

BNSF PROPERTY PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT

Prepared for
City of Kent
220 Fourth Avenue South
Kent, Washington 98032-5895

July 12, 2001

URS

1501 4th Avenue, Suite 1400
Seattle, WA 98101-1616
(206) 438-2700
54-09900118.00 00002



July 12, 2001

Ms. Kim Adams Pratt
Assistant City Attorney
Legal Department
City of Kent
220 Fourth Avenue South
Kent, Washington 98032-5895

Subject: Final Phase II ESA Investigation Report
BNSF Property, Kent, Washington
Project No. 54-09900118.02

Dear Ms. Pratt:

Enclosed are three copies of the *Final Phase II Environmental Site Assessment Report* for the Burlington Northern Santa Fe Railway (BNSF) property located at the south end of the Borden Chemical Facility in Kent, Washington.

We are very grateful for the opportunity to provide you this report. If you require additional information, please call me at 206/438-2700.

Sincerely,

A handwritten signature in cursive script that reads "Kathleen S. Goodman".

Kathleen S. Goodman, R.G.
Project Manager

Enclosure

TABLE OF CONTENTS

Executive Summary	ES-1
Section 1 Introduction	1-1
1.1 Background	1-1
1.2 Objective	1-1
Section 2 Scope of Services	2-1
Section 3 Site Description	3-1
3.1 Location	3-1
3.2 Site Improvements	3-1
3.3 Geologic Conditions	3-1
3.4 Groundwater	3-2
3.5 Borden Facility Operations	3-2
Section 4 Phase II Investigation Target Areas	4-1
Section 5 Phase II Field Work Procedures	5-1
5.1 Soil Sampling	5-1
5.2 Groundwater Sampling	5-2
Section 6 Phase II Results	6-1
6.1 File Review	6-1
6.2 Interview	6-2
6.3 Soil Quality	6-2
6.4 Groundwater Quality	6-4
Section 7 Summary of Potential Issues	7-1
Section 8 Conceptual Cleanup Plan and Estimated Costs	8-1
Section 9 Limitations	9-1
Section 10 References	10-1

Tables

Table 1	Analytical Results for Soil – TPH and BTEX
Table 2	Analytical Results for Soil – Chlorinated Acid Herbicide Compounds
Table 3	Analytical Results for Soil – PCBs
Table 4	Analytical Results for Soil – Total Metals
Table 5	Analytical Results for Soil – Formaldehyde, Methanol, and Nitrate
Table 6	Analytical Results for Groundwater – TPH and BTEX
Table 7	Analytical Results for Groundwater – Chlorinated Acid Herbicide Compounds
Table 8	Analytical Results for Groundwater – Polycyclic Aromatic Hydrocarbons
Table 9	Analytical Results for Groundwater – Dissolved Metals
Table 10	Analytical Results for Groundwater – Formaldehyde, Methanol, and Nitrate

Figures

Figure 1	Property Location
Figure 2	Site Plan and Explorations, Kent, Washington

Appendices

Appendix A	Boring Logs
Appendix B	Laboratory Reports
Appendix C	Data Quality Assurance Review
Appendix D	Supporting Details for Remedial Cost Estimates

A Phase II Environmental Site Assessment (ESA) investigation was conducted at the Burlington Northern Santa Fe Railway (BNSF) property located between 1st Avenue North and 4th Avenue North in Kent, Washington (BNSF Property). The BNSF Property and the adjacent Borden Chemical Company property to the north comprise the Borden Chemical Facility. The City of Kent plans to acquire the BNSF Property and redevelop it, possibly for multifamily residential and commercial mixed use.

The majority of the BNSF Property has been used as a rail loading and unloading area for the adjacent Borden Chemical facility. This portion of the BNSF Property contains several rail spurs and a loading/unloading rack with piping that connects to the Borden Chemical Facility. The southeastern portion of the facility has been used for equipment storage by an adjacent business. The adjacent business used the southeastern portion of the BNSF Property as a fenced-in equipment yard containing abandoned automobiles, refrigerators, and other equipment.

Soil sampling activities included the collection and analysis of soil samples from 10 locations throughout the BNSF Property to a maximum depth of approximately 9 feet below ground surface (bgs). Selected soil samples were analyzed for concentrations of petroleum hydrocarbon compounds, metals, herbicides, polychlorinated biphenyls, methanol, formaldehyde, and nitrates. The results of these analyses indicated that heavy oil-range petroleum hydrocarbon compounds were detected above the current Model Toxics Control Act (MTCA) Method A residential cleanup level in two shallow soil samples collected from near the equipment yard. Both samples were collected from depths of less than 3 feet bgs. One of these samples also contained lead at a concentration exceeding the current MTCA Method A cleanup level. The heavy oil-range hydrocarbon concentrations detected do not exceed the proposed MTCA Method A unrestricted use cleanup level that will take effect on August 15, 2001. The elevated concentrations of lead and petroleum hydrocarbons in this area are likely the result of minor surface leaks of motor oil and/or fuel from the items stored in the equipment yard. None of the other soil samples collected contained concentrations of metals or petroleum hydrocarbons exceeding MTCA residential cleanup levels. In addition, none of the other analytes were detected at concentrations exceeding MTCA residential cleanup levels.

Groundwater samples were collected from temporary monitoring points in selected soil borings. Selected samples were analyzed for concentrations of petroleum hydrocarbon compounds, metals, herbicides, methanol, formaldehyde, and nitrates. The results of these analyses indicate that arsenic is present in groundwater throughout the central portion of the BNSF Property at concentrations exceeding MTCA Method A cleanup levels. Concentrations of lead and chromium were also detected in individual groundwater samples near the center of the BNSF Property at concentrations slightly exceeding MTCA Method A cleanup levels. These elevated metals concentrations could be from any of three possible sources: residual colloidal sediment, an upgradient source, or natural (background) conditions. Benzene was detected in one groundwater sample collected in the eastern portion of the BNSF Property at concentrations exceeding MTCA Method A cleanup levels. Elevated benzene concentrations in this area are likely attributed to a former leaking gasoline underground storage tank located on an adjacent property.

Based on the results of the Phase II ESA investigation, the petroleum- and lead-impacted surface soils in the vicinity of the equipment yard should be scraped and disposed of at an appropriate facility or capped with provisions for institutional controls if the area of surface contamination is to be used for residential purposes.

SECTION ONE**Introduction**

1.1 BACKGROUND

URS Corporation (URS) was retained by the City of Kent to conduct a Phase II Environmental Site Assessment (ESA) of the Burlington Northern Santa Fe Railway (BNSF) property (BNSF Property) located between 1st Avenue North and 4th Avenue North in Kent, Washington. The BNSF Property and the adjacent Borden Chemical Company property to the north comprise the Borden Chemical Facility (Figures 1 and 2). (All figures and tables appear at the end of the main report.) The facility address is 421 1st Avenue North. This project was performed in accordance with the URS Consultant Services Contract, dated August 15, 2000, and our revised proposal dated May 2, 2001.

URS conducted a Phase II ESA investigation of the Borden property in late 2000 (URS 2000). Since that time, the City of Kent has purchased the Borden property. We understand that the City is currently considering purchasing the BNSF Property. Because of the potential acquisition, the City of Kent requested an evaluation of the current environmental condition of the BNSF Property.

1.2 OBJECTIVE

The objectives of this Phase II ESA are to evaluate the environmental condition of the BNSF Property and also to estimate costs to remedy recognized environmental conditions. The extent of research to identify potential environmental conditions is limited by the scope of services. URS recently completed Phase II work for the adjacent Borden property (URS 2000). Some of the information obtained during that project has been incorporated into the Phase II work for the BNSF Property.

SECTION THREE

Site Description

3.1 LOCATION

The BNSF Property consists of approximately 1.73 acres of land in the northeast quarter of Section 24, Township 22 North, Range 4 East, in the City of Kent, King County, Washington (Figure 1), and is located approximately 3/4 mile northeast of the Green River. The address for the Borden Chemical Facility, which includes the BNSF Property, is 421 1st Avenue North, Kent, Washington. The BNSF Property is apparently leased by Borden Chemical. The tax identification number of the parcel is 242204-9010. The BNSF Property is bounded on the north by the remainder of the Borden Chemical Facility, on the south by vacant land and a future Central Puget Sound Regional Transit Authority (Sound Transit) parking garage (including the former Silvestri property) that is apparently part of an undeveloped City right-of-way (ROW), on the east by 1st Avenue North, and on the west by 4th Avenue North. The BNSF Property area is generally urban commercial and industrial land.

3.2 SITE IMPROVEMENTS

The BNSF Property is unequally divided by a cyclone fence extending in an east-west alignment (Figure 2). The fence appears to coincide with the property boundary in the western portion of the BNSF Property. In the eastern portion of the BNSF Property, the fence separates the Borden Chemical operations, which are located to the north of the fence, from the Silvestri family operations, which are located south of the fence. The majority of the Silvestri portion of the BNSF Property (an area approximately 115 feet by 25 feet in dimension) is also enclosed by a roughly rectangular fence. This fence appears to extend onto the adjacent City ROW. The area inside the fence (referred to herein as the "equipment yard") was observed to contain various types of abandoned automobiles, refrigerators, and various other trash and debris.

The Borden Chemical portion of the BNSF Property consists mostly of a main rail spur that connects to the BNSF mainline located to the east across 1st Avenue North. Three smaller spurs split from this main spur, one extending onto the adjacent Borden property. The area around the rails is covered with gravel ballast. A loading/unloading structure (referred to herein as the "loading rack") is located near the center of the BNSF Property with piping that connects to the main Borden Facility. A concrete spill containment structure is present beneath a portion of the loading rack. The eastern portion of the BNSF Property is generally bare; however, vegetation is present between the rail lines in the western portion of the BNSF Property. The southwestern portion of the BNSF Property is mostly wooded.

3.3 GEOLOGIC CONDITIONS

According to the U.S. Geological Survey (USGS) 7.5-minute topographic map of the Renton Quadrangle, the BNSF Property is located in a relatively flat portion of the Green River valley (Kent Valley) at an elevation of approximately 35 feet above mean sea level. The Green River valley is located in the southeastern portion of the Puget Lowland, which is an elongated topographic and structural depression bordered by the Cascade Mountains to the east and the Olympic Mountains to the west. The Puget Lowland has been repeatedly occupied by a lobe of the Cordilleran ice sheet, one of two continental glaciers that developed during the recent ice ages of the Quaternary period. The Cordilleran ice sheet advanced and retreated from British

The scope of services conducted for this assessment consisted of the following tasks:

- **Records Review**—A review of Washington State Department of Ecology (Ecology) files was conducted for information pertaining to the former Northwest Metal Products facility and former operations at the adjacent Silvestri property.
- **Interviews**—A telephone interview was conducted with Mr. Al Bunger of Borden Chemical to provide information about historic activities conducted on the BNSF Property that may have created a potential for contamination of the BNSF Property (personal communication, Bunger, 2001).
- **Soil Sampling and Analyses**—On May 30 and 31, 2001, URS personnel observed the advancement of eight Geoprobe® borings at the BNSF Property in the locations shown on Figure 2. URS personnel collected soil samples from each of the eight borings. In addition, two hand auger borings were installed at the BNSF Property in the locations shown on Figure 2. One soil sample was collected from each hand auger boring. Selected soil samples were submitted to OnSite Environmental of Redmond, Washington, for chemical analyses.
- **Groundwater Sampling and Analyses**—URS personnel collected groundwater samples from six of the eight borings mentioned above on May 30 and 31, 2001. Groundwater samples were submitted to OnSite Environmental for chemical analyses.
- **Evaluation, Analysis and Report**—Information collected during the above activities was evaluated. This investigation report addresses our findings and presents our conclusions and recommendations.

SECTION FOUR

Phase II Investigation Target Areas

The targets of the Phase II investigation of the BNSF Property are as follows:

- **Dissolved Metals.** The results of the Phase II investigation of the Borden property revealed the presence of elevated concentrations of arsenic in groundwater in the southwestern portion of the Borden facility. These elevated concentrations were suspected to be emanating from the Northwest Metal Products Company facility that was formerly located to the southwest of the BNSF Property. Metals other than arsenic may have also been released from this facility.
- **Methanol.** A rupture in an off-loading pipeline in the mid-1980s on the Borden property resulted in a release of methanol to groundwater near the northern boundary of the BNSF Property. Subsequent remedial actions and/or natural attenuation have resulted in the removal of the majority of methanol; however, the extent of the plume is unknown.
- **Nitrate.** Previous investigations conducted at the Borden facility revealed elevated concentrations of nitrate in soil and groundwater in the vicinity of three former settling ponds on the Borden property.
- **Formaldehyde.** Previous investigations revealed the presence of formaldehyde in soil and groundwater in various locations at the Borden facility, including near the loading rack on the BNSF Property.
- **Herbicides.** The absence of vegetation along the rail spurs potentially indicates historic application of herbicides to surface soils on the BNSF Property.
- **Surface Petroleum Releases.** The operation of locomotives on the rail spurs may have resulted in the release of minor quantities of diesel fuel and/or other petroleum products. In addition, petroleum products may have been released from automobiles and other equipment located at the Silvestri equipment yard.
- **Petroleum Releases From Former Off-Site Underground Storage Tanks.** As part of Sound Transit's demolition activities, two underground storage tanks (USTs) (one 1,000 gallon gasoline and one 6,000 gallon diesel) were removed from adjacent portions of the Silvestri property in June 2000. During removal, impacted soils were encountered beneath and to the north of the former USTs. Subsequent excavation activities resulted in the removal of the majority of the impacted soil from the Silvestri property and adjacent City of Kent ROW; however, confirmation sampling results indicated that diesel and heavy oil concentrations are present in soil at the boundary of the BNSF Property and likely extend beneath the BNSF Property.

pipelines and mixed to produce the PF and UF resins. Heat was introduced into the manufacturing process by a natural gas-fired boiler. All process water from the PF resin manufacturing process was routed to the resin sump and then to a mix tank, where the pH of the water (containing sodium hydroxide) was neutralized with hydrochloric acid. From the mix tank, process water was pumped into settling tanks. Borden reportedly recycled as much of the water in the settling tanks as possible back into the manufacturing process. Process water that was not fit for recycling was discharged into the King County Department of Natural Resources' Industrial Waste Sewer (under Permit No. 7129). Resin that settled out of the process water was consolidated and spread out on the concrete drying pad adjacent to the settling tanks. Once dry, the resin was stockpiled at the northern end of the pad and periodically transported off-site for disposal by a contracted waste management service.

In February 2001, resin manufacturing activities at the facility ceased. The only activities currently performed at the site are methanol recovery from groundwater at well MW-10, site maintenance and cleaning activities, and residual waste water treatment.

SECTION FIVE

Phase II Field Work Procedures

Field procedures described in this section followed URS' standard operating procedures in order to provide: (1) consistency and thoroughness of sample collection and data-generation activities and (2) scientifically valid data that meet established objectives of known and acceptable quality as defined by the U.S. Environmental Protection Agency (EPA) and Ecology.

Cascade Drilling, Inc., of Woodinville, Washington, was contracted to provide a truck-mounted GeoProbe™ rig to advance eight soil borings and to collect groundwater and soil samples. Cascade Drilling personnel also assisted in the advancement of hand-augered borings. Boring locations are shown on Figure 2. Kathryn Pineo of URS observed all drilling activities.

5.1 SOIL SAMPLING

Prior to implementing boring activities, an attempt was made to locate all underground utilities at the BNSF Property. URS contacted the utility underground location service to locate public utilities at or in the vicinity of the BNSF Property. URS also contracted Applied Professional Services (APS), of Issaquah, Washington, to locate private underground utilities on the BNSF Property. A representative of Borden Chemical was on site to assist the APS representative.

Soil sampling activities were conducted on May 30 and 31, 2001. Soil samples were collected from each boring. The types of soils encountered and depths were recorded on the boring log form, in addition to unusual colors, odors, or other indicators of potential contamination. (The boring logs are provided in Appendix A.) Each boring was advanced to depths ranging from 6 to 9 feet bgs. Samples were collected using a stainless steel split spoon sampler. Two soil samples were collected from each boring. The first sample was collected from between 0 and 3 feet bgs and the second sample was collected from near the observed water table, which was generally at a depth of approximately 6 feet bgs. Specific sample depths are noted on boring logs (Appendix A). Soil samples were transferred from the split-spoon sampler directly into clean glass jars supplied by the laboratory. The sampler was decontaminated with a solution of tap water and Alconox™ prior to collecting each sample.

In addition to the soil borings, two hand-augered borings were also advanced at the BNSF Property to a maximum depth of 2 feet bgs. One soil sample was collected from each hand-augered boring. Samples were transferred directly from the hand auger into laboratory-provided glass jars. The hand auger was decontaminated with a solution of tap water and Alconox™ prior to collecting each sample.

Sample jars were clearly labeled with the project name, sample location, and collection date and time. Following labeling, sample jars were placed in a cooler with ice pending transport to the laboratory under standard chain-of-custody (COC) procedures.

Soil samples were submitted to OnSite Environmental, Inc., of Redmond, Washington, for selected analysis of diesel- and heavy oil-range petroleum hydrocarbons (NWTPH-Dx); gasoline-range petroleum hydrocarbons, including benzene, toluene, ethylbenzene, and xylenes (NWTPH-Gx/BTEX); polyaromatic hydrocarbons (PAHs); polychlorinated biphenyl compounds (PCBs); Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver); herbicides; methanol; formaldehyde; and nitrates. Following sampling activities, all borings not selected for groundwater sampling were abandoned with hydrated bentonite chips.

The results of the Phase II ESA investigation of the BNSF Property are presented in the following section.

6.1 FILE REVIEW

The results of the review of Ecology files concerning the Silvestri property, located to the southeast of the BNSF Property, revealed that two USTs (one 1,000 gallon gasoline and one 6,000 gallon diesel) were removed from the Silvestri property and adjacent City of Kent ROW in June 2000 by Sound Transit during site demolition activities. Information provided to Ecology concerning the tank removals indicated that soil and groundwater adjacent to the USTs were impacted with petroleum hydrocarbon compounds exceeding Model Toxics Control Act (MTCA) Method A cleanup levels. According to the information in Ecology's files, Sound Transit was planning to conduct remedial actions to address these impacts. At the time of the preparation of this report, Sound Transit's environmental consultant, Shannon and Wilson, had not completed the remedial action report; however, URS was able to obtain information concerning the remedial actions that were conducted from Sound Transit personnel (personal communication, Morud, 2001). According to this information, the majority of the petroleum-impacted soils were excavated and removed from the UST area immediately following tank removal activities in June 2000. A second round of excavation was conducted in January 2001. Based on the results of confirmation sampling and analysis, this second round of excavation resulted in the removal of soils impacted with petroleum products in excess of MTCA Method A cleanup levels from the Silvestri property. However, the confirmation sampling results indicated that impacted soils remain at the boundary with the BNSF Property, which was the northern limit of the diesel UST excavation. The concentration of heavy oil detected in this soil, which was collected at a depth of 7.5 feet bgs, was 520 mg/kg. This concentration exceeds the current MTCA Method A residential cleanup level of 200 mg/kg, although it is below the proposed Method A cleanup level of 2,000 mg/kg. Groundwater analytical data from the UST excavations were not provided by Sound Transit.

Ecology files concerning the Northwest Metal Products site, formerly located to the west and southwest of the BNSF Property, were also reviewed for information concerning potential releases of metals to groundwater. Information provided in a 1992 site investigation report (Parametrix 1992) indicated the following:

- During a 1992 measuring event, shallow groundwater flowed to the northwest, away from the BNSF Property.
- Concentrations of metals in soil samples were below MTCA Method A cleanup levels in all soil borings except one. The maximum concentration of arsenic detected in this boring was 27 mg/kg, which exceeds the current and proposed MTCA Method A residential cleanup level of 20 mg/kg. This concentration was detected in a surface soil sample located in the central portion of the Northwest Metals facility, approximately 500 feet northwest of the BNSF Property.
- Concentrations of dissolved metals in groundwater samples were below MTCA Method A cleanup levels; however, total arsenic was detected in one well at a concentration of 6.4 micrograms per liter ($\mu\text{g/L}$) which slightly exceeds the MTCA Method A cleanup level of

current MTCA Method B soil cleanup levels. Method B cleanup levels are also appropriate for use at residential sites.

Review of the soil analytical data indicates that TPH as heavy oil was detected in two surface soil samples in the vicinity of the Silvestri equipment yard at concentrations exceeding current MTCA Method A cleanup levels. TPH as heavy oil was detected at a concentration of 700 mg/kg in a sample collected from a depth of 0 to 3 feet bgs in boring GP-6, and at a concentration of 350 mg/kg in a sample from a depth of 0 to 0.5 foot bgs in boring GP-7. Both of these concentrations exceed the current Method A cleanup level of 200 mg/kg; however, both of these results are below the proposed Method A cleanup level of 2,000 mg/kg. The heavy oil concentrations in this area are likely attributed to minor surface spills of motor oil or fuel from automobiles and equipment stored in the equipment yard. No other soil samples contained concentrations of gasoline-, diesel- or heavy oil-range TPH or BTEX compounds above cleanup levels.

Lead was detected in eight of the soil samples submitted for analysis. Lead concentrations in seven of these samples were below the current and proposed Method A cleanup levels. A lead concentration of 300 mg/kg was detected in the sample from boring GP-7 at a depth of 0 to 0.5 foot bgs, which exceeds the current and proposed residential Method A cleanup levels of 250 mg/kg. This boring was located adjacent to the Silvestri equipment yard. A soil sample collected directly beneath this sample did not contain detectable concentrations of lead. In addition, concentrations of lead in other shallow soil samples collected from the equipment yard were below cleanup levels; therefore, it appears that the extent of lead-impacted soil in this area is very limited. Because this elevated concentration occurs in the same sample as the elevated heavy oil concentration, it is likely that the elevated lead concentration encountered is also the result of minor motor oil releases from the equipment stored in the area.

Total chromium was detected in all soil samples submitted for analysis. A total chromium concentration of 21 mg/kg (which includes chromium III and chromium VI) was detected in the soil sample collected from boring GP-1 at a depth of 0 to 3 feet bgs. This concentration slightly exceeds the proposed chromium VI cleanup level of 19 mg/kg, but is well below the proposed chromium III cleanup level of 2,000 mg/kg and the current total chromium cleanup level of 100 mg/kg. Although chromium speciation analysis was beyond the scope of work for this project, URS experience at similar sites suggests that it is highly unlikely that the total chromium concentration detected at this location is attributable to chromium VI; therefore, total chromium or chromium III cleanup levels are more appropriate. Consequently, the chromium concentrations detected at the BNSF Property do not exceed cleanup levels.

Arsenic was detected in one soil sample, cadmium was detected in two soil samples, and barium was detected in all soil samples submitted for analysis. None of these concentrations exceeded cleanup levels. Mercury, selenium, and silver were not detected in any of the soil samples submitted for analysis.

Formaldehyde was detected in all four samples submitted for analysis at concentrations ranging from 8.8 to 23 mg/kg. All of these samples were collected from just above the water table. None of these concentrations exceeded the Method B soil cleanup level of 33.3 mg/kg.

PCBs or methanol were not detected in any of the samples submitted for analysis. Nitrate was detected in two of the samples submitted, but at concentrations well below MTCA Method B cleanup levels.

Total chromium was detected in the samples collected from borings GP-2 and GP-5 at concentrations of 34 µg/L and 52 µg/L, respectively. The concentration in the sample from boring GP-5 exceeds both the current and proposed Method A cleanup levels of 50 µg/L. Lead was detected in one sample collected from boring GP-2 at a concentration of 11 µg/L. This concentration exceeds the current Method A cleanup level of 5 µg/L, but is below the proposed Method A cleanup level of 15 µg/L. Based on the groundwater flow direction at the BNSF Property, these elevated concentrations are also likely emanating from an off-site source located south of the BNSF Property or are the result of turbidity in the samples. No other metals were detected in the groundwater samples submitted for analysis.

Nitrate was detected in the sample collected from boring GP-1 at a concentration of 0.79 µg/L. This concentration is well below the MTCA Method B cleanup level of 26 µg/L. Methanol was not detected in any of the groundwater samples submitted for analysis.

Formaldehyde was detected in the samples collected from borings GP-1 and GP-5 at concentrations of 0.047 µg/L and 0.44 µg/L, respectively. Neither of these concentrations exceeds the MTCA Method B groundwater cleanup level of 1.46 µg/L. Formaldehyde was not detected in the sample from boring GP-2.

SECTION SEVEN**Summary of Potential Issues**

Despite long-term industrial use of the BNSF Property, significant soil and groundwater contamination were not found. The only soil impacts found were to surficial soils in the area of the Silvestri equipment yard. The only groundwater impacts appear to result from off-site sources, or, given the low concentrations, could be attributed to the analytical method or natural background levels. Details of these findings are summarized below:

- The concentration of heavy oil in shallow soils in the vicinity of the Silvestri equipment yard exceeds the current MTCA Method A cleanup level. This elevated concentration is likely the result of minor surface leaks of motor oil from automobiles and other similar equipment stored in the area.
- The concentration of lead in shallow soils in the vicinity of the Silvestri equipment yard exceeds the MTCA Method A cleanup levels. Elevated lead concentrations are commonly associated with motor oil releases; therefore, it is likely that the elevated concentration detected is also the result of minor motor oil leaks from automobiles and other similar equipment stored in the area.
- Concentrations of dissolved arsenic in groundwater exceed MTCA Method A cleanup levels in the central and eastern portions of the BNSF Property. Elevated arsenic concentrations were not detected in soil samples from the BNSF Property. Therefore, based on the groundwater flow direction in the area, these elevated concentrations are likely emanating from an off-site source located to the south of the BNSF Property or are indicative of natural groundwater conditions.
- Concentrations of dissolved lead and chromium in groundwater slightly exceed MTCA Method A cleanup levels in the central portion of the BNSF Property. Based on the groundwater flow direction in the area, these elevated concentrations are also likely emanating from an off-site source located to the south of the BNSF Property or are indicative of natural groundwater conditions.
- The concentration of benzene in groundwater in the extreme eastern portion of the BNSF Property exceeds the MTCA Method A cleanup level. This elevated concentration is likely emanating from the former gasoline UST that was removed from the nearby Silvestri property. Because the source has been removed, benzene concentrations in this area will likely attenuate over time.

SECTION EIGHT**Conceptual Cleanup Plan and Estimated Costs**

It is URS' understanding that the BNSF Property will be redeveloped into residential and commercial mixed use. Residential use warrants a higher level of environmental protection than industrial use because of the potential for children and full-time residents to be exposed to contaminants in soil and groundwater. The following recommendations are based on this proposed use.

Impacts to soils at the BNSF Property are limited to the upper few feet of soil in the immediate vicinity of the Silvestri equipment yard. These impacts are limited to heavy oil and lead. Based on the limited data collected in this area, URS estimates the volume of impacted soil in this area to be no more than approximately 240 cubic yards. URS recommends that this soil be excavated and transported off site for disposal at an appropriate facility or capped with provisions made for institutional controls. Confirmation soil samples should be collected from the base of the excavation to confirm that all of the impacted soil has been removed if a removal action is conducted. In addition, at least one soil sample will need to be collected and analyzed to characterize the impacted soils for parameters specified by the disposal facility. The estimated cost to conduct characterization, excavation, transportation, and disposal activities in addition to confirmation sampling activities is approximately \$18,400. Supporting details of our cost estimate is presented in Appendix D.

Elevated arsenic, lead, chromium, and benzene concentrations detected in groundwater samples at the BNSF Property appear to originate from unknown off-site sources, most likely located to the south of the BNSF Property. In addition, there is no groundwater use in the immediate vicinity of the BNSF Property. Based on these factors, cleanup of these constituents in groundwater is not practicable or reasonable.

SECTION NINE**Limitations**

URS has performed services for this project in accordance with our Agreement and workplan; no guarantees are either expressed or implied.

The records search was limited to information that was reasonably available from public sources. This information is changing continually and is frequently incomplete. Unless we have actual knowledge to the contrary, information obtained from interviews or provided to us has been assumed to be correct and complete. We do not assume any liability for information that has been misrepresented to us or for items not visible, accessible, or present on the BNSF Property at the time of the site visit.

There is no investigation thorough enough to preclude the presence of materials on the BNSF Property that currently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable may, in the future, become subject to different regulatory standards and require remediation.

Where records indicate that prior remedial work or tank removals have occurred, there is a risk that the work may not have been performed correctly or completely. In these cases, if the regulatory agency has approved the closure of the tank or other work done, we have assumed that the work was done correctly and completely.

Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions. This document and the information contained herein have been prepared solely for the use of the City of Kent. No third party shall have the right to rely on our opinions rendered in connection with the services or in this document without our written consent and the third party's agreement to be bound to the same conditions and limitations as the client.

The qualifications of the Project Manager and of the other environmental professionals involved in this ESA meet the URS corporate requirements for performing ESAs.

SECTION TEN**References**

EMCON Northwest, Inc. (EMCON). 1992. *Summary Report Hydrogeologic Investigations, Borden Packaging and Industrial Products Facility, Kent, Washington, Volumes I and II.*

Parametrix, Inc. 1992. *Final: Third Phase Site Characterization and Preliminary Remedial Evaluation Report, King County Regional Justice Center Project, Proposed Site: Kent, WA.* November 1992.

URS Corporation (URS). 2000. *Borden Chemical Facility Phase II Report.* November 2000.

Personal Communications

Mr. Al Bunger. June 25, 2001. Phone conversation with Gary Stoyka of URS.

Ms. Linda Morud. May 22, 2001. Conversation with Gary Stoyka of URS.

Table 1
ANALYTICAL RESULTS FOR SOIL--TPH AND BTEX

Sample ID	GP5/0-1	GP-6-(0-3')	GP-6-(6-7.5')	GP-7-(0-0.5')	GP-7-(6-9')	GP8/0-1	GP8/4-5	HA2/0-1	MTCA Method A Residential (Unrestricted) Cleanup Level	
Sample depth (feet bgs)	0 to 1	0 to 3	6 to 7.5	0 to 0.5	6 to 9	0 to 1	4 to 5	0 to 1	Current	Proposed
Sample date	5/31/01	5/30/01	5/30/01	5/30/01	5/30/01	5/31/01	5/31/01	5/31/01		
Analyte (mg/Kg)										
Benzene	--	0.28 U	0.36 U	0.060 U	0.067 U	0.053 U	0.068 U	0.054 U	0.5	0.03
Toluene	--	0.28 U	0.36 U	0.060 U	0.067 U	0.053 U	0.068 U	0.054 U	40	7
Ethylbenzene	--	0.28 U	0.36 U	0.060 U	0.067 U	0.053 U	0.068 U	0.054 U	20	6
m,p-xylene	--	0.28 U	0.36 U	0.060 U	0.067 U	0.053 U	0.068 U	0.054 U	20	9
o-xylene	--	0.28 U	0.36 U	0.060 U	0.067 U	0.053 U	0.068 U	0.054 U	20	9
TPH-gas	--	28 U	36 U	6 U	6.7 U	5.3 U	6.8 U	5.4 U	100	100 ^a
TPH-diesel fuel	27 U	28 U	36 U	30 U	33 U	27 U	34 U	27 U	200	2,000
TPH-heavy oil	53 U	700	72 U	350	170	53 U	68 U	54 U	200	2,000

^a Applies to gasoline mixtures without benzene and consisting of no more than 20% aromatic hydrocarbons between EC 8 and EC 16. The cleanup level for all other gasoline mixtures is 30 mg/kg.

Notes:

Results shown in bold exceed at least one of the cleanup levels presented.

BTEX analyzed by EPA 8021

BTEX - benzene, toluene, ethylbenzene, xylenes

Diesel and heavy oil analyzed by NWTPH-Dx (extended)

feet bgs - feet below ground surface

Gasoline analyzed by NWTPH-G

mg/Kg - milligrams per kilogram

MTCA - Model Toxics Control Act

TPH - Total petroleum hydrocarbons

U - not detected above laboratory practical quantitation limit (POL)

-- = Sample not analyzed for this parameter

Table 2
ANALYTICAL RESULTS FOR SOIL--CHLORINATED ACID HERBICIDE COMPOUNDS

Sample ID	GP-2-(0-1)	GP4/0-3	GP-7-(0-0.5')	HA1/0-1	MTCA Method B Cleanup Level
Sample Depth (feet bgs)	0 to 1	0 to 2	0 to 0.5	0 to 1	
Sample Date	5/30/01	5/31/01	5/30/01	5/31/01	
Analyte (mg/Kg)					
Dalapon	280 U	260 U	270 U	240 U	2,400,000
Dicamba	29 U	27 U	28 U	25 U	2,400,000
MCP	5,700 U	5,400 U	5,600 U	5,000 U	NA
MCPA	5,700 U	5,400 U	5,600 U	5,000 U	40,000
Dichloroprop	29 U	27 U	28 U	25 U	NA
2,4-D	29 U	27 U	28 U	25 U	800,000
2,4,5-TP (Silvex)	29 U	27 U	28 U	25 U	640,000
2,4,5-T	29 U	27 U	28 U	25 U	800,000
2,4-DB	29 U	27 U	28 U	25 U	640,000
Dinoseb	29 U	27 U	28 U	25 U	80,000

Notes:

feet bgs - feet below ground surface

Herbicides analyzed by EPA 8151

mg/Kg - milligrams per kilogram

MTCA - Model Toxics Control Act

NA - No MTCA B cleanup level for this analyte

U - not detected above laboratory practical quantitation limit (PQL)

Table 3
ANALYTICAL RESULTS FOR SOIL--PCBs

Sample ID	GP-6-(0-3')	GP-7-(0-0.5')	HA2/0-1	GP8/4-5	MTCA Method A Residential (Unrestricted) Cleanup Level	
Sample depth (feet bgs)	0 to 3	0 to 0.5	0 to 1	4 to 5		
Sample date	5/30/01	5/30/01	5/31/01	5/31/01	Current	Proposed
Analyte (mg/Kg)						
Aroclor 1016	0.056 U	0.060 U	0.054 U	0.068 U	Sum < 1	Sum < 10
Aroclor 1221	0.056 U	0.060 U	0.054 U	0.068 U		
Aroclor 1232	0.056 U	0.060 U	0.054 U	0.068 U		
Aroclor 1242	0.056 U	0.060 U	0.054 U	0.068 U		
Aroclor 1248	0.056 U	0.060 U	0.054 U	0.068 U		
Aroclor 1254	0.056 U	0.060 U	0.054 U	0.068 U		
Aroclor 1260	0.056 U	0.060 U	0.054 U	0.068 U		

Notes:

feet bgs - feet below ground surface

mg/kg - milligrams per kilogram

MTCA - Model Toxics Control Act

PCBs analyzed by EPA Method 8082

U - not detected above laboratory practical quantitation limit (PQL)

Table 4

ANALYTICAL RESULTS FOR SOIL--TOTAL METALS

Sample ID	GP-1-(0-3)	GP-1-(3-6)	GP-2-(0-1)	GP-2-(4-5)	GP-3-(0-1)	GP-3-(4-5)	MTCA Method A Residential (Unrestricted) Cleanup Level		MTCA Method B Cleanup Level
Sample depth (feet bgs)	0 to 3	3 to 6	0 to 1	4 to 5	0 to 1	4 to 5			
Sample date	5/30/01	5/30/01	5/30/01	5/30/01	5/30/01	5/30/01	Current	Proposed	
Analyte (mg/Kg)									
Arsenic	12 U	13 U	12 U	14 U	12 U	14 U	20	20	--
Barium	50 J	49 J	51 J	44 J	49 J	41 J	NA	NA	5,600
Cadmium	0.58 U	0.67 U	0.61 U	0.70 U	0.60 U	0.68 U	2	2	--
Chromium	21	13	11	11	14	12	100	Cr III: 2,000 Cr VI: 19	--
Lead	30	6.7 U	6.1 U	7.0 U	6.5	6.8 U	250	250	--
Mercury	0.29 U	0.33 U	0.30 U	0.35 U	0.30 U	0.34 U	1	2	--
Selenium	12 U	13 U	12 U	14 U	12 U	14 U	NA	NA	400
Silver	0.58 U	0.67 U	0.61 U	0.70 U	0.60 U	0.68 U	NA	NA	400

Table 4
ANALYTICAL RESULTS FOR SOIL--TOTAL METALS
(cont.)

Sample ID	GP4/0-3	GP4/4-5	GP5/0-1	GP5/4-5	GP-6-(0-3)	GP-6-(6-7.5)	MTCA Method A Residential (Unrestricted) Cleanup Level	MTCA Method B Cleanup Level
Sample depth (feet bgs)	0 to 3	4 to 5	0 to 1	4 to 5	0 to 3	6 to 7.5		
Sample date	5/31/01	5/31/01	5/31/01	5/31/01	5/30/01	5/30/01	Current	Proposed
Analyte (mg/Kg)								
Arsenic	11 U	13 U	11 U	14 U	11 U	14 U	20	--
Barium	39	33	21	56	60 J	40 J	NA	5,600
Cadmium	0.57 U	0.65 U	0.53 U	0.68 U	1.2	0.72 U	2	--
Chromium	11	7.1	14	13	15	7.8	100	--
							Cr III: 2,000	--
							Cr VI: 19	--
Lead	7.6	6.5 U	8.6	6.8 U	97	20	250	--
Mercury	0.29 U	0.32 U	0.27 U	0.34 U	0.28 U	0.36 U	1	--
Selenium	11 U	13 U	11 U	14 U	11 U	14 U	NA	400
Silver	0.57 U	0.65 U	0.53 U	0.68 U	0.56 U	0.72 U	NA	400

Table 4

ANALYTICAL RESULTS FOR SOIL--TOTAL METALS (cont.)

Sample ID	GP-7-(0-0.5)	GP-7-(6-9)	GP8/0-1	GP8/4-5	HA1/0-1	HA2/0-1	MTCA Method A Residential (Unrestricted) Cleanup Level		MTCA Method B Cleanup Level
Sample depth (feet bgs)	0 to 0.5	6 to 9	0 to 1	4 to 5	0 to 1	0 to 1			
Sample date	5/30/01	5/30/01	5/31/01	5/31/01	5/31/01	5/31/01	Current	Proposed	
Analyte (mg/Kg)									
Arsenic	16	13 U	11 U	14 U	11 U	11 U	20	20	--
Barium	56 J	50 J	66	38	23	57	NA	NA	5,600
Cadmium	0.60 U	0.67 U	1.1	0.68 U	0.53 U	0.54 U	2	2	--
Chromium	19	11	21	8.9	13	19	100	Cr III: 2,000 Cr VI: 19	--
Lead	300	6.7 U	57	6.8 U	50	33	250	250	--
Mercury	0.30 U	0.33 U	0.27 U	0.34 U	0.27 U	0.27 U	1	2	--
Selenium	12 U	13 U	11 U	14 U	11 U	11 U	NA	NA	400
Silver	0.60 U	0.67 U	0.53 U	0.68 U	0.53 U	0.54 U	NA	NA	400

Notes:

Total metals analyzed by EPA 6010B/7471A

feet bgs - feet below ground surface

J - Value is estimated

MTCA B soil values are listed only for analytes for which there is no MTCA A value.

MTCA - Model Toxics Control Act

mg/kg - milligrams per kilogram

NA - No MTCA A cleanup level for this analyte

U - not detected above laboratory practical quantitation limit (PQL)

Table 5
ANALYTICAL RESULTS FOR SOIL--FORMALDEHYDE, METHANOL, AND NITRATE

Sample ID	GP-1-(0-3)	GP-2-(4-5)	GP-3-(4-5)	GP4/4-5	GP5/4-5	MTCA Method B Cleanup Level
Sample date	5/30/01	5/30/01	5/30/01	5/31/01	5/31/01	
Analyte (mg/kg)						
Formaldehyde	--	8.8	3.4	9	23	33.3
Methanol	--	10.0 U	10.0 U	10.0 U	10.0 U	40,000
Nitrate	0.25 J	0.52	--	--	0.36 U	128,000

Notes:

Formaldehyde analyzed by EPA 8315

J - The value reported was below the practical quantitation limit. The value is an estimate.

Methanol analyzed by EPA 8015B

mg/kg - milligrams per kilogram

MTCA - Model Toxics Control Act

U - not detected above laboratory practical quantitation limit (PQL)

-- = Sample not analyzed for this parameter

Nitrate analyzed by EPA 300.0

Table 6
ANALYTICAL RESULTS FOR GROUNDWATER--TPH AND BTEX

Sample ID	GW/GP5	GW/GP-6	GW/GP-7	GW/GP8	MTCA Method A Cleanup Level	
Sample date	5/31/01	5/30/01	5/30/01	5/31/01	Current	Proposed
Analyte (µg/L)						
Benzene	1.0 U	1.0 U	1.0 U	51	5	5
Toluene	1.0 U	1.0 U	1.0 U	1.0 U	40	1,000
Ethylbenzene	1.0 U	1.0 U	1.0 U	1.0 U	30	700
m,p-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	20	1,000
o-Xylene	1.0 U	1.0 U	1.0 U	1.0 U	20	1,000/800 ^a
TPH-gas	120	100 U	100 U	100 U	1,000	1,000
Diesel fuel	250 U	250 U	250 U	250 U	1,000	500
Heavy oil	500 U	500 U	500 U	500 U	1,000	500

^a800 µg/L cleanup level applies when benzene is detected.

Notes:

Gasoline analyzed by NWTPH-G

Diesel and heavy oil analyzed by NWTPH-Dx (extended)

Results shown in bold exceed indicated cleanup level(s).

BTEX analyzed by EPA 8021

BTEX - benzene, toluene, ethylbenzene, xylenes

TPH - Total petroleum hydrocarbons

µg/L - micrograms per liter

U - not detected above laboratory practical quantitation limit (PQL)

Table 7
ANALYTICAL RESULTS FOR GROUNDWATER--
CHLORINATED ACID HERBICIDE COMPOUNDS

Sample ID	GW/GP5	MTCA Method B Cleanup Level
Sample date	5/31/01	
Analyte (µg/L)		
Dalapon	0.023 U	480
Dicamba	0.024 U	480
MCPP	4.7 U	NA
MCPA	4.7 U	8
Dichloroprop	0.030	NA
2,4-D	0.024 U	160
2,4,5-TP (Silvex)	0.024 U	128
2,4,5-T	0.024 U	160
2,4-DB	0.024 U	128
Dinoseb	0.024 U	16

Notes:

Herbicides analyzed by EPA 8151

NA = No MTCA B cleanup level for this analyte

µg/L = micrograms per liter

U = not detected above laboratory practical quantitation limit (PQL)

Table 8
ANALYTICAL RESULTS FOR GROUNDWATER--
POLYCYCLIC AROMATIC HYDROCARBONS

Sample ID	GW/GP8	MTCA Method A Cleanup Level	
Sample date	5/30/01	Current	Proposed
Analyte (µg/L)			
Naphthalene	0.50 U	NA	160
2-Methylnaphthalene	0.50 U	NA	NA
1-Methylnaphthalene	0.50 U	NA	NA
Acenaphthylene	0.50 U	NA	NA
Acenaphthene	0.50 U	NA	NA
Fluorene	0.50 U	NA	NA
Phenanthrene	0.50 U	NA	NA
Anthracene	0.50 U	NA	NA
Fluoranthene	0.50 U	NA	NA
Pyrene	0.50 U	NA	NA
Benzo[a]anthracene	0.012 U	0.1	NA
Chrysene	0.012 U	0.1	NA
Benzo[b]fluoranthene	0.012 U	0.1	NA
Benzo[k]fluoranthene	0.012 U	0.1	NA
Benzo[a]pyrene	0.012 U	0.1	NA
Indeno[1,2,3-cd]pyrene	0.012 U	0.1	NA
Dibenz[a,h]anthracene	0.012 U	0.1	NA
Benzo[g,h,i]perylene	0.012 U	NA	NA

Notes:

NA - No MTCA A cleanup level for this analyte

PAHs analyzed by EPA 8270C SIM

µg/L - micrograms per liter

U - not detected above laboratory practical quantitation limit (PQL)

Table 9
ANALYTICAL RESULTS FOR GROUNDWATER--
DISSOLVED METALS

Sample ID	GW/GP-1	GW/GP-2	GW/GP-5	GW/GP-7	MTCA Method A Cleanup Level		MTCA Method B Cleanup Level
Sample date	5/31/01	5/31/01	5/31/01	5/31/01	Current	Proposed	
Analyte (µg/L)							
Arsenic	3.0 U	79	9.3	6.7	5	5	--
Barium	50 U	190	50 U	50 U	NA	NA	1,120
Cadmium	4.0 U	4.0 U	4.0 U	4.0 U	5	5	--
Chromium	10 U	34	52	10 U	50	50	--
Lead	1.0 U	11	1.0 U	1.0 U	5	15	--
Mercury	0.50 U	0.50 U	0.50 U	0.50 U	2	2	--
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	NA	NA	80
Silver	10 U	10 U	10 U	10 U	NA	NA	80

Notes:

Total metals analyzed by EPA 200.8/7421A/7470A

MTCA Method B cleanup levels are listed only for analytes for which there is no MTCA Method A cleanup level

NA - No MTCA A cleanup level for this analyte

µg/L - micrograms per liter

U - not detected above laboratory practical quantitation limit (PQL)

Table 10
**ANALYTICAL RESULTS FOR GROUNDWATER--
 FORMALDEHYDE, METHANOL, AND NITRATE**

Sample ID	GW/GP1	GW/GP2	GW/GP5	MTCA Method B Cleanup Level
Sample Date	5/31/01	5/31/01	5/31/01	
Analyte (mg/L)				
Formaldehyde	0.047	0.02 U	0.44	1.46
Methanol	10.0 U	10.0 U	10 U	4
Nitrate	0.79	0.3 U	0.06 U	26

Notes:

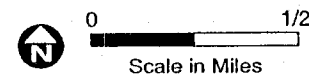
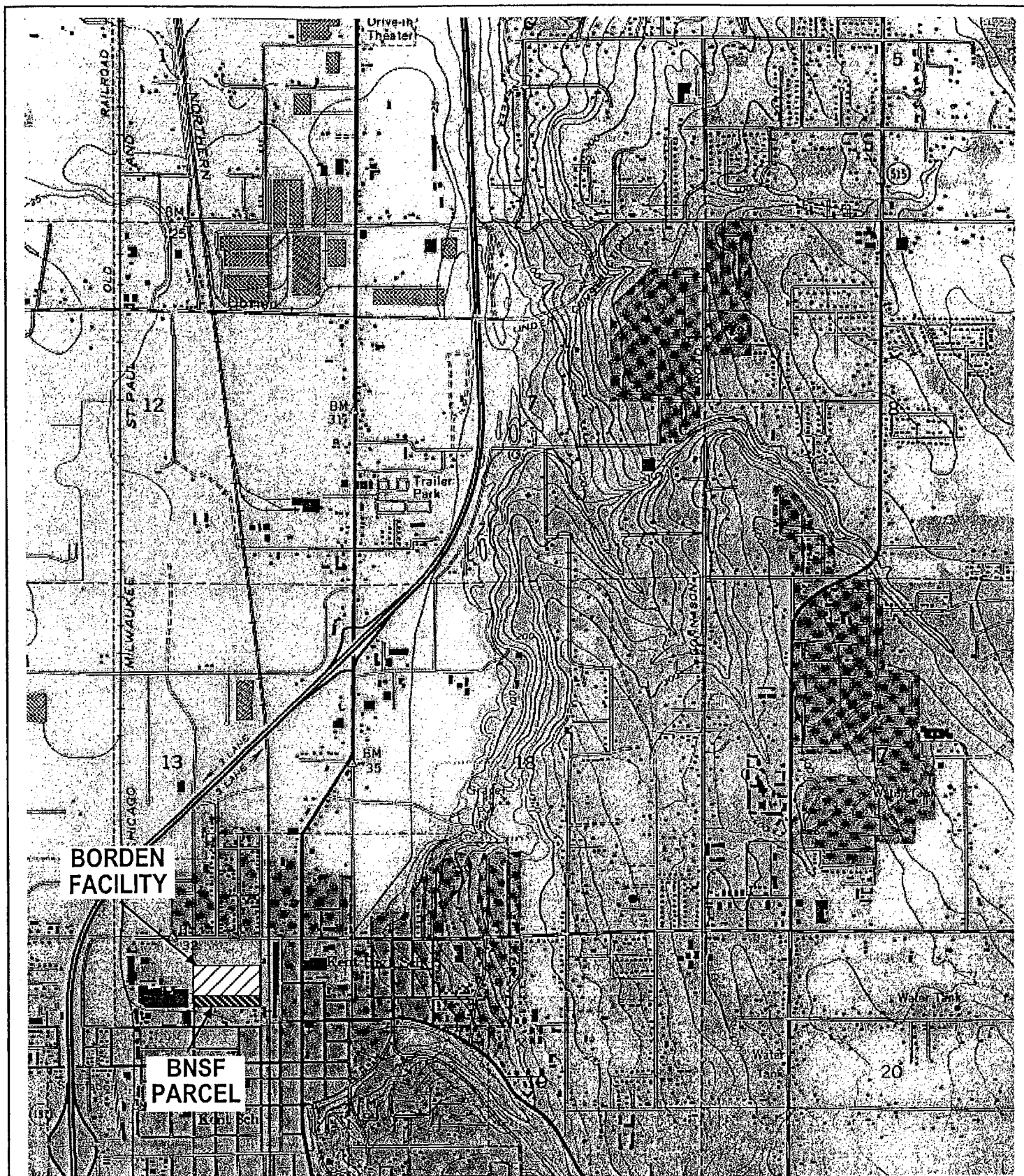
Formaldehyde analyzed by EPA 8315

Methanol analyzed by EPA 8015B

Nitrate analyzed by EPA 300.0

mg/L - milligrams per liter

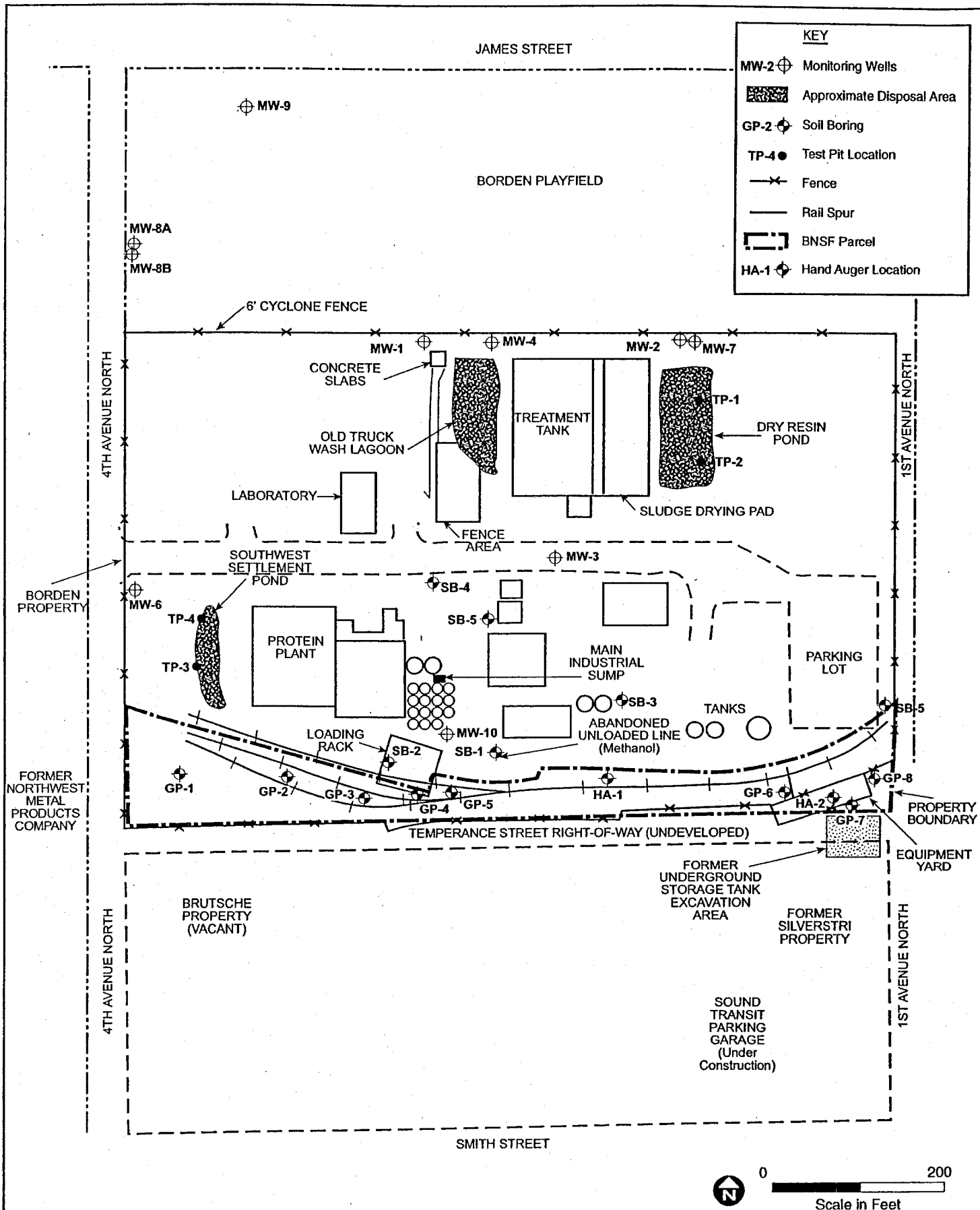
U - not detected above laboratory practical quantitation limit (PQL)



City of Kent	Project No. 5409900118
URS	

Property Location

Figure
1



Source: EMCON Northwest, 1992