Tetrachloride	< 0.116	mg/kg	
Chlorobenzene	< 0.116	mg/kg	
Dibromochloromethane	< 0.116	mg/kg	
Bromodichloromethane	> 4	mg/kg	
Chloroethane	< 0.116	mg/kg	
Chloroform	< 0.116	mg/kg	
1,1-Dichloroethane	> 1	mg/kg	
1,2-Dichloroethane	< 0.116	mg/kg	
1,1-Dichloroethene	> 20	mg/kg	
1,2-Dichloropropane	< 0.116	mg/kg	
Cis-1,3-Dichloropropene	< 0.116	mg/kg	
Trans-1,3-Dichloropropene	< 0.116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.116	mg/kg	
Methylene Chloride	> 0.5	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.116	mg/kg	
Tetrachloroethene (PCE)	< 0.116	mg/kg	
Trans-1,2-Dichloroethene	< 0.116	mg/kg	
1,1,1-Trichloroethane	> 40	mg/kg	
1,1,2-Trichloroethane	< 0.116	mg/kg	
Trichloroethene (TCE)	> 20	mg/kg	
Trichlorofluoromethane	< 0.116	mg/kg	
Vinyl Chloride	< 0.116	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.0	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923865
Location : B-5-3.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923866
Location : B-5-4.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.116	mg/kg	
1,3-Dichlorobenzene	< 0.116	mg/kg	
1,4-Dichlorobenzene	< 0.116	mg/kg	
Bromoform	< 0.116	mg/kg	
Carbon Tetrachloride	< 0.116	mg/kg	
Chlorobenzene	< 0.116	mg/kg	
Dibromochloromethane	< 0.116	mg/kg	
Bromodichloromethane	> 0.1	mg/kg	
Chloroethane	< 0.116	mg/kg	
Chloroform	< 0.116	mg/kg	
1,1-Dichloroethane	> 1	mg/kg	
1,2-Dichloroethane	> 0.116	mg/kg	
1,1-Dichloroethene	> 20	mg/kg	
1,2-Dichloropropane	< 0.116	mg/kg	
Cis-1,3-Dichloropropene	< 0.116	mg/kg	
Trans-1,3-Dichloropropene	< 0.116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.116	mg/kg	
Methylene Chloride	> 1	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.116	mg/kg	
Tetrachloroethene (PCE)	< 0.116	mg/kg	
Trans-1,2-Dichloroethene	< 0.116	mg/kg	
1,1,1-Trichloroethane	> 50	mg/kg	
1,1,2-Trichloroethane	< 0.116	mg/kg	
Trichloroethene (TCE)	> 10	mg/kg	
Trichlorofluoromethane	< 0.116	mg/kg	
Vinyl Chloride	< 0.116	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.5	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923866
Location : B-5-4.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923867
Location : B-5-6.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.116	mg/kg	
1,3-Dichlorobenzene	< 0.116	mg/kg	
1,4-Dichlorobenzene	< 0.116	mg/kg	
Bromoform	< 0.116	mg/kg	
Carbon Tetrachloride	< 0.116	mg/kg	
Chlorobenzene	< 0.116	mg/kg	
Dibromochloromethane	< 0.116	mg/kg	
Bromodichloromethane	> 0.5	mg/kg	
Chloroethane	< 0.116	mg/kg	
Chloroform	< 0.116	mg/kg	
1,1-Dichloroethane	> 1	mg/kg	
1,2-Dichloroethane	< 0.116	mg/kg	
1,1-Dichloroethene	> 3	mg/kg	
1,2-Dichloropropane	< 0.116	mg/kg	
Cis-1,3-Dichloropropene	< 0.116	mg/kg	
Trans-1,3-Dichloropropene	< 0.116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.116	mg/kg	
Methylene Chloride	> 0.1	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.116	mg/kg	
Tetrachloroethene (PCE)	< 0.116	mg/kg	
Trans-1,2-Dichloroethene	< 0.116	mg/kg	
1,1,1-Trichloroethane	> 4	mg/kg	
1,1,2-Trichloroethane	< 0.116	mg/kg	
Trichloroethene (TCE)	> 8	mg/kg	
Trichlorofluoromethane	< 0.116	mg/kg	
Vinyl Chloride	< 0.116	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.3	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923867
Location : B-5-6.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923868
Location : B-6-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.115	mg/kg	
1,3-Dichlorobenzene	< 0.115	mg/kg	
1,4-Dichlorobenzene	< 0.115	mg/kg	
Bromoform	< 0.115	mg/kg	
Carbon Tetrachloride	< 0.115	mg/kg	
Chlorobenzene	< 0.115	mg/kg	
Dibromochloromethane	< 0.115	mg/kg	
Bromodichloromethane	< 0.115	mg/kg	
Chloroethane	< 0.115	mg/kg	
Chloroform	< 0.115	mg/kg	
1,1-Dichloroethane	> 3	mg/kg	
1,2-Dichloroethane	< 0.115	mg/kg	
1,1-Dichloroethene	> 10	mg/kg	
1,2-Dichloropropane	< 0.115	mg/kg	
Cis-1,3-Dichloropropene	< 0.115	mg/kg	
Trans-1,3-Dichloropropene	< 0.115	mg/kg	
Bromomethane (Methyl Bromide)	< 0.115	mg/kg	
Chloromethane (Methyl Chloride)	< 0.115	mg/kg	
Methylene Chloride	> 0.2	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.115	mg/kg	
Tetrachloroethene (PCE)	< 0.115	mg/kg	
Trans-1,2-Dichloroethene	< 0.115	mg/kg	
1,1,1-Trichloroethane	> 5	mg/kg	
1,1,2-Trichloroethane	< 0.115	mg/kg	
Trichloroethene (TCE)	> 10	mg/kg	
Trichlorofluoromethane	< 0.115	mg/kg	
Vinyl Chloride	< 0.115	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.8	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923868
Location : B-6-1.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREAS OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923869
Location : B-6-5.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 8010
1,2-Dichlorobenzene	< 0.118	mg/kg	
1,3-Dichlorobenzene	< 0.118	mg/kg	
1,4-Dichlorobenzene	< 0.118	mg/kg	
Bromoform	< 0.118	mg/kg	
Carbon Tetrachloride	< 0.118	mg/kg	
Chlorobenzene	< 0.118	mg/kg	
Dibromochloromethane	< 0.118	mg/kg	
Bromodichloromethane	< 0.118	mg/kg	
Chloroethane	< 0.118	mg/kg	
Chloroform	< 0.118	mg/kg	
1,1-Dichloroethane	> 0.7	mg/kg	
1,2-Dichloroethane	< 0.118	mg/kg	
1,1-Dichloroethene	> 10	mg/kg	
1,2-Dichloropropane	< 0.118	mg/kg	
Cis-1,3-Dichloropropene	< 0.118	mg/kg	
Trans-1,3-Dichloropropene	< 0.118	mg/kg	
Bromomethane (Methyl Bromide)	< 0.118	mg/kg	
Chloromethane (Methyl Chloride)	< 0.118	mg/kg	
Methylene Chloride	> 0.1	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.118	mg/kg	
Tetrachloroethene (PCE)	< 0.118	mg/kg	
Trans-1,2-Dichloroethene	< 0.118	mg/kg	
1,1,1-Trichloroethane	> 5	mg/kg	
1,1,2-Trichloroethane	< 0.118	mg/kg	
Trichloroethene (TCE)	> 10	mg/kg	
Trichlorofluoromethane	< 0.118	mg/kg	
Vinyl Chloride	< 0.118	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	84.8	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923869
Location : B-6-5.5
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

Comment: QUALITATIVE RESULTS ONLY, DUE TO PEAK AREA OUTSIDE OF CALIBRATION CURVE.

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923870
Location : TRIP BLANK
Client ID :

Date Sampled : 07/31/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/14/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923871
Location : FIELD BLANK
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/03/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	5.6	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/29/89
BCM # : 00-6471-01
P.O.# :
Order# : 29200

BCM Number : 923871
Location : FIELD BLANK
Client ID :

Date Sampled : 08/01/89
Date Received : 08/01/89
Sampler : ES

Test Description	Results	Units	Test Method

Certified by : (b) (4) [redacted]

BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4)
BCM MALL
30-6471-01

Date 08/16/89
BCM # 00-6471-07
P O #
Order# 29266

BCM Number 924150
Station CW-11-1 S
Test ID

Date Sampled 08/02/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. DENNING on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0116	mg/kg	
1,3-Dichlorobenzene	< 0.0116	mg/kg	
1,4-Dichlorobenzene	< 0.0116	mg/kg	
Bromoform	< 0.0116	mg/kg	
Carbon Tetrachloride	< 0.0116	mg/kg	
Chlorobenzene	< 0.0116	mg/kg	
Dibromochloromethane	< 0.0116	mg/kg	
Bromodichloromethane	< 0.0116	mg/kg	
Chloroethane	< 0.0116	mg/kg	
Chloroform	< 0.0116	mg/kg	
1,1-Dichloroethane	< 0.0116	mg/kg	
1,2-Dichloroethane	< 0.0116	mg/kg	
1,1-Dichloroethene	< 0.0116	mg/kg	
1,2-Dichloropropane	< 0.0116	mg/kg	
Cis-1,3-Dichloropropene	< 0.0116	mg/kg	
Trans-1,3-Dichloropropene	< 0.0116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0116	mg/kg	
Methylene Chloride	0.0301	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0116	mg/kg	
Tetrachloroethene (PCE)	< 0.0116	mg/kg	
Trans-1,2-Dichloroethene	< 0.0116	mg/kg	
1,1,1-Trichloroethane	< 0.0116	mg/kg	
1,1,2-Trichloroethane	< 0.0116	mg/kg	
Trichloroethene (TCE)	< 0.0116	mg/kg	
Trichlorofluoromethane	< 0.0116	mg/kg	
Vinyl Chloride	< 0.0116	mg/kg	
Solids Total (%) by M. SMITH on 08/14/89			Std. Mtd. 209F
Total Solids	86.5	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924150
Location : MW-11-1.5
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number 924151
Location : MW-11-9 5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J DENNING on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	< 0.0117	mg/kg	
Chloroform	< 0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	< 0.0117	mg/kg	
1,2-Dichloropropane	< 0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	0.0281	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	< 0.0117	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	0.0223	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by H SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	85.3	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number 124151
Location NW-11-9.5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P O.# :
Order# : 29266

BCM Number : 924152
Location : B-7-1 5
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. DENNING on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0116	mg/kg	
1,3-Dichlorobenzene	< 0.0116	mg/kg	
1,4-Dichlorobenzene	< 0.0116	mg/kg	
Bromoform	< 0.0116	mg/kg	
Carbon Tetrachloride	< 0.0116	mg/kg	
Chlorobenzene	< 0.0116	mg/kg	
Dibromochloromethane	< 0.0116	mg/kg	
Bromodichloromethane	< 0.0116	mg/kg	
Chloroethane	< 0.0116	mg/kg	
Chloroform	< 0.0116	mg/kg	
1,1-Dichloroethane	< 0.0116	mg/kg	
1,2-Dichloroethane	< 0.0116	mg/kg	
1,1-Dichloroethene	< 0.0116	mg/kg	
1,2-Dichloropropane	< 0.0116	mg/kg	
Cis-1,3-Dichloropropene	< 0.0116	mg/kg	
Trans-1,3-Dichloropropene	< 0.0116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0116	mg/kg	
Methylene Chloride	0.0337	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0116	mg/kg	
Tetrachloroethene (PCE)	< 0.0116	mg/kg	
Trans-1,2-Dichloroethene	< 0.0116	mg/kg	
1,1,1-Trichloroethane	< 0.0116	mg/kg	
1,1,2-Trichloroethane	< 0.0116	mg/kg	
Trichloroethene (TCE)	< 0.0116	mg/kg	
Trichlorofluoromethane	< 0.0116	mg/kg	
Vinyl Chloride	< 0.0116	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	86.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924152
Location : 8-7-1 5
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 024153
Location : B-7-10.5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. DENNING on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0119	mg/kg	
1,3-Dichlorobenzene	< 0.0119	mg/kg	
1,4-Dichlorobenzene	< 0.0119	mg/kg	
Bromoform	< 0.0119	mg/kg	
Carbon Tetrachloride	< 0.0119	mg/kg	
Chlorobenzene	< 0.0119	mg/kg	
Dibromochloromethane	< 0.0119	mg/kg	
Bromodichloromethane	< 0.0119	mg/kg	
Chloroethane	< 0.0119	mg/kg	
Chloroform	< 0.0119	mg/kg	
1,1-Dichloroethane	< 0.0119	mg/kg	
1,2-Dichloroethane	< 0.0119	mg/kg	
1,1-Dichloroethene	0.0705	mg/kg	
1,2-Dichloropropane	< 0.0119	mg/kg	
Cis-1,3-Dichloropropene	< 0.0119	mg/kg	
Trans-1,3-Dichloropropene	< 0.0119	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0119	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0119	mg/kg	
Methylene Chloride	0.0311	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0119	mg/kg	
Tetrachloroethene (PCE)	< 0.0119	mg/kg	
Trans-1,2-Dichloroethene	< 0.0119	mg/kg	
1,1,1-Trichloroethane	< 0.0119	mg/kg	
1,1,2-Trichloroethane	< 0.0119	mg/kg	
Trichloroethene (TCE)	< 0.0119	mg/kg	
Trichlorofluoromethane	< 0.0119	mg/kg	
Vinyl Chloride	< 0.0119	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	83.7	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT PAGE 8

This is a final report.
The results have been checked and authorized for release.

CLIENT

(b) (4)
(b) (4)

00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number 924153
Location 8-7-10.5
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

CLIENT REPORT PAGE : 9
This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924154
Location : S-7-10.5A
Client ID

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Volatile Halocarbons by J. LENNING on 08/04/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	< 0.0117	mg/kg	
Chloroform	< 0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	0.0420	mg/kg	
1,2-Dichloropropane	< 0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	0.0350	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	< 0.0117	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	0.219	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by M. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	85.7	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 924154
Station 3-7-10.5A
Client ID

Date Sampled 08/02/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method

Comment All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) [redacted]
BCM WALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number	124155	Date Sampled	: 08/02/89
Location	B-7-13	Date Received	: 08/03/89
Client ID		Sampler	: ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by D. JENNING on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0134	mg/kg	
1,3-Dichlorobenzene	< 0.0134	mg/kg	
1,4-Dichlorobenzene	< 0.0134	mg/kg	
Bromoform	< 0.0134	mg/kg	
Carbon Tetrachloride	< 0.0134	mg/kg	
Chlorobenzene	< 0.0134	mg/kg	
Dibromochloromethane	< 0.0134	mg/kg	
Bromodichloromethane	< 0.0134	mg/kg	
Chloroethane	< 0.0134	mg/kg	
Chloroform	0.282	mg/kg	
1,1-Dichloroethane	< 0.0134	mg/kg	
1,2-Dichloroethane	< 0.0134	mg/kg	
1,1-Dichloroethene	0.0461	mg/kg	
1,2-Dichloropropane	< 0.0134	mg/kg	
Cis-1,3-Dichloropropene	< 0.0134	mg/kg	
Trans-1,3-Dichloropropene	< 0.0134	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0134	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0134	mg/kg	
Methylene Chloride	< 0.0134	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0134	mg/kg	
Tetrachloroethene (PCE)	< 0.0134	mg/kg	
Trans-1,2-Dichloroethene	< 0.0134	mg/kg	
1,1,1-Trichloroethane	0.728	mg/kg	
1,1,2-Trichloroethane	< 0.0134	mg/kg	
Trichloroethene (TCE)	0.781	mg/kg	
Trichlorofluoromethane	< 0.0134	mg/kg	
Vinyl Chloride	< 0.0134	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	74.9	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 324155
Location : B-T-13
Client ID :

Date Sampled : 08/02/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.# :
Order# 29266

BCM Number 824156
Location MW-12-1 S
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0115	mg/kg	
1,3-Dichlorobenzene	< 0.0115	mg/kg	
1,4-Dichlorobenzene	< 0.0115	mg/kg	
Bromoform	< 0.0115	mg/kg	
Carbon Tetrachloride	< 0.0115	mg/kg	
Chlorobenzene	< 0.0115	mg/kg	
Dibromochloromethane	< 0.0115	mg/kg	
Bromodichloromethane	< 0.0115	mg/kg	
Chloroethane	< 0.0115	mg/kg	
Chloroform	< 0.0115	mg/kg	
1,1-Dichloroethane	< 0.0115	mg/kg	
1,2-Dichloroethane	< 0.0115	mg/kg	
1,1-Dichloroethene	< 0.0115	mg/kg	
1,2-Dichloropropane	< 0.0115	mg/kg	
Cis-1,3-Dichloropropene	< 0.0115	mg/kg	
Trans-1,3-Dichloropropene	< 0.0115	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0115	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0115	mg/kg	
Methylene Chloride	< 0.0115	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0115	mg/kg	
Tetrachloroethene (PCE)	< 0.0115	mg/kg	
Trans-1,2-Dichloroethene	< 0.0115	mg/kg	
1,1,1-Trichloroethane	< 0.0115	mg/kg	
1,1,2-Trichloroethane	< 0.0115	mg/kg	
Trichloroethene (TCE)	< 0.0115	mg/kg	
Trichlorofluoromethane	< 0.0115	mg/kg	
Vinyl Chloride	< 0.0115	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	87.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-0471-01

Date : 08/16/89
BCM # 00-6471-07
P O # :
Order# : 29266

BCM Number 924156
Location MW-12-1.5
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is the final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924157
Location : MW-12-7.5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Volatile Halocarbons by J. DENNING on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0124	mg/kg	
1,3-Dichlorobenzene	< 0.0124	mg/kg	
1,4-Dichlorobenzene	< 0.0124	mg/kg	
Bromoform	< 0.0124	mg/kg	
Carbon Tetrachloride	< 0.0124	mg/kg	
Chlorobenzene	< 0.0124	mg/kg	
Dibromochloromethane	< 0.0124	mg/kg	
Bromodichloromethane	< 0.0124	mg/kg	
Chloroethane	< 0.0124	mg/kg	
Chloroform	< 0.0124	mg/kg	
1,1-Dichloroethane	< 0.0124	mg/kg	
1,2-Dichloroethane	< 0.0124	mg/kg	
1,1-Dichloroethene	< 0.0124	mg/kg	
1,2-Dichloropropane	< 0.0124	mg/kg	
cis-1,3-Dichloropropene	< 0.0124	mg/kg	
trans-1,3-Dichloropropene	< 0.0124	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0124	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0124	mg/kg	
Methylene Chloride	< 0.0124	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0124	mg/kg	
Tetrachloroethene (PCE)	< 0.0124	mg/kg	
Trans-1,2-Dichloroethene	< 0.0124	mg/kg	
1,1,1-Trichloroethane	< 0.0124	mg/kg	
1,1,2-Trichloroethane	< 0.0124	mg/kg	
Trichloroethene (TCE)	0.0136	mg/kg	
Trichlorofluoromethane	< 0.0124	mg/kg	
Vinyl Chloride	< 0.0124	mg/kg	
Solids, Total (%) by H. BRETH on 08/14/89			Std. Mtd. 209F
Total Solids	80.6	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O #
Order# : 29266

BCM Number 924157
Location MW-16-7.5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT — PAGE 17

This is a final report.
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 924158
Location MW-12-15
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Hydrocarbons by (b) (4) [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0158	mg/kg	
1,3-Dichlorobenzene	< 0.0158	mg/kg	
1,4-Dichlorobenzene	< 0.0158	mg/kg	
Bromoform	< 0.0158	mg/kg	
Carbon Tetrachloride	< 0.0158	mg/kg	
Chlorobenzene	< 0.0158	mg/kg	
Dibromochloromethane	< 0.0158	mg/kg	
Bromodichloromethane	< 0.0158	mg/kg	
Chloroethane	< 0.0158	mg/kg	
Chloroform	0.0237	mg/kg	
1,1-Dichloroethane	< 0.0158	mg/kg	
1,2-Dichloroethane	0.0133	mg/kg	
1,1-Dichloroethene	< 0.0158	mg/kg	
1,2-Dichloropropane	0.0133	mg/kg	
1,3-(1,3-)Dichloropropene	< 0.0158	mg/kg	
trans 1,3-Dichloropropene	< 0.0158	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0158	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0158	mg/kg	
Methylene Chloride	< 0.0158	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0158	mg/kg	
Tetrachloroethene (PCE)	< 0.0158	mg/kg	
Trans 1,2-Dichloroethene	< 0.0158	mg/kg	
1,1,1-Trichloroethane	0.117	mg/kg	
1,1,2-Trichloroethane	< 0.0158	mg/kg	
Trichloroethene (TCE)	0.758	mg/kg	
Trichlorotrifluoromethane	< 0.0158	mg/kg	
Vinyl Chloride	< 0.0158	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	83.3	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # 00-6471-07
P.O.# :
Order# : 29266

BCM Number 924158
Location W-12-15
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ZS

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT PAGE 19
This is a final report.
The results have been checked and authorized for release

[redacted] CLIENT

CHRISTIANA METALS [redacted]RP
ATTN: [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # 00-6471-07
P.O. #
Order# : 29266

BCM Number 924159
Location B-9-1.5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by [redacted] on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0118	mg/kg	
1,3-Dichlorobenzene	< 0.0118	mg/kg	
1,4-Dichlorobenzene	< 0.0118	mg/kg	
Bromoform	< 0.0118	mg/kg	
Carbon Tetrachloride	< 0.0118	mg/kg	
Chlorobenzene	< 0.0118	mg/kg	
Dibromochloromethane	< 0.0118	mg/kg	
Bromodichloromethane	< 0.0118	mg/kg	
Chloroethane	< 0.0118	mg/kg	
Chloroform	< 0.0118	mg/kg	
1,1-Dichloroethane	0.0118	mg/kg	
1,2-Dichloroethane	< 0.0118	mg/kg	
1,1-Dichloroethene	< 0.0118	mg/kg	
1,2-Dichloropropane	< 0.0118	mg/kg	
Cis-1,3-Dichloropropene	< 0.0118	mg/kg	
Trans-1,3-Dichloropropene	< 0.0118	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0118	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0118	mg/kg	
Methylene Chloride	< 0.0118	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0118	mg/kg	
Tetrachloroethene (PCE)	< 0.0118	mg/kg	
Trans-1,2-Dichloroethene	0.0562	mg/kg	
1,1,1-Trichloroethane	< 0.0118	mg/kg	
1,1,2-Trichloroethane	< 0.0118	mg/kg	
Trichloroethene (TCE)	0.0225	mg/kg	
Trichlorofluoromethane	< 0.0118	mg/kg	
Vinyl Chloride	< 0.0118	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	84.6	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT PAGE 20
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # 00-6471-07
P.O.# :
Order# : 29266

BCM Number 024159
Location [illegible]
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924160
Location : B-9-7.5
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. DENNING on 08/07/89			EPA # 8010
1,2-Dichlorobenzene	0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	0.0117	mg/kg	
Chloroform	0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	0.0117	mg/kg	
1,1-Dichloroethene	< 0.0117	mg/kg	
1,2-Dichloropropane	0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	< 0.0117	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	0.0353	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	0.0117	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by H. SHETH on 08/14/89			Std. Mtd. 209F
Total Solids	85.7	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

[illegible] PAGE 22
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 24160
Location : [illegible]
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

[illegible] REPORT PAGE 23
[illegible] final report
[illegible] results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O. #
Order# 29266

BCM Number 024161
Location B-9-7 SA
Client ID

Date Sampled 08/03/89
Date Received 08/03/89
Sampler ES

[illegible]	Results	Units	Test Method
Purgeable Halocarbons by [redacted] (b) (4) on 08/07/89			EPA # 8010
[illegible]-Dichlorobenzene	< 0.0115	mg/kg	
[illegible]-Dichlorobenzene	< 0.0115	mg/kg	
[illegible]-Dichlorobenzene	< 0.0115	mg/kg	
Bromoform	< 0.0115	mg/kg	
Carbon Tetrachloride	< 0.0115	mg/kg	
Chlorobenzene	< 0.0115	mg/kg	
Dibromochloromethane	< 0.0115	mg/kg	
Bromodichloromethane	< 0.0115	mg/kg	
Chloroethane	< 0.0115	mg/kg	
Chloroform	< 0.0115	mg/kg	
[illegible]-Dichloroethane	< 0.0115	mg/kg	
[illegible]-Dichloroethane	< 0.0115	mg/kg	
[illegible]-Dichloroethene	< 0.0115	mg/kg	
[illegible]-Dichloropropane	< 0.0115	mg/kg	
[illegible]-Dichloropropene	< 0.0115	mg/kg	
[illegible]-Dichloropropene	< 0.0115	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0115	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0115	mg/kg	
[illegible] Chloride	< 0.0115	mg/kg	
[illegible]-Tetrachloroethane	< 0.0115	mg/kg	
Tetrachloroethane (PCE)	< 0.0115	mg/kg	
[illegible]-Dichloroethene	0.229	mg/kg	
[illegible]-Trichloroethane	< 0.0115	mg/kg	
[illegible]-Trichloroethane	< 0.0115	mg/kg	
Trichloroethene (TCE)	0.0311	mg/kg	
Trichlorofluoromethane	< 0.0115	mg/kg	
Vinyl Chloride	< 0.0115	mg/kg	
Solids, Total (%) by H [redacted] on 08/14/89			Std. Mtd. 209F
Total Solids	86.8	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAL[redacted]
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number : 024161
Station : B-9-7 CA
Client ID

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT
This is a final report
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: (b) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924162
Location : B-9-10.5
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 08/09/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0121	mg/kg	
1,3-Dichlorobenzene	< 0.0121	mg/kg	
1,4-Dichlorobenzene	< 0.0121	mg/kg	
Bromoform	< 0.0121	mg/kg	
Carbon Tetrachloride	< 0.0121	mg/kg	
Chlorobenzene	< 0.0121	mg/kg	
Dibromochloromethane	< 0.0121	mg/kg	
Bromodichloromethane	< 0.0121	mg/kg	
Chloroethane	< 0.0121	mg/kg	
Chloroform	0.0703	mg/kg	
1,1-Dichloroethane	< 0.0121	mg/kg	
1,2-Dichloroethane	< 0.0121	mg/kg	
1,1-Dichloroethene	< 0.0121	mg/kg	
1,2-Dichloropropane	< 0.0121	mg/kg	
Cis-1,3-Dichloropropene	< 0.0121	mg/kg	
Trans-1,3-Dichloropropene	< 0.0121	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0121	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0121	mg/kg	
Methylene Chloride	0.0157	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0121	mg/kg	
Tetrachloroethene (PCE)	< 0.0121	mg/kg	
Trans-1,2-Dichloroethene	0.0182	mg/kg	
1,1,1-Trichloroethane	< 0.0121	mg/kg	
1,1,2-Trichloroethane	< 0.0121	mg/kg	
Trichloroethene (TCE)	0.0702	mg/kg	
Trichloro-fluoromethane	< 0.0121	mg/kg	
Vinyl Chloride	< 0.0121	mg/kg	
Solids, Total (%) by A. (b) [redacted] on 08/14/89			Std Mtd 209F
Total Solids	82.6	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

TEST REPORT PAGE : 26

This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

Job Number : 084162
Location : 9-9-10.5
Point ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

ID. Description	Results	Units	Test Method
Comment: All applicable results for this sample reported on dry weight basis			

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

[illegible] REPORT
[illegible] a final report
[illegible] results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN: [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.#
Order# : 29266

BCM Number 924163
Location TRIP BLANK
Client ID

Date Sampled : 08/01/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. [redacted] on 08/04/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	2.1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4)
BCM MALL
00-6471-01

Date 08/16/89
BCM # 00-6471-07
P.O.#
Order# 29266

BCM Number 9E4104
Location FIELD BLANK
Client ID

Date Sampled 08/02/89
Date Received 08/03/89
Sampler ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) on 08/07/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: J(b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number : 924165
Location : FIELD BLANK
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 08/07/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 08/16/89
BCM # : 00-6471-07
P.O.# :
Order# : 29266

BCM Number 924165
Location : FIELD BLANK
Client ID :

Date Sampled : 08/03/89
Date Received : 08/03/89
Sampler : ES

Test Description	Results	Units	Test Method

(b) (4) [redacted]

Certified by _____

Lab Certifications:

PA - 46-007 NJ - 77175 EPA BULK ASBESTOS QC - 3339
AL - 40300 MD - 136

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926125
Location : B-10-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0117	mg/kg	
1,3-Dichlorobenzene	< 0.0117	mg/kg	
1,4-Dichlorobenzene	< 0.0117	mg/kg	
Bromoform	< 0.0117	mg/kg	
Carbon Tetrachloride	< 0.0117	mg/kg	
Chlorobenzene	< 0.0117	mg/kg	
Dibromochloromethane	< 0.0117	mg/kg	
Bromodichloromethane	< 0.0117	mg/kg	
Chloroethane	< 0.0117	mg/kg	
Chloroform	< 0.0117	mg/kg	
1,1-Dichloroethane	< 0.0117	mg/kg	
1,2-Dichloroethane	< 0.0117	mg/kg	
1,1-Dichloroethene	< 0.0117	mg/kg	
1,2-Dichloropropane	< 0.0117	mg/kg	
Cis-1,3-Dichloropropene	< 0.0117	mg/kg	
Trans-1,3-Dichloropropene	< 0.0117	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0117	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0117	mg/kg	
Methylene Chloride	< 0.0117	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0117	mg/kg	
Tetrachloroethene (PCE)	< 0.0117	mg/kg	
Trans-1,2-Dichloroethene	< 0.0117	mg/kg	
1,1,1-Trichloroethane	< 0.0117	mg/kg	
1,1,2-Trichloroethane	< 0.0117	mg/kg	
Trichloroethene (TCE)	1.03	mg/kg	
Trichlorofluoromethane	< 0.0117	mg/kg	
Vinyl Chloride	< 0.0117	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	85.5	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926125
Location : B-10-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3600

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS (b) [redacted] (4)
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926126
Location : B-10-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0116	mg/kg	
1,3-Dichlorobenzene	< 0.0116	mg/kg	
1,4-Dichlorobenzene	< 0.0116	mg/kg	
Bromoform	< 0.0116	mg/kg	
Carbon Tetrachloride	< 0.0116	mg/kg	
Chlorobenzene	< 0.0116	mg/kg	
Dibromochloromethane	< 0.0116	mg/kg	
Bromodichloromethane	< 0.0116	mg/kg	
Chloroethane	< 0.0116	mg/kg	
Chloroform	< 0.0116	mg/kg	
1,1-Dichloroethane	< 0.0116	mg/kg	
1,2-Dichloroethane	< 0.0116	mg/kg	
1,1-Dichloroethene	< 0.0116	mg/kg	
1,2-Dichloropropane	< 0.0116	mg/kg	
Cis-1,3-Dichloropropene	< 0.0116	mg/kg	
Trans-1,3-Dichloropropene	< 0.0116	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0116	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0116	mg/kg	
Methylene Chloride	< 0.0116	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0116	mg/kg	
Tetrachloroethene (PCE)	< 0.0116	mg/kg	
Trans-1,2-Dichloroethene	< 0.0116	mg/kg	
1,1,1-Trichloroethane	< 0.0116	mg/kg	
1,1,2-Trichloroethane	< 0.0116	mg/kg	
Trichloroethene (TCE)	< 0.0116	mg/kg	
Trichlorofluoromethane	< 0.0116	mg/kg	
Vinyl Chloride	< 0.0116	mg/kg	
Solids, Total (%) by L. (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	86.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926128
Location : B-11-65
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 1.18	mg/kg	
1,3-Dichlorobenzene	< 1.18	mg/kg	
1,4-Dichlorobenzene	< 1.18	mg/kg	
Bromoform	< 1.18	mg/kg	
Carbon Tetrachloride	< 1.18	mg/kg	
Chlorobenzene	< 1.18	mg/kg	
Dibromochloromethane	< 1.18	mg/kg	
Bromodichloromethane	< 1.18	mg/kg	
Chloroethane	< 1.18	mg/kg	
Chloroform	< 1.18	mg/kg	
1,1-Dichloroethane	< 1.18	mg/kg	
1,2-Dichloroethane	< 1.18	mg/kg	
1,1-Dichloroethene	39.8	mg/kg	
1,2-Dichloropropane	< 1.18	mg/kg	
Cis-1,3-Dichloropropene	< 1.18	mg/kg	
Trans-1,3-Dichloropropene	< 1.18	mg/kg	
Bromomethane (Methyl Bromide)	< 1.18	mg/kg	
Chloromethane (Methyl Chloride)	< 1.18	mg/kg	
Methylene Chloride	1.44	mg/kg	
1,1,2,2-Tetrachloroethane	< 1.18	mg/kg	
Tetrachloroethene (PCE)	10.2	mg/kg	
Trans-1,2-Dichloroethene	< 1.18	mg/kg	
1,1,1-Trichloroethane	36.0	mg/kg	
1,1,2-Trichloroethane	< 1.18	mg/kg	
Trichloroethene (TCE)	3280	mg/kg	
Trichlorofluoromethane	< 1.18	mg/kg	
Vinyl Chloride	< 1.18	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	84.5	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926128
Location : B-11-65
lient ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926129
Location : B-12-4.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 1.15	mg/kg	
1,3-Dichlorobenzene	< 1.15	mg/kg	
1,4-Dichlorobenzene	< 1.15	mg/kg	
Bromoform	< 1.15	mg/kg	
Carbon Tetrachloride	< 1.15	mg/kg	
Chlorobenzene	< 1.15	mg/kg	
Dibromochloromethane	< 1.15	mg/kg	
Bromodichloromethane	< 1.15	mg/kg	
Chloroethane	< 1.15	mg/kg	
Chloroform	< 1.15	mg/kg	
1,1-Dichloroethane	< 1.15	mg/kg	
1,2-Dichloroethane	< 1.15	mg/kg	
1,1-Dichloroethene	< 1.15	mg/kg	
1,2-Dichloropropane	< 1.15	mg/kg	
Cis-1,3-Dichloropropene	< 1.15	mg/kg	
Trans-1,3-Dichloropropene	< 1.15	mg/kg	
Bromomethane (Methyl Bromide)	< 1.15	mg/kg	
Chloromethane (Methyl Chloride)	< 1.15	mg/kg	
Methylene Chloride	< 1.15	mg/kg	
1,1,2,2-Tetrachloroethane	< 1.15	mg/kg	
Tetrachloroethene (PCE)	< 1.15	mg/kg	
Trans-1,2-Dichloroethene	< 1.15	mg/kg	
1,1,1-Trichloroethane	< 1.15	mg/kg	
1,1,2-Trichloroethane	< 1.15	mg/kg	
Trichloroethene (TCE)	157	mg/kg	
Trichlorofluoromethane	< 1.15	mg/kg	
Vinyl Chloride	< 1.15	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	87.1	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926129
Location : B-12-4.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926130
Location : B-12-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0605	mg/kg	
1,3-Dichlorobenzene	< 0.0605	mg/kg	
1,4-Dichlorobenzene	< 0.0605	mg/kg	
Bromoform	< 0.0605	mg/kg	
Carbon Tetrachloride	< 0.0605	mg/kg	
Chlorobenzene	< 0.0605	mg/kg	
Dibromochloromethane	< 0.0605	mg/kg	
Bromodichloromethane	< 0.0605	mg/kg	
Chloroethane	< 0.0605	mg/kg	
Chloroform	< 0.0605	mg/kg	
1,1-Dichloroethane	< 0.0605	mg/kg	
1,2-Dichloroethane	< 0.0605	mg/kg	
1,1-Dichloroethene	< 0.0605	mg/kg	
1,2-Dichloropropane	< 0.0605	mg/kg	
Cis-1,3-Dichloropropene	< 0.0605	mg/kg	
Trans-1,3-Dichloropropene	< 0.0605	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0605	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0605	mg/kg	
Methylene Chloride	0.357	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0605	mg/kg	
Tetrachloroethene (PCE)	< 0.0605	mg/kg	
Trans-1,2-Dichloroethene	< 0.0605	mg/kg	
1,1,1-Trichloroethane	< 0.0605	mg/kg	
1,1,2-Trichloroethane	< 0.0605	mg/kg	
Trichloroethene (TCE)	6.99	mg/kg	
Trichlorofluoromethane	< 0.0605	mg/kg	
Vinyl Chloride	< 0.0605	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	82.7	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926130
Location : B-12-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926131
Location : TRIP BLANK
Client ID :

Date Sampled : 08/17/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926132
Location : FIELD BLANK
lient ID :

Date Sampled : 08/17/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 601
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926132
Location : FIELD BLANK
Client ID :

Date Sampled : 08/17/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Certified by : (b) (4) [redacted]

BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027566
Location : MW-1
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	< 0.1	mg/l	
Nitrate as N by J. SUTHERLAND on 09/05/89			EPA# 353.2

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN: J(b) (4) [redacted]
BCM MALL
30-6471-01

Date : 09/22/89
BCM # : 30-6471-01
P.O.# :
Order# : 29800

BCM Number : 027566
Location : MW-1
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	0.789	mg/l	
pH - Field by M. FISH on 08/30/89			EPA # 150.1
pH-Field	5.93	Std.Un	
Specific Conductance - Field by M. FISH on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	95	umhos	

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number : 927567
Location : MW-4
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	11.2	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	5.5	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	24.9	ug/l	
Trans-1,2-Dichloroethene	316	ug/l	
1,1,1-Trichloroethane	18.9	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	1110	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	42.2	ug/l	
Fluoride by (b) (4) [redacted] on 09/07/89			EPA # 340.2
Fluoride	14.1	mg/l	
Nitrate as N by (b) [redacted] on 09/05/89			EPA# 353.2

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927567
Location : MW-4
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	7.13	mg/l	
pH - Field by ([redacted] on 08/29/89			EPA # 150.1
ph-field	6.28	Std.Un	
Specific Conductance - Field by A. SMUCKLER on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	500	umhos	

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: [redacted] (b) (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927568
Location : MW-5
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. BROUDT on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	3.3	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	16.5	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	18.5	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	4.2	ug/l	
Fluoride by [redacted] (b) (4) on 09/07/89			EPA # 340.2
Fluoride	9.56	mg/l	
Nitrate as N by [redacted] on 09/21/89			EPA# 353.2

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927568
Location : MW-5
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	0.099	mg/l	
pH - Field by ([redacted] on 08/29/89			EPA # 150.1
pH-Field	6.62	Std.un	
Specific Conductance - Field by ([redacted] on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	4600	umhos	

ORIGINAL

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927569
Location : MW-6
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	9.9	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	6.5	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropane	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	82.4	ug/l	
1,1,1-Trichloroethane	70.1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	326	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	8.7	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	8.02	mg/l	
Nitrate as N by ([redacted] on 09/05/89			EPA# 353.2

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS C[redacted] (b) (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927569
Location : MW-6
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	1.67	mg/l	
pH - Field by [redacted] on 08/29/89 (b) (4)			EPA # 150.1
pH-Field	6.58	Std.Un	
Specific Conductance - Field by A SMUCKLER on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	710	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

[redacted] CLIENT

CHRISTIANA METALS (b) [redacted]
[redacted] (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# 29800

BCM Number : 927570
Location : MW-7
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	1.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	49.3	ug/l	
1,1,1-Trichloroethane	2.5	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	78.9	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
Fluoride by J. F (b) [redacted] on 09/07/89			EPA # 340.2
Fluoride	5.66	mg/l	
Nitrate as N by J. (b) (4) [redacted] on 09/05/89			EPA# 353.2

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 87570
Location : MW-7
Client ID : UNFILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Nitrate as N	3.21	mg/l	
pH - Field by (b) (4) [redacted] on 08/29/89			EPA # 150.1
pH-Field	5.83	Std.Un	
Specific Conductance - Field by A. SMUCKLER on 08/29/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	250	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927571
Location : MW-1
Client ID : FILTERED

Date Sampled 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by P. GOLDSTEIN on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by P. GOLDSTEIN on 09/13/89			EPA # 6010
Copper	0.035	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by P. GOLDSTEIN on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927572
Location : MW-4
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by P. GOLDSTEIN on 09/15/89			EPA # 6010
Chromium	0.011	mg/l	
Copper by P. [redacted] on 09/13/89			EPA # 6010
Copper	0.027	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by P. [redacted] on 09/15/89			EPA # 6010
Nickel	0.269	mg/l	

ORIGINAL (Red)

BCM Laboratory Division

1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number : 027573
Location : MW-5
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by (b) (4) [redacted] on 09/13/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by P. GOLDSTEIN on 09/13/89			EPA # 6010
Copper	0.022	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by P. (b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	0.090	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027574
Location : MW-6
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by P. (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	0.010	mg/l	
Copper by P. (b) (4) [redacted] on 09/13/89			EPA # 6010
Copper	0.021	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by P. (b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 027575
Location : MW-7
Client ID : FILTERED

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Chromium as Cr by (b) (4) on 09/15/89			EPA # 6010
Chromium	0.220	mg/l	
Copper by P. GOLDSTEIN on 09/13/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/08/89			EPA # 3010
Metal Digestion	9/8/89	M/D/Y	
Nickel by P. (b) (4) on 09/15/89			EPA # 6010
Nickel	0.251	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927576
Location : MW-13
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	33.6	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	164	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	23.5	ug/l	
Trans-1,2-Dichloroethene	110	ug/l	
1,1,1-Trichloroethane	3470	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	10600	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	7.34	Std.Un	
Specific Conductance - Field by A. (b) (4) [redacted] on 08/29/89			EPA #120.1

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA [redacted] CORP
ATTN: [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 9E7576
Location : MW-13
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @15 deg C.	380	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number 327577
Location : MW-14A
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	8.9	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	16.6	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	12.5	ug/l	
1,1,1-Trichloroethane	267	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	666	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. (b) (4) [redacted] on 08/29/89			EPA # 150.1
pH-Field	6.05	Std.Un	
Specific Conductance - Field by A. (b) (4) [redacted] on 08/29/89			EPA #120.1

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN. (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P O.# :
Order# : 29800

BCM Number : 927577
Location : MW-14A
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @25 deg C)	430	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS [redacted] (b)
ATTN: J[redacted] S [redacted] (4)
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 327578
Location : MW-148
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by A. [redacted] (b) (4) on 09/05/89			EPA # 3010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	7.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	13.2	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	10.6	ug/l	
1,1,1-Trichloroethane	323	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	751	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	6.95	Std.Un	
Specific Conductance - Field by A. [redacted] (b) (4) on 08/29/89			EPA #120.1

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: J(b) (4) [redacted]
BCM MALL[redacted]
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 427578
Location : MW-14B
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @25 Deg C)	430	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927579
Location : MW-15
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	53.8	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	564	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.8	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	39 3	ug/l	
Trans-1,2-Dichloroethene	570	ug/l	
1,1,1-Trichloroethane	7600	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	44400	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	7.13	Std.Un	
Specific Conductance - Field by A (b) (4) [redacted] on 08/29/89			EPA #120.1

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927579
Location : MW-15
Client ID

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(umhos/cm @25 Deg C)	510	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927580
Location : MW-16
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	18.6	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	419	ug/l	
1,2-Dichloroethane	41.8	ug/l	
1,1-Dichloroethene	140	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	7.4	ug/l	
Trans-1,2-Dichloroethene	169	ug/l	
1,1,1-Trichloroethane	2340	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	4580	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	
pH - Field by A. SMUCKLER on 08/29/89			EPA # 150.1
pH-Field	7.18	Std.Un	
Specific Conductance - Field by (b) (4) [redacted] on 08/29/89			EPA #120.1

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927580
Location : MW-16
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Specific Conductance(Umhos/cm @25 Deg C)	580	Umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O # :
Order# : 29800

BCM Number : 027581
Location : TRIP BLANK
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by ([redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P.O.# :
Order# : 29800

BCM Number : 927582
Location : FIELD BLANK
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G. (b) (4) [redacted] on 09/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/22/89
BCM # : 00-6471-01
P O.# :
Order# : 29800

BCM Number : 927582
Location : FIELD BLANK
Client ID :

Date Sampled : 08/29/89
Date Received : 08/29/89
Sampler : BM

Test Description	Results	Units	Test Method

Certified by (b) (4) [redacted]

BCM Laboratory Director

Lab Certifications:

PA - 46-007 NJ - 77175 EPA BULK ASBESTOS QC - 3339
AL - 40300 MD - 136

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT PAGE 1

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number 927714
Location : MW-8
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. (b) (4) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	16.6	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	3.2	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	37.7	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.6	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroetrene (PCE)	9.3	ug/l	
Trans-1,2-Dichloroethene	803	ug/l	
1,1,1-Trichloroethane	399	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	2860	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	86.8	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	1.11	mg/l	
Nitrate Nitrite by J. SUTHERLAND on 09/05/89			EPA# 353.2

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 127714
Location : MW-8
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AR

Test Description	Results	Units	Test Method
Nitrate as N	0.327	mg/l	
pH - Field by M. FISH on 08/30/89			EPA # 150.1
pH-Field	6.91	Std.Un	
Specific Conductance - Field by M. FISH on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	440	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927715
Location : MW-8A
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. (b) (4) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	2.8	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	9.2	ug/l	
Trans-1,2-Dichloroethene	798	ug/l	
1,1,1-Trichloroethane	395	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	2750	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	60.8	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	1.02	mg/l	
Nitrate as N by J. SUTHERLAND on 09/05/89			EPA# 353.2

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O # :
Order# : 29827

BCM Number : 927715
Location : MW-8A
Test ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Nitrate as N	0.121	mg/l	
pH - Field by M. FISH on 08/30/89			EPA # 150.1
pH-Field	6.91	Std.Un	
Specific Conductance - Field by (b) (4) [redacted] on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	440	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927716
Location : MW-9
Client ID : UNFILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	20.6	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	63.3	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	2.4	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	14.9	ug/l	
Trans-1,2-Dichloroethene	462	ug/l	
1,1,1-Trichloroethane	621	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	4130	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	14.4	ug/l	
Fluoride by J. FICKE on 09/07/89			EPA # 340.2
Fluoride	2.57	mg/l	
Nitrate as N by J(b) (4) [redacted] on 09/05/89			EPA# 353.2

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4)
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927716
Location : MW-9
Client ID : UNFILTERED

Date Sampled 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Nitrate as N	0.106	mg/l	
pH - Field (b) (4)(b FISH on 08/30/89			EPA # 150.1
pH-Field	6.98	Std.Un	
Specific Conductance - Field by M. FISH on 08/30/89			EPA #120.1
Specific Conductance(umhos/cm @25 Deg C)	450	umhos	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: JA(b) (4)
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 967717
Location : MW-8
Client ID : FILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Chromium as Cr by P. (b) (4) on 09/15/89			EPA # 6010
Chromium	0.012	mg/l	
Copper by P. GOLDSTEIN on 09/19/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/14/89			EPA # 3010
Metal Digestion	9/14/89	M/D/Y	
Nickel by P. G(b) (4) on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927718
Location : MW-8A
Client ID : FILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Chromium as Cr by (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by P. GOLDSTEIN on 09/19/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/14/89			EPA # 3010
Metal Digestion	9/14/89	M/D/Y	
Nickel by P. (b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MAIL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927719
Location : MW-9
Client ID : FILTERED

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Chromium as Cr by (b) (4) [redacted] on 09/15/89			EPA # 6010
Chromium	< 0.01	mg/l	
Copper by P. C(b) (4) [redacted] on 09/15/89			EPA # 6010
Copper	< 0.02	mg/l	
Metal Digestion (No Charge) by LORI JONES on 09/14/89			EPA # 3010
Metal Digestion	9/14/89	M/D/Y	
Nickel by(b) (4) [redacted] on 09/15/89			EPA # 6010
Nickel	< 0.04	mg/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927720
Location : MW-2
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. (b) (4) [redacted] on 09/12/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	157	ug/l	
1,2-Dichloroethane	1050	ug/l	
1,1-Dichloroethene	611	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	10.9	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	85.6	ug/l	
Trans-1,2-Dichloroethene	685	ug/l	
1,1,1-Trichloroethane	17300	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	36100	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927721
Location : MW-3
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. (b) (4) [redacted] on 09/12/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	14.0	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	103	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	< 10	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	124	ug/l	
Trans-1,2-Dichloroethene	236	ug/l	
1,1,1-Trichloroethane	3130	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	199000	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # . 00-6471-01
P.O.# :
Order# : 29827

BCM Number . 927722
Location : MW-10
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	1.4	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	4.6	ug/l	
1,1,1-Trichloroethane	84.2	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	93.8	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

ORIGINAL

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927723
Location : MW-11
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J (b) (4) [redacted] on 09/11/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	900	ug/l	
1,2-Dichloroethane	103	ug/l	
1,1-Dichloroethene	600	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	15.0	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	32.1	ug/l	
Trans-1,2-Dichloroethene	1970	ug/l	
1,1,1-Trichloroethane	20700	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	17100	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
(b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927724
Location : MW-12
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	12.8	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	< 10	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	14.8	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE		
Tetrachloroethene (PCE)	14.7	ug/l	
Trans-1,2-Dichloroethene	85.9	ug/l	
1,1,1-Trichloroethane	540	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	3940	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927725
Location : TRIP BLANK
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927726
Location : FIELD BLANK
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 09/08/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	< 1	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

ORIGINAL (Red)

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/21/89
BCM # : 00-6471-01
P.O.# :
Order# : 29827

BCM Number : 927726
Location : FIELD BLANK
Client ID :

Date Sampled : 08/30/89
Date Received : 08/30/89
Sampler : AH

Test Description	Results	Units	Test Method

Certified by : (b) (4) [redacted]

BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # 00-6471-01
P.O. #
Order# 30302

BCM Number 930389
Location MW-2
Client ID

Date Sampled 09/28/89
Date Received 09/28/89
Sampler EM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 100	ug/l	
1,3-Dichlorobenzene	< 100	ug/l	
1,4-Dichlorobenzene	< 100	ug/l	
Bromoform	< 100	ug/l	
Carbon Tetrachloride	< 100	ug/l	
Chlorobenzene	< 100	ug/l	
Dibromochloromethane	< 100	ug/l	
Bromodichloromethane	< 100	ug/l	
Chloroethane	< 100	ug/l	
Chloroform	< 100	ug/l	
1,1-Dichloroethane	157	ug/l	
1,2-Dichloroethane	< 100	ug/l	
1,1-Dichloroethene	1190	ug/l	
1,2-Dichloropropane	< 100	ug/l	
Cis-1,3-Dichloropropene	< 100	ug/l	
Trans-1,3-Dichloropropene	< 100	ug/l	
Bromomethane (Methyl Bromide)	< 100	ug/l	
Chloromethane (Methyl Chloride)	< 100	ug/l	
Methylene Chloride	152	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	102	ug/l	
Trans-1,2-Dichloroethene	623	ug/l	
1,1,1-Trichloroethane	16500	ug/l	
1,1,2-Trichloroethane	< 100	ug/l	
Trichloroethene (TCE)	48900	ug/l	
Trichloro-fluoromethane	< 100	ug/l	
Vinyl Chloride	< 100	ug/l	

Comment A BLANK CONTAINED 3.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 380 UG/L IN THIS SAMPLE. BASED ON 1 TO 100 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS (b) [redacted]
[redacted] (4)
BCM MALL
00-6471-01

Date 10/20/89
BCM # 00-6471-01
P.O.#
Order# 30302

BCM Number 930390
Location MW-3
Client ID

Date Sampled 09/28/89
Date Received 09/28/89
Sampler BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1000	ug/l	
1,3-Dichlorobenzene	< 1000	ug/l	
1,4-Dichlorobenzene	< 1000	ug/l	
Bromoform	< 1000	ug/l	
Carbon Tetrachloride	< 1000	ug/l	
Chlorobenzene	< 1000	ug/l	
Dibromochloromethane	< 1000	ug/l	
Bromodichloromethane	< 1000	ug/l	
Chloroethane	< 1000	ug/l	
Chloroform	< 1000	ug/l	
1,1-Dichloroethane	< 1000	ug/l	
1,2-Dichloroethane	< 1000	ug/l	
1,1-Dichloroethene	< 1000	ug/l	
1,2-Dichloropropane	< 1000	ug/l	
Cis-1,3-Dichloropropene	< 1000	ug/l	
Trans-1,3-Dichloropropene	< 1000	ug/l	
Bromomethane (Methyl Bromide)	< 1000	ug/l	
Chloromethane (Methyl Chloride)	< 1000	ug/l	
Methylene Chloride	2160	ug/l	
1,1,2,2-Tetrachloroethane	< 1000	ug/l	
Tetrachloroethene (PCE)	< 1000	ug/l	
Trans-1,2-Dichloroethene	< 1000	ug/l	
1,1,1-Trichloroethane	2730	ug/l	
1,1,2-Trichloroethane	< 1000	ug/l	
Trichloroethene (TCE)	680000	ug/l	
Trichlorofluoromethane	< 1000	ug/l	
Vinyl Chloride	< 1000	ug/l	

Comment * BLANK CONTAINED 2.9 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 2900 UG/L IN THIS SAMPLE, BASED ON 1 TO 1000 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # 00-6471-01
P.O.#
Order# 30302

BCM Number : 930391
Location : MW-10A
Client ID :

Date Sampled 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	4.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	2.6	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	2.8	ug/l	
1,1,2,2-Tetrachloroethane	<	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	9.9	ug/l	
1,1,1-Trichloroethane	84.4	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	244	ug/l	
Trichlorofluoromethane	1	ug/l	
Vinyl Chloride	< 1	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930392
Location : MW-10B
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G.J. JARVIS on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	6.3	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	4.9	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	1.0	ug/l	
Trans-1,2-Dichloroethene	14.2	ug/l	
1,1,1-Trichloroethane	112	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	227	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	1.5	ug/l	

Comment: M. BLANK CONTAINED 3.8 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: J(b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # : 00-6471-01
P.O # :
Order# : 30302

BCM Number 930393
Location : MW-11
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G J JARVIS on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 100	ug/l	
1,3-Dichlorobenzene	< 100	ug/l	
1,4-Dichlorobenzene	< 100	ug/l	
Bromoform	< 100	ug/l	
Carbon Tetrachloride	< 100	ug/l	
Chlorobenzene	< 100	ug/l	
Dibromochloromethane	< 100	ug/l	
Bromodichloromethane	< 100	ug/l	
Chloroethane	< 100	ug/l	
Chloroform	< 100	ug/l	
1,1-Dichloroethane	711	ug/l	
1,2-Dichloroethane	< 100	ug/l	
1,1-Dichloroethene	934	ug/l	
1,2-Dichloropropane	< 100	ug/l	
Cis-1,3-Dichloropropene	< 100	ug/l	
Trans-1,3-Dichloropropene	< 100	ug/l	
Bromomethane (Methyl Bromide)	< 100	ug/l	
Chloromethane (Methyl Chloride)	< 100	ug/l	
Methylene Chloride	237	ug/l	
1,1,2,2-Tetrachloroethane	< 100	ug/l	
Tetrachloroethene (PCE)	< 100	ug/l	
Trans-1,2-Dichloroethene	2170	ug/l	
1,1,1-Trichloroethane	19600	ug/l	
1,1,2-Trichloroethane	< 100	ug/l	
Trichloroethene (TCE)	15500	ug/l	
Trichlorofluoromethane	< 100	ug/l	
Vinyl Chloride	< 100	ug/l	

Comment: A. BLANK CONTAINED 3.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 380 UG/L IN THIS SAMPLE, BASED ON 1 TO 100 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930394
Location : MW-12
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by G J JARVIS on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	12.0	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	53.1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	7.5	ug/l	
Trans-1,2-Dichloroethene	69.5	ug/l	
1,1,1-Trichloroethane	425	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	3150	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	15.6	ug/l	

Comment M BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930395
Location : MW-13
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	< 10	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	22.6	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	19.2	ug/l	
1,1,2,2-Tetrachloroethane	< 10	ug/l	
Tetrachloroethene (PCE)	< 10	ug/l	
Trans-1,2-Dichloroethene	12.3	ug/l	
1,1,1-Trichloroethane	490	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	863	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 28 UG/L IN THIS SAMPLE, BASED ON 1 TO 10 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930396
Location : MW-14
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/05/89			EPA # 8010
1,2-Dichlorobenzene	< 10	ug/l	
1,3-Dichlorobenzene	< 10	ug/l	
1,4-Dichlorobenzene	< 10	ug/l	
Bromoform	< 10	ug/l	
Carbon Tetrachloride	< 10	ug/l	
Chlorobenzene	< 10	ug/l	
Dibromochloromethane	< 10	ug/l	
Bromodichloromethane	< 10	ug/l	
Chloroethane	< 10	ug/l	
Chloroform	< 10	ug/l	
1,1-Dichloroethane	35.9	ug/l	
1,2-Dichloroethane	< 10	ug/l	
1,1-Dichloroethene	229	ug/l	
1,2-Dichloropropane	< 10	ug/l	
Cis-1,3-Dichloropropene	< 10	ug/l	
Trans-1,3-Dichloropropene	< 10	ug/l	
Bromomethane (Methyl Bromide)	< 10	ug/l	
Chloromethane (Methyl Chloride)	< 10	ug/l	
Methylene Chloride	16.7	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	31.3	ug/l	
Trans-1,2-Dichloroethene	140	ug/l	
1,1,1-Trichloroethane	3930	ug/l	
1,1,2-Trichloroethane	< 10	ug/l	
Trichloroethene (TCE)	13800	ug/l	
Trichlorofluoromethane	< 10	ug/l	
Vinyl Chloride	< 10	ug/l	

Comment: M. BLANK CONTAINED 2.8 PPB METHYLENE CHLORIDE. THIS IS EQUIVALENT TO 28 UG/L IN THIS SAMPLE, BASED ON 1 TO 10 DILUTION

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930397
Location : MW-15
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by J. STOUDT on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	4.9	ug/l	
1,1-Dichloroethane	66.4	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	789	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	97.6	ug/l	
Trans-1,2-Dichloroethene	446	ug/l	
1,1,1-Trichloroethane	10100	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	116000	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number 930398
Location : MW-16
Client ID

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	5.7	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	265	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	103	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	< 1	ug/l	
1,1,2,2-Tetrachloroethane	SEE PCE	ug/l	
Tetrachloroethene (PCE)	3.0	ug/l	
Trans-1,2-Dichloroethene	110	ug/l	
1,1,1-Trichloroethane	1320	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	1144	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
(b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930399
Location : TRIP BLANK
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.2	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	12.7	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

Comment: M. BLANK CONTAINED 2.4 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL REPORT
This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930400
Location : FIELD BLANK
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 10/06/89			EPA # 8010
1,2-Dichlorobenzene	< 1	ug/l	
1,3-Dichlorobenzene	< 1	ug/l	
1,4-Dichlorobenzene	< 1	ug/l	
Bromoform	< 1	ug/l	
Carbon Tetrachloride	< 1	ug/l	
Chlorobenzene	< 1	ug/l	
Dibromochloromethane	< 1	ug/l	
Bromodichloromethane	< 1	ug/l	
Chloroethane	< 1	ug/l	
Chloroform	< 1	ug/l	
1,1-Dichloroethane	< 1	ug/l	
1,2-Dichloroethane	< 1	ug/l	
1,1-Dichloroethene	< 1	ug/l	
1,2-Dichloropropane	< 1	ug/l	
Cis-1,3-Dichloropropene	< 1	ug/l	
Trans-1,3-Dichloropropene	< 1	ug/l	
Bromomethane (Methyl Bromide)	< 1	ug/l	
Chloromethane (Methyl Chloride)	< 1	ug/l	
Methylene Chloride	1.2	ug/l	
1,1,2,2-Tetrachloroethane	< 1	ug/l	
Tetrachloroethene (PCE)	< 1	ug/l	
Trans-1,2-Dichloroethene	< 1	ug/l	
1,1,1-Trichloroethane	< 1	ug/l	
1,1,2-Trichloroethane	< 1	ug/l	
Trichloroethene (TCE)	3.5	ug/l	
Trichlorofluoromethane	< 1	ug/l	
Vinyl Chloride	< 1	ug/l	

Comment: M. BLANK CONTAINED 2.4 PPB METHYLENE CHLORIDE

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS [redacted] (b) (4)
BCM MALL
00-6471-01

Date : 10/20/89
BCM # : 00-6471-01
P.O.# :
Order# : 30302

BCM Number : 930400
Location : FIELD BLANK
Client ID :

Date Sampled : 09/28/89
Date Received : 09/28/89
Sampler : BM

Test Description	Results	Units	Test Method

Certified by : [redacted] (b) (4)

BCM Laboratory Director

Lab Certifications:

PA - 46-007
AL - 40300
NJ - 77175
MD - 136
EPA BULK ASBESTOS QC - 3339

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: JAMES CONNOR
[redacted]L
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926126
Location : B-10-6.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

FINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS (b) [redacted] (4)
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926127
Location : B-11-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method
Purgeable Halocarbons by (b) (4) [redacted] on 08/21/89			EPA # 8010
1,2-Dichlorobenzene	< 0.0119	mg/kg	
1,3-Dichlorobenzene	< 0.0119	mg/kg	
1,4-Dichlorobenzene	< 0.0119	mg/kg	
Bromoform	< 0.0119	mg/kg	
Carbon Tetrachloride	< 0.0119	mg/kg	
Chlorobenzene	< 0.0119	mg/kg	
Dibromochloromethane	< 0.0119	mg/kg	
Bromodichloromethane	< 0.0119	mg/kg	
Chloroethane	< 0.0119	mg/kg	
Chloroform	< 0.0119	mg/kg	
1,1-Dichloroethane	< 0.0119	mg/kg	
1,2-Dichloroethane	< 0.0119	mg/kg	
1,1-Dichloroethene	< 0.0119	mg/kg	
1,2-Dichloropropane	< 0.0119	mg/kg	
Cis-1,3-Dichloropropene	< 0.0119	mg/kg	
Trans-1,3-Dichloropropene	< 0.0119	mg/kg	
Bromomethane (Methyl Bromide)	< 0.0119	mg/kg	
Chloromethane (Methyl Chloride)	< 0.0119	mg/kg	
Methylene Chloride	< 0.0119	mg/kg	
1,1,2,2-Tetrachloroethane	< 0.0119	mg/kg	
Tetrachloroethene (PCE)	< 0.0119	mg/kg	
Trans-1,2-Dichloroethene	< 0.0119	mg/kg	
1,1,1-Trichloroethane	< 0.0119	mg/kg	
1,1,2-Trichloroethane	< 0.0119	mg/kg	
Trichloroethene (TCE)	0.0226	mg/kg	
Trichlorofluoromethane	< 0.0119	mg/kg	
Vinyl Chloride	< 0.0119	mg/kg	
Solids, Total (%) by (b) (4) [redacted] on 08/30/89			Std. Mtd. 209F
Total Solids	84.2	%	

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM Laboratory Division
1850 Gravers Road
Norristown, PA 19401
(215) 275-0281

PLEASE REMIT CHECKS TO:
BCM Eastern Inc.
1 PLYMOUTH MEETING
PLYMOUTH MEETING, PA 19462
215-825-3800

ORIGINAL (Red)

FINAL REPORT

This is a final report.
The results have been checked and authorized for release.

CLIENT

CHRISTIANA METALS CORP
ATTN: (b) (4) [redacted]
BCM MALL
00-6471-01

Date : 09/01/89
BCM # : 00-6471-01
P.O.# :
Order# : 29596

BCM Number : 926127
Location : B-11-1.5
Client ID :

Date Sampled : 08/18/89
Date Received : 08/18/89
Sampler : ES

Test Description	Results	Units	Test Method

Comment: All applicable results for this sample reported on dry weight basis

PAYMENT IS DUE UPON RECEIPT OF INVOICE. PAST DUE AMOUNTS OVER 30 DAYS WILL BE SUBJECT TO AN INTEREST RATE OF 18% PER ANNUM.

BCM

ORIGINAL (Red)

APPENDIX F

BCM INTEROFFICE CORRESPONDENCE DOCUMENTING SOIL SAMPLE ANALYTICAL PROCEDURES FOR SAMPLES OBTAINED FROM BORINGS B-5 and B-6

BCM

INTEROFFICE

ORIGINAL (Red)

TO: J(b) (4) [redacted]

cc: (b) (4) (b) (4) [redacted]

DATE: January 12, 1990

FROM: (b) (4) [redacted] BMR

SUBJECT: Christiana Metals
BCM Project No. 00-6471-01
BCM Lab Order No. 29200

The purpose of this memo is to provide additional explanation for the results reported in August for the above referenced order. Seven soil samples, a trip blank, and a field blank were analyzed for purgeable halocarbons by gas chromatograph in accordance with EPA Method No. 8010. In each of the samples where volatile organic compounds were detected, the concentrations are reported as greater than a specific value (e.g. 1,1-dichloroethene >10 mg/kg).

Normally, a specific concentration, not a greater than concentration, is reported. Each of the samples was collected on 8/1/89 and received and logged in at the laboratory that same day. Each of the samples were initially analyzed on 8/3 with a 1 to 10 (1/10) dilution. The concentrations detected were outside the linear range of the instrument calibration. This meant that the results for these analyses were qualitative only and that the concentrations detected were less than those actually present in the samples. Each of these samples was subsequently run 2-6 additional times at varying dilutions in order to obtain results within the range of instrument calibration. Attached is a table listing the dates and dilutions for the initial and subsequent tests for each sample. In each of these cases no concentrations above the level of detection were detected. As we know the samples initially contained several volatile organic compounds, our conclusion regarding the later runs was that disturbance of the samples by sample container opening and the volatile nature of the compounds resulted in the volatilization of the compounds from the samples.)

Review of the initial sample chromatograms indicates that the compound identifications are correct. These results are consistent with other data from the site. Consequently, the results reported can be used so long as it is understood that the concentrations are greater than reported.

Should you have any questions or require additional information, please contact either Rocco Alessandro or me.

BCM

INTEROFFICE

ORIGINAL (Red)

TO: (b) (4) [redacted]

DATE: 1/8/90

FROM: (b) (4) [redacted]

SUBJECT: Christiana Metals Order 29200

· Attached is a copy of a report from August which we had to qualify the data. The project manager needs a brief memo explaining why the samples could not be rerun (they were but the concentrations were gone-volatilized) I need to see the file for this order w/ dates of data reduction and rerun attempt.

923863 – Date:	8/3	8/4	8/17		923864 –	8/3	8/4	8/10	8/11	8/17				
(MW-10A-1.5) dilution:	1/10	1/500	1/10		(B-5-1.5)	1/10	1/500	1/50	1/1	1/50				
923865 –	8/3	8/4	8/10	8/11	8/14	8/15	8/17	8/18			923871 – (Field Blank)	8/3		
(B-5-3.5)	1/10	1/1000	1/5000	1/1	1/50	1/10	1/1000	1/10				1/1		
923866 –	8/3	8/4	8/10	8/11	8/17	8/18		923867 –	8/3	8/4	8/10	8/17	8/18	
(B-5-4.5)	1/10	1/500	1/50	1/5000	1/500	1/10		(B-5-6.5)	1/10	1/50	1/50	1/50	1/10	
923868 –	8/3	8/4	8/10	8/11	8/17	8/18		923869 –	8/3	8/4	8/17		923870 –	8/14
(B6-1.5)	1/10	1/500	1/2500	1/1000	1/100	1/10		(B6-5.5)	1/10	1/500	1/100		(Trip Blank)	1/1

Samples ran on 8/3 on 1/10 dilution were overloaded, After that the corresponding dilutions shown sample were clean.
8/11 reran from original soil again showed clean.