

FINAL REPORT

BORDEN CHEMICAL FACILITY ENVIRONMENTAL SUMMARY AND CLOSURE REPORT

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

June 2003

URS

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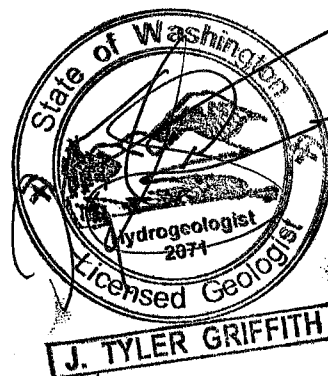


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This report summarizes results of several environmental investigations and cleanup efforts conducted from 1987 to December 2002 at the former Borden Chemical facility and adjacent Burlington Northern Sante Fe (BNSF) railroad spur (collectively referred to as "the Property") in the City of Kent, Washington. The Property is located at 421 1st Avenue North and is situated on the north end of the retail core of the city. The buildings and foundations at the site were demolished by Borden Chemical during Fall 2001; the City acquired the property in the same year. Currently, new utility lines and an extension of Second Avenue are being constructed through the Property to support redevelopment for commercial and multi-family residential uses. The soil and groundwater contaminant levels at this site have been compared to Model Toxics Control Act (MTCA, WAC 173-340) cleanup levels for unrestricted site uses (i.e., residential and commercial). Based on cleanup actions conducted, and soil and groundwater contaminant concentrations, environmental issues historically affecting the Property require no further cleanup actions.

HISTORICAL SITE USE

The Property was used for agricultural purposes until 1956 when Borden Chemical developed the Property for the manufacture of plywood resins. Resins were either phenol-formaldehyde or urea-formaldehyde based; methanol was used to generate the formaldehyde. Resins that settled out of process water were deposited in shallow depressions on the site. A rail spur adjacent to the facility was used to transport and offload chemicals. In the recent past, the southeast portion of the BNSF rail spur was used for equipment storage by a neighboring property owner. All equipment on the rail spur area was removed during the facility demolition in 2001.

RELEASES

Based on URS' observations of the facility and interviews with operators, the facility appears to have been operated well, and accidental releases of chemicals to the environment were few considering the length of operation and quantity of chemicals handled. Where releases occurred, they appear to have been reported and investigated by the facility. Documented releases to site soil and groundwater included methanol and formaldehyde, which occurred in the late 1980s due to damage to a pipeline in the loading area. Resin particles were deposited in three onsite depressions, termed the southwest settlement pond, the old truck wash lagoon, and the dry resin pond. More recently, releases of petroleum hydrocarbons occurred in surface soils in the southeast portion of the BNSF rail spur, due to the unauthorized occupancy of that area by a neighboring business.

The Washington Department of Ecology (Ecology) conducted a Site Hazard Assessment of the facility in 1992 that resulted in a rank of "1", representing the highest potential for contamination. One concern of Ecology was the known release to soil and groundwater from the damaged pipeline cited above. Many of Ecology's concerns were, however, related to the aboveground storage tanks (ASTs) containing volatile chemicals (e.g., methanol, ethanol, and formaldehyde) and their close proximity to a populated area in the event of a catastrophic failure. Given that the ASTs and related chemicals have been removed from the site, and groundwater concentrations for the releases have degraded to below cleanup levels, the reasons for Ecology's ranking of the site have been eliminated.

STATUS OF CONTAMINANT ISSUES

Soil

Soil samples collected from the affected areas on the Property were evaluated during environmental investigations in 2000 and 2001, before and during demolition activities. Elevated levels of nitrates were identified in the southwest settling pond and elevated levels of total petroleum hydrocarbons (TPH) and lead were detected in the southeast portion of BNSF property. No other areas on the property, including the truck wash lagoon and dry resin pond, were found to have soil contaminant concentrations in exceedence of MTCA Method A unrestricted levels (or Method B if Method A levels were not available). In 2002, 950 tons of soils in the southwest settlement pond, and 560 tons of soil in the southeast portion of the BNSF property were removed and disposed in licensed landfills.

Groundwater

Shallow groundwater on the site and on the adjacent ball fields was monitored for methanol, ammonia, and nitrate in 10 wells from 1987 to 2000 by Borden's consultant. Elevated levels of methanol and nitrate exhibited significant decreases during the 13-year period, although still in exceedence of MTCA Method B levels in two wells as of 2000. Sampling and analysis conducted in December 2002 resulted in concentrations of methanol and nitrate below detection limits or cleanup levels in the remaining affected wells.

During a site investigation in 2000, groundwater samples were collected from each of six wells on the Borden facility and analyzed for volatiles, semi-volatiles, and inorganics (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Arsenic was found in two wells above MTCA A levels at the northern border of the Property; other analytes were either not detected or were below MTCA cleanup levels for unrestricted use properties. The source of the arsenic in the groundwater was not found as there were no known historical uses of arsenic at the site and soil samples collected during the investigation were below MTCA A unrestricted cleanup levels.

Groundwater samples were collected through push probe borings during an investigation of the BNSF site in 2001. Benzene was detected above MTCA Method A levels in the sample collected downgradient from a former gasoline underground storage tank (UST) remediation project conducted in August 2000 at the Sound Transit parking garage site (formerly the Sylvestri property). The benzene is likely to be a residual release from the offsite UST cleanup effort and will naturally degrade in time because the source soils were removed.

In other borings on the BNSF site, several inorganics (arsenic, total chromium, and lead) were detected in the groundwater samples collected through the push probe. While lead and chromium were detected just at or below cleanup levels, arsenic was detected above MTCA Method A levels in three water samples. As on the Borden site, no known source of arsenic was found since arsenic was detected in only one soil sample (out of 18 analyzed) at a concentration that was below MTCA Method A (unrestricted) levels. The report concluded that the arsenic was either from an offsite source, or reflective of natural background variability, or due to turbidity (high suspended sediment amounts) in the groundwater because the sample was collected from a boring and not a fully constructed well. The arsenic in groundwater does not

Executive Summary

pose a risk to the public because use of the groundwater for potable purposes on the site or vicinity will be precluded by a restrictive covenant on the deed, and other exposure pathways will be prevented by future site structures as currently planned. Therefore, no groundwater remediation for arsenic is indicated at this time.

NATURE OF SUMMARY REPORT

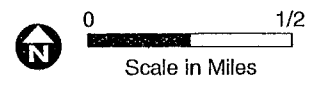
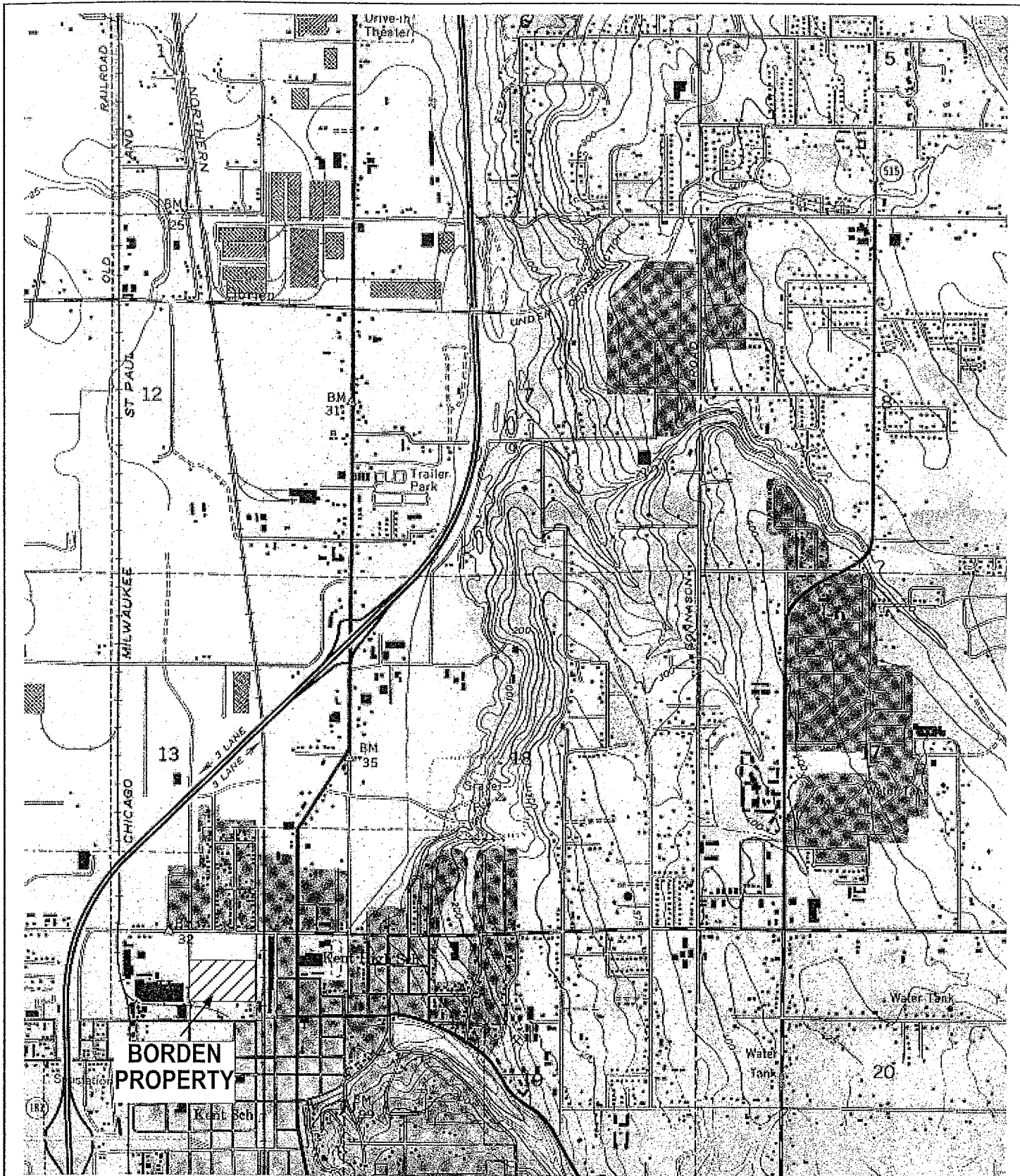
Several environmental investigations and cleanup actions performed on the Property have been documented in separate reports. This report summarizes the findings of those reports in a single document. The summary report refers back to the original reports, and the reader should consult those reports for additional details.

URS was retained by the City of Kent (City) to prepare specifications and assist in contaminated soil cleanup activities at the former Borden Chemical Facility in Kent, Washington (Figure 1). The work was conducted under the Consultant Services Contract between the City and URS, authorized on January 30, 2002 and subsequent amendments. This cleanup report presents a summary of the past environmental studies, investigations, and remedial activities conducted on the site, as well as the work completed under this contract. The purpose of the remedial activities conducted under this contract was to clean up the soils at the site to allow the sale of the property for mixed-use redevelopment (e.g., office, retail, multi-family residential units).

The objective of this cleanup was to achieve soil cleanup levels below Model Toxics Control Act (MTCA) concentrations for unrestricted land use at two previously identified problem areas. Cleanup levels for unrestricted land use were targeted because of potential multi-family residential development. The first area, the southwest settling pond, was excavated due to elevated nitrate concentrations. The second area, the southeast area of the Burlington Northern Santa Fe (BNSF) property, was excavated due to elevated petroleum hydrocarbons and lead concentrations. The specific scope of work under this contract included:

- preparing select specifications for the remedial activities in association with the construction of the extension of Second Avenue through the property
- attending a pre-construction meeting with the contractor and the City
- reviewing and commenting on the contractor submittals associated with the cleanup activities
- directing the excavation and removal activities
- collecting confirmation soil samples from the excavations
- preparing a report summarizing the work performed

This cleanup report is applicable only to the remediation project as described herein. URS accepts no responsibility or liability for any previous work or work product addressed or cross-referenced in this document that was conducted without URS oversight.



2.1 LOCATION

The project site comprises the former Borden Chemical property and former Burlington Northern Santa Fe (BNSF) property, collectively referred to as the Property in this report. The Property is located in the northeast quarter of Section 24, Township 22 North, Range 4 East, in King County, Washington, approximately 3/4 mile northeast of the Green River (Figure 1). The specific address is 421 1st Avenue North, Kent, Washington, 98035. The Property occupies approximately 12 acres and is bounded on the north by James Street, on the east by 1st Avenue North, on the south by other properties including Sound Transit's parking garage, and on the west by 4th Avenue North. According to the U.S. Geological Survey (USGS) 7.5-minute topographic map of the Renton Quadrangle, the Property is relatively flat and at an elevation of approximately 35 feet above mean sea level (msl).

2.2 FORMER SITE IMPROVEMENTS

The Property was initially used for agricultural purposes. Beginning in 1956, the Property was used to manufacture and distribute Phenol-Formaldehyde (PF) and Urea-Formaldehyde (UF) resins used in plywood manufacturing. During the manufacturing period, 49 aboveground storage tanks (ASTs) were present onsite, containing industrial quantities of chemicals such as formaldehyde, phenol, methanol, petroleum products, hydrochloric acid (HCl), sodium hydroxide (NaOH), and potassium hydroxide (KOH). Approximately 30 ASTs remained onsite when the City acquired the Property in 2001. There were also six buildings onsite that occupied approximately 40,000 square feet (ft²). In addition, the Property's wastewater collection and recycling system consisted of a mixing tank, a large treatment tank, several smaller settlement tanks, and a sludge drying pond occupying approximately 30,000 ft². Resin solids were deposited in shallow depressions on the site, termed the southwest settlement pond, the old truckwash lagoon, and the dry resin pond.

A former BNSF rail spur traversed the Property along its southern boundary. Three smaller spurs split from this main spur. The area around the rails was covered with gravel or ballast. A loading/unloading structure (rack) was located near the center of the former BNSF property with piping connecting to the facility. The southwestern portion of the BNSF property was mostly wooded. The former facility layout is depicted in Figure 2.

2.3 ENVIRONMENTAL SETTING

2.3.1 Regional Geologic Conditions

The area surrounding the Property is urban commercial and industrial land, located on the eastern side of the Kent Valley and on the northern edge of downtown Kent, Washington. The Kent Valley is located in the southeastern portion of the Puget Lowland, 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 which developed during the recent ice ages of the Quaternary period. The Cordilleran ice sheet advanced and retreated from British Columbia, Canada between about 13,000 and 20,000 years ago. The advancing ice sheet filled

the Puget Lowlands with as much as 3,000 to 5,000 feet of ice at least four different times during this period. This resulted in a thick, complex sequence of glacial and interglacial sediments.

Geologic mapping of the Property indicates that the site is underlain by recent alluvial sediments consisting of interbedded fine sands and silts to a depth of at least 50 feet (EMCON 1992).

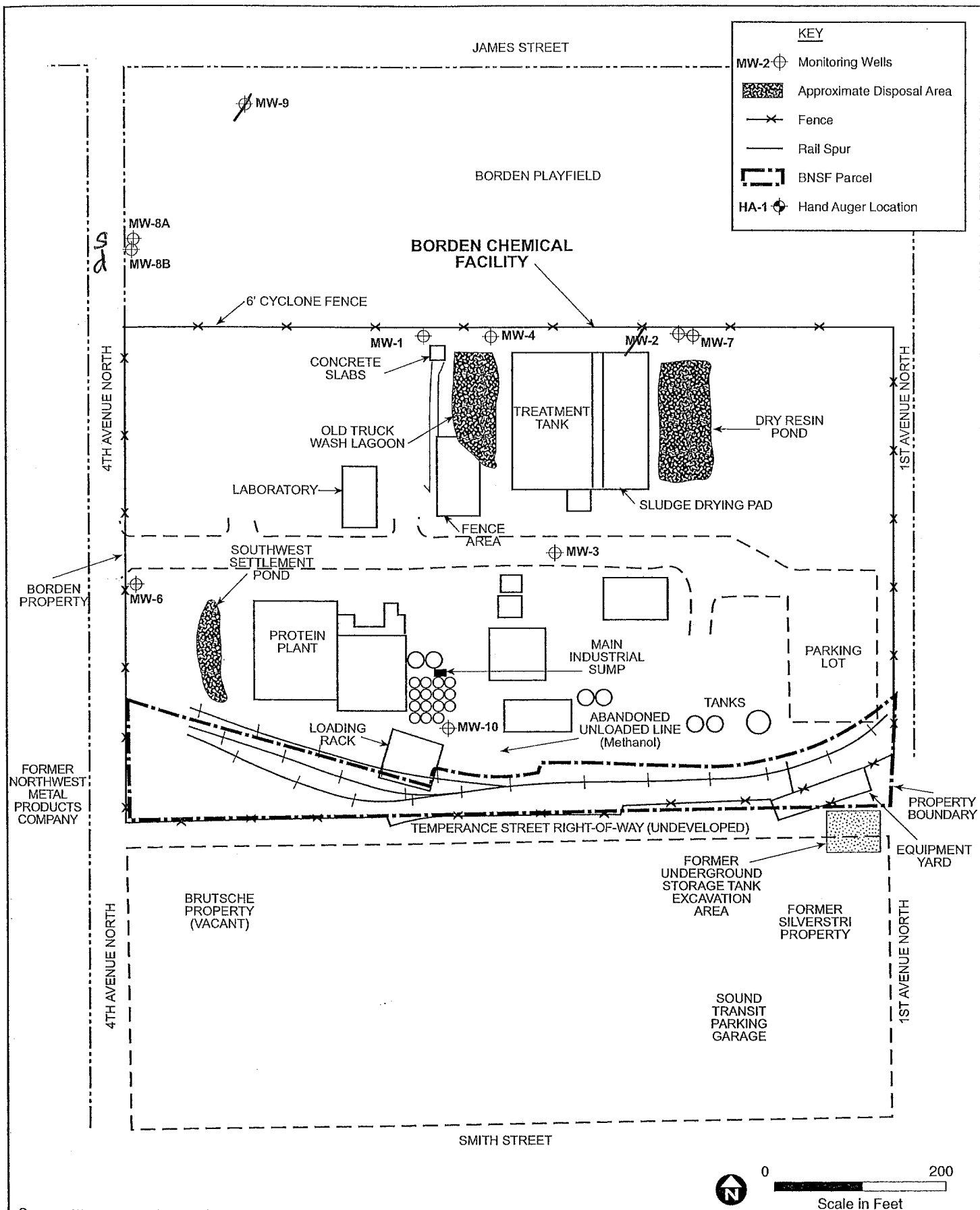
These sediments are typical of those found throughout the Kent Valley. EMCON identified four geologic units in the upper 50 feet of the water table aquifer. The sediments composing these units exhibit gradational boundaries and tend to interfinger both laterally and vertically over relatively short distances, and therefore lack uniformity across the site. The four geologic units reported by EMCON are listed below in descending order.

- **Layer A** is the uppermost unit, averaging 10 feet in thickness. It is predominantly composed of moist to saturated silty fine sand overlain by a thin layer of fill.
- **Layer B** is located directly beneath Layer A over the majority of the Property. This unit averages 10 feet in thickness. Layer B is composed of fine to medium fine sand with areas of silt, and is very saturated and loose.
- **Layer C** is located beneath Layer B across the majority of the Property and under Layer A in some areas. This unit ranges from 5 to 10 feet in thickness. Layer C is composed of sandy silt interbedded with areas of the fine sands found in Layer B.
- **Layer D** is approximately 20 feet in thickness and is composed of interbedded fine and silty sands similar to Layer A. However, Layer D is denser and contains thin interbeds of gravelly fine sand.

2.3.2 Groundwater

The water table elevation varies seasonally from 4 to 9 feet below ground surface (bgs) in the alluvial sands and silts underlying the Property, and the flow is toward the north-northeast (EMCON 1992). The depth to groundwater and the direction of the groundwater flow are in general agreement with those observed by URS in September 2000. Permeability testing performed in the shallow aquifer sediments yielded moderate hydraulic conductivity values ranging from 2×10^{-4} to 3×10^{-2} centimeters per second (EMCON 1992). The interbedded and gradational nature of the four geologic units underlying the Property most likely contributes to the lack of correlation between units.

Monitoring wells were installed at the site in 1987 to evaluate groundwater conditions (EMCON 1992). In 1993, an extraction well was installed to remove methanol dissolved in shallow groundwater that had resulted from an accidental release. A list of the wells and pertinent information is provided in Table 1.



Source: EMCON Northwest, 1992

City of Kent

Project No.
33749353

URS

Former Facility Layout
Kent, Washington

Figure
2

Several investigations and remedial activities have been performed on the Property since 1992. These are identified and summarized below. URS reviewed a hydrogeologic investigation report prepared by EMCON Northwest, Inc., a site assessment report prepared by Ecology, and an annual groundwater monitoring letter report prepared by IT Corporation (2000a). In addition, URS conducted Phase II investigations at the former Borden Chemical and BNSF properties, and collected soil samples during demolition of the structures (URS 2002a). The objective of this review was to identify potential environmental concerns. A summary of each report is provided below.

3.1 EMCON NORTHWEST, INC.

Summary Report Hydrogeologic Investigations, Borden Packaging & Industrial Products Facility, Kent, Washington, Volume I (EMCON 1992). These investigations were conducted to assess onsite soil and groundwater in known disposal and manufacturing areas around the Property. EMCON's conclusions were as follows:

- The Property is underlain by four interbedded geologic units to a depth of 50 feet. Groundwater flow is generally to the northeast (see Section 2.3.2).
- Approximately 2 to 4 feet of fill material consisting of dry resin chips intermixed with gravelly sand was discovered at the former truck wash lagoon area. This material was underlain by 2 to 6 feet of saturated gelatinous resin mixed with fill material and straw.
- Approximately 0.5 foot of dry resin chips and yellow precipitate was discovered at the former southwest settlement pond site overlain by 1.5 to 2.5 feet of fill material consisting of fine sand, gravel, and wood chips.
- Approximately 1 foot of dry resin chips intermixed with coarse, gravelly sand was discovered at the former dry resin pond site. This material was underlain by 0.5 foot of gravelly sand fill material.
- Concentrations of phenol in groundwater and soil were generally at or below detection levels.
- Ammonia concentrations in groundwater were localized and restricted to Borden Chemical property.
- Ten monitoring wells were installed in 1987 (MW-1 through MW-7, MW-8s, MW-8d, and MW-9). Monitoring Wells MW-2 and MW-9 were decommissioned in 1987 and 1991, respectively.
- Nitrate soil concentrations observed in resins buried in the three former pond areas ranged from 300 to 5,000 milligrams per kilogram (mg/kg), with the highest concentrations observed in buried resins in the southwest settlement pond area. Nitrate concentrations in the native soils underlying buried resins in the three former pond areas ranged from 150 to 1,400 mg/kg. Nitrate concentrations in groundwater were generally below 1 milligram per liter (mg/L), but consistently exceeded 100 mg/L just north of the dry resin pond. In addition to the identification of the dry resin pond as a possible source of nitrate in the well, the report also identified fertilizer used on the adjacent playfield grass as a possible source.
- Elevated formaldehyde concentrations detected prior to 1988 were believed to have been the result of laboratory error. Groundwater data generated after 1988 show formaldehyde

concentrations ranging from 30 to 40 micrograms per liter ($\mu\text{g/L}$) in two monitoring wells near the former truck wash lagoon and the western boundary of the Borden Playfields, and from less than 20 to 30 $\mu\text{g/L}$ in temporary wells located in the former production and rail offloading areas. One temporary well located directly at the former methanol unloading area revealed a concentration of 1,800 $\mu\text{g/L}$. Formaldehyde levels in soil sampled in the production area ranged from less than 0.4 mg/kg to 63 mg/kg.

Included in the EMCON report are two priority pollutant laboratory analyses for soil samples collected in two test pits in the former truck wash lagoon area. The analytical data indicated no chemicals were present in concentrations exceeding MTCA residential soil cleanup levels; in fact, very few chemicals were detected in concentrations exceeding the laboratory's reporting limits.

Soil samples collected in other areas of the Property were analyzed for nitrate, ammonia, phenol, and formaldehyde. None of the results exceeded MTCA Method B cleanup levels for these analytes. The summary tables of the analytical test results are included in Appendix A.

3.2 WASHINGTON STATE DEPARTMENT OF ECOLOGY

Site Hazard Assessment, Borden Packaging & Industrial Products, Kent, Washington (Ecology 1992). Ecology prepared a follow-up report to the hydrogeologic investigations by EMCON. A summary of the information provided in the Ecology report follows.

- When Borden submitted the EMCON report to Ecology, their cover letter indicated that they planned to remediate the methanol and formaldehyde contamination in the vicinity of the former rail offloading area by extraction.
- Ecology conducted their site investigation shortly after receiving the EMCON report from Borden Chemical. The odor of formaldehyde was apparent during Ecology's site reconnaissance, and subsequent air monitoring determined the formaldehyde concentration in air to exceed 5 parts per million.
- Results from a soil grab sample analyzed for volatile organic compounds (VOCs) revealed acetone and methylene chloride at concentrations of 28 and 19 $\mu\text{g/kg}$, respectively. However, these levels were below MTCA Methods A or B screening levels and were considered to be probable results of laboratory contamination.
- Ecology ranked the Borden facility as a "1" (on a scale of 1 to 5, with 1 representing the highest potential for contamination). Their decision was based on the following factors:
 - a) the large quantities of hazardous materials onsite,
 - b) the toxicity and relative mobility of the materials stored and released into the environment,
 - c) the proximity of the site to populated areas,
 - d) the shallow groundwater beneath the site,
 - e) the widespread usage of groundwater for drinking in the Kent area,
 - f) a documented release to groundwater and air,
 - g) the proximity of the Property to Spring Brook Creek, a fishery resource tributary to the Green River, and
 - h) the secondary containment surrounding the onsite ASTs was not large enough to contain the volume of all of the tanks should a catastrophic failure occur.

3.3 2000 ANNUAL GROUNDWATER MONITORING LETTER REPORT

2000 Annual Groundwater Monitoring, Borden Facility, Kent, Washington (IT 2000). This letter report was prepared by IT Corporation and is dated March 3, 2000. Borden Chemical submitted this report to Ecology on March 15, 2000. The letter report is a listing of groundwater analyses for samples collected from the nine monitoring wells on the site. The data listed date back to October, 1987 and include only specific conductance, nitrate, ammonia, and methanol. The data indicate that nitrate concentrations in well MW-7 were greater than the MTCA Method B cleanup level of 25.6 mg/L for every year sampled, but had declined steadily. The nitrate concentration in well MW-7 was 38.9 mg/L on February 17, 2000.

The report indicates that MW-10 (the groundwater extraction well) was installed around 1993 based on the date of the initial sampling (i.e. January 26, 1993). Methanol concentrations in well MW-10 located near the former offloading area exceeded the MTCA Method B cleanup level of 4 mg/L every year sampled. The letter report mentions a dedicated pump in well MW-10 that pumped continuously into a 300-gallon chemical tote. Methanol concentrations in well MW-10 declined from 89,000 to 2,200 mg/L between 1994 and 2000. IT Corporation's summary tables of the analytical test results are included in Appendix B.

3.4 BORDEN CHEMICAL FACILITY PHASE II REPORT

Final Report, Borden Chemical Facility Phase II Report, Kent, Washington (URS 2000). This report was prepared by URS and included Phase I level background investigation as well as Phase II level site investigation. Water levels were measured in six existing monitoring wells on site, and these confirmed EMCON's observations of the depth and gradient of the groundwater. The seventh well on site (MW-10) is used for groundwater extraction.

Six wells were sampled and analyzed for VOCs, semi-volatile organic compounds (SVOCs), and priority pollutant metals. Monitoring Well (MW-10) was not sampled due to low yield. The analyses found arsenic to exceed the MTCA (2001) Method A cleanup level of 5 µg/L in wells MW-1 (20 µg/L) and MW-4 (5.4 µg/L). No historical onsite source for arsenic was identified, and soil samples collected during the investigation were below MTCA Method A unrestricted cleanup levels. The report surmised that the arsenic could have originated from an upgradient (offsite) site. Other analytes were not encountered at concentrations exceeding the MTCA Method A or B cleanup levels for groundwater.

Four test pits were excavated in the dry resin pond and old truck wash lagoon. Soil samples were analyzed for VOCs, SVOCs, priority pollutant metals, and polychlorinated biphenyls. No analytes were detected above current MTCA Method A or B cleanup levels except for chromium in Test Pit TP-3 at 21 mg/kg. However, this concentration is below the cleanup level for chromium III of 2000 mg/kg, and it is highly likely that most, or all, of the chromium in the sample is chromium III and not the more toxic chromium VI. (Speciation of chromium and individual cleanup levels for chromium III and VI were introduced in the revised MTCA version adopted in August 2001, after this study was conducted.) Summary tables of the analytical test results are included in Appendix C.

URS identified the following environmental issues at the site:

- Methanol contamination in soil and groundwater in the vicinity of the former offloading area
- Nitrate contamination in groundwater at MW-7 above the MTCA Method B groundwater cleanup level
- Arsenic contamination in MW-1 and MW-4 above the MTCA Method A groundwater cleanup level
- Nitrate contamination in resin in the former southwest settlement pond above the MTCA Method B soil cleanup level
- Non-friable, asbestos-containing material throughout the plant
- Lead-based paint on buildings and structures

3.5 BNSF PHASE II REPORT

Final report, BNSF Property, Phase II Environmental Site Assessment Report, Kent, Washington (URS 2001). This report was prepared by URS for the BNSF portion of the Property and included Phase I site assessment information as well as Phase II level sampling. URS collected 8 soil samples using Geoprobe™ technique and an additional 2 samples using hand auger technique. The samples were analyzed for total petroleum hydrocarbons (TPH) in gasoline, diesel, and oil ranges (NWTPH-Dx and Gx); benzene, toluene, ethylbenzene, and xylenes (BTEX); polyaromatic hydrocarbons (PAHs); PCBs; Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver); herbicides; methanol; formaldehyde; and nitrates. TPH as heavy oil was detected at GP-6 and GP-7 at concentrations of 700 and 350 mg/kg, respectively, which are below the MTCA (2001) Method A cleanup level of 2,000 mg/kg. Lead was detected at 7 locations, but only a near surface sample at GP-7 (300 mg/kg) exceeded the current MTCA Method A cleanup level of 250 mg/kg. All other analytes, where present, were below the MTCA Method A cleanup levels.

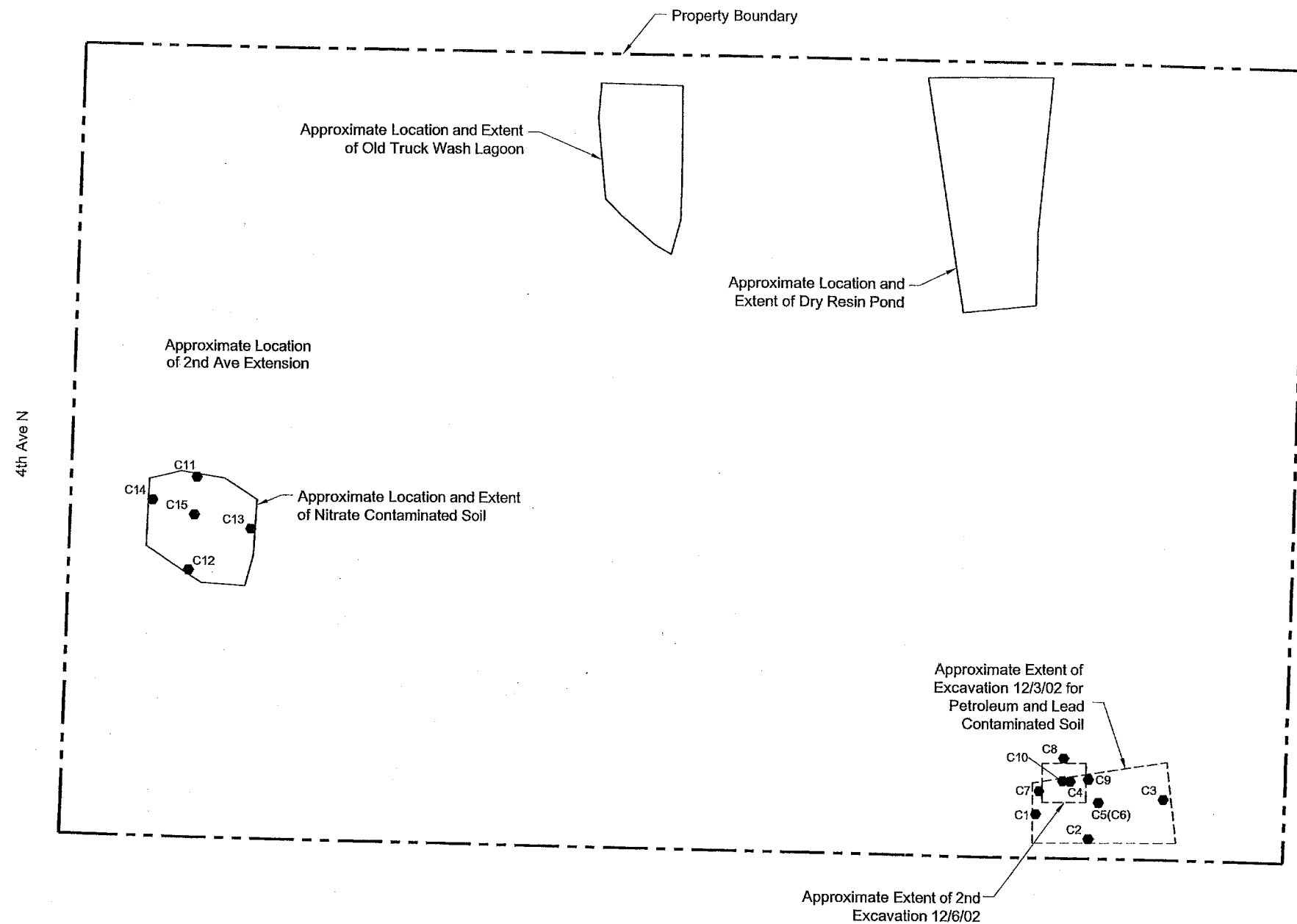
Groundwater samples were collected at the same location as the 6 soil sample locations. Select samples were analyzed for TPH in diesel, oil and gas ranges, BTEX, PAHs, dissolved RCRA metals, herbicides, methanol, formaldehyde, and nitrates. The analytical results were compared to the MTCA (2001) Method A cleanup levels. Benzene was detected at a concentration of 51 µg/L in GP-8, which exceeded the cleanup level of 5 µg/L. Arsenic was detected at GP-2, GP-5, and GP-7 at concentrations ranging from 6.7 to 79 µg/L, which exceeded the cleanup level of 5 µg/L. A chromium concentration of 52 µg/L was detected at GP-5, which is essentially at the current MTCA cleanup level of 50 µg/L (i.e., within the range of laboratory error). Other analytes, if present, were below MTCA (2001) Method A cleanup levels. The summary tables of the analytical test results are included in Appendix D.

As on the Borden site, no known source of arsenic was found at the BNSF site. In fact, of the 18 samples analyzed for arsenic, all yielded non-detectable results except one. That result was detected, but below the MTCA Method A (unrestricted) soil cleanup level. The report concluded that the arsenic was either from an offsite source, or reflected natural background variability, or was due to high turbidity in the sample (which resulted from the collection technique of sampling at the time of drilling, as opposed to using a constructed well).

Benzene in the water sample at GP-8 was likely elevated because the boring was located downgradient from a gasoline UST remediation site. This UST was removed and surrounding soils were excavated and disposed of in August 2000 as part of the site preparation for the new Sound Transit Commuter Rail parking garage. The benzene is likely to be a residual release from the offsite excavation work and will naturally degrade with time because the source soils were removed.

3.6 DEMOLITION REPORT

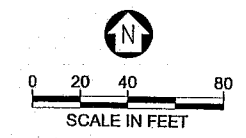
Borden Chemical Facility Demolition Monitoring Report, Kent, Washington (URS 2002). This report was prepared by URS for the limited demolition monitoring and soil sampling conducted during the facility demolition. During this project all site improvements that were present at the time of the City's property acquisition were demolished and removed from the site. URS collected 9 soil samples from the exposed subgrade after the removal of surface slab to determine the soil conditions where it had been previously covered by structures. The samples were selectively analyzed for methanol, formaldehyde, nitrate, and TPH in diesel and heavy oil ranges based on the anticipated contamination. None of the analytes were detected above the MTCA Method A (unrestricted use) or B, as applicable, soil cleanup levels. The summary of the analytical test results is included in Appendix E.



Legend

C1 ● Confirmation Sample Location and Identifying No.

Note:
Base drawing obtained from the City of Kent.



The City decided to conduct remediation of the previously identified contaminated soil at the Property concurrently with the construction of the extension of Second Avenue through the Property. This section summarizes the remedial activities conducted on the Property and the work performed by URS.

4.1 PRECONSTRUCTION ACTIVITIES

URS field-marked the southwest settling pond, old truck wash lagoon, and dry resin pond. The locations were later surveyed by the City's surveyor and shown on the construction drawings. URS prepared select specifications related to excavation and disposal of contaminated soil and submitted them to the City in May 2002 for inclusion in the Special Provisions prepared by the City. The contract included excavation and disposal of the TPH and lead contaminated soil on the former BNSF property and the nitrate contaminated soil at the former southwest settling pond. The excavation of the old truck wash lagoon and the dry resin pond were identified as optional items by the City. The decision to excavate those areas was to be based on field sampling and characterization conducted during the construction.

The extension of Second Avenue traversed the location of Monitoring Well MW-3. In August 2002, Monitoring Well MW-3 was decommissioned by Cascade Drilling, Inc., Woodinville, Washington, in the full-time presence of a URS representative. The well was decommissioned in accordance with the State of Washington requirements by grouting the well with bentonite and removing the well monument.

URS attended the September 2002 pre-construction meeting with the selected contractor. Because the development plans required excavation and placement of a utility corridor through one of the northern ponds, URS was authorized to characterize the soil at the former dry resin pond and old truck wash lagoon prior to start of construction. The previous sampling conducted at these locations was limited for the purpose of identification.

On September 19, 2002, the City excavated 10 test pits in the presence of URS in the two northern ponds: 3 in the old truck wash lagoon and 7 in the dry resin pond. The quantity of the samples was determined based on the anticipated volume of fill material. One sample was collected for approximately every 500 cubic yards of suspect fill material. URS collected one composite sample from each test pit and analyzed all the samples for nitrates and five samples for formaldehyde. None of the analytes were detected above MTCA Method B soil cleanup levels. As a result, the City decided to leave the fill materials in those areas in place. A letter report (URS 2002b) presenting URS activities and findings was submitted to the City on September 30, 2002. A copy of the letter report with the associated attachments is included in Appendix D.

R.W. Scott Construction Company (RW Scott) in Auburn, Washington, was selected by the City to perform the excavation work. URS reviewed the submittals for the environmental excavation and provided comments. Based on our review, a proposed disposal site was rejected and the disposal site for nitrate contaminated soil that had been suggested in the specifications was used.

4.2 EXCAVATION

The contaminated soil excavation was completed in December 2002. Contaminated soil was excavated from the BNSF-southeast area in the presence of a URS representative. The

excavation proceeded from west to east in the upper 1.5 feet. The soil was screened for contamination based on visual staining and odor, and the contaminated portion was segregated. In one area, heavy contamination was encountered and the impacted soil was excavated and disposed of offsite. Exploratory test pits were excavated in an approximately 25-foot grid over the rest of the suspect area, but no other contaminated areas were identified. Based on the confirmation sampling results (discussed in the next section), additional TPH contaminated soil was excavated and disposed of offsite. Approximately 560 tons of TPH contaminated soil were shipped to Rabanco landfill, in Roosevelt, Washington for disposal.

The nitrate contaminated soil at the former southwest settling pond could not be screened without extensive sampling and analysis, which would have been costly and would have resulted in significant standby time for the contractor. Therefore, the predefined area was excavated in the presence of the City's inspector to the depth of 3 feet prior to sampling by URS. Approximately 950 tons of nitrate contaminated soil were shipped to Rinker Material in Everett, Washington, for disposal.

The clean portion of the excavated soil from the former BNSF property as well as the excavated soil from the roadway construction were used to backfill the excavations. The weight tickets for the offsite disposal of contaminated soil are available in the City's construction files.

4.3 CONFIRMATION SAMPLING

This section describes the results of the confirmation sampling following the excavation activities. Concentrations of contaminants were compared to cleanup levels provided in MTCA.

Cleanup levels under MTCA are categorized as Methods A, B, and C (WAC 173-340-700). Method A cleanup levels are intended to be used for routine site cleanups. Cleanup levels under Method A are available for only about 30 contaminants of the hundreds of potential priority pollutants, and are generally the more commonly found contaminants. Tables of the Method A cleanup levels are available for groundwater, unrestricted use (includes residential) soil, and industrial soil.

Method B cleanup levels are established for hundreds of priority pollutants in groundwater, surface water and unrestricted use soil. Cleanup levels under Method B can be applied to all sites. Method B tables for most priority pollutants are listed in CLARC 3.1 (Ecology 2001). Cleanup levels under Method B can also be calculated using equations provided in WAC 173-340-740 (3).

In contrast to Method B, Method C cleanup levels are intended for industrial sites where exposure to potential contaminants is limited and controllable. Method C cleanup levels for groundwater and soil are available in the CLARC 3.1 (Ecology 2001) or can be calculated using equations provided in WAC 173-340-745(5).

Comparisons to Method A unrestricted use (i.e., residential) and Method B levels are used in the document because the future use of the Property is intended to be mixed use, including multi-family residential. In some cases, some contaminants may have either a Method A level or Method B level for soil. While in other cases the contaminant may have both Method A and B levels.

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

4.3.1 Soil Sampling

Confirmation samples from the BNSF southeast area were collected in two rounds. After the initial excavation, five confirmation soil samples (C1 through C5) were collected from the sidewalls and bottom of the excavation (Figure 3). Samples were collected using disposable scoops and placed in clean glass jars supplied by the laboratory. The jars were clearly labeled with the project name, sample location, and collection date and time. The sample jars were placed in an ice chest and chilled. The soil samples were delivered to OnSite Environmental laboratory in Redmond, Washington, under standard chain-of-custody procedures.

Samples were analyzed for TPH as diesel and heavy oil range (Method NWTPH-Dx) and RCRA metals. Sample C2 was also analyzed for gasoline range hydrocarbons and BTEX (Method NWTPH-Gx/BTEX). TPH in the heavy oil range was detected in four samples at concentrations ranging from 78 to 9500 mg/kg. Sample C4 exhibited the highest concentration and was the only sample to exceed the MTCA (2001) unrestricted land use cleanup level of 2,000 mg/kg. As a result, the area surrounding sample location C4 was excavated further. In the expanded excavation, four additional confirmation soil samples (C7 through C10) were collected from the excavation sidewalls and analyzed for NWTPH-Dx, Gx/BTEX, and RCRA metals. TPH and BTEX were not detected in these samples and the metals detected were below MTCA Method A or B soil cleanup levels, as applicable.

The former southwest settling pond was sampled by URS after completion of excavation. Five soil samples (C11 through C15) were collected from the excavation sidewalls and bottom. Sample collection, storage, and documentation were as described above. Samples were delivered to Severn Trent Laboratory in Tacoma, Washington, for analysis. All five samples were analyzed for nitrate and the sample from the bottom (C15) was also analyzed for formaldehyde. Analytes were not detected above MTCA Method B soil cleanup levels.

The analytical data were reviewed by URS' in-house chemists for accuracy as part of URS quality assurance/quality control (QA/QC) procedure. The data were found to be of good quality and acceptable for use. The laboratory analytical results and the URS's QA/QC reports are included in Appendix E. A summary of the laboratory test results is presented in Tables 2 and 3. The sample locations and identifying numbers are shown in Figure 3.

4.3.2 Groundwater Sampling

Previous investigations had identified methanol contamination in groundwater samples from MW-10 and nitrate contamination in groundwater samples from MW-7. The City requested that URS sample these wells to determine the current status of the groundwater contamination. On December 4, 2002, MW-10 was sampled for methanol (Sample W1), and on December 11, 2002, MW-7 was sampled for nitrate (Sample MW7-1). Prior to well sampling, the depth to groundwater in the well was measured from the top of the well casing using a decontaminated water level indicator. The wells were sampled using a battery-powered peristaltic pump and

disposable tubing. Each well was purged until pH, temperature, conductivity, and dissolved oxygen readings stabilized within plus or minus 10 percent. Following well purging, the samples were collected in clean, laboratory-prepared bottles. Each sample bottle was clearly labeled with the project name, sample location, and collection date and time. The sample bottles were stored in an ice chest and chilled, and shipped to Severn Trent Laboratory under standard chain-of-custody procedures.

Methanol from the MW-10 sample was not detected above the practical quantitation limit (PQL) of 10 mg/L. However, the MTCA Method B cleanup level is 4 mg/L. Despite URS requests, the laboratory could not attain a lower PQL. Moreover, discussions with personnel at Ecology's Manchester laboratory confirmed the difficulty of obtaining a PQL at or below 4 mg/L (Carrol 2002). Therefore, if methanol is present, current technology will not allow for practical quantitation at such low concentrations.

Nitrate from the MW-7 sample was detected at a concentration of 1.09 mg/L, which is below the MTCA Method B cleanup level of 1.6 mg/L. The analytical results were reviewed by URS chemists for QA/QC. The analytical test results are presented in Table 4; the laboratory documentation and the URS QA/QC report is included in Appendix E.

Remediation sampling activities under this project focused on the following:

- Sampling fill materials in the former old truck wash lagoon and dry resin basin
- Post-excavation confirmatory sampling of the southeastern area of the former BNSF property and the southwest settling pond
- Sampling groundwater from MW-10 for methanol and MW-7 for nitrate

Characterization samples collected from the former old truck wash lagoon and dry resin basin indicated that nitrate concentrations are below MTCA Method B soil cleanup levels. The contaminated soil excavation in the former BNSF property and the southwest settling pond achieved reduction of soil cleanup concentrations to below MTCA Methods A or B cleanup levels, as applicable.

Groundwater samples collected from monitoring wells MW-10 and MW-7 indicate that the previously identified contamination concentrations have declined to below MTCA Method B groundwater cleanup levels (allowing for the caveat regarding methanol PQL as described in Section 4.3.2). Based on the sampling and analysis conducted during the remedial activities, the cleanup goals and project objectives have been achieved. Any residual groundwater impacts from offsite sources do not pose a risk to the public because shallow groundwater is not currently used for drinking water on the site or in the vicinity. A restrictive covenant will be placed on the deed to preclude use of the shallow groundwater for potable purposes; otherwise, no further remedial activity is indicated at this time.

We have performed our services for this project in accordance with our Agreement; no guarantees are either expressed or implied.

There is no investigation thorough enough to preclude the presence of materials on the Property which presently, 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.

Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards and property conditions during the period of the cleanup activities, should not be construed as legal opinions. Unless site conditions change, 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 City of Kent.

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Tables

Table 1
Former Borden Chemical Facility Monitoring Well Information
 (Information is based on well logs provided in Emcon, 1992)

Well Number	Date Installed by Borden	Casing Diameter	Total Depth (feet)	Screened Interval (feet below ground)	Date Decommissioned
MW-1	March 30, 1987	2" PVC	15	5-15	remains open
MW-2	March 30, 1987	2" PVC	15	5-15	October 14, 1987
MW-3	March 30, 1987	2" PVC	15	5-15	August 2002*
MW-4	October 13, 1987	2" PVC	49	37-47	remains open
MW-5	October 12, 1987	2" PVC	19	8-18	remains open
MW-6	October 12, 1987	2" PVC	15	5-15	remains open
MW-7	October 13, 1987	2" PVC	15	5-15	remains open
MW-8s	December 21, 1987	2" PVC	20	8-18	remains open
MW-8d	December 22, 1987	2" PVC	50	40-50	remains open
MW-9	December 22, 1987	2" PVC	20	10-20	December 1991
MW-10	NA; first sampled in 1/93	2" PVC	18.5	NA	remains open

NA = Information not available

* URS oversaw decommissioning of MW-3

Table 2
Total Petroleum Hydrocarbon (TPH) and Metals Soil Results
Former Borden Chemical Facility
Kent, Washington

Location ID	MTCA 2001 ^{1,2}		KENT C1-120302 12/3/2002	KENT C2-120302 12/3/2002	KENT C3-120302 12/3/2002	KENT C4-120302 12/3/2002	KENT C5-120302 12/3/2002	KENT C7-120302 12/6/2002	KENT C8-120302 12/6/2002	KENT C9-120302 12/6/2002	KENT C10-120302 12/6/2002
	Method A	Method B									
TPH (mg/kg)											
Diesel Range	2000	NE	31 U	30 U	33 U	280 U	31 U	33 U	28 U	28 U	28 U
Heavy Oil Range	2000	NE	78	1000	160	9500	62 U	67 U	55 U	56 U	56 U
Gasoline Range	100	NE	-	12	-	-	-	6.7 U	5.5 U	5.6 U	5.6 U
Benzene	0.03	18.2	-	0.013 U	-	-	-	0.013 U	0.011 U	0.011 U	0.011 U
Toluene	7	16,000	-	0.063 U	-	-	-	0.067 U	0.055 U	0.056 U	0.056 U
Ethylbenzene	6	800	-	0.063 U	-	-	-	0.067 U	0.055 U	0.056 U	0.056 U
Xylene	9	160,000	-	0.063 U	-	-	-	0.067 U	0.055 U	0.056 U	0.056 U
Metals (mg/kg)											
Arsenic	20	0.667	13 U	12 U	13 U	11 U	12 U	13 U	11 U	11 U	11 U
Barium	NE	5,600	58	66	66	26	49	71	30	21	33
Cadmium	2	80	0.66	0.6 U	0.75	0.55 U	0.62 U	0.67 U	0.55 U	0.56 U	0.56 U
Chromium	2000/19 ³	120,000/240 ³	14	11	17	12	11	17	7.2	9.4	8.7
Lead	250	NE	49	110	63	90	62 U	7.8	5.5 U	5.6 U	5.6 U
Mercury	2	24	0.31 U	0.3 U	0.33 U	0.27 U	0.31 U	0.33 U	0.27 U	0.28 U	0.28 U
Selenium	NE	400	13 U	12 U	13 U	11 U	12 U	13 U	11 U	11 U	11 U
Silver	NE	400	0.63 U	0.6 U	0.67 U	0.55 U	0.62 U	0.67 U	0.55 U	0.56 U	0.56 U

Notes:

¹ Model Toxics Control Act (MTCA) Cleanup Regulations WAC 173-340 Method A Values from Washington Department of Ecology (Ecology) Publication 94-06 amended February 12, 2001. Method B values are from Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) Version 3.1, Ecology Publication 94-145 updated November 2001.

² Values shown are for unrestricted land use.

³ Cleanup levels shown are for Cr III/Cr VI

- Not analyzed

NE not established

U not detected above practical quantitation limit.

BOLD in exceedence of MTCA levels.

Table 3
Nitrate and Formaldehyde Soil Results
Former Borden Chemical Facility
Kent, Washington

Location ID Sample Date	MTCA 2001 ^{1,2}		C-11 12/11/2002	C-12 12/11/2002	C-13 12/11/2002	C-14 12/11/2002	C-15 12/11/2002
	Method A	Method B					
Analysis (mg/kg)							
Nitrate	NE	8,000	1.06	1.17	1.78	21.6	0.377 U
Formaldehyde	NE	33.3	--	--	--	--	2.31 J

Notes:

¹ Model Toxics Control Act (MTCA) Cleanup Regulations WAC 173-340 Method A Values from Washington Department of Ecology (Ecology) Publication 94-06 amended February 12, 2001. Method B values are from Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) Version 3.1, Ecology Publication 94-145 updated November 2001.

² Values are shown for unrestricted land use.

-- Not analyzed

J sample results are considered estimated.

NE not established

U not detected above practical quantitation limit.

Table 4
Groundwater Results
Former Borden Chemical Facility
Kent, Washington

Location ID Sample Date	MTCA 2001 ¹		KENT-W1-120402 12/4/2002	121102-MW7-1 12/11/2002
	Method A	Method B	Well MW-10	Well MW-7
Analyte (mg/L)				
Nitrate	NE	2	3	1
Methanol	NE	4	10 U	--

Notes:

¹ Model Toxics Control Act (MTCA) Cleanup Regulations WAC 173-340 Method A Values from Washington Department of Ecology (Ecology) Publication 94-06 amended February 12, 2001. Method B values are from Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) Version 3.1, Ecology Publication 94-145 updated November 2001.

-- Not analyzed

NE not established

U not detected above practical quantitation limit.