



Work Plan **Offsite Investigation**

CTEC
(Former Neilsen Manufacturing
Property)

33501 Portland Road NE
Salem, Oregon

ECSI File No. 220

January 2, 2020

Prepared for:



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Project No. 689-14001-17

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Work Plan

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1.0 INTRODUCTION

EVREN Northwest, Inc. (ENW) has prepared this Work Plan for conducting further environmental assessment of ground water in the vicinity of the above-referenced property (Figures 1 and 2; subject site). Previous ground water investigations identified hexavalent chromium (Cr(VI)) in ground water beneath the site. As a result, the Oregon Department of Environmental Quality (ODEQ) has requested further investigation of off-site ground water in order to assess the concentrations of Cr(VI) in ground water off-site.

2.0 BACKGROUND

The site is currently occupied by the Salem-Keizer School District (SKSD) Career and Technical Education Center; however, previously it was operated by Nielsen Manufacturing Inc. (NMI), who manufactured precision-cut parts and metal cabinets from sheet aluminum at the subject site from 1957 through about 2005. Additionally, the facility operated two chromate conversion areas on the subject site during some of this time. From June 2014 through January 2017, multiple soil and ground water investigations were completed at the site in conjunction with the leasing of the property to the SKSD. Investigation results revealed the following:

- Sampling from multiple exploratory borings detected hexavalent chromium (CrVI) in surface soil at concentrations exceeding ODEQ screening level risk-based concentrations (SLRBCs).
- Dissolved CrVI was detected in shallow ground water at concentrations exceeding SLRBCs.

3.0 PROPOSED SCOPE OF WORK

Given the use of ground water by the City of Keizer the ODEQ requested additional investigation of ground water in adjacent areas to the subject site in order to provide a better understanding of the occurrence of CrVI in offsite ground water. Based on this, ENW proposes the following specific scope of work:

- Sample soil and reconnaissance ground water from three (3) temporary borings hydraulically down gradient of the onsite monitoring well network.

- Submit soil and reconnaissance ground water samples to a qualified laboratory for analysis in order to further the understanding of the occurrence of Cr(VI) in ground water in the vicinity of the subject site.
- Submit a report documenting the findings of reconnaissance ground water sampling activities.

4.0 METHODS AND PROCEDURES

This section describes the methods proposed to complete the field work described above. All work will be performed by employees and subcontractors trained and licensed to work with hazardous materials. Safety procedures will be strictly enforced through the use of a Health and Safety Plan.

4.1 Soil and Reconnaissance Ground Water Sampling

Three (3) temporary soil borings (B76, B77 and B78) will be advanced at down-gradient locations for the purpose of collecting reconnaissance ground water samples to further out understanding of the distribution of Cr(VI) in ground water. The proposed locations of the temporary borings are illustrated on Figure 2. It should be noted that ENW is currently coordinating with property owners to obtain permission to install temporary borings and that boring locations may need to be modified. Additionally, since ENW has already received approval from the City for borings B77 and B78; however, as not received permission for the land owner for boring B76 (alternative location 1), ENW presented two locations for boring B76 on Figure 2, in case permission from the private land owner is not given.

Temporary soil borings will be advanced using a truck- or track-mounted sonic drill rig. A call will be placed with One-Call Utility Notification Center prior to all subsurface field work. Soil boring construction notices (start cards) and reports (geotechnical logs) will be prepared and submitted to the Oregon Water Resources Department (OWRD) as required by Oregon Administrative Rules (OAR) 690-240-090. Following collection of necessary samples of soil and reconnaissance ground water from a given borehole, each of the temporary borings will be sealed with hydrated Bentonite ‘hole plug’ to within six (6) inches of the ground surface. The borings will be finished to match the existing ground surface.

4.1.1 Soil Logging

All soil cores will be logged by an ENW Oregon Registered Geologist. Standards for uniformity in sample description are very important for correlating hydrostratigraphic units across the site. Soil samples will be described using appropriate geologic nomenclature and Unified Soil Classification System to the extent practical. Color will be described using the Munsell system. Information such as percentage of gravel, sand, and fines; particle size range, shape, and angularity; and plasticity, strength, and dilatancy will be recorded, as appropriate. In addition, the presence of odors, moisture, and interpretation of geologic unit will be documented.

The format to be recorded on boring logs is shown below:

Light brown (5YR 6/4) silty SAND (SM) – 80% fine sand, subrounded, micaceous, 15 to 20% silty fines with low plasticity; firm; wet; some organic debris; petroleum-like odor; (FILL).

4.1.2 Soil and Reconnaissance Ground Water Sampling

Soil materials recovered from the temporary borings will be inspected continuously by visual and olfactory inspection. Soil lithology, field screening results, and other observations will be recorded by a geologist onto soil boring logs. ENW anticipates collecting soil samples at the soil/water interface, and below the surface of the water table, at each water-bearing unit sampled for ground water. ENW will collect additional samples of suspect soil during borehole advance, if applicable, based on field screening. Soil samples will be placed directly into laboratory prepared glass sample containers, sealed with a Teflon-lined cap, uniquely labelled, and preserved on ice packs in a cooler for transport to the project laboratory. The samples will be analyzed according to the Analysis Plan shown in Table 4-1, below. Sample containers, preservatives, and holding times for each analytical method are provided on Table 4-2. Chain-of-custody protocols will be followed. All sampling will be conducted in accordance with the appropriate provisions of the project Health and Safety Plan.

4.1.3 Reconnaissance Ground Water Sampling

Soil borings will be advanced to approximately 100 feet below ground surface. At least four (4) reconnaissance ground-water samples will be collected from each boring, with the first sample collected at approximately 40 feet bgs, and subsequent samples collected at approximately 20-foot intervals. Exact sample depths will be confirmed in the field, based on observations during drilling, with the following objectives:

- Collect a reconnaissance ground water sample above a possible confining unit that may be present around 50 feet bgs.
- Collect additional reconnaissance ground-water samples below this possible confining unit in 20 feet intervals, targeting more productive zones if present, until reaching 100 feet bgs. More productive/prolific water-bearing zones may be identified based on grain size (noncohesive materials, larger and rounded) and matrix (absence of fine-grained materials and/or cohesive materials, e.g., silt and/or clay).
- Prior to collection of a reconnaissance ground water sample, ground water will be monitored during purging using a flow-through cell and the following parameters will be recorded:
 - pH
 - Dissolved Oxygen (DO)

- Oxidation-Reduction Potential (ORP)
- Confirm the presence of all possible confining units.

Reconnaissance ground water samples will be collected using a temporary well screen installed in the open borehole. To ensure collection of formation water at the target depth, low-flow sampling techniques will be utilized. Borehole water will be purged prior to collection of each sample using a low-flow pump and dedicated polyethylene tubing, and specific ground-water parameters (temperature, pH, DO, and conductivity) will be monitored until equilibrated to ensure representative ground water is being drawn into the temporary well point from the target water-bearing interval (see Section 4.1.4). Reconnaissance ground water samples will be collected using the same low-flow pump (see Section 4.1.5).

4.1.3.1 Low-Flow Purging

The boreholes will be purged using low-flow techniques to ensure collection of formation ground-water at the target depth opposite the pump intake. Generally, the following protocol will be followed:

- Measure the water level and record on a FSDS.
- Place the pump (bladder or peristaltic) and support equipment at the wellhead and slowly lower tubing into the monitoring well until the pump intake is at the center of the wetted portion of the well screen within the monitoring well.
- Connect the discharge line from the pump to a flow-through cell. Direct the discharge line from the flow-through cell to a container to contain the purge water during the purging and sampling of the monitoring well.
- Initiate pumping the well at a low flow rate (0.2 to 0.5 liters per minute [L/min]) and slowly increase the pump speed. Check water level to ensure total drawdown is less than 10 centimeters (cm) / 0.3 feet, otherwise lower pump speed.
- Measure the discharge rate of the pump with a graduated cylinder and a stop watch. Record both depth to water and flow rate on FSDS every three to five minutes.
- Purge a minimum of one tubing volume (including volume of water in pump and flow cell) prior to recording water-quality indicator parameters (DO, specific electrical conductance, pH, ORP, temperature, and turbidity). Note, ORP may not always be an appropriate stabilization parameter, and will depend on site-specific conditions. However, readings will be recorded as a double check for oxidizing conditions.
- The stabilization criterion is based on three successive readings of water quality field parameters, as referenced below:
 - pH +/- 0.1 pH units,
 - Spec electrical conductance +/- 3% $\mu\text{S}/\text{cm}$,

- Temp +/- 0.1 °C.
- DO +/- 10%,
- ORP +/- 10mVs
- Record all readings on the FSDS until readings have stabilized.

4.1.3.2 Low-Flow Reconnaissance Ground Water Sampling

Reconnaissance ground water sampling will begin immediately following purging, or as soon as enough water is available for sampling. Sample data will be recorded on the FSDS, including sample number and time collected, the observed physical characteristics of the sample (e.g., color, visual turbidity, etc.), field parameters (pH, specific conductance, temperature, ORP, turbidity, and DO), and other data that may be important in the evaluation of sample quality. The pump rate for sampling will be the same or lower than that used for purging (generally between 0.2 to 0.5 L/min) to minimize disturbance of the water column.

Ground water samples will be collected using the same low-flow pump used for purging with polyethylene tubing. Clean Nitrile gloves will be worn when collecting each sample. The following constituents will be sampled for:

Total CrVI: The water sample will be discharged slowly and carefully through a 0.45 micrometer (µm) ground-water filter, into a polyethylene bottle containing an ammonium sulfate/ammonium hydroxide preservative. The sample will be shipped to the lab the same day as the sample is collected, due to laboratory hold time.

Dissolved metals: The water sample will be discharged slowly and carefully through a 0.45 micrometer (µm) ground-water filter, into a polyethylene bottle containing an aliquot of nitric acid preservative.

Total metals: The water sample will be discharged slowly and carefully into a polyethylene bottle containing an aliquot of nitric acid preservative.

The samples will be labeled as follows:

- Sample Designation, or Identification
- Location
- Date and time of collection
- Medium
- Project number
- Name of sampler(s)
- Analysis required
- Preservation (if applicable).

Samples will be immediately placed in cooled storage until they are delivered to Friedman & Bruya, Inc. (F&BI) of Seattle, Washington (for total and dissolved metals) and Brooks Analytical, Inc. (BAI) of Seattle, Washington [for Cr(VI)]. The samples will be analyzed according to the Analysis Plan shown in Table 4-1, below. Sample containers, preservatives, and holding times for each analytical method are provided on Table 4-2. Chain-of-custody protocols will be followed. All sampling will be conducted in accordance with the appropriate provisions of the project Health and Safety Plan.

Flow cell and all water-quality field parameter sensors and the pump (bladder and/or peristaltic, as appropriate) will be decontaminated by hand-washing with phosphate-free detergent and a scrub brush in three stages, each successively lower in concentration of detergent, with a final rinse with deionized water.

4.2 Analytical Plan

Reconnaissance ground water samples will be analyzed for dissolved chromium (EPA method 1638) and dissolved hexavalent chromium (both EPA 218.7 and SOP BAL-4300). Samples collected during this investigation will be analyzed according to the plan and protocol described in the following tables.

Table 4-1. Proposed Analytical Plan

Analytical Method	Constituents	Soil	Reconnaissance Ground Water
EPA 1638 / EPA 6020B	Total and Dissolved Chromium, Iron and Manganese	Total in all samples	Total and dissolved in all samples
SOP BAL-4300 / EPA 7196 and EPA 218.7	Total Chromium VI	All	All
Fraction organic Carbon (Foc)	Foc	Select samples, with Cr(VI) concentrations >0.3 mg/Kg	None

Table 4-2. Analytical Protocol

Analyte(s)	Analytical Method	Container and preservative	Holding time	Preservation
Soil:				
Total Chromium, Iron and Manganese	EPA 1638 / EPA 6020B	4 oz glass jar with Teflon® lined lid	6 months	Ice
Total Chromium VI	SOP BAL-4300	4 oz glass jar with Teflon® lined lid	14 days	Ice
Foc	Walkley-Black Method	4 oz glass jar with Teflon® lined lid	28 days	Ice
Ground Water:				
Total and Dissolved Iron and Chromium	EPA 1638 / EPA 6020B	500 mL polyethylene bottles (samples for dissolved analysis will be filtered through a 0.45 µm filter)	6 months	Ice and HNO ₃
Dissolved Chromium VI	SOP BAL-4300 (IC-ICP-MS) and EPA 218.7	500 mL polyethylene bottles (samples for dissolved analysis will be filtered through a 0.45 µm filter)	24 hours	Ice & Ammonium Sulfate/Ammonium Hydroxide

4.3 Data Quality Objectives and Quality Control

Data quality objectives (DQOs) will be developed to ensure the collection of useful data for the risk screening. The data quality objectives for the project include the utilization of laboratory method reporting limits that are sufficiently low to allow for evaluation of results against generic human health risk-based screening levels, as outline in ODEQ's. In general, the laboratory will be requested to ensure laboratory method reporting limits for constituents being tested are lower than their respective risk-based screening levels, as feasible based on current EPA laboratory methodologies.

4.3.1 Quality Control

As outlined in ODEQ's Quality Assurance Project Plan¹, the following quality control/quality assurance samples will also be collected, to ensure overall DQOs are met.

4.3.1.1 Rinsate Blank

An equipment rinsate blank will be collected during each field event to ensure the is not cross-contamination during sample collection. Following decontamination of the sampling equipment (temporary well screen and/or sample barrel), an equipment rinsate blank will be collected using a deionized water rinse, with collection of the rinsate in sample containers provided by the laboratory for laboratory analysis.

¹ ODEQ. November 2016. Quality Assurance Project Plan.

4.3.1.2 Field Duplicate

A blind field duplicate will be collected during each sampling event to measure laboratory precision and variability. A duplicate sample will be collected for each sample matrix per field event. Precision is a measure of mutual agreement among individual measurements of the same property under prescribed similar conditions. Precision for this project may be demonstrated by the analytical laboratory based upon results of either laboratory duplicate analyses, laboratory control sample/control sample duplicate (LCS/LCSD) analyses, matrix spike/matrix spike duplicate (MS/MSD) analyses, and/or results from field duplicate samples.

A field duplicate is defined as a sample that is collected and divided into two parts for analysis of the same parameters. Results from field duplicates are useful in determining potential sampling variability. Greater than expected differences between duplicates may occur due to variability within the sample matrix. Field duplicates shall be used as a quality control measure to monitor precision of sample collection methods.

Precision is independent of the error (accuracy) of the analyses and reflects only the degree to which the measurements agree with one another, not the degree to which they agree with the “true” value for the parameter measured.

Precision is calculated in terms of Relative Percent Difference (RPD), which is expressed as:

$$RPD = \frac{|X_1 - X_2|}{(X_1 + X_2) / 2} \times 100$$

Where X1 and X2 represent the individual values found for the target analytes in the duplicate analyses. RPDs for field duplicate samples include the additional variability of field sampling methods and sample homogeneity. Therefore, RPDs for field duplicate samples will be evaluated against an acceptance criterion of 50 percent for quantitative data.

4.4 Decontamination Procedures

Before collecting any sample, collection tools will be decontaminated by steam-cleaning or alternatively using a sequential wash of Alconox or trisodium phosphate solution, rinsed in tap water from a known source (e.g., municipal water), and subjected to a final rinse with distilled or deionized water. Wash and rinse liquids will be changed frequently during sampling activities, as appropriate. Wash and rinse fluids will be collected, if possible, and appropriately disposed. Fresh nitrile gloves will be worn during any sample collection and when handling tools which are to be inserted into sampling areas. Solid waste generated during sampling activities (gloves, foil, paper towels, etc.) will be appropriately disposed.

4.5 Equipment Calibration

Monitoring equipment used during sampling (e.g., specific conductance, ORP and pH meters) will be calibrated according to manufacturer's specifications at the beginning of each sample day. Meter calibration will be checked at least twice during a sample day (middle and end of

day) or when meter drift is suspected. The meters will be calibrated with gases or buffered solutions closest to known field parameters (usually this is pH = 7, specific conductivity = 240 μ S).

4.6 Investigation-Derived Waste Storage and Disposal

Potentially impacted investigation-derived waste (IDW) may be generated during this investigation. It is assumed that this waste may be impacted with low-level Cr(VI); however, characterization of all waste will be necessary to properly treat or dispose of generated waste.

4.6.1 Soil Cuttings, and Cores

Soil cuttings and cores derived from the drilling of well borings will be placed in drums, sealed, and labeled as to the a) nature of the contents, b) date contents sealed, and c) responsible party. One composite soil sample will be collected from the soil cuttings drums at each drilling location separately to determine proper method of disposal.

4.6.2 Decontamination and Purge Water

Water associated with drilling, borehole purging, sampling purging and decontamination will be drummed, sealed, and labeled.

Upon receipt of analytical data, the disposal requirements of the drummed fluid investigation-derived waste will be evaluated. It is anticipated that all waste generated will be handled as a non-hazardous material and will not be characteristic of hazardous waste. However, water waste determined to be impacted with contaminants at levels regulated under Resource Conservation and Recovery Act (RCRA)² rules as characteristic (hazardous waste) must be disposed or treated in a manner consistent with RCRA regulation.

4.7 Future Monitoring Well Installation

Based on the results of this reconnaissance ground water investigation, ENW may prepare a work plan for permanent offsite ground-water monitoring well installation; however, that will be determined, based on the data collected during this investigation.

5.0 REPORT PREPARATION

A report will be prepared documenting the work conducted in the previously described sections and will include borings logs and an updated east-west geologic cross-section. Data generated during this reconnaissance ground-water sampling will be screened against applicable risk-based concentrations (RBCs) identified in the risk assessment³. During the course of this work, should results indicate a need for additional work; ODEQ will be consulted regarding proposed actions.

² Resource Conservation and Recovery Act.

³ ENW, July 27, 2017, *Risk Assessment – Former Nielsen Manufacturing Property 2501 Portland Road NE, Salem, Oregon*. Prepared for Salem-Keizer School District

6.0 PROPOSED SCHEDULE

Work on the project can begin upon receiving approval from the ODEQ Project Manager for the proposed work plan and receiving permission from property owners to utilize their properties for the purpose of this investigation. The final report will be submitted to ODEQ within 30 days of receiving the final analytical results.

7.0 CERTIFICATION

This Work Plan has been prepared under the supervision of the following Oregon-registered Certified Engineering Geologist.

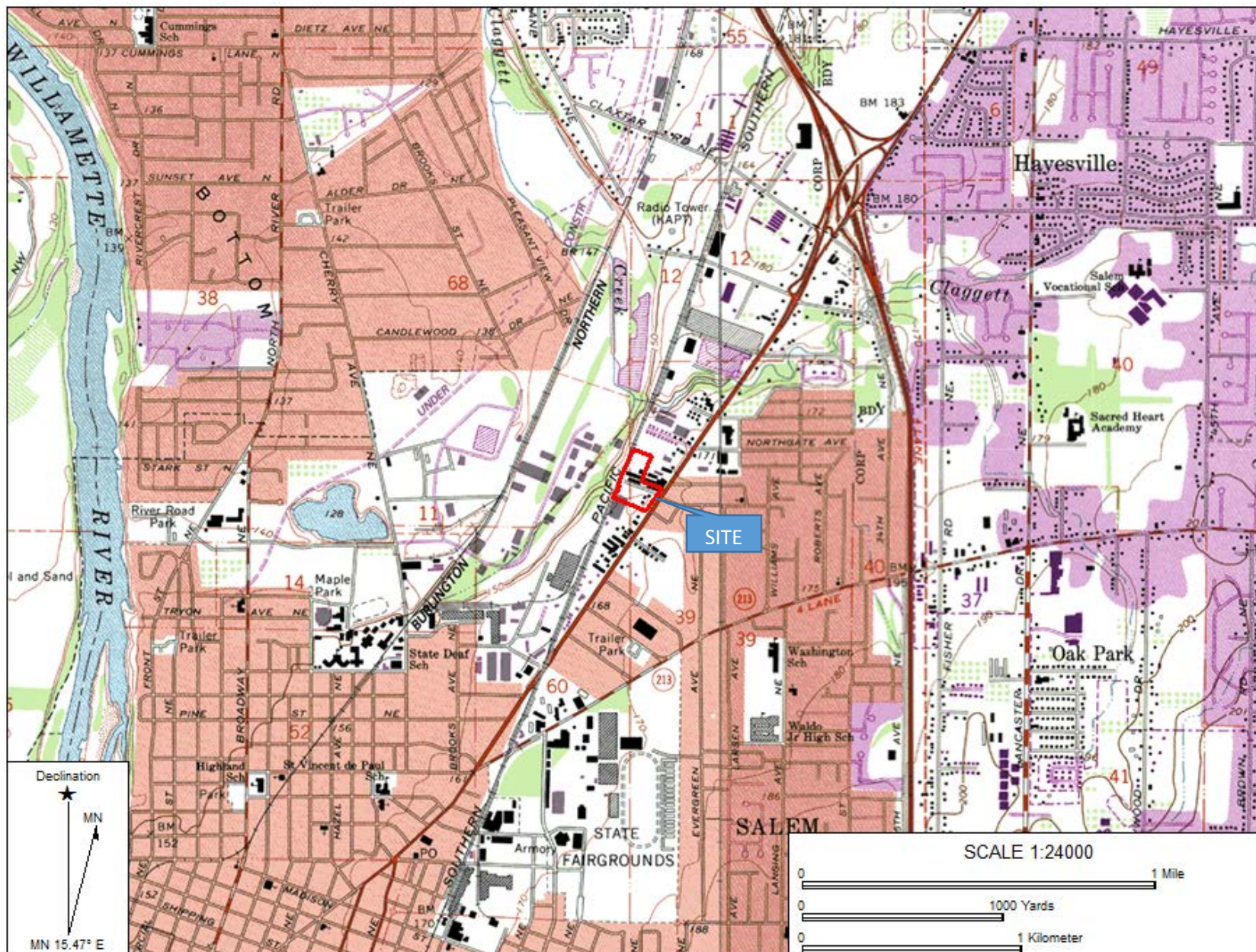


Lynn D. Green, L.E.G., Principal Engineering Geologist
EVREN Northwest, Inc.



EXP. 2/1/2021

FIGURES



Quadrangle: SALEM WEST
Date: 1969 / Date Revised: 1986

Location: Sec 012 T007S R003W OR Willamette
Contour Interval: 10 Feet



Date Drawn: 4/4/2017
CAD File Name: 689-14001fig1sv_map(v01)
Drawn By: JOB
Approved By: LDG

Former Neilsen Manufacturing Property
3501 Portland Road NE
Salem, Oregon

**Site Vicinity
Map**

Project No.
689-14001-14
Figure No.
1



LEGEND:

SUBJECT BUILDINGS

FORMER BUILDING LOCATION (PLANT #3)

SUBJECT PROPERTY BOUNDARIES

ABANDONED UNDERGROUND FUEL STORAGE TANK

APPROXIMATE MONITORING WELL LOCATION

PROPOSED BOREHOLE LOCATION

- NOTES:
1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2016 AND ENW FIELD NOTES.

2. ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.

APPROXIMATE SCALE

0

150

300 FEET

N

EVRENNORTHWEST INC.

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FIGURE 3

PROPOSED BOREHOLE LOCATIONS

FORMER NEILSEN MANUFACTURING INC

3501 PORTLAND ROAD NE

SALEM, OREGON