APPENDIX C

Standard Operating Procedures

ASSVE

GRAB VAPOR EXTRACTION SYSTEM AIR SAMPLING

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to define the method for collecting grab vapor extraction system air samples. This SOP describes the collection of grab vapor extraction system air samples in a manner consistent with sampling and data quality objectives. The length of the test is approximately 12 minutes.

2.0 Materials

- Field notebook and field sampling data sheets
- PPE appropriate for site
- Timepiece (to record start and end sample collection times)
- Calibrated 6-liter Summa™ canister(s) or equivalent with attached analog vacuum gauge and designated time-integrated flow controller(s) (supplied by laboratory) calibrated to 0.5 Liters per minute
- 9/16-inch wrench
- Digital calibrated vacuum gauge
- Polytetrafluoroethylene (PTFE) stainless steel braided hose to connect to sampling ports

3.0 Air Sampling Procedure

The following procedures are adhered to during vapor extraction system air sampling using a Summa™ canister or equivalent that has been properly cleaned and evacuated by the laboratory.

Prior to Collection of the Sample

1. Record the initial date, time, and atmospheric readings on the field data sheet.

2. Using a 9/16" wrench, remove the brass cap above the valve on top of the Summa™ canister.

3. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. Document the initial canister pressures.

4. Attach the analog pressure gauge to the top of the Summa™ canister then attach the 0.5 liter per minute regulator to the analog pressure gauge. Attach the PTFE stainless steel braided hose to the regulator.

Sample Collection

1. When ready to begin sampling, attach the stainless steel hose to the sampling port, and open the valve to the Summa™ canister by turning the valve control knob approximately 1 and 1/4 turns counterclockwise.

2. Record the sample location, sample date and time, and Summa™ canister serial/ barcode numbers as well as the barometric pressure, temperature and humidity at the sample location on the field data sheet. Make any notes regarding the sample location that could potentially influence sample results.

3. Continue to monitor the analog vacuum gauge and shut-off the control valve by turning clockwise when the vacuum gauge reads approximately -6.0 in/Hg. If necessary, collect a duplicate sample immediately after the primary sample collection is complete, following the same procedures for both sample canisters.

4. Remove the stainless steel braided hose from the 24-hour flow control device. Remove the flow control device and measure the remaining vacuum in the Summa™ canister with the vacuum gauge. Record the final canister vacuum on the field data sheet. Sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 in/Hg. Replace the brass cap and tighten gently.

5. Record on the sample tag the sample date and time, client name, sample ID, and requested analysis and attach the tag to the Summa™ canister. Record the final date and time, and atmospheric readings on the field data sheet. The sample IDs should be consistent with previous sampling events and as they are reported on tables included in reports. For example, AS/ SVE manifold sample locations should be labeled as follows:

   CM-VE-03 where,

   CM=Cadet Manufacturing

   VE-03=Vapor Extraction manifold 03

   Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for the Cadet AS/ SVE system (e.g. CM-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label. Field data sheets should clearly indicate which samples include duplicates.

6. Record the sample ID exactly as it is listed on the sample label, date, time, Summa™ canister serial number, flow controller serial number, sample volume, and desired analysis on the chain-of-custody form.

7. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that

includes those samples in each box (every shipping box should include a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g., duct tape, cellophane packaging tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

8. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

GW

LOW STRESS (LOW FLOW) PUMPING AND SAMPLING WITH DEDICATED MONITORING WELL PUMPS

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to describe the method used to collect groundwater samples from monitoring wells with dedicated submersible bladder pumps. Low flow purging is used to reduce stress on the water column and minimize drawdown inside the well in order to limit alterations to the water chemistry and the mobilization of solids. Low stress purge rates should be from 0.2 to 0.5 liters per minute (L/min), with an overall drawdown of less than 0.1 meter (0.33 feet). Sampling should occur when the water column and other parameter measurements (based on the criteria listed below) have stabilized.

2.0 Materials

The following materials are used during low stress groundwater sampling:

- Water level indicator
- Bladder pump controller
- 0.25-inch (OD) polyethylene tubing
- Air compressor or nitrogen tank and regulator
- Power source (generator or field vehicle power outlet)
- Two graduated 5-gallon plastic buckets
- pH meter
- Specific conductance meter
- Redox meter
- Temperature meter
- Dissolved oxygen meter
- Flow through cell for water quality meters
- Field data sheets
- Sample containers

- Sample labels
- Personal Protective Equipment (PPE)
- Decontamination supplies

3.0 Sampling Procedure

1. Open monitoring well monument, remove the protective plug from the well cap, and allow groundwater to stabilize (groundwater has stabilized when fluctuations in the groundwater level are no longer observed). Once groundwater has stabilized, use the water level indicator to measure the depth to water to the nearest 0.01 feet from the surveyed measuring point (typically a notch or ink mark on the north rim of the top of well casing). Record the water level on the field data sheet.
2. Calibrate all field meters according to manufacturers' specifications and record results on the field data sheet.
3. Connect the air compressor (connected to power source) or nitrogen tank to the pump controller and the controller to the pump connection on the wellhead.
4. Connect polyethylene tubing to the pump effluent line on the wellhead. Run the effluent end of the tubing to the flow through cell containing the water quality meters. Direct overflow from the flow through cell into the graduated 5-gallon bucket.
5. Start compressor or open nitrogen tank control valve and begin purging via the pump controller.
6. Adjust pump controll to achieve minimum drawdown (less than 0.33 feet) and optimum groundwater flow rate (0.2 to 0.5 L/min). Record depth to water measurements on the field data sheet every 3 to 5 minutes.
7. Collect water quality indicator parameters every 3 to 5 minutes. The water quality indicators include: dissolved oxygen, specific conductance, pH, oxidation-reduction potential, and temperature. Groundwater is considered stable and representative of groundwater in the formation when three consecutive water-quality indicator readings are within the following criteria:

Groundwater Quality Parameters	**Stabilization Criteria**
pH	+/- 0.1 pH units
Specific conductance	+/- 3% S/cm
Oxidation-reduction potential	+/- 10 millivolts
Dissolved oxygen	+/- 10 milligrams per liter
Temperature	+/- 3%

8. Once the groundwater quality parameter stabilization criteria are met, sample collection can take place. Collect sample from the effluent line of the wellhead, not from the discharge of the flow-through cell.

9. After sampling is completed, disconnect the air compressor or nitrogen tank from the pump controller and the pump controller from the well. The polyethylene tubing connecting the pump effluent line on the wellhead should also be removed and discarded or decontaminated, unless dedicated to the well. Reinstall protective plug in the well cap and replace monument cover.

10. Record on the sample label the sample date and time, client name, sample identification (ID), and requested analysis, and attach the label to the sample container. The sample IDs should be consistent with previous sampling events and should be the same as they are reported on the tables included in quarterly monitoring reports. For example, well CM-MW-01d-060.5 should be labeled as such on the sample container; do not use “shortcut” labeling such as eliminating the .5 at the end of the ID. POV wells should be labeled MW-01, MW-02, etc. Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet wells and POV-FD-mmddyy for SMC wells (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label.

11. Record the project name and number, sample ID, sample date and time, weather conditions, personnel on site, any problems or corrective actions, and any other information that will allow reconstruction of pertinent field activities on the field data sheet. Field data sheets should clearly indicate which samples include duplicates.

12. Record the sample ID exactly as it is listed on the sample container, date, time, and desired analysis on the chain-of-custody form.

13. Place the samples into a cooler with ice, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection against melt water). Place packing materials around the samples as needed to ensure that breakage will not occur during shipping. Close the cooler and secure with tape (e.g., duct tape, cellophane packing tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the cooler.

14. A commercial carrier (e.g., FedEx, UPS, etc.) or a courier from the project laboratory will pick up and transport the cooler to the project analytical laboratory under chain-of-custody procedures.

LOW STRESS (LOW FLOW) PUMPING AND SAMPLING WITH A PERISTALTIC PUMP

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to describe the method used to collect groundwater samples from monitoring wells with a peristaltic pump. Low flow purging is used to reduce stress on the water column and minimize drawdown inside the well in order to limit alterations to the water chemistry and the mobilization of solids. Low stress purge rates should be from 0.2 to 0.5 liters per minute (L/min), with an overall drawdown of less than 0.1 meter (0.33 feet). Sampling should occur when the water column and other parameter measurements (based on the criteria listed below) have stabilized.

2.0 Materials

The following materials are used during low stress groundwater sampling:

- Water level indicator
- Peristaltic pump
- 0.25-inch (OD) polyethylene tubing
- Power source (generator or field vehicle power outlet)
- Two graduated 5-gallon plastic buckets
- pH meter
- Specific conductance meter
- Redox meter
- Temperature meter
- Dissolved oxygen meter
- Flow through cell for water quality meters
- Field data sheets
- Sample containers
- Sample labels
- Personal Protective Equipment (PPE)

- Decontamination supplies

3.0 Sampling Procedure

1. Open monitoring well monument, remove the protective plug from the well cap, and allow groundwater to stabilize (groundwater has stabilized when fluctuations in the groundwater level are no longer observed). Once groundwater has stabilized, use the water level indicator to measure the depth to water to the nearest 0.01 feet from the surveyed measuring point (typically a notch or ink mark on the north rim of the top of well casing). Record water level on the field data sheet.

2. Calibrate all field meters according to manufacturers' specifications and record results on the field data sheet.

3. Connect the peristaltic pump to the generator or other power source.

4. Connect polyethylene tubing to the flexible tubing which is placed in the pumphead. Run the effluent end of the tubing to the flow through cell containing the water quality meters. Direct overflow from the flow through cell into the graduated 5-gallon bucket.

5. Start generator or activate power source and activate pump to begin purging.

6. Adjust pump control to achieve minimum drawdown (less than 0.33 feet) and optimum groundwater flow rate (0.2 to 0.5 L/min). Record depth to water measurements on the field data sheet every 3 to 5 minutes.

7. Collect water quality indicator parameters every 3 to 5 minutes. The water quality indicators include: dissolved oxygen, specific conductance, pH, oxidation-reduction potential, and temperature. Groundwater is considered stable and representative of groundwater in the formation when three consecutive water-quality indicator readings are within the following criteria:

Groundwater Quality Parameters	**Stabilization Criteria**
pH	+/- 0.1 pH units
Specific conductance	+/- 3% S/cm
Oxidation-reduction potential	+/- 10 millivolts
Dissolved oxygen	+/- 10 milligrams per liter
Temperature	+/- 3%

8. Once the groundwater quality parameter stabilization criteria are met, sample collection can take place. Collect sample from the tubing routed through the peristaltic pump, not from the discharge

of the flow-through cell. Reduce flow rate before sampling to minimize possibility of volatilization of dissolved VOCs before sampling. If necessary, collect duplicate sample immediately after primary sample collection is complete, following the same procedures for both samples.

9. After sampling is completed, disconnect the generator or other power source from the pump and remove the tubing (if not dedicated) from the well and discard. Tubing dedicated to the well should be stored in a plastic bag for future use. The polyethylene tubing connecting the pump effluent line on the wellhead should also be removed and discarded. Reinstall protective plug in the well cap and replace monument cover.

10. Record on the sample label the sample date and time, client name, sample ID, and requested analysis, and attach the label to the sample container. The sample IDs should be consistent with previous sampling events and should be the same as they are reported on the tables included in quarterly monitoring reports. For example, well CM-MW-01d-060.5 should be labeled as such on the sample container; do not use “shortcut” labeling such as eliminating the .5 at the end of the ID. POV wells should be labeled MW-01, MW-02, etc. Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet wells and POV-FD-mmddyy for SMC wells (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label.

11. Record the project name and number, sample ID, sample date and time, weather conditions, personnel on site, any problems or corrective actions, and any other information that will allow reconstruction of pertinent field activities on the field data sheet. Field data sheets should clearly indicate which samples include duplicates.

12. Record the sample ID exactly as it is listed on the sample container, date, time, and desired analysis on the chain-of-custody form.

13. Place the samples into a cooler with ice, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection against melt water). Place packing materials around the samples as needed to ensure that breakage will not occur during shipping. Close the cooler and secure with tape (e.g., duct tape, cellophane packing tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the cooler.

14. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the cooler to the project analytical laboratory under chain-of-custody procedures.

INDOOR AIR

INDOOR AIR SAMPLING

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to define the method for the collection of indoor air samples. This SOP describes the collection of time integrated samples from the breathing zones of potentially impacted structures in a manner consistent with sampling and data quality objectives. The length of the test is approximately 24 hours.

2.0 Materials

- Indoor air sample collection field data sheet
- PPE appropriate for site
- If working in crawlspaces, flashlights and knee pads
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record start and end sample collection times)
- Calibrated 6-liter Summa™ canister(s) or equivalent with attached analog vacuum gauge and designated time-integrated flow controller(s) (supplied by laboratory) calibrated to 0.25 liters per hour
- 9/16-inch wrench
- Digital calibrated vacuum gauge

3.0 Indoor Air Sampling Procedure

The following procedures are adhered to during indoor air sampling using a 24-hour flow controller on a Summa™ canister or equivalent that has been properly cleaned and evacuated by the laboratory.

1. Set appointments – Prior to arriving at each residence, Parametrix personnel will schedule a visit with each homeowner and inform them of the scope of work for the visit.
2. Assemble Equipment – The PID and the anemometer may be found in the equipment storage area. The ladder is stored in the RGRW-3 shed.
3. Arrival at the Residence – Upon arrival at the residence, Parametrix personnel will contact the homeowner and inform them of how the sampling will be done.

Prior to Collection of the Sample

1. Record the initial date, time, and atmospheric readings on the field data sheet.
2. Using a 9/16” wrench, remove the brass cap above the valve on top of the Summa™ canister.

3. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. Record the initial canister pressures.

4. Attach the laboratory supplied 24-hour flow control device to the top of the Summa™ canister. Ensure connected fittings are finger tight followed by a 1/4" turn with the 9/16" wrench.

5. Site one Summa™ canister at a location within the structure where representative sampling will occur in the breathing zone. If necessary, place a duplicate sample canister at the same time and location, and follow the same procedures for both sample canisters. Consider the occupants and uses of the building. In a typical residence, the indoor air sampling consists of one sample collected in the living room and one collected in the basement and/ or crawlspace.

Sample Collection

1. When ready to begin sampling, open the valve to the Summa™ canister by turning the valve control knob approximately 1 and 1/4 turn counterclockwise.

2. Record the sample location, sample date and time, canister and 24-hour flow control valve serial/barcode numbers, as well as the barometric pressure, and temperature and humidity of the sample location on the field data sheet. Make any notes regarding the sample location that could potentially influence sample results (ie: cleaning product usage, open doors or windows, tobacco smoking, auxiliary air circulation (fans), or chemical occurrences near the sample location).

3. 24 hours after opening the Summa™ canister, shut off the control valve by turning clockwise. Record this time on the field data sheet.

4. Make sure to ask the resident the 13 questions listed on the field data sheet regarding activities in the household 48 hours prior to and during sampling.

5. Remove the 24-hour flow control device and measure the remaining vacuum in the Summa™ canister with the vacuum gauge. Record the final canister vacuum on the field data sheet. Sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 in/Hg. Replace the brass cap and tighten gently.

6. Record on the sample tag the sample date and time, client name, sample location/name, and requested analysis and attach to the Summa™ canister. Record the final date and time, and atmospheric readings on the field data sheet. The sample IDs should be consistent with previous sampling events and as they are reported on the tables included in quarterly monitoring reports. For example, indoor air sample locations should be labeled as follows:

   1903-27-IA-LS where,

   1903-27=address-street

   IA=indoor air

   LS=living space (CS=crawl space, BS=basement)

   Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-

FD-mmddyy for Cadet sample locations and POV-FD-mmddyy for SMC sample locations (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody form as well as on the sample label. Field data sheets should clearly indicate which samples include duplicates.

7. Record the sample ID exactly as it is listed on the sample label, date, time, Summa™ canister serial number, flow controller serial number, sample volume, and desired analysis on the chain-of-custody form.

8. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that includes those samples in each box (every shipping box should include a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g., duct tape, cellophane packaging tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

9. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

OUTDOOR AIR

OUTDOOR AIR SAMPLING

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to define the method for collecting outdoor air samples. This SOP describes the collection of time integrated samples from the breathing zones of potentially impacted areas in a manner consistent with sampling and data quality objectives. The length of the test is approximately 24-hours.

2.0 Materials

- Outdoor air sample collection field sheet
- PPE appropriate for site
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record start and end sample collection times)
- Calibrated 6-liter Summa™ canister(s) or equivalent with attached analog vacuum gauge and designated time-integrated flow controller(s) (supplied by laboratory) calibrated to 0.25 liters per hour
- 9/16-inch wrench
- Digital calibrated vacuum gauge

3.0 Indoor Air Sampling Procedure

The following procedures are adhered to during outdoor air sampling using a 24-hour flow controller on a Summa™ canister or equivalent that has been properly cleaned and evacuated by the laboratory.

Prior to Collection of the Sample

1. Record the initial date, time, and atmospheric readings on the field data sheet.

2. Using a 9/16-inch wrench, remove the brass cap above the valve on top of the Summa™ canister.

3. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. Document the initial canister pressures.

4. Attach the laboratory-supplied 24-hour flow control device to the top of the Summa™ canister. Ensure that connected fittings are finger-tight, followed by a 1/4 turn with the 9/16-inch wrench.

5. Place the Summa™ canisters at locations where representative sampling will occur. If necessary, place a duplicate sample canister at the same time and location, and follow the same procedures

for both sample canisters. Site the canisters where they are protected from severe weather (e.g., heavy rain, freezing, high winds).

Sample Collection

1. When ready to begin sampling, open the valve control knob on the Summa™ canister approximately 1 and 1/4 turns counterclockwise.

2. Record the sample ID and sample date and time, Summa™ canister and 24-hour flow control valve serial/ barcode numbers, as well as the barometric pressure, temperature and humidity at the sample location on the field data sheet. Make any notes regarding the sample location that could potentially influence sample results (e.g., use of chemicals, vehicle traffic, industrial activities, etc.).

3. 24 hours after opening the Summa™ canister, shut off the control valve by turning clockwise. Record the time on the field data sheet.

4. Remove the 24-hour flow control device and measure the remaining vacuum in the Summa™ canister with the vacuum gauge. Record the final canister vacuum on the field data sheet. Sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 inHg. Replace the brass cap and tighten gently.

5. Record on the sample tag the sample date and time, client name, sample location/name, and requested analysis and attach to the Summa™ canister. Record the final date and time, and atmospheric readings on the field data sheet. The sample IDs should be consistent with previous sampling events and as they are reported on the tables included in quarterly monitoring reports. For example, outdoor air sample locations should be labeled as follows:

   Fram-OA where,

   Fram=location

   OA=outdoor air

   Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet sample locations and POV-FD-mmddyy for SMC sample locations (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label. Field data sheets should clearly indicate which samples include duplicates.

6. Record the sample ID exactly as it is listed on the sample label, date, time, Summa™ canister serial number, flow controller serial number, sample volume, and desired analysis on the chain-of-custody form.

7. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that includes those samples in each box (every shipping box should include a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g.,

duct tape, cellophane packaging tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

8. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

PID

PHOTOIONIZATION DETECTOR (PID) CALIBRATION

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to describe the method used to calibrate the PhoCheck+ 1000Ex Photoionization Detector (PID). The PID is a portable, nonspecific vapor/ gas detector that detects both organic and inorganic chemical compounds in air.

2.0 Materials

The following materials are used during PID calibration:

- PID (PhoCheck+ 1000Ex)
- Operating manual
- Tygon® tubing
- 100 parts per million (ppm) Isobutylene calibration gas and regulator
- Calibration Kit (A-845213)

3.0 Calibration Procedure

1. The PhoCheck+ 1000Ex comes factory calibrated and does not need to be calibrated for every use. It is recommended that the PID be sent to a certified PhoCheck+ repair facility to be calibrated annually. A custom two-point calibration can be performed on the PID if necessary (see below).
2. For a custom calibration, follow all steps in the operations manual under “Custom Calibration Procedure”:
   a. Ensure that the PID is set to be calibrated using 100 ppm isobutylene calibration gas.
   b. Set the calibration procedure to “Custom”.
   c. Attach the carbon filter and zero the PID using a known clean air source.
   d. Using the canister of 100 ppm isobutylene and associated regulator, introduce the isobutylene to the instrument per the calibration procedure in the manual.
3. After calibration is complete, the PID is ready to be used.

SOIL AND GAS

BUILDING SUB-SLAB SOIL GAS SAMPLING

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to describe a method for collecting a representative soil gas sample through a building slab soil gas monitoring port. This SOP includes the materials required and procedures used in the collection of soil gas samples beneath buildings.

2.0 Materials

- Sub-slab soil gas sample collection field sheet
- Specially designed tool to open the monitoring port cap
- Specially designed sampling adapter with valve and 1/4-inch OD threaded fitting
- Timepiece (to record start and end sample collection times)
- 1-Liter Summa™ canister or equivalent with designated 30-minute critical orifice assembly (supplied by laboratory)
- Vacuum pump
- Teflon® tubing
- One-liter Tedlar® bags
- 9/16-inch wrench
- Digital vacuum gauge
- Gas monitoring equipment (O_2, CO_2, CH_4)

3.0 Method

1. Calibrate gas monitoring equipment per manufactures instructions.

2. If sampling equipment is not dedicated to the specific monitoring port, decontaminate sub-slab soil gas sampling tools and adapters.

3. Remove the sub-slab soil gas monitoring port cap with the specially designed cap tool.

4. Install the specially designed sampling adapter into the soil gas monitoring port. Ensure the ball valve on the sampling adapter is closed.

5. Connect the sampling adapter to the vacuum pump influent. Then connect the vacuum pump effluent to a Tedlar® bag.

6. Open the valve on the sampling adapter and turn on the vacuum pump. Record the time on the field data sheet. Purge the sub-slab soil gas monitoring port by filling Tedlar® bags with at least 2-liters of sub-slab soil gas. Record the purge volume and duration on the field data sheet.

7. After purging, close the sampling adapter and turn off the vacuum pump. Disconnect the tubing from the vacuum pump to the sampling adapter.

8. Measure and record the concentrations of O_2, CO_2, and CH_4 in each Tedlar® bag.

9. Ensure the Summa™ canister is closed. Open the 1-L Summa™ canister by removing the brass cap with the 9/16-inch wrench.

10. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. Document the initial canister pressures.

11. Connect the 30-minute critical orifice assembly to the Summa™ canister. Attach the critical orifice assembly to the sampling adapter. Open the sampling adapter valve. Open the valve on the canister by turning the knob 1 1/4 turns clockwise. Record the time the canister is opened.

12. After the Summa™ canister valve has been open for approximately 25 to 28 minutes close the canister and the sampling adapter.

13. Remove the 30-minute critical orifice assembly and measure the remaining vacuum in the Summa™ canister with the vacuum gauge. Record the final canister vacuum and time the canister is closed on the field data sheet. Sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 inHg. Replace the brass cap and tighten gently. If necessary, collect duplicate sample immediately after primary sample collection is complete, following the same procedures for both sample canisters.

14. Remove the sampling adapter from the sub-slab sampling port. Replace the sampling port cap with the specially designed tool and tighten gently.

15. Decontaminate soil gas and air quality equipment between each sampling location by purging the equipment with nitrogen gas for approximately 60 seconds. Adjust all valves and fittings through their full range of motion while purging with nitrogen gas. Wrap decontaminated equipment in aluminum foil and place in clean self-sealing plastic bags for storage until next use.

16. Record on the sample tag the Summa™ canister and control device serial numbers, sample volume, sample date and time, client name, sample ID, and requested analysis; attach the tag to the canister. The sample IDs should be consistent with previous sampling events and as they are reported on the tables included in reports. For example, sample 2113-28-SGVP1 where,

    2113=address

    28=street name

    SGVP#=soil gas vapor point number

should be labeled as such on the canisters. Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet samples and POV-FD-mmddyy for SMC samples (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label. Field data sheets should clearly indicate which samples include duplicates.

17. Record on the field sheet the project name and number, sample ID, Summa™ canister and flow control device serial numbers, sample date and time, atmospheric readings/ weather conditions, personnel on site, any problems or corrective actions, and any other information that will allow reconstruction of pertinent field activities.

18. Record the sample ID exactly as it is listed on the sample label, date, time, Summa™ canister serial number, flow control device serial number, sample volume, and desired analysis on the chain-of-custody form.

19. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that includes those samples in each box (every shipping box should include a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g., duct tape, cellophane packaging tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

20. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

SOIL GAS WELL SAMPLING

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to describe the methods used to collect samples from soil gas monitoring wells. This SOP describes the collection of time-integrated samples from soil gas wells in a manner consistent with sampling and data quality objectives. Procedures for soil gas monitoring well sampling are detailed in the following sections.

2.0 Materials

The following materials are used during soil gas well sampling:

- Soil gas sample field data sheet
- PPE appropriate for site
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record start and end sample collection times)
- Calibrated 6-liter Summa™ canister(s) or equivalent with attached analog vacuum gauge and designated time-integrated flow control device(s) (supplied by laboratory) calibrated to 0.5 liters per minute
- 9/16-inch wrench
- Digital calibrated vacuum gauge
- Vacuum pump
- Power source for pump
- Methane meter (for monitoring oxygen [O_2] and carbon dioxide[CO_2])
- Teflon®-lined stainless steel or polyethylene tubing

3.0 Soil Gas Sampling Procedure

The following procedures are adhered to during soil gas sampling using a flow control device calibrated to a flow rate of approximately 0.5 liters per minute, attached to a Summa™ canister or equivalent that has been properly evacuated by the laboratory.

Prior to Collection of the Sample

1. Prior to purging, the vacuum pump is calibrated to a flow rate of approximately 0.5 liters per minute. Calibrate gas monitoring equipment per manufactures instructions.

2. Soil gas wells are purged by attaching one end of Teflon®-lined stainless steel tubing or Teflon®-lined polyethylene tubing to the PVC well casing adapter and sampling port and the other end to the vacuum pump. Approximately 5 soil gas well volumes are withdrawn prior to sample collection, using the vacuum pump to purge the well casing of all ambient air. This volume ensures that a sample will be representative of soil gas in the vadose zone. Effluent should be monitored for oxygen and carbon dioxide to evaluate the possibility of short circuiting in the purging process. Readings for O_2 and CO_2 should be recorded on the field sheet. If abnormal levels (i.e. significant changes between readings, etc.) are measured, the system should be evaluated for potential leakages.

3. Using a 9/16-inch wrench, remove the brass cap above the valve on top of the Summa™ canister.

4. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. Document the initial canister pressures.

5. Attach the laboratory-supplied and calibrated flow control device to the top of the Summa™ canister. Ensure that connected fittings are finger-tight, followed by a 1/4 turn with the 9/16-inch wrench. Care should be taken during sample collection to ensure that air from the surface is not being inadvertently sampled (resulting from well seal failure) and that desorption of contaminants does not occur. To minimize the potential for desorption of contaminants from soil, the flow control valve has been calibrated so that the canister is filled at a rate of approximately 0.5 liters per minute (L/min).

6. Disconnect the vacuum pump from the Teflon®-lined stainless steel or polyethylene tubing connected to the well sample port and immediately attach tubing to the flow control device on the Summa™ canister.

Sample Collection

1. When ready to begin sampling, open the valve control knob on the Summa™ canister approximately 1 and 1/4 turns counterclockwise.

2. Record the sampled well ID, sample date and time, Summa™ canister and flow control valve serial/barcode numbers, as well as the barometric pressure, temperature and humidity of the sample location on the field data sheet. The sample canister should be protected from any severe weather. Make any notes regarding the sample location that could potentially influence sample results (e.g., use of chemicals, vehicle traffic, industrial activities, etc.).

3. Approximately 12 to 15 minutes after opening the Summa™ canister, shut off the control valve by turning it clockwise and check the vacuum in the canister using the calibrated field vacuum gauge. If the canister vacuum is greater than -9 inHg, open control valve and continue sampling. Sample collection is complete when the vacuum remaining in the canister is between -0.1 and -9 inHg. When sample collection is complete, check the barometric pressure, temperature, and humidity of the sample location again and record this information on the field data sheet.

4. When sampling is complete, remove the flow control device and measure the remaining vacuum in the Summa™ canister with the vacuum gauge. Record the final canister vacuum on the field

data sheet. Again, sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 inHg. Replace the brass cap and tighten gently. If necessary, collect duplicate sample immediately after primary sample collection is complete, following the same procedures for both sample canisters.

5. Record on the sample tag the Summa™ canister and control device serial numbers, sample volume, sample date and time, client name, sample ID, and requested analysis; attach the tag to the canister. The sample IDs should be consistent with previous sampling events and as they are reported on the tables included in quarterly monitoring reports. For example, wells CM-SG-01-10 (Cadet well) and POV-SG-01-10 (SMC well) where,

   CM=Cadet Manufacturing and POV=Port of Vancouver

   SG=Soil Gas

   01=well number 01

   10=depth of well,

   should be labeled as such on the sample canisters for wells 10 feet in depth, CM-SG-01-20 and POV-SG-01-20 for wells 20 feet in depth, etc. Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet wells and POV-FD-mmddyy for SMC wells (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label.

6. Record on the field sheet the project name and number, sample ID, Summa™ canister and flow control device serial numbers, sample date and time, atmospheric readings/ weather conditions, personnel on site, any problems or corrective actions, and any other information that will allow reconstruction of pertinent field activities. Field data sheets should clearly indicate which samples include duplicates.

7. Record the sample ID exactly as it is listed on the sample label, date, time, Summa™ canister serial number, flow control device serial number, sample volume, and desired analysis on the chain-of-custody form. Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label.

8. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that includes those samples in each box (every shipping box should contain a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g., duct tape, cellophane packing tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

9. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

SVV

INDOOR AIR SAMPLING IN HOMES WITH SVV SYSTEMS

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to define the method for collecting indoor air samples in homes with soil vapor vacuum (SVV) systems. This SOP describes the collection of time integrated samples from the breathing zones of potentially impacted structures in a manner consistent with sampling and data quality objectives. The length of the test is approximately 24-hours. Routine operation and maintenance (O&M) will generally be conducted during the same visit as the indoor air sampling.

2.0 Materials

- Indoor air sample collection field sheet
- PPE appropriate for site
- SVV tool kit (with screwdrivers, wrenches, specifically a 9/16" wrench)
- If working in crawlspaces, flashlights and knee pads
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record start and end sample collection times)
- Calibrated 6-liter Summa™ canister(s) or equivalent with attached analog vacuum gauge and designated time-integrated flow controller(s) (supplied by laboratory) calibrated to 0.25 liters per hour
- 9/16-inch wrench
- Digital calibrated vacuum gauge

3.0 Indoor Air Sampling Procedure

The following procedures are adhered to during indoor air sampling using a 24-hour flow controller on a Summa™ canister or equivalent that has been properly cleaned and evacuated by the laboratory.

1. Set appointments – Prior to arriving at each residence, Parametrix personnel will schedule a visit with each homeowner and inform them of the scope of work for the visit.
2. Assemble Equipment – Most equipment should already be in the SVV tool kit. The PID and the anemometer may be found in a separate location. The ladder is stored in the RGRW 3 shed.
3. Arrival at the Residence – Upon arrival at the residence, Parametrix personnel will contact the homeowner for access to the SVV system and inform them of the work to be done.

Prior to Collection of the Sample

1. Record the initial date and time, and atmospheric readings on the field data sheet.

2. Using a 9/16" wrench, remove the brass cap above the valve on top of the Summa™ canister.

3. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. A duplicate sample canister, if necessary, should be placed at the same time and location. Follow the same procedures for both sample canisters.

4. Attach the laboratory supplied 24-hour flow control device to the top of the Summa™ canister. Ensure connected fittings are finger tight followed by a 1/4" turn with the 9/16" wrench.

5. Site one Summa™ canister at a location within the structure where representative sampling will occur in the breathing zone. If necessary, place a duplicate sample canister at the same time and location, and follow the same procedures for both sample canisters. Consider the occupants and uses of the building. In a typical residence, the indoor air sampling consists of one sample collected in the living room and one collected in the basement and/ or crawlspace.

Sample Collection

1. When ready to begin sampling, open the valve to the Summa™ canister by turning the valve control knob approximately 1 and 1/4 turn counterclockwise.

2. Record the sample location, sample date and time, canister and 24-hour flow control valve serial/barcode numbers, as well as the barometric pressure, and temperature and humidity of the sample location on the field data sheet. Make any notes regarding the sample location that could potentially influence sample results (ie: cleaning product usage, open doors or windows, tobacco smoking, auxiliary air circulation (fans), or chemical occurrences near the sample location).

3. 24 hours after opening the Summa™ canister, shut off the control valve by turning clockwise. Record this time on the field data sheet.

4. Make sure to ask the resident the 13 questions listed on the field data sheet regarding activities in the household 48 hours prior to and during sampling.

5. Remove the 24-hour flow control device and measure the remaining vacuum in the Summa™ canister with the vacuum gauge. Record the final canister vacuum on the field data sheet. Sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 in/Hg. Replace the brass cap and tighten gently.

6. Record on the sample tag the sample date and time, client name, sample location/name, and requested analysis and attach to the Summa™ canister. Record the final date and time, and atmospheric readings on the field data sheet. The sample IDs should be consistent with previous sampling events and as they are reported on the tables included in quarterly monitoring reports. For example, indoor air sample locations should be labeled as follows:

   1903-27-IA-LS where,

   1903-27=address-street number or abbreviation

   IA=indoor air

   LS=living space (CS=crawl space, BS=basement)

Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet sample locations and POV-FD-mmddyy for SMC sample locations (e.g. CM-FD-033009 or POV-FD-033009). Duplicate sample times should be recorded as 0000 on the sample label. Field data sheets should clearly indicate which samples include duplicates.

7. Record the sample ID exactly as it is listed on the sample label, date, time, Summa™ canister serial number, flow controller serial number, sample volume, and desired analysis on the chain-of-custody form.

8. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that includes those samples in each box (every shipping box should include a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g., duct tape, cellophane packaging tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

9. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

SVV SYSTEM GRANULAR ACTIVATED CARBON (GAC) SAMPLING

1.0 Purpose and Scope

The purpose of this Standard Operating Procedure (SOP) is to collect representative spent Granular Activated Carbon (GAC) samples from the North Fruit Valley Neighborhood (NFVN) residential Soil Vapor Vacuum (SVV) systems. The spent GAC is currently in steel drums stored in Recycling Groundwater Recovery Well (RGRW) shed #3. The spent GAC is segregated by address according to each SVV system. Initially, the spent GAC is removed from the plastic containment bags in the drum, emptied back into the drum, and mixed in their respective drums. Following mixing, a representative sample is collected in a clear, 16-ounce wide-mouth jar. All sampling will occur with only one drum open at a time in order to prevent cross-contamination.

2.0 Materials

- SVV system O&M field data sheets and indelible pens
- Tools to open and close the steel drums and fiber board drums, as necessary.
- PPE appropriate for site (Level C including full-faced respirator and Tyvek® coveralls)
- Plastic sheeting.
- Utility knife with extra blades.
- 9/16-inch wrench
- Heavy plastic drum liners.
- Stainless steel sampling bowls and spoons.
- Six clear, 16-ounce wide-mouth jars.
- Dust suppression spray bottle or equivalent.
- Decontamination equipment and materials appropriate for activities (Alconox®, methanol, deionized water, clean-wipes [e.g. paper towels], and spray bottles).
- Photoionization Detector (PID).

3.0 Procedure

The following procedures are adhered to when sampling spent GAC.

1. Calibrate PID as per manufacturer's instructions (see PID calibration SOP).
2. Take PID readings from the ambient air in the RGRW shed prior to opening the drums.

3. Inspect the drums in RGRW shed #3 to make sure they are in good condition. Check for signs of corrosion, bulging, deterioration, and punctures.
4. Spread a plastic sheet over the floor in the RGRW shed and spread another sheet immediately outside the shed.
5. Don PPE (Level C including full-faced respirator and Tyvek® coveralls).
6. Using a 9/16-inch wrench, loosen the drum ring bolt and remove the drum ring from the drum.
7. Continue to monitor the air around the drum with the PID while the drum lid is open.
8. Inspect the bags of spent GAC in the drum for signs of deterioration.
9. Transfer un-deteriorated bags containing spent GAC to the plastic sheeting located outside the shed.
10. With the last bag still inside the drum, open the bag and slowly and carefully pour the contents into the drum. Concurrently, spray the air above the drum with a fine mist of water to aid in the suppression of GAC dust in the shed.
11. After all the GAC has been removed, place the used plastic bags into a heavy plastic drum liner.
12. When pouring the contents of each bag into the drum, collect a spoonful of spent GAC using a stainless steel spoon and place this sample into the stainless steel mixing bowl. Be particularly careful about accounting for all bags for each address.
13. Continue adding the spent GAC from the previously removed bags into the drum and continue spraying the air above the drum with a fine mist of water until work activities are complete.
14. Once portions of the sample have been collected from each bag for the address, mix the spent GAC in the stainless steel mixing bowl with the spoon and then transfer the contents into a clear, 16-ounce wide-mouth sampling jar.
15. Using the paper towels, perform a triple wipe of the stainless steel spoon and mixing bowl. Begin with an Alconox® solution wipe followed by a deionized water wipe and finally a methanol wipe. Spray the Alconox® solution onto a paper towel and wipe the equipment surface clean of any visible dust or GAC. Then spray another paper towel with deionized water and wipe the equipment surface clean of any remaining Alconox® and/ or GAC. Finally spray a paper towel with methanol and wipe the equipment surface clean and allow to air dry. Inspect equipment for any visible GAC or residue. Place used paper towels in lined, 20-gallon steel drum.
16. Fill out the provided sample label using ink. Attach the completed sample label to the jar and record the sample on the chain-of-custody.
17. Close drum by securing drum lid to drum with drum ring and then tighten drum ring bolt using 9/16-inch wrench.

18. Repeat for each address.

19. Place used plastic bags along with decontamination materials and PPE into a lined, 20-gallon steel drum and label appropriately. Include accumulation start date, process generating the waste, and the work site location.

20. Record the date, time, and location on the field data sheet. Make any notes regarding sample location that will potentially influence the spent GAC sample collection.

21. Submit the one-liter clear wide-mouth jars with the chain-of-custody form to the project laboratory or manufacturer, as appropriate, for analysis. Follow shipping instructions provided by the project laboratory or manufacturer.

Standard Operating Procedures

SVV SYSTEM GRANULAR ACTIVATED CARBON (GAC) CHANGEOUT

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to conduct a changeout of the Granulated Activated Carbon (GAC) in each of the residential Soil Vapor Vacuum (SVV) systems. Routine operation and maintenance (O&M) will generally be conducted during the same visit as the GAC Changeout.

2.0 Materials

- SVV system O&M Field data sheets and indelible pens
- PPE appropriate for site (this should include ½-face respirators or surgical masks and gloves, due to the carbon dust)
- SVV tool kit (with screwdrivers, wrenches, specifically a 9/16-inch wrench)
- If working in attic, you will need flashlights and knee pads
- Ladder, when working in attics (located in RGRW 3 shed)
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record time of visit)
- Heavy-duty garbage bags, duct tape, HEPA vacuum cleaner (located in RGRW 3 shed)

3.0 Procedure

The following procedures are adhered to when an SVV system GAC vessel is changed out.

1. Set appointments – Prior to arriving at each residence, Parametrix personnel will schedule a visit with each homeowner and inform them of the scope of work for the visit.

2. Collect Equipment – Most equipment should already be in the SVV tool kit. The PID and anemometer may be found in a separate location. The ladder is stored in the RGRW 3 shed.

3. Arrival at the Residence – Upon arrival at the residence, Parametrix personnel will contact the homeowner for access to the SVV system and inform them of the work to be done.

4. In order to safely complete a removal and recharge of the GAC vessels, the following steps will need to be completed:

   a. To remove the carbon, stop the airflow, take the lid off and place the top of a large, heavy duty garbage bag over the opening of the system. Secure the garbage bag to the system with a strip of the duct tape, or your hands. Flip the container upside down so the carbon falls into the garbage bag. While sliding the garbage bag off, slowly close it to minimize the release of dust particles. Use duct tape to seal the bag, and then place the bag in a second, equally strong bag. Label the bag with the address of the home where the SVV system is located and the date that the carbon was removed.

b. Refill the filter with fresh carbon to within 3 inches of the top of the container (about 1 full bag.)

c. Reassemble the lid and any air conduits. Check for air leaks. Vacuum up any spillage with a HEPA vacuum cleaner.

d. Non-hazardous carbon can be stored in properly labeled 55-gallon drums. Hazardous waste must remain secure at the site for retrieval by a hazardous waste transporter.

e. When the filters are located in the attic, the field personnel can complete this procedure in the attic as long as they determine that there is enough room to complete the task and only after they prepare a flat and safe area in which to work. Otherwise, they must pass down the filter from the attic to the first floor and carry it outside for the change-out. While lifting the filter, the Parametrix personnel should use proper lifting methods to avoid back injury.

5. Visual Assessment – Parametrix personnel will conduct a visual assessment of the SVV system to look for any potential damage or service required by the system. If the repairs or service cannot be made during the regular site visit, the field personnel will make an appointment with the homeowner for a time when the work can be completed.

SVV SYSTEM OPERATIONS AND MAINTENANCE (O&M)

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to conduct operation and maintenance (O&M) on the Soil Vapor Vacuum (SVV) systems. Activities typically performed under O&M of the SVV systems include:

- Monitoring of the performance of the SVV system operations
- Repairing or servicing SVV system equipment as needed

2.0 Materials

- SVV system O&M Field data sheets and indelible pens
- PPE appropriate for site
- SVV system tool kit (with screwdrivers, wrenches; specifically a 9/16-inch wrench)
- If working in attics; ladder, flashlights, and knee pads
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record time of visit)

3.0 Procedure

The following procedures are adhered to when conducting an operation and maintenance visit to a residence.

1. Set appointments – Prior to arriving at each residence, Parametrix personnel will schedule an operations and maintenance visit with each homeowner and inform them of the scope of work for the visit.

2. Collect Equipment – Most equipment should already be in the SVV system tool kit. The PID and the anemometer may be found in a separate location. The ladder is stored in the RGRW 3 shed.

3. Arrival at the Residence – Upon arrival at the residence, Parametrix personnel will contact the homeowner for access to the SVV system and inform them of the work to be done.

4. SVV Readings – Parametrix personnel will utilize the instruments to record the SVV system readings, which include the following:

   a. Air Temperature – Air temperatures and Relative Humidity will be measured for outdoor air, influent to the granulated activated carbon (GAC) vessel, and effluent from the GAC vessel. These readings will be measured at the sampling ports on both sides of the GAC vessel.

   b. Volatiles – A photo-ionization detector (PID) will be used to monitor the air stream for volatiles. The influent and effluent air from the GAC vessel will be checked for volatiles with the PID.

c. SVV System Anemometer – An anemometer will be used on the vacuum side of the SVV system to determine the operating vacuum of the system. This data will be utilized to determine the air-flow rate and velocity through the SVV system.

5. Parametrix personnel will record any communications with the resident as well as any system maintenance issues. If maintenance can not easily be done on-site during this visit, the field crew will attempt to reschedule with the resident.

6. If GAC is changed out during this appointment, or any air samples are collected, this information should be recorded on the O&M Field data sheet as well.

NORTH FRUIT VALLEY NEIGHBORHOOD SVV SYSTEM AIR SAMPLING

1.0 Purpose and Scope

The objective of this Standard Operating Procedure (SOP) is to define the method for the collection of soil vapor samples from the North Fruit Valley Neighborhood (NFVN) residential Soil Vapor Vacuum (SVV) systems. A sample will be collected in a pre-evacuated Summa™ canister from both the influent and effluent sampling ports at each SVV system. All sampling ports will be fitted with a slip cap and fitting to allow quick connection to the ¼-inch tubing. The length of the test is approximately ½ minute. Routine O&M will occur during the same visit as the system air sampling.

2.0 Materials

- Indoor air sample collection field data sheet
- PPE appropriate for site
- SVV system tool kit (with screwdrivers, wrenches, specifically a 9/16-inch wrench)
- If working in attic, you will need flashlights and knee pads
- Ladder, when working in attics
- Monitoring instruments (PID, anemometer, thermometer, hygrometer)
- Timepiece (to record time of visit)
- Calibrated 6-liter Summa™ canister(s) or equivalent with attached analog vacuum gauge and designated time-integrated flow controller(s) (supplied by laboratory) calibrated to 0.25 liters per hour
- Inert nitrogen gas
- Stainless steel fittings and polyethylene ¼-inch tubing to connect to sampling port
- Digital calibrated vacuum gauge

3.0 Procedure

The following procedures are adhered to during air sampling using a Summa™ canister or equivalent that has been properly cleaned and evacuated by the laboratory.

1. Set appointments – Prior to arriving at each residence, Parametrix personnel will schedule a visit with each homeowner and inform them of the scope of work for the visit.

2. Collect Equipment – Most equipment should already be in the SVV system tool kit. The PID and the anemometer may be found in a separate location. The ladder is stored in the RGRW 3 shed.

3. Arrival at the Residence – Upon arrival at the residence, Parametrix personnel will contact the homeowner for access to the SVV system and inform them of the work to be done.

Prior to Collection of the Sample

1. Calibrate PID as per manufacturer's instructions (see PID calibration SOP).

2. Take PID readings from both the influent and effluent sampling ports as well as background readings.

3. Check that the valve on the Summa™ canister is closed. The green knob should be turned completely clockwise.

4. Using a 9/16-inch wrench, remove the brass cap above the valve on top of the Summa™ canister.

5. Attach a vacuum gauge to the Summa™ canister to ensure it has a vacuum of at least -28.5 inches of mercury (in/Hg) when deployed. Record the initial vacuum in each canister. Any vacuum less than -28.5 in/Hg may indicate a possible leak and will not be used. The canister should be kept out of direct sunlight. Document the initial canister pressures.

6. Decontaminate the stainless steel tubing by purging with the Nitrogen gas prior to each sample collection. If using polyethylene tubing, individual lengths of tubing should be used for each sample.

Sample Collection

1. Attach the stainless steel or polyethylene tubing to the top of the Summa™ canister.

2. When ready to begin sampling, attach the tubing to the sampling port, and open the valve to the Summa™ canister. Turn the green knob until there is no resistance (approximately 1 and 1/4 turn) counterclockwise; then turn clockwise slightly until resistance is detected. A hissing noise should be heard as the air flows into the evacuated canister.

3. After approximately ½ minute (when analog gauge shows between -5 and -10 psi), shut-off the control valve by turning clockwise. Do not over-tighten. Next, close the sampling port valve.

4. Remove the stainless steel or polyethylene tubing and measure the Summa™ canister vacuum with the vacuum gauge. Document the final canister vacuum. Sampled canisters should have some remaining vacuum, preferably between -0.1 and -9 in/Hg. Replace the brass cap and tighten gently. If necessary, collect duplicate sample immediately after primary sample collection is complete, following the same procedures for both sample canisters.

5. Record on the sample tag: the sample date and time, client name, sample location/name, and requested analysis and attach to the Summa™ canister. Document the final date and time, and atmospheric readings on the field data sheet. The sample IDs should be consistent with previous sampling events. For example, an SVV system effluent sample should be labeled as follows:

   2809-UN-SGBSE where,

   2809-UN=address-street abbreviation

SG=soil gas

B=basement

SE=system effluent

Also, trip blank labels and duplicate labels should be consistent between samplers. For example, trip blanks should be labeled as TB-01, TB-02, TB-03, etc. Duplicates should be labeled as CM-FD-mmddyy for Cadet sample locations (e.g. CM-FD-033009). Duplicate sample times should be recorded as 0000 on the chain-of-custody as well as on the sample label.

6. Record on the field sheet the sample location, sample date and time, Summa™ canister serial/barcode numbers, as well as the barometric pressure, and temperature and humidity of the sample location. Make any notes regarding the sample location that could potentially influence sample results (ie: cleaning product usage, open doors or windows, tobacco smoking, auxiliary air circulation (fans), or chemical occurrences near the sample location).

7. Record the sample location, date, time, Summa™ canister serial number, sample volume, and desired analysis on the chain-of-custody form.

8. Place the Summa™ canister samples into the boxes they were originally shipped in, along with the completed chain-of-custody form (place the custody form in a plastic bag for protection). If samples listed on the custody form are in multiple shipping boxes, place a copy of the chain that includes those samples in each box (every shipping box should include a copy of the chain-of-custody form that lists the samples in that box). Close the box lids and secure with tape (e.g., duct tape, cellophane packaging tape, etc.), and attach a minimum of two custody seals such that they extend across the seam between the lid and body of the box.

9. A commercial carrier (e.g., FedEx, UPS, etc.) or courier from the project laboratory will pick up and transport the box to the project analytical laboratory under chain-of-custody procedures.

APPENDIX D

Water Use and Building Survey - NFVN

APPENDIX D

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
1701 W 31ST St	Fall 2003	12/03/03	Resident/owner completed	Conwood Products Inc.	360-694-5195	NI	NI	NI	NI	NI	Commercial	1996	Commercial	NI	Metal, wood	1
1902 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1902 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	Zwer, Pat	360-693-0439	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1903 W 27TH ST	Fall 2003	01/28/04 Survey dated	Resident/owner completed	Kimberly Prentice	360-993-2034, w/c: 360-904-3214	2 months	A (1)	Unemployed (f)	NI	NI	Residential		Single family, ranch	1	NI	1
1903 W 28TH ST	Fall 2003	01/28/04 Survey dated	Resident/owner completed	Ida Zwer	360-694-3108	58	A (1)	Retired (f)	NI	NI	Residential	1945	Single family	NI	NI	1
1903 W 31ST ST, Unit A	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1974	NI	2	NI	NI
1903 W 31ST ST, Unit B	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1971	NI	2	NI	NI
1903 W 31ST ST, Unit C	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1971	NI	2	NI	NI
1903 W 31ST ST, Unit D	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1971	NI	2	NI	NI
1903 W 31ST ST, Unit E	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit G	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1971	NI	2	NI	NI
1903 W 31ST ST, Unit H	Fall 2003	12/08/03	Resident/owner completed	Treena Schneider	360-696-9728	3.5	C (3), A (2)	Carpenter (m), Homemaker (f)	Yes	No	Residential	NI	Apartment building	12	Wood, drywall	2
1903 W 31ST ST, Unit I	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit K	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	2	NI	NI
1903 W 31ST ST, Unit L	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit M	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit U	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1904 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	Aceves, Alejandra	360-546-0809	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1904 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1907 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	Kiltz, Robert A	360-693-9048	NI	NI	NI	Yes	No	Residential	1950	NI	NI	Wood	1
1907 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1908 W 4TH PLAIN BL	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

APPENDIX D

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
1701 W 31ST St	Insulation, energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	No
1902 W 27TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1902 W 28TH ST	Storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1903 W 27TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1903 W 28TH ST	Insulation, storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1903 W 31ST ST, Unit A	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit B	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit C	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit D	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit E	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit G	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit H	Insulation, storm windows	Crawl space	Yes	Open	Yes	On the ground	Torn	NA	Dirt	Poured concrete	Damp	No	NA	Yes, few (1-3)
1903 W 31ST ST, Unit I	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit K	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit L	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit M	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit U	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1904 W 27TH ST	Energy-efficient windows, storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1904 W 28TH ST	Storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1907 W 27TH ST	Storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1907 W 28TH ST	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
1908 W 4TH PLAIN BL	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
1701 W 31ST St	None	NA	NA	Heat pump	Natural gas	No	Central air conditioning, bathroom ventilation fan	NI	No	No	No	No	No	No	No	Yes
1902 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1902 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 27TH ST	NI	NI	NI	Electric wall/baseboard, gas-fired	Natural gas, electric	No	Bathroom ventilation fan, kitchen range hood fan	NI	Closet	Yes	Yes	No	Yes	Yes	No	No
1903 W 28TH ST	NI	NI	Front porch and dining area	Electric wall/baseboard	Natural gas, electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	No	Yes	No	Yes	No	No	No	Yes
1903 W 31ST ST, Unit A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit C	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit E	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit G	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit H	3" x 10"	No	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	No	No	Under kitchen sink cabinet	No	No	No	Bathroom	No	Bathroom
1903 W 31ST ST, Unit I	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit K	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit M	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1903 W 31ST ST, Unit U	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1904 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1904 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1907 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
1907 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1908 W 4TH PLAIN BL	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
1701 W 31ST St	No	No	No	No	No	No	NI	NI	No	Storage	No	No	No	
1902 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1902 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 27TH ST	No	No	Yes	No	Candles	Yes	No	No	No	Doors	No	No	NI	
1903 W 28TH ST	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No	
1903 W 31ST ST, Unit A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit C	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit E	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit G	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit H	No	No	Bedroom	No	Living room	Yes	No	No	No	No	No	No	No	
1903 W 31ST ST, Unit I	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit K	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit M	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1903 W 31ST ST, Unit U	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1904 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1904 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1907 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1907 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1908 W 4TH PLAIN BL	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

APPENDIX D

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
1910 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	NI	NI	NI	NI	NI
1910 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1910 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1910 W 4TH PLAIN BL	Fall 2003	12/04/03	Resident/owner completed	NI	h:360-892-3885, alt:695-9550	NI	NI	NI	Yes	No	Commercial (gas station, mini-mart)	NI	NI	NI	Concrete block	1
1911 W 27TH ST	Fall 2003	12/05/03	Resident/owner completed	NI	NI	11	A (2)	Group manager (f), Reg. dietician (f)	Yes	No	Residential	1940's	Single family, tract	1	Wood	1
1911 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1913 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1913 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1914 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1914 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1915 W 31ST ST APT A	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT B	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT C	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT D	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT E	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT F	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT G	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT H	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT I	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT J	Fall 2003	12/02/03	Resident/owner completed	Teryl Laidlaw	360-993-5476	8	C (2), A (2)	Housewife (f), laborer/printer (m)	NI	NI	Residential	NI	Multiple family, duplex	2	Brick, wood, cement, siding	1
1915 W 31ST ST APT K	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT L	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1916 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1916 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1919 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
1910 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1910 W 27TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1910 W 28TH ST	Storm windows	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1910 W 4TH PLAIN BL	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NA	NA	NA	NI
1911 W 27TH ST	Insulation, storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	Dry	NA	NA	Yes, some (3-6)
1911 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
1913 W 27TH ST	Energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1913 W 28TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1914 W 27TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1914 W 28TH ST	Storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT A	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT B	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT C	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT D	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT E	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT F	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT G	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT H	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT I	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT J	Insulation, storm windows, energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	Dry	NA	NA	No
1915 W 31ST ST APT K	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1915 W 31ST ST APT L	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1916 W 27TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1916 W 28TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1919 W 27TH ST	Energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
1910 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1910 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1910 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1910 W 4TH PLAIN BL	NI	NA	NI	Heat pump	Electric	No	Central air conditioning, Kitchen range hood fan	No	NI	NI	NI	NI	NI	NI	NI	NI
1911 W 27TH ST	Small	NA	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	Yes	No	No	Yes	Yes	No	Yes	Yes
1911 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1913 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1913 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1914 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1914 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT C	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT E	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT F	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT G	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT H	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT I	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT J	None	NA	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	Storage shed	No	Under kitchen sink	Under kitchen sink	Under kitchen sink	Bathroom shelf	Bathroom shelf	Under bathroom sink
1915 W 31ST ST APT K	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1915 W 31ST ST APT L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1916 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1916 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1919 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
1910 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1910 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1910 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1910 W 4TH PLAIN BL	NI	NI	NI	NI	NI	No	NI	NI	NI	No	No	NI	NI	
1911 W 27TH ST	No	No	Yes	Yes	Yes	Outside only	No	No	Yes, painting	Plywood, paneling, more illegible	Yes	No	Annually: Round-up and Weed & Feed	Child age 2 years
1911 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1913 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1913 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1914 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1914 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT B	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT C	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT E	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT F	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT G	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT H	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT I	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT J	Under kitchen sink	Under kitchen sink	Bathroom shelf, bedroom dresser	Kitchen drawers, shed outside	No	Yes	No	No	No	No	No	Raid- for spiders. Also sprayed for ants- NI what chem. was used. Used flea bombs.	No	
1915 W 31ST ST APT K	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1915 W 31ST ST APT L	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1916 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1916 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1919 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
1919 W 28TH ST	Fall 2003	01/02/04	Resident/owner completed	Robert J. Biffle	360-993-5025	1	A (3)	Mechanical (unemployed) (m), Healthcare (unemployed) (f), General (unemployed) (m)	NI	NI	Residential	1942?	Single family, ranch	NI	Wood framework, concrete sheetrock	1
1921 W 27TH ST	Fall 2003	12/08/03	Resident/owner completed	John and Joyce Garcia	h: 360-694-0666, w/c: 360-219-6009	1.5	A (2)	NI	NI	NI	Residential	~1950	Single family, ranch	NI	Wood	1
1921 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1922 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1922 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1926 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1950	NI	1	Wood	1
1926 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1950	NI	1	Wood	1
1927 W 27TH ST	Fall 2003	01/28/04 date form completed	Resident/owner completed	Nick Wideman	360-993-5219	0.5	A (2)	NI	NI	NI	Residential	1950	Single family, ranch	NI	Wood	1
1927 W 28TH ST	Fall 2003	01/31/04 date form completed	Resident/owner completed (during sampling)	William Paterson	360-326-4474	0.5	C (2), A (2)	Carpenter (m)	Yes	No	Residential	~1942	Single family, ranch	NI	Wood, concrete	1
2102 W 27TH ST	Fall 2003	12/04/03	Resident/owner completed	George Fish	h:360-993-5163 w/c:503-970-1407	1	A (2)	Truck driver (m), Housewife (f)	NI	NI	Residential	NI	Single family	NI	Wood	1
2102 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	2	NI	1
2102 W 31ST ST	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1955	NI	2	NI	NI
2103 W 28TH ST	Winter 2002	01/25/02 (date of form)	Resident/owner completed	Karen George	360-695-9634 (h)	NI	A (2)	Clerk/line haul dispatcher (f), Assembly worker (m)	NI	NI	Residential	NI	Single family	NI	NI	1
2103 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	Karen George	503-557-6200 x275 (day); 360-695-9634 (eve-H)	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2013 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	NI	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
1919 W 28TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1921 W 27TH ST	Other	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	Yes, few (1-3)
1921 W 28TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1922 W 27TH ST	Energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1922 W 28TH ST	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
1926 W 27TH ST	Energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1926 W 28TH ST	Energy-efficient windows	NI	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
1927 W 27TH ST	Insulation, energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
1927 W 28TH ST	Storm windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	No
2102 W 27TH ST	Energy-efficient windows	Crawl space	Yes	Seasonally	No	NA	NA	NA	Dirt	Poured concrete	NI	No	NA	No
2102 W 28TH ST	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NA	NA	NA	NI
2102 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2103 W 28TH ST	Other - new roof this year	Basement	NI	NI	NA	NA	NA	Unfinished	Concrete	Poured concrete	Damp	Yes	NI	YES
2103 W 28TH ST	NI	Basement	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2013 W 31ST ST	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
1919 W 28TH ST	NI	NI	NI	Hot air radiation	Electric	No	Mechanical fans, bathroom ventilation fan	No	No	Utility	No	No	No	No	No	Bathroom
1921 W 27TH ST	NI	NA	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan	Yes	Shed	Shed	No	Kitchen	No	No	Yes	No
1921 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1922 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1922 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1926 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1926 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
1927 W 27TH ST	NI	NA	Addition on east side	Electric wall/baseboard	Electric	Yes	Bathroom ventilation fan, kitchen range hood fan	Yes	No	Yes	Bathroom	No	No	No	No	Bathroom
1927 W 28TH ST	None	NA	Converted garage	Electric wall/baseboard, gas furnace	Natural gas, electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	No	No	No	No	No	Hall closet	Bathroom	Under kitchen sink
2102 W 27TH ST	None	NA	NI	Electric wall/baseboard	Electric	NI	Mechanical fans, individual air conditioning units, kitchen range hood fan	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2102 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2102 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2103 W 28TH ST	NI	Cracks, not sure about utility conduits	NI	Electric wall/baseboard	Electric	NI	Mechanical fans (summer usage, wall plug-in type)	NI	YES	YES	No	No	No	No	No	Yes (Bathroom)
2103 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2013 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
1919 W 28TH ST	No	No	Bathroom	Art room	Aromatherapy, candles	Yes	No	No	No	Living area	No	NI	NI	"Yes: ceiling fan gets greasy dusty every other weeks" One resident in house for 6 months.
1921 W 27TH ST	No	Kitchen	Bathroom	No	No	No	No	No	No	No	No	No	Malathion, twice yearly	
1921 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1922 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1922 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1926 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1926 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
1927 W 27TH ST	Yes	No	Yes	No	Candles	Outside only	No	No	Yes, master bedroom early January 2004	Paneling over fireplace	No	No	No	
1927 W 28TH ST	Under kitchen sink	No	Bedroom dresser	Cabinet near front door	Under kitchen sink	Yes	No	No	No	In kitchen	No	Raid periodically	Perhaps summer 2003	
2102 W 27TH ST	No	Yes	Yes	Yes	No	Yes	No	No	No	Yes	NI	NI	NI	
2102 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2102 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2103 W 28TH ST	No	No	Yes (Bathroom)	No	Yes	Yes	No	No	Yes (Plumbing work, new roof)	Yes	No	Historically once/year, but not in ~3 years. Dogs on flea control program.	Blackberries treated with RoundUp, etc. (~13 years)	
2103 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2013 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2104 W 27TH ST	Fall 2003	01/08/04	Resident/owner completed	Rich Arola	360-513-3561	6 months	A (1)	Inside Sales (m)	Yes	NI	Residential	1940?	Single family, ranch	NI	Wood	1
2104 W 27TH ST	Winter 2002	01/15/02	Resident/owner completed	Aaron Hogan	360-699-6176 (h)	NI	A (1)	Chemical operator (m)	NI	NI	Residential	NI	Single family	NI	Wood, plaster	1
2104 W 28TH ST	Fall 2003	01/31/04	Resident/owner completed	Kathy A Peirce	360-750-1782	6	A (1)	Electrician (f)	NI	NI	Residential	1942	Single family, salt box	NI	Wood	1
2105 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	NI	360-695-4259 (h)	NI	C (1), A (2)	Direct mailing (f), Construction (m)	NI	NI	Residential	NI	Single family, ranch	NI	Wood framework, composite roof, vinyl siding	1
2105 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	George Ledridge	H:360-695-4259 C:360-513-2411	10	C (1), A (2)	NI	NI	NI	Residential	NI	Single family, ranch	NI	Wood	1
2105 W 28TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/17/02	Resident/owner completed	Duncan and Suzanne Forbes	360-992-5912(h)	NI	C (2), A (2)	Computer programmer (m), Homemaker (f)	NI	NI	Residential	NI	Single family, cape	NI	NI	1
2105 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2106 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	NI	360-696-9405 (h)	NI	A (1)	Clerical (f)	NI	NI	Residential	NI	Single family	NI	Rock and plaster, cedar siding	1
2106 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2106 W 28TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/26/02	Resident/owner completed	NI	360-993-4282 (h)	NI	A (1)	Designer/programmer (m)	NI	NI	Residential	NI	Single family	NI	Wood frame	1
2106 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2107 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/19/03	Resident/owner completed	Ruth Buckner	360-693-9218	56	A (1)	Retired (f)	NI	NI	Residential	1942	Single family	NI	Wood, metal siding	1
2107 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	Winter 2002	Resident/owner completed	NI	360-693-9218 (h)	NI	A (1)	Retired (f)	NI	NI	Residential	NI	Single family	NI	Wood, metal siding	1
2107 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	Youso, Cassidy	360-695-2600	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2108 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/09/03	Resident/owner completed	Dave Kuehlwain	360-695-5539	11	A (1)	Travel (m)	NI	NI	Residential	1946	Single family	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2104 W 27TH ST	Insulation, energy-efficient windows	Partial Basement (half crawl space)	No	NI	Yes	Attached to floor joist	Absent in places	Half finished basement, half unfinished crawl space	Concrete	Poured concrete	NI	No	NA	No
2104 W 27TH ST	Energy-efficient windows	Partial Basement	NI	NI	NI	NI	NI	Unfinished	Concrete	Poured concrete	Dry	No	NA	NO
2104 W 28TH ST	Insulation (attic), energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No
2105 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation, energy-efficient windows, vinyl siding	Crawl space	NI	NI	NI	NI	NI	NA	NI	Poured concrete	Dry	No	NA	NI
2105 W 27TH ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Torn	NA	Dirt	NI	NI	NI	NI	NI
2105 W 28TH ST (QA-ed 9-5-04, NTF)	insulation, energy-efficient windows	Basement	NI	NI	NA	NA	NA	Unfinished	Concrete	Poured concrete	Dry	No	NA	NI
2105 W 28TH ST	Energy-efficient windows	Basement/Crawl space Combination	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2106 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation, energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	No	NA	NI
2106 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2106 W 28TH ST (QA-ed 9-5-04, NTF)	Energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2106 W 28TH ST	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2107 W 27TH ST (QA-ed 8-25-04, LMS)	Insulation (attic), energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Absent in places	NA	Dirt	Poured concrete	Dry	No	NA	NI
2107 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation, storm windows	Partial basement	NI	NI	NA	NA	NA	Unfinished	Dirt	Poured concrete	Dry	No	NA	NI
2107 W 28TH ST	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2108 W 27TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2104 W 27TH ST	None	NI	Half-basement added	Hot air circulation	Natural gas	No	Central air conditioning, bathroom ventilation fan, kitchen range hood fan	Yes	No	Bedroom	Yes	No	Kitchen	No	No	Bathroom
2104 W 27TH ST	None	No	NI	Hot air circulation	Natural gas, electric	NI	Bathroom ventilation fan, kitchen range hood fan	NI	NI	NI	NI	NI	NI	NI	NI	NI
2104 W 28TH ST	None	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	Closet	No	No	No	No	No	Bathroom	No
2105 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Natural gas fireplace	Natural gas, electric	Yes	Individual AC units, kitchen range hood, foundation - roof vents	Yes	No	No	No	No	No	Bathroom	No	No
2105 W 27TH ST (QA-ed 8-25-04, LMS)	NI	NA	No	Natural gas	Natural gas, electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	Yes	Yes	No	No	Yes	No	Yes
2105 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NI	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, individual AC units, kitchen range hood	NI	No	No	No	No	No	Bedroom	Bathroom	Yes
2105 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2106 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Wood stove, electric wall/baseboard, plug-in heater	Electric, wood	Wood stove	Ceiling fans	NI	Spare bedroom	Kitchen cabinet	No	No	No	Bathroom	Closet	Bathroom cabinet
2106 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2106 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Hot air radiation	Natural gas, electric	No	Central AC	NI	Yes	Kitchen	Yes	No	No	No	No	Yes
2106 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2107 W 27TH ST (QA-ed 8-25-04, LMS)	NI	NA	NI	Heat pump, other (electric furnace)	Electric	No	Central air conditioning, mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	No	Under laundry tray	Bathroom	No	No	Bathroom	Hall closet	Under bathroom sink
2107 W 27TH ST (QA-ed 9-5-04, NTF)	NI	Dirt floor	NI	Hot air circulation, heat pump	Electric	No	Central AC, mechanical fans, bathroom ventilation fan, kitchen range hood	Ni	No	No	Bathroom	Kitchen	No	Bathroom	Hall closet	Bathroom
2107 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2108 W 27TH ST (QA-ed 8-25-04, LMS)	None	NA	NI	Hot air circulation, electric wall/baseboard	NI	No	Mechanical fans, bathroom ventilation fan, individual AC units, kitchen range hood	Yes	Garage (detached)	Garage (detached)	No	No	No	No	No	Bathroom

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2104 W 27TH ST	No	No	Bathroom	No	No	Yes	No	No	No	No	Yes	No	Occassional insecticide use.	
2104 W 27TH ST	NI	NI	NI	NI	NI	No	No	No	No	Yes	No	Raid fogger for ants.	No	Partial basement
2104 W 28TH ST	No	No	No	No	Candle	No	No	No	No	Wall paneling on north wall of living room	No	No	No	
2105 W 27TH ST (QA-ed 9-5-04, NTF)	No	No	Bedroom	No	No	Yes	No	No	No	Yes	No	NI	NI	
2105 W 27TH ST (QA-ed 8-25-04, LMS)	No	Yes	Yes	No	No	Yes	No	No	No	No	No	No	No	
2105 W 28TH ST (QA-ed 9-5-04, NTF)	No	Yes	No	No	No	No	No	No	No	No	No	NI	NI	
2105 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2106 W 27TH ST (QA-ed 9-5-04, NTF)	Yes	Kitchen cabinet	Bedroom	Spare bedroom	Attic	No	No	No	Yes	Yes	Yes	No	Wood-be-gone sprayed previous summer	
2106 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2106 W 28TH ST (QA-ed 9-5-04, NTF)	No	Yes	No	Yes	No	No	No	NI	Yes	No	NI	Bug bombs in attic and garage	By previous owner	Glue, paint
2106 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2107 W 27TH ST (QA-ed 8-25-04, LMS)	No	Hall closet	Bedroom	No	Kitchen	No	No	No	No	Under the kitchen and bathroom sinks	No	No	Roundup weed killer 2 to 3 x yr	
2107 W 27TH ST (QA-ed 9-5-04, NTF)	No	Hall closet	Bedroom	No	Kitchen, bathroom	No	No	No	No	NI	No	No	No	Storm windows on 1/2 of house - not picture windows; 1/2 basement
2107 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2108 W 27TH ST (QA-ed 8-25-04, LMS)	No	No	Bathroom	No	No	No	No	No	No	Yes and no, why?	No	NI	Roundup/crossbow: springtime	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2109 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/26/03	Resident/owner completed	Kianne Nelson	h: 360-258-2714, c: 360-909-6186	1.5 and 1	C (1), A (2)	Office Manager (f), Chemical Operator (m)	Yes	No	Residential	1940's	Single family, ranch	NI	Wood	1
2109 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Jason and Brooke Kendall	360-993-4134 (h)	3.5	C (1), A (2)	Project accountant (m), Switchboard operator (f)	NI	NI	Residential	NI	Single family	NI	Wood, plaster, vinyl siding	1
2109 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/31/03	Resident/owner completed	Thomas and Martina Leahy	360-258-3916	2	C (3), A (2)	Glaizer (m), Homemaker (f)	Yes	No	Residential	1942	Single family	NI	Wood	1
2110 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2110 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	NI	NI	NI	NI	NI
2110 W 31ST ST	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	2	NI	NI
2111 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2111 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/29/04 Survey Dated	Resident/owner completed	Alesandro Guapilla	360-695-2149	1.5	C (1), A (2)	Cook (m)	NI	NI	Residential		Single family, ranch	NI	Wood, concrete	1
2111 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1943	NI	1	Wood	1
2112 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/31/04 Survey dated	Resident/owner completed	David Gibbs	NI	4 months	A (1)	Realtor (m)	Yes	No	Residential	1942	Single family, cottage	NI	Wood, concrete	1
2112 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04 Survey dated	Resident/owner completed	Jake Garcia	360-695-7833	7	C (2), A (2)	Residential treatment counselor (m), Housewife (f)	Yes	No	Residential	1949	Single family, cottage	NI	Wood	1
2113 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/17/02	Resident/owner completed	Megan Olson	360-693-1125 (h)	NI	C (1), A (2)	Carpenter (m), Homemaker (f)	NI	NI	Residential	NI	Single family	NI	NI	1
2113 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2113 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/17/03 Survey dated	Resident/owner completed	Dennis Wall	360-695-6447 (H)	31	A (1)	Disability/retired (m)	Yes	No	Residential	1950's	Single family	NI	Wood, cedar siding	1
2114 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/30/04 Survey Dated	Resident/owner completed	Monica Baker	360-735-9087	9 months	C (2), A (2)	Truck Driver (m), Package handler (f)	Yes	No	Residential	NI	Single family	NI	Wood	1

APPENDIX D

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2109 W 27TH ST (QA-ed 8-25-04, LMS)	Insulation	Crawl space	Yes	Open	No	NI	NI	NA	Dirt	Poured concrete	NI	No	NA	NI
2109 W 27TH ST (QA-ed 9-5-04, NTF)	NI	Crawl space	NI	NI	NI	NI	NI	NA	Dirt	Poured concrete	Damp	No	NA	NI
2109 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Basement/Crawl space Combination	Yes	Open	Yes	On the ground	Whole	Unfinished	Dirt, concrete	Cinder block	NI	No	NA	NI
2110 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2110 W 28TH ST	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2110 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2111 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2111 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places, torn	NA	Dirt	Poured concrete	Wet, damp	No	NA	NI
2111 W 31ST ST	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2112 W 27TH ST (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	Yes	NI	Yes	On the ground	Absent in places, torn	NA	Dirt	Poured concrete	Damp	NI	NI	NI
2112 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places	NA	NI	NI	NI	No	NA	Yes, some (3-6)
2113 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2113 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2113 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation (attic)	Basement	Yes	Closed	NA	NA	NA	Yes	Concrete	Poured concrete	Dry	Yes	No	Yes, some (3-6)
2114 W 27TH ST (QA-ed 8-25-04, LMS)	NI	Crawl space	NI	NI	Yes	On the ground	Absent in places	NA	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2109 W 27TH ST (QA-ed 8-25-04, LMS)	NI	NA	No	Wood stove, electric wall/baseboard	Electric, wood	Yes	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Laundry room	Laundry room	No	No	Laundry room	No	Bathroom	Laundry room
2109 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	NI	Mechanical fans, bathroom ventilation fan, individual AC units, kitchen range hood	NI	Utility room	Utility room	No	No	Utility room	Bathroom	Bathroom	Utility room
2109 W 28TH ST (QA-ed 8-25-04, LMS)	NI	No	Addition in back of house	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan (vents to inside only)	Yes	No	Under sink	Bathroom	Under sink	No	No	No	Under sink
2110 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2110 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2110 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2111 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2111 W 28TH ST (QA-ed 8-25-04, LMS)	NI	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan, laundry room fan	NI	No	No	Bathroom, living room	No	Yes	No	No	Yes
2111 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2112 W 27TH ST (QA-ed 8-25-04, LMS)	NI	NA	Addition to back, date unknown	Electric wall/baseboard	Electric	No	NI	Yes	No	No	No	No	No	No	No	Under kitchen sink
2112 W 28TH ST (QA-ed 8-25-04, LMS)	Not more than few inches	NA	Partial remodeling and additions to 3 rooms	Electric wall/baseboard	Electric	Wood stove (unused)	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	No	Under kitchen sink	Under kitchen sink	Under kitchen sink	No	Bathroom	Bathroom, bedroom	Bathroom
2113 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual AC units, kitchen range hood	NI	No	No	Under kitchen sink	No	No	Under bathroom sink	Under bathroom sink	Under kitchen sink
2113 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2113 W 28TH ST (QA-ed 8-25-04, LMS)	15-20' x hairline	Sewer pipe, filled with tar	Possibly basement after house erected	Other: forced air oil	Fuel oil	No, only woodstove but unused since 1980's	Mechanical fans (range hood, fan through ceiling that is closed off)	Yes	No	Various places	Living room	No	No	Bathroom	No	Bathroom
2114 W 27TH ST (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2109 W 27TH ST (QA-ed 8-25-04, LMS)	No	No	Bedroom	No	No	No	No	No	No	NI	No	No	No	1 year old male child resides in house
2109 W 27TH ST (QA-ed 9-5-04, NTF)	Utility room	Utility room	Bathroom	No	No	Yes	No	No	Yes	Yes	No	Ant killer and fruit fly killer in the summer	Weed and feed, 2 times a year	
2109 W 28TH ST (QA-ed 8-25-04, LMS)	No	Under sink	Bathroom sink	No	No	No	No	No	No	No	No	No	No	3 year old child in house
2110 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2110 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2110 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2111 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2111 W 28TH ST (QA-ed 8-25-04, LMS)	Yes	No	Yes	No	Yes	No	No	No	Yes	Yes	Yes, small living room rug	Summer 2003 for ants	No	Remodeled in last 3-10 years, 18 month old child.
2111 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2112 W 27TH ST (QA-ed 8-25-04, LMS)	No	Laundry area	Bathroom	No	No	No	No	No	No	Yes	No	Terminex may have been used	Terminex used	
2112 W 28TH ST (QA-ed 8-25-04, LMS)	Kitchen	No	Bathroom	No	Various rooms	No	Yes	No	No	Back of house, garage (attached)	No	No	Mouse poisoning in 2003	
2113 W 27TH ST (QA-ed 9-5-04, NTF)	No	No	Bathroom	No	No	Yes	No	No	Yes	Yes	No	NI	NI	
2113 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2113 W 28TH ST (QA-ed 8-25-04, LMS)	No	Utility room	Bathroom	Computer room	No	No	No	Yes	No	Hardwood floors, 1 paneled wall, some particleboard	No	Diasmin crystal powder, ortho - last winter	Diasmin crystal powder, ortho	
2114 W 27TH ST (QA-ed 8-25-04, LMS)	No	Yes	No	No	No	Yes	No	No	No	Hardwood floors	No	Diazanon in summer	Diazanon in summer	

APPENDIX D

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2114 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	Kiersta Tomblison	h: 360-737-4171 w/c: 576-4312	9	C (1), A (2)	Medical assistant (f), Appraiser (m)	Yes	NI	Residential	1942	Single family, ranch	NI	Wood	1
2115 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Angela and Juanita Carlson	360-735-0974 (h)	NI	A (2)	Social security	NI	NI	Residential	NI	NI	NI	NI	1
2115 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2115 W 28TH ST (QA-ed 8-25-04, LMS)			Resident/owner completed	Teresa Lehto	360-735-9275, w: 360-574-7780	8 months	C (1), A (1)	Business (f)	Yes	No	Residential		Single family	NI	NI	1
2202 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/23/02	Resident/owner completed	Bobbie Jones	360-695-2828 (h)	35	A (2)	Mechanic (m), Retired (f)	NI	NI	Residential	NI	Single family, ranch	NI	Wood	1
2202 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2202 W 28TH ST (QA-ed 9-5-04, NTF)	Fall 2003	02/07/04 Date survey completed	Resident/owner completed	Linda Hatch		20+	A (1)	Unemployed	NI	NI	Residential	NI	Single family, cottage	NI	Wood	1
2202 W 28TH ST (QA-ed 8-25-04, LMS)	Winter 2002	01/25/02	Resident/owner completed	Linda Hatch	NI	NI	NI	NI	NI	NI	Residential	NI	Single family	NI	Wood frame, some siding	1
2202 W 31ST ST (QA-ed 8-25-04, LMS)	Fall 2003	12/23/03	Resident/owner completed	Stacy Engle	360-694-5168 (h) 360-514-272	2.5	A (2)	Clerical Assistant (f), Painter (m)	NI	NI	Residential	1942	Single family, ranch	NI	Wood	1
2203 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/22/03	Resident/owner completed	Robert C. Gerber	360-695-5416	6	A (3)	Unemployed (m), Store clerk/manager (f), Unemployed/student (f)	NI	NI	Residential	1945	Single family, bungalow	NI	Wood	1
2203 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/29/04	Resident/owner completed	Daniel Hilton	360-883-2925 (h) 503-281-3821 (w/c)	4 months	A (2)	Embalmer	NI	NI	Residential	1940's	Single family, ranch	NI	Wood, plaster	1
2203 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2205 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1943	NI	1	Wood	1
2205 W 28TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/20/02	Resident/owner completed	NI	360-256-7938 (h), 360-816-3662 (w)	NI	A (2)	Construction worker (m), Office worker (f)	NI	NI	Residential	NI	Single family, ranch	NI	Wood	1
2205 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Mary J. Storm	360-256-7938	2	A (2)	Construction worker (m), Billing analyst (f)	NI	NI	Residential	1948	Single family, ranch	NI	Wood, concrete	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2114 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places	NA	Dirt	Poured concrete	Damp	NI	No	NI
2115 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2115 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2115 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2202 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	No	NA	NI
2202 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2202 W 28TH ST (QA-ed 9-5-04, NTF)	Energy-efficient windows	Crawl space	Yes	Open and closed	Yes	On the ground	NI	NA	NI	NI	NI	NI	NI	NI
2202 W 28TH ST (QA-ed 8-25-04, LMS)	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2202 W 31ST ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	Attached to foundation	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No
2203 W 27TH ST (QA-ed 8-25-04, LMS)	Storm windows, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	Yes	No	No
2203 W 28TH ST (QA-ed 8-25-04, LMS)	NI	Crawl space	Yes	Open	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2203 W 31ST ST	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2205 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2205 W 28TH ST (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	Poured concrete	Dry	No	NA	NI
2205 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	Attached to floor joist	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2114 W 28TH ST (QA-ed 8-25-04, LMS)	NI	NA	No	Hot air circulation, electric wall/baseboard	Electric	No, not anymore	Mechanical fans, bathroom ventilation fan	Yes	Garage (detached)	Kitchen	No	No	No	Bathroom	No	Closet
2115 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NI	NI	Electric wall/baseboard	Electric	NI	Bathroom ventilation fan, kitchen range hood fan, cel\iling fan	NI	Garage	House	House	NI	NI	NI	NI	NI
2115 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2115 W 28TH ST (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	No	No	No	No	Yes	Bedroom	No
2202 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Individual AC units	NI	No	No	Bathroom, kitchen	No	No	Bathroom	Hall closet	Yes
2202 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2202 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Wood stove, electric wall/baseboard	Electric, wood	Wood stove	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	NI	NI	NI	NI	NI	NI	NI	NI	NI
2202 W 28TH ST (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric, wood	Wood stove	Bathroom ventilation fan, kitchen range hood fan	NI	No	No	Candles	No	No	No	No	No
2202 W 31ST ST (QA-ed 8-25-04, LMS)	None	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	Shed	Kitchen	Kitchen	Kitchen	Kitchen	Bathroom	Bathroom	Bathroom
2203 W 27TH ST (QA-ed 8-25-04, LMS)	None	NA	No	Hot air circulation	NI	No	NI	Yes	Garage (detached)	Garage (detached), house	No	House	House	House	No	House
2203 W 28TH ST (QA-ed 8-25-04, LMS)	NI	NA	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	NI	No	No	No	No	No	No	No	No
2203 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2205 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2205 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Heat pump, electric wall/baseboard	Electric	NI	Bathroom ventilation fan	NI	NI	NI	NI	NI	NI	NI	NI	NI
2205 W 28TH ST (QA-ed 8-25-04, LMS)	None	None	Two additions to the house	Heat pump, electric wall/baseboard	Electric	Yes	Bathroom ventilation fan, kitchen range hood, heat pump/attic fan	Yes	No	No	Yes	No	No	No	Yes	Yes

APPENDIX D

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2114 W 28TH ST (QA-ed 8-25-04, LMS)	Kitchen	Kitchen	Bathroom	No	Various rooms	No	No	No	Yes	Walls	No	No	No	Male adult resided in home for 5 years.
2115 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2115 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2115 W 28TH ST (QA-ed 8-25-04, LMS)	No	No	Bedroom	No	No	No	No	No	No	NI	NI	NI	NI	
2202 W 27TH ST (QA-ed 9-5-04, NTF)	Yes	No	Yes	No	Yes	No	No	No	No	NI	No	No	No	Lived in house since 1967
2202 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2202 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2202 W 28TH ST (QA-ed 8-25-04, LMS)	No	No	No	No	No	Yes	No	No	No	No	No	No	No	Recent fire in kitchen wall
2202 W 31ST ST (QA-ed 8-25-04, LMS)	No	Kitchen	Bedroom	Shed	No	No	No	No	No	Closet	Yes	Bug and flea bombs 1-2 x yearly	No	
2203 W 27TH ST (QA-ed 8-25-04, LMS)	No	No	House	No	No	Yes	No	No	No	Kitchen	No	No	No	Keep windows closed during winter
2203 W 28TH ST (QA-ed 8-25-04, LMS)	No	No	No	No	No	No	No	No	No	No	No	No	No	
2203 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2205 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2205 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NI	nI	NI	NI	No	No	No	No	Yes	No	NI	NI	
2205 W 28TH ST (QA-ed 8-25-04, LMS)	Yes	Yes	Yes	No	No	NI	No	No	No	No	No	Commercial application for ants	No	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2206 W 27TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/20/04	Resident/owner completed	Patrick O'Grady	360-696-6129	7	A (1)	Airline Customer Service (m)	Yes	NI	Residential	1942	Single family, cape	NI	Wood	1
2206 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	George and Wanda Schader	360-693-3573 (h)	50	A (2)	Retired (f), Retired (m)	NI	NI	Residential	NI	Single family, ranch	NI	Wood	1
2206 W 28TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	George and Wanda Schader	360-693-3573 (h)	NI	A (2)	Retired (f), Retired (m)	NI	NI	Residential	NI	Single family	NI	Wood, vinyl siding	1
2207 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1992	NI	1	Wood	1
2209 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Fall 2003	01/02/04	Resident/owner completed	Luella Zupan	360-693-5710	39	A (1)	Retired (f)	NI	NI	Residential	1959-1964	Single family	NI	Wood, concrete	1
2209 W 27TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Cheryl and Dan Mullen	NI	NI	A (2)	Nail technician (f), Warehouse manager (m)	NI	NI	Residential	NI	Single family	NI	Wood frame	1
2209 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2209 W 28TH ST (QA-ed 9-5-04, NTF)	Winter 2002	01/21/02	Resident/owner completed	Coeo D. Schader	360-885-3615 (h)	NI	A (1)	Retired (m)	NI	NI	Residential	NI	Single family, ranch	NI	Wood frame, lathe-plaster	1
2209 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/05/03	Resident/owner completed	Coeo D. Schader	360-885-3615 (h)	2	A (1)	Retired (m)	Yes	No	Residential	1940's	Single family, ranch	NI	Wood	1
2210 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2210 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	12/04/03	Resident/owner completed	Jason Davies	360-695-1825	3.5	C(1), A (2)	Full-time student (m), Homemaker (f)	Yes	No	Residential	1942	Single family, bungalow	NI	LP siding	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2206 W 27TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows, aluminum siding	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Damp, seasonally	NI	NI	Unsure
2206 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	Yes, few (1-3)
2206 W 28TH ST (QA-ed 9-5-04, NTF)	Insulation, storm windows, energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2207 W 31ST ST	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2209 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Insulation, storm windows	Basement/Crawl space Combination	Yes	NI	NI	NI	NI	Finished	Concrete	Poured concrete	Dry	Yes	Yes	Yes
2209 W 27TH ST (QA-ed 9-5-04, NTF)	Insulation	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	No	NA	NI
2209 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2209 W 28TH ST (QA-ed 9-5-04, NTF)	Storm windows	Crawl space	NI	NI	NI	NI	NI	NA	Dirt	Poured concrete	Dry	NI	NI	NI
2209 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No
2210 W 27TH ST	NI	Crawl space	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2210 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	NI	NI	NI	NI	No	No

APPENDIX D

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2206 W 27TH ST (QA-ed 8-25-04, LMS)	Hairline if there	NA	Addition to back in late 70's or early 80's	Hot air circulation, gas stove	Natural gas	No	Mechanical fans, bathroom ventilation fan	Yes	Garage (detached)	Garage (detached)	No	Garage (detached)	Laundry room shelf	No	No	Under bathroom sink
2206 W 28TH ST (QA-ed 8-25-04, LMS)	8 inches	NI	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood, mechanical fans	Yes	Garage (detached)	Garage (detached)	No	No	Utility room	Bedroom	Bathroom	Bathroom
2206 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	NI	No	No	No	No	No	Yes	No	Yes
2207 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2209 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	NI	Conduits in basement ceiling	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning unite, kitchen range hood fan	Yes	No	Hallway closet	Bathroom, kitchen	Hall closet	Hall closet	Bathroom	Spare bedroom storage	Hall closet
2209 W 27TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, individual air-conditioning units, kitchen range hood fan	NI	Garage and laundry room	Under kitchen sink	Various rooms	No	No	Yes	Yes	Yes
2209 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2209 W 28TH ST (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	NI	No	No	Kitchen	Kitchen	No	No	No	Bathroom
2209 W 28TH ST (QA-ed 8-25-04, LMS)	None	NA	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	No	Yes	No	Yes	No	No	Yes
2210 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2210 W 28TH ST (QA-ed 8-25-04, LMS)	None	NA	New drywall and siding only	Wood stove, electric wall/baseboard	Electric, wood	No	Bathroom ventilation fan, kitchen range hood	Yes	Garage (detached)	No	Bathroom	No	No	Bathroom	No	Bathroom

APPENDIX D

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2206 W 27TH ST (QA-ed 8-25-04, LMS)	Under kitchen sink	Under kitchen sink	Bathroom vanity	Garage (detached)	Laundry room	No	No	No	No	Shelves in laundry room	Yes, small rug	No	Diazinon - once a month in summer and once in winter	There was 4 feet of mold up the walls in 2 bedrooms and the bathroom when moved in. In 1997, used bleach water to clean and a sealant, then painted.
2206 W 28TH ST (QA-ed 8-25-04, LMS)	Utility room	Utility room	Bedroom	No	No	No	No	No	No	No	No	No	Weed B Gone- couple times a year	
2206 W 28TH ST (QA-ed 9-5-04, NTF)	Yes	Yes	Yes	No	No	Yes	No	No	Yes	No	No	No	Round-up in spring and summer.	
2207 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2209 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Hall closet	Hall closet	Bedroom	No	No	No	No	No	No	One living room wall paneled and unused basement bedroom	No	No	No	Several years ago, a tree by my front porch with roof drain by it that didn't have proper drainage, caused water to ooze in that area on the inside basement wall
2209 W 27TH ST (QA-ed 9-5-04, NTF)	Yes	Yes	Yes	No	Yes	No	No	No	No	No	No	Insecticides in crawl space 2 years ago	No	
2209 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2209 W 28TH ST (QA-ed 9-5-04, NTF)	No	No	No	No	No	Yes	No	No	No	No	No	No	No	
2209 W 28TH ST (QA-ed 8-25-04, LMS)	Yes	No	Yes	No	Yes	Yes	No	No	No	Plywood in attic	No	No	No	
2210 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2210 W 28TH ST (QA-ed 8-25-04, LMS)	No	Laundry room	Bathroom	No	No	No	No	No	No	Sub-flooring, kitchen and bathroom cabinets	No	No	No	Infant, 3 months old

APPENDIX D

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2210 W 31ST ST	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1943	NI	1	NI	NI
2211 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1943	NI	1	Wood	1
2211 W 28TH ST (QA-ed 8-25-04, LMS)	Fall 2003	01/31/04 Date survey completed	Resident/owner completed	Susan Holman	360-750-4832	1	A (1)	Clark College Instructor (f)	Yes	No	Residential	1940	Single family, ranch	NI	Wood	1
2211 W 31ST ST	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	2	NI	NI
2212 W 27TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2214 W 28TH ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	2	Wood	1
2301 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04 Survey date	Resident/owner completed	Mike Benson	NI	3 months	A (1)	Unemployed (m)	Yes	No	Residential		Multiple family, duplex	2	Wood, concrete	1
2302 W 31ST ST	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2303 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04	Resident/owner completed	Brenda Trent	360-695-6834	3.5	C (2), A (2)	Welder (m), Janitorial (f)	Yes	No	Residential	1978?	Multiple family	2	Wood	1
2303 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2305 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	1
2310 W 31ST ST (QA-ed 8-25-04, LMS)	Fall 2003	01/29/04 Survey completion date	Resident/owner completed	Alice Smith	360-695-7845	27	A (2)	Retired (m)	NI	NI	Residential	1947	Single family, ranch	NI	Wood	1
2311 W 31ST ST (QA-ed 8-25-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	Zach Givens and Natasha Kayton	360-693-8662	5	A (2)	Heavy equipment operator (m), Auto accounting/titles (f)	Yes	No	Residential	about 1939	Single family, ranch	NI	Wood	1
2313 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1969	NI	2	NI	NI
2315 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04 Survey dated	Resident/owner completed	Heide Ammons	360-258-0937	4	C (1), A (4)	Production workers, Homemaker (f), 4 f and 2 m	Yes	No	Residential	1940's	Multiple family, duplex	2	Wood	1
2401 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1977	NI	4	NI	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2210 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2211 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2211 W 28TH ST (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Absent in places	NA	Dirt	Poured concrete	NI	NI	NI	No
2211 W 31ST ST	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2212 W 27TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2214 W 28TH ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2301 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	Yes	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2302 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2303 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2303 W 31ST ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
2305 LA FRAMBOIS RD	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2310 W 31ST ST (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	Don't think so
2311 W 31ST ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places	NA	Dirt	Cinder block	Damp	No	NA	Yes, few (1-3)
2313 LA FRAMBOIS RD	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2315 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	Yes	NI	NI	NI	NI	NA	NI	Poured concrete	NI	NI	NI	NI
2401 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

APPENDIX D

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2210 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2211 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2211 W 28TH ST (QA-ed 8-25-04, LMS)	None	NA	Addition added to back	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan (interior recirculation only)	Yes	No	No	Under kitchen sink	No	No	Under bathroom sink	Bathroom	Under kitchen sink
2211 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2212 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2214 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2301 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	NI	NI	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan	Yes	No	No	No	No	Under kitchen sink	No	No	Bathroom cabinet
2302 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2303 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	NI	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan (interior recirculation only)	Yes	No	No	Bathroom	No	Laundry room shelf	No	Bathroom	Laundry room
2303 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2305 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2310 W 31ST ST (QA-ed 8-25-04, LMS)	NI	Utility conduits	Added garage and laundry room	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan (interior recirculation only)	Yes	Garage (attached)	No	Under kitchen sink	No	Garage (attached)	Laundry room shelf	Under bathroom sink	Under bathroom sink
2311 W 31ST ST (QA-ed 8-25-04, LMS)	NI	NA	No	Wood stove, electric wall/baseboard	Electric, wood	No	Individual air conditioning units	Yes	Garage (detached)	Under kitchen sink	No	No	No	No	Spare room, hall closet	Under kitchen sink
2313 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2315 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	NI	NA	NI	Hot air circulation	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	Under kitchen sink	Under kitchen sink	Under kitchen sink	Bathroom	Under bathroom sink	Under kitchen sink
2401 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2210 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2211 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2211 W 28TH ST (QA-ed 8-25-04, LMS)	Under kitchen sink	No	Bathroom	No	Candles in various places	Yes	No	No	No	Small strip of hardwood floor	No	Summer 2003 for sugar ants	No	
2211 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2212 W 27TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2214 W 28TH ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2301 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	No	No	No	No	No	Yes	No	No	No	No	No	No	No	
2302 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2303 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	No	No	Bathroom	Kitchen shelf	No	No	No	No	No	Living room	No	No	No	
2303 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2305 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2310 W 31ST ST (QA-ed 8-25-04, LMS)	Under kitchen sink	Garage (attached)	Bathroom, bedroom	Bedroom boxes	Bathroom	No	Yes	No	No	Hardwood floors, paneling	No	No	Few years ago	
2311 W 31ST ST (QA-ed 8-25-04, LMS)	No	No	Bathroom	No	No	Outside only	No	No	No	Plywood roof, hardwood under carpets, particle board siding	No	No	No	
2313 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2315 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Under kitchen sink	Under kitchen sink	Bathroom medicine cabinet	No	Under kitchen sink	No	No	No	No	Bathroom medicine cabinet	No	Raid, I year ago: usually every other year	No	
2401 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2402 W 31ST ST	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
2403 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1977	NI	4	NI	NI
2403 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	NI	NI
2405 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2405 W 31ST ST (QA-ed 8-25-04, LMS)	Fall 2003	01/30/04	Resident/owner completed	Laura Weber	360-993-1071		C (1), A (2)	Truck driver (m), Homemaker (f)	Yes	No	Residential	1942	Single family, cottage	NI	Wood	1
2407 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2407 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2409 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Fall 2003	01/22/04	Resident/owner completed	Mara Hall	360-699-5677	10	A (1)	Secretary (f)	NI	NI	Residential	1994	Single family, ranch	NI	Wood, concrete	1
2409 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2411 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	2	Wood	1
2412 W 31ST ST (QA-ed 8-25-04, LMS)	Fall 2003	01/30/04 Survey Dated	Resident/owner completed	Nelda Perez	360-693-6812, Ray cell: 360-772-5599	2	C (4), A (3)	Cabinet Maker (m), Homemaker/ Home schooler (f)	Yes	No	Residential/Hom eschool	Mid 1940's	Single family, ranch	NI	Wood, concrete	1
2413 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1994	NI	1	NI	NI
2413 W 31ST ST	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	NI	NI	NI	Wood	1
2417 LA FRAMBOIS RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1994	NI	1	NI	NI
2421 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Paul and Loralie Ahola	360-737-3143 (h) 360-696-4061 ext. 33666	4	C (1), A (2)	LPN (m), Music teacher (f)	NI	NI	Residential	1994	Single family, ranch	NI	wood, concrete, vinyl siding	1
2500 W 4TH PLAIN BL	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	Commercial	NA	NI	NI
2604 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	12/16/03	Resident/owner completed	Angela Kimbro	360-258-2122 (h)	1	C (2), A (1)	House cleaner (f)	Yes	No	Residential	1942	Single family	NI	Wood, siding	1
2607 WEIGEL AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Troy Gerlack	360-639-5942 (h)	NI	C (1), A (2)	Electrician (m), Administrator (f)	NI	NI	Residential	NI	Single family	NI	Wood	2

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2402 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2403 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2403 W 31ST ST	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2405 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2405 W 31ST ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Cinder block	Dry	No	NA	No
2407 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2407 W 31ST ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2409 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2409 W 31ST ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
2411 W 31ST ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
2412 W 31ST ST (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Cinder block	Dry	No	NA	No
2413 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2413 W 31ST ST	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
2417 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2421 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	Energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Poured Concrete	Dry	No	NA	Yes, few (1-3)
2500 W 4TH PLAIN BL	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2604 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	NI	NI	NI	NI	NI	No
2607 WEIGEL AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2402 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2403 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2403 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2405 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2405 W 31ST ST (QA-ed 8-25-04, LMS)	None	Utility conduits	Additions off back in 1995 or 1998	Electric wall/baseboard, wood burning stove	Electric, wood	Wood Stove	Mechanical fans, bathroom ventilation fan, kitchen range hood fan (interior recirculation only)	Yes	Shed in back yard	Under kitchen sink, shed	Utility room	Under kitchen sink	Utility room	Bathroom	Bathroom	Bathroom
2407 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2407 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2409 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	NI	NI	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2409 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2411 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2412 W 31ST ST (QA-ed 8-25-04, LMS)	None	Utility conduits	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan (interior recirculation only)	Yes	Laundry cupboard	No	Plug-in style	No	No	No	Bathroom medicine cabinet	Kitchen cabinet
2413 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2413 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2417 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2421 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	2mm	No	No	Electric wall heater	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood, Individual air conditioning units	Yes	Garage (attached)	Utility room, garage (attached), kitchen	Bathrooms	Utility room	Garage (attached)	Bedroom	Bedroom	Bathrooms
2500 W 4TH PLAIN BL	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2604 WEIGEL AV (QA-ed 8-25-04, LMS)	None	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
2607 WEIGEL AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	NI	Garage (attached)	Yes	Yes	No	No	Yes	No	Bathroom

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2402 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2403 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2403 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2405 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2405 W 31ST ST (QA-ed 8-25-04, LMS)	Under kitchen sink	Under kitchen sink	Bedroom, bathroom	No	Various rooms	No	No	No	Yes	Yes	No	Sprayed for spiders within last few weeks	NI	Male resided in home for 3 years, infant for 17 months
2407 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2407 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2409 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	No	No	Yes	No	No	No	Yes	No	No	Interior doors, cabinet doors	Yes	No	Homemade pesticide with Listerine and tobacco	
2409 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2411 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2412 W 31ST ST (QA-ed 8-25-04, LMS)	Pantry above water heater	Kitchen cabinet	Purse	School hutch	No	Yes	No	No	Yes	No	Yes	No	Weed and feed, 2 times a year	
2413 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2413 W 31ST ST	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2417 LA FRAMBOIS RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2421 LA FRAMBOIS RD (QA-ed 8-25-04, LMS)	No	Utility room	Bedroom	Garage (attached)	Bathrooms	NI	Yes	No	No	Particle board furniture, fiberboard construction	No	Ortho Rose spray twice a season	Weed and feed lawn annually, Round up gravel biannually	It is a well insulated house. Child age 14 years
2500 W 4TH PLAIN BL	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2604 WEIGEL AV (QA-ed 8-25-04, LMS)	Yes	Yes	Yes	Yes	Yes	No	No	No	No	Paneling in living room, kitchen	No	No	No	Not aware of any
2607 WEIGEL AV (QA-ed 9-5-04, NTF)	No	Yes	Bathroom	No	Carpet freshener	No	Yes	No	Yes	Yes	No	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2607 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	01/29/04 Suvery dated	Resident/owner completed	Doranna Fowler-Polk	503-680-5267	NI	C (1), A (2)	Warehouseman (m), Student (f)	NI	NI	Residential	1940's	Single family, ranch	NI	Wood, concrete	2
2608 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/22/03 suvey dated	Resident/owner completed	James Gerlack	360-737-1775 (h)	7	A (2)	Truck Driver (m), State Employee (f)	Yes	No	Residential	1950	Single family	NI	Wood	1
2608 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	James Gerlack	360-737-1775 (h), 800-426-8486 (w)	NI	A (1)	Truck driver (m)	NI	NI	Residential	NI	Single family, ranch	NI	Wood	1
2608 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2611 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2611 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04 Survey dated	Resident/owner completed	Audra Kleckner	360-906-7057	6 months	A (2)	Mover (m), Restaurant Manager (f)	Yes	No	Residential	NI	Single family, duplex	2	Wood	1
2612 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	02/07/04 Survey dated	Resident/owner completed	Michael and Pat Valentine	Declined	24	A (2)	Cadet Manufacturing (m)	NI	NI	Residential	1940's	Single family, cottage	NI	Wood, concrete	1
2613 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1950	NI	1	NI	NI
2613 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	02/07/04 Survey dated	Resident/owner completed	Julie Orahan	360-906-0708	2	C (3), A (1)	Homemaker (f)	NI	NI	Residential	1940's	Single family, cottage	NI	Wood, concrete	1
2702 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	01/08/04	Resident/owner completed	Enrique Vazquez Cortes	360-750-9666 (h)	5	A (1)	Mechanic and wood lathe (m)	NI	NI	Residential	1942	Single family	NI	Wood, concrete	1
2702 WEIGEL AV (QA-ed 9-5-04, NTF)	Winter 2002	01/26/02	Resident/owner completed	Enrique Vasquez	360-750-3666 (h), 360-573-0621 (w)	NI	NI	NI	NI	NI	Residential	NI	Single family	NI	NI	1
2703 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/31/03	Resident/owner completed	Christi Meader	NI	< 1	A (1)	Registered Nurse (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
2703 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	02/07/04 Survey dated	Resident/owner completed	NI	NI	6 months	A (3)	Janitors (f), Construction (m)	NI	NI	Residential	1942	Single family, cottage	NI	Wood	1
2704 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	Raymond A. Burke	360-6961430 (h)	18 +	A (2)	Retired (f), Retired (m)	NI	NI	Residential	1943-45	Single famliy	NI	Wood	1
2704 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Raymond A. Burke	360-696-1430 (h)	NI	A (2)	Retired (f), Retired (m)	NI	NI	Residential	NI	Single family	NI	Wood	1
2704 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	01/15/04	Resident/owner completed	Cynthia Nustad	h: 360-737-0457, w/c: 360-699-4280	4	C (2), A (1)	Bank (f)	NI	NI	Residential	1950's	Single family	NI	Wood, concrete	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2607 WEIGEL AV (QA-ed 8-25-04, LMS)	Energy-efficient windows, insulation, storm windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places	NA	Dirt	Poured concrete	Damp	No	NA	No
2608 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Seasonally	No	NA	NA	NA	Dirt	Poured Concrete	Seasonally damp or dry	NI	NI	Unsure
2608 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation, energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	Dirt	NI	NI	No	NA	NI
2608 WEIGEL AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured Concrete	NI	NI	NI	NI
2611 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2611 UNANDER AV (QA-ed 8-25-04, LMS)	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	No	NI
2612 WEIGEL AV (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	Yes	Open	No	NI	NI	NA	NI	NI	NI	No	NA	No
2613 FRUIT VALLEY RD	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
2613 UNANDER AV (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NA	NI	NI	NI	NI	NI	Few (1-3)
2702 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space, concrete slab	Yes	Seasonally	Yes	On the ground	Torn	NA	Dirt	Poured Concrete	Wet	NI	NI	Yes, some (3-6)
2702 WEIGEL AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	Dirt	Poured concrete	Damp	No	NA	NI
2703 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Basement/Crawl space Combination	Yes	Seasonally	Yes	On the ground	Whole	Unfinished	Concrete	Poured concrete or cinder block	Dry	No	NA	No
2703 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	Crawl space	NI	NI	Yes	On the ground	Whole	NA	NI	Poured concrete	NI	NI	NI	NI
2704 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	NI	NI	Yes, few (1-3)
2704 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation, energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	Dirt	Poured concrete	Dry	No	NA	NI
2704 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	No	NI	NI	NA	Dirt	Poured concrete	Wet	NI	NI	NI

APPENDIX D

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2607 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NA	Remodeled	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan, individual AC units	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes
2608 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	Remodeled in 1993	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual AC units, kitchen range hood fan	Yes	Garage (attached)	Garage (attached)	Under kitchen sink	NI	No	No	Bathroom	Bathroom
2608 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	NI	Shop	Washroom	No	No	No	No	No	Bathroom
2608 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2611 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2611 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric	Yes	Bathroom ventilation fan, kitchen range hood fan	Yes	No	Bathroom	Bathroom	No	Closet	No	Bedroom	Bathroom
2612 WEIGEL AV (QA-ed 8-25-04, LMS)	None	No	No	Gas	Natural gas	No	Individual air conditioning units	No	No	No	Yes	Yes	No	Yes	No	No
2613 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2613 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric, wood	Wood stove	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2702 WEIGEL AV (QA-ed 8-25-04, LMS)	1' or2' x 1/16" or 1/8"	No	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2702 WEIGEL AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Hot air circulation	Electric	No	Mechanical fans, kitchen range hood fan	NI	No	No	Plug-ins and candles	No	No	Yes	No	Yes
2703 UNANDER AV (QA-ed 8-25-04, LMS)	None	No	No	Other (furnace)	Natural gas, electric	No	Bathroom ventilation fan	Yes	Garage (attached)	No	No	No	Under kitchen sink	Bathroom	Bathroom	Bathroom
2703 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NI	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, individual air conditioning units	NI	NI	NI	NI	NI	NI	NI	NI	NI
2704 UNANDER AV (QA-ed 8-25-04, LMS)	4", 1/16"	NA	No	Wood stove, Electric wall/baseboard	Electric, wood	No	Mechanical fans	Yes	Garage (attached)	No	Living room	Kitchen	No	Bathroom	Bathroom	Bathroom
2704 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Wood stove, electric wall/baseboard	Electric, wood	Wood stove	Mechanical fans, bathroom ventilation fan	NI	Garage (attached)	No	Under sink	Under sink	Kitchen	Bathroom	Kitchen	Bathroom
2704 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NA	No	Hot air circulation	Natural gas	No	Mechanical fans, bathroom ventilation fan	Yes	No	Under sink	Kitchen	No	No	Bathroom	Bathroom	No

APPENDIX D

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2607 WEIGEL AV (QA-ed 8-25-04, LMS)	No	Yes	Yes	Yes	No	No	Yes	No	No	Kitchen cabinet doors	No	No	No	Child age 6 years
2608 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NI	Bedroom, bathroom	Garage (attached)	Various rooms	No	Yes	No	No	Entertainment center, wall paneling	No	No	Very little	
2608 UNANDER AV (QA-ed 9-5-04, NTF)	No	No	No	No	No	No	Yes	No	No	Yes	No	No	In spring	
2608 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2611 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2611 UNANDER AV (QA-ed 8-25-04, LMS)	Kitchen	Kitchen	Bedroom	No	Living room	Yes	No	No	No	Bedroom dresser	No	No	No	
2612 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	Yes	No	No	No	No	No	No	No	No	No	No	
2613 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2613 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NI	NI	NI	No	NI	NI	NI	NI	NI	NI	NI	NI	
2702 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NI	NI	NI	No	NI	No	No	No	Kitchen, utility room	No	No	weed killer on front lawn 4 to 5 months ago (about August)	
2702 WEIGEL AV (QA-ed 9-5-04, NTF)	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	
2703 UNANDER AV (QA-ed 8-25-04, LMS)	No	No	Bathroom	No	No	No	Yes	No	No	NI	Yes, drapes	No	No	
2703 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2704 UNANDER AV (QA-ed 8-25-04, LMS)	No	Under kitchen sink	No	No	No	No	Yes	No	Yes	Living room, bedroom	No	Not for 3-4 years	No	Gas lawn mower kept in garage, child 3 years old
2704 UNANDER AV (QA-ed 9-5-04, NTF)	Kitchen	Kitchen	Bathroom	No	No	No	Yes	No	No	Yes	No	Ant spray 2 years ago	No	
2704 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	Bathroom	No	No	NI	No	No	Yes	Kitchen	No	4 years ago	Ant traps in summer	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2704 WEIGEL AV (QA-ed 9-5-04, NTF)	Winter 2002	01/15/02	Resident/owner completed	Cynthia Nustad	360-737-0457 (h)	NI	C (2), A (1)	Unemployed (f)	NI	NI	Residential	NI	Single family	NI	Wood frame, vinyl siding	1
2705 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Lorraine Ehlinger	360-695-8019 (h)	NI	NI	NI	NI	NI	Residential	NI	Single family	NI	NI	1
2705 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/09/03	Resident/owner completed	Lorraine Ehlinger	360-695-8015	57	A (1)	Retired (f)	NI	NI	Residential	1940's	Single family, cape	1	NI	1
2706 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	01/26/04 Survery dated	Resident/owner completed	Maria A. Ramos	360-737-2855(h), w/c: 503-453-6667	14 months	C (2), A (2)	Carpentry (m), Homemaker (f)	NI	NI	Residential	1940's	Single family	NI	NI	NI
2707 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1950	NI	1	NI	NI
2708 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/29/04	Resident/owner completed	Ben and Ashley Phillip	360-694-5792	<1 month	A (2)	Hi-School pharmacy (m), Veteran's Hospital (f)	NI	NI	Residential	~1945	Single family, ranch	NI	Wood	1
2709 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1950	NI	1	NI	NI
2709 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/17/03 Survery dated	Resident/owner completed	Glann and Cathy Yandell	360-694-1413	5+	C (1), A (2)	Unemployed (f), Port laborer (m)	Yes	No	Residential	1948	Single family, cod	NI	Wood	1
2709 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2710 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	James Roberts	360-695-3723 (h)	3	C (1), A (2)	Homemaker (m), Bank employee (f)	NI	NI	Residential	1940's	Single family, ranch	NI	Wood	1
2710 WEIGEL AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	James Roberts	360-695-3723 (h)	NI	A (2)	Telecom (m), Banking (f)	NI	NI	Residential	NI	Single family	NI	Wood	1
2711 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2712 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	12/19/03	Resident/owner completed	Karrie Sheldon	360-695-0678	5 months	A (6)	NI	NI	NI	Residential	NI	Single family, ranch	NI	NI	NI
2712 WEIGEL AV (QA-ed 9-5-04, NTF)	Winter 2002	01/16/02	Resident/owner completed	Ron and Karrie Sheldon	360-750-1105	NI	C (1), A (4)	Box maker (m), Homemaker (2f), Student (f)	NI	NI	Residential	NI	Single family	NI	NI	1
2802 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	Not dated	Resident/owner completed	No name	No phone number	NI	NI	NI	Yes	No	Residential	1940's	Single family, cottage	NI	Wood, cinder block	1
2803 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/17/02	Resident/owner completed	Mac Johnson	360-737-9708 (h)	NI	NI	NI	NI	NI	Residential	NI	Single family	NI	Wood	1
2803 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2704 WEIGEL AV (QA-ed 9-5-04, NTF)	Insulation, energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2705 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2705 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	Open	No	NI	NI	NA	NI	Poured concrete	NI	No	NA	Yes, few (1-3)
2706 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	Crawl space	Yes	Open	Yes	On the ground	NI	NA	NI	NI	NI	NI	NI	NI
2707 FRUIT VALLEY RD	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
2708 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Concrete slab/Crawl space Combination	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2709 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2709 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation (some in floor)	Crawl space	Yes	Open	Yes	On the ground	Torn	NA	Dirt	Poured concrete	Dry	No	NA	NI
2709 WEIGEL AV	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2710 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Cinder Block	Dry	No	NA	No
2710 WEIGEL AV (QA-ed 9-5-04, NTF)	Insulation, energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	Dirt	Block	Dry	No	NA	NI
2711 UNANDER AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2712 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2712 WEIGEL AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2802 WEIGEL AV (QA-ed 8-25-04, LMS)	Energy-efficient windows	Partial basement	Yes	Seasonally	NA	NA	NA	Unfinished	Concrete, dirt	Poured concrete, cinder block	Dry	No	NA	No
2803 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2803 UNANDER AV	Storm windows	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2704 WEIGEL AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Hot air circulation	Natural gas	NI	Mechanical fans, bathroom ventilation fan	NI	No	No	No	No	No	No	No	Bathroom
2705 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall	Electric	No	NI	NI	No	No	No	No	No	Yes	No	No
2705 UNANDER AV (QA-ed 8-25-04, LMS)	6-8"	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	No	No	No	No	No	No	No
2706 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans	Yes	No	No	No	No	No	No	No	No
2707 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2708 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric	No	NI	NI	No	No	No	No	No	Bathroom	No	No
2709 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2709 UNANDER AV (QA-ed 8-25-04, LMS)	NI	Utility conduits	No	Electric wall/baseboard	Electric	No, but unused chimney	Mechanical fans, individual air conditioning units	Yes	Garage (detached)	Garage (detached)	No	Kitchen	Hall closet	Bathroom	Bathroom	Bathroom
2709 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2710 WEIGEL AV (QA-ed 8-25-04, LMS)	None	No	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	No	Garage (detached)	Garage (detached)	Bathroom	Garage (detached)	Kitchen
2710 WEIGEL AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	NI	No	No	No	No	Kitchen	Bathroom	Bedroom	Bathroom
2711 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2712 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NA	NI		Electric	No	Bathroom ventilation fan	Yes	Garage (attached)	No	Various rooms	No	No	No	No	Bathroom
2712 WEIGEL AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	NI	NI	Yes	Yes	Yes	No	No	Yes	Yes	Yes
2802 WEIGEL AV (QA-ed 8-25-04, LMS)	None	No vapor barrier	Basement expansion	Hot air radiation, electric wall/baseboard, other (portable)	Electric	No	Mechanical fans	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2803 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	NI	Bathroom ventilation fan, kitchen range hood fan	NI	NI	NI	NI	NI	NI	NI	NI	NI
2803 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2704 WEIGEL AV (QA-ed 9-5-04, NTF)	No	No	No	No	No	No	No	No	No	Yes	No	NI	NI	
2705 UNANDER AV (QA-ed 9-5-04, NTF)	No	No	No	No	No	No	No	No	No	NI	No	No	No	
2705 UNANDER AV (QA-ed 8-25-04, LMS)	No	No	No	No	No	No	No	No	No	Paneling	No	No	No	
2706 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	No	No	No	NI	Yes	No	No	No	No	NI	NI	"Often smells bad - esp. in heat"
2707 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2708 UNANDER AV (QA-ed 8-25-04, LMS)	No	No	No	No	Living room	No	No	Yes	No	Front landing	No	NI	No	Doesn't know too much about the house…only moved in 2 months ago.
2709 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2709 UNANDER AV (QA-ed 8-25-04, LMS)	Under kitchen sink	Under kitchen sink	Bathroom	No	No	Yes	No	No	No	Hardwood floors	No	Professionally treated	Yes	
2709 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2710 WEIGEL AV (QA-ed 8-25-04, LMS)	No	Garage (detached)	No	Garage (detached)	No	No	No	No	No	Living room, two bedrooms	No	Not in last 3 years, NI prior	No	Child age 2 years
2710 WEIGEL AV (QA-ed 9-5-04, NTF)	Kitchen	No	Bedroom	No	No	No	No	No	No	Yes	No	No	No	
2711 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2712 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	Bedroom	No	No	Yes	Yes	Yes	No	Yes	No	NI	NI	1 resident 4.5 months in house
2712 WEIGEL AV (QA-ed 9-5-04, NTF)	No	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	y	No	
2802 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NI	nI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2803 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NI	NI	NI	NI	No	No	No	No	Yes	No	NI	NI	
2803 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2803 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	Renter (Name unavailable)	NI	NI	NI	NI	NI	NI	Residential	1942	NI	2	Wood	1
2804 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	01/29/04	Resident/owner completed	Michael S. Ortego	360-699-1667 (h)	8	A (2)	Retired (m)	NI	NI	Residential	~1942	Single family, ranch	NI	Wood	1
2804 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Michael S. Ortego	360-699-1667 (h)	NI	A (2)	Unemployed (f), Unemployed (m)	NI	NI	Residential	NI	Duplex	2	NI	1
2804 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2805 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1950	NI	1	NI	NI
2805 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Bruce Gately or Chris Goodwin	360-694-9523 (h), 360-313-4074 (w)	NI	A (2)	Graphic designer (f), Auditorium manager (m)	NI	NI	Residential	NI	Single family	NI	Wood	1
2805 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2805 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2806 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	01/29/04 Survey dated	Resident/owner completed	Ramona and Raul Lomeli	360-693-9523 (h)	5	C (2), A (2)	Teacher (f), Landscaper (m)	NI	NI	Residential	1943	Single family, ranch	NI	Wood	1
2807 FRUIT VALLEY RD (QA-ed 8-25-04, LMS)	Fall 2003	12/04/03	Resident/owner completed	NI	360-254-3528	NI	NI	NI	Yes	No	Other (union hall)	NI	Commercial	NI	Wood, concrete	1
2807 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1942	NI	1	NI	NI
2808 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/23/02	Resident/owner completed	NI	360-693-3234 (h)	NI	A (1)	Homemaker (f)	NI	NI	Residential	NI	Single family	NI	Wood siding	1
2808 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	Yes, but not used	Residential	1942	NI	1	NI	1
2808 WEIGEL AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Bruce Clark	360-993-4645	1	A (2)	Parts and maintenance (m), Maintenance (m)	NI	nI	Residential	NI	Single family	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2803 WEIGEL AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2804 UNANDER AV (QA-ed 8-25-04, LMS)	Storm windows	Concrete slab	No	NA	NA	NA	NA	NA	Concrete	NI	NI	No	NA	No
2804 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2804 WEIGEL AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2805 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2805 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	Basement	NI	NI	NA	NA	NA	Unfinished	Concrete	Block	Damp	Yes	NI	Yes
2805 UNANDER AV	Storm windows	Basement	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2805 VAN ALLMAN AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2806 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	Open	No	NI	NI	NA	NI	NI	NI	NI	NI	No
2807 FRUIT VALLEY RD (QA-ed 8-25-04, LMS)	Insulation	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	Poured concrete	Dry	NA	NA	No
2807 VAN ALLMAN AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2808 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation, storm windows	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2808 UNANDER AV	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2808 WEIGEL AV (QA-ed 9-5-04, NTF)	Insulation	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2803 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2804 UNANDER AV (QA-ed 8-25-04, LMS)	None	NA	No	Portable heaters	Natural gas, electric	No	Bathroom ventilation fan (inoperable)	No	No	No	No	Yes	No	No	No	Yes
2804 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NI	NI	Gas	Natural gas	No	Ceiling fans	NI	No	Kitchen, bathroom	No	No	No	No	No	Bathroom
2804 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2805 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2805 UNANDER AV (QA-ed 9-5-04, NTF)	NI	Cracks, utility conduits, portion of wall removed	NI	Electric wall/baseboard, other-fireplace	Electric, wood	Yes	Mechanical fans, individual AC units, kitchen range hood fan	NI	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
2805 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2805 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2806 WEIGEL AV (QA-ed 8-25-04, LMS)	None	NA	No	Wood stove	Electric, wood	No	Bathroom ventilation fan	NI	No	No	Bedroom	No	No	Bathroom	Bathroom	Hall closet
2807 FRUIT VALLEY RD (QA-ed 8-25-04, LMS)	None	NA	No	Hot air circulation	Other: Propane	No	Central air conditioning, bathroom ventilation fan	Yes	Back utility room	Back utility room	No	No	No	No	No	Under bathroom sink
2807 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2808 UNANDER AV (QA-ed 9-5-04, NTF)	NI	NI	NI	Electric wall/baseboard, floor furnace (oil)	Electric, fuel oil	Yes	Mechanical fans	NI	No	No	No	No	No	No	No	No
2808 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2808 WEIGEL AV (QA-ed 9-5-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, individual AC units, kitchen range hood, ceiling fans	NI	No	No	No	No	No	No	No	Yes

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2803 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2804 UNANDER AV (QA-ed 8-25-04, LMS)	Yes	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	
2804 UNANDER AV (QA-ed 9-5-04, NTF)	Kitchen	No	Bathroom, bedroom	No	No	No	No	No	No	No	No	No	No	Duplex
2804 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	Wood stove
2805 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2805 UNANDER AV (QA-ed 9-5-04, NTF)	Yes	y	Yes	No	Yes	Yes	No	No	No	Yes	No	Bug bomb in attic (not in last year)	Aphid spray (rarely)	
2805 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2805 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	Two by five foot section of exposed soil in one basement wall
2806 WEIGEL AV (QA-ed 8-25-04, LMS)	Kitchen	Kitchen	Bathroom	No	Kitchen, living room	No	No	No	No	No	No	No	No	
2807 FRUIT VALLEY RD (QA-ed 8-25-04, LMS)	No	No	No	No	No	No	No	No	No	Maybe under counter tops and tables	No	No	No	Building is empty of occupants most of the time. Used for monthly union meetings and occasional office use. Heat set at 60 degrees and windows and doors always closed.
2807 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2808 UNANDER AV (QA-ed 9-5-04, NTF)	No	Yes	No	No	No	No	No	No	No	Yes	No	NI	NI	
2808 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2808 WEIGEL AV (QA-ed 9-5-04, NTF)	No	Kitchen	No	No	No	No	No	No	No	No	No	No	No	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2808 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2809 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/25/02	Resident/owner completed	Steve Selby	NI	1.5	A (2)	Electrician (m), Assistant superintendent (construction) (f)	NI	nI	Residential	NI	Single family	Ni	Wood	2
2809 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	NI	NI	NI	Wood	1
2809 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04 (survery date)	Resident/owner completed	Doug Martin	360-695-3927	10	A (2)	Retail (m), Manager for a broker (f)	NI	NI	Residential	1946	Single family	NI	Wood	NI
2810 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	01/28/04 (survery date)	Resident/owner completed	Jerry and Judy Brauer	360-693-8704	~10	A (3)	Housewife (f), Security (m), Car Dealership (m)	Yes	No	Residential	NI	Single family, cottage	NI	Wood, concrete	1
2810 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2811 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	01/21/04	Resident/owner completed	Filimon Gonzalez	360-944-7439	6	C (2), A (2)	Warehouse worker (m), Homemaker (f)	Yes	No	Residential	1945	Single family, colonial	NI	Wood	NI
2811 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2812 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2901 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1923	NI	1	NI	NI
2902 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	NI	NI
2902 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Fall 2003	12/24/03 (survey date)	Resident/owner completed	Aaron McEwen	360-735-8911	6	C (2), A (1)	NI	Yes	No	Residential	1944	Single family	NI	Wood	1
2902 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2903 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2903 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2903 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2904 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/11/03	Resident/owner completed	Robin Pappan	NI	Life	A (1)	Teacher (f)	Yes	No	Residential	1943	Single family, ranch	NI	NI	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2808 WEIGEL AV	Energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2809 UNANDER AV (QA-ed 9-5-04, NTF)	Insulation	Basement	NI	NI	NA	NA	NA	Finished	Concrete	Block	Wet	NI	NI	No
2809 UNANDER AV	Storm windows	Basement/Crawl space Combination	NI	NI	NI	NI	NI	NI	NI	Poured Concrete	NI	NI	NI	NI
2809 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation (attic)	Crawl space	Yes	Seasonally	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2810 UNANDER AV (QA-ed 8-25-04, LMS)	NI	Crawl space	Yes	Seasonally	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2810 WEIGEL AV	Storm windows	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2811 UNANDER AV (QA-ed 8-25-04, LMS)	NI	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Concrete	NI	Dry	NI	NI	Yes, some (3-6)
2811 VAN ALLMAN AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2812 WEIGEL AV	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2901 FRUIT VALLEY RD	NI	Basement	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2902 UNANDER AV	NI	Crawl space	NI	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2902 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	NI	Yes	Attached to floor joist	Torn	NA	Dirt	Poured concrete	Damp	NI	NI	NI
2902 WEIGEL AV	Storm windows	Crawl space	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2903 UNANDER AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2903 VAN ALLMAN AV	Storm windows	Crawl space	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2903 WEIGEL AV	Storm windows	Crawl space	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2904 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, storm windows	Crawl space	Yes	Seasonally	yes	On the ground	NI	NA	Dirt	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2808 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2809 UNANDER AV (QA-ed 9-5-04, NTF)	NI	Seepage, generally dry buy heavy rain caused seepage	NI	Central heat pump	Electric	No	Bathroom ventilation fan; air-to-air heat exchanger; indoor blower on heat pump; outdoor blower on furnace and AC	NI	Yes	No	Carpet freshener	NI	Yes	No	Yes	Yes
2809 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2809 WEIGEL AV (QA-ed 8-25-04, LMS)	NI	NA	Bedroom and garage added, and expanded kitchen in 1961	Hot air circulation, oil furnace, wood stove	Fuel oil, wood	Wood stove	Kitchen range hood fan	Yes	No	No	No	No	No	Yes	No	Yes
2810 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	No	Electric wall/baseboard	Electric	No	individual air conditioning units, kitchen range hood fan	NI	No	Kitchen	Various rooms	Yes	Yes	Bedroom	Bedroom	Kitchen
2810 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2811 UNANDER AV (QA-ed 8-25-04, LMS)	Very small	No	No	Hot air circulation, electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	No	No	Yes	Yes	No	No	Yes	Yes	Yes
2811 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2812 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2901 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2902 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2902 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	NI	Possibly plumbing conduits	No	Electric wall/baseboard	Electric	No, but unused chimney	Mechanical fans, bathroom ventilation fan, kitchen range hood fan, windows	Yes	Garage (detached)	No	No	Under kitchen sink	No	No	Bedroom	Bathroom
2902 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2903 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2903 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2903 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2904 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	No	Electric wall/baseboard	Electric	No	Kitchen range hood fan	Yes	No	No	No	Yes	No	Yes	No	Yes

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2808 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2809 UNANDER AV (QA-ed 9-5-04, NTF)	No	No	Yes	No	No	Yes	No	Ni	NI	Old particle board on ceiling in basement	NI	NI	NI	Exposed soil on one basement wall; water seepage - basement floor
2809 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2809 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	No	No	No	No	Yes	No	No	Perhaps in garage (attached)	NI	Not recently	Not recently	
2810 UNANDER AV (QA-ed 8-25-04, LMS)	Kitchen	Yes	Bedroom	No	No	No	No	No	No	No	No	No	No	
2810 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2811 UNANDER AV (QA-ed 8-25-04, LMS)	Yes	No	Yes	No	No	No	No	Yes	No	NI	No	No	No	Children ages 1 and 2 years
2811 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2812 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2901 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2902 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2902 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Under kitchen sink	No	Bedroom	No	No	No	No	No	No	No	No	No	No	
2902 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2903 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2903 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2903 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2904 UNANDER AV (QA-ed 8-25-04, LMS)	No	Yes	No	No	No	No	No	No	No	No	No	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2904 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2905 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/05/03	Resident/owner completed	Angela Claypoole	360-696-0299 (h)	12	C (4), A (2)	Truck driver (m), Homemaker (f), Courtesy clerk (f)	Yes	No	Residential	1942	Single family	NI	Wood	1
2905 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2905 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2906 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	Franklin L. Bush	360-695-5761	45	A (2)	Retired (m + f)	NI	NI	Residential	NI	Single family, ranch	NI	Wood	1
2906 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2906 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2907 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	Karla West	H:360-737-2960 W:503-283-0366	9.5	C (1), A (1)	Sales (wholesale) (f)	NI	NI	Residential	1942	Single family	NI	Wood, plaster walls	1
2907 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2907 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	12/11/03	Resident/owner completed	Toby Brandemihl	360-737-2384	7 and 3	A (2)	NI	NI	NI	Residential	~1942	Single family, bungalow	NI	Wood	1
2908 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2908 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Fall 2003	12/05/03	Resident/owner completed	Patrick and Heidi Murphy	360-735-9092	5	A (2)	Outside sales (m), Office specialist (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
2908 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2909 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1980	NI	2	NI	NI
2909 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1971	NI	2	NI	NI
2909 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1979	NI	4	NI	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2904 WEIGEL AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2905 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
2905 VAN ALLMAN AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2905 WEIGEL AV	Storm windows	Crawl space	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2906 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	NI	Poured concrete	Dry	NI	NI	No
2906 VAN ALLMAN AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2906 WEIGEL AV	Storm windows	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2907 UNANDER AV (QA-ed 8-25-04, LMS)	NI	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured Concrete	Dry	NI	No	No
2907 VAN ALLMAN AV	NI	Crawl space	Yes	Closed	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2907 WEIGEL AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No
2908 UNANDER AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2908 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry (uncertain)	NI	NI	No
2908 WEIGEL AV	Energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2904 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2905 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	No	Hot-air circulation	Electric	No	Mechanical fans, kitchen range hood fan	Yes	Garage (detached)	Under cabinet	No	No	No	No	Bedroom	Under cabinet
2905 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2905 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2906 UNANDER AV (QA-ed 8-25-04, LMS)	None	Possible water and sewer pipes	No	Heat pump	Electric	No	NI	Yes	No	No	No	No	No	Bathroom	No	Bathroom
2906 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2906 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2907 UNANDER AV (QA-ed 8-25-04, LMS)	None	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	No	Kitchen (409)	Bathroom	Laundry room	Laundry room	Bathroom	Bathroom	Laundry room (Comet, 409)
2907 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2907 WEIGEL AV (QA-ed 8-25-04, LMS)	None	NA	NI	Electric wall/baseboard, other (forced air furnace)	NI	No	Bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	No	No	Under kitchen sink	Under kitchen sink	No	Under bathroom sink	No
2908 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2908 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	None	NA	NI	Hot air circulation	Natural gas, electric	No	Central air conditioning, bathroom ventilation fan	Yes	No	No	No	No	No	Bathroom	No	Bathroom
2908 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2904 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2905 UNANDER AV (QA-ed 8-25-04, LMS)	No	No	Yes	No	No	No	No	No	No	Yes	No	No	No	3 year old child
2905 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2905 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2906 UNANDER AV (QA-ed 8-25-04, LMS)	No	Utility room	No	No	No	No	NI	NI	NI	NI	NI	NI	NI	
2906 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2906 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2907 UNANDER AV (QA-ed 8-25-04, LMS)	No	Laundry room	Bedroom, bathroom	No	Candles, potpourri in various places	Yes	No	No	No	Bathroom	No	Flea spray- summer time- once or twice a year, fogger once a year to kill spiders	Caseron- once a year in late spring or summer for weeds	
2907 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2907 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	No	No	No	NI	No	Yes	No	Hardwood floor throughout house	No	NI	Weed and Feed in yard seasonally, Roundup once a year	
2908 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2908 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	No	No	Bathroom	No	No	No	No	No	No	No	No	No	No	
2908 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2909 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1980	NI	4	NI	NI
2909 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	Ronald Young	360-694-8225 (h)	28	A (2)	Housewife (f), Disability (m)	NI	NI	Residential	1945	Single family	NI	Wood	1
2909 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	Dan Lubinski	360-694-9762 (h)	59	A (1)	Retired (m)	NI	NI	Residential	1940	Single family	NI	Wood	1
2909 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
2910 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	James Meuchel	360-694-8608 (h)	43	A (1)	Retired (m)	NI	NI	Residential	1943	Single family, ranch	NI	Wood	1
2910 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
2910 WEIGEL AV (QA-ed 8-25-04, LMS)	Fall 2003	12/05/03	Resident/owner completed	John Mack	360-696-1133 (h)	27	A (1)	Retired (m)	Yes	No	Residential	1942	Single family	NI	Wood	NI
2911 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2911 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Fall 2003	12/23/03	Resident/owner completed	Jennifer Story-Hawley	360-737-2790	5	C (3), A (2)	Hairdresser (f), Glazier (m)	Yes	No	Residential	1942	Single family	NI	Wood siding	1
2911 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2912 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2912 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2912 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2913 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/30/03	Resident/owner completed	Bev Moeller	360-696-0046 (h), 503-309-1615 (cell)	17.5	C (2), A (1)	Mental Health (f)	Yes	No	Residential	1940's	Single family, ranch	NI	Wood, concrete	1
2913 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2913 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2914 UNANDER AV (QA-ed 8-25-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	Michel Woodridge	360-694-7557 (h)	18	C (2), A (2)	Warehouseman (m), Child care provider (f)	NI	NI	Residential/ Day Care	1943	Single family, ranch	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	NI	NI	NA	NI	Poured Concrete	NI	NI	NI	No
2909 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Insulation	Crawl space	Yes	Seasonally	No	NI	NI	NA	Dirt	Poured Concrete	Dry	NI	NI	No
2909 WEIGEL AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2910 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation	Crawl space	No	NI	Yes	On the ground	Whole	NA	Dirt	Poured Concrete	Dry	No	NA	Yes, few (1-3)
2910 VAN ALLMAN AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2910 WEIGEL AV (QA-ed 8-25-04, LMS)	Storm windows	Crawl space	NI	Seasonally	Yes	On the ground	Whole	NA	NI	NI	NI	NI	NI	No
2911 UNANDER AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2911 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	NI	NI	NI	NI	NA	Dirt	Poured concrete topped by wood	Seasonally wet to dry	NI	NI	NI
2911 WEIGEL AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2912 UNANDER AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2912 VAN ALLMAN AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2912 WEIGEL AV	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2913 UNANDER AV (QA-ed 8-25-04, LMS)	Insulation, energy-efficient windows	Basement/Crawl space Combination	Yes	Closed	Yes, under kitchen	On the ground	Whole	Half finished, half unfinished	Concrete	Poured concrete	Damp	Yes	Yes	NI
2913 VAN ALLMAN AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2913 WEIGEL AV	Energy-efficient windows	Crawl space	Yes	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2914 UNANDER AV (QA-ed 8-25-04, LMS)	NI	Basement	No	No	NA	NA	NA	Unfinished	Concrete	Poured concrete	Dry	No	NA	No

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2909 UNANDER AV (QA-ed 8-25-04, LMS)	None	NA	No	Pellet Stove	Wood pellets	No	Bathroom ventilation fan	Yes	Utility room	Under kitchen sink	Under kitchen sink	Under kitchen sink	Under kitchen sink	No	Bathroom cabinet	Under bathroom sink
2909 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	None	NA	No	Stove	Natural gas	No	Kitchen range hood fan	No	No	Yes	Yes	No	No	Yes	No	Yes
2909 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2910 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NA	NI	Electric wall/baseboard	Electric	No	Individual air conditioning units	Yes	No	Yes	Yes	No	No	No	No	Yes
2910 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2910 WEIGEL AV (QA-ed 8-25-04, LMS)	None	NA	No	Electric wall/baseboard	Electric, fuel oil	No	Mechanical fans, individual air conditioning units	Yes	No	No	No	No	No	No	No	No
2911 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2911 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	NI	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan (covered)	Yes	Garage (detached)	Garage (detached)	Bathroom, kitchen (plug-in style)	Under kitchen sink	Under kitchen sink	Bathroom	Closet hall	Under bathroom sink
2911 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2912 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2912 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2912 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2913 UNANDER AV (QA-ed 8-25-04, LMS)	NI	NI	Basement added	Hot air circulation	Natural gas, fuel oil	No	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Basement	Basement	Bathroom	No	Sink	Bathroom	Bedroom	Bathroom
2913 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
2913 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2914 UNANDER AV (QA-ed 8-25-04, LMS)	None	NI	NI	Forced air	Natural gas	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	Upstaris, downstairs	No	Upstairs	Bathroom	Bathroom	Bathroom

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2909 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2909 UNANDER AV (QA-ed 8-25-04, LMS)	Under kitchen sink	Under kitchen sink	No	No	No	No	No	No	No	No	No	No	No	
2909 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	No	Yes	Yes	No	No	No	No	No	No	No	No	No	No	
2909 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2910 UNANDER AV (QA-ed 8-25-04, LMS)	No	Yes	Yes	No	No	NI	No	No	No	Walls, floor	No	NI	NI	
2910 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2910 WEIGEL AV (QA-ed 8-25-04, LMS)	No	No	No	No	No	No	No	No	No	No	No	NI	No	
2911 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2911 VAN ALLMAN AV (QA-ed 8-25-04, LMS)	Under kitchen sink	Under kitchen sink	Bathroom, bedroom	Hall closet, garage (detached)	Hall closet	Yes	No	No	No	Wall paneling in dining room and hall, end tables	No	No	No	13 and 14 year old children occupy home part-time
2911 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2912 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2912 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2912 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2913 UNANDER AV (QA-ed 8-25-04, LMS)	No	Sink	Bedrooms	No	No	No	No	No	No	Furniture, paneling in basement	No	No	No	Children 17 and 14 years old
2913 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2913 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2914 UNANDER AV (QA-ed 8-25-04, LMS)	No	No	Bathroom	Kitchen	Upstairs	No	No	No	No	Walls	No	No	Every few years for weeds	Children ages 12 and 14 years.

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
2914 UNANDER AV (QA-ed 9-5-04, NTF)	Winter 2002	01/15/02	Resident/owner completed	Michel Woodridge	360-694-7557 (h)	NI	C (2), A (2)	Supply coordinator (m), Child care provider (f)	NI	NI	Residential	NI	Single family	NI	Wood	1
2914 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
2915 FRUIT VALLEY RD (QA-ed 8-31-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Irene Ells	360-694-5450	47	A (1)	Retired homemaker (f)	NI	NI	Residential	1909	Single Family	NI	Plaster	1
2915 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
2917 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	0	NI	1	NI	NI
2929 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1963	NI	1	NI	NI
3002 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3002 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	Fall 2003	12/04/03	Resident/owner completed	Jamie Green	360-258-4855 (h)	Assmue 3 (only lists children)	C (2), A (1)	NI	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3002 WEIGEL AV (QA-ed 8-31-04, LMS)	Fall 2003	12/02/03	Resident/owner completed	Richard Steigleman	360-693-2107	32	A (1)	None	NI	NI	Residential	NI	Single family	NI	Wood	1
3003 UNANDER AV (QA-ed 8-31-04, LMS)	Fall 2003	01/20/04 (survey date)	Resident/owner completed	Linda Pritchard	360-250-929 (h), 360-397-2391(w/c)	4.5	A (2)	GIS Technician (f), GIS Analyst (m)	Yes	No	Residential	1942	Single family, cape	NI	Wood, aluminum	1
3003 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
3003 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3004 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3005 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
3005 VAN ALLMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	Yes	No	Residential	1942	NI	1	Wood	1
3008 UNANDER AV	Fall 2003	January 2004	AMEC exterior visual	Hogan, Denny	360-735-5680	NI	NI	NI	NI	NI	Residential	1942	NI	2	Wood	1
3008 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	NI	NI	NI	Wood	1
3009 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1986	NI	2	NI	NI

APPENDIX D

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
2914 UNANDER AV (QA-ed 9-5-04, NTF)	NI	Basement	NI	NI	NA	NA	NA	Finished	Concrete	Poured concrete, block	Dry	No	NA	No
2914 VAN ALLMAN AV	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2915 FRUIT VALLEY RD (QA-ed 8-31-04, LMS)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Concrete	Poured Concrete	NI	No	NA	Yes, few (1-3)
2915 VAN ALLMAN AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
2917 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2929 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3002 UNANDER AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
3002 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NA	Dirt	Poured concrete	Dry	No	NA	No
3002 WEIGEL AV (QA-ed 8-31-04, LMS)	Insulation, storm windows	Crawl space	NI	Seasonally	Yes	On the ground	NI	NA	NI	Laid up stone	Dry	NI	NI	No
3003 UNANDER AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Basement/Crawl space Combination	Yes	Open	Yes	On the ground	Whole	Unfinished	Concrete	Poured concrete	Dry	Yes	Yes	No
3003 VAN ALLMAN AV	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
3003 WEIGEL AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3004 UNANDER AV	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
3005 UNANDER AV	Storm windows	Crawl space	NI	NI	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
3005 VAN ALLMAN AV	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
3008 UNANDER AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3008 WEIGEL AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Poured concrete	NI	NI	NI	NI
3009 FRUIT VALLEY RD	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
2914 UNANDER AV (QA-ed 9-5-04, NTF)	None	Window, wood chute	NI	Hot air circulation	Natural gas	No	Bathroom ventilation fan, kitchen range hood fan	NI	No	Kitchen	No	Kitchen	No	Bathroom	Bathroom	Bathroom
2914 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2915 FRUIT VALLEY RD (QA-ed 8-31-04, LMS)	NI	NA	NI	Wood stove, electric wall/baseboard	Electric, wood	Yes	Bathroom ventilation fan	Yes	No	No	Closet	Closet	No	Bathroom	No	Bathroom
2915 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2917 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
2929 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3002 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3002 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	None	NA	NI	Hot air circulation, electric wall/baseboard	Natural gas, electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	NI	No	Kitchen	No	No	No	Bathroom	Bathroom	Bathroom
3002 WEIGEL AV (QA-ed 8-31-04, LMS)	None	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, individual air conditioning units	Yes	No	No	No	No	No	No	No	No
3003 UNANDER AV (QA-ed 8-31-04, LMS)	None	NI	Half-basement added (uncertain)	Hot air circulation	Natural gas	No	Mechanical fans, bathroom ventilation fan	Yes	Basement	Kitchen	No	Kitchen	No	Bathroom	Bathroom	Bathroom
3003 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3003 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3004 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3005 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3005 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3008 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3008 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3009 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
2914 UNANDER AV (QA-ed 9-5-04, NTF)	Kitchen	No	Bathroom	Kitchen	No	No	No	No	No	NI	No	Flea drops (on animals), advantage monthly	NI	Child care used on weekdays.
2914 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2915 FRUIT VALLEY RD (QA-ed 8-31-04, LMS)	Kitchen	No	No	No	No	No	No	No	No	Paneling in kitchen	No	No	Weed killer some time this summer	
2915 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2917 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
2929 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3002 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3002 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	Kitchen	No	Bedroom	No	No	No	No	No	No	No	No	No	No	
3002 WEIGEL AV (QA-ed 8-31-04, LMS)	No	No	No	No	No	No	No	No	No	Bedroom, kitchen, front room (paneling)	No	No	No	
3003 UNANDER AV (QA-ed 8-31-04, LMS)	No	No	Bedroom	Basement	No	No	No	No	Yes	Basement ceiling	No	No	No	Sewing studio in basement, male in home 1.5 years.
3003 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3003 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3004 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3005 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3005 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3008 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3008 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3009 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3009 WEIGEL AV (QA-ed 8-31-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Ben Steinbarge & Jennifer Young	NI	1	A (2)	Maintenance (m), Parts driver (f)	NI	NI	Residential	NI	Multiple family, duplex	2	Wood, lathe, plaster	1
3011 FRUIT VALLEY RD, #A	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #B (QA-ed 8-31-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	Sheri M. Roseburg	360-993-0284	1	A (1)	NI	NI	NI	Residential	NI	Multiple family apartment house	NI	Wood	1
3011 FRUIT VALLEY RD, #C	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #D	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #E	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #F	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #G	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #H	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3015 FRUIT VALLEY RD	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	Yes	No	NI	1914	NI	1	NI	NI
3101 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 UNANDER AV (QA-ed 8-31-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	John and Eva Mae Conley	360-695-1353	4	A (2)	NI	Yes	No	Residential	1955	Multiple family, duplex	2	Wood	1
3102 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3102 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3102 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 YEOMAN AV (QA-ed 8-31-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Dennis Chambers	360-695-6374	18	A (1)	NI	Yes	No	Residential	1947	Single family	NI	Wood	1
3103 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3104 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3104 WEIGEL AV (QA-ed 8-31-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	Edward R. Swindell	360-695-1343 (h)	9	C (3), A (1)	Homemaker (f), student (m)	Yes	No	Residential	1940's	Single family, cape	NI	Wood	1
3104 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3009 WEIGEL AV (QA-ed 8-31-04, LMS)	NI	Crawl space	Yes	NI	NI	NI	NI	NA	Concrete	Poured Concrete	NI	NI	NI	No
3011 FRUIT VALLEY RD, #A	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3011 FRUIT VALLEY RD, #B (QA-ed 8-31-04, LMS)	Other (new roof)	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	Damp	No	NA	Yes
3011 FRUIT VALLEY RD, #C	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3011 FRUIT VALLEY RD, #D	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3011 FRUIT VALLEY RD, #E	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3011 FRUIT VALLEY RD, #F	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3011 FRUIT VALLEY RD, #G	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3011 FRUIT VALLEY RD, #H	NI	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI
3015 FRUIT VALLEY RD	NI	Crawl space	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3101 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 UNANDER AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places	NA	Dirt	Cinder block	Dry	NI	NI	No
3102 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 YEOMAN AV (QA-ed 8-31-04, LMS)	Insulation, storm windows, vinyl siding	Crawl space	Yes	Open	No	NA	NA	NA	Dirt	Poured Concrete	Dry	NI	NI	No
3103 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3104 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3104 WEIGEL AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	No	NI	NI	NA	Dirt	Cinder block	Dry	No	NA	No
3104 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3009 WEIGEL AV (QA-ed 8-31-04, LMS)	None	NA	No	Hot air circulation	Natural gas	No	Bathroom ventilation fan	Yes	NI	NI	NI	NI	NI	NI	NI	Under sink
3011 FRUIT VALLEY RD, #A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #B (QA-ed 8-31-04, LMS)	6 inches	Only crack in foundation	No	NI	NI	NI	NI	NI	No	No	No	No	No	No	No	NI
3011 FRUIT VALLEY RD, #C	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #E	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #F	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #G	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3011 FRUIT VALLEY RD, #H	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3015 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3101 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 UNANDER AV (QA-ed 8-31-04, LMS)	None	NA	NI	Hot air circulation, electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	No	Kitchen	Kitchen	Kitchen	No	No	Bathroom	Kitchen
3102 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3102 YEOMAN AV (QA-ed 8-31-04, LMS)	None	NA	No	Electric wall/baseboard	Electric	NI	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood	Yes	No	In House	No	House	House	No	No	Bathroom
3103 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3104 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3104 WEIGEL AV (QA-ed 8-31-04, LMS)	None	NA	No	Wood stove, electric wall/baseboard	Electric, wood	Wood stove	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	NI	No	Kitchen	Kitchen	Kitchen	Laundry room	Bathroom	Bathroom	Kitchen
3104 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3009 WEIGEL AV (QA-ed 8-31-04, LMS)	No	No	No	No	No	Yes	No	No	No	Paneling in kitchen	No	No	No	
3011 FRUIT VALLEY RD, #A	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3011 FRUIT VALLEY RD, #B (QA-ed 8-31-04, LMS)	NI	NI	NI	NI	NI	NI	No	No	No	Pressed wood, sheet rock	NI	For cockroaches	NI	Building needs work. Neighbor burns trash
3011 FRUIT VALLEY RD, #C	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3011 FRUIT VALLEY RD, #D	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3011 FRUIT VALLEY RD, #E	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3011 FRUIT VALLEY RD, #F	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3011 FRUIT VALLEY RD, #G	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3011 FRUIT VALLEY RD, #H	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3015 FRUIT VALLEY RD	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3101 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3102 UNANDER AV (QA-ed 8-31-04, LMS)	Kitchen	Kitchen	Bathroom	No	Bathroom	No	No	No	No	No	No	No	No	
3102 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3102 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3102 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3102 YEOMAN AV (QA-ed 8-31-04, LMS)	No	In House	No	No	No	NI	NI	NI	NI	No	No	No	No	
3103 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3104 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3104 WEIGEL AV (QA-ed 8-31-04, LMS)	Kitchen	Kitchen	Bathroom	Laundry room	Bedroom	Yes	No	No	No	Hardwood floors, plywood on floors, particle board on floors	NI	No	No	Adult femail in house 7 years and children for 6 years.
3104 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3104 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3105 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3105 WEIGEL AV (QA-ed 8-31-04, LMS)	Fall 2003	12/09/03	Resident/owner completed	John T. Martin	0	7	A (1)	Hotel engineer (m)	Yes	No	Residential	1943 ?	Single family, ranch	1	Wood, concrete foundation	1
3105 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3105 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3106 UNANDER AV (QA-ed 8-31-04, LMS)	Fall 2003	01/26/04 (survey date)	Resident/owner completed	Rachel Lileet-Foley	360-750-8790 (h)	3	A (1)	Retired and teaches Hindi (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3106 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3106 WEIGEL AV (QA-ed 8-31-04, LMS)	Fall 2003	12/11/03	Resident/owner completed	Jacqueline Knutson	h: 360-604-4755, w/c: 360-256-1709	1.5	A (2)	Escrow (f), Unemployed (m)	Yes	No	Residential, recreational	1942	Single family, ranch	NI	NI	1
3106 XAVIER AV (QA-ed 8-31-04, LMS)	Fall 2003	02/02/04 (survey date)	Resident/owner completed	Georgena Morey	360-693-5640 (h)	10	A (1)	Utility (f)	Yes	No	Residential	1942	Single family	NI	Wood	1
3106 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3107 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Walter L. Warren	360-696-0108 (h)	15	A (1)	Retired (m)	Yes	No	Residential	1940's	Single family	NI	Wood	1
3107 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3107 XAVIER AV (QA-ed 8-31-04, LMS)	Fall 2003	02/02/04	Resident/owner completed	JR and Nicole Klock	360-699-3096	1.5 months	C (1), A (2)	Warehouse Manager (m), Homemaker (f)	Yes	No	Residential	1940's	Single family, cape	NI	Wood, concrete, vinyl siding	1
3107 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1943	NI	1	Wood	1
3108 WEIGEL AV (QA-ed 8-31-04, LMS)	Fall 2003	12/01/03	Resident/owner completed	Jerald N. Jensen	360-695-7278 (h)	33 to 34	A (2)	Retired (f), Retired (m)	Yes	No	Residential	1943-1945	Single family	NI	Wood	1
3108 XAVIER AV (QA-ed 8-31-04, LMS)	Fall 2003	01/29/04 (survey date)	Resident/owner completed	Elton Taylor	360-693-3890 (h)	9.5	A (1)	Hair cutter (m)	Yes	No	Residential	1942	Single family, cottage	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3104 YEOMAN AV	NI	Crawl space	Yes	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3105 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3105 WEIGEL AV (QA-ed 8-31-04, LMS)	Energy-efficient windows	Crawl space	Yes	Open	No	NI	NI	NA	Dirt	Poured Concrete	Damp	No	NA	No
3105 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3105 YEOMAN AV	Storm windows	Crawl space	Yes	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3106 UNANDER AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Basement	No	NA	NA	NA	NA	Half finished, half unfinished	Concrete	Poured concrete	Dry, unless outside faucet runs (then damp)	No	NA	Yes, few (1-3)
3106 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3106 WEIGEL AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Crawl space	Yes	Open	No	NA	NA	NA	Concrete	NI	NI	No	NA	Yes, some (3-6)
3106 XAVIER AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Concrete slab/Crawl space Combination	Yes	NI	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No
3106 YEOMAN AV	NI	Crawl space	Yes	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3107 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows, vinyl siding	Crawl space	Yes	Seasonally	No	NA	NA	NA	Dirt	Poured Concrete	Dry	No	NA	No
3107 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3107 XAVIER AV (QA-ed 8-31-04, LMS)	Insulation, energy-efficient windows	Crawl space	NI	NI	NI	NI	NI	NA	Concrete	Poured concrete	Dry	NI	NI	NI
3107 YEOMAN AV	Storm windows, energy-efficient windows	NI	NI	NI	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3108 WEIGEL AV (QA-ed 8-31-04, LMS)	Insulation, storm windows, vinyl siding	Basement	Yes	Open	NA	NA	NA	Unfinished	Concrete	Poured Concrete	Dry	Yes	No	No
3108 XAVIER AV (QA-ed 8-31-04, LMS)	Insulation (blown in attic), storm windows	Crawl space	Yes	Seasonally	Yes	NI	Whole	NA	Dirt	Poured concrete	Dry	NI	NI	No

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3104 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3105 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3105 WEIGEL AV (QA-ed 8-31-04, LMS)	None	NA	No	Hot air circulation, electric wall/baseboard	Electric	No	Mechanical fans, kitchen range hood fan	Yes	No	Under kitchen sink	Entertainment center	Under sink	Hall closet	No	No	Under sink
3105 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3105 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3106 UNANDER AV (QA-ed 8-31-04, LMS)	Hairline	Laundry room conduits	Basement and addition on back for basement entry	Hot air circulation (forced air gas)	Natural gas	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan (interior recirculation only)	Yes	Garage (attached)	No	No	No	No	Bathroom counter	No	Under bathroom sink
3106 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3106 WEIGEL AV (QA-ed 8-31-04, LMS)	NI	NA	NI	Hot air circulation	Electric	Yes, but not in use	Mechanical fans, individual air conditioning units	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes
3106 XAVIER AV (QA-ed 8-31-04, LMS)	None	NA	No	Hot air circulation, electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	Shed in back	No	No	No	Kitchen floor cabinet	No	Bathroom cabinet	Bathroom
3106 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3107 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	None	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans	Yes	Garage (detached)	No	Kitchen	Kitchen	Kitchen	No	No	Kitchen, bathroom
3107 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3107 XAVIER AV (QA-ed 8-31-04, LMS)	NI	NA	NI	Electric wall/baseboard, space heaters	Electric	NI	Bathroom ventilation fan	NI	Yes	Yes	Yes	No	No	Yes	Yes	Yes
3107 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3108 WEIGEL AV (QA-ed 8-31-04, LMS)	None	No	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	Kitchen	Kitchen	Kitchen	Kitchen	Bathroom	No	Bathroom
3108 XAVIER AV (QA-ed 8-31-04, LMS)	None	Utility conduits	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Garage (detached)	No	Living area	No	Yes	Bathroom shelf	No	Under bathroom sink

APPENDIX D

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3104 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3105 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3105 WEIGEL AV (QA-ed 8-31-04, LMS)	No	No	No	No	No	Yes	No	No	No	Underlayment of floor	No	No	No	
3105 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3105 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3106 UNANDER AV (QA-ed 8-31-04, LMS)	Under bathroom sink	Various rooms	No	Wood glue in garage (attached)	Bedroom	No	Yes	No	No	Computer desk, wardrobe	No	Ant traps 1 year ago	Roundup in fall	
3106 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3106 WEIGEL AV (QA-ed 8-31-04, LMS)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Hardwood floors	No	Flea spray for cats	No	Male resided in home for 1 year.
3106 XAVIER AV (QA-ed 8-31-04, LMS)	Kitchen	Kitchen	Bedroom	No	No	No	No	No	No	No	No	NI	NI	
3106 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3107 VAN ALLMAN AV (QA-ed 8-31-04, LMS)	No	Kitchen	Bathroom	No	No	No	No	No	No	1 wall in each of the 2 bedrooms has wall paneling	No	No	No	
3107 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3107 XAVIER AV (QA-ed 8-31-04, LMS)	No	No	Yes	No	No	No	No	No	Yes	Wood wall paneling	Yes	No	No	
3107 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3108 WEIGEL AV (QA-ed 8-31-04, LMS)	Kitchen	Kitchen	Bathroom	No	No	No	No	No	No	1 wall in living room	No	No	NI	
3108 XAVIER AV (QA-ed 8-31-04, LMS)	Under kitchen sink	Under bathroom sink	Bathroom	No	No	No	No	Yes	No	Wall paneling, plywood possibly, computer table	No	No	No	Bird anti-flea hanger near bird house in living room

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3108 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3109 VAN ALLMAN AV (QA-ed 9-2-04, NTF)	Fall 2003	12/08/03	Resident/owner completed	Tomorrow J. Wilson	360-695-1782 (h)	25	A (1)	Welder and millwright (m)	Yes	No	Residential	1942	Single family, ranch	NI	Wood (white pine), cedar siding	NI
3109 WEIGEL AV (QA-ed 9-2-04, NTF)	Fall 2003	12/04/03	Resident/owner completed	Les and Pam Filbeck	360-695-9046 (h)	5	A (2)	NI	Yes	No	Residential	1940's	Single family	NI	Wood	1
3109 XAVIER AV (QA-ed 9-2-04, NTF)	Fall 2003	01/29/04 (survey date)	Resident/owner completed	Jennifer Martin	360-693-2631(h)	4	C (2), A (2)	Construction (m), Homemaker (f)	Yes	No	Residential	1943	Single family, cottage	NI	Wood	1
3109 YEOMAN AV (QA-ed 9-2-04, NTF)	Fall 2003	12/11/03	Resident/owner completed	Shawn, Anita, and Nick Kirchner	360-737-7783 (h)	10	C (1), A (2)	Driver (m), Laundry (f)	Yes	No	Residential	NI	Single family, colonial	NI	Wood	1
3110 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3110 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3110 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3110 XAVIER AV (QA-ed 9-2-04, NTF)	Fall 2003	12/08/03	Resident/owner completed	David Cox	h: 360-693-4143, w/c: 503-274-6611	4	A (1)	EFT banking specialist (m)	Yes	No	Residential	1942	Single family, cottage	NI	Wood frame, concrete foundation, vinyl siding	1
3110 YEOMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	12/18/03 (survey date)	Resident/owner completed	Dolas (Dotty) Williams	360-693-8575 (h)	40+	A (1)	Retired (f)	Yes	No	Residential	1942	Single family, ranch	NI	Plaster, wood	1
3111 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	12/18/03 (survey date)	Resident/owner completed	Judy Calderwood	360-696-3722 (h)	37	C (1), A (4)	Retired (f)	Yes	No	Residential	1940's	Single family	NI	Wood	1
3111 WEIGEL AV (QA-ed 9-3-04, NTF)	Fall 2003	12/04/03	Resident/owner completed	William and Lucilla Foster	360-690-8275 (h)	NI	A (2)	NI	Yes	No	Residential	1942	Single family	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3108 YEOMAN AV	Insulation	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3109 VAN ALLMAN AV (QA-ed 9-2-04, NTF)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	NI	Dry	No	NA	No
3109 WEIGEL AV (QA-ed 9-2-04, NTF)	Energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured Concrete	Dry	No	NA	No
3109 XAVIER AV (QA-ed 9-2-04, NTF)	Insulation (attic mainly), energy-efficient windows	Crawl space	Yes	NI	No	NA	NA	NA	Dirt	Cinder block	NI	No	NA	NI
3109 YEOMAN AV (QA-ed 9-2-04, NTF)	Insulation, energy-efficient windows	Partial Basement	No	NI	Yes	On the ground	Whole	Unfinished	Concrete, dirt	Poured concrete, cinder block	Dry	Yes	Yes	Yes, few (1-3)
3110 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3110 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3110 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3110 XAVIER AV (QA-ed 9-2-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Absent in places	NA	Dirt	Poured Concrete	Dry	NI	NI	NI
3110 YEOMAN AV (QA-ed 9-3-04, NTF)	Insulation, storm windows	Partial Basement	Yes	Open	NA	NA	NA	Finished	Concrete	Poured concrete	Dry	Yes	Yes	No
3111 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	NI	NI	NA	Concrete	Poured concrete	NI	NI	NI	NI
3111 WEIGEL AV (QA-ed 9-3-04, NTF)	Insulation	Crawl space	Yes	Seasonally	NI	NI	NI	NA	NI	NI	NI	NI	NI	No

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3108 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3109 VAN ALLMAN AV (QA-ed 9-2-04, NTF)	None	NA	No	Hot air circulation, hot air radiation, other (glass heat)	Electric	Yes	NI	NI	Pantry	No	Bathroom	Pantry	Pantry	Bathroom	No	Hall closet
3109 WEIGEL AV (QA-ed 9-2-04, NTF)	None	NA	No	Heat pump	Electric	No	Central air conditioning, kitchen range hood fan, bathroom ventilation fan	Yes	No	No	Bathroom	No	Under kitchen sink	No	Hall closet	Under bathroom sink
3109 XAVIER AV (QA-ed 9-2-04, NTF)	NI	NA	Addition to back in 1970's	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	Garage (detached)	Garage (detached)	Bathroom shelf	No	No	Bathroom shelf	Bathroom shelf	Bathroom shelf
3109 YEOMAN AV (QA-ed 9-2-04, NTF)	2' x 0.5"	NI	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	No	No	No	Under kitchen sink	No	Bathroom	No	No
3110 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3110 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3110 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3110 XAVIER AV (QA-ed 9-2-04, NTF)	NI	NA	No	Electric wall/baseboard	Electric	No, but chimney present	Mechanical fans, bathroom ventilation fan	Yes	Kitchen closet	Kitchen	No	No	Kitchen	No	No	Bathroom
3110 YEOMAN AV (QA-ed 9-3-04, NTF)	None	Utility conduits	Kitchen enlarged, utility room added, partial basement added	Other: forced air furnace	Electric	No	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Garage (detached)	Utility shelf	Under kitchen sink	Under kitchen sink	Storage room off garage	Bathroom	Bedroom	Bathroom
3111 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	NI	NA	About 20 yrs ago	Electric wall/baseboard	Electric	Yes	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood	Yes	No	Under kitchen sink	Under kitchen sink	No	Under kitchen sink	No	Bathroom	Bathroom
3111 WEIGEL AV (QA-ed 9-3-04, NTF)	None	NA	No	Electric wall/baseboard	Electric	No	Kitchen range hood fan, bathroom ventilation fan	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3108 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3109 VAN ALLMAN AV (QA-ed 9-2-04, NTF)	No	Pantry	Bathroom	No	No	No	No	No	No	No	No	Termite and carpenter ant (ortho), twice	Grass and weed (Spectracide) yearly	Occupant reports that there may be a mold problem with this house.
3109 WEIGEL AV (QA-ed 9-2-04, NTF)	Under kitchen sink	Under kitchen sink	Bedroom	No	No	No	No	No	No	Hardwood: kitchen table, entertainment center, bedroom furniture, roll-top desk	No	No	No	
3109 XAVIER AV (QA-ed 9-2-04, NTF)	Laundry room shelf	No	Bathroom shelf	Various rooms	Candles in various places	No	No	No	No	Living room cabinet, bedroom dressers	No	Not for 2 years	In the summer	
3109 YEOMAN AV (QA-ed 9-2-04, NTF)	No	No	No	No	No	Yes	No	No	No	No	No	No	No	
3110 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3110 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3110 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3110 XAVIER AV (QA-ed 9-2-04, NTF)	No	No	Bathroom	No	No	No	No	No	No	Softwood flooring throughout, interior doors, closet doors, kitchen and bathroom cabinets	No	Ant killer in April 2003	Weed & Feed, but not since 2002	All windows are newer insulated vinyl except one in the kitchen that is still aluminum framed and single-paned.
3110 YEOMAN AV (QA-ed 9-3-04, NTF)	Under kitchen sink, bathroom	Utility shelf	Bedroom	No	China cabinet in living room	No	No	No	No	Fiberboard in utility room, paneling in kitchen nook and bedrooms	No	Raid for fleas monthly	2 yrs ago	Treatment center to west makes things smell musty or moldy sometimes
3111 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	No	Under kitchen sink	Bedroom, bathroom	No	No	Outside only	No	No	No	No	No	NI	NI	Possibly asbestos siding
3111 WEIGEL AV (QA-ed 9-3-04, NTF)	Yes	No	Yes	No	No	Yes	Yes	No	No	Yes	No	No	No	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3111 XAVIER AV (QA-ed 9-3-04, NTF)	Fall 2003	12/05/03	Resident/owner completed	Jerry and Alice Vaughan	360-696-3071 (h)	27	A (3)	Care provider (m), Homemaker (f), Unemployed (m)	Yes	No	Residential	NI	Single family	NI	Wood	1
3111 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3112 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3112 WEIGEL AV (QA-ed 9-3-04, NTF)	Fall 2003	12/22/03	Resident/owner completed	Jaime Garcia Cisneros	h: 360-694-4913, w/c:360-771-0493	5	C (3), A (1)	NI	Yes	No	Residential	1942	Multiple family, (duplex?)	2?	Wood, concrete	1
3112 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3112 YEOMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	12/04/03	Resident/owner completed	Jason Weber	360-693-4680 (h)	5.5	A (1)	Sales (m)	Yes	No	Residential	1950's	Single family, ranch	NI	Wood, concrete	1
3113 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3113 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3113 YEOMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	02/03/04	Resident/owner completed	NI	Unlisted	27	A (2)	Laborer (m), Laborer (f)	Yes	No	Residential	1945	Single family, ranch	NI	Wood	1
3114 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	0	NI	NI
3114 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3114 XAVIER AV (QA-ed 9-3-04, NTF)	Fall 2003	01/29/04 (survey date)	Resident/owner completed	Ron Huebner	360-693-7766 (h)	14	C (1), A (4)	Albertson's Deli worker (f), Unemployed (m), Pepsi sales (m)	Yes	No	Residential	1942	Single family, cottage	NI	Wood	1
3114 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3115 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	01/26/04 (survey date)	Resident/owner completed	Rico Juanatos	360-993-1366 (h)	5	C (1), A (2)	NI	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3115 XAVIER AV (QA-ed 9-3-04, NTF)	Fall 2003	03/18/04	Resident/owner completed	Roz Halstron	360-750-4895 (h), 360-907-7414 (w/c)	6	A (2)	Heating and air conditioning manager and system design (m), Customer service (f)	Yes	No	Residential	1940's	Single family, cape	NI	Wood, metal roof, concrete foundation	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3111 XAVIER AV (QA-ed 9-3-04, NTF)	Energy-efficient windows	Crawl space	Yes	Seasonally	No	NA	NA	NA	Dirt	Poured Concrete	Dry	NI	NI	Yes, few (1-3)
3111 YEOMAN AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3112 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3112 WEIGEL AV (QA-ed 9-3-04, NTF)	Insulation, storm windows, energy-efficient windows	Basement/Crawl space Combination	Yes	Seasonally	Yes	On the ground	Whole	Finished	Concrete	Poured concrete, cinder block	Dry	No	NA	Yes, few (1-3)
3112 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3112 YEOMAN AV (QA-ed 9-3-04, NTF)	Insulation, storm windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured Concrete	Dry	No	NA	No
3113 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3113 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3113 YEOMAN AV (QA-ed 9-3-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3114 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3114 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3114 XAVIER AV (QA-ed 9-3-04, NTF)	Insulation, storm windows	Crawl space	Yes	Open	No	NA	NA	NA	Dirt	Cinder block	Damp	NI	NI	Yes
3114 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3115 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Insulation, storm windows	Crawl space	Yes	NI	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	No	NA	No
3115 XAVIER AV (QA-ed 9-3-04, NTF)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	On the ground	Torn	NA	Dirt	Poured Concrete	Damp	No	NA	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3111 XAVIER AV (QA-ed 9-3-04, NTF)	NI	NI	Laundry room addition	Hot air circulation	Natural gas	Yes	Bathroom ventilation fan	Yes	No	No	Yes	No	No	Yes	Yes	Yes
3111 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3112 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3112 WEIGEL AV (QA-ed 9-3-04, NTF)	10 to 12"	No	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Under kitchen sink	Under kitchen sink	Under kitchen sink	Under kitchen sink	Closet next to bathroom	Closet next to bathroom	Under bathroom sink
3112 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3112 YEOMAN AV (QA-ed 9-3-04, NTF)	None	NA	NI	Hot air circulation, electric wall/baseboard	Electric	Yes	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Yes	Yes	Yes	No	Yes	No	No	Yes
3113 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3113 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3113 YEOMAN AV (QA-ed 9-3-04, NTF)	NI	NI	NI	Wood stove, electric wall/baseboard	Electric, wood	Wood stove	Opening doors	Yes	Yes	No	No	No	Yes	Yes	No	No
3114 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3114 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3114 XAVIER AV (QA-ed 9-3-04, NTF)	1/4 inch by 15 feet	Crawl space flooded 2 feet in 1996	Addition that doubled square footage in 1998	Other (oil filled heaters)	Electric, fuel oil	No	Central air conditioning, mechanical fans, bathroom ventilation fan	Yes	Under kitchen sink	No	No	No	No	No	Bedroom	Under bathroom sink
3114 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3115 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	None	NA	Small utility room added at back	Gas stove heater	Natural gas	No	Mechanical fans, kitchen range hood fan	No	No	Utility	Kitchen	Kitchen	Utility	Bathroom	Bathroom	Bathroom
3115 XAVIER AV (QA-ed 9-3-04, NTF)	NI	NA	NI	Wood stove, electric wall/baseboard	Electric, wood	Wood stove	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	Plug-in style, sprays in house	Under kitchen sink	Under kitchen sink	Bathroom	Bathroom	Bathroom

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3111 XAVIER AV (QA-ed 9-3-04, NTF)	No	No	Yes	No	No	Yes	No	No	No	Floor, walls	No	No	Weed 'n Feed, hornet spray	
3111 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3112 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3112 WEIGEL AV (QA-ed 9-3-04, NTF)	Under kitchen sink	Under kitchen sink	Closet next to bathroom	No	No	No	No	Yes	No	Paneling in basement	No	No	No	
3112 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3112 YEOMAN AV (QA-ed 9-3-04, NTF)	No	No	Yes	No	No	No	No	No	Yes	No	No	NI	NI	
3113 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3113 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3113 YEOMAN AV (QA-ed 9-3-04, NTF)	No	No	No	Outside	No	Yes	No	No	No	NI	NI	NI	NI	
3114 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3114 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3114 XAVIER AV (QA-ed 9-3-04, NTF)	Various rooms	No	No	No	Bathroom	Yes	No	No	Yes	Wafer board siding, computer table	No, but soon	Advantage on cats 1 x monthly	Roundup occasionally	
3114 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3115 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Kitchen	Kitchen	Bathroom	No	No	No	No	No	No	In utility, one bedroom	No	NI	Weed killer spot spray last summer and along fence	
3115 XAVIER AV (QA-ed 9-3-04, NTF)	Under kitchen sink	Under kitchen sink	Bathroom, bedroom	Garage (detached)	Various rooms	Outside only	No	No	No	Wall paneling in living room	No	Ant killer 2-3 times yearly around wall edges	Ant killer around foundation mainly on visible ants	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3115 YEOMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	01/30/04 (survey date)	Resident/owner completed	Naomi Solomon and Joseph Rozco	360-699-3017 (h)	1.75	A (2)	Social security (m), VA (f)	Yes	No	Residential	1942	Single family, cottage	NI	Wood, concrete	1
3116 UNANDER AV (QA-ed 9-3-04, NTF)	Fall 2003	01/26/04 (survey date)	Resident/owner completed	Robert Lundy	360-993-0843 (h)	2	C (1), A (2)	Drywall finisher (m), Export Administrator (f)	Yes	No	Residential	1946	Single family, ranch	NI	Wood	1
3116 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3116 WEIGEL AV (QA-ed 9-3-04, NTF)	Fall 2003	12/05/03	Resident/owner completed	Gaylen Gano	360-693-1046 (h)	41	A (2)	Retired (f), Retired (m)	Yes	No	Residential	1954	Single family, ranch	NI	Wood with vinyl siding, brick	1
3116 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3116 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3117 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Fall 2003	12/18/03 (survey date)	Resident/owner completed	Tania Lozenski	360-906-1790 (h)	2	C (2), A (3)	Site staffing, Jubids, Unemployed	Yes	No	Residential	1940	Single family, ranch	NI	Wood, siding	1
3117 XAVIER AV (QA-ed 9-3-04, NTF)	Fall 2003	12/08/03	Resident/owner completed	Robert and Sara Murphy	360-750-4686 (h)	30	A (2)	Retired (m), School staff assistant (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood, cinder block foundation	1
3119 VAN ALLMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3202 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3202 WEIGEL AV (QA-ed 9-3-04, NTF)	Fall 2003	12/29/03	Resident/owner completed	James Lockhart	360-906-7199 (h)	NI	NI	NI	NI	NI	Residential	NI	Single family	NI	Wood, concrete, cinder block foundation	1
3202 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/26/03	Resident/owner completed	Leland Richardson	360-606-6735 (w/c)	0.5	A (3)	Student (f), Cabinet Worker (m), Unemployed (m)	Yes	No	Residential	1940's	Single family, ranch	NI	Wood, cement block	1
3202 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3203 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3115 YEOMAN AV (QA-ed 9-3-04, NTF)	Insulation (laid in attic)	Crawl space	Yes	NI	Yes	On the ground	Absent in places, torn	NA	Dirt	Cinder block	Damp	NI	NI	No
3116 UNANDER AV (QA-ed 9-3-04, NTF)	Insulation (attic), energy-efficient windows	Crawl space	Yes	Seasonally	NI	NI	NI	NA	NI	poured concrete	NI	NI	NI	NI
3116 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3116 WEIGEL AV (QA-ed 9-3-04, NTF)	Insulation, storm windows, energy-efficient windows	Basement	Yes	Open	NA	NA	NA	Partially finished, partially unfinished	Concrete	Poured Concrete	Dry	Yes	Yes	No
3116 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3116 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3117 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NA	Dirt	Poured concrete	Dry	No	NA	NI
3117 XAVIER AV (QA-ed 9-3-04, NTF)	Insulation (attic)	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Cinder block	Dry	No	NA	Yes, few (1-3)
3119 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3202 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3202 WEIGEL AV (QA-ed 9-3-04, NTF)	Energy-efficient windows	Crawl space	Yes	Always closed	No	NA	NA	NA	Dirt	Cinder block	Dry	No	NA	No
3202 XAVIER AV (QA-ed 9-4-04, NTF)	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NA	Dirt	Cinder block	NI	No	NA	No
3202 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3203 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3115 YEOMAN AV (QA-ed 9-3-04, NTF)	None	NA	NI	Wood stove, electric wall/baseboard	Electric, wood	Wood stove	Mechanical fans	Yes	No	No	No	No	Under kitchen sink	No	No	Under kitchen sink
3116 UNANDER AV (QA-ed 9-3-04, NTF)	NI	NA	Laundry room addition to back of house	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Laundry room	Under sink	Plug-in style in various places	No	No	Bathroom	Bathroom	Bathroom
3116 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3116 WEIGEL AV (QA-ed 9-3-04, NTF)	None	NI	No	Heat pump	Electric	Yes, but not used	Central air conditioning, mechanical fans, bathroom ventilation fan	Yes	Garage (detached)	Garage (detached)	No	Under sink	Under sink	Bathroom	Bathroom	Bathroom
3116 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3116 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3117 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	NI	NA	Laundry room and 2 bedrooms added	Electric wall/baseboard	Electric	Yes	Mechanical fans, individual air conditioning units, kitchen range hood fan	Yes	No	Laundry room cabinet	Bathroom	No	Laundry room cabinet	Under bathroom sink	Under bathroom sink	Laundry room cabinet
3117 XAVIER AV (QA-ed 9-3-04, NTF)	Small	NA	No	Electric wall/baseboard, other (electric forced air units)	Electric	No, but closed unused chimney	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	No	Storage closet	Bathroom	Utility room	Storage closet	Bathroom	Bathroom	Storage closet
3119 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3202 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3202 WEIGEL AV (QA-ed 9-3-04, NTF)	None	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	No	Kitchen	Kitchen	No	No	Bathroom
3202 XAVIER AV (QA-ed 9-4-04, NTF)	None	NA	NI	Hot air circulation	Natural gas, electric	No	Bathroom ventilation fan, individual air conditioning units	Yes	No	No	No	No	No	Bathroom	No	No
3202 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3203 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3115 YEOMAN AV (QA-ed 9-3-04, NTF)	No	No	Various shelves	No	Atop refrigerator	No	No	No	Yes, to cover mold	TV stand and end tables	No	No	No	2 ft of mold on walls in two bedrooms. One was water-cleaned and painted over, one untouched.
3116 UNANDER AV (QA-ed 9-3-04, NTF)	Kitchen	Kitchen	Bedrooms	No	No	No	No	No	No	No	No	Ant spray 1 year ago	NI	
3116 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3116 WEIGEL AV (QA-ed 9-3-04, NTF)	Under sink	Under sink	Bedroom	Garage (detached)	Garage (detached)	No	No	No	No	Roof, paneling in dining/living area	No	No	Yes, Weed and Feed in spring 2003	
3116 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3116 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3117 VAN ALLMAN AV (QA-ed 9-3-04, NTF)	Laundry room cabinet	Laundry room cabinet	Bathroom	Hall drawers	No	Yes	No	No	No	Living room paneling (painted over)	No	No	Last summer for blackberry bushes, chemical unknown	
3117 XAVIER AV (QA-ed 9-3-04, NTF)	Under kitchen sink	No	Bedroom, bathroom	No	Yes	No	No	No	No	Hardwood floor, wall paneling	No	Kitchen and bathroom for ants	Herbicides for lawn weeds, pesticide for ants	
3119 VAN ALLMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3202 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3202 WEIGEL AV (QA-ed 9-3-04, NTF)	Kitchen	Kitchen	No	Kitchen, back bedroom	Bedroom cupboard, water heater cupboard	No	No	No	No	Paneling in bedrooms	No	No	No	
3202 XAVIER AV (QA-ed 9-4-04, NTF)	No	No	Bathroom	No	No	No	No	No	No	T-111 siding, kitchen cabinets	No	No	No	
3202 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3203 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3203 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	02/04/04	Resident/owner completed	NI	360-693-7716 (h)	38	A (1)	Retired homemaker (f)	Yes	No	Residential	1940's	Single family, cottage	NI	Wood, vinyl siding	1
3204 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3204 WEIGEL AV (QA-ed 9-4-04, NTF)	Fall 2003	12/04/03	Resident/owner completed	Beulah A. Hicks	360-693-4924 (h), 360-909-5959 (w/c)	36	A (2)	Retired (f), Heavy equipment operator (m))	Yes	No	Residential	1940	Single family, ranch	NI	Wood	1
3204 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3204 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3205 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/08/03	Resident/owner completed	Scott and Donna Bush	360-690-0013 (h), 360-254-0211 (w/c)	5	A (2)	NW Auto Paint Supply VP (m), Homemaker (f)	Yes	No	Residential	1942	Single family	NI	Wood, concrete	1
3205 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	12/19/03 (survey date)	Resident/owner completed	Mrs. Van Buskirk (survey response by son, Dan)	360-694-2801 (h)	2	A (1)	Retired (f)	Yes	No	Residential	1946	Single family	NI	Wood	1
3207 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3207 YEOMAN AV (QA-ed 8-23-04, LMS)	Fall 2003	12/08/03	Resident/owner completed	Jennifer Mott	360-694-6306	1.5 (NTF, 9-4-04)	C (1), A (2)	Laborer (m), Mother (f)	Yes	No	Residential, rental planned in future	1954 ?	Single family, ranch	NI (NTF, 9-4-04)	Wood, drywall, concrete	1
3208 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3208 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3208 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3208 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	12/29/03	Resident/owner completed	Ray Phelan	360-737-1987 (h)	1	A (3)	Pilot (m), Student (m), Physician's Assistant (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3209 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3203 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, storm windows, vinyl siding	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	NI	NI	NI	No	NA	No
3204 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3204 WEIGEL AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	NI	Poured Concrete	Dry	No	NA	NI
3204 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3204 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3205 XAVIER AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	NI (Yes based on following response)	Seasonally	Yes	On the ground	Whole	NA	Dirt	Cinder block	Dry	NI	NI	No
3205 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation (blown in attic), storm windows	Crawl space	Yes	Seasonally	NI	NI	NI	NA	Dirt	Cinder block	Damp	NI	NI	NI
3207 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3207 YEOMAN AV (QA-ed 8-23-04, LMS)	Insulation, storm windows	Crawl space	Yes	Seasonally	No	NA	NA	NA	Dirt	Cinder block	Dry	NI	NI	No
3208 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3208 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3208 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3208 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	NI	Poured concrete	Dry	No	NA	No
3209 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3203 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	No	Oil furnace	Fuel oil	No	None	Yes	No	No	No	No	No	No	No	No
3204 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3204 WEIGEL AV (QA-ed 9-4-04, NTF)	NI	NA	Remodel in 1982, adding 600 sq ft	Electric wall/baseboard	NI	No	Mechanical fans, bathroom ventilation fan	Yes	Garage (detached)	Garage (detached)	Various rooms	Kitchen	Kitchen	Bathroom	Bathroom	Bathroom
3204 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3204 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3205 XAVIER AV (QA-ed 9-4-04, NTF)	None	NA	No	Hot air circulation, wood stove, electric wall/baseboard	Electric, wood	Wood stove	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	Garage (detached)	Garage (detached), kitchen, laundry room	Garage (detached), bathroom, kitchen, laundry room	Kitchen	Laundry room	Bathroom	Bathroom	Kitchen
3205 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NA	No	Other (gas furnace)	Natural gas	No	Mechanical fan, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	No	Garage (detached)	Kitchen	NI	Kitchen	NI	Bathroom	NI	Bathroom
3207 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3207 YEOMAN AV (QA-ed 8-23-04, LMS)	None	NA	NI	Other: gas (Holly Wally)	Natural gas, electric	No	Mechanical fans	Yes	No	Cabinet	Under sink	No	No	Room	Bathroom	Cabinet
3208 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3208 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3208 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3208 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	Addition 15 yrs ago	Hot air circulation	Natural gas, electric	No	Central air conditioning, mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	No	Yes	No	Yes	Yes	No	No	No
3209 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3203 YEOMAN AV (QA-ed 9-4-04, NTF)	No	No	No	No	No	No	No	No	No	Wall paneling in 3 rooms, masonite in bathroom	No	No	No	
3204 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3204 WEIGEL AV (QA-ed 9-4-04, NTF)	Kitchen	Kitchen	Bathroom	Various rooms	Various rooms	No (based on comment at survey end)	NI	NI	NI	Flooring in remodeled region	No	No	Fertilizer in yard and garden in spring and summer	
3204 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3204 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3205 XAVIER AV (QA-ed 9-4-04, NTF)	Kitchen	Kitchen	Bedroom	Bedroom, garage (detached)	Kitchen	No	No	No	Yes	Crown molding, living room	Yes	No	No	
3205 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	Living room cabinet	NI	Living room cabinet	No	No	No	No	Yes	Paneling on one wall, particle board in cabinet	No	Not in last 3 years	NI	Sometimes standing water in yard, but likely from gutter runoff
3207 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3207 YEOMAN AV (QA-ed 8-23-04, LMS)	Cabinet	No	Room	No	No	No	No	No	No	Living room entertainment center, laundry room desk, bookcases	No	NI	Round-up, only once about mid 2003	
3208 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3208 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3208 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3208 YEOMAN AV (QA-ed 9-4-04, NTF)	Yes	No	No	No	No	Yes	No	Yes	No	Hardwood floors in living room and hall	No	No	No	
3209 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

APPENDIX D

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3209 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/29/04 (survey date)	Resident/owner completed	Sheri Otto	360-699-0548 (h)	5	A (1)	Clerk (f)	Yes	No	Residential	1942	Single family, cottage	NI	Wood	1
3209 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	Wood	1
3210 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/26/04 (survey date)	Resident/owner completed	Pat Pryor	360-693-8870 (h)	1 yr 2 months	A (2)	Retired from LA Fire Prevention work (m)	Yes	No	Residential	1943	Single family, ranch	NI	Wood	1
3210 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3210 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/09/04	Resident/owner completed	Debbi McMillan	360-693-8177 (h), 360- -4242 Ext 5009	11 and 5	C (2), A (2)	Banking (f), Truck driver (m)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3210 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3211 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3211 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	01/30/04 (survey date)	Resident/owner completed	Tangie and WilliamTaves	360-737-1735 and William at work: 503-692-2760	0.5	C (2), A (2)	Acetylene gas plant worker (m), Waitress (f)	Yes	No	Residential	1943	Single family, ranch	NI	Wood	1
3301 FRUIT VALLEY RD		NA	Not Completed													
3302 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1943	NI	1	NI	NI
3302 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3302 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3302 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3209 XAVIER AV (QA-ed 9-4-04, NTF)	Insulation (laid in attic), storm windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	NI	NI	NI
3209 YEOMAN AV	NI	Crawl space	Yes	NI	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3210 UNANDER AV (QA-ed 9-4-04, NTF)	Insulation, storm windows	Crawl space	yes	Open	NI	NI	NI	NA	Dirt	Cinder block?	NI	NI	NI	No
3210 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3210 XAVIER AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Absent in places	NA	Dirt	Poured concrete	Damp	NI	NI	Yes, few (1-3)
3210 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3211 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3211 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, storm windows	Crawl space	Yes	NI	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
3301 FRUIT VALLEY RD														
3302 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3302 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3302 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3302 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3209 XAVIER AV (QA-ed 9-4-04, NTF)	NI	NA	Yes, but when is unknown	Other (gas stove)	Natural gas	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	Crawl space	No	Hall closet	Hall closet	No	Under bathroom sink	Hall closet	Hall closet
3209 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3210 UNANDER AV (QA-ed 9-4-04, NTF)	None	NA	Kitchen and bathroom in 1956	Electric wall/baseboard	Electric	No	Individual air conditioning units	Yes	Lidded garbage can outside	No	No	No	No	Under bathroom sink	Under bathroom sink	Under bathroom sink
3210 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3210 XAVIER AV (QA-ed 9-4-04, NTF)	Small	NA	Crawl space was dug deeper to comply with sale - addition to house was done in '98, new crawl space was added	Hot air circulation, woodstove	Electric, wood	Chimney for wood stove	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	Garage (detached)	Under kitchen sink	Plug-in style	No	No	Bathroom	Bathroom	Yes
3210 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3211 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3211 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NA	Addition, date unknown	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan (interior recirculation only)	Yes	Garage (detached)	No	Bathroom toilet	No	No	No	No	Laundry room shelf
3301 FRUIT VALLEY RD																
3302 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3302 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3302 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3302 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3209 XAVIER AV (QA-ed 9-4-04, NTF)	Under kitchen sink	Hall closet	Bedroom	No	No	No	No	No	Yes	Bedroom paneling	No	4 years ago	Round-Up and Miracle Grow every 2 weeks	
3209 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3210 UNANDER AV (QA-ed 9-4-04, NTF)	No	No	Bathroom	Art room	No	No	No	No	Yes	Wallboard (5'x6') in bedroom	No	No	No	
3210 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3210 XAVIER AV (QA-ed 9-4-04, NTF)	Under kitchen sink	Under kitchen sink	Bedroom	No	No	Yes	No	No	No	Hardwood floors under carpet, plywood in kitchen	No	No	No	"I would like to bring up a health point. Our 5 year of daughter has velo-cardio-facial-syndrome which is a chromosome issue. Study's are happening to see if there are any environmental issues linked to this dis-order."
3210 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3211 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3211 YEOMAN AV (QA-ed 9-4-04, NTF)	Under kitchen sink	No	No	No	No	Outside only	No	No	No	No	No	NI	Weed and Feed Summer 2003	Mold in crawl space
3301 FRUIT VALLEY RD														
3302 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3302 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3302 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3302 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3303 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3303 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/19/03 (survey date)	Resident/owner completed	Steve Harrell	360-695-7010 (h)	3	A (2)	Unemployed (m), Unemployed (m)	Yes	No	Residential	1940	Single family	NI	Wood	1
3303 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	NI	1
3304 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1943	NI	1	NI	NI
3304 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3305 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3305 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	02/18/04	Resident/owner completed	Sheron Gonzales	360-737-9870 (h)	5	A (2)	Caregiver (f), Unemployed (m)	Yes	No	Residential	NI	Single family	NI	Wood	NI
3306 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3306 WEIGEL AV (QA-ed 9-4-04, NTF)	Fall 2003	12/05/03	Resident/owner completed	Scott and Traci Tingley	360-737-9938 (h), 360-699-8856 (w/c)	17	A (2)	Maintenance assistant IV (m), Preschool teacher (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3306 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	12/09/03	Resident/owner completed	Connie Harvester and Christine Eisenbraun-homeowner	360-694-1812 (h)	48	A (2)	Homeowner (f), Care provider (f)	Yes	No	Residential	NI	Single family	NI	Wood, concrete	1
3308 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/29/04 (survey date)	Resident/owner completed	Lori Dickerson	360-694-0822 (h)	11.5	C (3), A (2)	Truck mechanic (m), Homemaker (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3308 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	01/28/04 (survery date)	Resident/owner completed	Mike Spina	360-693-4418 (h)	17	A (2)	Chef instructor (m)	Yes	No	Residential	1943	Single family	NI	Wood	1
3309 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3309 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	12/11/03	Resident/owner completed	Jim Mohagen	360-695-6976 (h)	15	A (1)	NI	Yes	No	Residential	1940's	Single family, cape	NI	Wood, concrete	1
3310 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/29/04	Resident/owner completed	Robert Pfaff	360-696-1689 (h)	9	A (1)	Retired (m)	Yes	No	Residential	NI	Multiple family, duplex	2	Wood	NI

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3303 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3303 XAVIER AV (QA-ed 9-4-04, NTF)	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NA	Dirt	Poured Concrete	Damp	No	NA	NI
3303 YEOMAN AV	Energy-efficient windows	Crawl space	Yes	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3304 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3304 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3305 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3305 YEOMAN AV (QA-ed 9-4-04, NTF)	Storm windows	Crawl space	Yes	Open	No	NA	NA	NA	NI	Poured concrete	Dry	No	NA	No
3306 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3306 WEIGEL AV (QA-ed 9-4-04, NTF)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Cinder block	Dry	No	NA	No
3306 YEOMAN AV (QA-ed 9-4-04, NTF)	Storm windows	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3308 XAVIER AV (QA-ed 9-4-04, NTF)	Insulation, storm windows, other (siding)	Crawl space	Yes	Closed	NI	NI	NI	NA	Dirt	NI	NI	NI	NI	NI
3308 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows, weather stripping	Crawl space	Yes	Seasonally	Yes	On the ground	Torn possibly	NA	Dirt	NI	Dry	NI	NI	No
3309 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3309 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Concrete	Poured Concrete	Dry	No	NA	No
3310 UNANDER AV (QA-ed 9-4-04, NTF)	Storm windows	Crawl space	Yes	NI	Yes	On the ground	Whole	NA	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3303 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3303 XAVIER AV (QA-ed 9-4-04, NTF)	NI	NA	NI	Gas	Natural gas	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	No	Garage (detached)	No	No	Bathroom	No	No	Bathroom
3303 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3304 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3304 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3305 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3305 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	No	Wood stove, electric baseboard	Electric, wood	No	Mechanical fans, individual air conditioning units	Yes	Garage (detached), utility room	Kitchen	No	Kitchen	Utility room	Bathroom	Bathroom	Bathroom
3306 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3306 WEIGEL AV (QA-ed 9-4-04, NTF)	None	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	No	Kitchen	Kitchen	No	Kitchen	Bathroom	No	Kitchen
3306 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NI	No	Other: gas	Natural gas	No	Kitchen range hood fan	NI	NI	NI	NI	NI	NI	NI	NI	NI
3308 XAVIER AV (QA-ed 9-4-04, NTF)	NI	NA	Addition of 1 bedroom	Electric wall/baseboard	Electric	Insert	Bathroom ventilation fan, individual air conditioning units, kitchen range hood fan	Yes	No	No	No	Under bar sink	No	Under bathroom sink	Under bathroom sink	Under bathroom sink
3308 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	Extended back a few feet	Electric wall/baseboard	Electric	NI	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	Shed in back	No	Bathroom	No	No	No	No	Bathroom
3309 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3309 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	No	Hot air circulation	Natural gas, electric	Yes	Bathroom ventilation fan, kitchen range hood fan	Yes	Under kitchen sink, bathroom	No	Under kitchen sink, under bathroom sink	Under kitchen sink, under bathroom sink	No	No	No	Under kitchen sink, under bathroom sink
3310 UNANDER AV (QA-ed 9-4-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	NI	bathroom ventilation fan	No	Shed	Shed	No	No	No	Bathroom	No	Bathroom

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3303 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3303 XAVIER AV (QA-ed 9-4-04, NTF)	No	No	No	Garage (detached)	No	No	No	No	No	Wall paneling	No	No	Wasp pray 1.5 yrs ago	
3303 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3304 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3304 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3305 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3305 YEOMAN AV (QA-ed 9-4-04, NTF)	Kitchen	Kitchen	Bathroom, bedroom	Hall closet	No	Yes	No	No	No	Living room, bedroom	No	No	No	
3306 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3306 WEIGEL AV (QA-ed 9-4-04, NTF)	No	Yes	Bathroom	No	No	No	No	No	No	No	No	No	No	
3306 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NI	NI	NI	NI	Yes	No	No	No	Wall paneling in the front room , the bedroom, and the bathroom	No	No	No	
3308 XAVIER AV (QA-ed 9-4-04, NTF)	Under bar sink	Hall closet	Bathroom medicine cabinet	No	Various rooms	No	No	No	No	Entertainment center, computer table in living room	No	No	Summer 2003	Use an air purifier
3308 YEOMAN AV (QA-ed 9-4-04, NTF)	Kitchen	Kitchen	No	In water heater closet	No	No	No	No	No	Computer table	Yes, a small bathroom rug	Ortho for ants in 2002	Anti-fungal for aphids yearly, and weed and feed yearly	Water treatment plant smelly from time to time
3309 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3309 YEOMAN AV (QA-ed 9-4-04, NTF)	Under kitchen sink, under bathroom sink	Under kitchen sink, under bathroom sink	Under kitchen sink, under bathroom sink	No	No	Yes	No	No	No	No	No	No	No	
3310 UNANDER AV (QA-ed 9-4-04, NTF)	Kitchen	No	Bathroom	No	No	No	No	No	No	Kitchen, living room	No	NI	NI	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3310 WEIGEL AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3310 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/29/04 (survey date)	Resident/owner completed	Maria Guzman	360-695-6992 (h)	3	C (3), A (3)	Advertising (m), Student (f)	Yes	No	Residential	1943	Single family, ranch	NI	Wood	1
3310 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3311 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/04/03	Resident/owner completed	William Taves	h: 360-750-0455, w/c: 503-998-3134	10	A (2)	Plant manager (m), Homemaker (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3311 YEOMAN AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	NI	1
3402 WEIGEL AV (QA-ed 9-4-04, NTF)	Fall 2003	12/04/03	Resident/owner completed	Andrew Kersteter	360-694-8196 (h), 360-901-5486 (w/c)	51	A (3)	Die caster (m), Homemaker (f)	Yes	No	Residential	NI	Single family	1	Wood, concrete base	1
3402 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/26/04	Resident/owner completed	Solomon Tyler	360-258-1938 (h)	5	A (1)	NI	Yes	No	Residential	1941	Single family, ranch	NI	NI	1
3402 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3403 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/26/04 (survey date)	Resident/owner completed	Troy Groat	360-993-0327 (h)	38	A (1)	Pack technician (m)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1
3403 XAVIER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/08/03	Resident/owner completed	Juanita Flynn	NI	23	A (1)	Clerk (f)	Yes	No	Residential	1942	Single family	NI	Wood	1
3403 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	01/28/04 (survery date)	Resident/owner completed	Jon Nielson	360-694-3750 (h)	8	A (2)	Comcastworker (m), Student (m)	Yes	No	Residential	1953	Single family, ranch	NI	Wood	1
3404 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3405 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	12/31/03	Resident/owner completed	Chris Quimby	h: 360-693-3982, w/c: 503-293-1759	24	A (1)	Antique dealer (m)	Yes	No	Residential	NI (1942?)	Single family	NI	Wood	1
3406 XAVIER AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	NI	1
3406 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	02/02/04	Resident/owner completed	Ronald and Roxy Roy	360-737-0206 (h)	0.75	C (1), A (3)	Telecom installer (m), Homemaker (f), Cashier (f)	Yes	No	Residential	NI (1942?)	Single family, ranch	NI	Wood	1
3407 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	2	NI	NI
3407 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	01/08/04	Resident/owner completed	Chris & Yvonne Edgell	h: 360-737-3880, Yvonne w: 360-693-2521	3	C (2), A (2)	Merchandiser (m), Retail clerk (f)	Yes	No	Residential	1942	Single family, ranch	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3310 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3310 XAVIER AV (QA-ed 9-4-04, NTF)	Insulation, storm windows	Crawl space	Yes	NI	Yes	On the ground	Whole	NA	Dirt	Cinder block?	Dry	NI	NI	No
3310 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3311 XAVIER AV (QA-ed 9-4-04, NTF)	Insulation, storm windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Wood	NI	Damp	No	NA	No
3311 YEOMAN AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3402 WEIGEL AV (QA-ed 9-4-04, NTF)	Insulation	Crawl space	Yes	Seasonally	No	NA	NA	NA	Dirt	NI	NI	NI	NI	No
3402 XAVIER AV (QA-ed 9-4-04, NTF)	Energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NA	NI	NI	NI	NI	NI	No
3402 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3403 UNANDER AV (QA-ed 9-4-04, NTF)	Insulation (blown in), storm windows	Crawl space, enlarged as root cellar	Yes	Seasonally	No	NA	NA	NA	Dirt	Cinder block	Damp	NI	NI	NI
3403 XAVIER AV (QA-ed 9-4-04, NTF)	NI	Crawl space	NI	Seasonally	No	NA	NA	NA	Dirt	Cinder block	Damp	NI	NI	NI
3403 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Absent in places, torn	NA	Dirt	Cinder block	NI	NI	NI	NI
3404 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3405 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Seasonally	Yes	On the ground	Whole	NA	Dirt	Cinder block	Damp in spots in winter, dry otherwise	NI	NI	No
3406 XAVIER AV	NI	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3406 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
3407 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3407 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Cinder block	Dry	NI	NI	No

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3310 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3310 XAVIER AV (QA-ed 9-4-04, NTF)	None	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan	Yes	No	Shed	Bathroom	No	No	Bedroom dresser	No	Under bathroom sink
3310 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3311 XAVIER AV (QA-ed 9-4-04, NTF)	None	NA	No	Electric wall/baseboard	Electric	NI	Mechanical fans	Yes	No	Storage building	No	No	No	Bathroom	Bathroom, bedroom	No
3311 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3402 WEIGEL AV (QA-ed 9-4-04, NTF)	None	NA	No	Wood stove, electric wall/baseboard	Wood	No	Bathroom ventilation fan	NI	No	No	Yes	Yes	Yes	No	No	Yes
3402 XAVIER AV (QA-ed 9-4-04, NTF)	None	NA	NI	Electric wall/baseboard	Electric, natural gas	No	Bathroom ventilation fan	Yes	Garage (detached)	Garage (detached)	Garage (detached)	Under kitchen sink	No	Under bathroom sink	Under bathroom sink	Under bathroom sink
3402 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3403 UNANDER AV (QA-ed 9-4-04, NTF)	NI	Utility conduits	No	Other (forced air)	Natural gas	Yes	Mechanical fans, bathroom ventilation fan (not working)	Yes	Backroom (converted garage)	Backroom (converted garage)	No	No	No	No	No	Under bathroom sink
3403 XAVIER AV (QA-ed 9-4-04, NTF)	NI	NA	No	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan, other (doors)	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes
3403 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NA	No	Gas furnace	Natural gas	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan (interior recirculation only)	Yes	Garage (detached)	Garage (detached)	No	No	Under bathroom sink, kitchen cabinet	No	No	Bathroom
3404 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3405 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	NI	Hot air circulation	Natural gas, electric	No	Individual air conditioning units	Yes	Garage (detached)	No	No	No	No	No	No	Bathroom
3406 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3406 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Bathroom ventilation fan, kitchen range hood fan	Yes	No	Under kitchen sink	Bathroom	Under kitchen sink	Under kitchen sink	Bathroom shelf	Bathroom shelf	Under sink
3407 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3407 YEOMAN AV (QA-ed 9-4-04, NTF)	None	NA	NI	Hot air circulation, electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	No	No	Garage (detached)	Bathroom	House closet	Kitchen

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3310 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3310 XAVIER AV (QA-ed 9-4-04, NTF)	Under kitchen sink	Under kitchen sink	Bedroom	Bedroom closet	Under kitchen sink	No	No	No	No	No	No	No	No	
3310 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3311 XAVIER AV (QA-ed 9-4-04, NTF)	No	No	No	No	No	No	No	No	No	Living room, dining area, hall	No	No	No	
3311 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3402 WEIGEL AV (QA-ed 9-4-04, NTF)	Yes	Yes	Yes	Yes	No	No	Yes	No	No	Walls	No	No	No	
3402 XAVIER AV (QA-ed 9-4-04, NTF)	Under kitchen sink	Under kitchen sink	Bathroom cabinet	No	No	No	No	No	No	Living room wall	No	No	No	
3402 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3403 UNANDER AV (QA-ed 9-4-04, NTF)	No	Under kitchen sink	Bathroom cabinet	Dining room cupboard	No	Yes	No (room now)	No	No	Entertainment center, paneling	No	No	No	Dusty region
3403 XAVIER AV (QA-ed 9-4-04, NTF)	Yes	Yes	Yes	No	No	Yes	No	No	No	Paneling (all rooms), plywood floor	No	No	No	
3403 YEOMAN AV (QA-ed 9-4-04, NTF)	Under kitchen sink	Under kitchen sink	No	Bedrooms	No	No	No	No	No	No	New couch	Flea killer 2 x yearly	Weed killer yearly	Odor from water treatment facility
3404 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3405 YEOMAN AV (QA-ed 9-4-04, NTF)	No	No	Bedroom, bathroom	No	No	No	No	No	No	Kitchen counter top, misc. shelves	No	No	No	
3406 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3406 YEOMAN AV (QA-ed 9-4-04, NTF)	No	Under sink	Bathroom shelf	No	No	No	No	No	No	Wall paneling	No	No	No	
3407 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3407 YEOMAN AV (QA-ed 9-4-04, NTF)	No	No	Hall closet	No	No	No	No	No	No	Entertainment center	No	Bug bombs under house summer 2003	No	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3408 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/28/04 (survery date)	Resident/owner completed	Annabelle Caba	360-906-1400 (h)	2	C (1), A (3)	Fiberglass production	Yes	No	Residential	NI (1942?)	Single family, cape	NI	Wood	1
3408 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3408 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3409 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/26/03	Resident/owner completed	Irene Fant (?)	NI	1	C (1), A (2)	Billing (f), Tech support (m)	Yes	No	Residential	NI (1942?)	Single family, ranch	NI	Wood	1
3409 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3410 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/11/03	Resident/owner completed	Edith Waring	360-695-3919 (h)	27	A (1)	Retired (f)	Yes	No	Residential	1942	Single family, tract	NI	Wood, brick, vinyl siding	NI
3410 WEIGEL AV	Fall 2003	January 2004	AMEC exterior visual	NI	NI	NI	NI	NI	NI	NI	Residential	1942	NI	1	NI	1
3410 XAVIER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	2	NI	NI
3410 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3412 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	01/28/04 (survery date)	Resident/owner completed	Jack Hudson	360-696-0086 (h)	8	A (2)	Truck Driver (m)	Yes	No	Residential	1952	Single family, cottage	NI	Wood	1
3414 UNANDER AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3416 UNANDER AV (QA-ed 9-4-04, NTF)	Fall 2003	12/22/03 (survey date)	Resident/owner completed	Marline Wanamaker and Julie Grendahl	360-695-8830 (h) (calls to daughter Marline Wanamaker @ 360-696-1456)	41	A (2)	Retired (f), Retired (m)	Yes	No	Residential	Early 1940's	Single family	NI	Wood	1
3502 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	12/05/03	Resident/owner completed	David Norton	360-771-7212 (h), 503-240-7686 (w/c)	3	A (1)	Lab tech (m)	Yes	No	Residential	NI	Single family, ranch	NI	Wood, concrete, brick	1
3503 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	2	NI	NI
3504 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	2	NI	NI
3507 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3508 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	01/08/04	Resident/owner completed	Joni M. Piercy	360-258-5621	4	C (1), A (3)	SSD (f), SSI (f), Night motel auditor (m)	Yes	No	Residential	1940's	Single family, split level	NI	Wood	1

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3408 UNANDER AV (QA-ed 9-4-04, NTF)	Insulation (?), energy-efficient windows	Crawl space	Yes	Open	NI	NI	NI	NA	NI	NI	NI	NI	NI	NI
3408 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3408 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3409 UNANDER AV (QA-ed 9-4-04, NTF)	Energy-efficient windows	Crawl space	Yes	NI	Yes	On the ground	Whole	NA	Dirt	NI	Dry	NI	NI	No
3409 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3410 UNANDER AV (QA-ed 9-4-04, NTF)	Energy-efficient windows	Concrete slab/Crawl space Combination	Yes	Open	Yes	On the ground, attached to the floor joist	Whole	NA	Dirt	Cinder block	Dry	No	NA	Yes, few (1-3)
3410 WEIGEL AV	Storm windows	Crawl space	Yes	Open	NI	NI	NI	NI	NI	Cinder block	NI	NI	NI	NI
3410 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3410 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3412 UNANDER AV (QA-ed 9-4-04, NTF)	Insulation, storm windows, energy-efficient windows	Crawl space	Yes	Open	Yes	On the ground	Whole	NA	Dirt	Poured concrete	Dry	NI	NI	No
3414 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3416 UNANDER AV (QA-ed 9-4-04, NTF)	Insulation, storm windows	Crawl space	No	NA	No, don't think so	NA	NA	NA	Dirt	Poured Concrete	Dry (uncertain)	NI	NI	NI
3502 YEOMAN AV (QA-ed 9-4-04, NTF)	Insulation, energy-efficient windows	Crawl space	Yes	Some opened some closed	Yes	On the ground	Whole	NA	Dirt	Poured concrete, cinder block	Dry	No	NA	NI
3503 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3504 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3507 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3508 YEOMAN AV (QA-ed 9-4-04, NTF)	Storm windows, energy-efficient windows	Concrete slab	NA	NA	NA	NA	NA	NA	Concrete	NA	NI	NA	NA	NI

APPENDIX D

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3408 UNANDER AV (QA-ed 9-4-04, NTF)	NI	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	Under kitchen sink	Under kitchen sink	Under bathroom sink	Bathroom counter	No	Under bathroom sink
3408 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3408 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3409 UNANDER AV (QA-ed 9-4-04, NTF)	None	NA	No	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, individual air conditioning units	Yes	No	Under sink	No	No	Under sink	No	No	Closet
3409 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3410 UNANDER AV (QA-ed 9-4-04, NTF)	2 feet	NA	No	Electric wall/baseboard	Electric, wood	Yes	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	No	No	Under kitchen sink	Bathroom	Bathroom	Bathroom cabinet
3410 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	Yes	NI	NI	NI	NI	NI	NI	NI	NI
3410 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3410 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3412 UNANDER AV (QA-ed 9-4-04, NTF)	None	NA	Addition	Electric wall/baseboard	Electric	No	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	Garage (detached)	Laundry room	Laundry room	Laundry room	Bathroom	Laundry room	Bathroom
3414 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3416 UNANDER AV (QA-ed 9-4-04, NTF)	NI	NA	Additions and then interior about 10 yrs ago	Electric wall/baseboard, wood stove	Electric, wood	Wood stove	Mechanical fans, bathroom ventilation fan, individual air conditioning units, kitchen vent (not over range)	Yes	Garage (detached)	Garage (detached)	Various rooms	No	Laundry room	Bathroom	Bathroom	Laundry utility
3502 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NA	No	Hot air circulation, wood stove, electric wall/baseboard	Electric, wood	Yes	Mechanical fans, bathroom ventilation fan, kitchen range hood fan	Yes	Garage (detached)	House	House	No	No	No	No	No
3503 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3504 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3507 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3508 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NA	NI	Electric wall/baseboard	Electric	No	Mechanical fans, kitchen range hood fan	NI	Garage (attached)	No	Kitchen, bathroom	Under kitchen sink	Under kitchen sink	Under bathroom sink	Under bathroom sink	Under bathroom sink

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3408 UNANDER AV (QA-ed 9-4-04, NTF)	Under bathroom sink	No	Bedroom	Closet in spare bedroom	No	No	No	Yes	No	Living room, bedroom	No	No	No	
3408 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3408 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3409 UNANDER AV (QA-ed 9-4-04, NTF)	No	No	Bathroom	No	No	No	No	No	No	No	No	No	No	
3409 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3410 UNANDER AV (QA-ed 9-4-04, NTF)	Kitchen cabinet	Kitchen cabinet	Bedroom	Garage (detached)	No	No	No	No	No	Wood floor, wall paneling, particle board	No	Carpenter ant treatment 4 years ago, pest control every 6 months	Roundup once a year	
3410 WEIGEL AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3410 XAVIER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3410 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3412 UNANDER AV (QA-ed 9-4-04, NTF)	Laundry room	Laundry room	Bathroom	Garage (detached)	No	Outside only	No	No	No	Hardwood floors covered with carpet	No	No	Weed and Feed in summer	
3414 UNANDER AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3416 UNANDER AV (QA-ed 9-4-04, NTF)	Laundry utility	Laundry utility	Bedroom, bathroom	No	No	No	No	No	No	Laminate on floor	No	No	No	Public water tastes funny and smells like sulfur
3502 YEOMAN AV (QA-ed 9-4-04, NTF)	No	No	House	No	No	No	No	No	No	Hardwood floors	No	No	No	
3503 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3504 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3507 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3508 YEOMAN AV (QA-ed 9-4-04, NTF)	Kitchen	No	Bedrooms	No	No	Outside only	Yes	No	No	Bathroom, bedroom	No	No	No	

SITE STREET ADDRESS	SURVEY DISTRIBUTION DATE (e.g., Fall 2003)	DATE SURVEY RECEIVED	METHOD OF SURVEY COMPLETION	RESIDENT NAME	RESIDENT PHONE NUMBER	YEARS OCCUPIED BY CURRENT RESIDENT	NUMBER OF RESIDENTS (C = Child, A = Adult)	RESIDENTS' OCCUPATIONS	PUBLIC WATER SUPPLY?	PRIVATE WELL AND USAGE?	PRIMARY USE OF RESIDENCE	YEAR BUILT	BUILDING TYPE	UNITS	PRIMARY BUILDING MATERIAL	STORIES
3510 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3512 YEOMAN AV	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI
3514 YEOMAN AV	Fall 2003	12/22/03 (survey date)	Resident/owner completed	Tammie Trump	360-693-8184 (h)	0.5	C (1), A (2)	Truck driver, Cashier	Yes	No	Residential	1940's	Single family	NI	Wood	1
3516 YEOMAN AV (QA-ed 9-4-04, NTF)	Fall 2003	NA	Not completed	NI	NI	NI	NI	NI	NI	NI	NI	1942	NI	1	NI	NI

		NA														
		NA														
		NA														
		NA														
		NA														
		NA														
		NA														
		NA														

Multiple Units
No address available from county database
Residence previously surveyed - Winter 2002 response
Residence previously surveyed - Fall 2003 response
Address listed on map - no accompanying info in county database

SITE STREET ADDRESS	WEATHERIZATION	FOUNDATION TYPE	FOUNDATION VENTILATED?	VENTS OPEN, CLOSED, OR SEASONALLY OPENED?	IF CRAWL SPACE, LINED WITH PLASTIC?	POSITION OF PLASTIC?	CONDITION OF PLASTIC?	BASEMENT FINISHED OR UNFINISHED?	FOUNDATION FLOOR	FOUNDATION WALLS	FOUNDATION MOISTURE	BASEMENT SUMP	BASEMENT SUMP PUMP	FOUNDATION CRACKS
3510 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3512 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3514 YEOMAN AV	No	Crawl space	NI	NI	NI	NI	NI	NA	Concrete (looks newer than house)	NI	NI	NI	NI	NI
3516 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	CRACK SIZE RANGE	BASEMENT VAPOR ENTRY	ALTERED BY CONSTRUCTION	HEAT TYPE	FUELS USED	FIREPLACE	VENTILATION	ROOF VENTS	PAINTS	CLEANING SOLVENTS	AIR FRESHENERS	OVEN CLEANERS	CARPET/ UPHOLSTERY CLEANERS	HAIRSPRAY	NAIL POLISH/ REMOVER	BATHROOM CLEANER
3510 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3512 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
3514 YEOMAN AV	NI	NA	Likely, but unknown	Electric wall/baseboard	Electric	Yes, but sealed off, chimney remains	mechanical fans	Yes	Laundry utility	No	Various rooms	Garage (detached)	No	Bathroom , bedroom	Bathroom , bedroom	Under kitchen sink
3516 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

SITE STREET ADDRESS	APPLIANCE CLEANER	FURNITURE/ FLOOR POLISH	PERFUME/ COLOGNES	HOBBY SUPPLIES	SCENTED TREES, WREATHS, POTPOURRI	SMOKERS	ATTACHED GARAGE	DRY CLEANING	REMODELING OR PAINTING	PRESSED WOOD	NEW UPHOLSTERY, DRAPES, OR TEXTILES	HOUSE TREATED WITH INSECTICIDES/ HERBICIDES	YARD TREATED WITH INSECTICIDES/HERBICIDES	ADDITIONAL BUILDING FEATURES, AND NOTES
3510 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3512 YEOMAN AV	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	
3514 YEOMAN AV	Under kitchen sink	Under kitchen sink	Bathroom, bedroom	Garage (detached)	Various rooms	Yes	No	No	No	Wood paneling in front room	No	Ant farms in various places	Blackberry spray (EnvSafe) in summer 2003, raid within last month	Public water tastes funny and smells like sulfur
3516 YEOMAN AV (QA-ed 9-4-04, NTF)	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	

APPENDIX E

AS/SVE As-Built Drawings and Supporting Information

AIR SPARGING AND SOIL VAPOR EXTRACTION REMEDIATION SYSTEM INSTALLATION AND STARTUP REPORT

CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

Submitted to:
Washington State Department of Ecology
Vancouver Field Office
2108 Grand Boulevard
Vancouver, Washington 98661-4622

Submitted by:
AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

On Behalf of:
Cadet Manufacturing Company
2500 West Fourth Plain Boulevard
Vancouver, Washington 98660

4-61M-10135-K

April 2004

amec

April 30, 2004

4-61M-10135-K

Mr. Craig Rankine
Site Manager/Hydrogeologist
Washington State Department of Ecology
2108 Grand Boulevard, MS: S-70
Vancouver, Washington 98661-4622

Dear Mr. Rankine:

Re: Air Sparging and Soil Vapor Extraction Remediation System Installation and Startup Report Cadet Manufacturing Company 2500 West Fourth Plain Boulevard Vancouver, Washington

AMEC Earth & Environmental, Inc. is pleased to submit this Air Sparging and Soil Vapor Extraction Remediation System Installation and Startup Report for the above-referenced Site.

If you have any questions or would like additional information, please feel welcome to contact me at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

John L. Kuiper, L.G.
Principal

JLK/va

c: Mr. Craig Peterson, Cadet Manufacturing Company
Ms. Barbara Trejo, Washington State Department of Health

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List of Abbreviations, Acronyms, and Key Terms

AMEC	AMEC Earth & Environmental, Inc.
AS	air sparging
AS/SVE	air sparging/soil vapor extraction
bgs	below ground surface
Cadet	Cadet Manufacturing Company
cfm	cubic feet per minute
1,1-DCE	1,1-dichloroethene
cis-1,2-DCE	cis-1,2-dichloroethene
Installation Report	Air Sparging and Soil Vapor Extraction Remediation System Installation and Startup Report
Ecology	Washington State Department of Ecology
GAC	granular activated carbon
HDPE	high density polyethylene
HVOCs	halogenated volatile organic compounds
IRAM	interim remedial action measure
lb/day	pounds per day
μg/ kg	micrograms per kilogram
μg/L	micrograms per liter
μg/m^3	micrograms per cubic meter
O&M	operation and maintenance
PCE	tetrachloroethene
PID	photoionization detector
ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
Site	Cadet Manufacturing Company, 2500 W. Fourth Plain Boulevard, Vancouver, Washington
SVE	soil vapor extraction
1,1,1-TCA	1,1,1-trichloroethane
1,1,2-TCA	1,1,2-trichloroethane
TCE	trichloroethene
TCLP	Toxic Characteristic Leaching Procedure
VOC	volatile organic compound

1.0 INTRODUCTION

AMEC Earth & Environmental, Inc. (AMEC) has prepared this Air Sparging and Soil Vapor Extraction Remediation System Installation and Startup Report (Installation Report) to summarize the installation and activation of the remediation system at the Cadet Manufacturing Facility in Vancouver, Washington. The installation of an air sparging (AS) system and the expansion of the existing soil vapor extraction (SVE) system were conducted as a groundwater source control interim remedial action measure (IRAM) for the Site.

The design and implementation of this IRAM for groundwater is being conducted under Agreed Order No. 00TCPVA-847, dated January 2000. The agreement was entered into between the Cadet Manufacturing Company (Cadet) and the Washington State Department of Ecology (Ecology). This Installation Report includes a summary of background information, an overview of the air sparging/soil vapor extraction (AS/SVE) system design, a detailed description of the AS/SVE system installation and startup activities, well construction logs, As-Built Drawings, and a system Operation and Maintenance (O&M) Manual.

2.0 BACKGROUND

2.1 Site Description

The Cadet Manufacturing facility (Site) consists of one 15,750-square-foot manufacturing/office building with associated asphalt and gravel parking areas (Figures 1 and 2). The Site is located at 2500 West Fourth Plain Boulevard in Vancouver, Washington. Two paved access roads enter the south side of the Site from West Fourth Plain Boulevard.

The Site lies on the relatively flat floor of the Columbia River Valley. The Columbia River is located approximately 0.5 miles southwest of the Site, and Vancouver Lake is located approximately 1.75 miles to the northwest of the Site (Figure 1). The Site elevation is approximately 25 feet above mean sea level.

Since the mid-1960s, the Site has operated as an electric heater manufacturing facility. The Site was an orchard prior to being developed for its current use. Further details on Site history and setting are summarized in the Remedial Investigation Report (AMEC, 2003b).

2.2 Environmental History

Chemical analytical data have been collected since the discovery of trichloroethene (TCE) contamination in 1993 (AMEC, 2003a). Since 1999, AMEC has completed numerous investigations to characterize the nature and extent of halogenated volatile organic compounds (HVOCs) in the Site and vicinity soil and groundwater. Data collected from over 200 borings and monitoring wells have indicated impacts to soil from multiple HVOCs, including: TCE, tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), cis-1,2-dichlorethene (cis-1,2-DCE), methylene chloride, and bromomethane. The HVOC levels in soil beneath the paint room inside the Site building, as well as outside and to the east of the Site building are higher than what has been observed elsewhere.

HVOC impact to groundwater was detected on- and off-Site, with the greatest impact observed beneath the paint room and east of the Site building in shallow groundwater (less than 60 feet below ground surface [bgs]). Dissolved-phase TCE extends generally to the east and southeast into the adjacent Fruit Valley Neighborhood (FVN). Most TCE levels in groundwater are a few hundred micrograms per liter (μg/L). HVOC migration patterns indicate that HVOCs are separate from those reported at the nearby former Swan manufacturing site on Port of Vancouver property. Intermediate (80 to 90 feet bgs) groundwater quality is similar to shallow groundwater quality, but deep (150 to 175 feet bgs) groundwater has diminished HVOC impact.

Additional information regarding Site investigations is summarized in several reports including AGRA 1999-2000b and AMEC 2000-2003f.

3.0 ORIGINAL SVE REMEDIATION SYSTEM

AMEC installed and activated an on-Site SVE system in May 2002. This system operated through June 2003 when it was temporarily shut down and incorporated into the current and expanded AS/SVE system, as described in this report. The remedial action objective for the original SVE system was to capture and treat soil vapors in the source area vadose zone soils at the Site. The installation and activation of the original system is described in the Soil Vapor Extraction System Installation and Startup Report (AMEC, 2002b). A summary of the original SVE system operation and maintenance since its activation in May 2002 through its shut-down in June 2003 is provided in the RI Report (AMEC, 2003b); in the Semi-Annual Groundwater Monitoring Report 2002/2003 (AMEC, 2003f); and in the forthcoming Semi-Annual Groundwater Monitoring Report 2003.

The original SVE system consisted of thirteen SVE wells, including eight vertical SVE wells (VE-1, VE-3, VE-4, and VE-8 to VE-12), three angled SVE wells (VE-5 to VE-7), and two horizontal SVE wells (HVE-1 and HVE-2). Six of the SVE wells (VE-9 to VE-12, HVE-1, and HVE-2) were installed inside the Site building near the paint room. The remaining seven SVE wells (VE-1 and VE-3 to VE-8) were installed in the parking area along the eastern boundary of the Site. Subsurface piping connected each well to the SVE equipment compound, formerly located in the paint room. Granular activated carbon (GAC) vessels were used to treat extracted soil vapors before being discharged to the atmosphere.

4.0 AS/SVE SYSTEM DESIGN SUMMARY

AMEC prepared an "Air Sparging and Soil Vapor Extraction Remediation System Design" report (Design Report; AMEC, 2003e) that described the details of the AS/SVE system design, including subsurface conditions, remedial action objectives, AS/SVE system components, controls and failsafe functions, activation, contingency monitoring, and O&M procedures. The Design Report included the AS/SVE system plans and specifications that were used for bidding and installation purposes. With the exception of some deviations as described in Section 7.0 of this report, the system installation generally followed the design plans. This report and the AS/SVE System As-Built Drawings as presented in Appendix A, document the AS/SVE system installation process and the as-built configuration of the AS/SVE.

5.0 PREINSTALLATION ACTIVITIES

5.1 Permitting

Agreed Order No. 00TCPVA-847 serves as the regulatory compliance mechanism for the general installation and operation of the AS/SVE system at the Site. Regulatory issues related to air emissions from remediation systems are handled directly with Ecology. For regulatory compliance of the AS/SVE system air discharge, modifications were made to the Notice of Construction previously submitted to Ecology as part of the design of the original SVE system.

In addition, specific permitting approvals were obtained for electrical equipment installations. The permit to complete the electrical work was obtained by the electrical installation contractor from the City of Vancouver.

5.2 Bid Administration

AMEC managed subcontractor and vendor bidding processes for the system installation work. Contracts were awarded to bidding firms based on proposed costs, experience, and/or familiarity with the Site. The excavation, subsurface piping installation, and fencing work were awarded to Munitor Construction of Portland, Oregon. Geo-Tech Explorations, Inc. of Tualatin, Oregon, was awarded the well installation work. The control panel construction was awarded to Powers of Automation of Bend, Oregon. Progress Electric of Battle Ground, Washington was awarded the electrical installation work. Components of the AS/SVE system (e.g., blowers, tanks, compressors, piping, fittings, sensors, and other components) were purchased based on product quality, price, and availability.

6.0 AS/SVE SYSTEM INSTALLATION

The installation of the AS/SVE system was performed from June through October 2003. AS and SVE wells were installed at the Site beginning on June 6, 2003. Installation activities associated with components of the system inside the Site building occurred during an already scheduled facility shutdown from June 28 to July 13, 2003 so that disruption to facility operations would be minimized. Most system components located outdoors were installed after the indoor work was completed. Installation initially occurred during weekdays, but later was staged during evening and weekend hours due to concerns that excavation equipment might interfere with operation of a paint system inside the facility. Aboveground piping and compound equipment were installed by AMEC personnel following completion of the excavation-related activities. Photos of the system installation activities and the completed system compound are presented in Appendix B.

6.1 Well Installations

The AS/SVE system includes 73 AS wells and 39 SVE wells, including the 13 original SVE system wells. A combination of vertical, angled, and horizontal AS and SVE wells maximize lateral and vertical coverage of the AS/SVE remediation system and minimize disruptions to Site facility operations. Well drilling and installation were completed in June 2003. Locations of the AS and SVE wells are shown in Sheets C-3 and C4 of the As-Built Drawings (Appendix A-1). Table 1 summarizes well specifications, including well identifications, locations, and completion depths. Well construction logs are presented in Appendix C.

6.1.1 AS Wells

Each vertical AS well was installed with hollow-stem auger drilling technology. A small truck-mounted drilling rig and a limited access, propane-powered rig were used to install the AS wells inside the building. Indoor wells were installed in 8-inch diameter borings. Outdoor wells were installed in 10-inch diameter borings. The locations of the newly installed AS wells are shown in As-Built Drawing Sheets C3 and C4 (Appendix A-1).

Outdoor angled AS wells were installed using a casing advancing system with 4-inch diameter casings and a tri-cone bit. Potable water was used during drilling to remove cuttings from each borehole. Angled wells generally were installed at 45° from vertical.

Each AS well was equipped with 5 feet of pre-packed, polyvinyl chloride (PVC) screen installed near the bottom of the well. The pre-packed screens consisted of:

- A 2-inch diameter, 0.020-inch slotted, PVC inner screen,
- A 3.5-inch diameter, 0.020-inch slotted, PVC outer screen, and
- An 8-12 sieve-size filter sand pack between the screen annulus.

Each AS well was completed with 2-inch, Schedule 40, PVC well casings placed above the pre-packed screen. The annulus space was filled with 8-12 sieve-size sand. From approximately 2 feet above the screen to near the surface, the annulus space was filled with hydrated bentonite chips and/or bentonite grout. Well construction logs are included in Appendix C. Typical remediation well construction details are summarized in Table 1 and shown in Sheet C-5 of the As-Built Drawings (Appendix A-1).

6.1.2 SVE Wells

Five horizontal SVE wells (VE-30 to VE-34) were installed indoors, and 17 vertical SVE wells (VE-13 to VE-29) and four vertical monitoring points (MP-1 to MP-4) were installed outdoors. The vertical and angled SVE wells were installed in 12-inch diameter boreholes drilled with hollow-stem auger technology. The locations of the newly installed SVE wells are shown in As-Built Drawing Sheets C3 and C4 (Appendix A-1).

The new vertical SVE wells consist of 4-inch diameter, Schedule 40, PVC well casings and screens. Screen intervals on the vertical wells extend from a depth of approximately 5 to 30 feet, depending on the location of the well. The horizontal wells consist of 2-inch diameter, Schedule 40, PVC, 0.020-inch slotted screens installed inside shallow trenches approximately two feet below the facility concrete slab. Well specification details are summarized in Table 1 and the well logs (Appendix C). Typical construction details of the SVE wells also are shown on As-Built Drawing Sheet C-6 (Appendix A-1).

6.2 Trenching and Piping Installation

The AS/SVE wells are connected to the system equipment compound through a network of subsurface piping placed in trenches and aboveground piping (e.g., remote AS manifolds). Indoor subsurface piping was installed during an already scheduled facility shutdown between June 28 and July 13, 2003. The remainder of the subsurface piping was installed in July and August 2003. The subsurface piping installation work involved excavating trenches, installing piping in the trenches, testing the piping, backfilling and compacting, and resurfacing.

6.2.1 Excavation and Trenching Activities

The excavation contractor performed excavation, trenching, subsurface piping installation, compound slab construction, and fencing installation activities. Subsurface installation began on June 28, 2003, with saw cutting of the indoor concrete slab. Limited-access excavation equipment was used to remove the concrete and excavate soils from trenches to approximately 18 inches below floor grade. Concrete was transported off-Site for recycling as clean construction debris.

During trench excavation inside the Site building, volatile organic compound (VOC)-impacted soils were encountered near horizontal SVE well VE-34. Elevated VOC levels were measured with a photo-ionization detector (PID), which triggered characterization of the impacted soils. One soil sample was obtained from the impacted area and submitted to North Creek Analytical Laboratories (NCA; Beaverton, Oregon) for VOC testing by EPA Method 8260B. Data indicated the presence of PCE and TCE at 2,560 and 2,780 micrograms per kilogram (μg/kg), respectively. Approximately six cubic yards of impacted soils were excavated from a 40-square-foot area to a depth of four feet. The impacted soils were temporarily stored on-Site and were eventually transported off-Site for disposal at Waste Management's Hillsboro Landfill in Hillsboro, Oregon. No other impacted soils were observed during the trenching and excavation activities.

Non-impacted, excavated soil and drilling soil cuttings were temporarily managed in a bermed and lined stockpile at the western edge of the Site. Although no field-screening evidence of contamination was observed, laboratory testing indicated low levels of TCE were present in the stockpiled soil, ranging from 59.5 to 90.1 μg/kg.

Following characterization, a total of 1,969 tons of soil were transported off-Site for disposal at the Hillsboro Landfill.

6.2.2 Subsurface Piping Installation

Subsurface piping is a 1.25-inch diameter high-density polyethylene (HDPE) piping that connects the AS wells to either the remote manifolds or directly to the main compound. To connect each remote manifold to the equipment compound, 3-inch diameter, Schedule 80, PVC piping was installed in the trenches.

Various diameters of Schedule 40 PVC piping were used in the subsurface to connect the SVE wells to the equipment compound located adjacent to the east side of the Site building. In general, greater distances between the SVE wells and the equipment compound required the use of 4-inch-diameter or larger piping. The locations and details of the subsurface piping are documented in the As-Built Drawings as presented in Appendix A-1.

6.3 Compound Construction

An equipment compound, consisting of a 50-foot x 20-foot concrete slab surrounded by cyclone security fencing, was constructed adjacent to the east side of the facility, as shown in the As-Built Drawings presented in Appendix A-1. The current configuration of the AS/SVE equipment located in the compound is shown in As-Built Drawing Sheet C-8 and in the photo logs as presented in Appendix B. The equipment compound contains two AS blowers, one AS compressor, three AS system control manifolds, four SVE blowers, two SVE system control manifolds, SVE system influent and effluent piping, three moisture separator tanks, six GAC air treatment units, and electrical control equipment. The equipment compound and each of the five remote AS manifolds are located inside locked security fencing.

6.4 Aboveground Piping Installation

Two AS rotary lobe blowers and an AS compressor are used to deliver the compressed air to eight AS control manifolds. Individual valves and air flow meters located on the AS manifolds provide control of airflow to each AS well. Pressure hose piping and galvanized steel piping are installed to connect each rotary lobe blower and the compressor to the AS manifolds in the main equipment compound. The AS manifold in the compound and the AS remote manifolds are constructed with galvanized steel pipe. In general, galvanized steel piping was installed approximately 1 to 2 feet bgs where AS piping transitioned from the subsurface to aboveground.

Details of AS piping locations, depths, types, and sizes are shown in the As-Built Drawings as presented in Appendix A-1.

Schedule 40, PVC piping was used for most aboveground piping and connections in the SVE system. Valves were installed on the SVE manifolds to provide control of airflow to each SVE well. A galvanized, sheet-metal duct connects the SVE blowers to the GAC units, and conveys the treated effluent air to a discharge stack located along the roof of the Site building adjacent to the compound. Details of SVE pipe locations, depths, types, and sizes are shown in the As-Built Drawings (Appendix A-1).

6.5 Equipment Installation

Major equipment of the AS/SVE system includes two rotary positive-displacement AS blowers, one rotary scroll AS compressor, four regenerative SVE blowers, three SVE moisture separator tanks, six GAC air treatment units, and two system control panels. The AS/SVE system equipment was installed in September and October of 2003, after the subsurface and most of the aboveground piping installation was completed. The locations and configuration of the system equipment are shown in the As-Built Drawings (Appendix A-1).

The AS blowers manufactured by Sutorbilt (model 6H-LegendP), are capable of generating 15 pounds per square inch (psi) gauge pressure. The AS blowers were installed inside weatherproof, ventilated sound enclosures.

The AS compressor is manufactured by Powerex and is a rotary scroll compressor (Model SED 1007), capable of generating 100 psi gage pressure. The AS compressor is equipped with a custom-ventilated sound enclosure. AS piping was configured so that the AS compressor supplies air to four deep AS wells, while the rotary lobe blowers deliver air to approximately half of the shallower AS wells (e.g. to one of two AS Well Groups) at one time. The wells included in AS Well Groups 1 and 2 are listed in Table 2.1.1 of the O&M Manual presented in Appendix A.

The four SVE blowers (Rotron model 808) are installed inside ventilated sound enclosures and connected to three moisture separators, which consist of one 200-gallon tank and two 55-gallon tanks. The moisture separator tanks are installed upstream of each SVE blower to protect the blowers from moisture damage. The GAC units are connected to the effluent stream of the SVE blowers and consist of two 2,000-pound units and four 1,000-pound units. The GAC units are configured in series such that half of the GAC (a total of 4,000 pounds) is used for primary air treatment, and the other half is used for secondary treatment.

7.0 AS-BUILT DRAWINGS

The AS/SVE System As-Built Drawings were prepared to document the installation and present configuration of the system. The drawings were created from construction observation field notes, field measurements, construction photographs, survey data of outdoor wells, and other construction activity observations. Copies of the AS/SVE System As-Built Drawings are presented in Appendix A-1.

In general, the As-Built Drawings do not deviate significantly from the original design documents followed during the system installation. Minor changes to drawings were made to address unknown conditions encountered during installation. Deviations from the Design Drawings are summarized as follows:

- The planned equipment shed was not installed in the equipment compound, due to fire code restrictions. Instead, outdoor-rated equipment was purchased and installed in the compound.
- Horizontal SVE well VE-34 was moved slightly to remove soil gas near the area where impacted soils were encountered, and the original sections of the horizontal SVE wells VE-30 to VE-33 were relabeled.
- Two additional SVE moisture separator tanks were installed to allow for operational flexibility.
- Original SVE system wells VE-1, VE-3, VE-7, and VE-8 were connected directly to the main compound with individual pipes.
- Monitoring points MP-1 to MP-4 were added along the eastern Site boundary as contingency monitoring wells. SVE piping was connected to these wells for the option of incorporating the wells into the SVE system, if necessary.
- Due to indoor access restrictions, sparge well AS-66 was installed outdoors in an angled boring to position the screen near the original planned location underneath the Site building.
- Deep sparge wells AS-43 and AS-64 were not connected to the compressor manifold as originally intended. Instead, these wells were connected to remote manifolds located inside the building, and are supplied by the rotary lobe blowers.

8.0 AS/SVE SYSTEM STARTUP

AMEC conducted the system startup according to the procedures outlined in the Design Report. The general purpose of the startup procedures was to gradually increase air sparging flow rates, while monitoring field conditions for proper capture of

AS vapors. This section summarizes the AS/SVE system startup activities performed from October through December 2003, and system O&M through February 2004.

8.1 AS/SVE System Startup Procedures

The SVE system was activated on October 23, 2003. The AS system was activated on October 27, 2003, with approximately half of the 73 sparging wells in operation (e.g., AS Well Group 1).

The initial flow rate for each sparge well was approximately 2 cubic feet per minute (cfm) per well. This rate was increased to approximately 4 cfm after two days of operation and to 6 cfm after four days of operation. After two weeks of operation the flow rate was increased to 8 cfm. On December 3, 2003, following approximately one month of operation of AS Well Group 1, the sparge well operation was switched to AS Well Group 2. The wells in AS Well Group 2 were operated at a flow of approximately 8 cfm at the beginning of the switchover, due to the favorable results of the vacuum/pressure monitoring during the startup of AS Well Group 1.

System status monitoring was performed periodically throughout the activation period by completing field data forms to record vacuums, pressures, flows, and other system parameters. In addition, vacuum monitoring was performed at selected nearby monitoring wells before each incremental increase in air sparging flow rates. Samples of the AS/SVE system field data forms are included in Appendix A-8.

8.2 AS/SVE System Startup Results

Results of the AS/SVE system activation indicate successful delivery or injection of air to the AS wells and successful capture of air and vapors by the SVE system. The maximum manifold pressure obtained at the AS system was approximately 11 psi. Air flow calculations derived from field readings collected since the system startup confirmed the minimum total SVE flow (approximately 770 cubic feet per minute [cfm]) was at least twice the maximum observed AS flow (approximately 280 cfm) to ensure full capture of the AS vapors. Periodic contingency monitoring performed since the system startup indicates strong vacuum influence at monitoring points located in the eastern parking lot and along the Site boundary.

PID readings are collected from the SVE system influent and the treated air effluent during regular site visits. The PID readings are obtained to measure the concentration of volatile compounds in the air streams. The PID data, along with flow rate data, are used to calculate the total contaminant mass removed and the mass removal rates. A correction factor of 0.55 was used with the PID readings to account for the assumption that the TCE accounts for the majority of the contaminants in the influent stream. Table 2 includes mass removal data collected since the system startup. A graph showing total TCE removed and the TCE removal rate is included as Figure 3.

On October 24, 2003 when the SVE system was re-activated, the PID indicated a system influent concentration of 3.5 parts per million (ppm), which corresponds to a mass removal rate of approximately 0.9 pounds per day (lb/day) at an SVE flowrate of approximately 950 cfm. By October 27, 2003, immediately prior to the startup of the AS system, the mass removal rate had dropped to approximately 0.3 lb/day. Mass removal rates increased following the startup of the AS system, ranging from approximately 0.5 to 2.7 lb/day. As of February 11, 2004, the combined AS/SVE system had removed an estimated 92 pounds of volatiles (believed to be predominantly TCE) from the subsurface. PID readings collected at the individual SVE lines indicate the majority of HVOCs in the extracted soil and AS vapors originate from the SVE wells in the paint room area (i.e., VE- 4-12, VE-31A, B, C).

8.3 SVE Air Sampling

Influent and effluent air samples are collected periodically from the primary and secondary GAC units to estimate the mass loading of the carbon and to confirm that effluent VOC levels remain below permissible emission limits. The current, bi-weekly air sampling frequency will likely be reduced when enough data have been obtained to predict constituent breakthrough of the carbon units of the SVE system with reasonable accuracy. The air samples are collected using Summa® canisters and transported to Columbia Analytical Services in Simi Valley, California for analysis of ten target HVOCs by EPA Method TO-15. The ten HVOCs analyzed were selected based on compounds previously detected in air samples and on AMEC's understanding of compounds potentially present in Site soils and groundwater. Analytical results for air samples collected since the system startup are summarized in Table 3.

To establish pre-sparging conditions, a sample of the SVE system air influent was collected on October 27, 2003, prior to activation of the AS system. Samples of the GAC air treatment unit influent and effluent also were collected on the following dates: December 3, 2003, after air flow into the AS wells was fully established; January 16, 2004, prior to changeout of the 2,000-lb GAC units; and on February 11, 2004, after the changeout of the 2,000-lb GAC units.

Comparison of analytical results for the October 27 and December 3, 2003 air influent samples indicate that recovery of HVOCs nearly doubled following the startup of the sparge system (Table 2 and Figure 3). Analytical results for the October 27, 2003 (pre-sparge) influent air sample indicated the presence of TCE (2,400 micrograms per cubic meter [μg/m³]), PCE (1,600 μg/m³), cis-1,2-DCE (57 μg/m³), and 1,1,1-TCA (35 μg/m³). Analytical results for the December 3, 2003 (post-sparge) influent air sample indicated the following HVOC levels: 5,600 μg/m³ TCE; 3,100 μg/m³ PCE; 86 μg/m³ cis-1,2-DCE; and 55 μg/m³ 1,1-TCA. HVOCs present in the December 3 effluent air sample were: TCE (1,700 μg/m³), PCE (1,100 μg/m³), cis-1,2-DCE (130 μg/m³), 1,1,1-TCA (21 μg/m³), and 1,1-DCE (68 μg/m³).

The December 3, 2003 effluent analytical results indicated that the 2,000-lb GAC filter units needed replacement. The batch of carbon in the 2,000-lb units had been on-line since the activation of the original SVE system in May 2002. Following receipt of the December 3, 2003 analytical results, the AS/SVE system was temporarily shut down and reconfigured from a parallel arrangement to series arrangement. The filter series arrangement, previously used in the original SVE system, was deemed a more conservative operational mode so as to provide a final cleaning step.

Prior to the changeout of carbon in the two 2,000-lb treatment units, the system was briefly operated with the 2,000-lb units off-line and the four 1,000-lb carbon units in parallel. Influent and effluent air samples were collected on January 16, 2004, during this temporary configuration of the treatment units. Analytical results for the January 16 influent samples indicated the presence of TCE (4,400 μg/m³), PCE (1,100 μg/m³), cis-1,2-DCE (220 μg/m³), and 1,1-TCA (34 μg/m³). HVOC levels in the January 16, 2004 effluent sample were: 240 μg/m³ TCE; 70 μg/m³ PCE; 50 μg/m³ cis-1,2-DCE; 36 μg/m³1,1-DCE; 2.2 μg/m³ 1,1,1-TCA; and 1.3 μg/m³ 1-Dichloroethane (1,1-DCA). Comparison of the January 16 influent and effluent results indicates an HVOC adsorption efficiency of as much as 95% with half of the carbon units on-line.

Influent and effluent samples were collected on February 11, 2004, following the changeout of the 2,000-lb GAC units. Following the changeout, the GAC units were reconfigured, with the 2,000-lb units used as polish units (Section 9.0). Influent HVOC levels in the February 11 sample were 3,000 μg/m³ TCE, 930 μg/m³ PCE, and 110 μg/m³ cis-1,2-DCE. HVOCs present in the February 11 effluent sample were: TCE (1.6 μg/m³), PCE (2.8 μg/m³), cis-1,2-DCE (43 μg/m³), 1,1-DCE (15 μg/m³), and 1,1,1-TCA (5.9 μg/m³). Comparison of influent and effluent analytical results for the February 11 samples indicate a TCE and PCE adsorption efficiency of greater than 99%.

Influent and effluent PID readings collected concurrently with the air samples indicate the TCE mass estimated by the PID readings was generally 50% higher than the TCE mass present in the air sample analytical results. The estimated total TCE mass removal presented in Table 2 and Figure 3 was based on PID measurements, and has not been adjusted to correlate with the air sampling results. AMEC intends to continue "side-by-side" PID and canister sampling to determine the most accurate method of calculating the HVOC recovery rates. As such, total estimated mass removal may be revised in the future if appropriate.

9.0 ROUTINE AS/SVE SYSTEM OPERATIONS

As discussed in previous sections, an air treatment system consisting of six carbon units currently is in use at the AS/SVE system on-Site. The carbon units are used to adsorb HVOCs from the extracted soil gas and AS vapors prior to discharge to the atmosphere. Initially, the six carbon units were arranged in parallel, however, these were changed to a series configuration in January 2004.

Following the constituent breakthrough of the two 2,000-lb carbon units in December 2003 (see Section 8.3), samples of the GAC were obtained on December 11, 2003 from the carbon units for chemical analysis. The samples were transported to NCA for analysis of VOCs by EPA Method 8260B and Toxic Characteristic Leaching Procedure (TCLP) VOCs by EPA Method 1311/8260B.

Analytical results of the carbon samples indicated levels of leachable HVOCs that exceeded permissible non-hazardous waste limits. Therefore, the spent carbon was characterized as a hazardous waste, with a waste code designation of D-040. Additional carbon samples were collected from the two 2,000-lb units on January 23, 2004 and transported to the US Filter Laboratory (Los Angeles, California) for analysis of eleven Resource Conservation and Recovery Act (RCRA) tests (i.e. flash-point, compatibility, heating value) required for regeneration of the carbon as a hazardous waste.

Replacement of the spent carbon in the two 2,000-lb units occurred on February 11, 2004. Following the carbon changeout, the hoses to the 2,000-lb and 1,000-lb carbon units were switched, such that the four 1,000-lb carbon units operate as the primary treatment units, and the 2,000-lb units with the fresh carbon provide a polishing step. The spent carbon was transferred to clean 55-gallon drums and stored on-Site within the AS/SVE compound, pending transport to the US Filter RCRA waste facility in Parker, Arizona for regeneration. The carbon will be transported to the regeneration facility by a hazardous waste transporter, in accordance with Department of Transportation regulations.

The AS/SVE system was manually shut down on December 24, 2003, following constituent breakthrough of the 2,000-lb carbon units, and remained off-line until January 16, 2004 due to a series of storms that resulted in excessive snow and ice in the system compound. The system was again manually shut off from January 25 through 30, 2004 for the indoor and ambient air sampling event at the adjacent FVN. A system shutdown also occurred for a half day during a carbon changeout in the system on February 11, 2004. The system has been operating without interuption since that time.

AMEC is pleased to have prepared this Installation Report. If you have any questions or concerns, please contact the undersigned at 503-639-3400.

AMEC Earth & Environmental, Inc.

John L. Kuiper, L.G.
Principal

JLK/va

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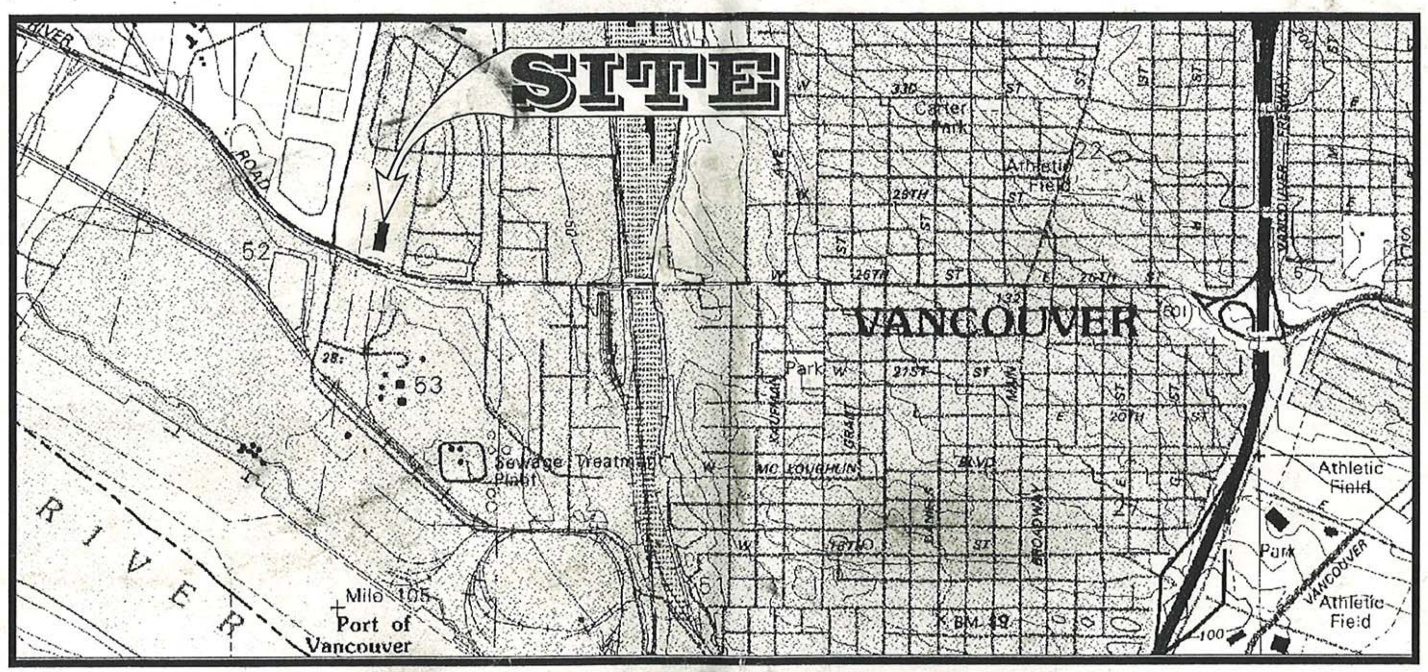
LIMITATIONS

This report was prepared exclusively for Cadet Manufacturing Company by AMEC Earth & Environmental, Inc. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services, and are based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended for use by Cadet Manufacturing Company for the 2500 West Fourth Plain Boulevard facility and vicinity only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on this report by any third party, is at that party's sole risk.

The findings contained herein are relevant to the dates of the AMEC Site visits and should not be relied upon to represent conditions at later dates. In the event that changes in the nature, usage, or layout of the property or nearby properties are made, the conclusions and recommendations contained in this report may not be valid. If additional information becomes available, it should be provided to AMEC so the original conclusions and recommendations can be modified as necessary.

CADET MANUFACTURING COMPANY
2550 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

AIR SPARGE AND SOIL VAPOR EXTRACTION
REMEDIATION SYSTEM AS-BUILT DRAWINGS



INDEX

N

T-1

NOTES:
1. "AS" REPRESENTS "AIR SPARGE"
2. "SVE" REPRESENTS "SOIL VAPOR EXTRACTION"

amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

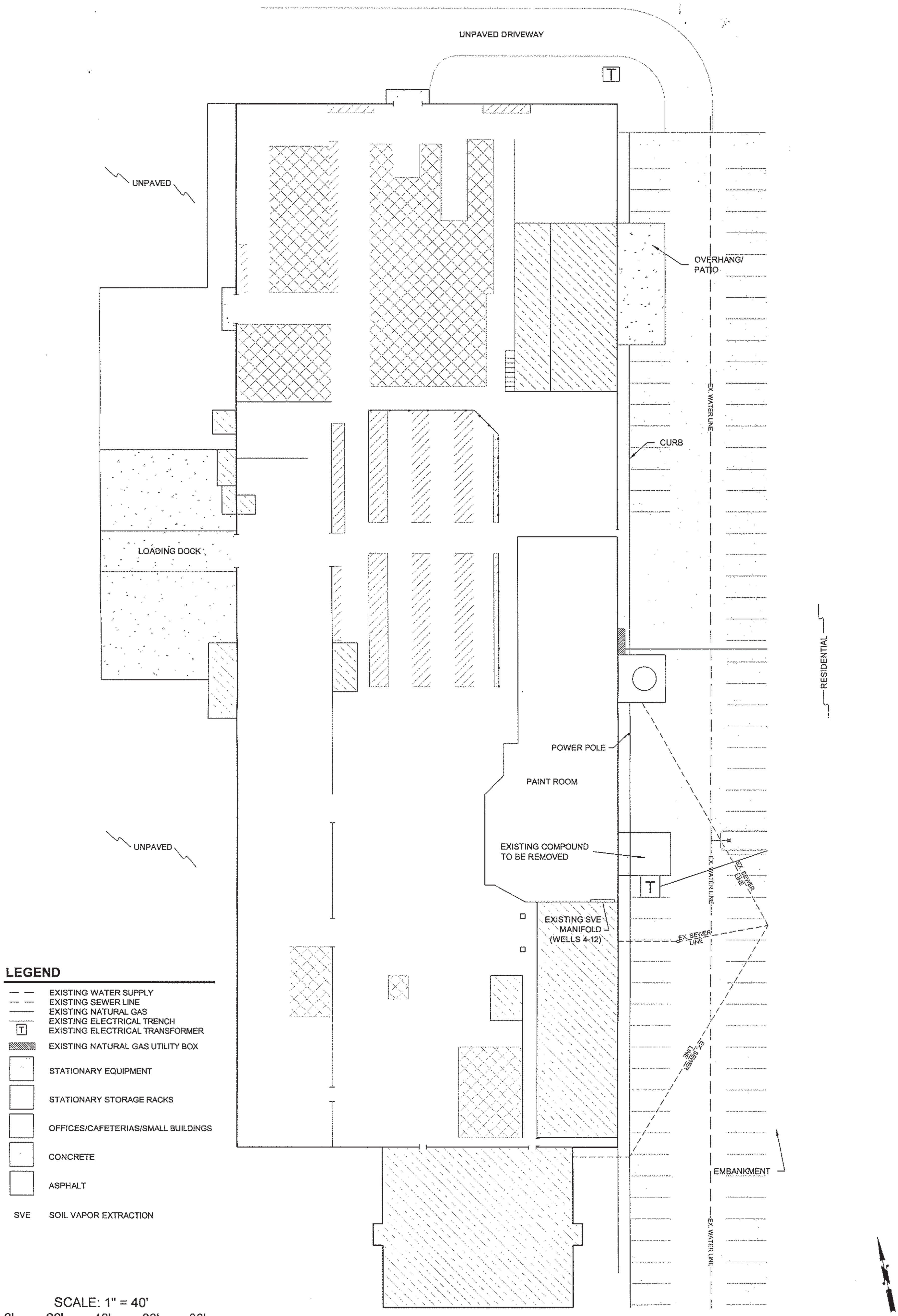
W.O.	3-61M-10135-D
DESIGN	LBJ
DRAWN	DD
DATE	NOVEMBER 2003
SCALE	NOT TO SCALE

CADET MANUFACTURING COMPANY
2550 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

TITLE PAGE WITH SITE LOCATION MAP

AMEC DRAWING NO. K:\10000\10100\10135\AS and SVE\As-Builts\TITLE SHEET. DWG

NOTE: LOCATIONS OF EXISTING SITE FEATURES ARE BASED ON FIELD MEASUREMENTS AND GPS DATA GATHERED BY AMEC EMPLOYEES. LOCATIONS OF THESE FEATURES ARE NOT FROM DATA GATHERED BY A REGISTERED LAND SURVEYOR AND SHOULD BE CONSIDERED APPROXIMATE.



C-1

amec

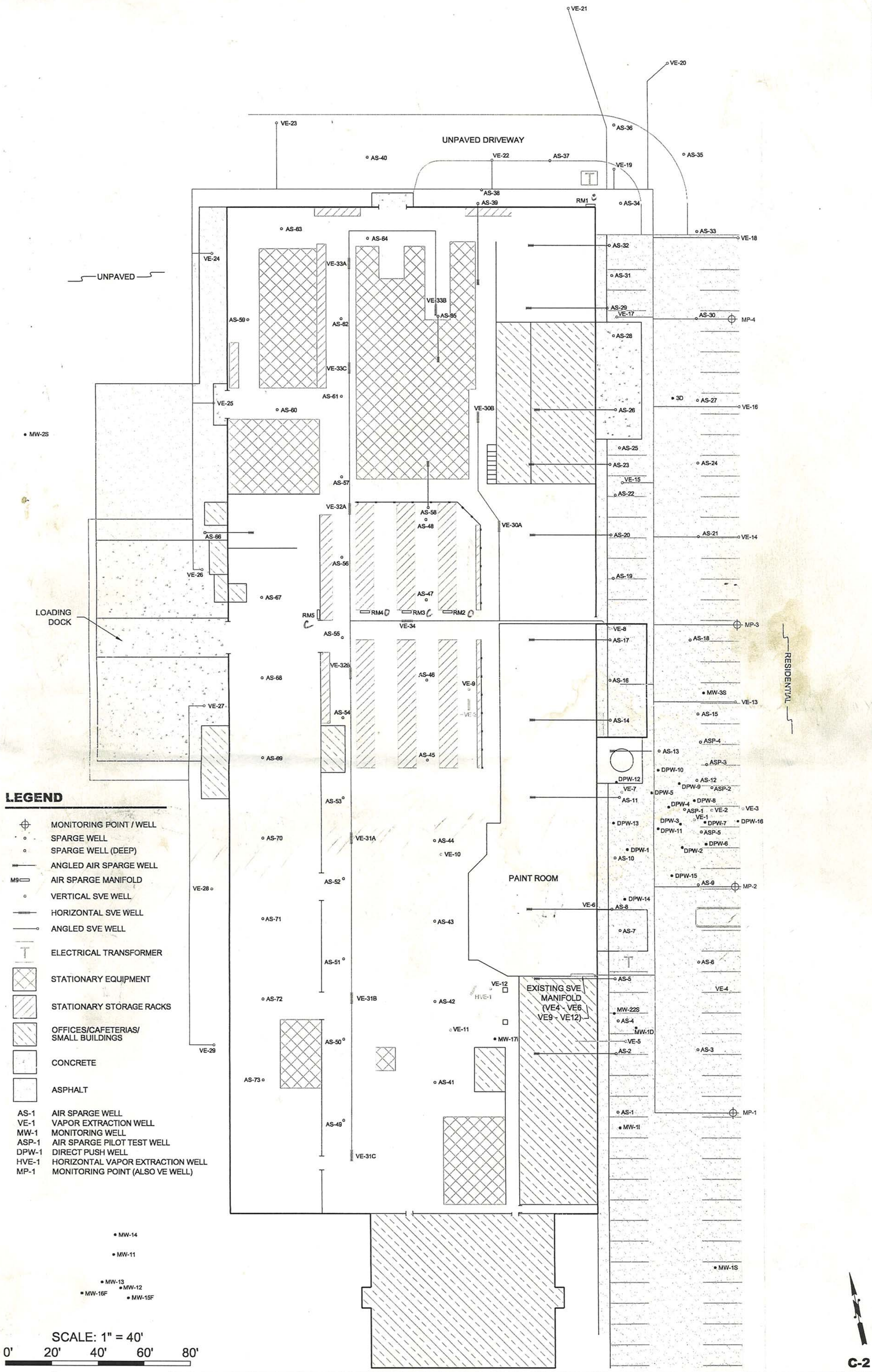
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135-D
DESIGN	LBJ
DRAWN	DD
DATE	NOVEMBER 2003
SCALE	1"=40'

CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

SITE MAP WITHOUT WELLS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C1 Site Map without Wells. Dwg



amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135-D
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DRAWN	DD
DATE	NOVEMBER 2003
SCALE	1"=40'

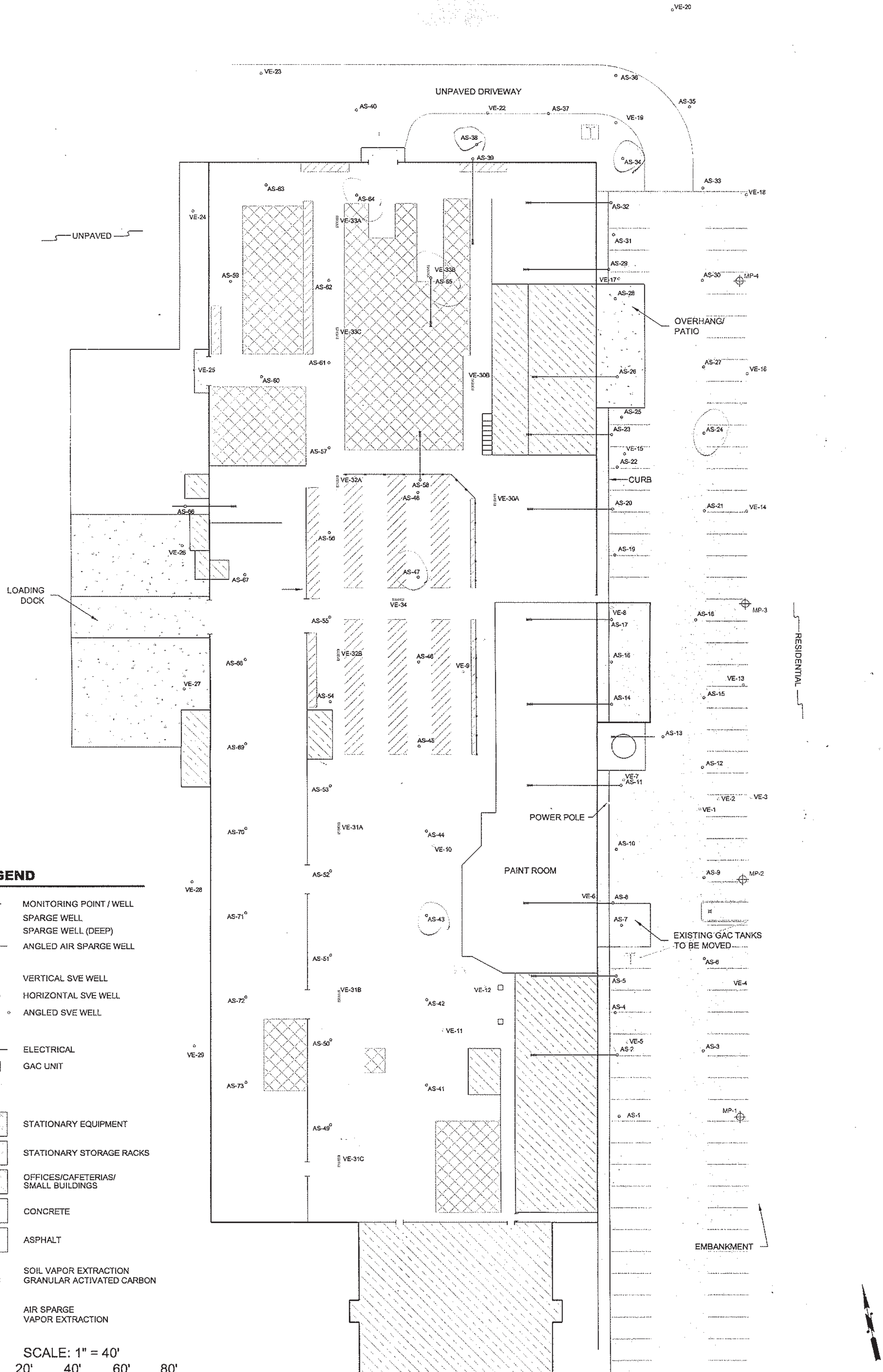
CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

SITE MAP WITH EXISTING SITE WELLS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C2 Site Map with Existing Site Wells. Dwg

NOTES

WELLS VE-1 - VE-12, HVE-1, AND HVE-2 WERE INSTALLED WITH THE ORIGINAL SVE SYSTEM IN MAY 2002.



LEGEND

⌖	MONITORING POINT / WELL
∘	SPARGE WELL
∘	SPARGE WELL (DEEP)
	ANGLED AIR SPARGE WELL
	VERTICAL SVE WELL
	HORIZONTAL SVE WELL
	ANGLED SVE WELL
	ELECTRICAL
	GAC UNIT
	STATIONARY EQUIPMENT
	STATIONARY STORAGE RACKS
	OFFICES/CAFETERIAS/ SMALL BUILDINGS
	CONCRETE
	ASPHALT
SVE	SOIL VAPOR EXTRACTION
GAC	GRANULAR ACTIVATED CARBON
AS	AIR SPARGE
VE	VAPOR EXTRACTION

SCALE: 1" = 40'

0' 20' 40' 60' 80'

C-3

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135-D
DESIGN	LBJ
DRAWN	DD
DATE	NOVEMBER 2003
SCALE	1"=40'

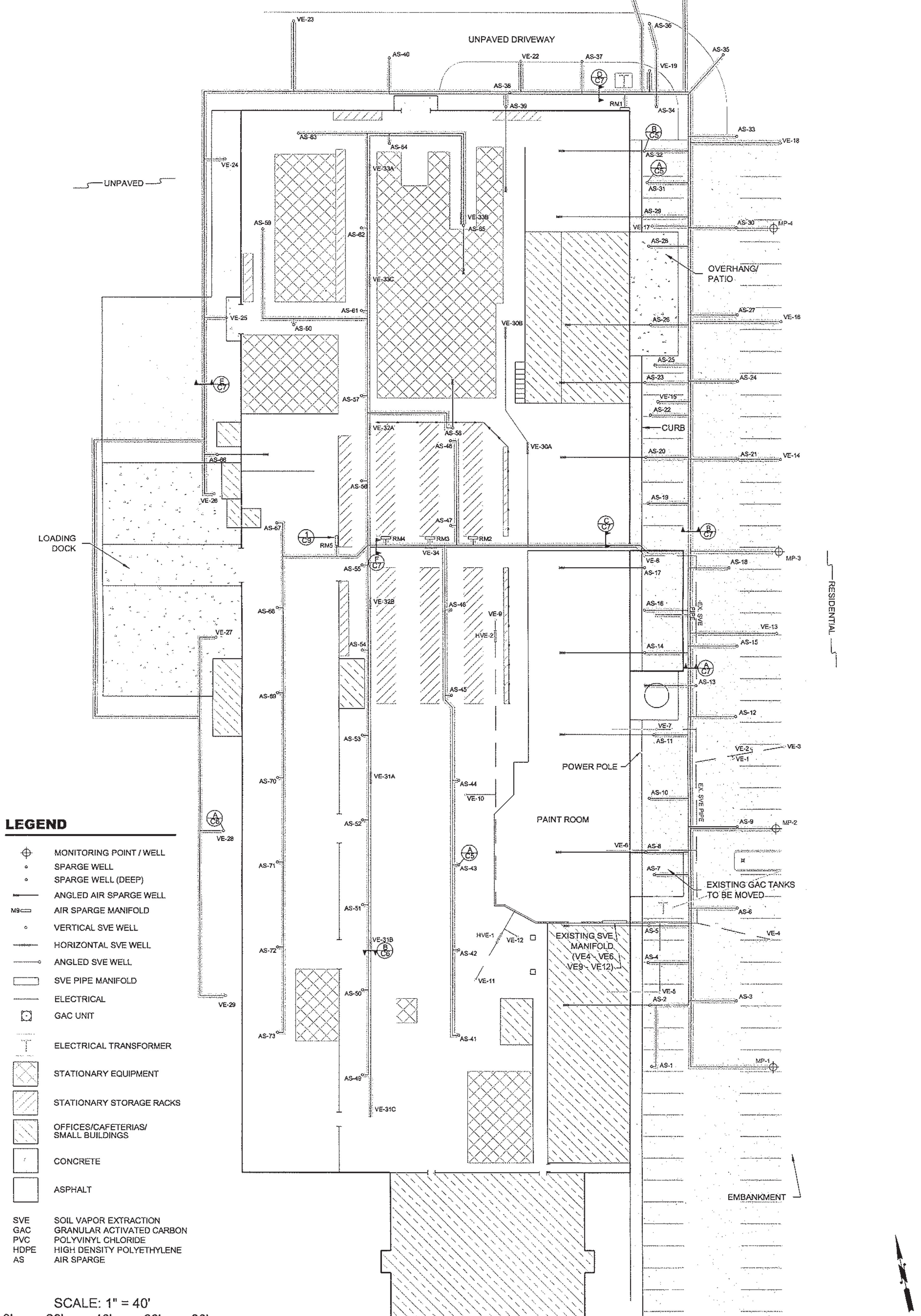
CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

AS / SVE SYSTEM WELLS CONNECTED TO COMPOUND

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C3 AS-SVE System Wells. Dwg

GENERAL UNDERGROUND PIPING SCHEDULE

PIPE LOCATION	PIPE INSIDE DIAMETER AND MATERIAL
Between each AS well and its AS manifold	1-1/4" HDPE tubing (73 pipe runs)
Between each AS manifold (RM1-RM5) and compound	3" sch 80 PVC (5 pipe runs)
Between most SVE wells and compound	3" sch 40 PVC (15 pipe runs)
To VE-24 - VE-26 and to VE-27 - VE-29	4" sch 40 PVC (2 pipe runs)
Between VE-1 - VE-12 and Compound	6" sch 40 PVC (1 pipe run)
Between each 2" slotted horizontal SVE well section	2" sch 40 PVC (8 sections of 2" pipe)



C-4

amec

7376 S.W. Durham Road
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W.O.	3-61M-10135-D
DESIGN	LBJ
DRAWN	DD
DATE	NOVEMBER 2003
SCALE	1"=40'

CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

AS / SVE SYSTEM TRENCHING

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C4 AS-SVE System Trenching. Dwg

VERTICAL AS WELLS

Well ID	Screen Depth (ft)
AS-1	3.5-38.5
AS-3	35-40
AS-4	54.5-59.5
AS-6	55-60
AS-7	53.5-58.5
AS-9	35-40
AS-10	35-40
AS-12	40.5-45.5
AS-15	35-40
AS-16	33.7-38.7
AS-18	35-40
AS-19	35-40
AS-21	35-40
AS-22	35-40
AS-24	35-40
AS-25	35-40
AS-27	35-40
AS-28	35.25-40.25
AS-30	35-40
AS-31	35-40
AS-33	35-40
AS-34	37-42
AS-35	34.5-39.5
AS-36	35-40
AS-37	39.7-34.7
AS-38	37-42
AS-40	35-40
AS-41	35-40
AS-42	35-40
AS-43	39.5-44.5
AS-44	35-40
AS-45	34.5-39.5
AS-46	34.5-39.5
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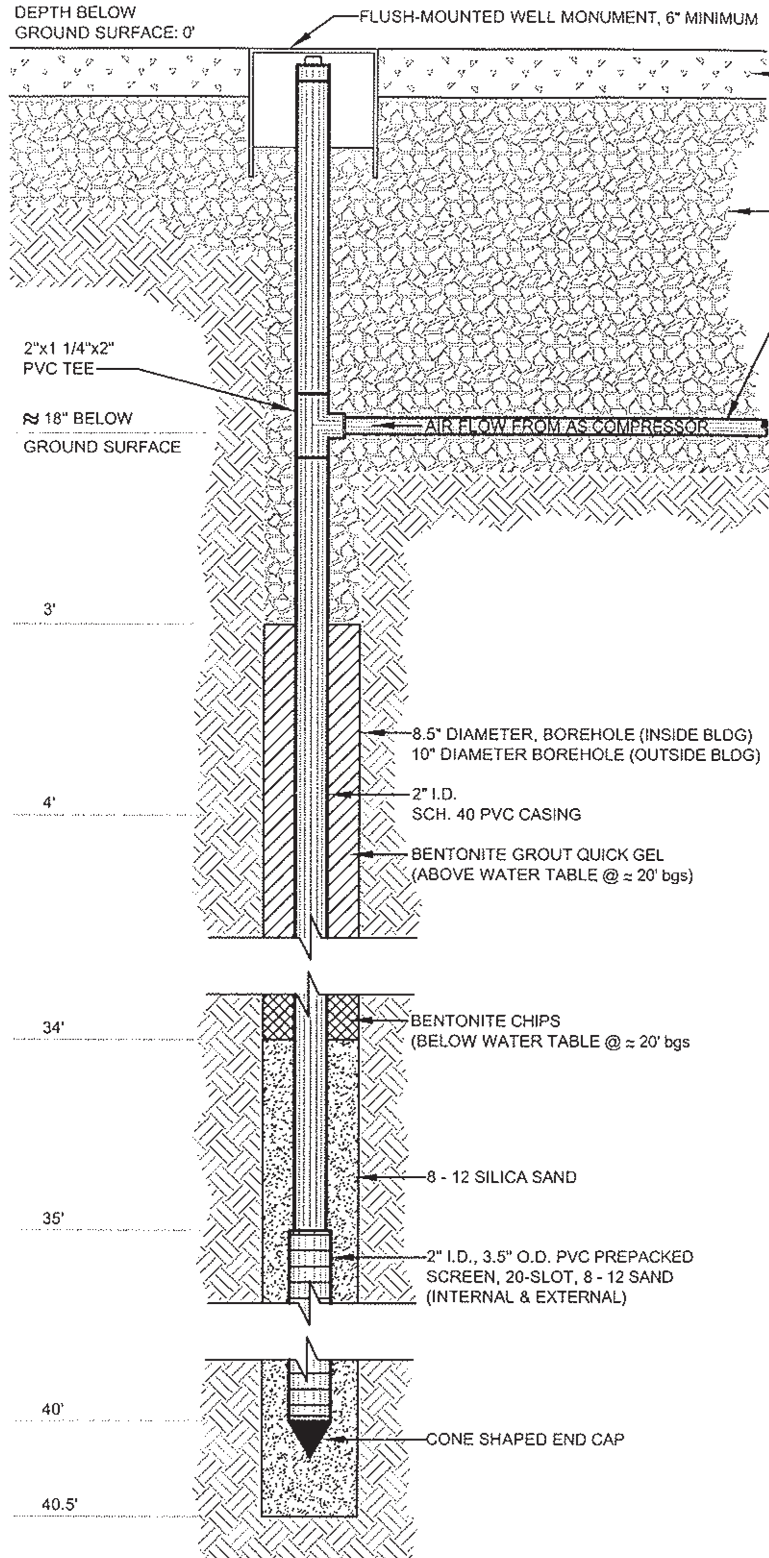
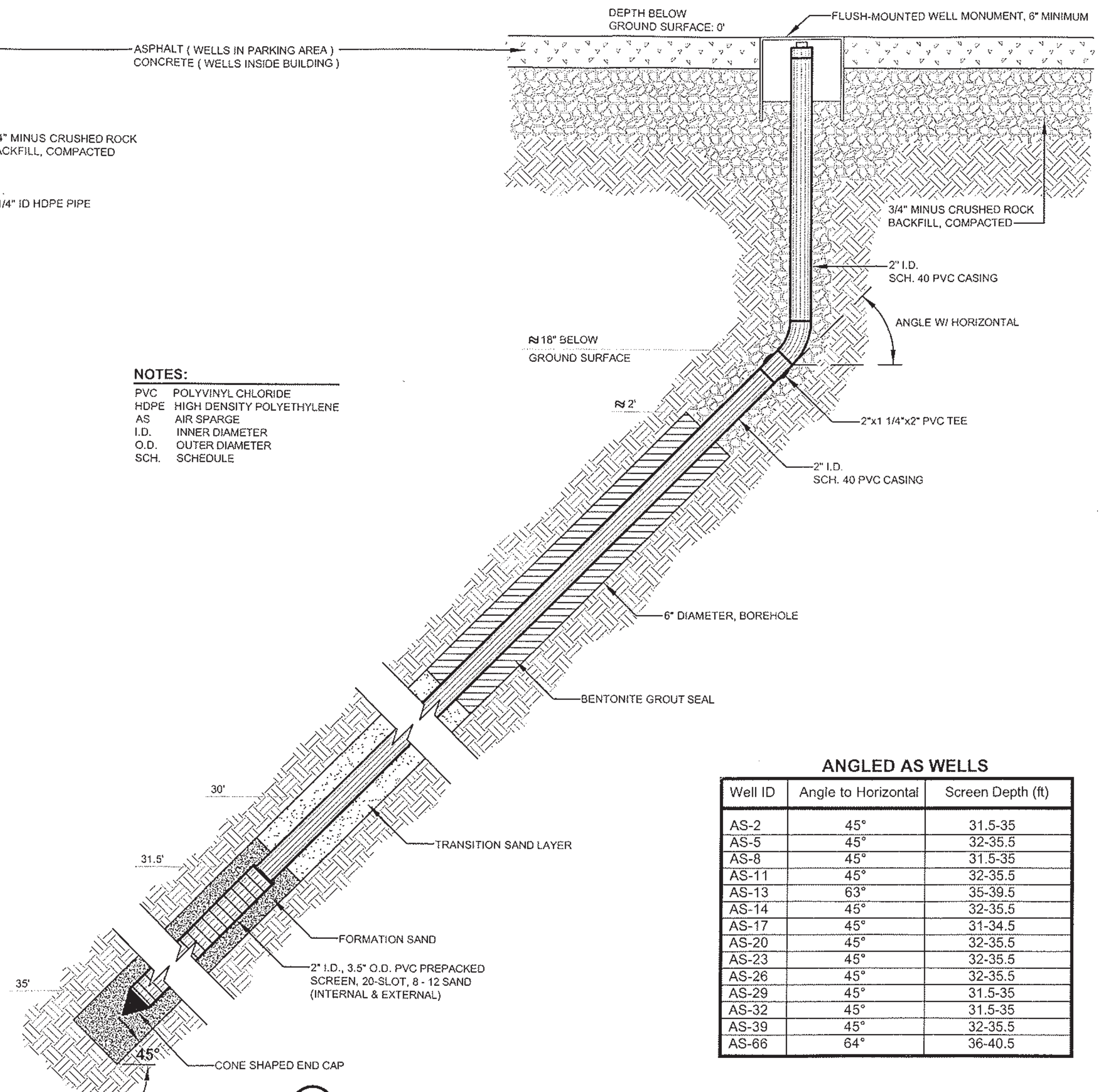


A/C5 VERTICAL AS WELL CROSS SECTION, TYPICAL

* SEE WELL CONSTRUCTION LOGS FOR SPECIFIC WELL DETAILS

NOTES:

PVC	POLYVINYL CHLORIDE
HDPE	HIGH DENSITY POLYETHYLENE
AS	AIR SPARGE
I.D.	INNER DIAMETER
O.D.	OUTER DIAMETER
SCH.	SCHEDULE



ANGLED AS WELLS

Well ID	Angle to Horizontal	Screen Depth (ft)
AS-2	45°	31.5-35
AS-5	45°	32-35.5
AS-8	45°	31.5-35
AS-11	45°	32-35.5
AS-13	63°	35-39.5
AS-14	45°	32-35.5
AS-17	45°	31-34.5
AS-20	45°	32-35.5
AS-23	45°	32-35.5
AS-26	45°	32-35.5
AS-29	45°	31.5-35
AS-32	45°	31.5-35
AS-39	45°	32-35.5
AS-66	64°	36-40.5

B/C5 ANGLED AS WELL CROSS SECTION, TYPICAL

* SEE WELL CONSTRUCTION LOGS FOR SPECIFIC WELL DETAILS

C-5

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SCALE	NOT TO SCALE

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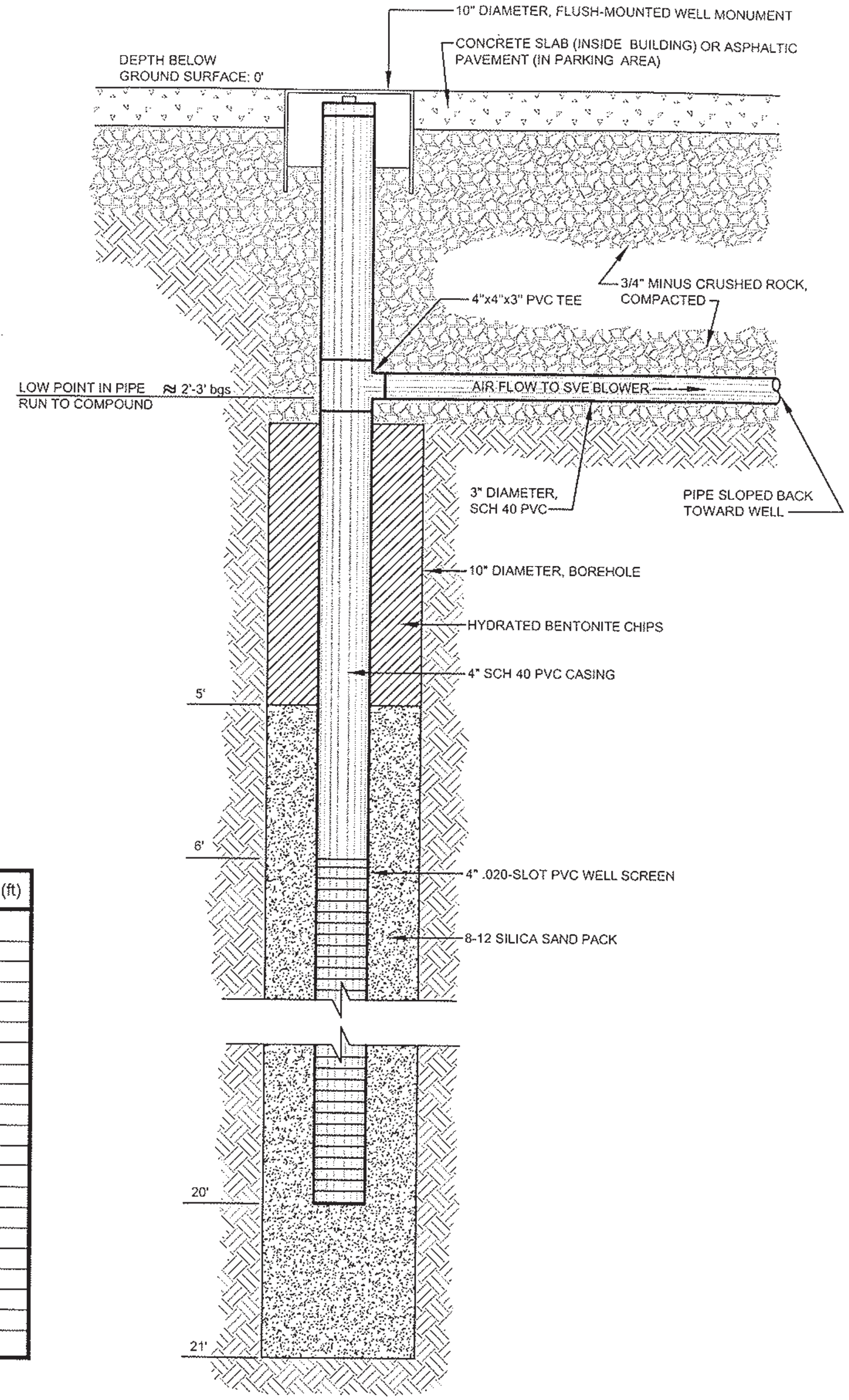
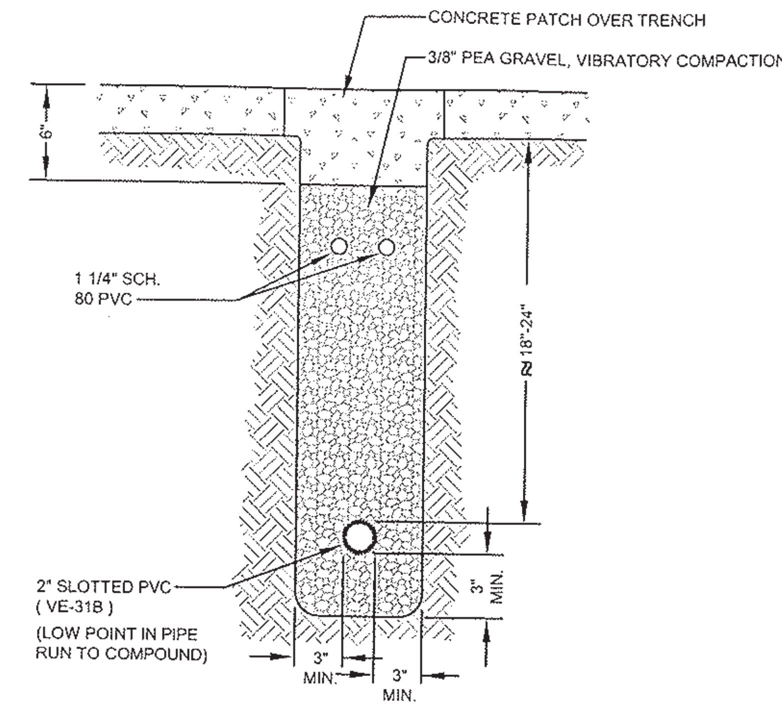
AS WELL CONSTRUCTION DRAWINGS

AMEC DRAWING NO. K / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C5 AS Well Construction Drawings.dwg



A
C6
SVE WELL CROSS SECTION,
TYPICAL FOR VE-15, VE-17, VE-19, VE-21 through VE-29
SEE WELL CONSTRUCTION LOGS FOR SPECIFIC WELL DETAILS

Well ID	Vertical Screen Depth (ft)
VE-13	6-26
VE-14	6-26
VE-15	6-21
VE-16	6-26
VE-17	5.5-20.5
VE-18	5-25
VE-19	6-21
VE-20	6-26
VE-21	5.5-20.5
VE-22	6-21
VE-23	5.5-20.5
VE-24	5.5-20.5
VE-25	6.6-21.6
VE-26	5.5-20.5
VE-27	5.5-20.5
VE-28	5.5-20.5
VE-29	5.5-20.5
MP-1	6.6-21.6
MP-2	6.6-21.6
MP-3	6.6-21.6
MP-4	6.6-21.6



B
C6
HORIZONTAL SVE WELL CROSS SECTION
TYPICAL FOR VE-30 through VE-34 (INSIDE BUILDING)

NOTES:

2" BLANK SCHEDULE 40 PVC BETWEEN SECTIONS OF SLOTTED PIPE.
3" SCHEDULE 40 PVC PIPE CONNECTING FIRST SLOTTED SECTION TO COMPOUND.
SEE WELL CONSTRUCTION LOGS FOR SPECIFIC WELL DETAILS.

NOTES:

SVE SOIL VAPOR EXTRACTION
SCH SCHEDULE
PVC POLYVINYL CHLORIDE

GENERAL UNDERGROUND PIPING SCHEDULE (SVE)

PIPE LOCATION	PIPE INSIDE DIAMETER AND MATERIAL	APPROX. LENGTH
Between most SVE wells and compound	3" sch 40 PVC (15 pipe runs)	3,100'
To VE-24 - VE-26 and to VE-27 - VE-29	4" sch 40 PVC (2 pipe runs)	1,400'
Between VE-1 - VE-12 and Compound	6" sch 40 PVC (1 pipe run)	180'
Between each 2" slotted horizontal SVE well section	2" sch 40 PVC (8 sections of 2" pipe)	600'

C-6

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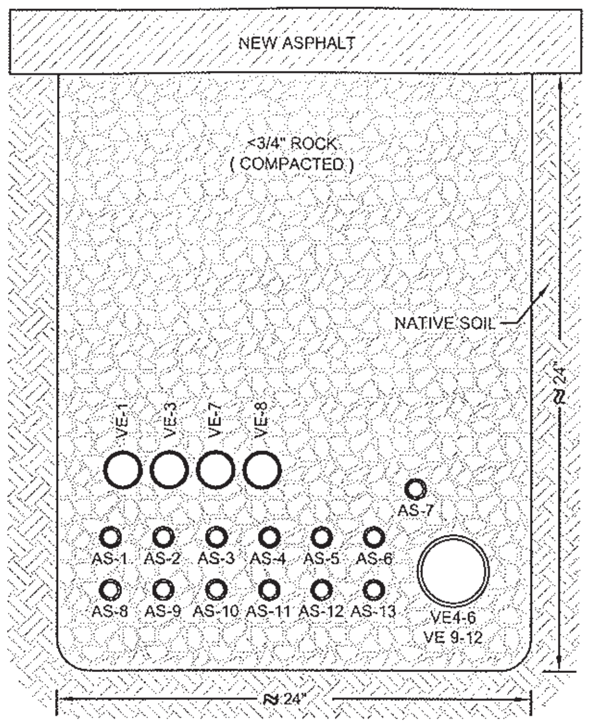
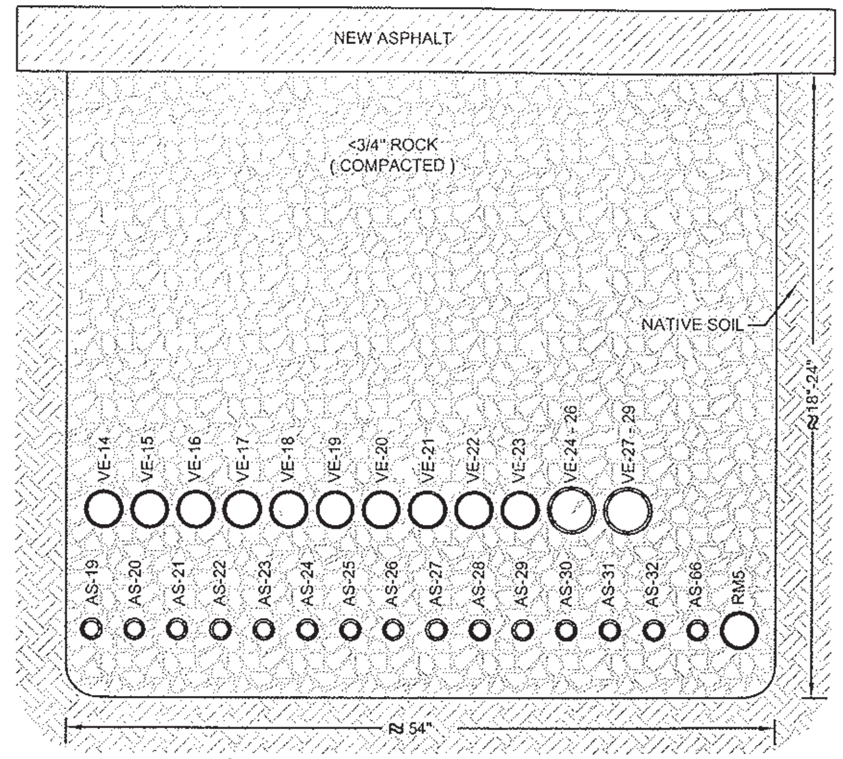
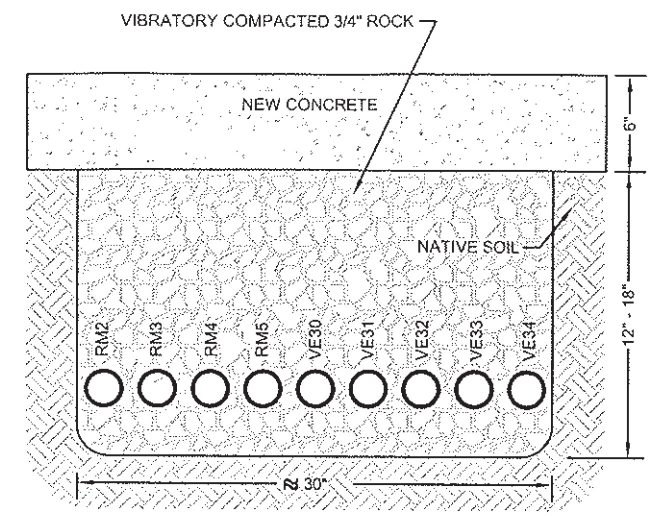
SVE WELL CONSTRUCTION DRAWINGS



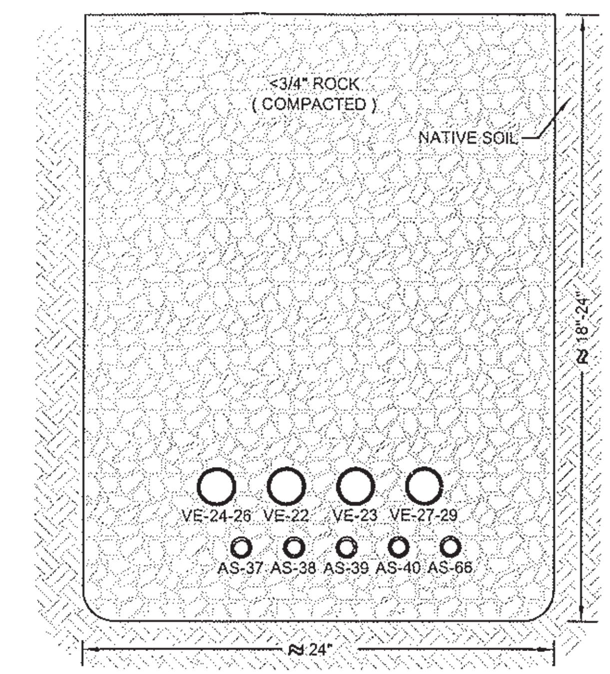
A/C7 TRENCH CROSS SECTION
(OUTSIDE BUILDING)



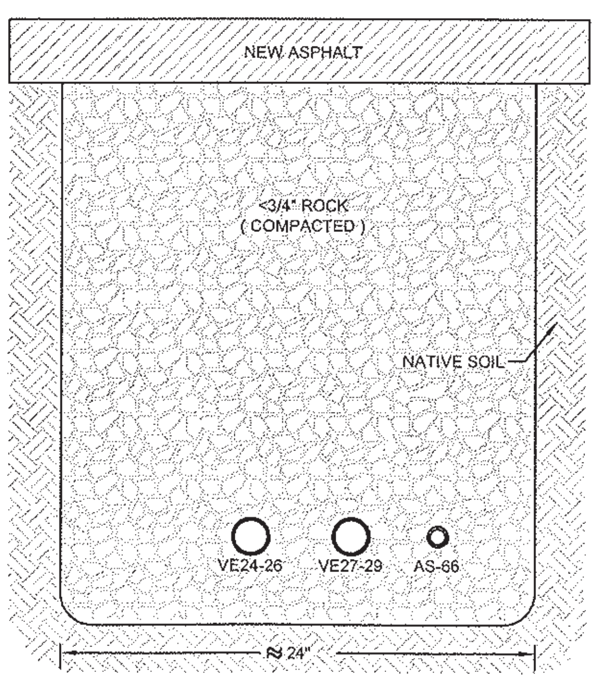
B/C7 TRENCH CROSS SECTION
(OUTSIDE BUILDING)



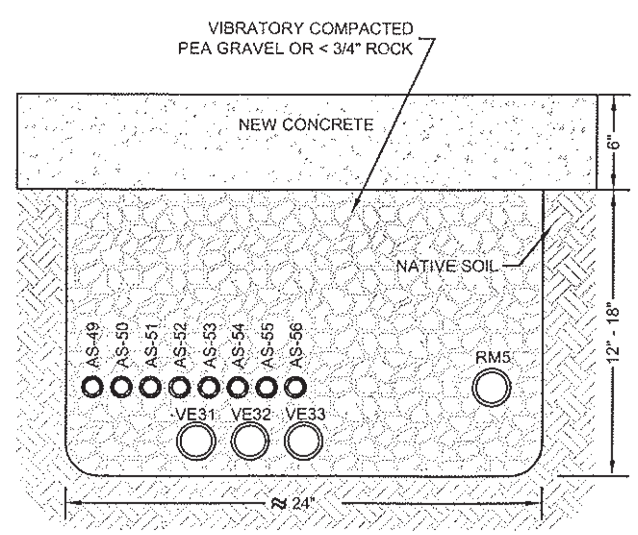
C/C7 TRENCH CROSS SECTION
(INSIDE BUILDING)



D/C7 TRENCH CROSS SECTION
(OUTSIDE BUILDING)



E/C7 TRENCH CROSS SECTION
(OUTSIDE BUILDING)



F/C7 TRENCH CROSS SECTION
(INSIDE BUILDING)

GENERAL UNDERGROUND PIPING SCHEDULE		
PIPE LOCATION	PIPE INSIDE DIAMETER AND MATERIAL	APPROX. LENGTH
Between each AS well and its AS manifold	1-1/4" HDPE tubing (73 pipe runs)	8,500'
Between each AS manifold (RM1-RM5) and compound	3" sch 80 PVC (5 pipe runs)	700'
Between most SVE wells and compound	3" sch 40 PVC (15 pipe runs)	3,100'
To VE-24 - VE-26 and to VE-27 - VE-29	4" sch 40 PVC (2 pipe runs)	1,400'
Between old SVE compound and new compound	6" sch 40 PVC (1 pipe run)	180'
Between each 2" slotted horizontal SVE well section	2" sch 40 PVC (8 sections of 2" pipe)	600'

NOTES:

1. ACTUAL ORDER OF PIPES WITHIN THE TRENCHES MAY BE DIFFERENT THAN SHOWN.
2. TRENCH WIDTHS WILL VARY BASED ON THE NUMBER OF PIPES IN TRENCHES.

SVE SOIL VAPOR EXTRACTION
AS AIR SPARGE
SCH SCHEDULE
PVC POLYVINYL CHLORIDE
HDPE HIGH DENSITY POLYETHYLENE

C-7

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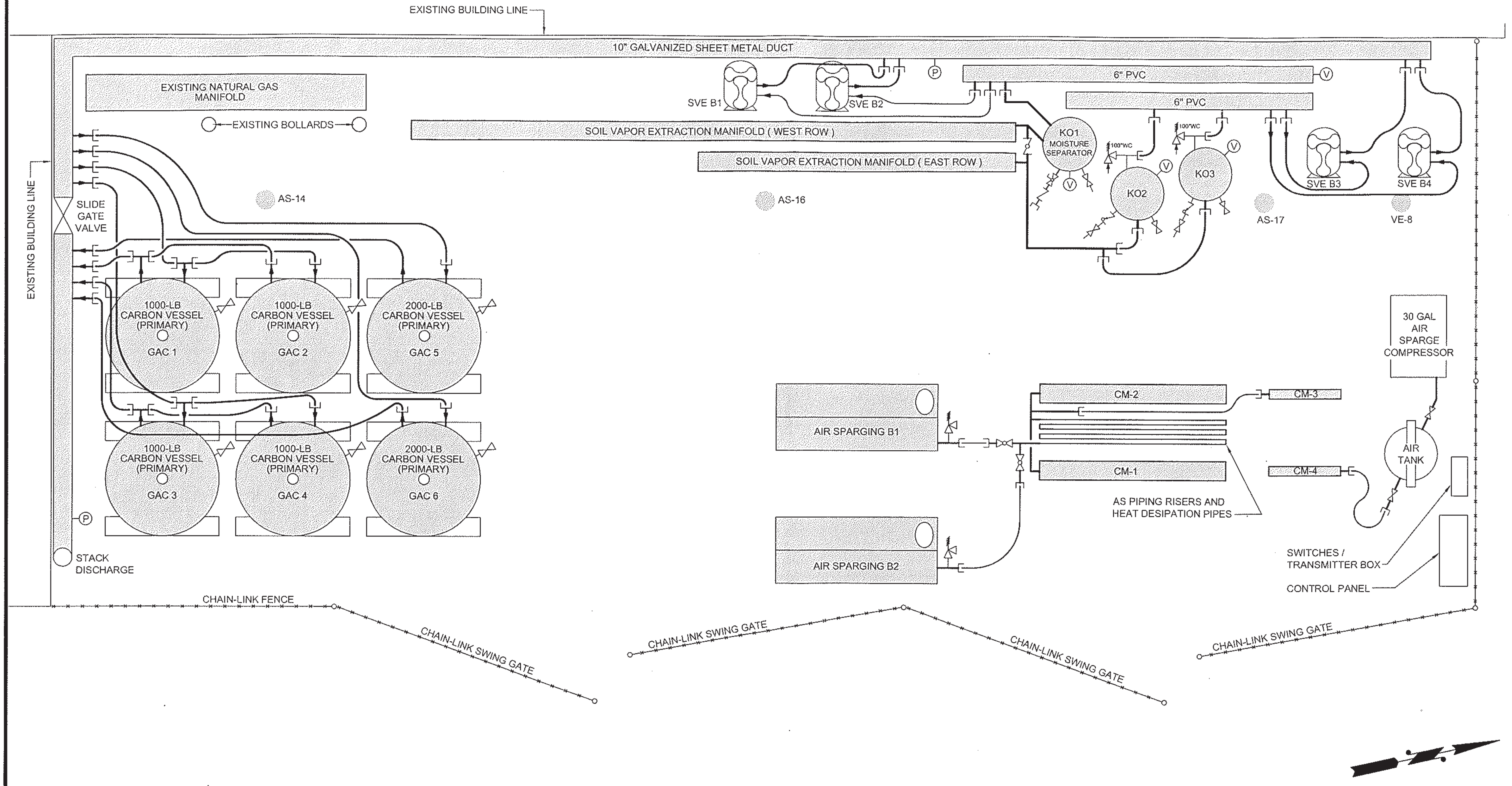
TRENCH CROSS SECTIONS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C7 Trench Cross Sections. Dwg



LEGEND

	3" HOSE	PVC	POLYVINYL CHLORIDE	SVE	SOIL VAPOR EXTRACTION
	4" HOSE	HDPE	HIGH DENSITY POLYETHYLENE	AS	AIR SPARGE
	6" PVC	SCH	SCHEDULE	HP	HORSEPOWER

C-8

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SCALE	1"=4'

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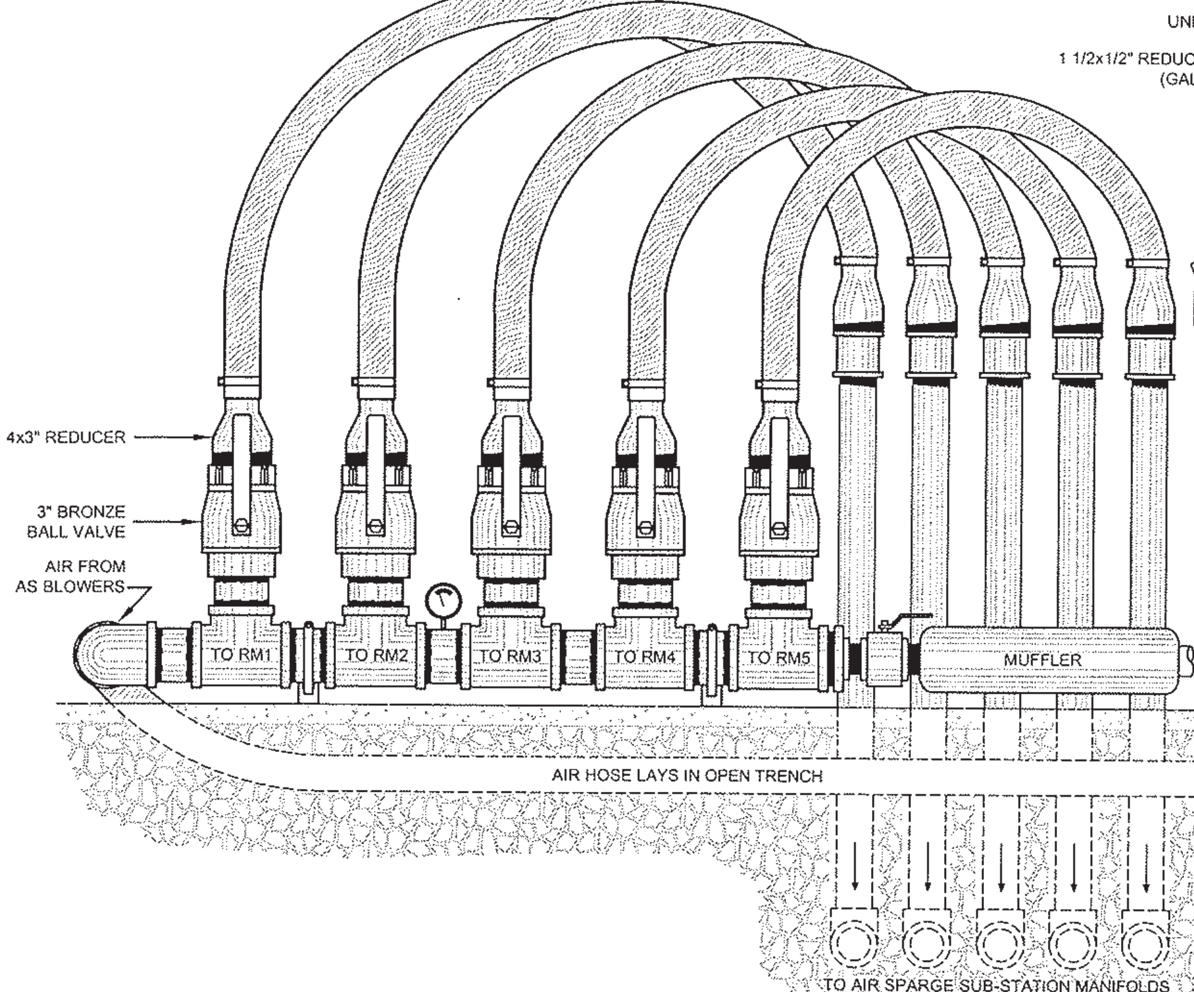
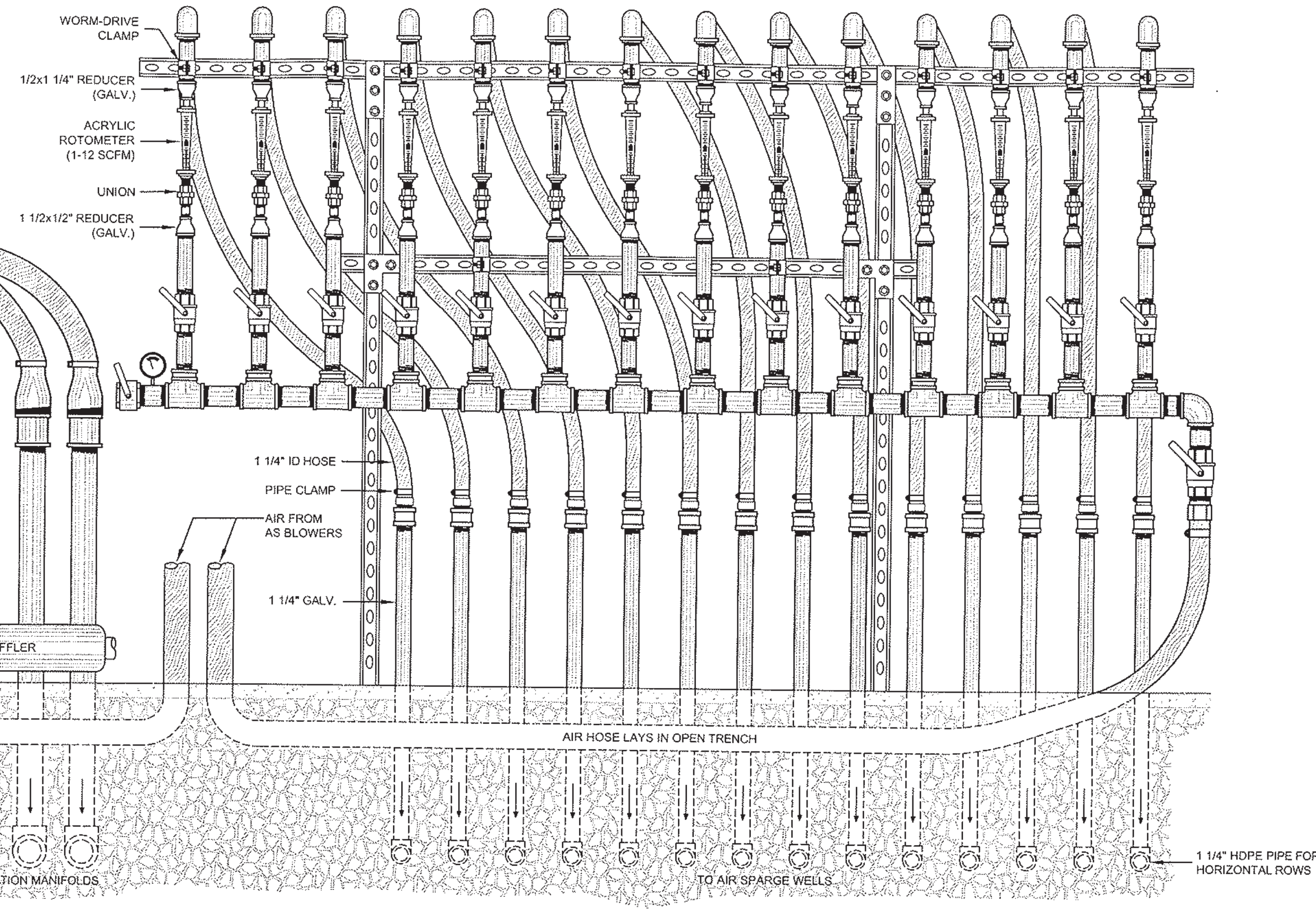
EQUIPMENT COMPOUND LAYOUT

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C8 EQUIPMENT COMPOUND LAYOUT. Dwg



AIR SPARGE MANIFOLD (CM-3)
(PIPES TO REMOTE MANIFOLDS RM1-RM5)

2/C9 TYPICAL OF 1 MANIFOLD (ONLY CONNECTIONS TO UNDERGROUND PIPING SHOWN)
NOT OT SCALE



AIR SPARGE MANIFOLD (CM-2)

1/C9 TYPICAL OF 2 MANIFOLDS
NOT TO SCALE

GENERAL UNDERGROUND PIPING SCHEDULE

PIPE LOCATION	PIPE INSIDE DIAMETER AND MATERIAL	APPROX. LENGTH
Between each AS well and its AS manifold	1-1/4" sch 80 PVC or HDPE tubing (73 pipe runs)	8,500'
Between each AS manifold (RM1-RM5) and compound	3" sch 80 PVC (5 pipe runs)	700'

NOTES:

ID INNER DIAMETER
SCFM STANDARD CUBIC FEET PER MINUTE
PVC POLYVINYL CHLORIDE
HDPE HIGH DENSITY POLYETHYLENE
AS AIR SPARGE

C-9

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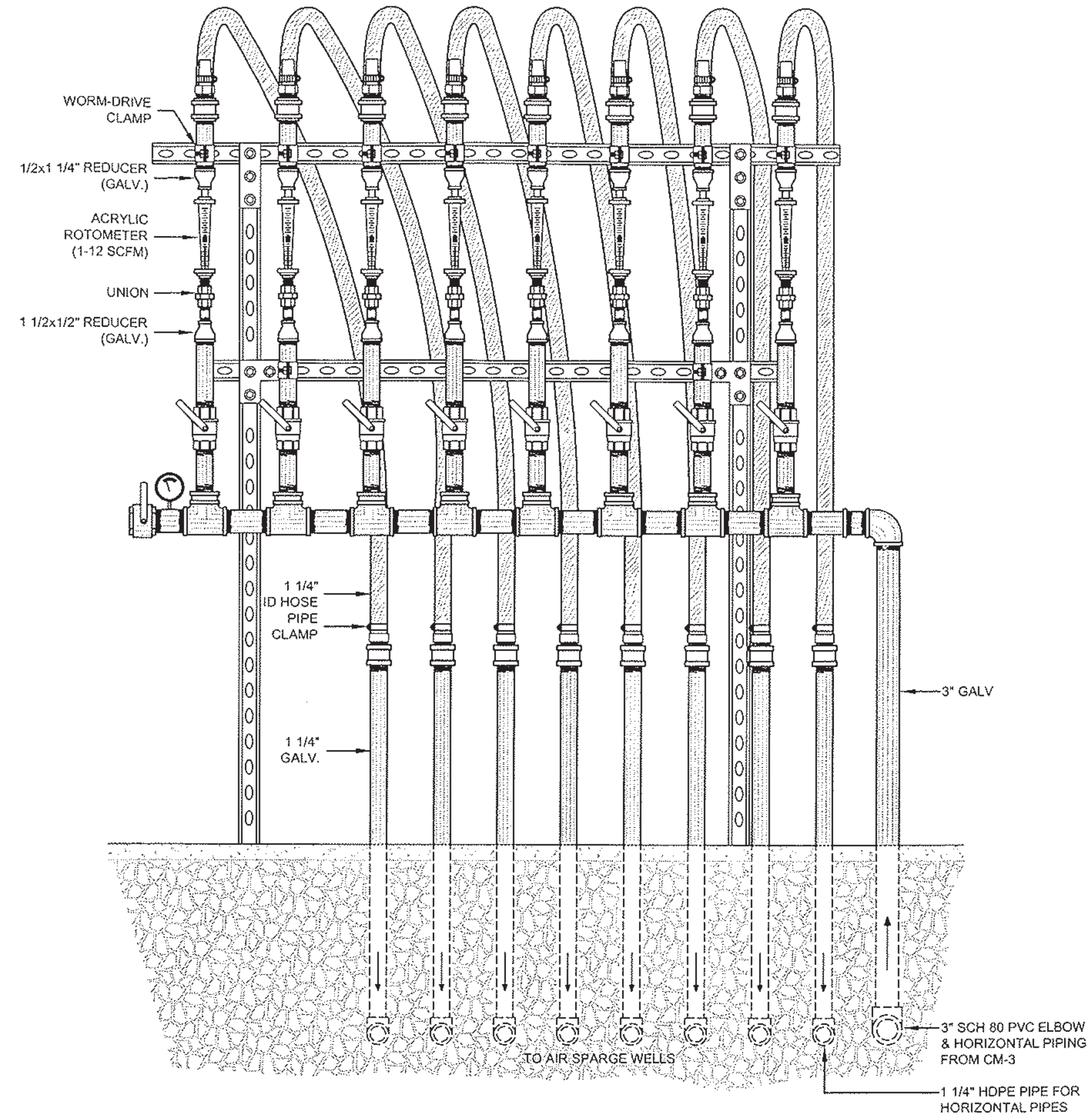
AS MANIFOLDS @ COMPOUND:
CONSTRUCTION DRAWINGS



1/C10 AIR SPARGE REMOTE MANIFOLD (RM-1 THRU RM-5)

TYPICAL OF 2 MANIFOLDS (NUMBER OF RISERS PER MANIFOLD MAY CHANGE)
NOT TO SCALE

GENERAL UNDERGROUND PIPING SCHEDULE		
PIPE LOCATION	PIPE INSIDE DIAMETER AND MATERIAL	APPROX. LENGTH
Between each AS well and its AS manifold	1-1/4" HDPE (73 pipe runs)	8,500'
Between each AS manifold (RM1-RM5) and compound	3" sch 80 PVC (5 pipe runs)	700'

NOTES:

ID	INNER DIAMETER
SCFM	STANDARD CUBIC FEET PER MINUTE
PVC	POLYVINYL CHLORIDE
HDPE	HIGH DENSITY POLYETHYLENE
AS	AIR SPARGE

C-10

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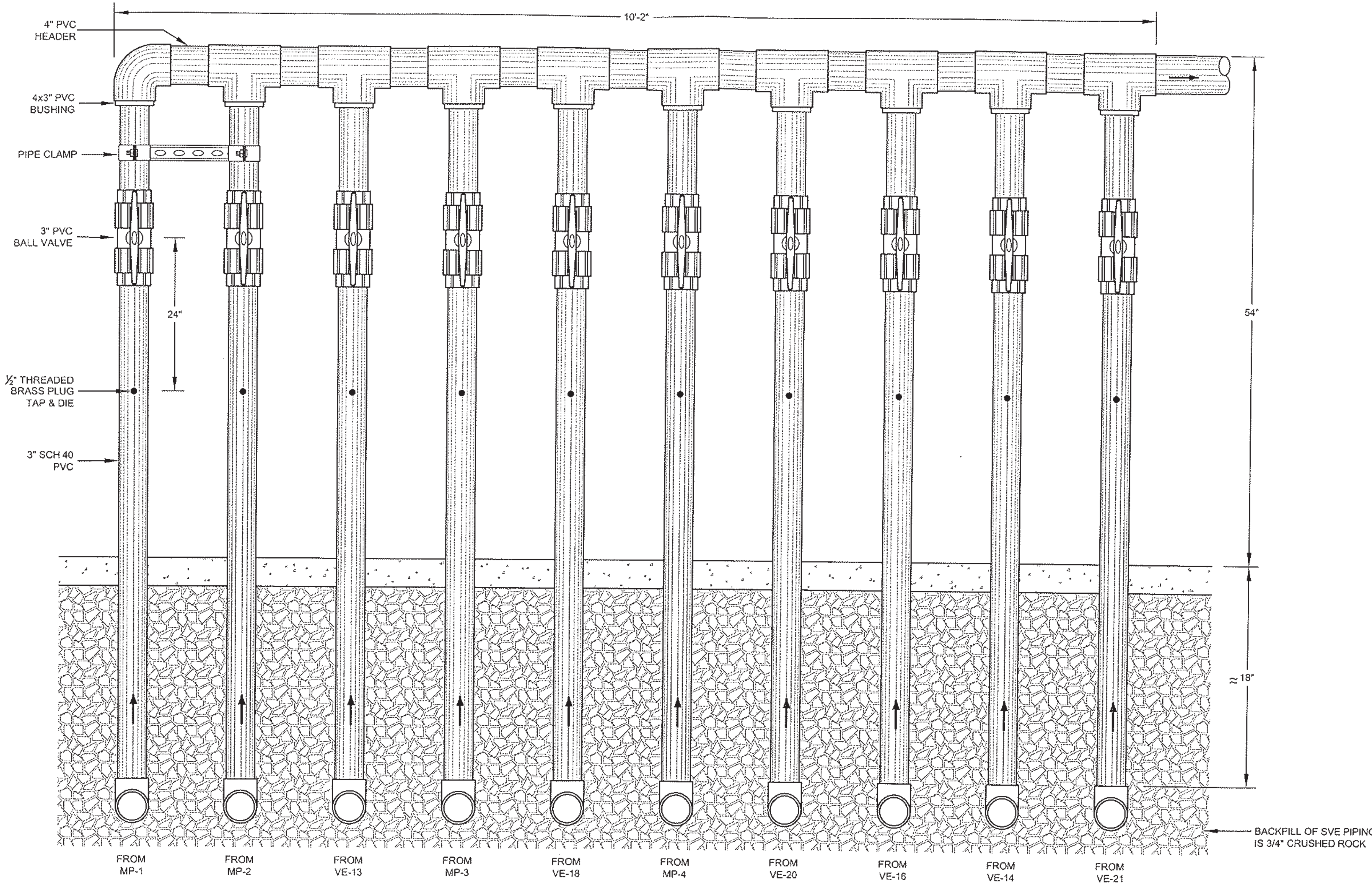
AS REMOTE MANIFOLDS
CONSTRUCTION DRAWINGS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C10 AS REMOTE MANIFOLD CONSTRUCTION DRAWINGS. Dwg



1 / C11 SVE PIPING MANIFOLD (EAST ROW)

NOTES:

PVC POLYVINYL CHLORIDE
SCH SCHEDULE
SVE SOIL VAPOR EXTRACTION

C-11

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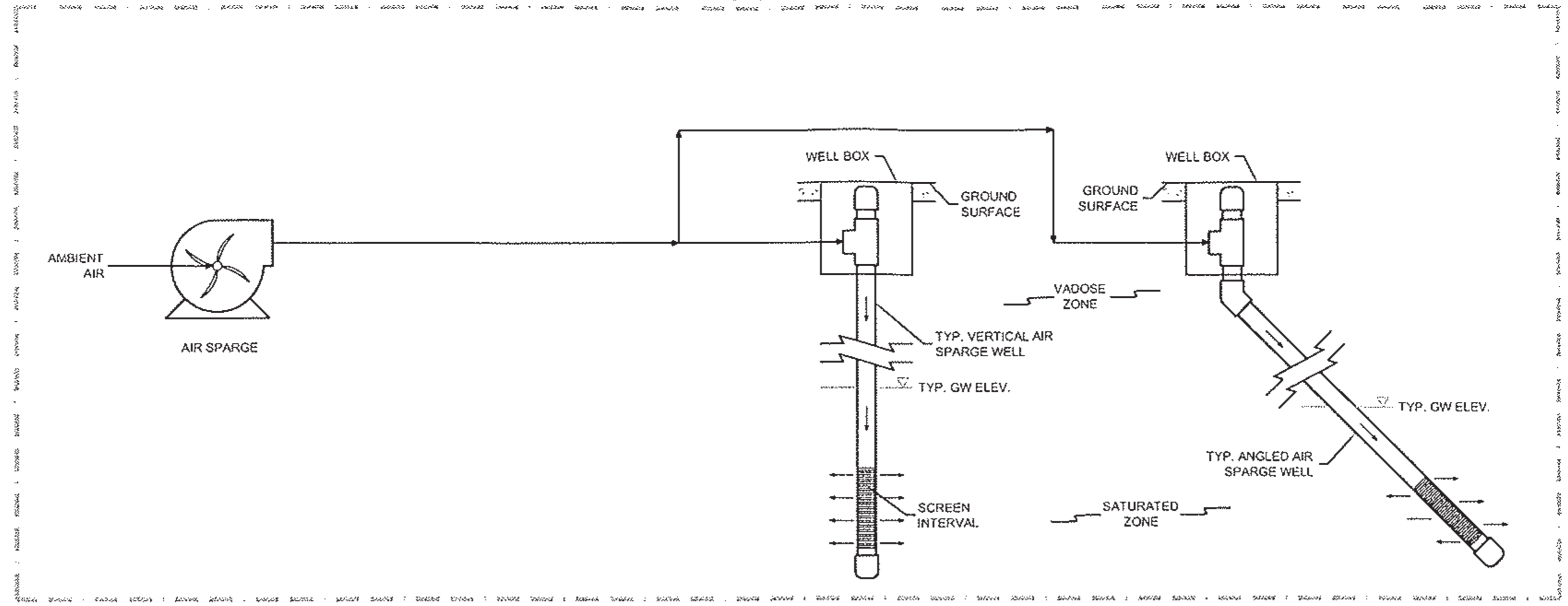
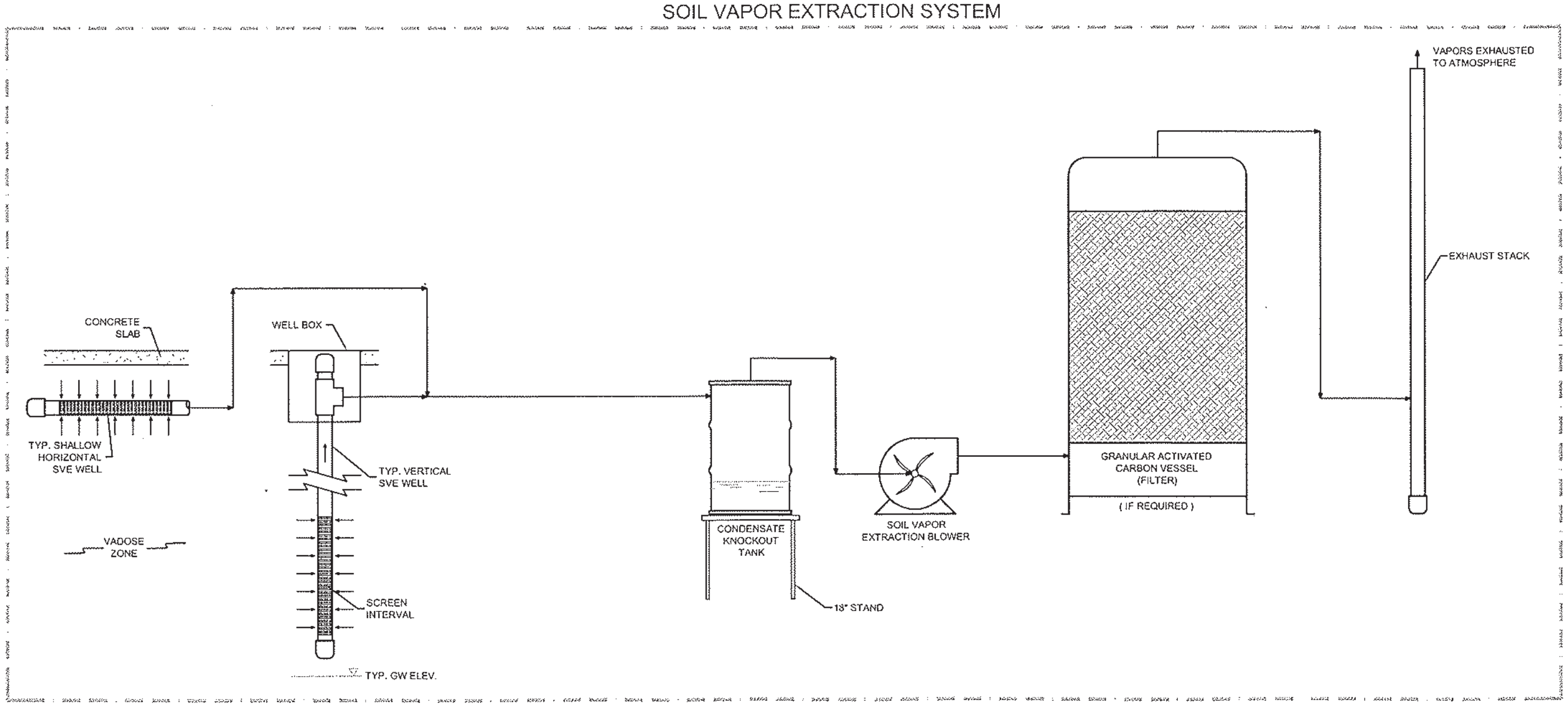
SVE MANIFOLDS CONSTRUCTION DRAWINGS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / C10 SVE MANIFOLDS CONSTRUCTION DRAWINGS.Dwg

AIR SPARGE SYSTEM



SOIL VAPOR EXTRACTION SYSTEM



NOTES:

SVE	SOIL VAPOR EXTRACTION
GW ELEV	GROUNDWATER ELEVATION

M-1

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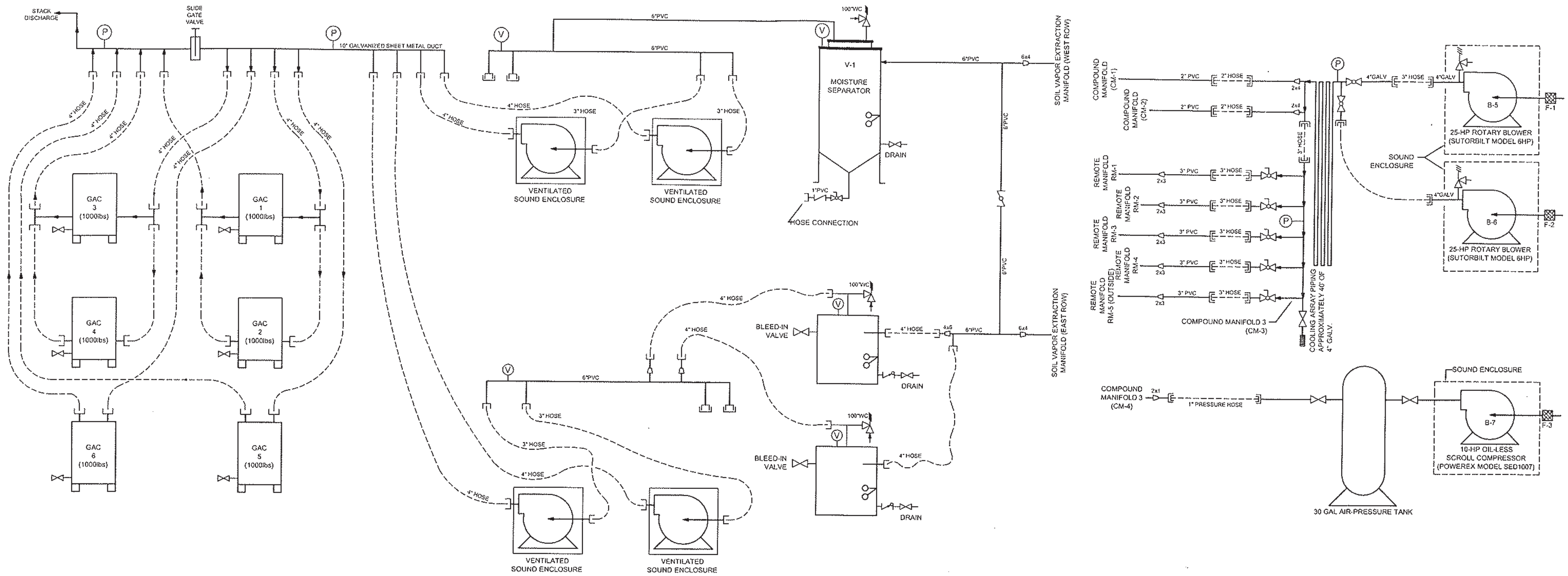
SCALE	NA

CADET MANUFACTURING COMPANY 2500 WEST FOURTH PLAIN BOULEVARD VANCOUVER, WASHINGTON SIMPLIFIED

SIMPLIFIED PROCESS FLOW DIAGRAM

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / M1 SIMPLIFIED PROCESS FLOW DIAGRAM. Dwg



LEGEND

- BALL VALVE
- CHECK VALVE
- AIR FILTER
- QUICK-CONNECT HOSE COUPLINGS
- ROTOMETER (1-12 SCFM)
- GATE VALVE
- MUFFLER
- PRESSURE REGULATOR
- 4x2 REDUCER (4" x 2")
- HOSE
- PRESSURE INDICATOR
- RM1 REMOTE MANIFOLD 1
- CM1 COMPOUND MANIFOLD 1
- UNION
- PRESSURE RELIEF VALVE

M-2

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SCALE	NA

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2500 WEST FOURTH PLAIN BOULEVARD
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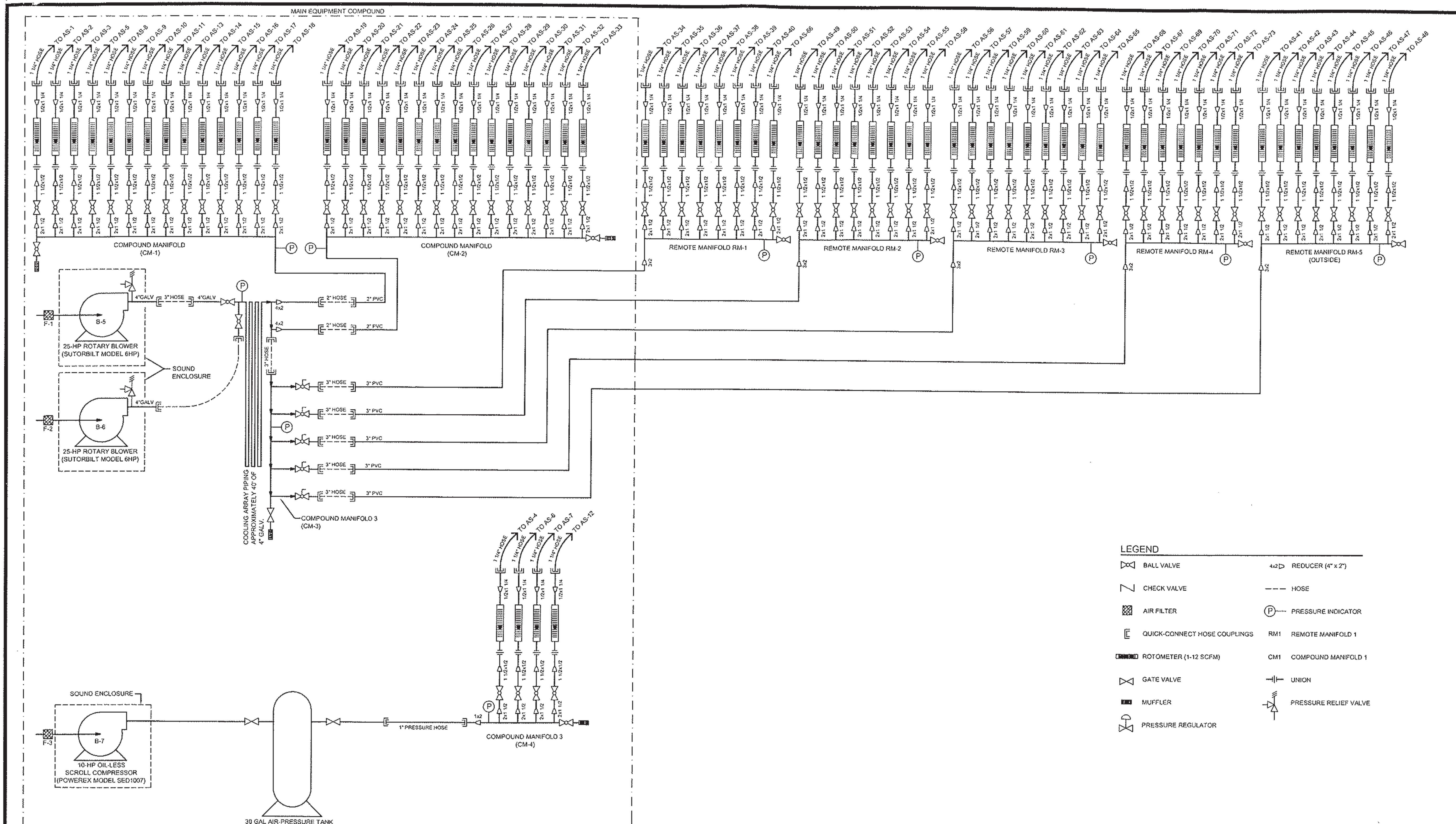
AS/SVE SYSTEM PROCESS & INSTRUMENTATION DIAGRAM

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / M2 AS-SVE System Process & Instrumentation Diagram. Dwg



M-3

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W.O.	3-61M-10135-D
DESIGN	LBJ
DRAWN	DD
DATE	NOVEMBER 2003
SCALE	NA

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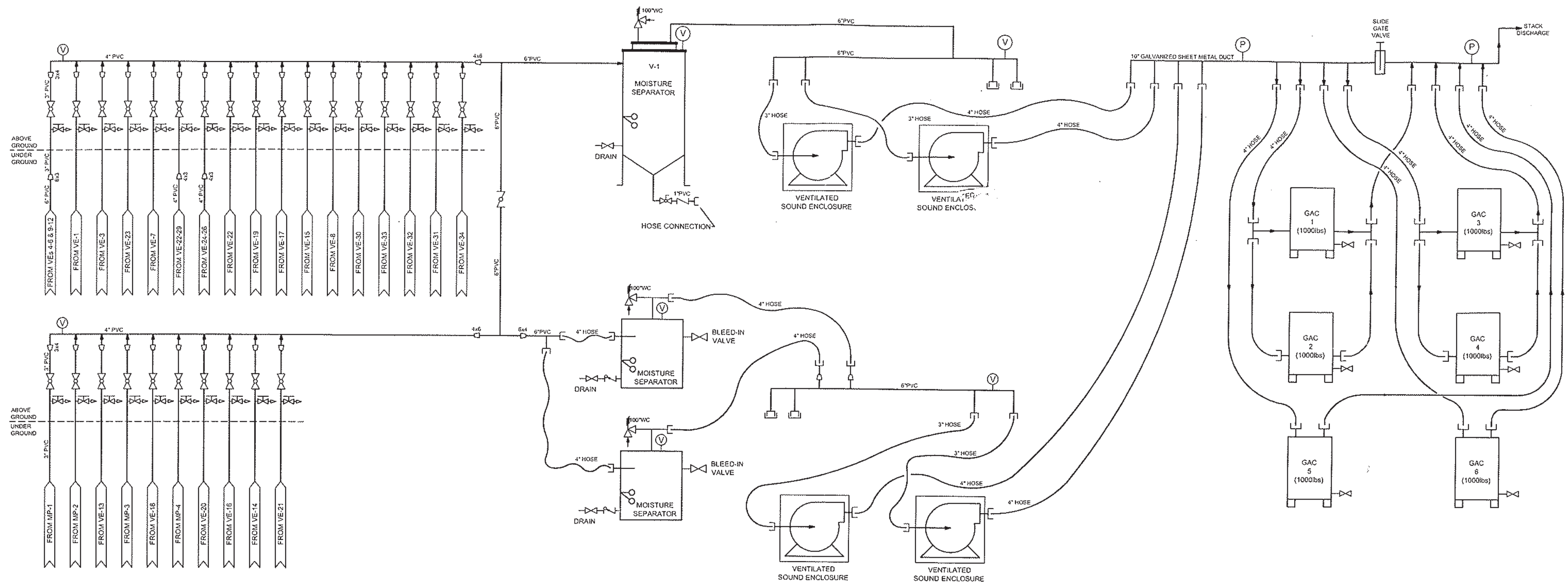
AS SYSTEM PROCESS & INSTRUMENTATION DIAGRAM

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / AS and SVE / As-Builts / M3 AS SYSTEM PROCESS - INSTRUMENT DIAGRAM. Dwg



LEGEND

- VACUUM RELIEF VALVE
- CHECK VALVE
- FLOAT SWITCH
- GATE VALVE
- BALL VALVE
- BUTTERFLY VALVE
- SAMPLE PORT
- HOSE CONNECTION
- FLEXIBLE HOSE
- TAP & THREADED PLUG
- REDUCER (4" X 6")
- PRESSURE GAUGE
- VACUUM GAUGE
- TEMPERATURE INDICATOR
- AIR FILTER
- MUFFLER

PVC	POLYVINYL CHLORIDE
WC	WATER COLUMN
SVE	SOIL VAPOR EXTRACTION
SCH	SCHEDULE
GAC	GRANULAR ACTIVATED CARBON

M-4

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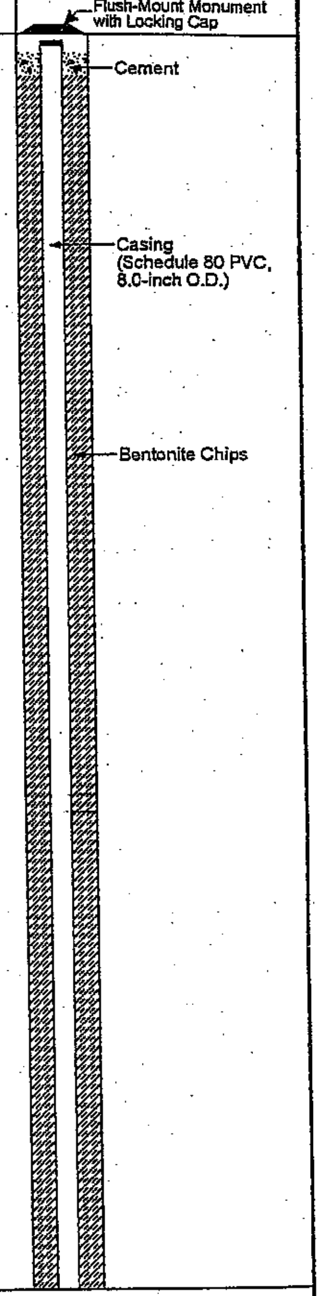
SVE SYSTEM PROCESS & INSTRUMENTATION DIAGRAM

APPENDIX F

RGRW As-Built Drawings and Supporting Information

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0			Asphalt.					
		SM	Soft, brown SILT with some sand; dry.					
5								
		SP	Loose, brown to gray, fine SAND with trace silt.					
10								
15								
20								
			Dense SAND (possible GRAVEL contact). Harder drilling and bit binding up.					
25			Trace gravel; slightly moist.				∇	
		GW	Dense, gray-brown, small to medium, fine SANDY GRAVEL with trace large gravel/cobbles; wet.					
30								

WELL SCHEMATIC



BORING METHOD: Air Rotary

BOREHOLE DIAMETER: 14.0 (in)

DRILL RIG: IR T30

CONTRACTOR: Geo-Tech Explorations

LOGGED BY: B. Lary

ELEVATION REFERENCE:

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID:

DRILLING DATES: 11/5/2003 - 12/1/2003

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

ENVR+WELL BORING REV2 3-61M-10135-C-T3.GPJ AMEC PORTLAND JUNE03.GDT 8/9/04

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Vancouver, Washington

3-61M-10135-C T3

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7376 SW Durham Road
Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

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LOG OF BORING
RGRW-1

AMEC 042162

006757

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
30	GW	Basalt GRAVEL with quartz and other lithologies (5% or less); wet.				▼	
		Drilling dry due to high pressure.					
35		Interbedded fine SAND layers.					
		Larger GRAVEL.					
		Interbedded fine GRAVEL with sand.					
		Large COBBLE; moist to wet.					
40		Dense, black SANDY GRAVEL with other lithologies (5-10%).					
		Started adding water during drilling (approximately 5 GPM).					
45		Black SANDY GRAVEL with occasional finer layers.					
		Less fine sediments. Turned off extra water. Relatively clear groundwater coming up.					
	GP						
50		Larger GRAVEL (3.0-inch plus) with trace to some sand, basalt (90%), other lithologies (10%); wet. Water production increases.					
55							
		High groundwater production during drilling continues.					
60							

WELL SCHEMATIC

BORING METHOD: Air Rotary
BOREHOLE DIAMETER: 14.0 (in)
DRILL RIG: IR T30
CONTRACTOR: Geo-Tech Explorations
LOGGED BY: B. Lary

ELEVATION REFERENCE:
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID:
DRILLING DATES: 11/5/2003 - 12/1/2003

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

ENVR+WELL BORING REV2 3-61M-10135-C-T3.GPJ AMEC PORTLAND JUNE03.GDT 8/9/04

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Vancouver, Washington

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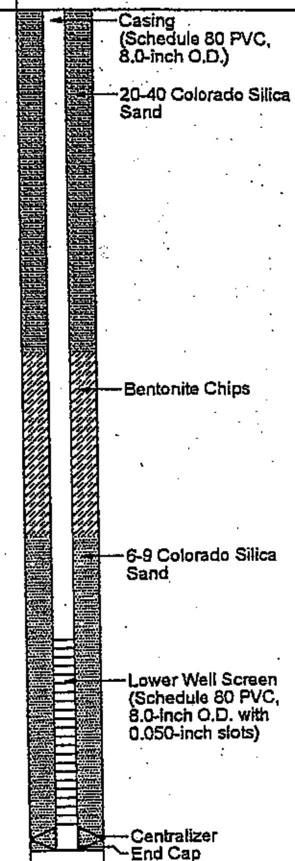
LOG OF BORING
RGRW-1

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
60	GP	Black GRAVEL and COBBLES (3.0-inch plus). High water production. Difficult drilling.					
65		GRAVEL/PEBBLES (some 4.0-inch), basalt quartz (at least 85%).					
70	SP	Medium to fine SAND layer.					
	GP	Black GRAVEL/COBBLES/PEBBLES (some 4.0-inch plus).					
75		Black GRAVEL/PEBBLES.					
80		Total depth = 80.0 feet below ground surface.					
85		NOTE: Vac truck cleared hole from 0.0-8.0 feet below ground surface to clear for utilities. Used Air Rotary with 14.0-inch casing using Tri-cone and button bit.					
90							

WELL SCHEMATIC



BORING METHOD: Air Rotary
BOREHOLE DIAMETER: 14.0 (in)
DRILL RIG: IR T30
CONTRACTOR: Geo-Tech Explorations
LOGGED BY: B. Lary

ELEVATION REFERENCE:
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID:
DRILLING DATES: 11/5/2003 - 12/1/2003

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

Cadet Manufacturing
Vancouver, Washington

3-61M-10135-C T3

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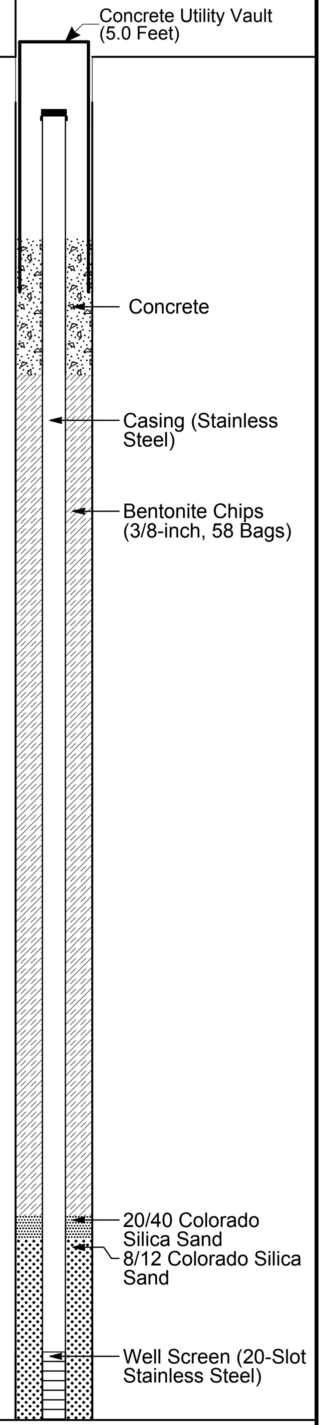
LOG OF BORING
RGRW-1

AMEC 042164

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0		Asphalt.					
	SM	Soft, brown SILT with some sand; dry.					
5							
	SP	Loose, brown to gray, fine SAND with trace silt.					
10							
15							
20							
		Dense SAND (possible GRAVEL contact). Harder drilling and bit binding up.					
25		Trace gravel; slightly moist.					
	GW	Dense, gray-brown, small to medium, fine SANDY GRAVEL with trace large gravel/cobbles; wet.					
30							

WELL SCHEMATIC



BORING METHOD: Sonic
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Rotosonic
CONTRACTOR: Boart Longyear/Geo-Tech/Bruce
LOGGED BY: B. Lary

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE00965/ALB959
DRILLING DATES: 09/15/2004 - 09/22/2004

REMARKS:

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING	WELL SCHEMATIC
30		GW	Basalt GRAVEL with quartz and other lithologies (5% or less); wet.						Well Screen (20-Slot Stainless Steel)
			Drilling dry due to high pressure.						
35			Interbedded fine SAND layers.						
			Larger GRAVEL.						8/12 Colorado Silica Sand
			Interbedded fine GRAVEL with sand.						
			Large COBBLE; moist to wet.						
40			Dense, black SANDY GRAVEL with other lithologies (5-10%).						
									Casing (Stainless Steel)
			Started adding water during drilling (approximately 5 GPM).						
45									20/40 Colorado Silica Sand (17 Bags)
			Black SANDY GRAVEL with occasional finer layers.						
			Less fine sediments. Turned off extra water. Relatively clear groundwater coming up.						
		GP							
50			Larger GRAVEL (3.0-inch plus) with trace to some sand, basalt (90%), other lithologies (10%); wet. Water production increases.						
55									
			High groundwater production during drilling continues.						
60									

BORING METHOD: Sonic

BOREHOLE DIAMETER: 8.0 (in)

DRILL RIG: Rotosonic

CONTRACTOR: Boart Longyear/Geo-Tech/Bruss

LOGGED BY: B. Lary

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: RE00965/ALB959

DRILLING DATES: 09/15/2004 - 09/22/2004

REMARKS:

Cadet Manufacturing

4-61M-10135

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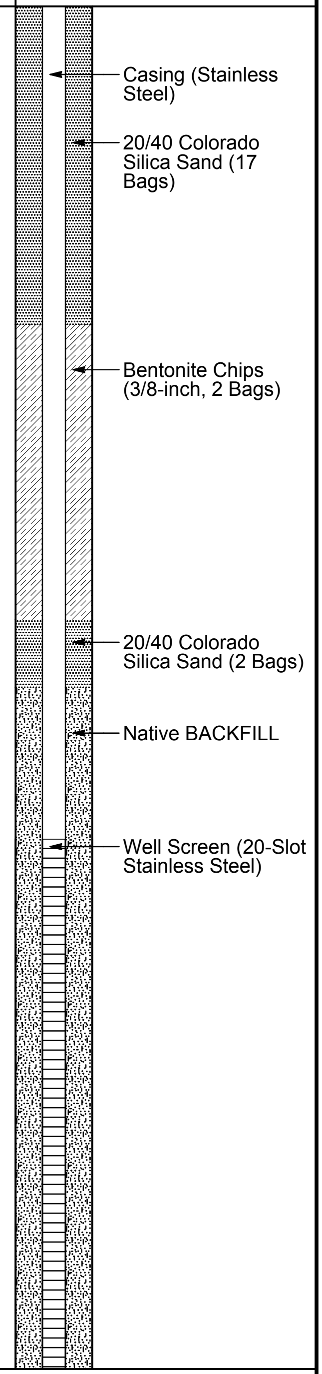
LOG OF BORING RGRW-1A

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
60		GP	Black GRAVEL and COBBLES (3.0-inch plus). High water production. Difficult drilling.					
65								
			GRAVEL/PEBBLES (some 4.0-inch), basalt quartz (at least 85%).					
70		SP	Medium to fine SAND layer.					
		GP	Black GRAVEL/COBBLES/PEBBLES (some 4.0-inch plus).					
75								
			Black GRAVEL/PEBBLES.					
80								
85								
90								

WELL SCHEMATIC



BORING METHOD: Sonic
BOREHOLE DIAMETER: 8.0 (in)
DRILL RIG: Rotosonic
CONTRACTOR: Boart Longyear/Geo-Tech/Bruss
LOGGED BY: B. Lary

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE00965/ALB959
DRILLING DATES: 09/15/2004 - 09/22/2004

REMARKS:

Cadet Manufacturing

4-61M-10135

AMEC Earth and Environmental

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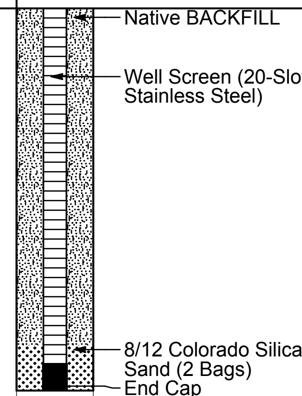
LOG OF BORING RGRW-1A

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING	WELL SCHEMATIC
90		GP							
95									
			Total depth = 98.33 feet below ground surface.						
100									
105									
110									
115									
120									

BORING METHOD: Sonic

BOREHOLE DIAMETER: 8.0 (in)

DRILL RIG: Rotosonic

CONTRACTOR: Boart Longyear/Geo-Tech/Bruse

LOGGED BY: B. Lary

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: RE00965/ALB959

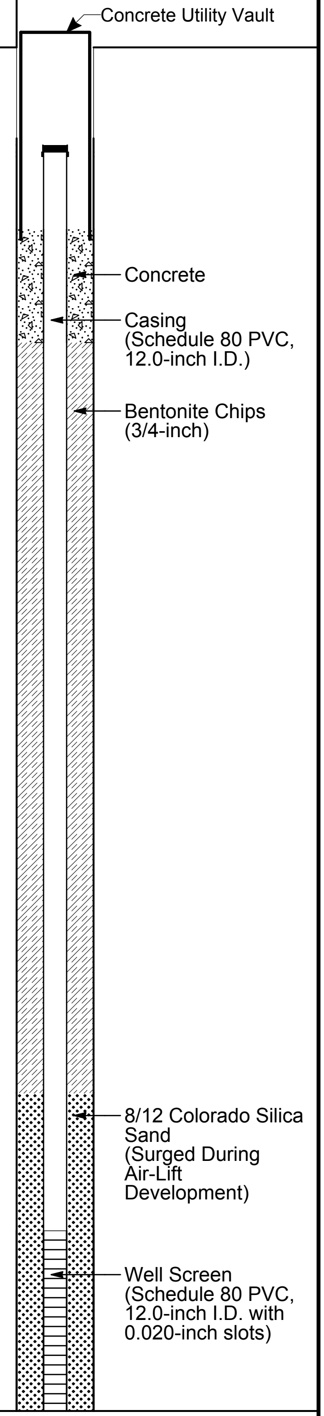
DRILLING DATES: 09/15/2004 - 09/22/2004

REMARKS:

ENVR+WELL BORING 4-61M-10135-RGRW 2004.GPJ AMEC PORTLAND.GDT 4/3/07

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0			Asphalt.					
		SM	Brown SANDY SILT; dry.					
5								
10								
15								
			No cuttings return from 19.3-23.0 feet below ground surface.					
20		SW	Contact with GRAVEL at 20.0 feet below ground surface. Slower drilling rate. Coarse, angular to subangular, well-graded GRAVELLY SAND, some silt, fine gravel (< 1/2-inch diameter).					
			Well-graded, some gravel cuttings (< 1.0-inch diameter).					
			No cuttings return from 24.0-29.0 feet below ground surface.					
25								
		GW	Fine to coarse, rounded to subrounded, well-graded GRAVEL (< 1.0-inch diameter) with some sand (20-30%); wet.					
30								

WELL SCHEMATIC



BORING METHOD: Air Rotary

ELEVATION REFERENCE: NA

BOREHOLE DIAMETER: 16.0 (in)

GROUND SURFACE ELEVATION: NA

DRILL RIG: NA

CASING ELEVATION: NA

CONTRACTOR: Geo-Tech Explorations/Joe

START CARD/TAG ID: NA

LOGGED BY: B. Lary/M. Kohlbecker

DRILLING DATES: 04/19/2004 - 05/11/2004

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

ENVR+WELL BORING 4-61M-10135-L T3.GPJ AMEC PORTLAND.GDT 4/3/07

Cadet Manufacturing Co.
Vancouver, Washington

4-61M-10135-L T3

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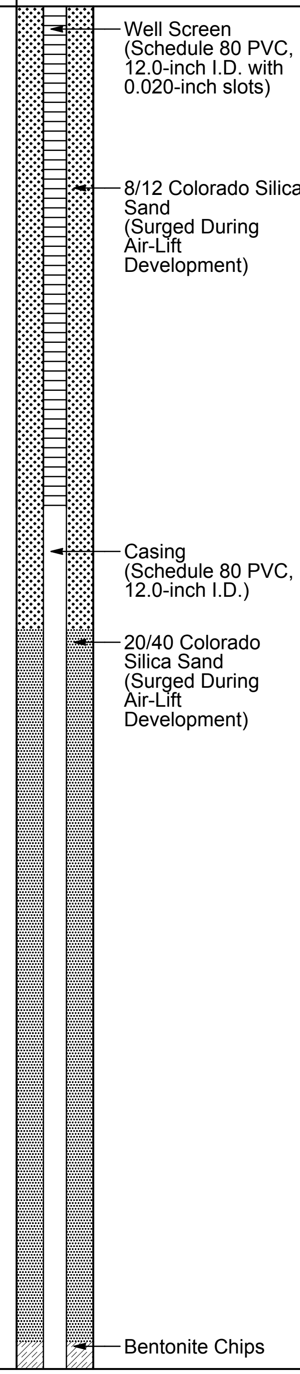
LOG OF BORING RGRW-2

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
30	GW	Fine, rounded to subrounded, well-graded GRAVEL (< 2.0-inch diameter) with sand (30%) and fines (5-10%); wet.					
		Fine, rounded to subrounded, well-graded SANDY GRAVEL, (sand, 40%); wet.					
35		SAND content increases to 50%.					
	SW	Medium to coarse, well-graded SAND. Poor sample return.					
40	GP	Fine and coarse GRAVEL (50%) layers starting at approximately 40.0 feet below ground surface (cuttings). Saturated, moderate production.					
		Coarse GRAVEL.					
45	SW	Coarse to medium, subangular to rounded, well-graded GRAVELLY SAND, fine gravel (20%), basalt, plagioclase feldspar, quartzite.					
	SP	Coarse, angular to subangular, poorly graded SAND (90-95%) with trace fine gravel (5-10%); saturated.					
50							
		Aquifer producing more water.					
55							
		Softer, faster drilling at 58.0 feet below ground surface.					
		Producing less water.					
60							

WELL SCHEMATIC



BORING METHOD: Air Rotary

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: NA

CONTRACTOR: Geo-Tech Explorations/Joe

LOGGED BY: B. Lary/M. Kohlbecker

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 04/19/2004 - 05/11/2004

REMARKS:

No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

Cadet Manufacturing Co.
Vancouver, Washington

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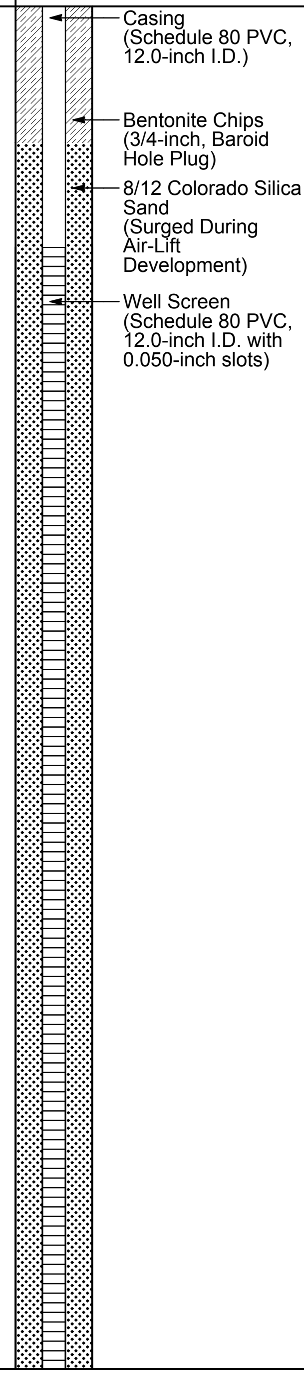
LOG OF BORING RGRW-2

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
60		SP	Coarse, subangular to subrounded, poorly graded SAND; saturated.					
			Slower drilling at 64.0 feet below ground surface.					
65			Trace gravel.					
			Producing copious amounts of water at 66.0 feet below ground surface (probably due to air being turned off).					
70		SW	Medium, subangular to subrounded, well-graded SAND (60%) with some coarse sand (30%), trace fine gravel (10%); saturated.					
			Easier drilling.					
75			Coarse (80%) to medium (20%), angular to subangular, well-graded SAND; saturated.					
			Not very productive at 78.0 feet below ground surface.					
80			Trace gravel.					
			Hard drilling at 81.0 feet below ground surface. Easier drilling immediately below 81.0 feet below ground surface.					
			Low water production.					
85			Coarse (60%) to medium (40%), well-graded SAND; saturated.					
			Low water production.					
90								

WELL SCHEMATIC



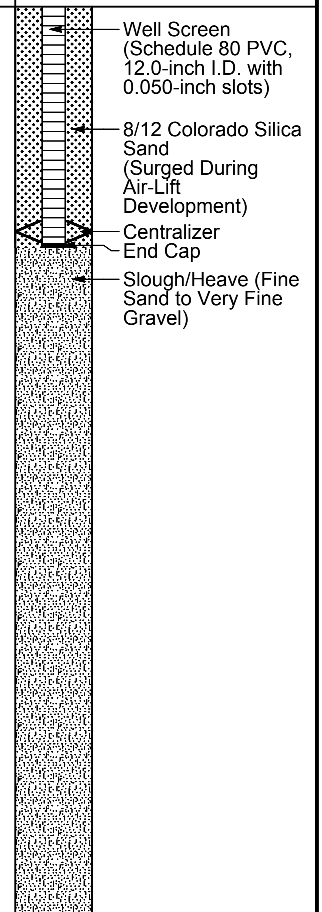
BORING METHOD: Air Rotary
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: NA
CONTRACTOR: Geo-Tech Explorations/Joe
LOGGED BY: B. Lary/M. Kohlbecker

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: NA
DRILLING DATES: 04/19/2004 - 05/11/2004

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
90		SW	Easy drilling.					
			Low water production.					
95		SP	Medium (90%) with some coarse (10%), poorly graded SAND; saturated.					
					337			
100		SW	Medium, subrounded to subangular, well-graded SAND with trace gravel (5-10%), trace fine sand, clasts of basalt, quartz, and plagioclase feldspar; saturated.					
					364			
			Fine SAND at 104.0 feet below ground surface.					
105								
					183			
		SP	Medium to fine (50%-50%), poorly graded SAND; saturated.					
110			Total depth = 110.0 feet below ground surface.					
115								
120								

WELL SCHEMATIC



BORING METHOD: Air Rotary

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: NA

CONTRACTOR: Geo-Tech Explorations/Joe

LOGGED BY: B. Lary/M. Kohlbecker

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: NA

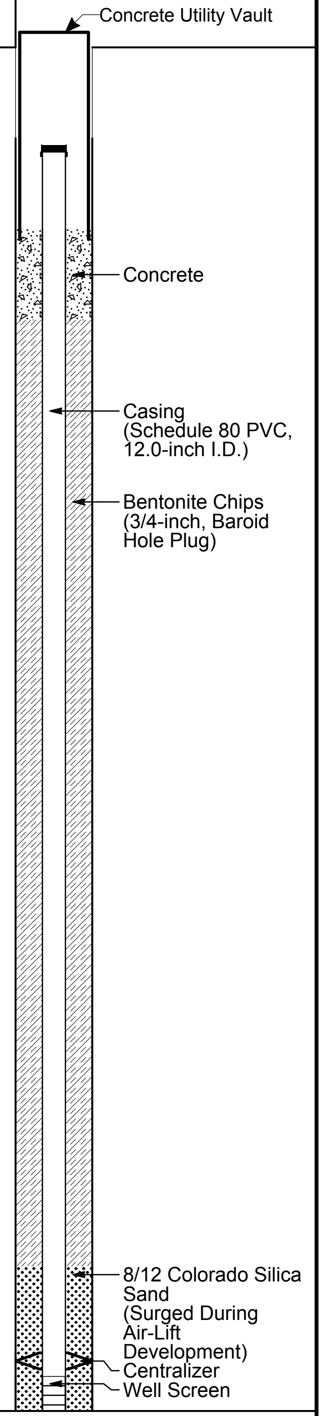
DRILLING DATES: 04/19/2004 - 05/11/2004

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

ENVR+WELL BORING 4-61M-10135-L T3.GPJ AMEC PORTLAND.GDT 4/3/07

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0			Asphalt (3.0-inch layer).					
			SILTY GRAVEL (FILL).					
		ML	Light brown, slightly plastic CLAYEY SILT with medium sand (< 5%), some fine sand.					
5								
10								
		SW	Change in penetration rate at 11.5 feet below ground surface.					
15			Dark gray, medium (60%) to coarse (30%), well-graded SAND with rounded to subrounded gravel (5%, < 1/2-inch diameter), basalt (90%) with some plagioclase feldspar and minor quartz, trace fine sand (5%).					
20			Dark gray, medium (80%) to fine (18%), well-graded SAND with trace coarse sand (2%), basalt (90%) with plagioclase feldspar and quartz. Gravel fragments (> 1.0-inch diameter) present in cuttings at 21.0 feet below ground surface.					
		SW	GRAVEL (30-50%) in cuttings below 22.0 feet below ground surface. Alternating coarse to medium sand and coarse to fine gravel layers.					
25			Dark gray, medium (65%), well-graded GRAVELLY SAND with trace coarse (5%) and fine sand (5%), fine, subrounded to subangular gravel (25%, < 3/4-inch diameter).					
30								

WELL SCHEMATIC



BORING METHOD: Air Rotary

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: NA

CONTRACTOR: Geo-Tech Explorations/Joe

LOGGED BY: M. Kohlbecker

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 04/22/2004 - 05/05/2004

REMARKS:

No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

Cadet Manufacturing Co.
Vancouver, Washington

4-61M-10135-L T3

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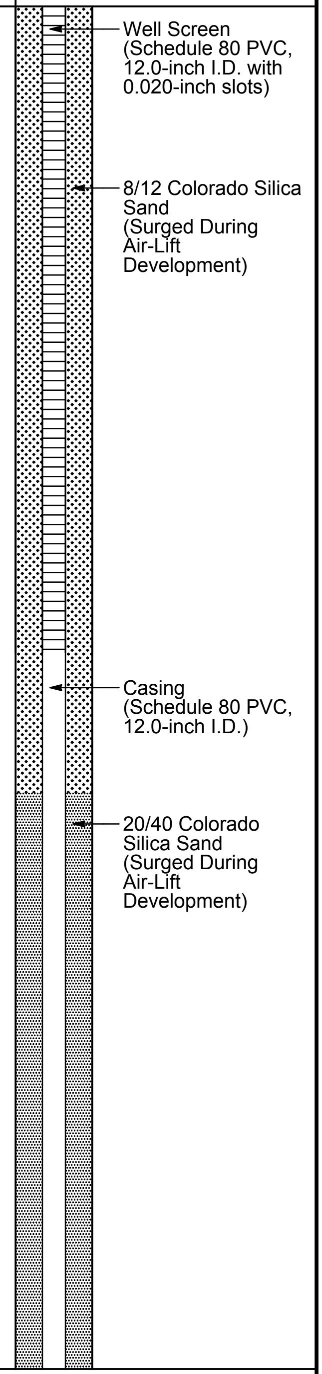
LOG OF BORING RGRW-3

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
30		SW						
		GW	Coarse to fine GRAVEL layers below 32.0 feet below ground surface. Difficulty advancing through gravel.					
			Difficulty advancing through GRAVEL at 34.0 feet and 35.0 feet below ground surface.					
35			Dark gray, coarse, rounded to subrounded, well-graded SANDY GRAVEL (60%, approximately 1.0-inch diameter), coarse sand (30%), fine and medium sand (10%).					
		SW	Penetration rate increases at 37.0 feet below ground surface (less coarse material in cuttings).					
40			Medium (50%) to fine (25%) to coarse (25%), well-graded SAND.					
		SW	Penetration rate decreases at 41.0 feet below ground surface. Difficulty advancing drill.					
			Penetration rate increases at 43.0 feet below ground surface.					
45			Medium (> 30%) to fine (30%) to coarse (20%), poorly sorted GRAVELLY SAND, fine, subrounded to rounded gravel (20%, < 3/4-inch diameter).					
			Penetration rate increases at 47.0 feet below ground surface. Less gravel in cuttings.					
50			Medium (50%) to fine (20%), poorly sorted GRAVELLY SAND, coarse, subrounded to rounded gravel (30%).					
			Coarse GRAVEL observed in cuttings at 52.0 feet below ground surface.					
			Penetration rate decreases dramatically at 54.0 feet below ground surface.					
55		SW	Medium (70%) to coarse (10%) to fine (10%), well-graded SAND with trace gravel (10%). Significant amounts of coarse GRAVEL in cuttings from 55.0-57.5 feet below ground surface.					
60								

WELL SCHEMATIC

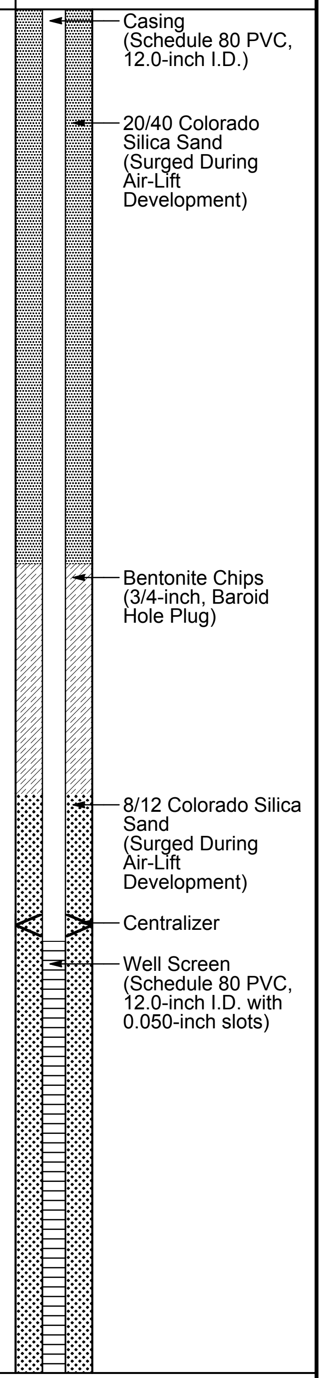


BORING METHOD: Air Rotary
ELEVATION REFERENCE: NA
BOREHOLE DIAMETER: 16.0 (in)
GROUND SURFACE ELEVATION: NA
DRILL RIG: NA
CASING ELEVATION: NA
CONTRACTOR: Geo-Tech Explorations/Joe
START CARD/TAG ID: NA
LOGGED BY: M. Kohlbecker
DRILLING DATES: 04/22/2004 - 05/05/2004

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
60		SW	Medium (70%) to coarse (10%) to fine (10%), well-graded SAND with rounded to subrounded gravel (10%). Significant GRAVEL in cuttings from 61.0-63.0 feet below ground surface.					
65			Medium (80%) to coarse (10%), well-graded SAND with fine, subrounded to rounded gravel (5-10%). Aquifer producing copious amounts of water at 65.0 feet below ground surface. Medium SAND observed in cuttings. Penetration rate increases at 66.5 feet below ground surface.					
70			Medium (60%) to fine (20%) to coarse (20%), well-graded SAND.					
75			Fine (50%) to medium (50%) with trace coarse, well-graded SAND.					
80			Fine (50%) to medium (50%), well-graded SAND.					
85		SP	Fine (90%) to medium (10%), poorly graded SAND.					
90								

WELL SCHEMATIC



BORING METHOD: Air Rotary

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: NA

CONTRACTOR: Geo-Tech Explorations/Joe

LOGGED BY: M. Kohlbecker

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 04/22/2004 - 05/05/2004

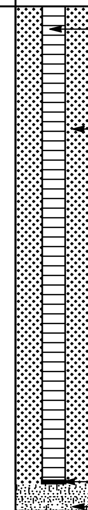
REMARKS:

No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

ENVR+WELL BORING 4-61M-10135-L T3.GPJ AMEC PORTLAND.GDT 4/3/07

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
90	SP	Moderate production rate from 91.0-93.0 feet below ground surface.					
	SW	Becomes gravelly. Slower penetration rate at 92.0 feet below ground surface. Lower water production and very hard drilling at 94.0 feet below ground surface. (Drilling through boulder.) Increase in water production at 94.25 feet below ground surface. Fine (40%) to medium (40%) to coarse (20%) GRAVELLY SAND with silt and clay (5%).					
95							
	GW	Fine (60%) to coarse (20%), angular to subangular SANDY GRAVEL with some cobble-size clasts consisting of basalt with other lithics (40%, quartzite, altered volcanics, granite, and sandstone) - Troutdale Formation (TGA). Water production up to approximately 250 gpm. Water is clear. Grades to moderately cemented at 100.0 feet below ground surface.					
100							
		Total depth = 101.1 feet below ground surface.					
105							
110							
115							
120							

WELL SCHEMATIC

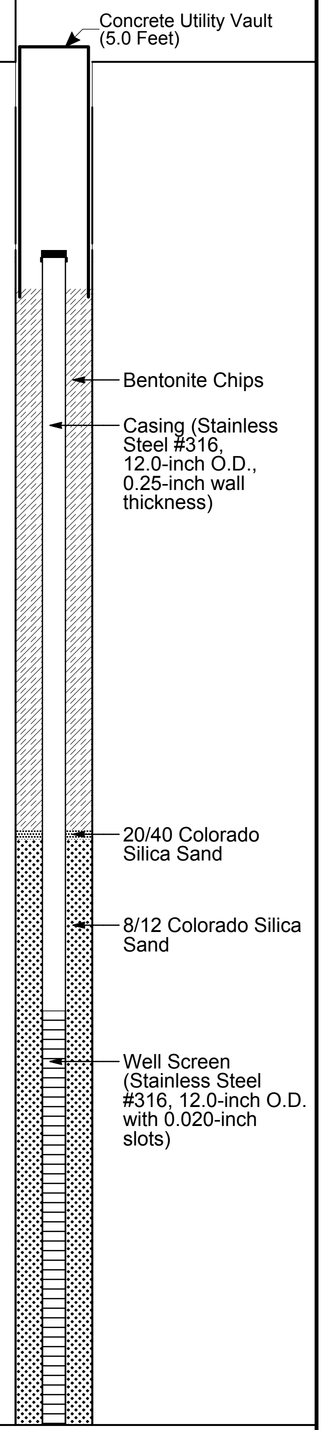


BORING METHOD: Air Rotary
ELEVATION REFERENCE: NA
BOREHOLE DIAMETER: 16.0 (in)
GROUND SURFACE ELEVATION: NA
DRILL RIG: NA
CASING ELEVATION: NA
CONTRACTOR: Geo-Tech Explorations/Joe
START CARD/TAG ID: NA
LOGGED BY: M. Kohlbecker
DRILLING DATES: 04/22/2004 - 05/05/2004

REMARKS:
No discrete soil samples collected. Lithology logged by drilling character/resistance and visual observations of return drill cuttings.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0		ML	Asphalt (1.5-inch layer) underlain by base coarse GRAVEL (FILL, 2.0-inch layer).					
			Medium stiff, brown CLAYEY SILT with trace organics (1-5% rootlets, plant debris), moderately plastic; moist.					
5								
10			Medium stiff, brown SILT with some clay, low plasticity; moist.					
		SM	Loose to medium dense, light brown, fine, poorly graded SILTY SAND; moist.					
15								
20		ML	Medium stiff, brown SILT with some clay, low plasticity; moist.				▼	
			Harder drilling at 23.0 feet below ground surface.				▽	
		SM-SW	Dense, gray, fine to coarse, well-graded SILTY GRAVELLY SAND (40%), gravel (30%), silt (30%); wet.					
25								
		SP	Dense, gray, coarse, poorly graded GRAVELLY SAND (55-60%), gravel (30-40%), trace medium to fine sand and silt (approximately 10%).					
30		GW	Becomes gravelly.					

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01063/ALB972
DRILLING DATES: 11/06/2004 - 12/18/2004

REMARKS:
Conventional Circulation

Cadet Manufacturing

4-61M-10135

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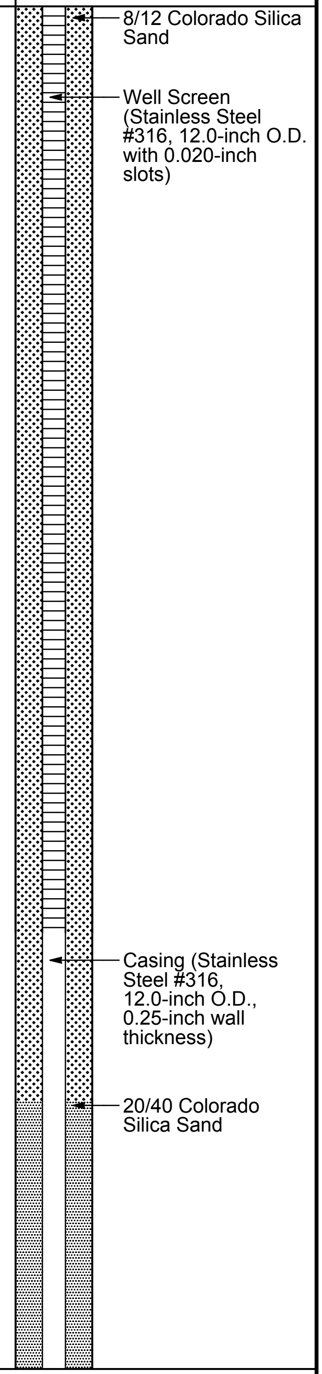
LOG OF BORING RGRW-4

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
30	GW	Very dense, gray, fine to coarse, well-graded GRAVEL (70-75%) with some sand (25%), trace silt, quartzite and chert clasts (10-15%), basaltic gravel (85%).					
35		Easier drilling at 35.0 feet below ground surface.					
	SP	Medium dense to dense, coarse, poorly graded SAND (70%) with some fine gravel (15-20%), trace fine to medium sand; wet.					
40							
45	GW	Dense, gray, fine to coarse, angular to rounded, well-graded SANDY GRAVEL (60-75%), sand (25-40%). Variable sand and gravel content; appears to be layered sand and gravel.					
50							
	SW	Medium dense to dense, gray, medium to coarse, well-graded GRAVELLY SAND (60%), gravel (40%).					
55							
60	GW	Harder drilling at 59.5 feet below ground surface.					

WELL SCHEMATIC

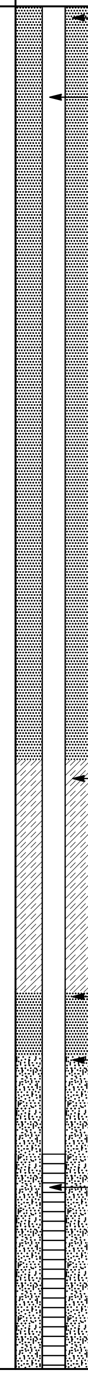


BORING METHOD: Dual Rotary Air
ELEVATION REFERENCE: NA
BOREHOLE DIAMETER: 16.0 (in)
GROUND SURFACE ELEVATION: NA
DRILL RIG: Formost DR24
CASING ELEVATION: NA
CONTRACTOR: Boart Longyear/Geo-Tech
START CARD/TAG ID: RE01063/ALB972
LOGGED BY: J. Fassio
DRILLING DATES: 11/06/2004 - 12/18/2004

REMARKS:
Conventional Circulation

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
60	GW	Dense to very dense, gray, fine to coarse, well-graded SANDY GRAVEL, coarse sand, trace silt.					
	SP	Dense, gray, coarse, poorly graded SAND, some gravel (15-20%), trace silt.					
65	GW	Dense, gray, fine to coarse, well-graded, subangular to subrounded SANDY GRAVEL (50-60%), sand (40-50%), trace silt (1%).					
75		Harder drilling at 74.0 feet below ground surface due to cobbles and boulders. Water production increases dramatically. Sand becomes fine to coarse, well-graded.					
		Water production decreases from 77.0-79.0 feet below ground surface.					
80	GW	Harder drilling at 79.0 feet below ground surface. Water production increases. Dense to very dense, gray, fine to coarse, subangular to subrounded GRAVEL, some to trace coarse sand, occasional cobble layers, predominately basaltic clasts (80-85%), other lithics (15-20%).					
85		Easier drilling at 84.5-86.0 feet below ground surface. Water production increases dramatically at 85.0 feet below ground surface. Produced water at rate of 300 gpm from 85.0-90.0 feet below ground surface. Harder drilling at 86.0 feet below ground surface.					
90							

WELL SCHEMATIC

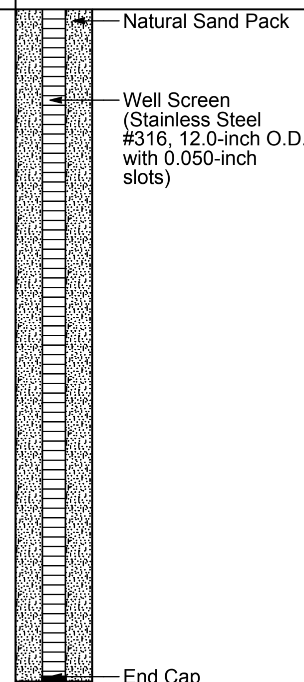


BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01063/ALB972
DRILLING DATES: 11/06/2004 - 12/18/2004

REMARKS:
Conventional Circulation

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING	WELL SCHEMATIC
90		GW							
95									
100									
			COBBLES at 103.0 feet below ground surface.						
105			Total depth = 105.0 feet below ground surface.						
110									
115									
120									



BORING METHOD: Dual Rotary Air

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: Formost DR24

CONTRACTOR: Boart Longyear/Geo-Tech

LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

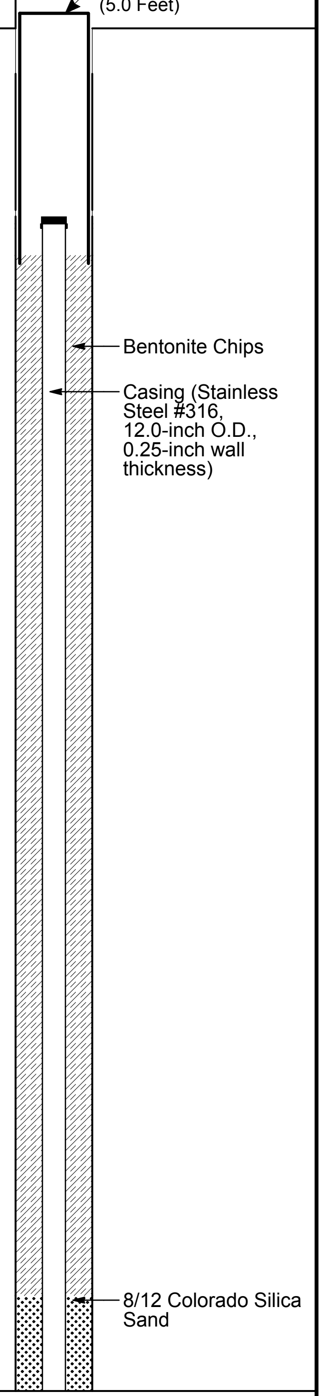
START CARD/TAG ID: RE01063/ALB972

DRILLING DATES: 11/06/2004 - 12/18/2004

REMARKS:
Conventional Circulation

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0			Asphalt (2.0-inch layer) underlain by dense SILTY SANDY GRAVEL (FILL); moist.					
		ML	Medium stiff, dark brown SILT with some clay, trace fine sand and gravel; moist.					
5								
10			Trace clay at 10.0 feet below ground surface.					
		SM	Medium dense, light brown, very fine, poorly graded SAND with some silt; moist.					
15								
20			Poor cutting return, driller used water at pumping rate of 30 gpm from 15.0-20.0 feet below ground surface.					
25		SW	Dense, gray, fine to coarse, well-graded GRAVELLY SAND (55-60%), gravel (30-35%), trace silt (10%).					
		GW	Harder drilling at 27.0 feet below ground surface.					
30								

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01130/ALB723
DRILLING DATES: 01/26/2005 - 02/04/2005

REMARKS:
Conventional Circulation

ENVR+WELL BORING 4-61M-10135-RGRW 2004.GPJ AMEC PORTLAND.GDT 4/3/07

Cadet Manufacturing

4-61M-10135

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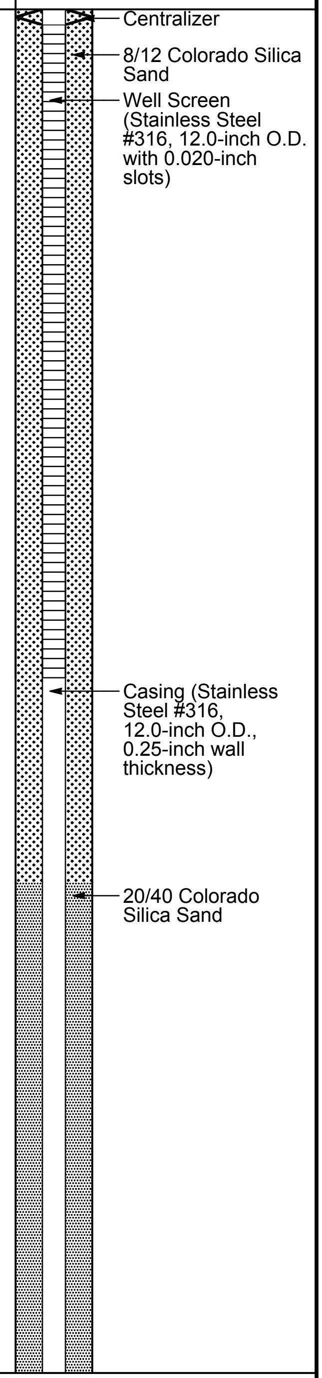
LOG OF BORING RGRW-5

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
30		GW	Very dense, gray, fine to coarse, well-graded SANDY GRAVEL (50-55%), medium to coarse sand (35-40%), some cobbles and trace silt (5-10%).					
35			Boulder or large cobble at 35.0 feet below ground surface.					
40								
45			Gravel content increases to 60% at 45.0 feet below ground surface.					
		SW	Very dense, gray, fine to coarse, well-graded SAND with trace gravel and cobbles.					
50		GW	Very dense, gray, fine, well-graded SANDY GRAVEL (60%), medium to coarse sand (20%), non-volcanic lithic clasts (quartzite, chert, metamorphics, granite, 10-15%), silt and clay (< 5%), trace cobbles and coarse gravel.					
55			Larger cobbles or boulder at 54.5 feet below ground surface. Low cutting return at 55.0-60.0 feet below ground surface.					
60								

WELL SCHEMATIC

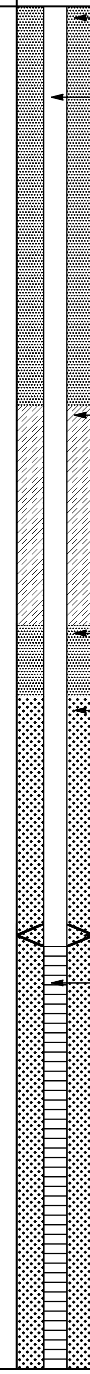


BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01130/ALB723
DRILLING DATES: 01/26/2005 - 02/04/2005

REMARKS:
Conventional Circulation

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING	WELL SCHEMATIC
60		GW							
63		SW	Easier drilling at 63.0-65.0 feet below ground surface.						
65			Dense, gray, fine to coarse, well-graded GRAVELLY SAND (65%), gravel (30%), trace cobbles and silt (5-10%).						
			Drilling without water from 67.0-75.0 feet below ground surface.						
68		GW	Very dense, gray, fine to coarse, well-graded SANDY GRAVEL (50%), fine to coarse sand (40%), trace cobbles and silt (10%).						
70									
75			Gravel content increases to 70%; higher coarse gravel content (30% coarse, 70% fine).						
80									
81		SW	Easier drilling at 81.0 feet below ground surface.						
85			Medium dense, gray, fine to coarse, well-graded SAND with some fine to coarse, rounded to subrounded gravel (25%), non-volcanic lithic clasts (quartzite, metamorphics, granite, 10-15%), trace silt and clay.						
90									



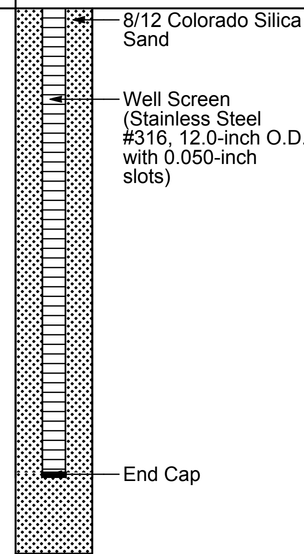
BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01130/ALB723
DRILLING DATES: 01/26/2005 - 02/04/2005

REMARKS:
Conventional Circulation

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
90		SW	Gravel content decreases to 10-15% (trace). Silt content increases to 15-20%.					
95			Fine to medium SAND with gravel (5-10%).					
100								
			Total depth = 102.0 feet below ground surface.					
105								
110								
115								
120								

WELL SCHEMATIC



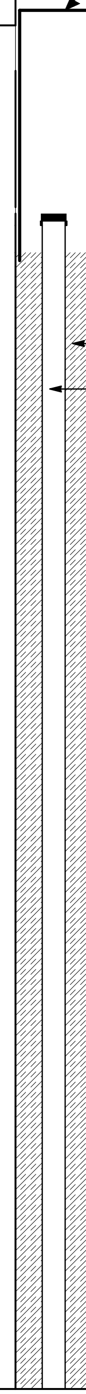
BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01130/ALB723
DRILLING DATES: 01/26/2005 - 02/04/2005

REMARKS:
Conventional Circulation

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0		ML	Asphalt (2.0-inch layer). Medium stiff to stiff, brown CLAYEY SILT with some coarse, subrounded to rounded gravel and cobbles, trace fine sand; moist to dry.					
5								
10								
		SM	Dense, brown, fine, well-graded SILTY SAND with some subrounded to rounded gravel.					
15								
20			Dense, gray, medium to coarse, well-graded SAND with some subrounded to subangular gravel (10%) and silt.					
25		GW	Very dense, fine to coarse, well-graded SANDY GRAVEL (50-55%), coarse to medium sand (30-35%), trace silt (5-10%).					
		SW	Easier drilling from 27.0-30.0 feet below ground surface. Dense, medium to coarse, well-graded SAND with trace gravel.					
30								

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01066/ALB974
DRILLING DATES: 10/28/2004 - 11/09/2004

REMARKS:
Conventional Circulation

Cleared hole with air knife from 0.0-5.0 feet below ground surface. Driller had to use water to prevent clogging in discharge hose above water table.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING	WELL SCHEMATIC
30		GW	Dense, gray, fine to coarse, well-graded SANDY GRAVEL (55-65%), coarse to medium sand (25-30%), trace silt (5-20%).						Bentonite Chips; Casing (Stainless Steel #316, 12.0-inch O.D., 0.25-inch wall thickness)
35		GM	Stiff, gray GRAVELLY SILT. (Low cuttings return).				▼		
40		SP	Dense, gray, coarse, poorly graded SAND with trace gravel (5-10%) and silt.						20/40 Colorado Silica Sand; 8/12 Colorado Silica Sand
45		GW	Very dense, gray, fine to coarse, subrounded to subangular, well-graded SANDY GRAVEL (55-60%), medium to coarse sand (40%), trace silt, basaltic clasts (80%), exotic clasts (quartzite, other metamorphic rocks, igneous clasts, 20%).						Well Screen (Stainless Steel #316, 12.0-inch O.D. with 0.020-inch slots)
50									
55			Gravel content decreases to 45-50% at 55.0 feet below ground surface.						
60									

BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01066/ALB974
DRILLING DATES: 10/28/2004 - 11/09/2004

REMARKS:
Conventional Circulation

Cleared hole with air knife from 0.0-5.0 feet below ground surface. Driller had to use water to prevent clogging in discharge hose above water table.

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LOG OF BORING RGRW-6

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
60		GW	Gravel becomes predominately fine at 60.0 feet below ground surface. Low water production.					
65		SW	Dense, gray, medium to coarse, well-graded SAND with some fine, rounded to subrounded gravel (20-30%) and trace silt.					
70			Fine sand content increases at 70.0 feet below ground surface.					
		SW-SM	Medium to dense (based on drilling rate), fine to medium, well-graded GRAVELLY SAND, predominately fine, rounded to subrounded gravel (40%), some silt (10-15%).					
75								
		GW	Slower drilling from 78.0-82.5 feet below ground surface. Very dense, dark gray, fine to coarse, subangular to subrounded SANDY GRAVEL with large cobbles, coarse sand (25-30%).					
80								
		SW	Easier drilling at 82.5 feet below ground surface.					
85			Dense, gray, medium to coarse, well-graded SAND with some gravel (15-25%) and trace silt. Water production increases from 85.0-90.0 feet below ground surface. Low cuttings return at 88.0-92.0 feet below ground surface.					
90								

WELL SCHEMATIC

- 8/12 Colorado Silica Sand
- Well Screen (Stainless Steel #316, 12.0-inch O.D. with 0.020-inch slots)
- Casing (Stainless Steel #316, 12.0-inch O.D., 0.25-inch wall thickness)
- 20/40 Colorado Silica Sand

BORING METHOD: Dual Rotary Air

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: Formost DR24

CONTRACTOR: Boart Longyear/Geo-Tech

LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: RE01066/ALB974

DRILLING DATES: 10/28/2004 - 11/09/2004

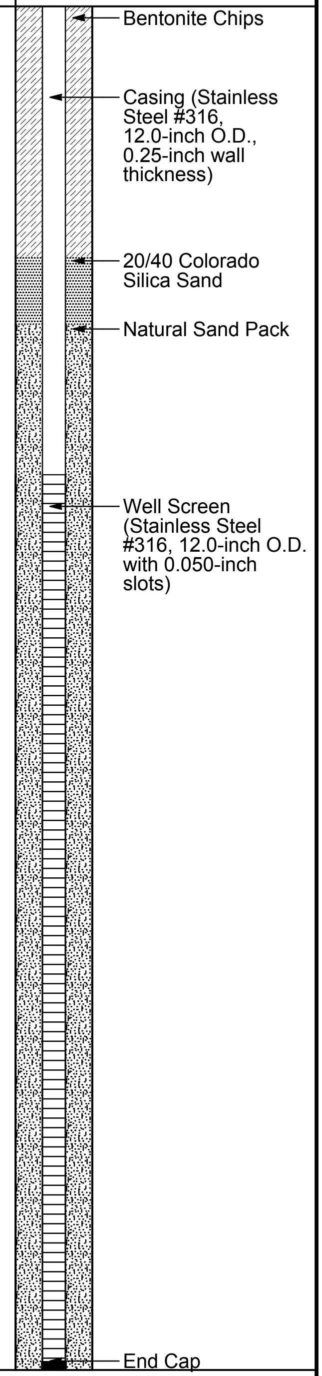
REMARKS:

Conventional Circulation

Cleared hole with air knife from 0.0-5.0 feet below ground surface. Driller had to use water to prevent clogging in discharge hose above water table.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
90		SW	Water production decreases at 90.0 feet below ground surface.					
		GW	Dense, gray, fine to coarse, subrounded to rounded GRAVEL (65-70%), some sand (25%) and trace silt (5-15%).					
95								
100								
		SW	Dense, gray, fine to coarse, well-graded SAND with some gravel (25-30%) and trace silt.					
105								
		GW	Harder drillling at 106.0 feet below ground surface. Very dense, gray, well-graded SANDY GRAVEL (50-60%), trace silt and cobbles, exotic clasts (quartzite, metamorphic rocks, and granitic clasts, 40-50%).					
110								
115								
120			Total depth = 120.3 feet below ground surface.					

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: Formost DR24

CONTRACTOR: Boart Longyear/Geo-Tech

LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: RE01066/ALB974

DRILLING DATES: 10/28/2004 - 11/09/2004

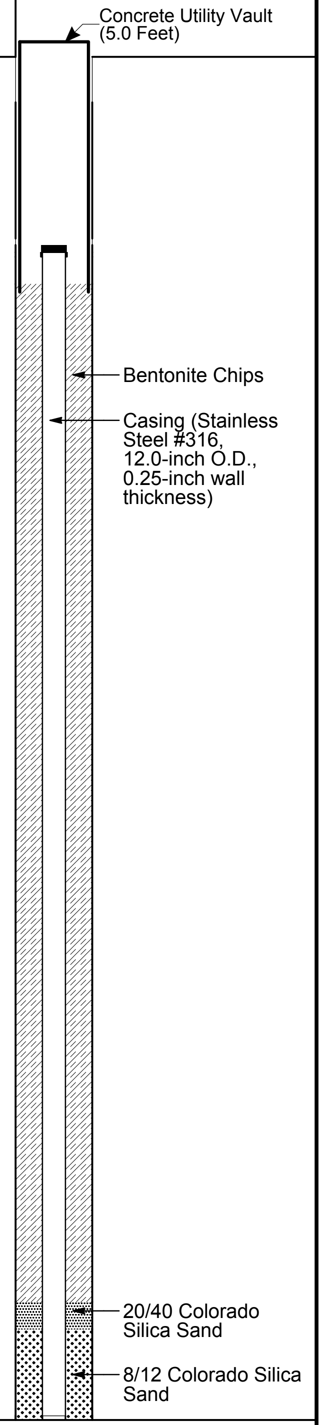
REMARKS:

Conventional Circulation

Cleared hole with air knife from 0.0-5.0 feet below ground surface. Driller had to use water to prevent clogging in discharge hose above water table.

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
0		Asphalt (1.5-inch layer) underlain by base coarse GRAVEL (FILL, 3.0-inch layer).					
	ML	Medium stiff, brown SANDY SILT with some clay, low plasticity; dry to moist.					
		Stiff, brown SILT with some clay, low plasticity; moist.					
5							
10		Low cuttings return and no samples from 6.0-15.0 feet below ground surface. Silt sticking on bit or plugging discharge.					
15							
20	GM	Medium dense to dense, gray, fine to coarse, subrounded to subangular SILTY GRAVEL (50-55%), silt (30%), some sand (20%) and trace clay (5%); saturated.				▼	
	GW	Silt content decreases.					
25		Dense, gray, fine, rounded to subangular, well-graded SANDY GRAVEL (50-60%), gravel clasts (quartzite, chert, and metamorphic rocks, 20-35%), sand (40%), silt (10%), trace clay. Harder drilling at 27.0-30.0 feet below ground surface due to cobbles and boulders.					
30							

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01065/ALB973
DRILLING DATES: 11/04/2004 - 11/16/2004

REMARKS:
Conventional Circulation
Cleared hole with air knife from 0.0-5.0 feet below ground surface.

ENVR+WELL BORING 4-61M-10135-RGRW 2004.GPJ AMEC PORTLAND.GDT 4/3/07

Cadet Manufacturing

4-61M-10135

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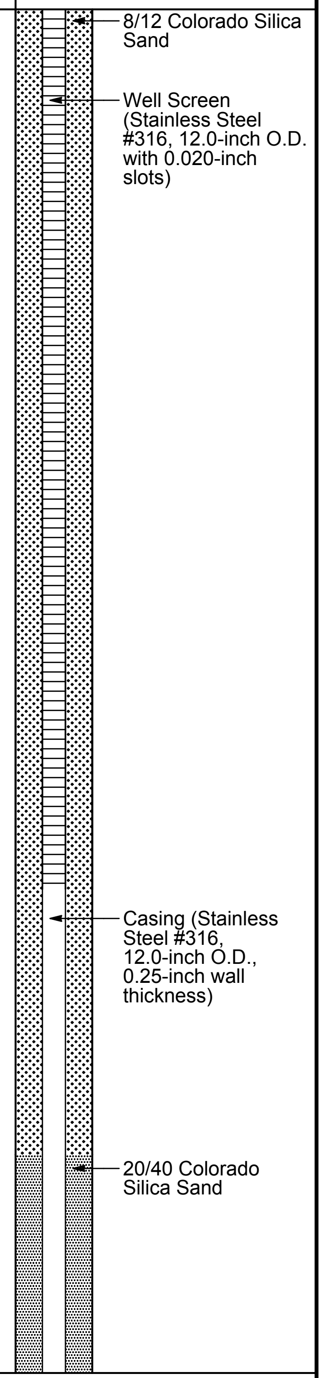
LOG OF BORING RGRW-7

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
30		SW	Medium dense to dense, medium to coarse, well-graded GRAVELLY SAND (65%), gravel (30-35%), trace silt (5%).					
35		GP	Medium dense to dense, fine to coarse GRAVEL (75%), some coarse to fine sand (15-20%), silt (<5%).					
40		SP	Medium dense, gray, coarse, poorly graded SAND with some fine, rounded to subangular gravel (10-15%) and trace medium and fine sand.					
45 50		SW	Dense to very dense, gray, medium to coarse, well-graded GRAVELLY SAND, fine to coarse gravel (40%), cobbles and trace silt. Harder drilling from 45.0-49.0 feet below ground surface.					
55		SP	Gravel content decreases. Medium dense, gray, coarse, poorly graded SAND with trace gravel.					
60		GW	Dense, gray, fine to coarse, rounded to subangular, well-graded SANDY GRAVEL (60-65%) with trace silt.					

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: Formost DR24

CONTRACTOR: Boart Longyear/Geo-Tech

LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: RE01065/ALB973

DRILLING DATES: 11/04/2004 - 11/16/2004

REMARKS:

Conventional Circulation

Cleared hole with air knife from 0.0-5.0 feet below ground surface.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING	WELL SCHEMATIC
60		GW							20/40 Colorado Silica Sand
		SW	Medium dense to loose, gray, medium to coarse, well-graded SAND with some fine to coarse gravel (25%), trace silt and fine sand.						Casing (Stainless Steel #316, 12.0-inch O.D., 0.25-inch wall thickness)
65									
70		SW	Silt and fine sand content increases; faster drilling at 70.0 feet below ground surface. Loose, gray, fine to medium, well-graded SAND with some fine to coarse gravel (10-15%) and silt.						
		SP	Loose, gray, fine, poorly graded SAND with some silt (10%), trace gravel (5%) and medium to coarse sand.						
75									
80									
85			Silt content increases to 15% at 85.0 feet below ground surface.						Bentonite Chips
			Gravel content decreases from 88.0-91.0 feet below ground surface.						
90									

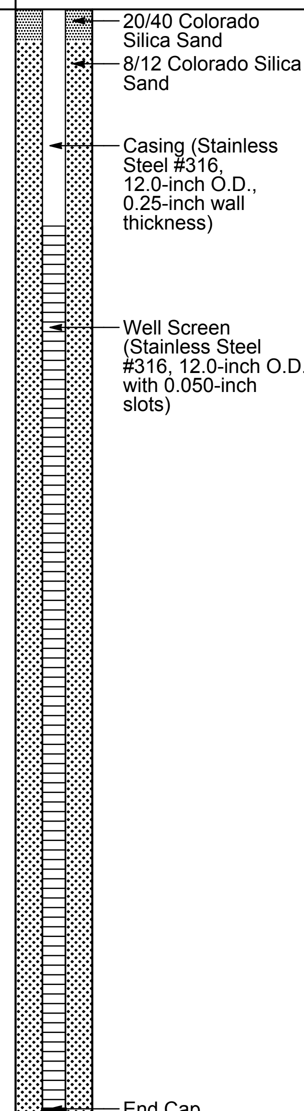
BORING METHOD: Dual Rotary Air
BOREHOLE DIAMETER: 16.0 (in)
DRILL RIG: Formost DR24
CONTRACTOR: Boart Longyear/Geo-Tech
LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA
GROUND SURFACE ELEVATION: NA
CASING ELEVATION: NA
START CARD/TAG ID: RE01065/ALB973
DRILLING DATES: 11/04/2004 - 11/16/2004

REMARKS:
Conventional Circulation
Cleared hole with air knife from 0.0-5.0 feet below ground surface.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	BLOW COUNT SPT N VALUE	VOLATILE READING (ppm)	GROUNDWATER	FIELD AND LABORATORY TESTING
90		SP						
		SP-GP	Loose to medium dense, brown, fine, poorly graded GRAVELLY SAND, fine to coarse gravel (approximately 30%) and trace silt (10-15%). Water production increases at 95.0 feet below ground surface.					
95		GW	Medium dense to dense, gray, fine, rounded to subrounded, well-graded SANDY GRAVEL (60-65%), coarse to medium sand (45-50%), basalt/volcanic clasts (80%), other lithics (quartzite, chert, igneous clasts, 20%), trace silt (< 5%). Water production decreases from 99.0-108.0 feet below ground surface.					
100								
		GW	Harder drilling at 102.0 feet below ground surface. Gravel content increases. Very dense, gray, fine to coarse, subrounded to subangular, poorly graded GRAVEL (65%) with some fine to coarse sand (30-35%), silt (40%), trace cobbles. Non-volcanic clasts (quartzite, chert, igneous) increase to 30-40%. Water production increases from 108.0-115.0 feet below ground surface.					
105								
110								
115			Total depth = 115.0 feet below ground surface.					
120								

WELL SCHEMATIC



BORING METHOD: Dual Rotary Air

BOREHOLE DIAMETER: 16.0 (in)

DRILL RIG: Formost DR24

CONTRACTOR: Boart Longyear/Geo-Tech

LOGGED BY: J. Fassio

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

CASING ELEVATION: NA

START CARD/TAG ID: RE01065/ALB973

DRILLING DATES: 11/04/2004 - 11/16/2004

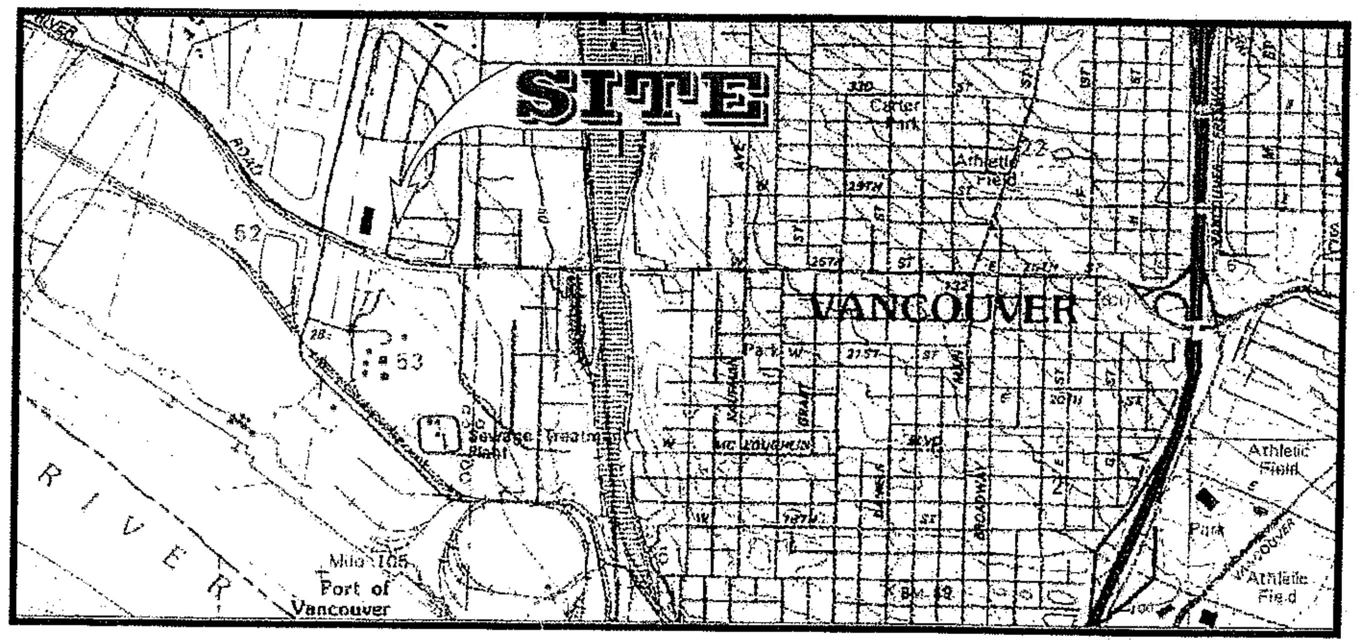
REMARKS:

Conventional Circulation

Cleared hole with air knife from 0.0-5.0 feet below ground surface.

CADET MANUFACTURING COMPANY - FRUIT VALLEY NEIGHBORHOOD SITE
2214 WEST 28TH STREET
VANCOUVER, WASHINGTON

RECIRCULATING WELL PILOT TEST SYSTEM
AS-BUILT DRAWINGS



INDEX

LANCE JOHNSON
STATE OF WASHINGTON
34755
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 07-15-05

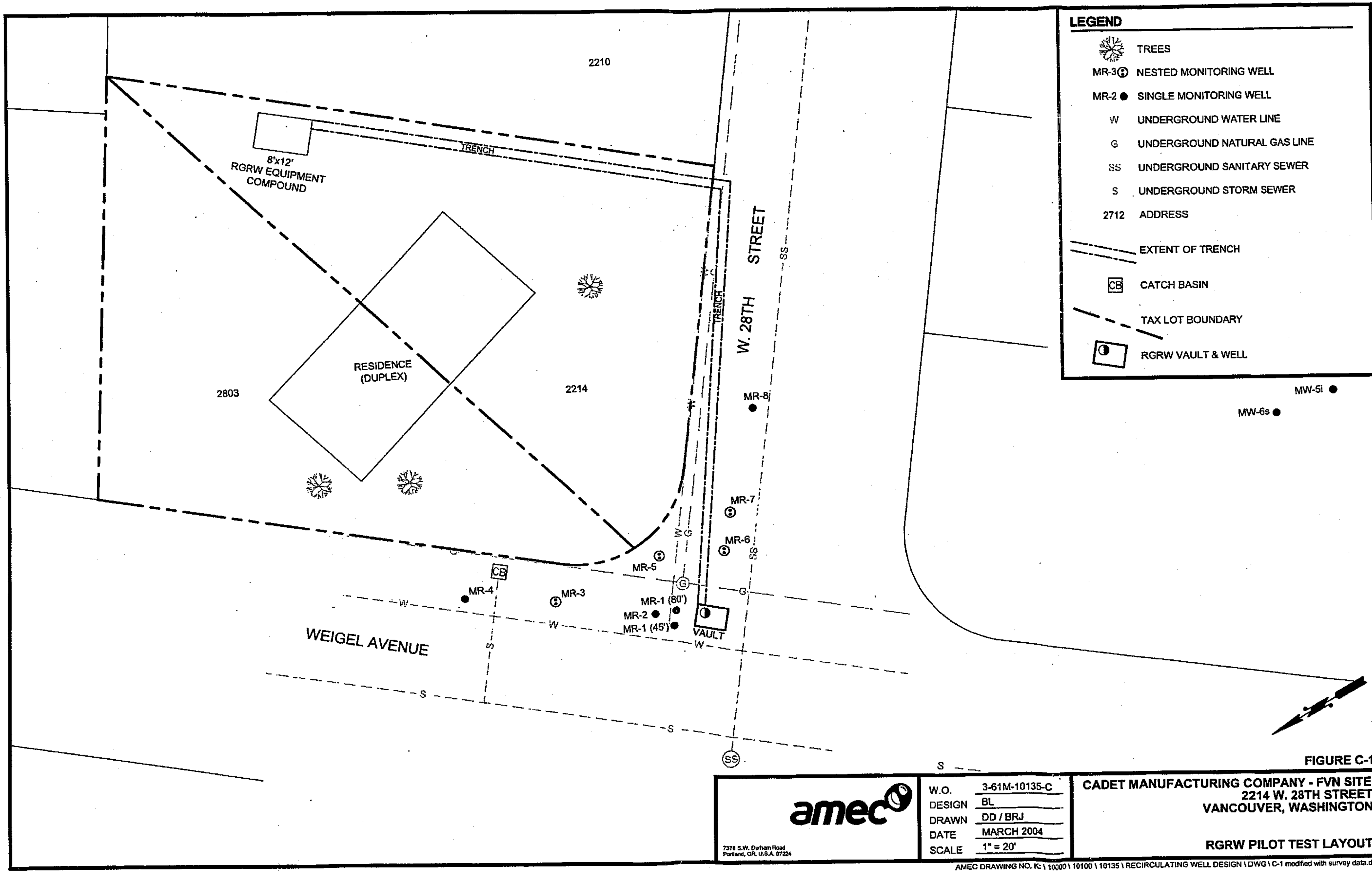
N

FIGURE C-0

amec	W.O. 3-61M-10135-C	CADET MANUFACTURING COMPANY - FVN SITE
7376 S.W. Durham Road Portland, OR, U.S.A. 97224	DESIGN ME	2214 W. 28TH STREET
	DRAWN DD	VANCOUVER, WASHINGTON
	DATE JANUARY 2004	
	SCALE NOT TO SCALE	RGRW PILOT TEST LOCATION

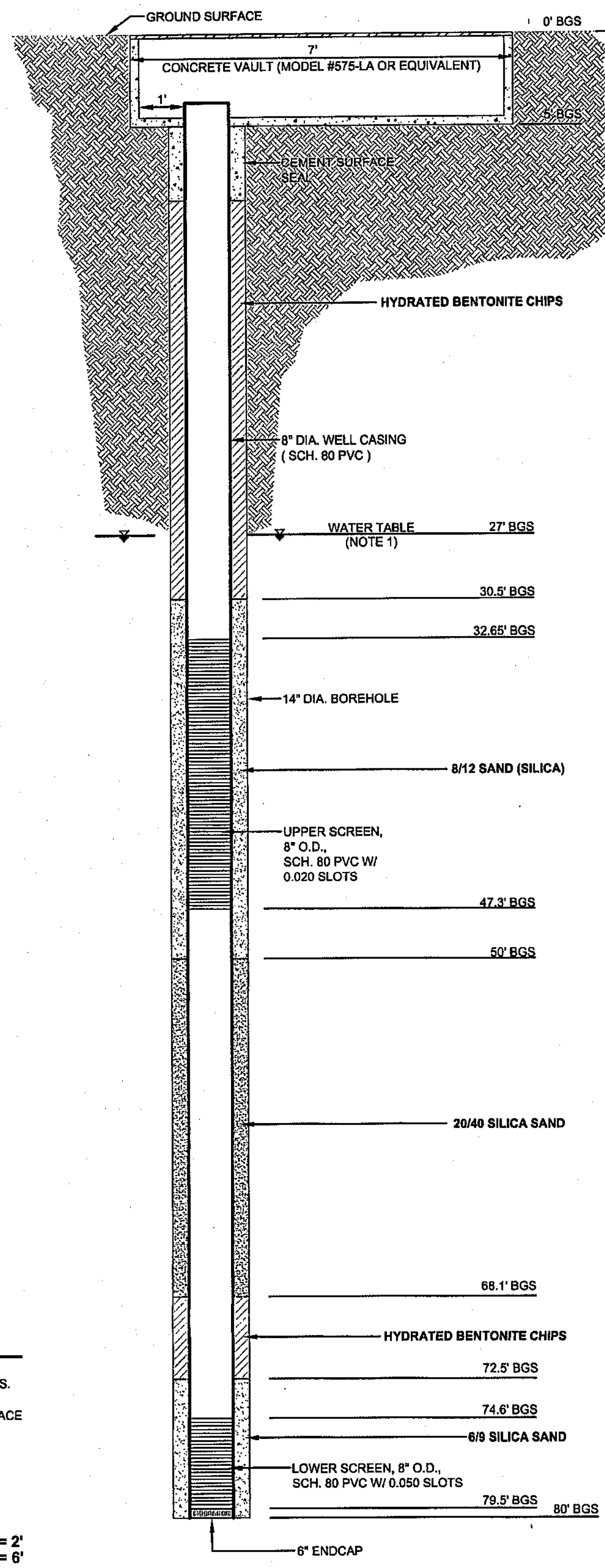
AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ C-0. DWG

AMEC011768



LEGEND
TREES
MR-3 NESTED MONITORING WELL
MR-2 SINGLE MONITORING WELL
W UNDERGROUND WATER LINE
G UNDERGROUND NATURAL GAS LINE
SS UNDERGROUND SANITARY SEWER
S UNDERGROUND STORM SEWER
2712 ADDRESS
EXTENT OF TRENCH
CB CATCH BASIN
TAX LOT BOUNDARY
RGRW VAULT & WELL
2210
8'x12' RGRW EQUIPMENT COMPOUND
TRENCH
RESIDENCE (DUPLEX)
2803
2214
W. 28TH STREET
WEIGEL AVENUE
MR-1 (80')
MR-1 (45')
MR-2
MR-3
MR-4
MR-5
MR-6
MR-7
MR-8
MW-5i
MW-6s
VAULT
CB
SS
FIGURE C-1
amec
7376 S.W. Durham Road Portland, OR, U.S.A. 97224
W.O. 3-61M-10135-C
DESIGN BL
DRAWN DD / BRJ
DATE MARCH 2004
SCALE 1" = 20'
CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON
RGRW PILOT TEST LAYOUT
AMEC DRAWING NO. K:\10000\10100\10135\RECIRCULATING WELL DESIGN\DWG\C-1 modified with survey data.dwg

AMEC011769



NOTES

1. WATER TABLE FUCTUATES BETWEEN 17.5 & 27 FEET BGS.

BGS	BELOW GROUND SURFACE
O.D.	OUTSIDE DIAMETER
SCH.	SCHEDULE
PVC	POLYVINYL CHLORIDE
DIA.	DIAMETER

HORIZONTAL SCALE: 1" = 2'
VERTICAL SCALE: 1" = 6'

FIGURE C-2

amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

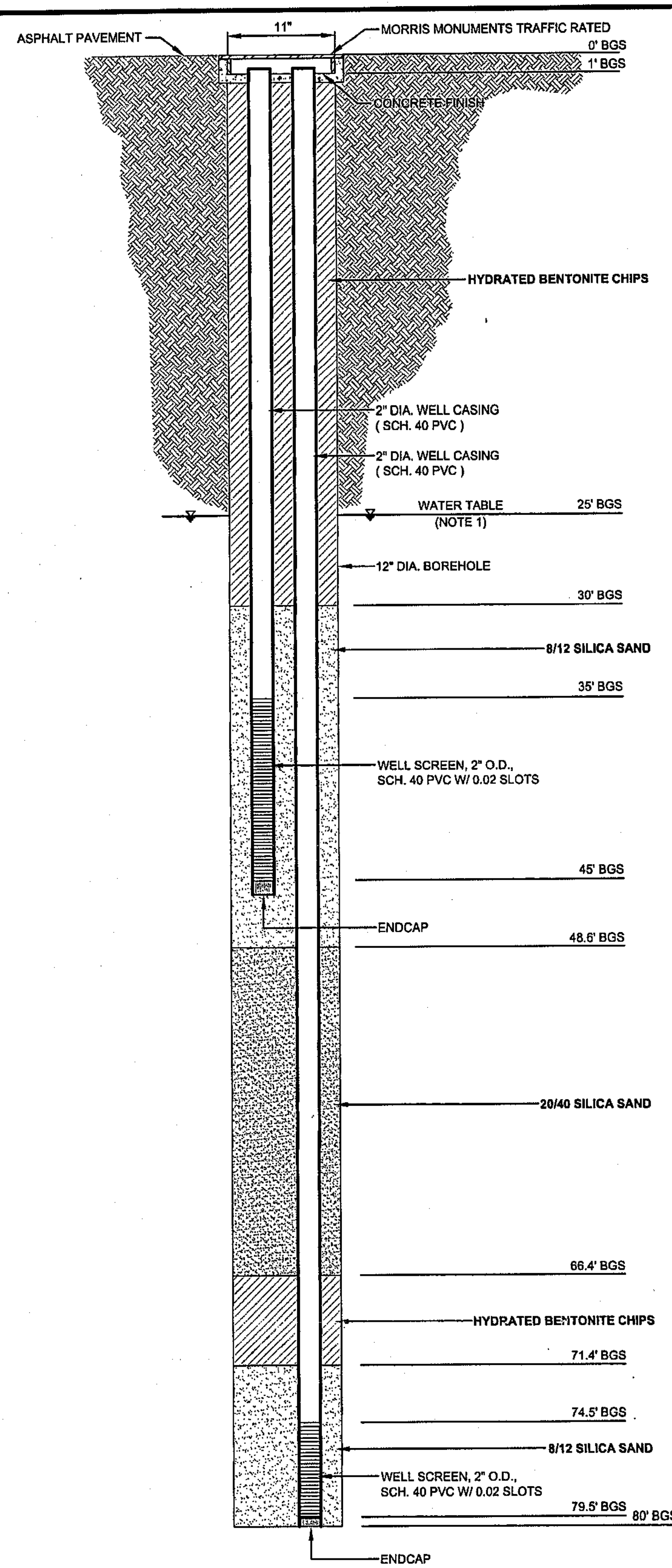
W.O.	3-61M-10135-C
DESIGN	STP
DRAWN	DD
DATE	MARCH 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

RGRW CONSTRUCTION DETAIL

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ C-2. Dwg

AMEC011770



NOTES

1. WATER TABLE FUCTUATES BETWEEN 17.5 & 25 FEET BGS.

BGS BELOW GROUND SURFACE
O.D. OUTSIDE DIAMETER
SCH. SCHEDULE
PVC POLYVINYL CHLORIDE
DIA. DIAMETER

HORIZONTAL SCALE: 1" = 1'
VERTICAL SCALE: 1" = 6'

FIGURE C-3

amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

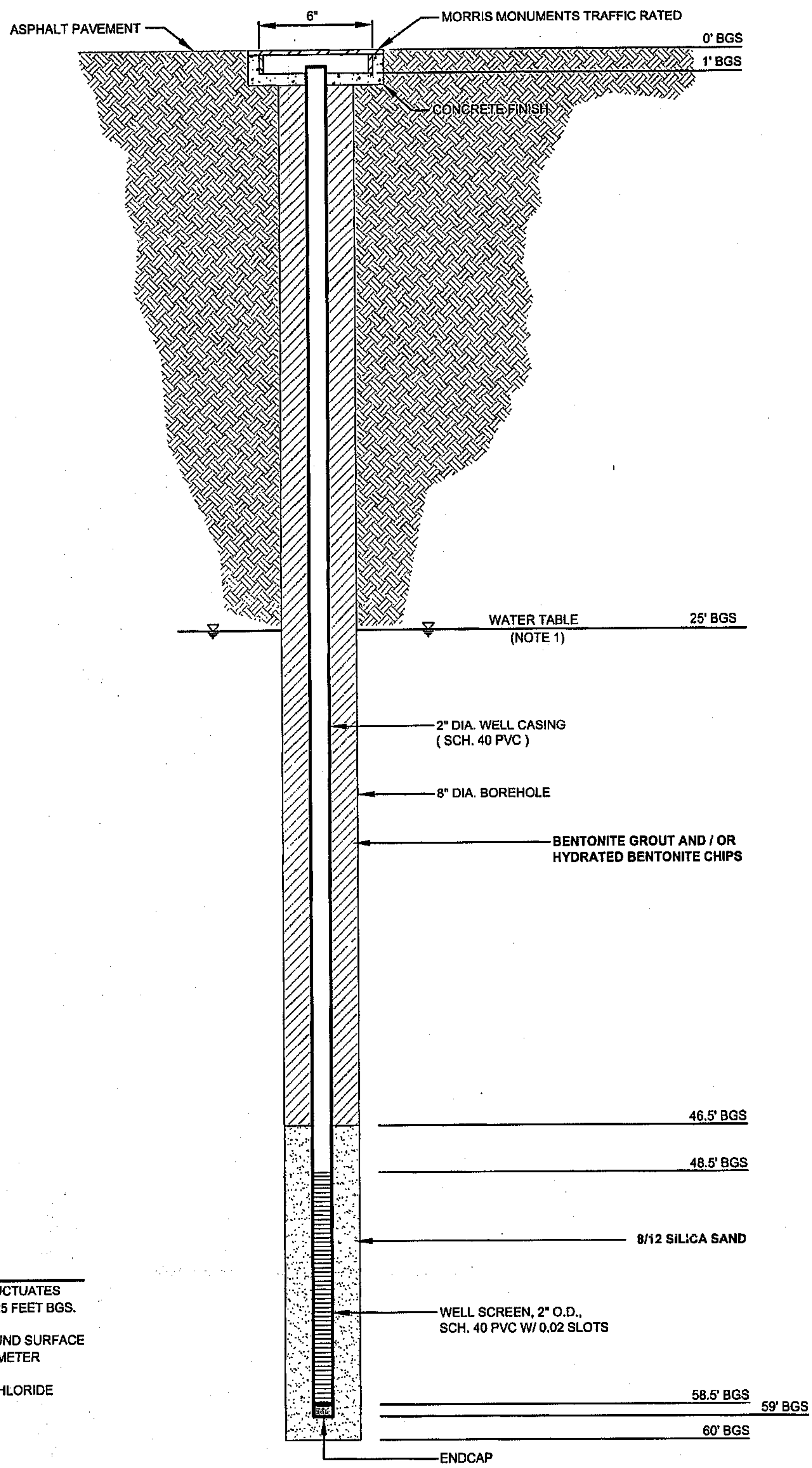
W.O.	3-61M-10135-C
DESIGN	STP
DRAWN	DD
DATE	MARCH 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

NESTED MONITORING WELL
CONSTRUCTION DETAIL

AMEC DRAWING NO. K:\10000\10100\10135\RECIRCULATING WELL DESIGN\DWG\C-3.Dwg

AMEC011771



NOTES

1. WATER TABLE FLUCTUATES BETWEEN 17.5 & 25 FEET BGS.

BGS BELOW GROUND SURFACE
O.D. OUTSIDE DIAMETER
SCH. SCHEDULE
PVC POLYVINYL CHLORIDE
DIA. DIAMETER

HORIZONTAL SCALE: 1" = 1'
VERTICAL SCALE: 1" = 5'

FIGURE C-4

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

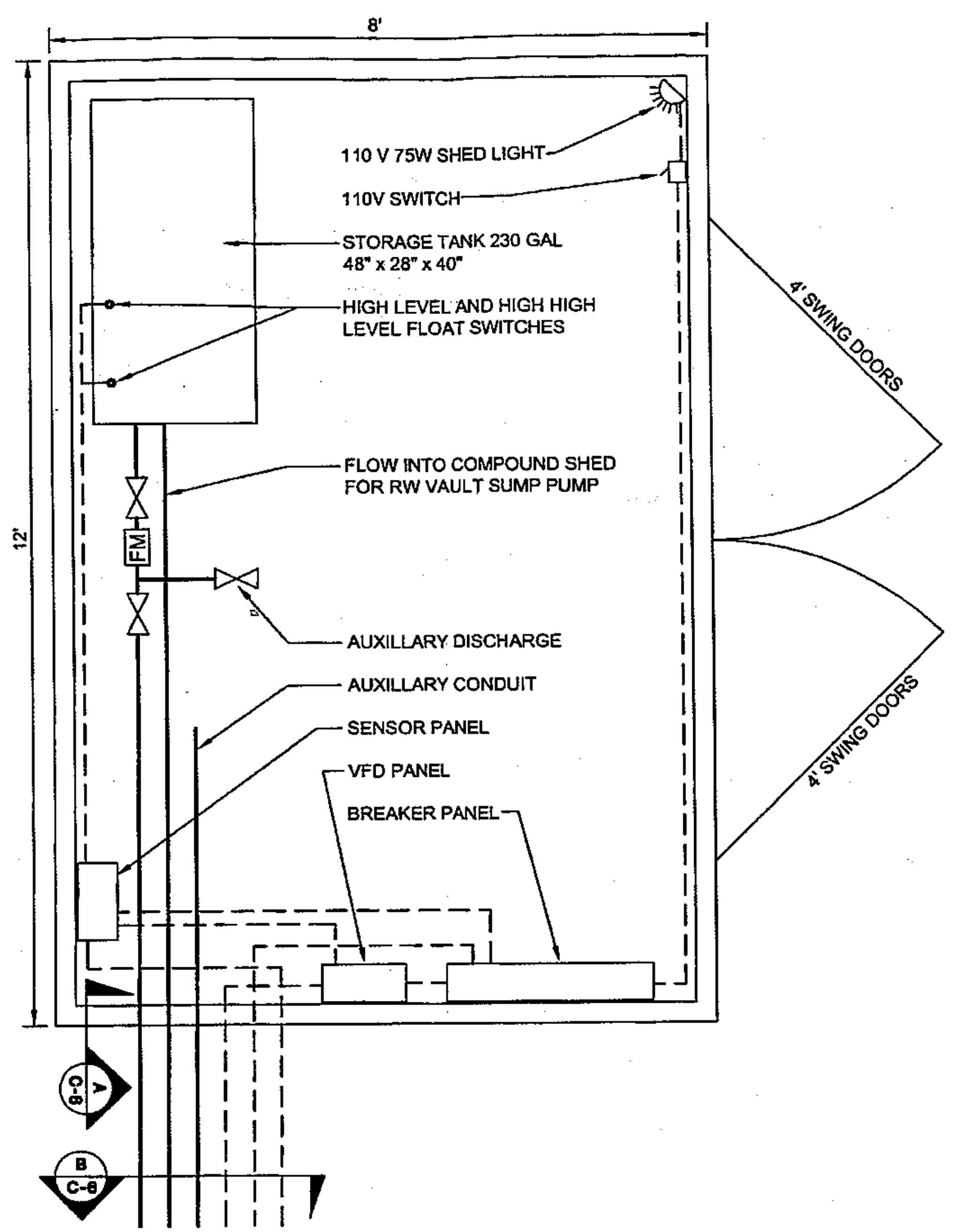
W.O.	3-61M-10135-C
DESIGN	STP
DRAWN	DD
DATE	MARCH 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

SINGLE MONITORING WELL CONSTRUCTION DETAIL

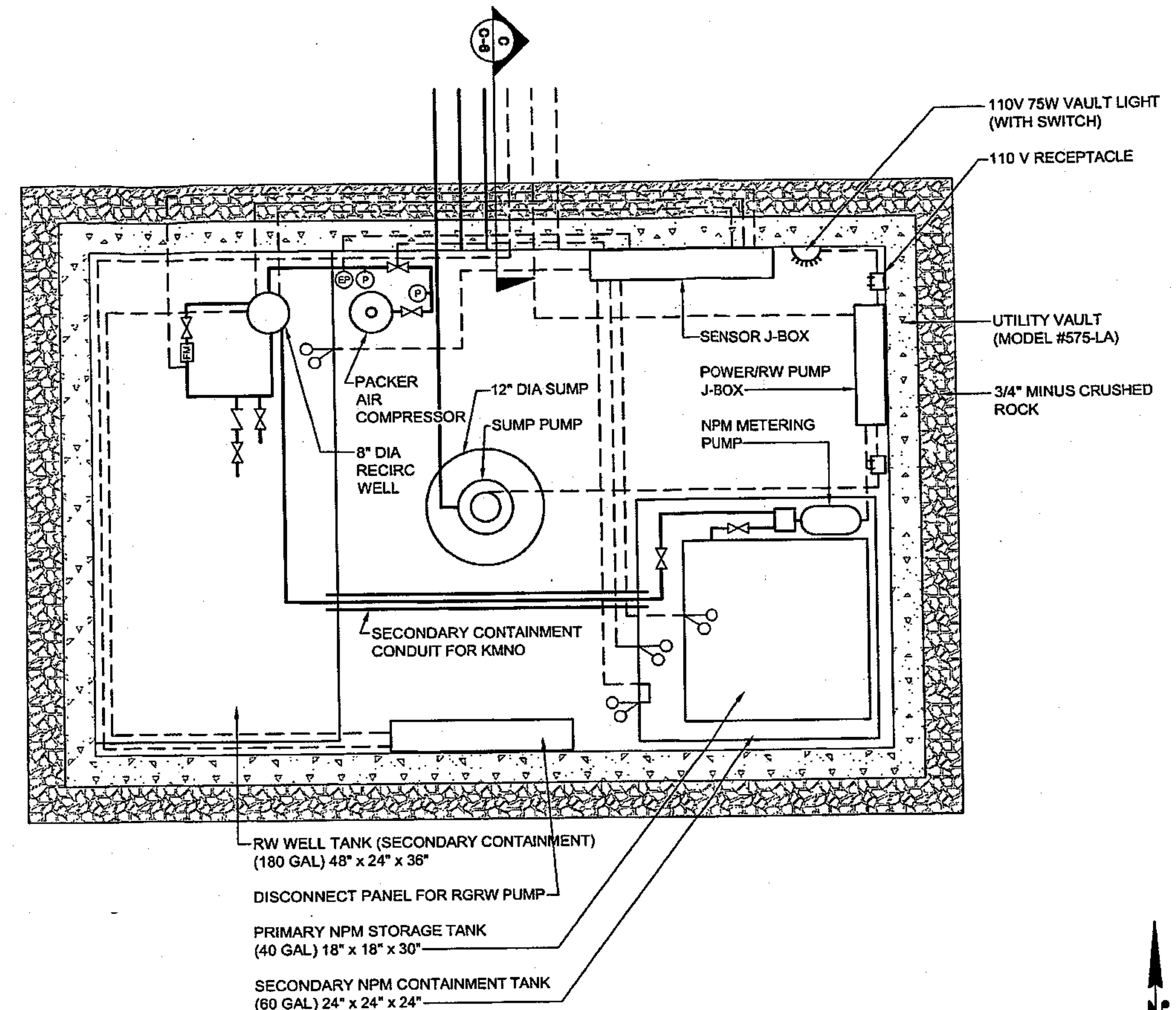
AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ C-4. Dwg

AMEC011772



EQUIPMENT COMPOUND PLAN "TUFF SHED"

NOT TO SCALE



UTILITY VAULT - PLAN VIEW

NOT TO SCALE

NOTES:

1) ENGINEER SHALL PROVIDE WOODEN SHED AND INSTALLATION.

2) CONTRACTOR SHALL REINFORCE CRIPPLED JOISTS UNDERNEATH THE SUMP.

PVC POLYVINYL CHLORIDE
SCH SCHEDULE
VFD VARIABLE FREQUENCY DRIVE
GAL GALLON
NPM SODIUM PERMANGANATE

LEGEND:

FM FLOWMETER
P MECHANICAL PRESSURE GAUGE
EP ELECTRONIC PRESSURE GAUGE
FLOAT SWITCH
BALL VALVE
CHECK VALVE

FIGURE C-5

amec

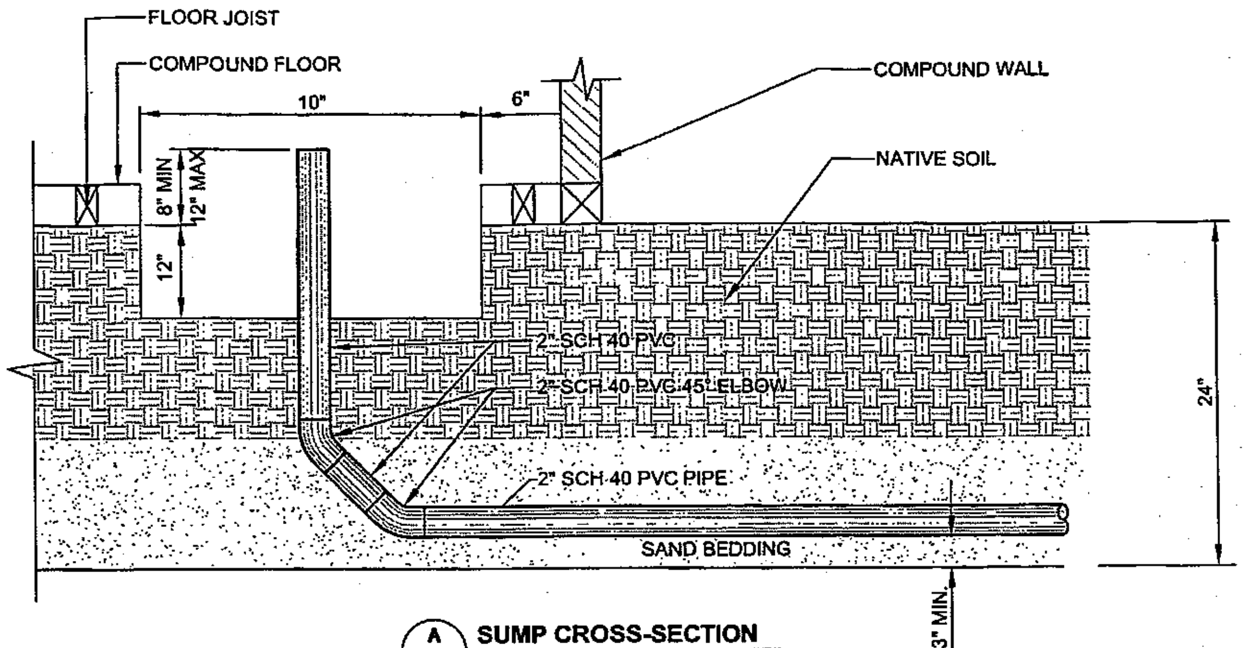
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135-C
DESIGN	ME
DRAWN	DD
DATE	MARCH 2004
SCALE	AS NOTED

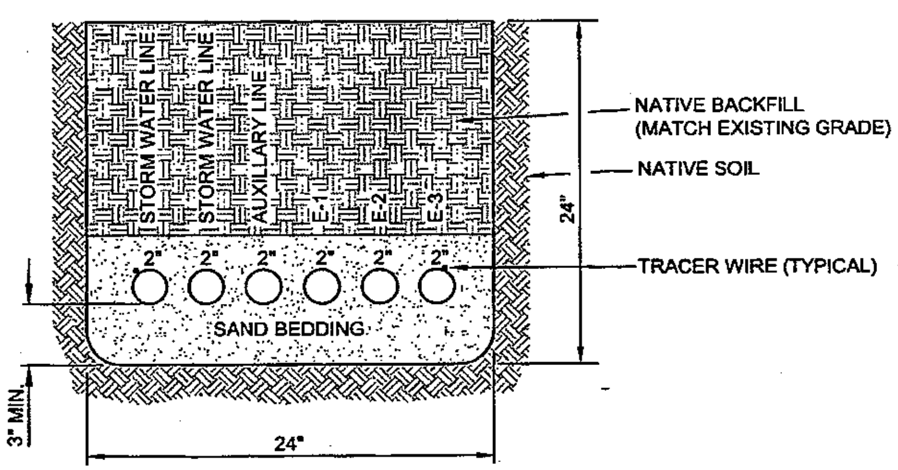
CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

EQUIPMENT COMPOUND AND UTILITY VAULT PLAN VIEWS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / RECIRCULATING WELL DESIGN / DWG / C-5.Dwg



A / C-6 SUMP CROSS-SECTION
SCALE: 1" = 1'



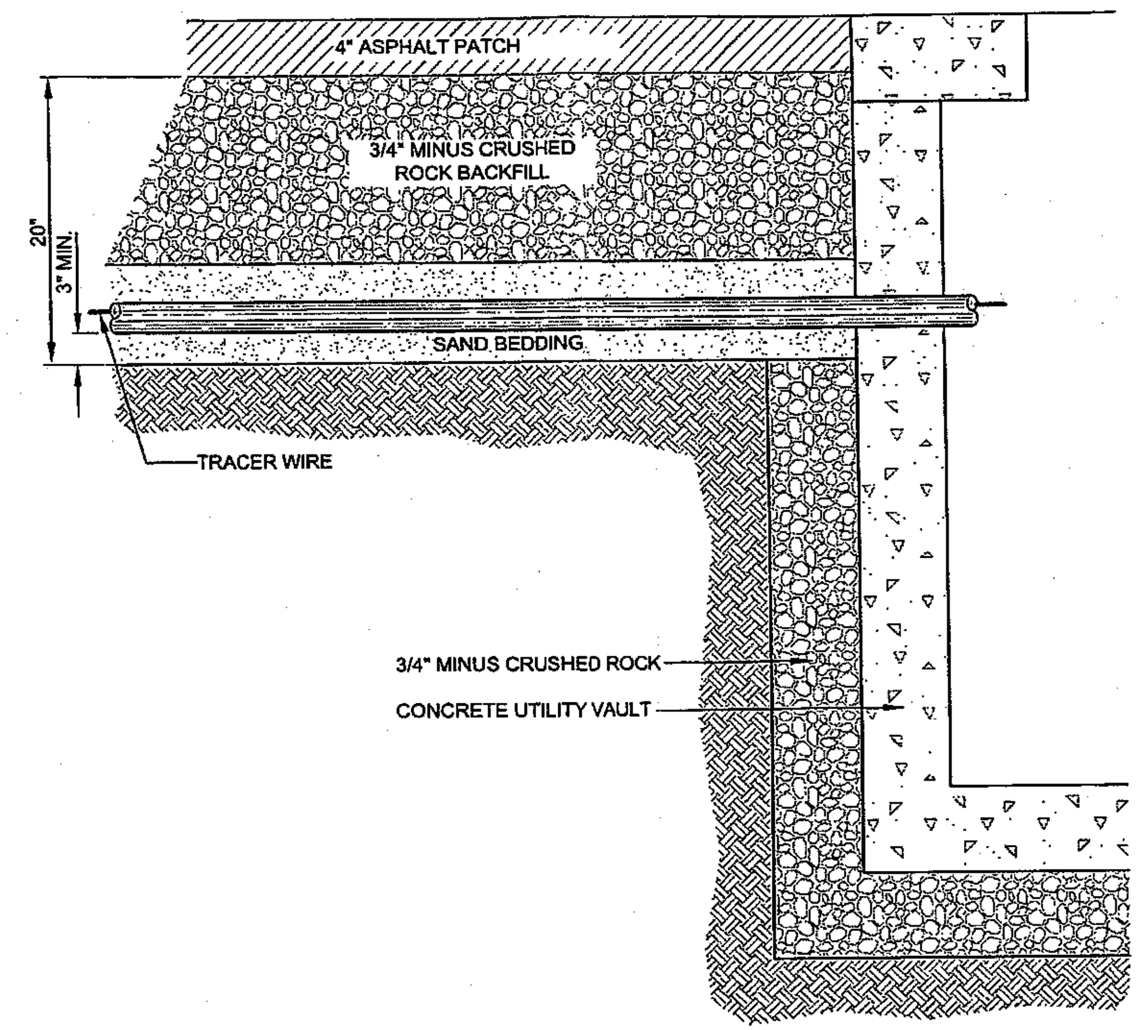
B / C-6 TRENCH CROSS-SECTION
SCALE: 1" = 1'

NOTES:

E-1; CONDUIT FOR RGRW PUMP POWER LINE

E-2; CONDUIT FOR OUTLETS & SUMP PUMP POWER LINE

E-3; CONDUIT FOR SENSOR LINES



C / C-6 LONGITUDINAL TRENCH CROSS-SECTION
SCALE: 1" = 1'

FIGURE C-6

amec
7376 S.W. Durham Road Portland, OR. U.S.A. 97224

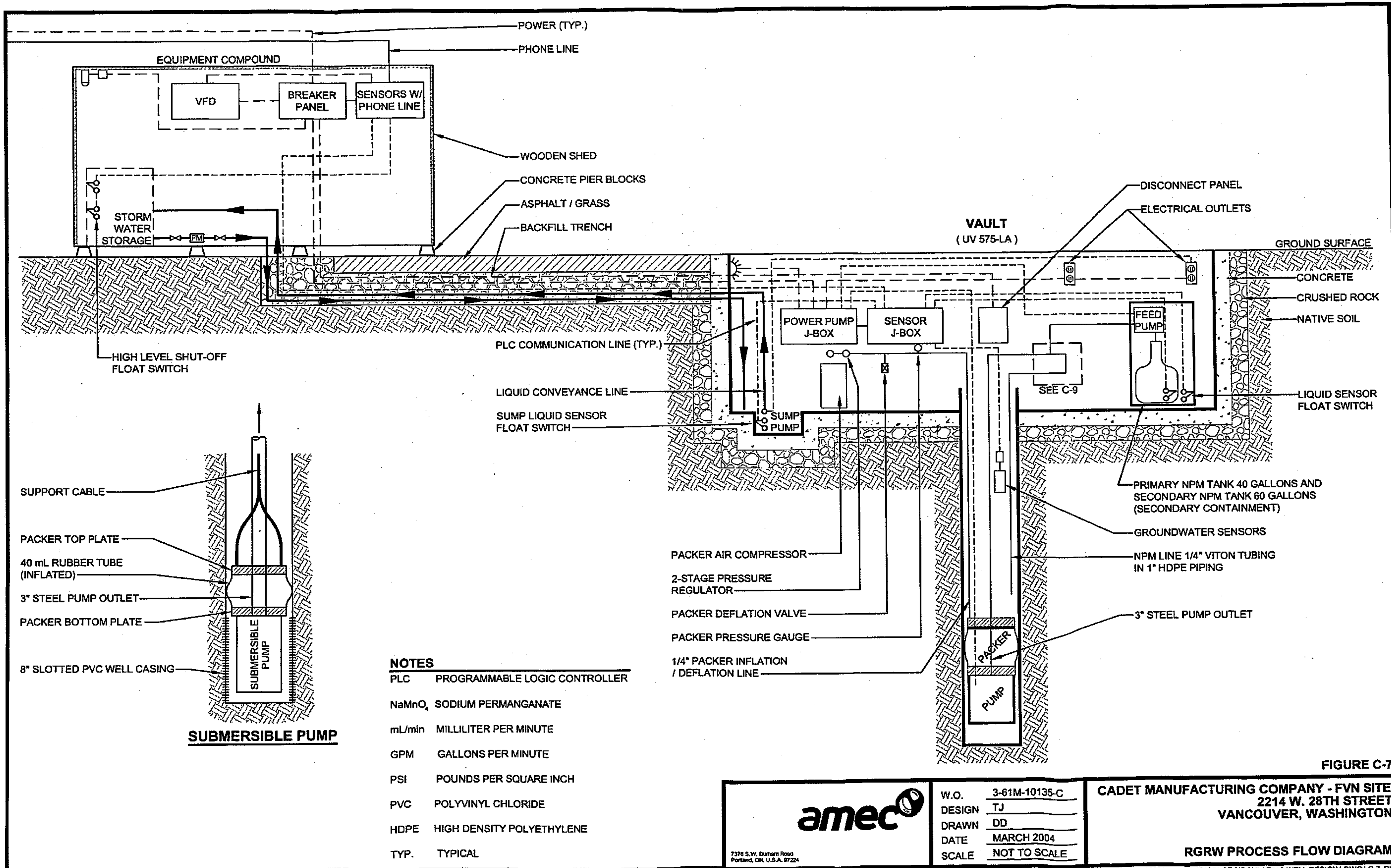
W.O.	3-61M-10135-C
DESIGN	ME
DRAWN	DD
DATE	MARCH 2004
SCALE	AS NOTED

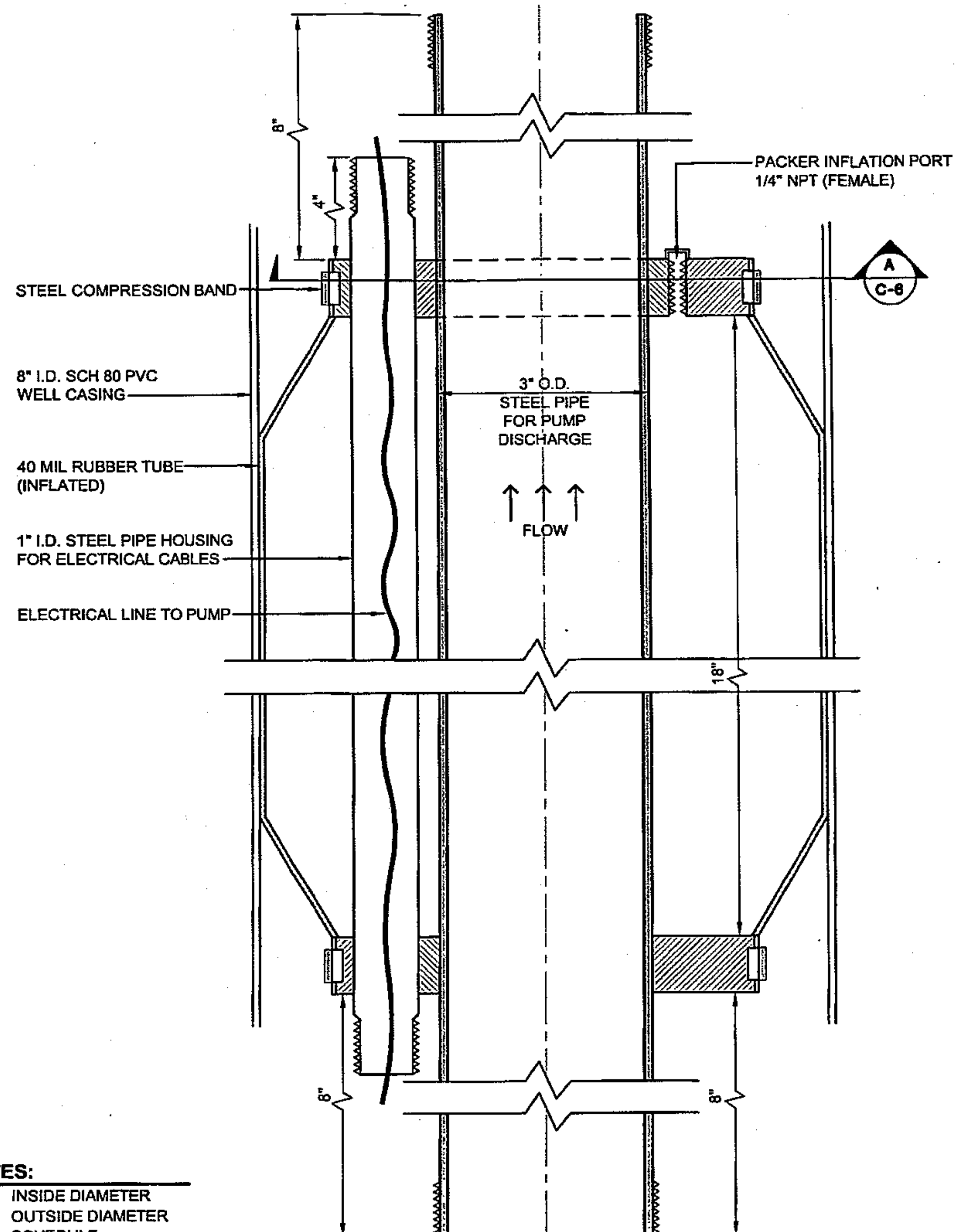
CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

UNDERGROUND PIPING CONSTRUCTION DETAILS

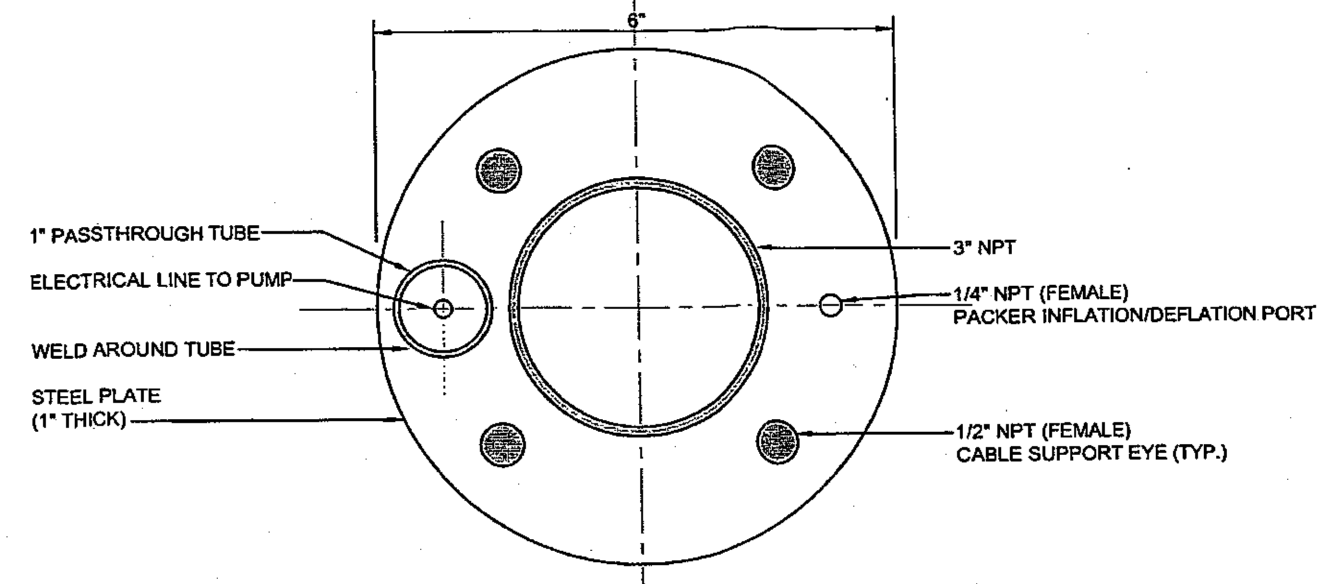
AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / RECIRCULATING WELL DESIGN / DWG / C-6. Dwg

AMEC011774

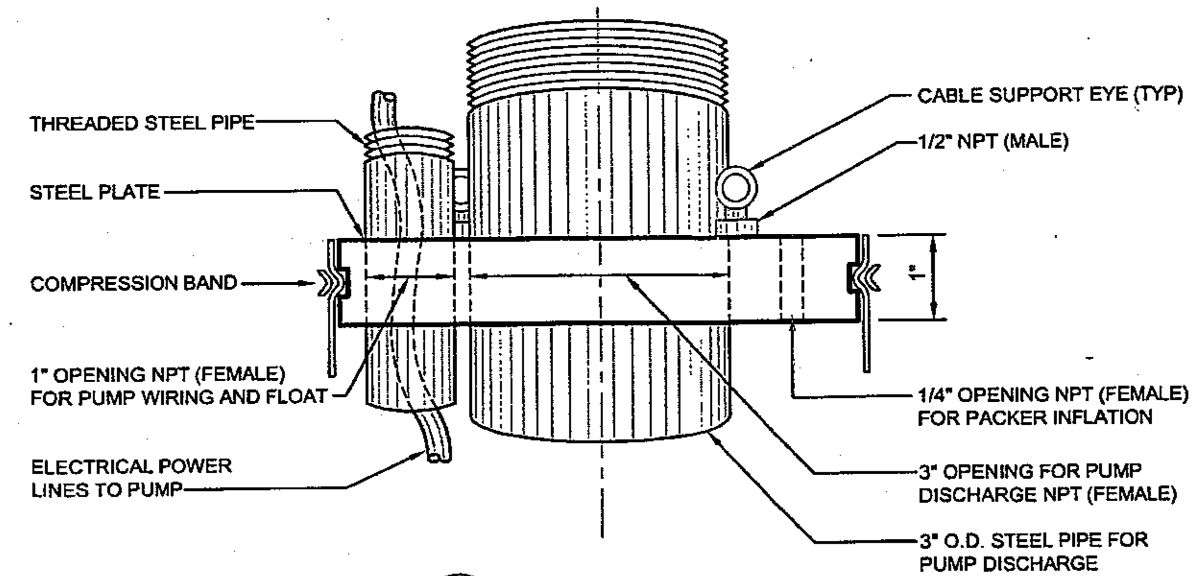

POWER (TYP.)
PHONE LINE
EQUIPMENT COMPOUND
VFD
BREAKER PANEL
SENSORS W/ PHONE LINE
WOODEN SHED
CONCRETE PIER BLOCKS
ASPHALT / GRASS
BACKFILL TRENCH
STORM WATER STORAGE
FM
HIGH LEVEL SHUT-OFF FLOAT SWITCH
VAULT
(UV 575-LA)
DISCONNECT PANEL
ELECTRICAL OUTLETS
GROUND SURFACE
CONCRETE
CRUSHED ROCK
NATIVE SOIL
POWER PUMP J-BOX
SENSOR J-BOX
FEED PUMP
SEE C-9
PLC COMMUNICATION LINE (TYP.)
LIQUID CONVEYANCE LINE
SUMP LIQUID SENSOR FLOAT SWITCH
SUMP PUMP
LIQUID SENSOR FLOAT SWITCH
PRIMARY NPM TANK 40 GALLONS AND SECONDARY NPM TANK 60 GALLONS (SECONDARY CONTAINMENT)
GROUNDWATER SENSORS
NPM LINE 1/4" VITON TUBING IN 1" HDPE PIPING
3" STEEL PUMP OUTLET
PACKER AIR COMPRESSOR
2-STAGE PRESSURE REGULATOR
PACKER DEFLATION VALVE
PACKER PRESSURE GAUGE
1/4" PACKER INFLATION / DEFLATION LINE
PACKER
PUMP
SUPPORT CABLE
PACKER TOP PLATE
40 mL RUBBER TUBE (INFLATED)
3" STEEL PUMP OUTLET
PACKER BOTTOM PLATE
8" SLOTTED PVC WELL CASING
SUBMERSIBLE PUMP
SUBMERSIBLE PUMP
NOTES
PLC PROGRAMMABLE LOGIC CONTROLLER
NaMnO4 SODIUM PERMANGANATE
mL/min MILLILITER PER MINUTE
GPM GALLONS PER MINUTE
PSI POUNDS PER SQUARE INCH
PVC POLYVINYL CHLORIDE
HDPE HIGH DENSITY POLYETHYLENE
TYP. TYPICAL
FIGURE C-7
amec
W.O. 3-61M-10135-C
DESIGN TJ
DRAWN DD
DATE MARCH 2004
SCALE NOT TO SCALE
CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON
RGRW PROCESS FLOW DIAGRAM
AMEC DRAWING NO. K:\10000\10100\10135\RECIRCULATING WELL DESIGN\DWG\C-7.DWG



SIDE VIEW
NOT TO SCALE



A/C-6 **TOP VIEW**
NOT TO SCALE



A/C-6 **ALTERNATE SIDE VIEW**
NOT TO SCALE

NOTES:

I.D.	INSIDE DIAMETER
O.D.	OUTSIDE DIAMETER
SCH.	SCHEDULE
PVC	POLYVINYL CHLORIDE
TYP.	TYPICAL
NPT	NATIONAL PIPE THREAD

FIGURE C-8

amec
7376 S.W. Durham Road Portland, OR, U.S.A. 97224

W.O.	3-61M-10135-C
DESIGN	TJ
DRAWN	DD
DATE	MARCH 2004
SCALE	NOT TO SCALE

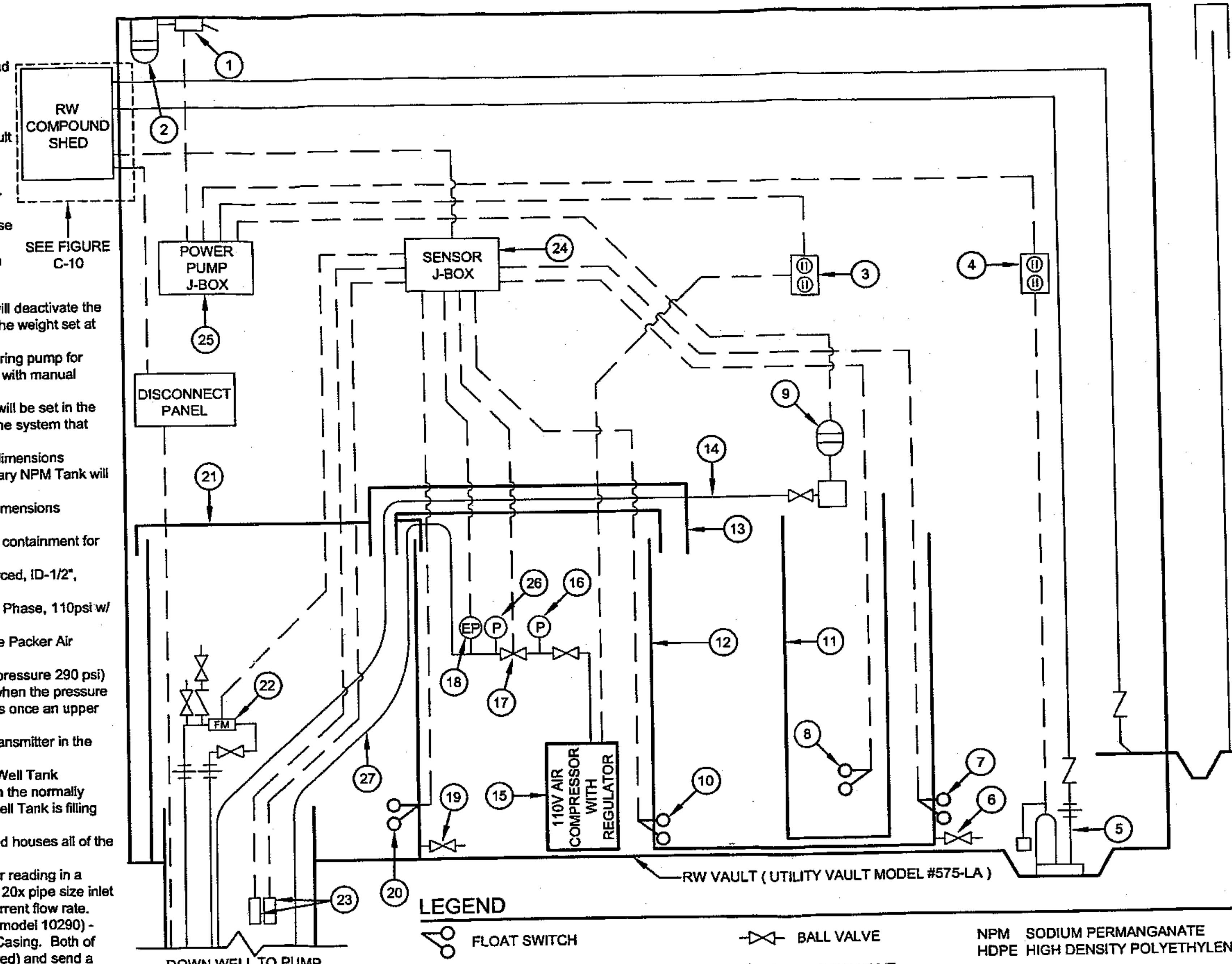
CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

RGRW PACKER DETAIL

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ C-8. DWG

Notes for Figure C-9

1) RW Vault Light Switch (110V-1PH weather-rated switch for RW Vault Light) - the switch should be accessible from the exterior of the vault (mount switch on the ceiling of the vault)
2) RW Vault Light (110V-1PH 75W weather-rated and protected light) - light should use standard 75W bulb and be on the same circuit as the outlet from Note 3.
3) 110V-1PH 20A weather-rated exterior outlet (RW Vault Outlet #1) - this outlet will be share a single 110V-1PH 20A circuit with the RW Vault Light.
4) 110V-1PH 20A weather-rated exterior outlet (RW Vault Outlet #2) - this outlet will provide power for the Vault Sump Pump
5) RW Vault Sump Pump (110V-1PH 12A Flotec Ironmate ½-HP sump pump model FPSC4550A) - this sump pump will be installed with an automatic vertical float switch, 1 ½" female NPT discharge pipe fitting, and 10 ft. power cord.
6) Secondary NPM Tank drain valve - 1" Sch. 40 PVC drain ball valve mounted to tank wall 1 ½" off of the base of the Secondary NPM Tank
7) RW Vault Flooding Float sensor (Dwyer model F7-HPS-11 - through tank mount) - this float sensor is set in the normally open (NO) position a location 2" above the Secondary NPM Tank (outside of tank)
8) Primary NPM Tank Low Float sensor (USA Bluebook model Avacado #47728 NC suspended) - this float will deactivate the NPM Pump when the level reaches a "low" point. This float will be in the normally closed (NC) position with the weight set at an appropriate level by AMEC.
9) NPM Metering Pump (Harrington PULSATron Series A Plus Model LB64SA-PTC1) - 110V-1PH 0.6A metering pump for NPM mounted to the top of the Primary NPM Tank. Rate for 150-psi, 30 gpd (with a turndown ratio of 100:1) with manual controls.
10) Secondary NPM Tank Flooding Float sensor (Dwyer model F7-HPS-21 - through tank mount) - this float will be set in the normally open (NO) position at a level 2" off of the base of the Secondary NPM Tank. This sensor will alert the system that the Primary NPM Tank has failed.
11) Primary NPM Tank (Harrington model 12000-0040) - this is a 40-gallon HDPE rectangular tank with the dimensions 18"x18"x30" (LxWxH) with a cover. The NPM Metering Pump will be set on the cover of this tank. The Primary NPM Tank will be placed within the Secondary NPM Tank.
12) Secondary NPM Tank (Harrington model 12000-0025) - this is a 60-gallon HDPE rectangular tank with dimensions 24"x24"x24" (LxWxH) with a cover. This tank will provide secondary containment for the Primary KPM Tank.
13) NPM Line Secondary Containment Conduit - this is a 2" Sch. 40 PVC conduit that will provide secondary containment for the NPM Line (line will drain back into the Secondary NPM Tank or Well Tank.
14) NPM Line (Harrington BraidFLEX 70 tubing model 8470-4515) - this tubing (1/2", 230-psi, braided reinforced, ID-1/2", OD-3/4") will transport KPM to the RW Pump Line inside the Well Tank.
15) Packer Air Compressor - that will maintain the packer pressure at a level determined by AMEC. (110V, 1 Phase, 110psi w/ Regulator).
16) Packer Air Compressor Mechanical Pressure Gauge - this is a mechanical pressure gauge that reads the Packer Air Compressor pressure.
17) Packer Electronic Pressure Valve (Dwyer model SAV100-NC) - this is the valve (120VAC, ½", NC, max pressure 290 psi) that is electronically controlled to keep the packer pressure level within a pre-set range. This valve opens (when the pressure in the packer decreases to a level below the acceptable range) to increase pressure in the packer and closes once an upper pressure level is reached.
18) Packer Electronic Pressure Gauge (Dwyer Series 679 model 679-2) - this is a weather-rated pressure transmitter in the 0-100 psi range (300 psi overpressure), 4-20mA output, 9-30VAC input.
19) Well Tank drain valve - 1" Sch. 40 PVC drain ball valve mounted to tank wall 1 ½" off of the base of the Well Tank
20) Well Tank Flooding Float sensor (Dwyer model F7-HPS-21 - through tank mount) - this float will be set in the normally open (NO) position at a level 2" off of the base of the Well Tank. This sensor will alert the system that the Well Tank is filling with water and it will shut off the RW Pump.
21) Well Tank (Harrington model 12000-0085) - this is the secondary containment for the RW Pump Line and houses all of the RW Pump Line equipment (160-gallon, 48"x24"x36", HDPE)
22) RW Pump Line Flow Sensor (USA Bluebook stock #65454) - this is an electronic flow meter and totalizer reading in a range of 20-200 gpm (4-20mA output, 1500-psi rating, SS housing, battery powered, 2" NPT female fittings, 20x pipe size inlet and 5x pipe size outlet). This meter will send an analog signal to the control panel to indicate the pump's current flow rate.
23) RW Groundwater Level Sensors (USA Bluebook PlantPro 1730 Series Submersible Level Transmitters model 10290) - two of these pressure transmitters will be installed in the well at a depth of 15 feet below the top of the RW Casing. Both of these pressure transmitters have a range of 0 - 11.55 feet of H2O and require 9-30 VDC (2-wire loop-powered) and send a 4-20mA signal. Operating range of pressure is 2-900 psi. Diameter of sensor is 0.59".
24) Sensor J-Box - This is a NEMA rated (weather-rated) junction box to collect all of the low voltage sensor lines so that they can be feed back to the RW Compound Shed. No lines with voltages above 100V should be allowed into this box. The sensor lines get their own electrical conduit line (E-3 conduit line). Appropriate shielding should be utilized to minimize any induced voltages from the higher voltage lines.
25) Power / RW Pump J-Box - This is a NEMA rate (weather-rated) junction box to collect all of the power lines (from electrical conduits E-1 and E-2). The power line to the pump will be routed through this line (after coming out of conduit E-1) and power for the KPM Metering Pump, RW Vault Light, RW Vault Outlet #1, RW Vault Outlet #2, and RW Vault Sump Pump (after coming out of conduit E-2). All of the 110V or higher voltage lines should be kept at least 12" from any of the low voltage lines.
26) Packer Line Mechanical Pressure Gauge - this is a mechanical pressure gauge that reads the Packer Line pressure.
27) Packer Line (BraidFLEX 70 model 8470-4340) - this is the ¼" tubing that supplies pressurized nitrogen to the RW Packer.



LEGEND

FLOAT SWITCH	BALL VALVE
(P) MECHANICAL PRESSURE GAUGE	CHECK VALVE
(EP) ELECTRONIC PRESSURE GAUGE	UNION
FM ELECTRONIC FLOW METER	110V RECEPTACLE

NPM SODIUM PERMANGANATE
HDPE HIGH DENSITY POLYETHYLENE

FIGURE C-9

amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135-C
DESIGN	PS
DRAWN	DD
DATE	MARCH 2004
SCALE	NOT TO SCALE

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

RGRW UTILITY VAULT SCHEMATIC AND EQUIPMENT SPECIFICATIONS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ C-9. DWG

AMEC011777

NOTES:

1) RW SHED TANK HIGH HIGH FLOAT SENSOR. (DWYER MODEL F7-HPS-21 THROUGH TANK MOUNT). THIS FLOAT WILL BE SET IN THE NORMALLY OPEN (NO) POSITION AT A LEVEL 12" OFF OF THE TOP OF THE RW SHED TANK. THIS SENSOR WILL ALERT THE SYSTEM THAT THE RW SHED TANK IS FILLING AND IT WILL SHUT OFF THE RW VAULT SUMP PUMP.

2) RW SHED TANK HIGH FLOAT SENSOR. (DWYER MODEL F7-HPS-21 THROUGH TANK MOUNT). THIS FLOAT SWITCH WILL BE SET IN THE NORMALLY OPEN (NO) POSITION AT A LEVEL 1 FOOT OFF OF THE TOP OF THE RW SHED TANK. THIS SENSOR WILL ALERT THE SYSTEM THAT THE RW SHED TANK IS FILLING AND IT WILL SEND SIGNAL TO SENSAPHONE.

3) WATER FROM RW VAULT SUMP PUMP.

4) TANK WATER DISCHARGING INTO SANITARY SEWER. (NOT CURRENTLY CONNECTED TO SANITARY SEWER).

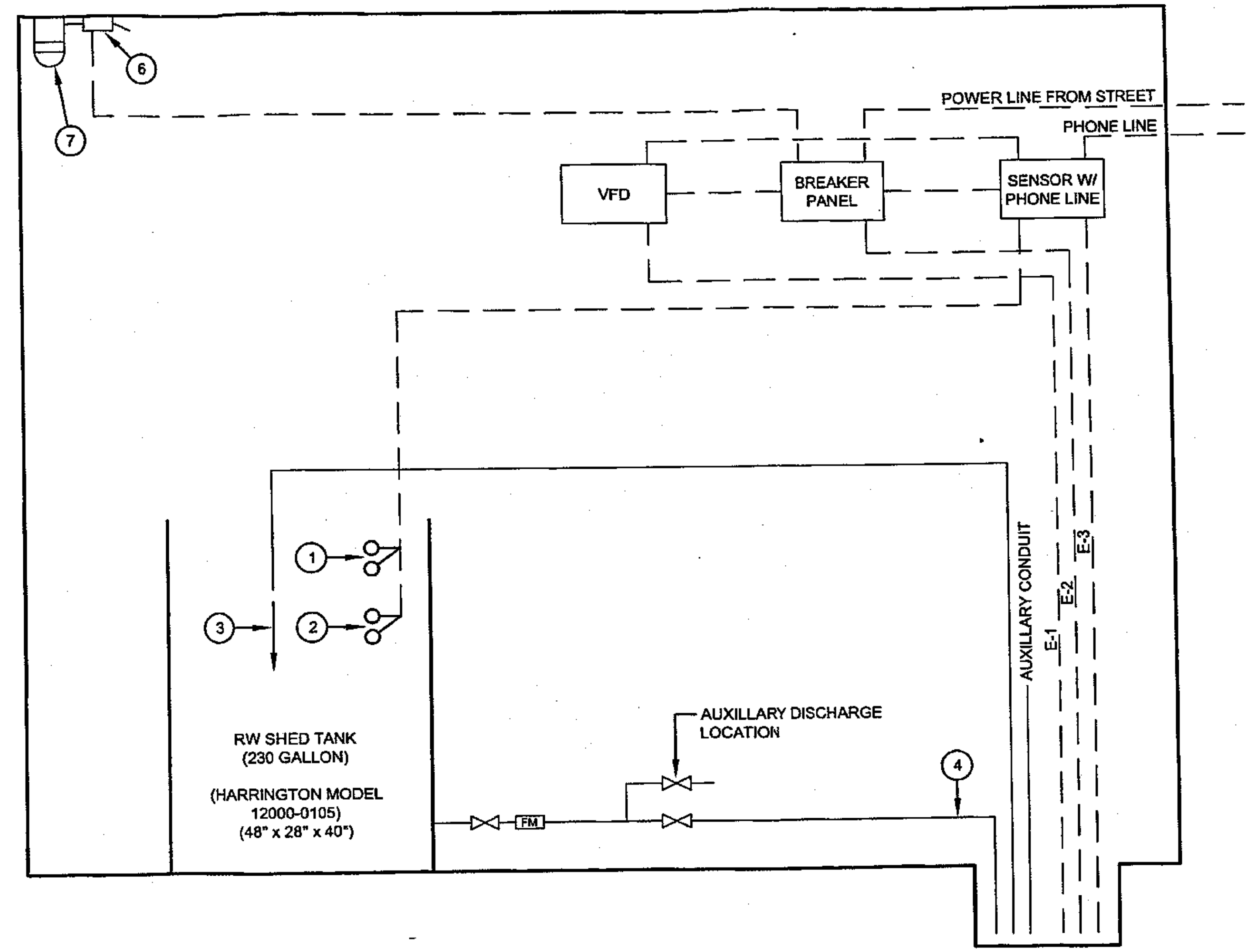
5) RW SHED LIGHT SWITCH (110V-1 PH WEATHER-RATED).

6) RW SHED LIGHT (110V-1 PH 75W WEATHER-RATED).

7) E-1 = ELECTRICAL CONDUIT FOR RW PUMP

8) E-2 = ELECTRICAL CONDUIT FOR RW VAULT OUTLETS / SUMP PUMP.

9) E-3 = ELECTRICAL CONDUIT FOR RW VAULT SENSORS.



LEGEND

- FLOAT SWITCH
- FM MECHANICAL FLOW METER
- BALL VALVE

FIGURE C-10

amec 7376 S.W. Durham Road Portland, OR, U.S.A. 97224	W.O. 3-61M-10135-C DESIGN STP DRAWN DD DATE MARCH 2004 SCALE NOT TO SCALE	CADET MANUFACTURING COMPANY - FVN SITE 2214 W. 28TH STREET VANCOUVER, WA. EQUIPMENT COMPOUND SCHEMATIC AND EQUIPMENT SPECIFICATIONS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ C-10. DWG

AMEC011778

WORK PLAN AND SPECIFICATIONS FOR CONTINUED FEASIBILITY TESTING OF RECIRCULATING GROUNDWATER REMEDIATION WELL SYSTEMS FOR THE FRUIT VALLEY NEIGHBORHOOD

CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

Submitted to:
Washington State Department of Ecology
Vancouver Field Office
2108 Grand Boulevard
Vancouver, Washington 98661-4622

Submitted by:
AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

On Behalf of:
Cadet Manufacturing Company
2500 W. Fourth Plain Boulevard
Vancouver, Washington 98660

4-61M-10135-L

April 2004

005786

4-61M-10135-L

April 15, 2004

Mr. Craig D. Rankine
Site Manager/Hydrogeologist
Toxics Cleanup Program
Washington State Department of Ecology
208 Grand Boulevard, MS: S-70
Vancouver, WA 89661-4622

Dear Mr. Rankine:

Re: **Work Plan and Specifications for Continued Feasibility Testing of Recirculating Groundwater Remediation Well Systems for the Fruit Valley Neighborhood**
Cadet Manufacturing Company
2500 West Fourth Plain Boulevard
Vancouver, Washington

On behalf of Cadet Manufacturing Company (Cadet), AMEC Earth & Environmental, Inc., presents this Work Plan and Specifications for Continued Feasibility Testing of Recirculating Groundwater Remediation Well Systems for the Fruit Valley Neighborhood, Vancouver, Washington. The work scope partially fulfills the requirements described in the Washington State Department of Ecology Agreed Order (00TCPVA-847) for the Cadet Site by developing information and investigating the design of an interim remedial action measure for mitigating elevated levels of chlorinated solvents beneath the Fruit Valley Neighborhood.

If you have any questions or desire further information, please contact me at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

John L. Kuiper, L.G.
Principal

SP/va

c: Mr. Craig Peterson, Cadet Manufacturing Company
Ms. Barbara Trejo, Washington State Department of Health

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

www.amec.com

K:\10000\10100\10135\WorkPlans\RGRW 2-3\Work Plan\RGRW 2-3 WP.doc

amec

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AMEC 008918

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AMEC 008919

List of Abbreviations, Acronyms, and Key Terms

AMEC	AMEC Earth & Environmental, Inc.
AS/SVE	air sparging/soil vapor extraction
bgs	below ground surface
Cadet	Cadet Manufacturing Company
cis-1,2-DCE	cis-1,2-dichloroethene
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EPA	U. S. Environmental Protection Agency
ft/day	feet per day
ft/ft	feet per foot
FVN	Fruit Valley Neighborhood
gpm	gallons per minute
g/L	grams per liter
GAC	Granular Activated Carbon
HASP	Health and Safety Plan
HVOC	halogenated volatile organic compound
IRAM	interim remedial action measure
ISE	ion specific electrode
L-Shaped Parcel	area immediately north and west of the Cadet Site
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
$NaMnO_4$	sodium permanganate
ORP	oxidation-reduction potential
Project Area	Area that currently includes the Cadet facility, the L-Shaped Parcel, and the FVN to the north and east of the Site, north of W. Fourth Plain Boulevard
RGRW	recirculating groundwater remediation well
ROI	radius of influence
RO/RO	roll on/roll off
Site	Cadet Manufacturing Company, 2500 West Fourth Plain Boulevard, Vancouver, Washington
SVE	soil vapor extraction
TCE	trichloroethene
TGA	Troutdale Gravel Aquifer
TOC	total organic carbon
µg/L	micrograms per liter
USA	Unconsolidated Sedimentary Aquifer
VOC	volatile organic compound
WAC	Washington State Administrative Code
WCM	West Coast Marine
WP	Work Plan

amec

1.0 INTRODUCTION

AMEC Earth & Environmental, Inc. (AMEC), has prepared this Work Plan and Specifications for Continued Feasibility Testing of Recirculating Groundwater Remediation Well (RGRW) Systems for the Fruit Valley Neighborhood (WP) for the Cadet Manufacturing Company (Cadet) Site, located at 2500 West Fourth Plain Boulevard, Vancouver, Washington (Site). This WP was developed in general compliance with:

- Washington State Department of Ecology (Ecology) Agreed Order (00TCPVA-847), entered into between Ecology and Cadet dated January 13, 2000; and
- Model Toxics Control Act (MTCA) Cleanup Regulations for interim actions, as specified in Washington Administrative Code (WAC) 173-340-430 and specifically WAC 173-340-430(7).

A series of interim remedial action measures (IRAMs) are currently being implemented at the Site and vicinity to reduce the potential for exposure to halogenated volatile organic compounds (HVOCs). An air sparging/soil vapor extraction (AS/SVE) system currently operates at the Site. The AS/SVE system is part of an IRAM aimed at remediating target contaminants in groundwater and soils beneath the Cadet facility. Off-site vapor mitigation systems were installed at some residences in the Fruit Valley Neighborhood (FVN) in August and September of 2003. The vapor mitigation systems in the residences are designed to reduce HVOCs in indoor air. It is anticipated that remediating groundwater through the installation of the proposed RGRWs will mitigate HVOCs in groundwater, which is the source of HVOCs in indoor air. The highest trichloroethene (TCE) levels measured to date in the FVN were observed in shallow groundwater at monitoring well MW-5s (5,010 micrograms per liter [µg/L] in May 2001) located in the Weigel Avenue right-of-way.

In November 2003, AMEC conducted the installation of the first test RGRW in the Weigel right-of-way. Pilot testing of the RGRW technology using this well was initiated on February 24, 2004. The tracer test results indicate a radius of influence (ROI) greater than 50 feet, which is larger than the ROI of approximately 38 feet predicted by groundwater modeling (AMEC, 2003). The HVOC samples analyzed after one week of sodium permanganate injection indicated 94 to 100% reduction in TCE levels in all of the shallow monitoring wells (45 feet below ground surface [bgs]) and one intermediate (60 feet bgs) monitoring well. TCE levels decreased by 4 to 60% in remaining intermediate and deep wells (80 feet bgs) except for one deep well where the TCE level increased by 2%. The 80-foot depth interval of the RGRW also indicated a reduction in TCE levels of 60%. Follow-up HVOC testing conducted on

April 7, 2004 confirmed that TCE and PCE levels have decreased for all wells within the pilot study area. Considering these results, AMEC proposes to continue pilot testing and investigating the RGRW technology at the FVN.

Following complete demonstration of RGRW feasibility, AMEC will prepare an IRAM WP, which will include the results of the RGRW feasibility testing as well as the final design of a full-scale remediation system. The results of this testing will be used, along with other criteria, to optimize the design of a full-scale system. The RGRW system, along with natural attenuation, is expected to fulfill Ecology's requirements for mitigation of elevated HVOC levels in the groundwater beneath the FVN. Test data will be used to calculate and select design parameters, including well spacing, well depth, equipment sizes, and treatment media for a full-scale remediation system.

Feasibility testing will include (in addition to the existing RGRW and monitoring well network [MR-1 through MR-8]), two new test RGRW wells (RGRW-2 and RGRW-3) and seven new monitoring wells (MR-9 through MR-15). The new RGRWs and associated monitoring wells will be located in West 28th Street near the residences where elevated indoor TCE levels were observed during the monitoring event of January 2004. Locating the RGRW pilot systems in this area (along West 28th Street) is likely to yield the greatest reduction in HVOC mass in the FVN area, is expected to reduce TCE levels in residences, and consequently, will provide immediate benefit to the FVN.

A full-scale RGRW system, if appropriate, would include a series of similar RGRW wells in the FVN and would rely, in part, on natural groundwater flow to carry contaminated water through the zones of treatment. The design and number of RGRW wells would be estimated according to the results of completed feasibility testing.

2.0 SITE LOCATION, GEOLOGY, AND HYDROGEOLOGY

2.1 Location

The Project Area consists of the Cadet Site, the L-Shaped Parcel, and the FVN. The L-Shaped Parcel is undeveloped land located immediately north and west of the Cadet Site. The FVN is the residential area immediately north and east of the Cadet Site and the L-Shaped Parcel.

Residential lots in the FVN typically accommodate single-family residences. The portion of the FVN considered to be part of the project area extends east to the Burlington Northern Santa Fe Railroad property, north to West 39th Street (east of Fruit

Valley Road), north to La Frambois Road (west of Fruit Valley Road), west to Yeoman Avenue, and south to West Fourth Plain Boulevard. Industrial property owned by the Port of Vancouver is located immediately south of the Site, across West Fourth Plain Boulevard.

2.2 Geology

The geology in the Project Area is consistent with regional geology, as shown by borehole data obtained during installation of monitoring wells and direct-push borings. Borehole information indicates the silt and sand of Columbia River alluvium extends from the ground surface to approximately 25 feet bgs. The coarse sand and sandy gravel of the underlying Missoula Flood deposits range in thickness from approximately 150 to 230 feet across the Project Area, with local beds of silt, sand, and gravel.

The depth to the Troutdale Formation varies with the land-surface elevation and the degree to which the Troutdale Formation was eroded before its burial beneath the Missoula Flood deposits. At the Site, the top of the Troutdale Formation was encountered at depths of 173 feet or greater and was identified based on the presence of cemented gravel, decreased water production, and the more difficult drilling characteristic of this unit.

In the northern portion of the FVN, the top of the Troutdale Formation was encountered at depths of 173 feet in MW-19d, and 198.5 feet in MW-18d. The Troutdale Formation was not encountered at the Site in boreholes MW-1d, MW-2d, and MW-3d, and in the eastern portion of the FVN in borehole MW-10d, even though these boreholes were drilled to 228 feet bgs or deeper. At the latter locations, the upper surface of the Troutdale Formation was apparently eroded to greater depths.

2.3 Hydrogeology

The hydrostratigraphic system in the Project Area consists of two units. The uppermost unit is the Unconsolidated Sedimentary Aquifer (USA). The second unit is the Troutdale Gravel Aquifer (TGA). To date, a confining layer separating these two units has not been identified. The TGA was encountered at depths of 173 and 198.5 feet in boreholes MW-19d and MW-18d, respectively. The top of the TGA at these locations consists of cemented gravel, or weathered clay overlying slightly cemented gravel. The top of the TGA usually corresponds to reduced water production. Shallow, unconfined groundwater occurs in the USA within the Project Area. Semi-annual monitoring shows that the water table in the Project Area fluctuates approximately 10 feet seasonally.

The horizontal groundwater flow direction varies at different depths but generally appears to be toward the east in the FVN. Groundwater velocity calculated during the October 2001 tracer test ranges from 1 to 44 feet per day (ft/day) (AMEC, 2002).

3.0 GEOCHEMICAL PROPERTIES OF GROUNDWATER

Geochemical parameters of the groundwater are monitored semi-annually. A summary of geochemical data is included in the Semi-Annual Groundwater Monitoring Report 2003/2004 (AMEC, 2004). Groundwater pH in the Project Area has remained near neutral during the monitoring period of November 1999 through February 2003. Manganese and iron concentrations generally have remained less than 1 milligram per liter (mg/L).

Fluctuations in TCE levels appear to correlate with fluctuations in oxidation-reduction potential (ORP) measurements and groundwater elevations. Cis-1,2-dichloroethene (cis-1,2-DCE) levels appear to inversely correlate with ORP and TCE fluctuations at some shallow wells. These observations show that limited reductive dechlorination of TCE to cis-1,2-DCE may be occurring in the Project Area.

Methane and ferrous iron have been detected sporadically in groundwater since collection of natural attenuation data began in July 2000. Total organic carbon (TOC) is observed at very low concentrations up to 9.8 mg/L in the Site groundwater. Hardness, alkalinity, conductivity, and calcium are also observed at low concentrations in groundwater.

4.0 RECIRCULATING GROUNDWATER REMEDIATION WELL TECHNOLOGY

Recirculating well technology has been designed to mitigate groundwater contamination without bringing groundwater to the surface for above-ground treatment. RGRWs have been used for in-well and/or in-aquifer treatment of a variety of dissolved contaminants such as HVOCs, volatile organic compounds (VOCs) (i.e., benzene, toluene, ethylbenzene, total xylenes), and metals.

The design of recirculating wells varies, but the most common well configuration includes separate screened intervals for groundwater intake and discharge. The intake screen generally is located at the bottom of the well, and the discharge screen is located close to the groundwater/vadose zone interface (water table). Typically, impacted groundwater is: (1) pumped in through the intake screen from the surrounding formation by means of a submersible pump or airlift, (2) treated by

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passing through an internal treatment system within the well casing, and (3) injected back into the formation through the discharge screen as treated water. This induces a spherical circulating groundwater flow pattern within the formation that continuously cycles contaminated groundwater through the RGRW. The RGRW also can be used to inject treatment media into the aquifer.

The typical RGRW is able to treat relatively large volumes of groundwater, thereby allowing significant contaminant mass removal to take place. In some cases, the RGRW is used as a tool to supplement groundwater with nutrients or chemicals prior to reinjection into the formation to promote treatment within the formation. RGRWs also can be used in conjunction with other technologies, such as SVE.

Some advantages of this remedial technology over others are:

1. **Cost-effectiveness.** An RGRW system can operate continuously with only routine maintenance. In-place treatment avoids the need to handle contaminated water aboveground and/or manage the disposal or storage of partially treated water. RGRW systems may be more cost-effective in areas with moderate levels of contaminants in groundwater. RGRWs can be operated either singly or in synergistic pairs.

2. **Integration.** The technology enables the distribution and recirculation of chemicals (i.e., oxidants, surfactants) and/or nutrients to aid groundwater remediation or bioremediation. RGRW systems can be easily coupled with an SVE system if in-well air stripping of HVOCs is chosen as a remedial option.

3. **Simplicity.** RGRW systems can be designed using simple components. Unlike other conventional remediation technologies, these systems are designed to treat groundwater without pumping it aboveground. This process minimizes the need for aboveground equipment.

4.1 Recommended Treatment Options

AMEC assessed a variety of treatment options before selecting the oxidant injection technology. In addition to effectiveness, the underlying criterion of the selection process was to minimize any potential adverse health effects to the nearby residents as a result of pilot testing. For instance, the combination of AS/SVE has proven to be effective in removing HVOCs from shallow groundwater beneath the Cadet facility. However, the potential for increasing the threat of vapor migration into FVN homes as a result of applying AS in the FVN was considered to be too high of a risk even when coupled with SVE. Chemical oxidation of HVOCs by $NaMnO_4$, on the other hand, is only slightly exothermic, resulting in little to no temperature increase in groundwater, which greatly decreases the risk of volatilizing HVOCs to indoor air in nearby homes. The oxidation process will occur in groundwater at depths greater than 20 feet bgs and is relatively rapid (approximately 18 minutes) with a low potential for generating harmful byproducts (vapor phase HVOCs or daughter products). Nonetheless, the feasibility test includes frequent monitoring in surrounding observation wells for any harmful byproducts that may result from the limited use of $NaMnO_4$. Given the absence of any nearby water supply wells or receiving surface water bodies, the likelihood of FVN residents coming into contact with the oxidant in groundwater is very unlikely. The RGRW design is based on extensive groundwater modeling to ensure that injected materials do not short-circuit to unintended locations. Furthermore, the various safeguards built into the RGRW system and $NaMnO_4$ delivery mechanism are intended to preclude residents from contacting any component of the RGRW system during the feasibility test.

Based on AMEC's understanding of the treatment options available at this time and the data obtained during the pilot test of the existing RGRW, a combination of recirculating wells and $NaMnO_4$ injection were selected for continued testing in the FVN. $NaMnO_4$ acts as an oxidant to chemically degrade HVOCs into innocuous by-products. Preliminary groundwater data collected from the existing RGRW observation well network indicate that $NaMnO_4$ injection has reduced TCE levels in shallow zones by 94 to 100%. AMEC is currently performing operation and maintenance of the RGRW system to evaluate the efficiency of the system and to monitor the TCE levels in groundwater.

Regarding the potential health effects to the nearby FVN residents as a result of implementing the feasibility test, we identified the following potential risks: (1) the presence of heavy construction equipment during RGRW system installation and pedestrian/vehicle traffic control; (2) damage to underground utilities during construction; (3) trenching and excavation; (4) creation of a confined space within the underground utility vault; (5) vault flooding and potential of electrical shock; and (6) a release of $NaMnO_4$ inside the vault or to the surrounding ground surface. Persuant to the Site Specific Health and Safety Plan (HASP), AMEC and its construction contractors will take the necessary precautions to protect FVN pedestrian and vehicle traffic in the vicinity of the construction site by creating appropriate exclusion zones and by implementing traffic control. (A complete copy of the HASP already has been provided to Ecology and Washington State Department of Health [DOH].) AMEC will make reasonable attempts to locate subsurface utilities prior to all drilling and excavation activities. A geotechnical engineer will continually monitor the stability of all open excavations and shoring will be implemented as appropriate. During periods of inactivity all excavations will be covered with steel plating and the resulting underground vault will be equipped with heavy steel doors that will be locked. During periods of inactivity, Site-specific confined space entry procedures will be followed by AMEC personnel as described in the HASP.

5.0 NUMERICAL GROUNDWATER FLOW MODELING

AMEC performed limited numerical groundwater flow modeling to evaluate whether RGRW systems can effectively capture and treat impacted groundwater in the FVN. The Groundwater Modeling System (GMS Version 4.0, United States Department of Defense) software package was used for the groundwater flow modeling. A detailed discussion of the groundwater modeling was presented in the Work Plan prepared for the existing RGRW system (AMEC, 2003).

AMEC performed sensitivity analysis by using groundwater pumping rates of 100 and 300 gallons per minute (gpm). The existing RGRW system is pumping at 120 gpm and has developed an ROI of greater than 50 feet. While developing the existing RGRW, AMEC observed that the upper screen (recharge screen) was capable of injecting as much as 300 gpm. Additional groundwater modeling indicated the ROI that developed as a result of pumping groundwater at 300 gpm was approximately 90 feet as compared with the actual ROI of approximately 50 feet at 100 gpm. Considering these results and the field data obtained during the existing pilot test, AMEC has designed the proposed RGRWs for extracting and injecting groundwater at 300 gpm. Using a larger pump will increase the size of the ROI of the RGRW which will decrease the number of RGRWs in future full scale design. Modeling results are presented in Figures 2 and 3.

Site-specific aquifer parameter values that were used in the model are listed in Table 1 below. The tracer results from the existing RGRW suggested that the hydrogeologic media is not isotropic in nature and that the vertical hydraulic conductivity is likely to be lower than the horizontal hydraulic conductivity in the area where the pilot test is being conducted. This is based on the observation that the tracer injected in the RGRW traveled faster horizontally than vertically (which means a larger ROI). However, to be conservative, the conductivity values used in the sensitivity analysis are the same as the previous model and the modeled domain is assumed to be isotropic.

Table 1: Site-Specific Model Parameter Values

Model Parameter	Parameter Value
Horizontal hydraulic conductivity	4,000 ft/day
Vertical hydraulic conductivity	4,000 ft/day
Effective porosity	0.21
Horizontal groundwater gradient	0.0001 ft/ft

ft/day = feet per day
ft/ft = feet per foot

6.0 WORK SCOPE

A work scope for the permitting, installation, and feasibility testing of pilot-scale RGRW systems in the FVN is described below. The RGRW feasibility testing plans and specifications are provided in attached figures. The RGRW and monitoring well designs are based on groundwater flow modeling results described above in Section 5.0 as well as the field data acquired during pilot testing of the existing RGRW.

Based on the conditions encountered during the installation of the existing RGRW, AMEC expects that the work to install the proposed RGRWs (RGRW-2 and RGRW-3) would require at least three subcontractors: a well drilling subcontractor, an excavation subcontractor, and an electrical subcontractor. AMEC would obtain competitive bids from at least three subcontractors for the installation of the proposed RGRWs and associated systems.

AMEC will provide geological and engineering construction oversight during well installation, trenching, electrical installation, and compound construction activities.

6.1 Permitting

During Ecology's review of this WP, AMEC will pursue obtaining the necessary permits for the proposed work. Final permits will be based on approval of the plans and specifications by Ecology. Permitting and approval required for the pilot-scale RGRW systems likely will include:

1. Ecology's Water Resource Division for underground injection of permanganate;
2. City of Vancouver's building permits for construction of the equipment sheds;
3. City of Vancouver right-of-way and long term use permit for drilling and conducting the tests in West 28th Street and Unander Avenue; and

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4. City of Vancouver discharge permit for discharge of water generated during the well installation into the City sewer.

6.2 RGRW System Installation

6.2.1 RGRW Well Construction

The proposed RGRW-2 will be installed in West 28th Street, approximately 300 feet east of the existing RGRW-1 location. RGRW-3 will be installed in Unander Avenue, near the intersection with West 28th Street. These locations were selected because the levels of HVOCs tested in indoor air are higher than elsewhere (Figure 4).

Similar in design to the existing RGRW (RGRW-1), the new wells RGRW-2 and RGRW-3 will be installed to approximately 80 feet bgs. To achieve a potentially larger ROI than the existing RGRW-1, RGRW-2 and RGRW-3 will be constructed with larger diameter casings and screens to accommodate an increased flow rate (approximately 300 gpm). The upper screen (discharge) of the RGRWs will be located at approximately 30 to 45 feet bgs and the lower screen (intake) interval will be at approximately 75 to 80 feet bgs. The screen interval of the upper injection screen has been designed to account for seasonal fluctuations in the water level. The upper screen interval should always be saturated if the well is installed at the specified depth. A schematic diagram of RGRW-2 and RGRW-3 is presented in Figure 5.

Table 2: Proposed RGRW Well Construction Details

Well ID	Approximate Depth (feet)	Approximate Screen Depth (feet)
RGRW-2	80	30-45 and 75-80
RGRW-3	80	30-45 and 75-80

The size of the sand filter pack and the well screen is based on the design of the existing RGRW. In addition, the existing monitoring wells and extraction well previously used for the aquifer pumping test were taken into account to design the proposed RGRWs. A screen slot size of 0.02 inches will be used for the upper screen (30 to 45 feet bgs). For the lower screen (75 to 80 feet bgs), a screen slot size of 0.05 inches will be used. Hydrated bentonite chips will be used to form a seal in the well annulus above the lower screen interval. An additional bentonite seal will be placed above the water table and will be extended to the existing grade to provide a water-tight seal, and to prevent any potential surface contamination from entering the well annulus. Filter packs for the upper (8-12 silica sand) and lower (6-9 silica sand) screen are designed to be consistent with the screen slot sizes.

6.2.2 Monitoring Well Construction

Seven new monitoring wells will be installed in the FVN as shown in Figure 4 to monitor the development of the flow cells and effectiveness of the treatment process. Four of these wells will be nested with two completions in each well. Shallow screens in each well will be located at a level overlapping the screen interval of the existing nearby monitoring wells. Shallow screens of monitoring wells at RGRW-2 will be at 20 to 40 feet bgs to overlap the screen interval of MW-25s (15-30 feet bgs), which is located approximately 150 feet east of the RGRW-2. Shallow monitoring well screens at RGRW-3 also will be at 20 to 40 feet bgs to overlap the screen interval of existing monitoring well MW-6s (19-34 feet bgs), located approximately 50 feet north of the RGRW-3. The shallow screen interval depths also were specified to overlap the upper screen intervals of the RGRWs in order to intercept the flow path of groundwater discharging through the upper screen of the RGRWs. Deep screen intervals of all monitoring wells will be located at 75 to 80 feet bgs, consistent with the bottom screen intervals of the RGRWs. Deep screen intervals of monitoring wells will be monitored to observe the vertical extent of the ROIs. All single monitoring wells will be screened at shallow levels. In addition to the new proposed monitoring wells, an existing monitoring well MW-6s screened at a depth of approximately 19 to 34 feet bgs, will be included in the monitoring network for the RGRW-3. Monitoring well locations and intervals are based on the most recent modeling results as discussed in Section 5.0 and the results of the pilot testing of the existing RGRW.

A sand filter pack, designed using aquifer-specific parameters, will be installed for all screened intervals. A screen slot size of 0.02 inches will be used for shallow and deep screen intervals. Hydrated bentonite chips will be used to form a seal in the well annulus above and below the screened intervals of the nested wells. An additional bentonite seal will be placed above the water table and will be extended to the existing grade to provide a water-tight seal, and to prevent any potential surface contamination from entering the well annulus. Monitoring wells dedicated to each RGRW and their distance from the associated RGRW are detailed in Tables 3A and 3B. Well construction details for nested and single observation wells are shown on Figures 6 and 7.

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Table 3A: Proposed Cluster of RGRW-2 Observation Wells

Single Well ID	Depth (feet)	Screen Depth (feet)	Distance from RGRW (feet)
MR-10	40	20-40	30
Nested Well ID	**Depth (feet)**	**Screen Depth (feet)**	**Distance from RGRW (feet)**
MR-9/45	40	20-40	40
MR-9/80	80	75-80	40
MR-11/45	40	20-40	60
MR-11/80	80	75-80	60

Table 3B: Proposed Cluster of RGRW-3 Observation Wells

Single Well ID	Depth (feet)	Screen Depth (feet)	Distance from RGRW (feet)
MR-13	40	20-40	30
MR-14	40	20-40	30
Nested Well ID	**Depth (feet)**	**Screen Depth (feet)**	**Distance from RGRW (feet)**
MR-12/45	40	20-40	90
MR-12/80	80	75-80	90
MR-15/45	40	20-40	60
MR-15/80	80	75-80	60
Existing Well ID	**Depth (feet)**	**Screen Depth (feet)**	**Distance from RGRW (feet)**
MW-6s	34.5	19-34	50

6.2.3 Drilling and Well Installation Activities

AMEC will make all reasonable attempts to locate subsurface utilities prior to drilling and well installation activities in the FVN. These efforts would include contacting a local public utility notification service, contracting a private utility locating service, and reviewing readily available Site records, utility blueprints, and/or construction drawings. The right-of-way permits for well installation to be obtained through the City of

Vancouver will include a traffic control plan. A licensed well drilling contractor will install the RGRWs using air-rotary methods. Monitoring wells will be installed using hollow-stem auger techniques. A Washington State Licensed Geologist familiar with Site conditions will log all wells.

RGRW development will be carefully performed to remove silt from the lower screen interval and to avoid placing silt generated during development of the lower screen into the upper screen interval during well development. The individual screened intervals will be isolated from each other using a packer and will be thoroughly developed separately. The packer will be placed at the top of the lower screen during development of the lower interval. Care will also be taken to protect the lower screen while developing the upper screen. A well packer will be placed at the bottom of the upper screen while pumping from the upper screen interval.

Soil cuttings will be managed temporarily at the Site in roll on/roll off (RO/RO) bins. The bins periodically will be transported to the Cadet Site, pending the results of analytical testing. Following receipt of analytical results, the soils will be transported to the Waste Management Inc. landfill in Hillsboro, Oregon. Water generated during well development activities will be stored temporarily at the Cadet Site in a storage tank. It is anticipated that the water will be discharged to the sanitary sewer under an appropriate City of Vancouver permit.

6.2.4 Vault Construction

An excavation contractor will construct and install the vaults for access to the new RGRW wells (Figures 8 and 9). Access into the concrete utility vaults (approximately 7 feet X 5 feet X 5 feet) will be provided by a traffic-rated utility cover. The vaults will be installed flush-mounted to the existing street grade to allow access to the RGRWs for pump maintenance and treatment media application. Soil excavated during construction activities will be managed by the contractor for disposal at a demolition landfill.

The utility vaults overlying the RGRW wellheads will be installed well above the water table (approximately 20 feet bgs). Subsequently, they will not be vulnerable to the infiltration and migration of dissolved-phase HVOCs. Pressure transducers and high water level float switches will be placed inside the RGRW casings to prevent casing overflow of groundwater. Since the extraction and re-injection of groundwater will occur below the static water table, and the oxidation of dissolved-phase HVOCs will occur primarily within the aquifer, not in the RGRW, we do not anticipate generating measurable quantities of vapor-phase HVOCs inside the vault. However, because of its size (i.e., depth > 4 feet) and content (i.e., permanganate), the vaults will be considered as confined spaces. A permit will be required prior to entering the vault. The confined space entry procedures, prepared for the existing RGRW vault, will be followed for the proposed vaults.

6.2.5 Equipment Installation

The equipment used for the pilot tests include: a submersible well pump, a packer, an air injection blower to inflate the packer, a chemical tank with secondary containment, a chemical feed pump, an electrical control panel with a sensaphone for remote access, and other miscellaneous items. Equipment installation details are illustrated schematically in Figures 10 through 13.

The submersible pump and well packer will be installed in the RGRW. The chemical tank and feed pump will be housed in the utility vault. The electrical control panel and controls for the system will be located in the Tuff Shed® proposed to be located on residence properties in the FVN.

6.2.6 Trenching

Subsurface trenching will be required to carry electrical conduits, a conduit to carry water from the vault sump, and other auxiliary lines for future uses. The water line will carry stormwater from the utility vault to the tank located in the Tuff Shed® in case stormwater leaks through the vault cover and accumulates in the sump and the vault. Trenching layout is provided in Figure 4 and details are shown in Figure 9.

6.2.7 Electrical Installation

An electrical power drop and subsurface trenching will be required for the installation of an electrical conduit and wire to provide power to the equipment. A power line will come from the existing power lines in the FVN.

6.3 RGRW Feasibility Testing

After the installation of the remediation equipment and testing of all system components, the RGRW systems will be started. A step test will be conducted on the first day of start-up by increasing the flow rate of the submersible pump gradually from 50 gpm to 300 gpm in increments of 50 gpm with a time interval of 1 hour between the steps. The step test will be performed to examine the efficiency of the submersible pump as well as the well packer installed inside the RGRW. Following testing, the submersible pump will continue to pump at 300 gpm. On day two of start-up activities, iodide tracer will be injected into the RGRW. Groundwater samples will be collected from all monitoring wells following the tracer injection and periodically thereafter until tracer is either detected in monitoring wells or tracer is diluted beyond measurable concentrations. The frequency of groundwater sampling will be adjusted based on field observations and tracer results. After the completion of the tracer test, a 40% solution of $NaMnO_4$ will be introduced into the RGRW. Using a pulse feed metering pump, a permanganate feedrate of 30 to 50 milliliters per minute will be maintained in the RGRW. Background samples from monitoring wells will be collected for HVOCs and geochemical parameters prior to permanganate injection. Sampling will also be conducted following two weeks of permanganate injection and once a month thereafter.

Unlike in the existing RGRW system, pressure transducers will not be used in the proposed RGRWs and observation wells. The data collected from the existing pilot test indicated that groundwater levels did not change significantly as a result of the RGRW operation. Nonetheless, groundwater levels will be periodically measured in the RGRWs to monitor the performance of these wells.

6.3.1 Tracer Test

In order to evaluate the ROI of the RGRWs, a tracer study will be conducted. Potassium iodide will be utilized as a tracer. Tracer samples will be analyzed at the AMEC office in Portland, Oregon using an ion specific electrode (ISE). An initial iodide tracer concentration of 200 grams per liter (g/L) will be injected into well RGRW-2 with a total volume of 1,000 liters of tracer solution. The same tracer concentration and volume were used at the existing RGRW-1. However, considering the location of the farthest observation well MR-12 (90 feet from the RGRW-3), an increased tracer concentration of 400 g/L will be injected into well RGRW-3 with a total volume of 1,000 liters. Based on the tracer results from RGRW-1, it is anticipated that the tracer will be detected in the monitoring wells located 50 to 60 feet from the RGRWs in approximately 15 days (AMEC, 2003). Tracer results for the existing RGRW-1 are presented in Appendix A. It is likely that the tracer will be detected in the farthest monitoring well MR-12 (90 feet from the RGRW-3) in less than 30 days. A further description of the tasks that will be performed during the tracer test is provided in the following sections.

6.3.1.1 Tracer Test Procedure

Background Data Collection: Baseline groundwater samples will be collected from the monitoring well network (MR-9 through MR-15) following well installation and development to evaluate initial HVOC levels, identify the presence of potential tracer interferences, and to determine tracer background levels. These samples will be analyzed for HVOCS and geochemical parameters at North Creek Analytical in Beaverton, Oregon, and for iodide in the AMEC Portland, Oregon office. Groundwater elevations also will be measured at all test area wells prior to tracer injection to establish a baseline and groundwater flow direction.

Tracer Injection and Monitoring: Tracer will be injected into the RGRW-2 and RGRW-3 following one day of the start-up of the RGRWs. Tracer will be injected in a single slug. A sample will be collected from the tracer solution prior to injection to evaluate the initial concentration. Tracer samples will be collected periodically from all monitoring wells until the tracer detection is observed. Sampling frequency will be adjusted depending on the field observations. An injection permit will be obtained through Ecology prior to the tracer test.

Sample Analysis: Sample analysis for iodide will be conducted at the AMEC office in Portland, Oregon using ISE. Groundwater samples collected for tracer analysis will be stored and transported in 250-milliliters (mL) HDPE bottles.

6.3.2 Permanganate Injection

Background Data Collection: Background samples will be collected from the monitoring wells (MR-9 through MR-15) following well installation and development and will be analyzed for HVOCs and geochemical parameters (see 6.3.1.1 above).

Permanganate Injection and Monitoring: Permanganate will be injected using a metering pump at a feedrate of 30 to 50 milliliters per minute. Permanganate feedrate of the current RGRW system is maintained at 30 milliliters per minute. It is anticipated that a higher feedrate will be necessary since the modeling results show a predicted flow cell much larger for the new RGRWs than for the current flow cell at the existing RGRW. The $NaMnO_4$ solution will be injected continuously during the pilot test. AMEC has hired a sub-contractor, West Coast Marine (WCM), to store and deliver permanganate to the RGRW systems. Depending on the feedrate of the permanganate, WCM will be delivering permanganate every 2 to 3 days.

During the test, AMEC will assess the performance of the RGRW by documenting the following parameters: groundwater elevations, HVOC levels in groundwater, changes in select geochemical parameters, and changes in operational parameters.

Groundwater samples will be collected from monitoring wells MR-9 through MR-15. A monitoring schedule is provided in Table 4. Trends observed in the HVOC and geochemical parameter levels associated with the operation of the RGRW systems will be evaluated.

AMEC observed purple colored water in all monitoring wells and the RGRW during the two sampling events at the existing RGRW well network. However, the analytical results indicated that only shallow groundwater samples had nondetect TCE levels. Most of the intermediate and deep wells still had detected TCE, albeit at levels lower than the initial levels. This suggests that permanganate and HVOCs can coexist in groundwater. AMEC also analyzed groundwater for limited geochemical parameters including chromium VI. The results indicated nondetect levels of chromium VI in all monitoring wells following permanganate injection. Other geochemical parameters also remained unchanged after permanganate injection.

Consistent with sampling techniques employed historically in other nearby wells, AMEC will utilize low-flow bladder pumps in the observation wells. These variable speed, positive displacement pumps will be used for future groundwater monitoring - purging, pumping, and VOC sampling. Orifice restrictions on the motor control the pump's discharge and air is not introduced down hole; nor is there expected to be any degassing of volatiles within the collected groundwater samples.

Table 4: Monitoring Schedule for RGRWs and Monitoring Well Network

Parameter	Well Number	Monitoring Frequency	
		Before Test	During Test
HVOCs: U.S. Environmental Protection Agency (EPA) 8260 list	MR-9 through MR-15	Once	Monthly
Geochemical: total manganese, iron, chromium VI, total dissolved solids, TOC	MR-9 through MR-15	Once	Quarterly
Water Quality: pH, temperature, specific conductance, dissolved oxygen, turbidity, ORP	MR-9 through MR-15	Once	Quarterly
System Operation: flow rate (AS/SVE, RGRW/$NaMnO_4$), pressure (RGRW, AS/SVE)	RGRW	Throughout the Test	

AMEC will continue to use and refer to the existing Operation and Maintenance (O&M) Plan for startup and operation of the proposed RGRWs (AMEC, 2004).

6.4 Schedule

It is anticipated that the RGRW feasibility testing will be started in May 2004. The RGRW systems will be operated until the HVOC levels in groundwater and in soil gas in the vadose zone have been mitigated.

6.5 RGRW Feasibility Testing Results and Recommendations Report

If the feasibility testing results indicate a successful outcome and the RGRW technology is demonstrated to be implementable and cost-effective, then AMEC would prepare an IRAM Work Plan for a full-scale system for the FVN. The plan would be completed on the basis of the findings from the pilot tests as well as a review of cleanup actions at other similar sites, and would be compatible with other interim and long-term actions in the vicinity.

AMEC is pleased to present this WP. If you have any questions or concerns, please contact the undersigned at (503) 639-3400.

AMEC Earth & Environmental, Inc.

John L. Kuiper, L.G.
Principal

SP/ELW/va

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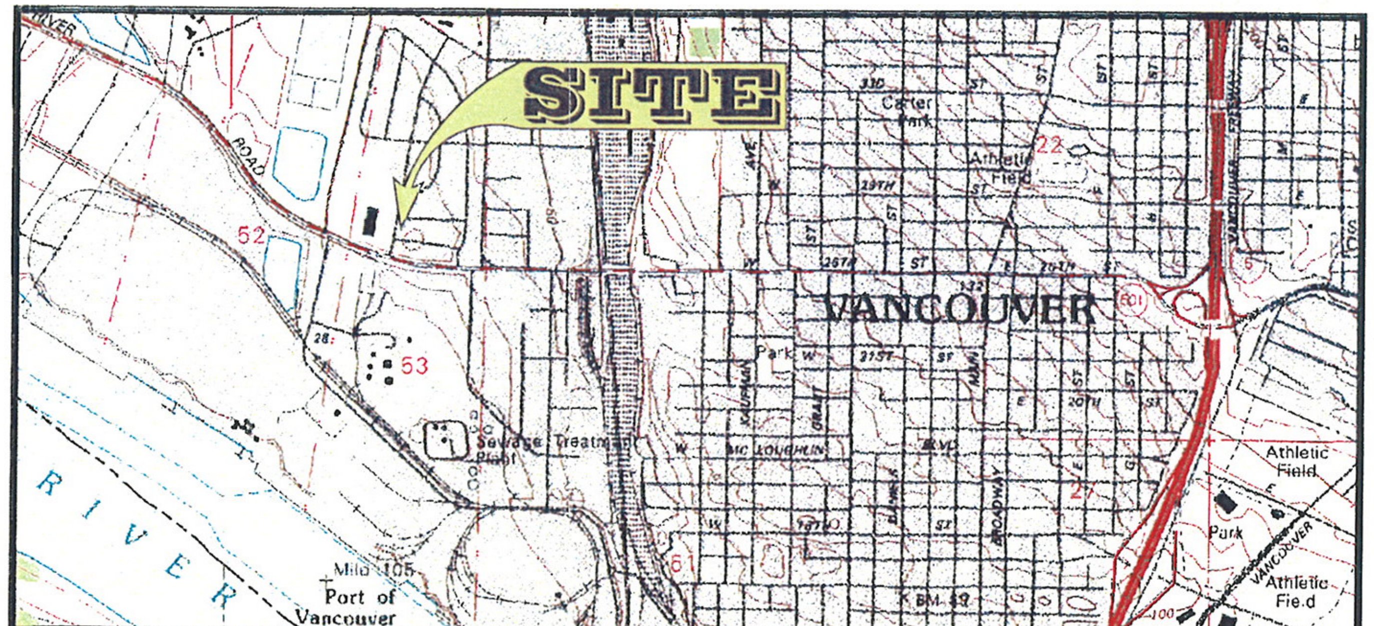
LIMITATIONS

This workplan was prepared exclusively for Cadet by AMEC. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This work plan is intended to be used by Cadet for the 2500 West Fourth Plain Boulevard facility and vicinity only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

The findings contained herein are relevant to the dates of the AMEC Site visits and should not be relied upon to represent conditions at later dates. In the event that changes in the nature, usage, or layout of the property or nearby properties are made, the conclusions and recommendations contained in this report may not be valid. If additional information becomes available, it should be provided to AMEC so the original conclusions and recommendations can be modified as necessary.

CADET MANUFACTURING COMPANY - FRUIT VALLEY NEIGHBORHOOD SITE
RECIRCULATING GROUNDWATER REMEDIATION WELL PILOT TEST
VANCOUVER, WASHINGTON

RECIRCULATING WELL PILOT TEST SYSTEM
AS-BUILT DRAWINGS



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N

FIGURE 1

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

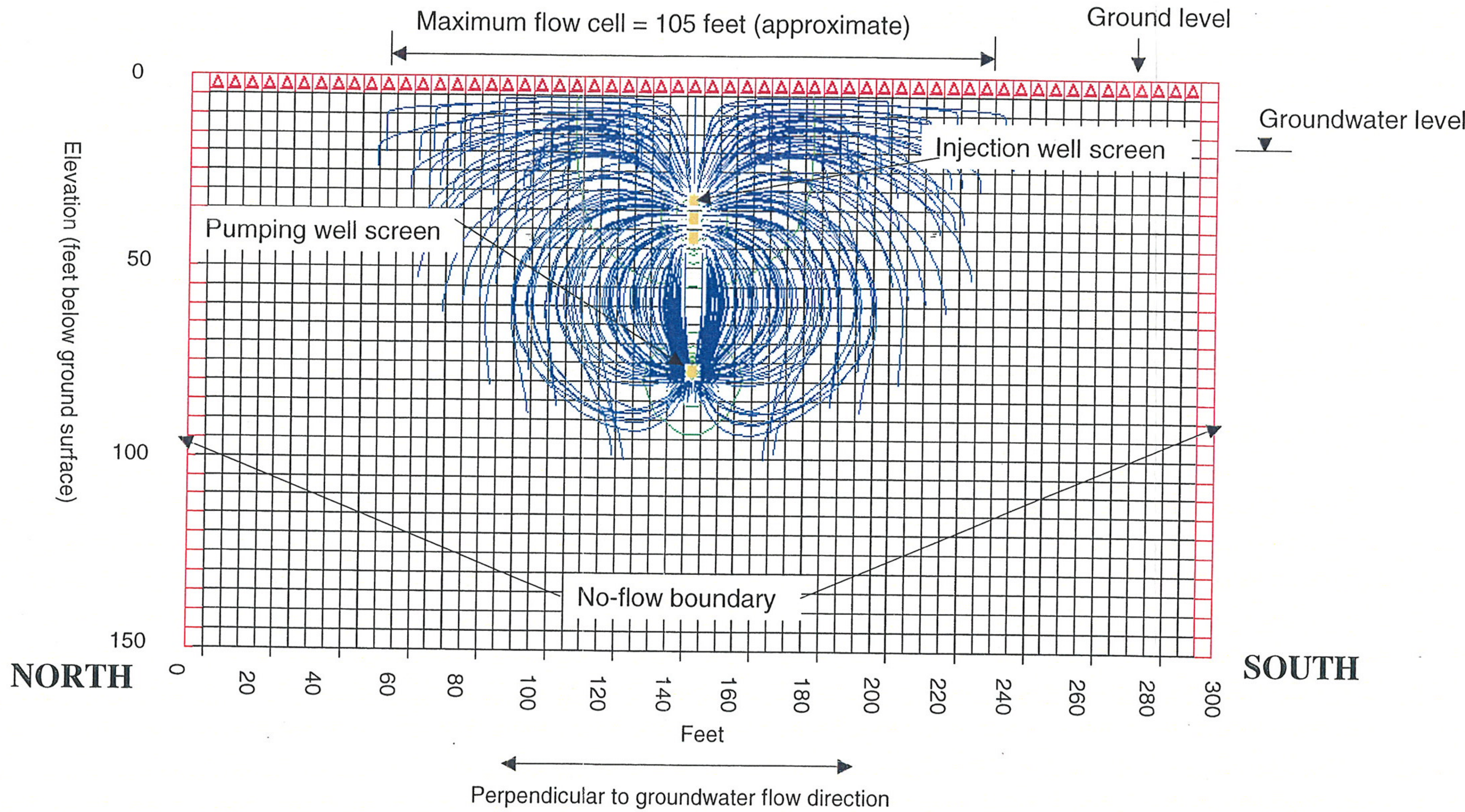
W.O.	4-61M-10135-L T-1
DESIGN	ME
DRAWN	DD
DATE	APRIL 2004
SCALE	NOT TO SCALE

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

AMEC 008940

SITE LOCATION MAP

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 0404 \ FIG-1. DWG



NOTES

Model input parameters: Flow rate = 100 gpm, Hydraulic conductivity (Kh&Kv)=4,000 ft/day, Porosity = 0.21, Horizontal gradient = 0.0001 ft/ft

amec

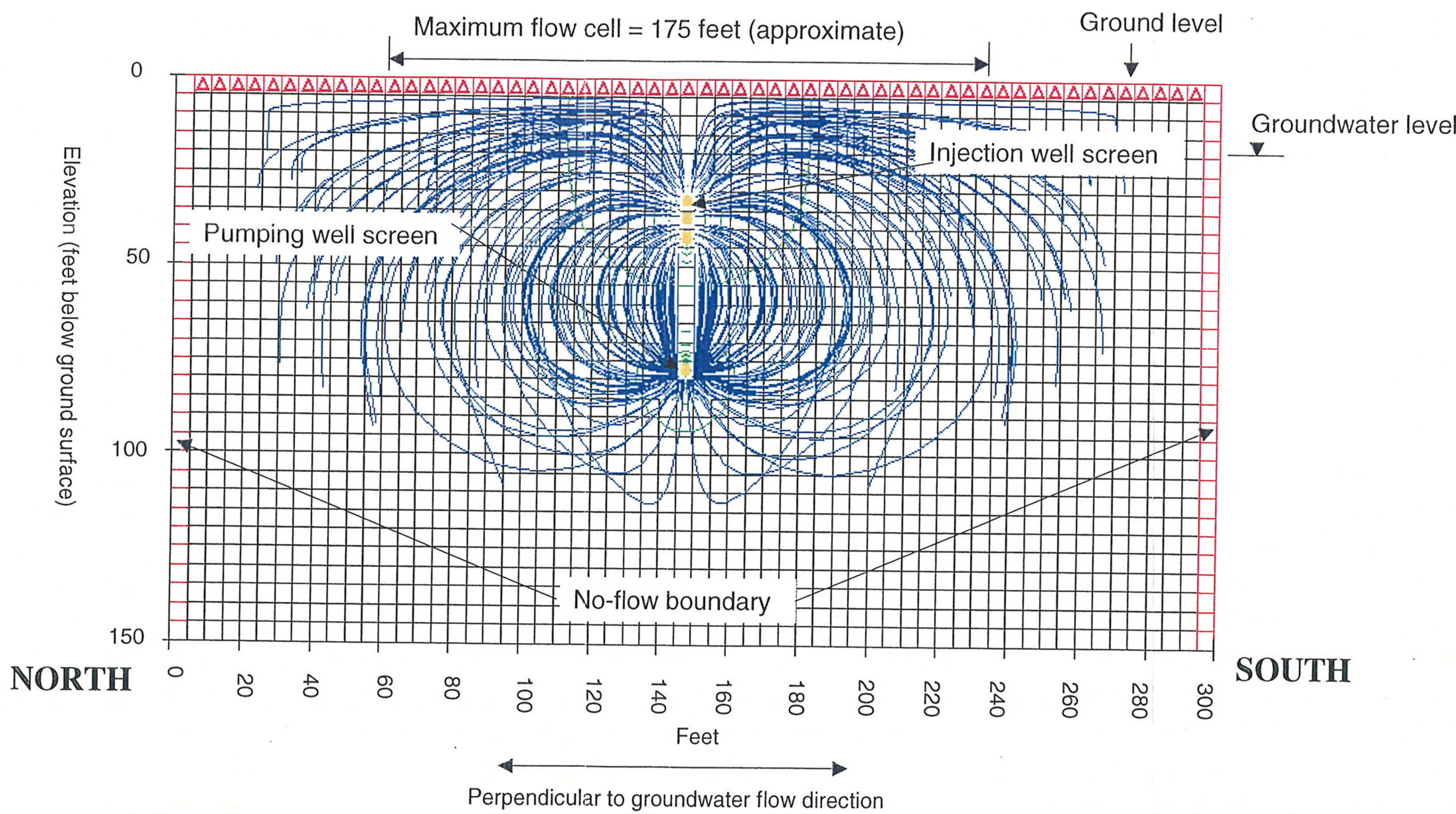
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-L T1
DESIGN	STP
DRAWN	STP
DATE	April 2004
SCALE	AS NOTED

FIGURE 2

Cadet Manufacturing Company Model Cross Section Perpendicular to Groundwater Flow Direction with Maximum Radius of Influence in approximately 2 months (Flowrate = 100 gpm)

K://10000/10100/10135/workplans/RGRW/Modeling results.ppt



NOTES

Model input parameters: Flow rate = 300 gpm, Hydraulic conductivity (Kh&Kv)=4,000 ft/day, Porosity = 0.21, Horizontal gradient = 0.0001 ft/ft

FIGURE 3

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Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-L T1
DESIGN	STP
DRAWN	STP
DATE	April 2004
SCALE	AS NOTED

Cadet Manufacturing Company
Model Cross Section Perpendicular to Groundwater Flow Direction with Maximum Radius of Influence in approximately 2 months (Flowrate = 300 gpm)

K://10000/10100/10135/workplans/RGRW/Modeling results.ppt

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W.O.	4-61M-10135-L T1
DESIGN	STP
DRAWN	BRJ
DATE	APRIL 2004

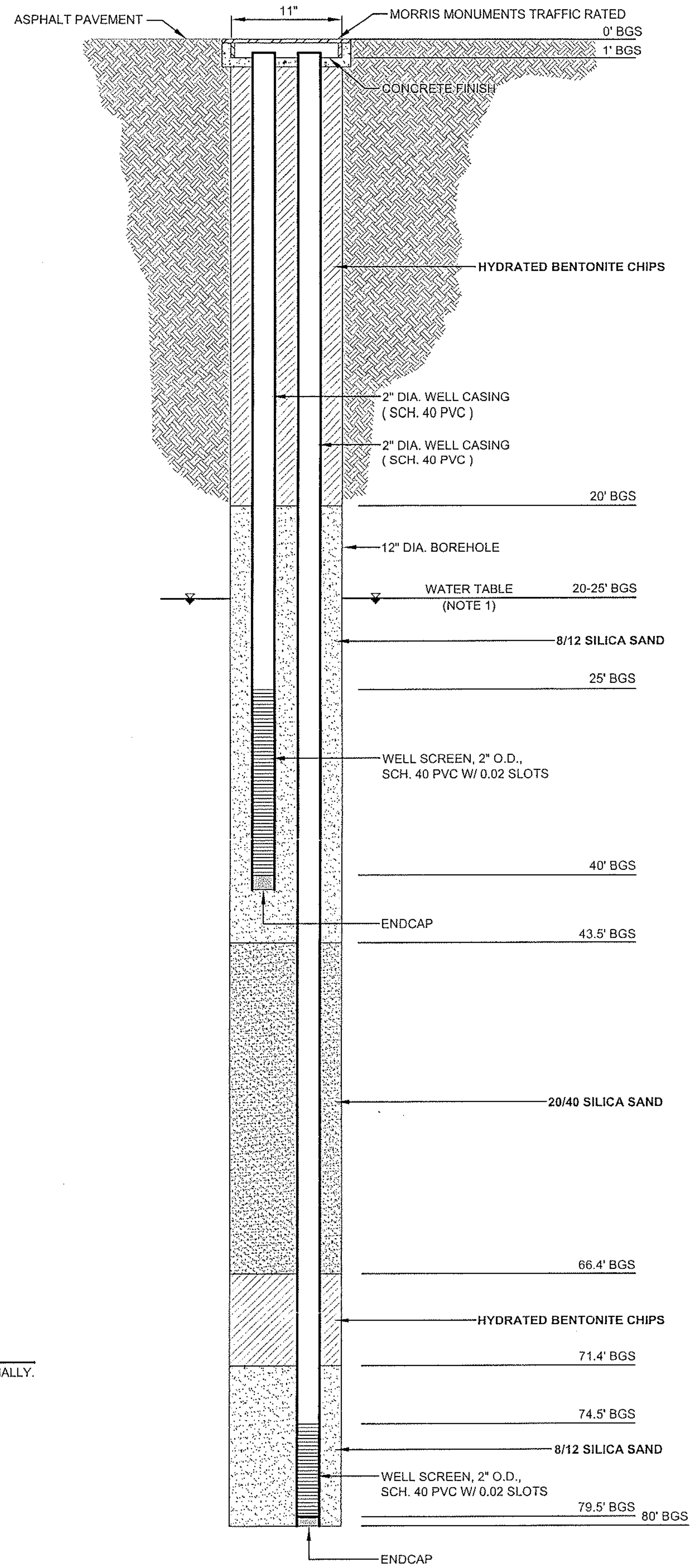
AMEC 008943

FIGURE 4

CADET MANUFACTURING CO.
2500 W FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

PROPOSED RECIRCULATING WELLS RGRW-2 AND RGRW-3
IN THE FRUIT VALLEY NEIGHBORHOOD

K:\10000\10100\10135\DWG\arcview\In Progress\Proposed Recirculating Wells 2 and 3.mxd



NOTES

1. WATER TABLE FLUCTUATES SEASONALLY.

BGS BELOW GROUND SURFACE
O.D. OUTSIDE DIAMETER
SCH. SCHEDULE
PVC POLYVINYL CHLORIDE
DIA. DIAMETER

HORIZONTAL SCALE: 1" = 1'
VERTICAL SCALE: 1" = 6'

FIGURE 6

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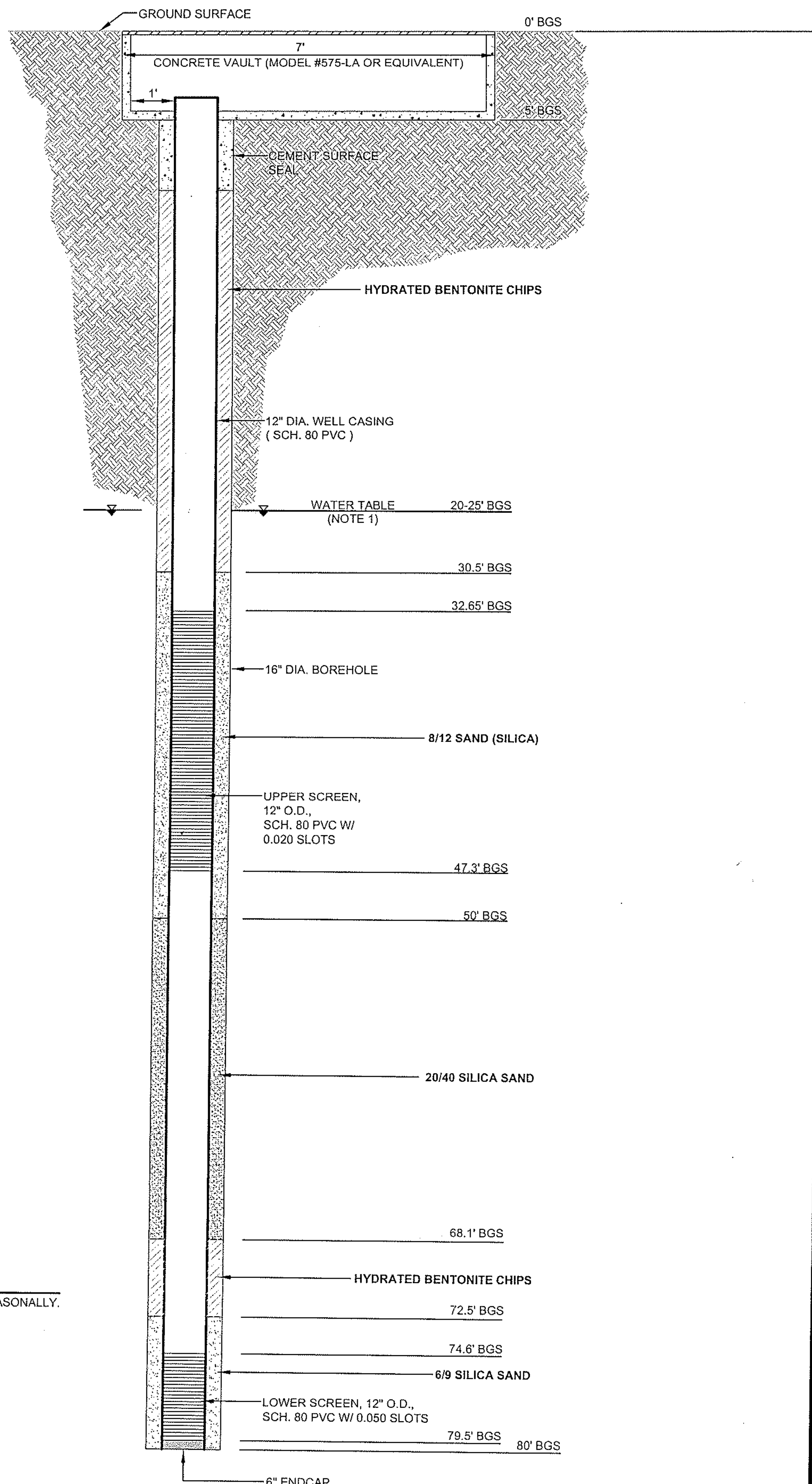
W.O.	4-61M-10135-L T-1
DESIGN	STP
DRAWN	DD
DATE	APRIL 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

NESTED MONITORING WELL
CONSTRUCTION DETAIL

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 0404 \ FIG-6. Dwg

AMEC 008945



NOTES

1. WATER TABLE FLUCTUATES SEASONALLY.

BGS BELOW GROUND SURFACE
O.D. OUTSIDE DIAMETER
SCH. SCHEDULE
PVC POLYVINYL CHLORIDE
DIA. DIAMETER

HORIZONTAL SCALE: 1" = 2'
VERTICAL SCALE: 1" = 6'

FIGURE 5

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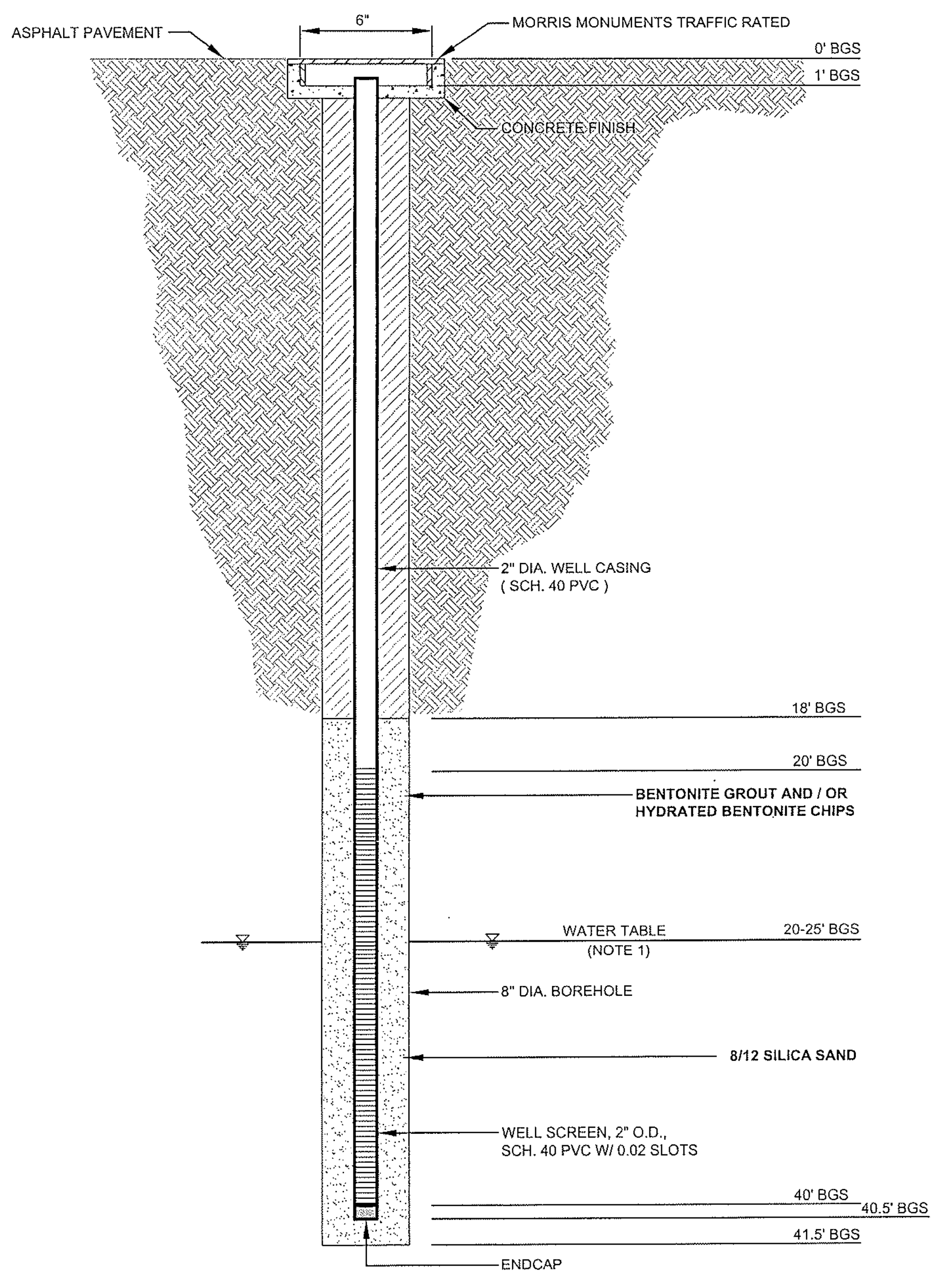
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-L T-1
DESIGN	STP
DRAWN	DD
DATE	APRIL 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

RGRW (RGRW-2 & RGRW-3)
CONSTRUCTION DETAIL

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 040 5. Dwg



NOTES

1. WATER TABLE FLUCTUATES SEASONALLY.

BGS BELOW GROUND SURFACE
O.D. OUTSIDE DIAMETER
SCH. SCHEDULE
PVC POLYVINYL CHLORIDE
DIA. DIAMETER

HORIZONTAL SCALE: 1" = 1'
VERTICAL SCALE: 1" = 5'

FIGURE 7

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Portland, OR, U.S.A. 97224

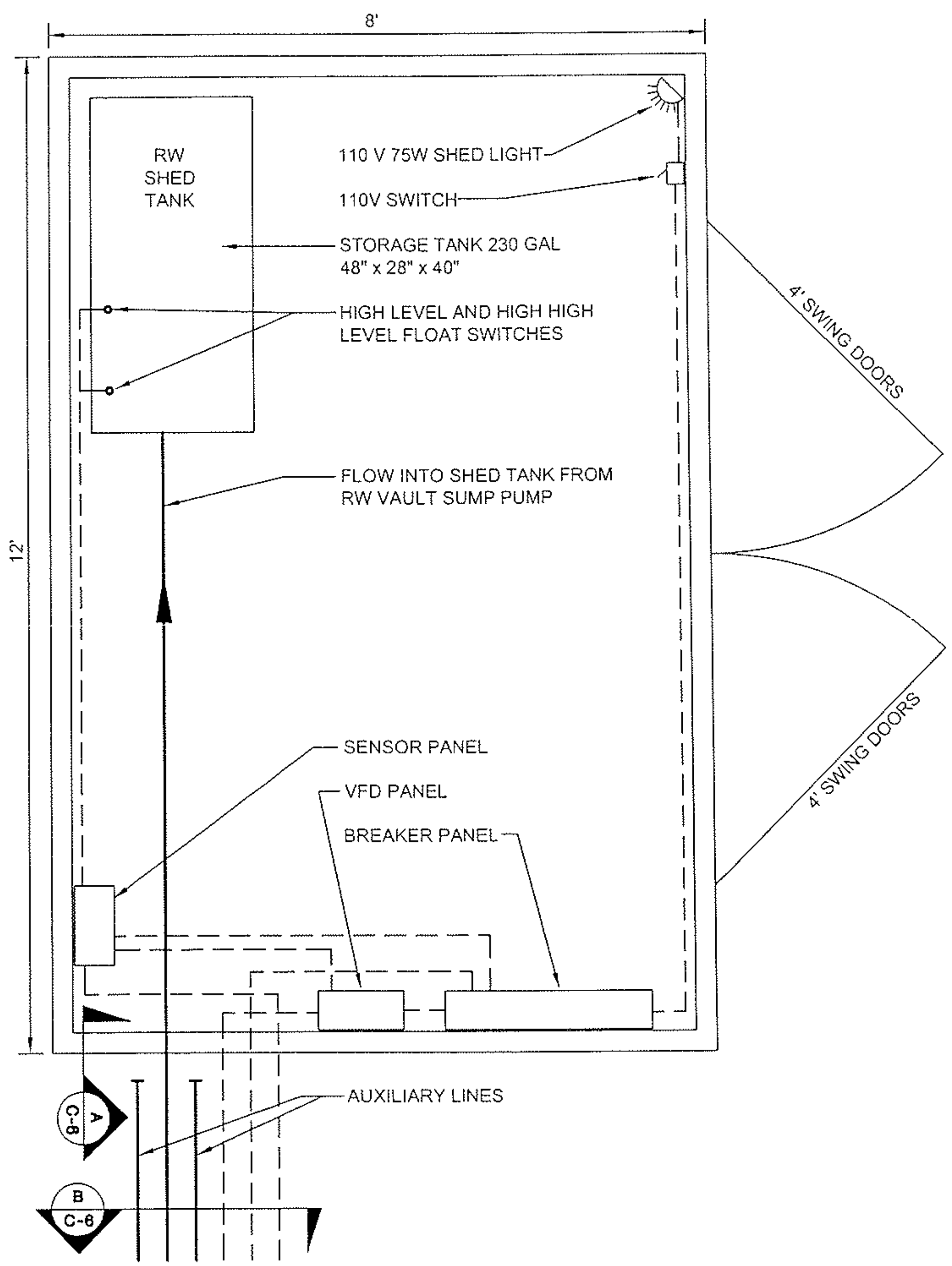
W.O.	4-61M-10135-L T-1
DESIGN	STP
DRAWN	DD
DATE	APRIL 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

SINGLE MONITORING WELL
CONSTRUCTION DETAIL

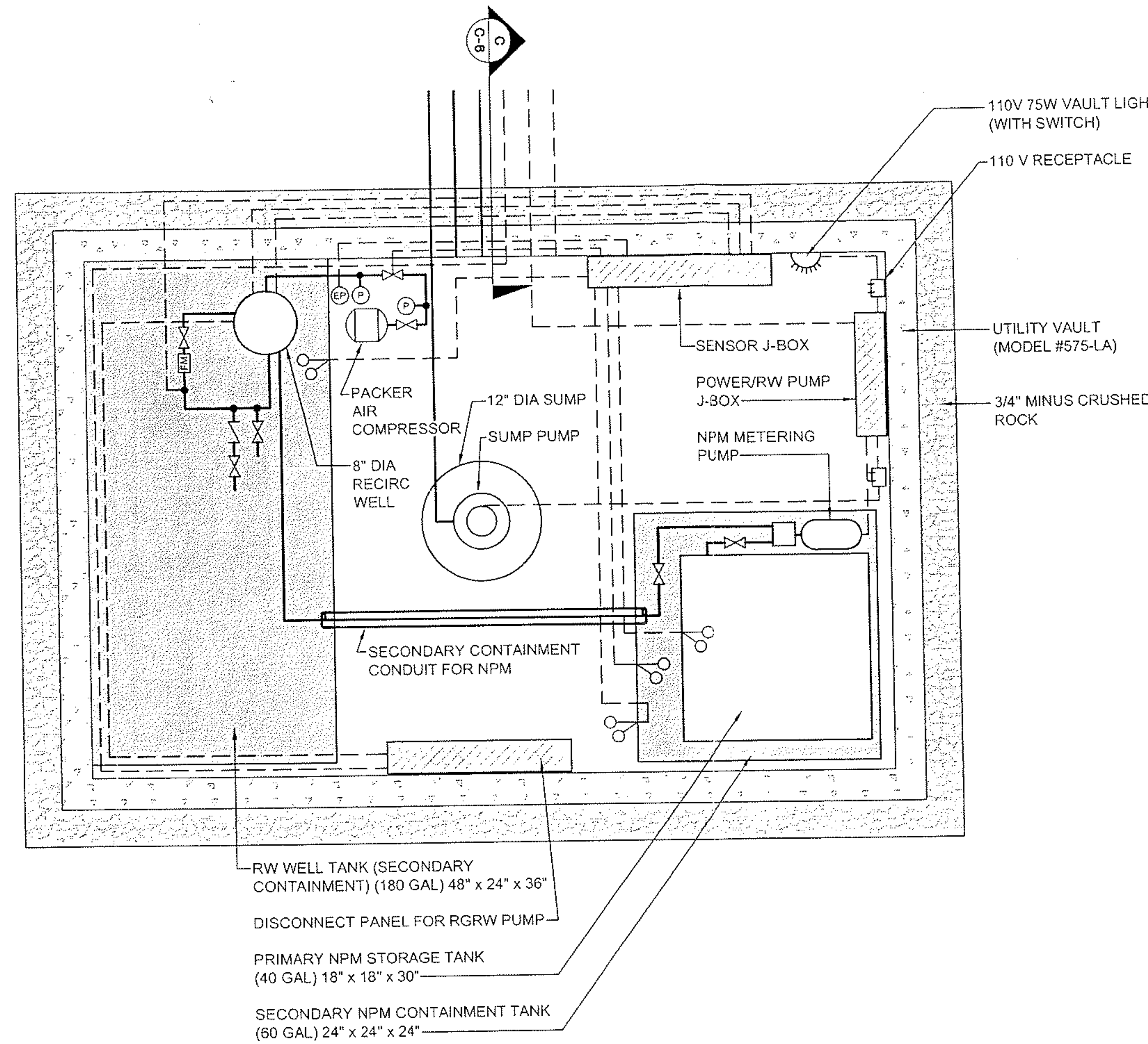
AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 0404 \ FIG-7. Dwg

AMEC 008946



EQUIPMENT COMPOUND "TUFF SHED" - PLAN VIEW

NOT TO SCALE



UTILITY VAULT - PLAN VIEW

NOT TO SCALE

NOTES:

1) ENGINEER SHALL PROVIDE WOODEN SHED AND INSTALLATION.

2) CONTRACTOR SHALL REINFORCE CRIPPLE JOISTS UNDERNEATH THE SUMP.

PVC POLYVINYL CHLORIDE
SCH SCHEDULE
VFD VARIABLE FREQUENCY DRIVE
GAL GALLON
NPM SODIUM PERMANGANATE

LEGEND:

FM	FLOWMETER
P	MECHANICAL PRESSURE GAUGE
EP	ELECTRONIC PRESSURE GAUGE
	FLOAT SWITCH
	BALL VALVE
	CHECK VALVE

FIGURE 8

amec

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Portland, OR, U.S.A. 97224

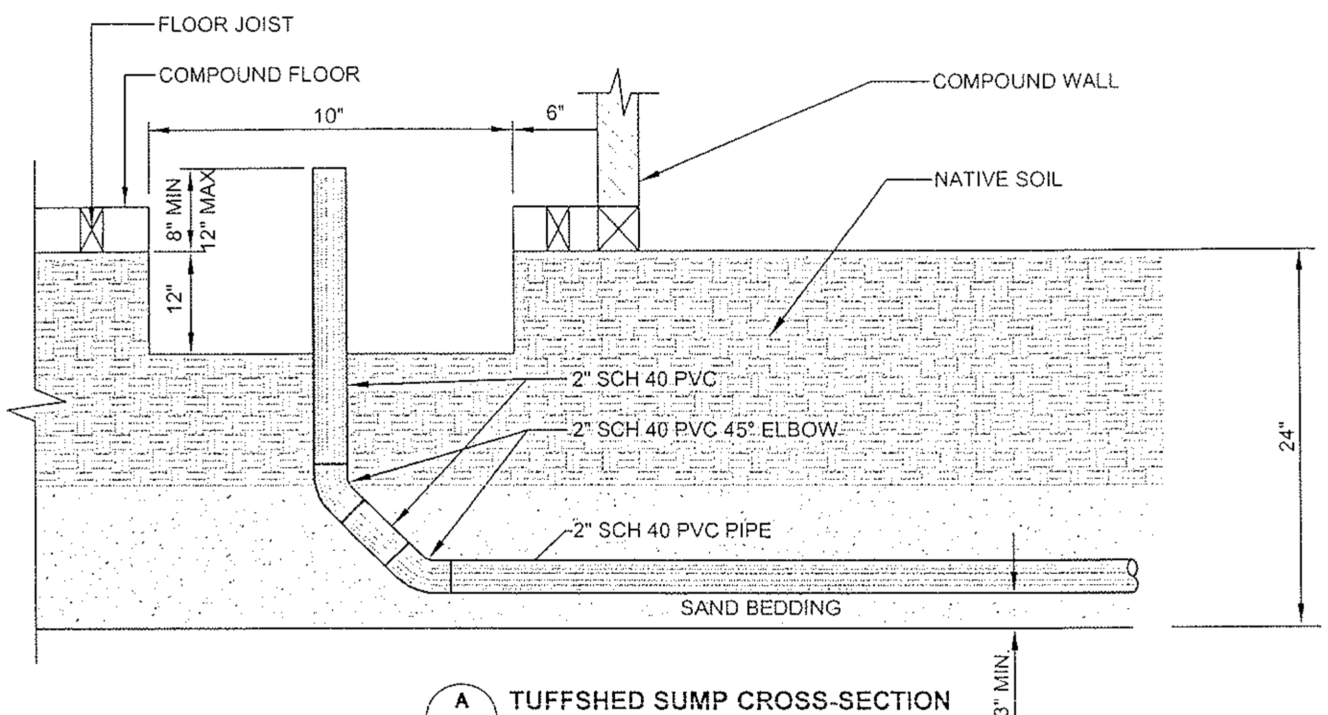
W.O.	4-61M-10135-L T-1
DESIGN	ME
DRAWN	DD
DATE	APRIL 2004
SCALE	AS NOTED

AMEC 008947

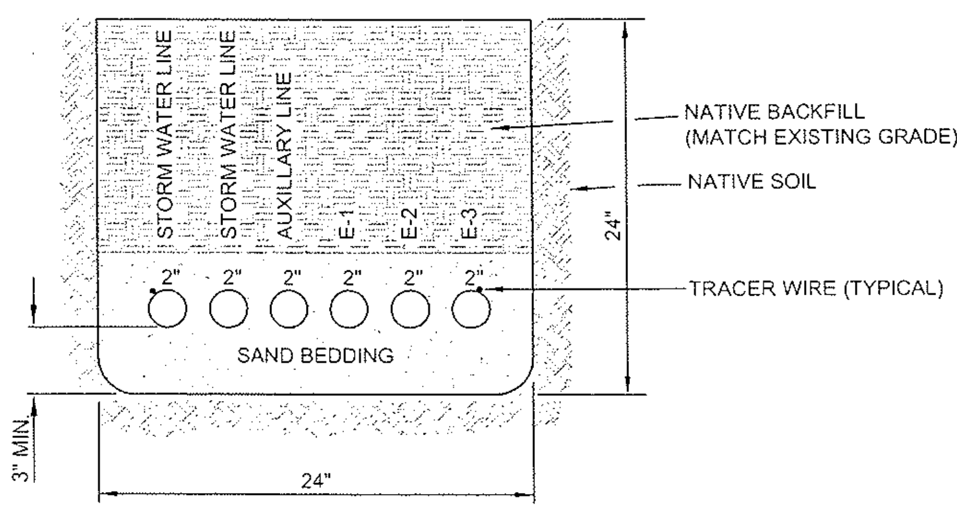
CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

EQUIPMENT COMPOUND AND UTILITY VAULT PLAN VIEWS

AMEC DRAWING NO. K: / 10000 / 10100 / 10135 / RECIRCULATING WELL DESIGN / DWG / DWG REVISIONS 0404 / FIG-8.Dwg



A / C-6 **TUFFSHED SUMP CROSS-SECTION**
SCALE: 1" = 1'



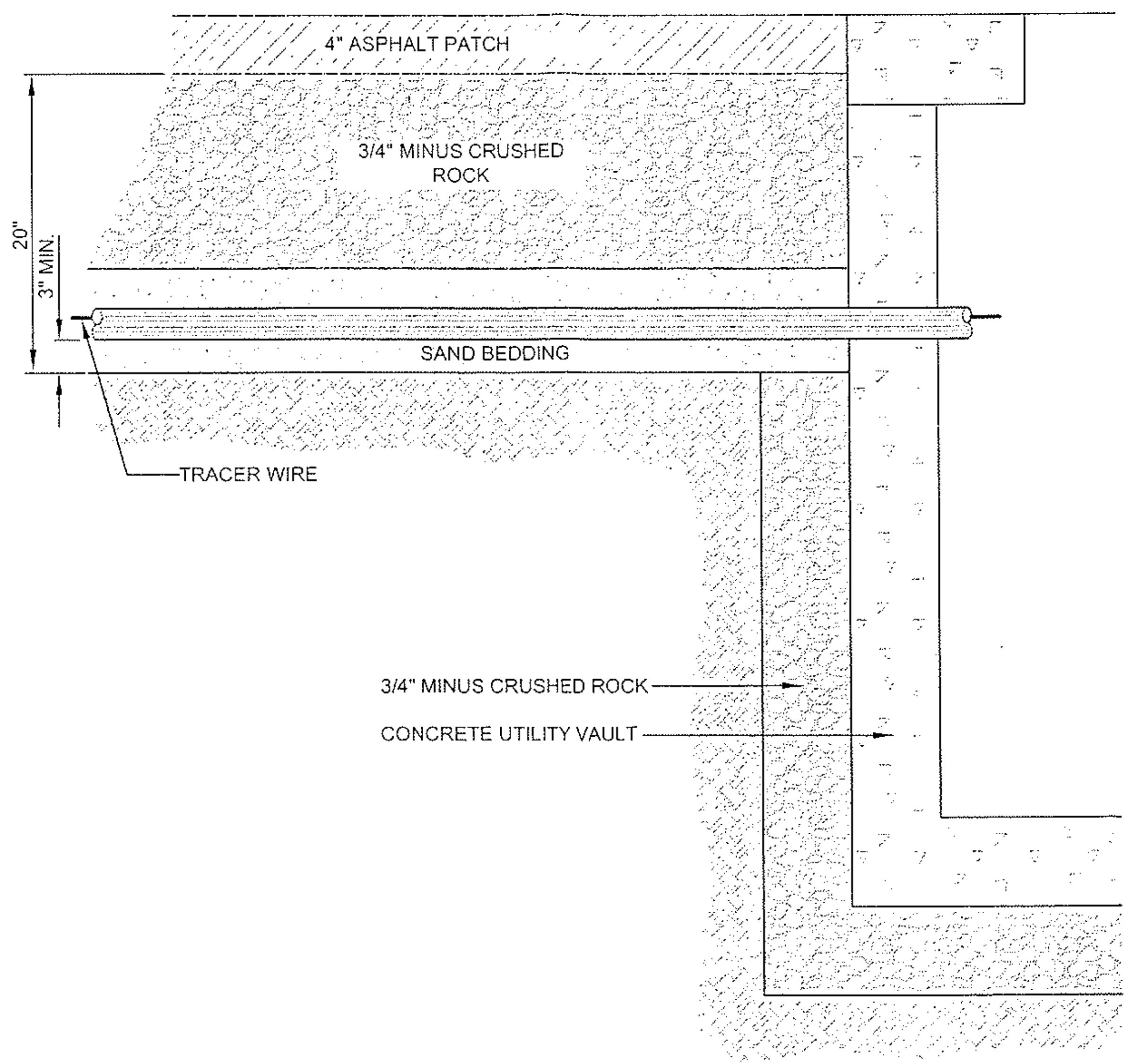
B / C-6 **TRENCH CROSS-SECTION**
SCALE: 1" = 1'

NOTES:

E-1; CONDUIT FOR RGRW PUMP POWER LINE

E-2; CONDUIT FOR OUTLETS & SUMP PUMP POWER LINE

E-3; CONDUIT FOR SENSOR LINES



C / C-6 LONGITUDINAL TRENCH CROSS-SECTION
SCALE: 1" = 1'

FIGURE 9

amec
7376 S.W. Durham Road
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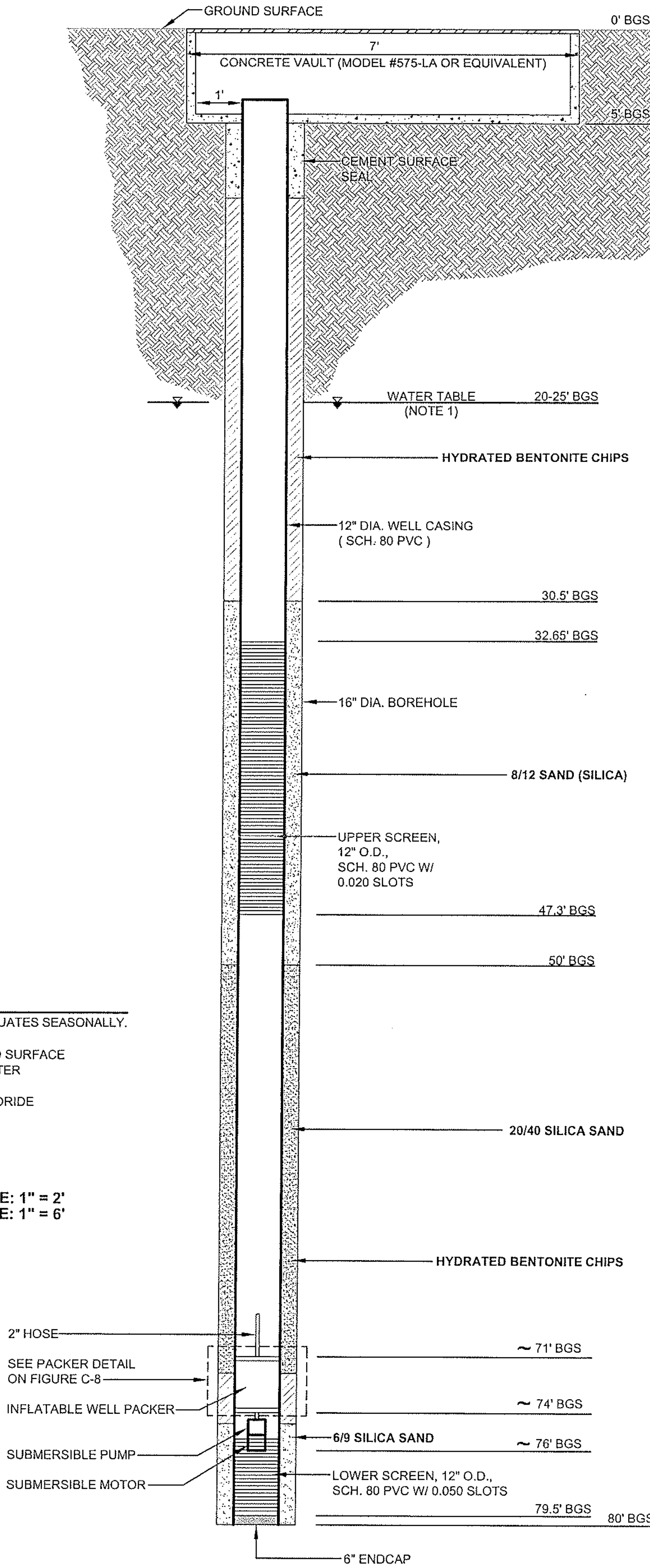
W.O. 4-61M-10135-L T-1
DESIGN ME
DRAWN DD
DATE APRIL 2004
SCALE AS NOTED

AMEC 008948

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

UNDERGROUND PIPING CONSTRUCTION DETAILS



NOTES

1. WATER TABLE FLUCTUATES SEASONALLY.

BGS	BELOW GROUND SURFACE
O.D.	OUTSIDE DIAMETER
SCH.	SCHEDULE
PVC	POLYVINYL CHLORIDE
DIA.	DIAMETER

HORIZONTAL SCALE: 1" = 2'
VERTICAL SCALE: 1" = 6'

FIGURE 10

amec

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Portland, OR, U.S.A. 97224

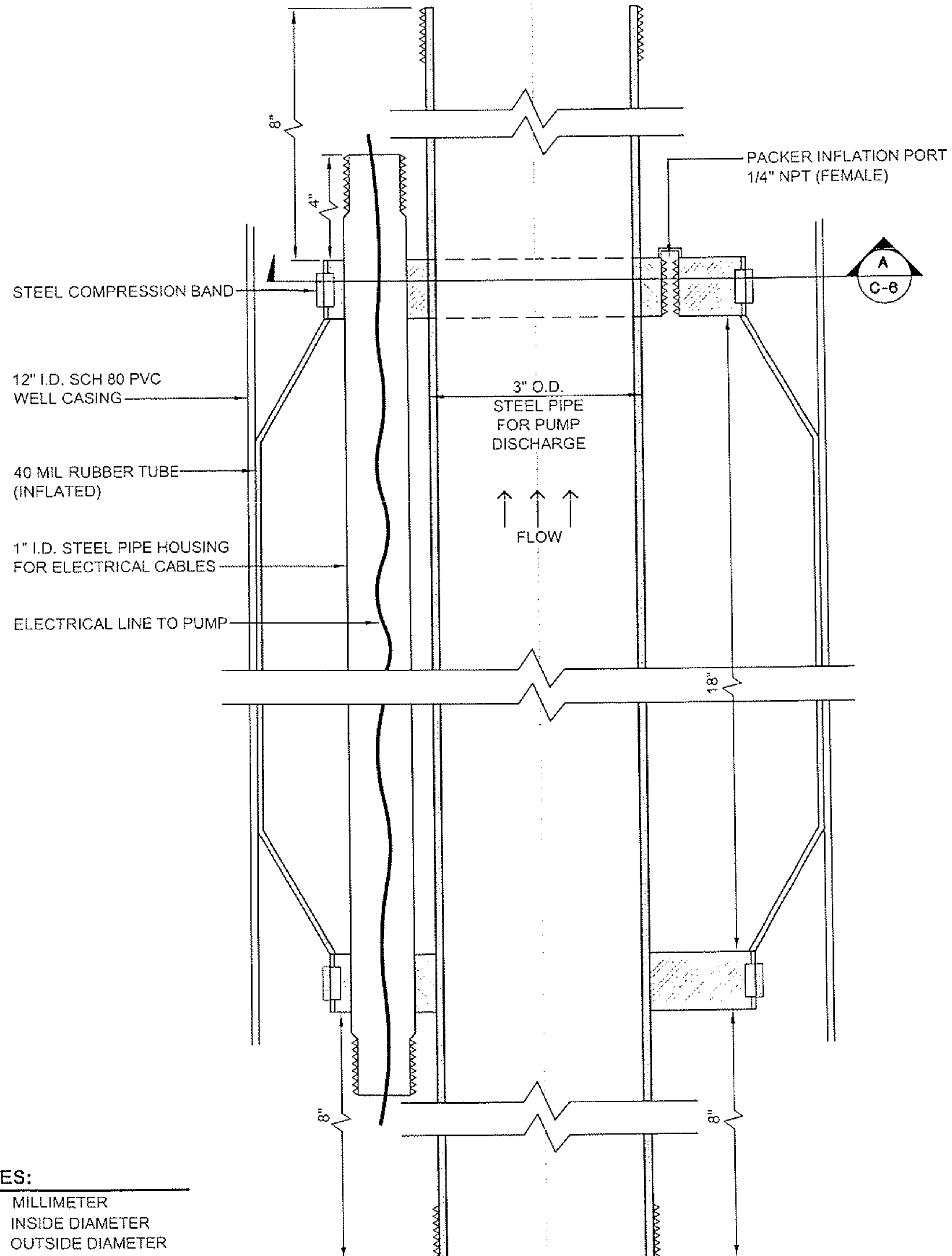
W.O.	4-61M-10135-L T-1
DESIGN	STP
DRAWN	DD
DATE	APRIL 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

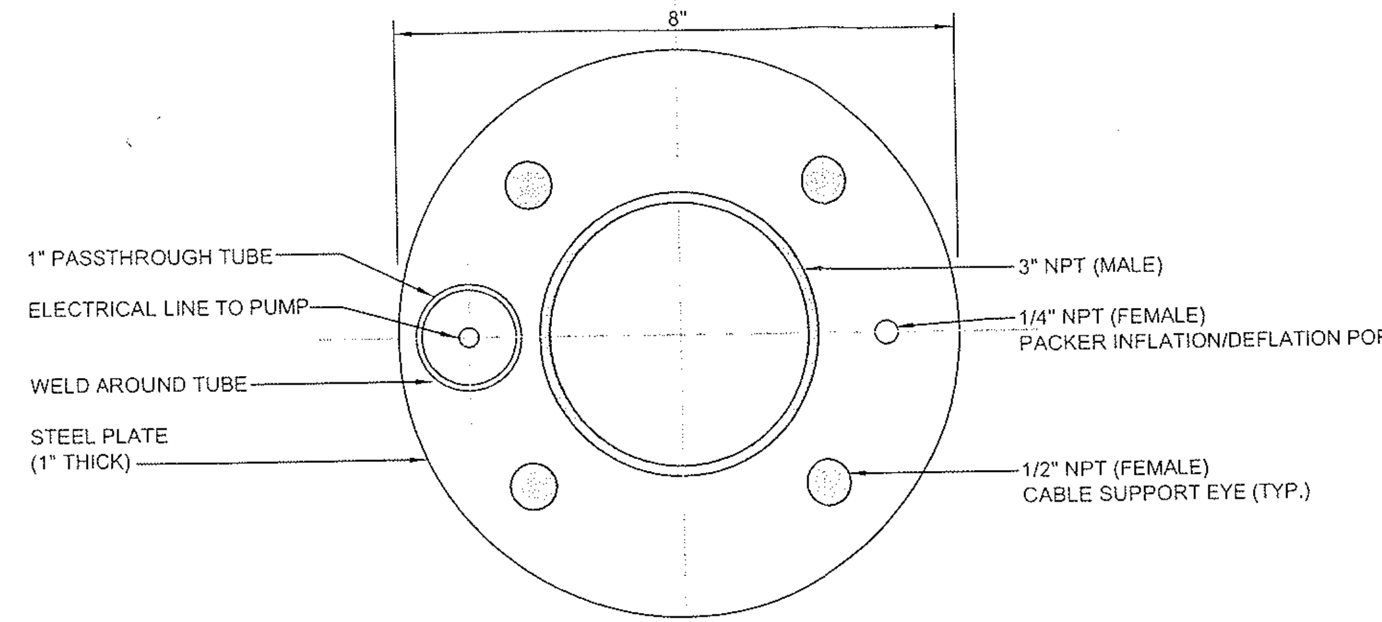
RGRW IN-WELL EQUIPMENT DETAIL

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 04?? \ FIG-10. Dwg

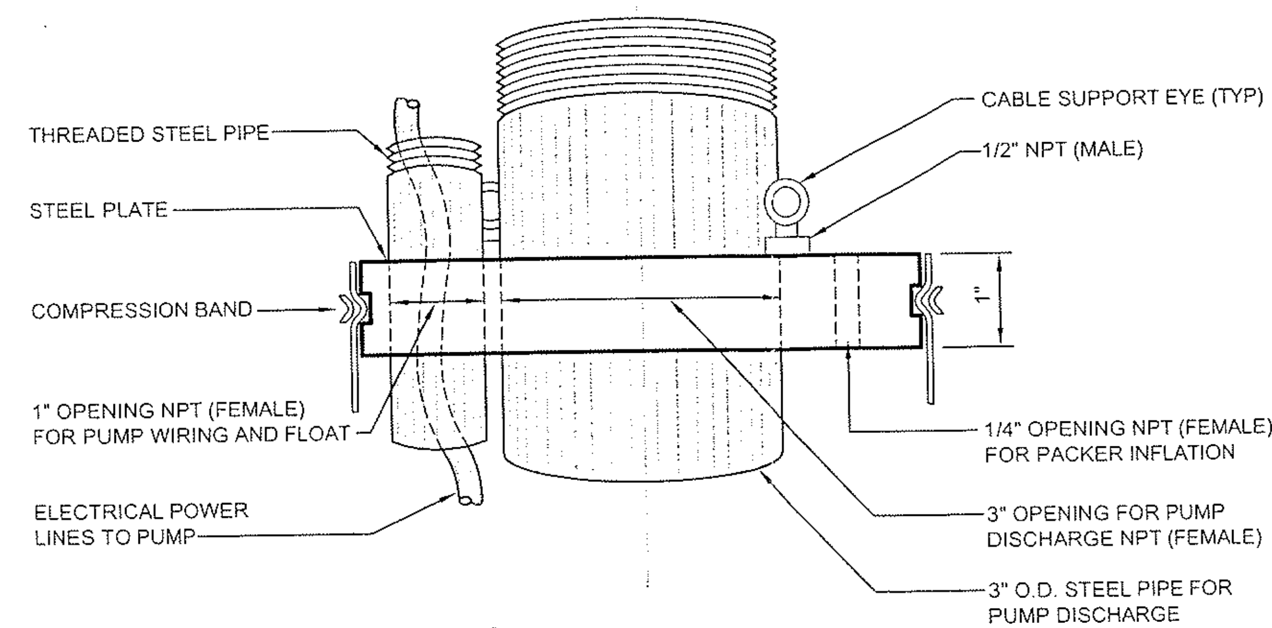
AMEC .J8949



SIDE VIEW
NOT TO SCALE



A / C-6 TOP VIEW
NOT TO SCALE



A / C-6 ALTERNATE SIDE VIEW
NOT TO SCALE

NOTES:

MIL	MILLIMETER
I.D.	INSIDE DIAMETER
O.D.	OUTSIDE DIAMETER
SCH.	SCHEDULE
PVC	POLYVINYL CHLORIDE
TYP.	TYPICAL
NPT	NATIONAL PIPE THREAD

FIGURE 11

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-L T-1
DESIGN	TJ
DRAWN	DD
DATE	APRIL 2004
SCALE	NOT TO SCALE

AMEC 008950

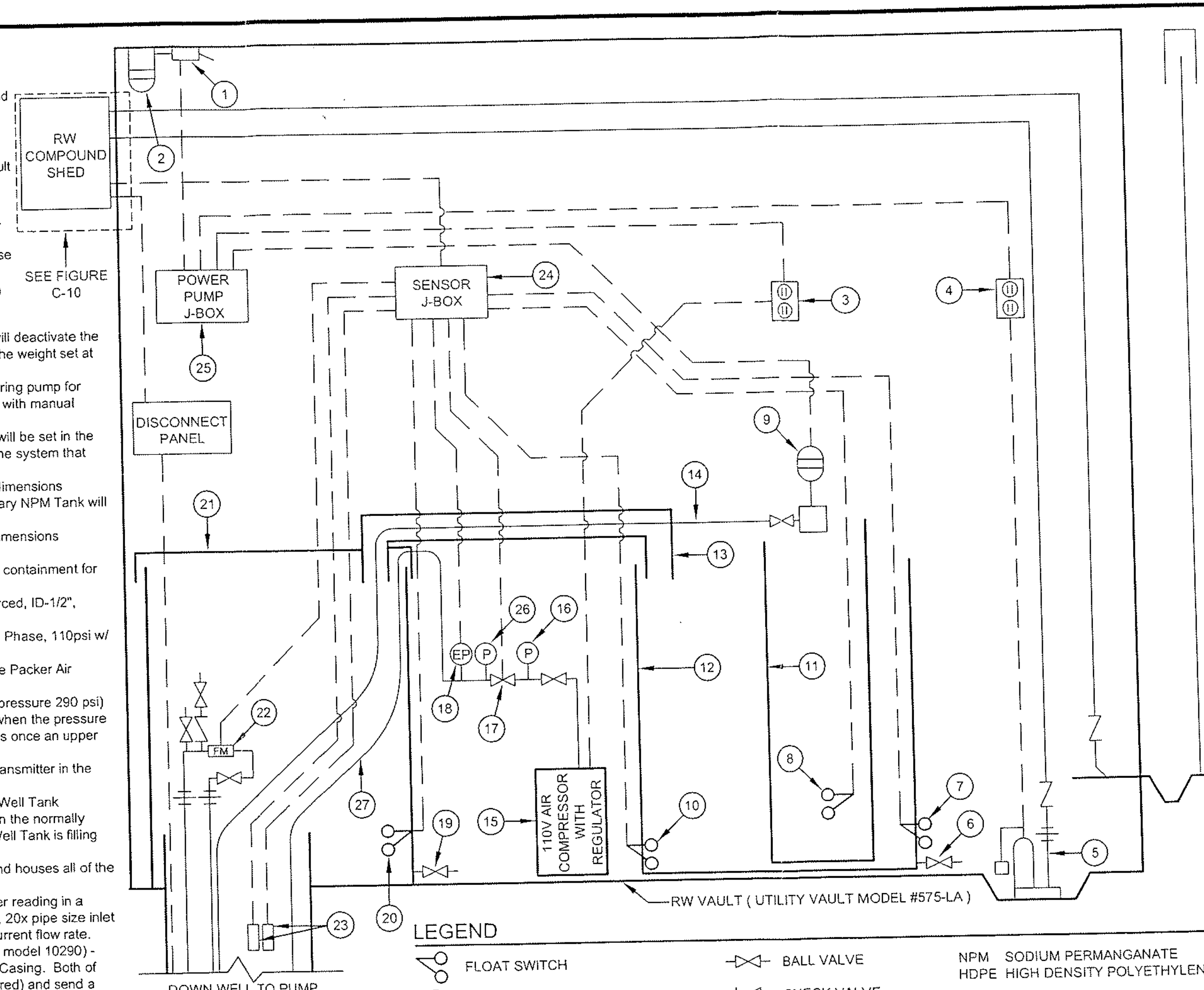
CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

RGRW PACKER DETAIL

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 0404 \ FIG-11. DWG

Notes for Figure C-9

1) RW Vault Light Switch (110V-1PH weather-rated switch for RW Vault Light) - the switch should be accessible from the exterior of the vault (mount switch on the ceiling of the vault)
2) RW Vault Light (110V-1PH 75W weather-rated and protected light) - light should use standard 75W bulb and be on the same circuit as the outlet from Note 3.
3) 110V-1PH 20A weather-rated exterior outlet (RW Vault Outlet #1) - this outlet will be share a single 110V-1PH 20A circuit with the RW Vault Light.
4) 110V-1PH 20A weather-rated exterior outlet (RW Vault Outlet #2) - this outlet will provide power for the Vault Sump Pump
5) RW Vault Sump Pump (110V-1PH 12A Flotec Ironmate ½-HP sump pump model FPSC4550A) - this sump pump will be installed with an automatic vertical float switch, 1 ½" female NPT discharge pipe fitting, and 10 ft. power cord.
6) Secondary NPM Tank drain valve - 1" Sch. 40 PVC drain ball valve mounted to tank wall 1 ½" off of the base of the Secondary NPM Tank
7) RW Vault Flooding Float sensor (Dwyer model F7-HPS-11 - through tank mount) - this float sensor is set in the normally open (NO) position a location 2" above the Secondary NPM Tank (outside of tank)
8) Primary NPM Tank Low Float sensor (USA Bluebook model Avacado #47728 NC suspended) - this float will deactivate the NPM Pump when the level reaches a "low" point. This float will be in the normally closed (NC) position with the weight set at an appropriate level by AMEC.
9) NPM Metering Pump (Harrington PULSATron Series A Plus Model LB64SA-PTC1) - 110V-1PH 0.6A metering pump for NPM mounted to the top of the Primary NPM Tank. Rate for 150-psi, 30 gpd (with a turndown ratio of 100:1) with manual controls.
10) Secondary NPM Tank Flooding Float sensor (Dwyer model F7-HPS-21 - through tank mount) - this float will be set in the normally open (NO) position at a level 2" off of the base of the Secondary NPM Tank. This sensor will alert the system that the Primary NPM Tank has failed.
11) Primary NPM Tank (Harrington model 12000-0040) - this is a 40-gallon HDPE rectangular tank with the dimensions 18"x18"x30" (LxWxH) with a cover. The NPM Metering Pump will be set on the cover of this tank. The Primary NPM Tank will be placed within the Secondary NPM Tank.
12) Secondary NPM Tank (Harrington model 12000-0025) - this is a 60-gallon HDPE rectangular tank with dimensions 24"x24"x24" (LxWxH) with a cover. This tank will provide secondary containment for the Primary KPM Tank.
13) NPM Line Secondary Containment Conduit - this is a 2" Sch. 40 PVC conduit that will provide secondary containment for the NPM Line (line will drain back into the Secondary NPM Tank or Well Tank.
14) NPM Line (Harrington BraidFLEX 70 tubing model 8470-4515) - this tubing (1/2", 230-psi, braided reinforced, ID-1/2", OD-3/4") will transport KPM to the RW Pump Line inside the Well Tank.
15) Packer Air Compressor - that will maintain the packer pressure at a level determined by AMEC. (110V, 1 Phase, 110psi w/ Regulator).
16) Packer Air Compressor Mechanical Pressure Gauge - this is a mechanical pressure gauge that reads the Packer Air Compressor pressure.
17) Packer Electronic Pressure Valve (Dwyer model SAV100-NC) - this is the valve (120VAC, ½", NC, max pressure 290 psi) that is electronically controlled to keep the packer pressure level within a pre-set range. This valve opens (when the pressure in the packer decreases to a level below the acceptable range) to increase pressure in the packer and closes once an upper pressure level is reached.
18) Packer Electronic Pressure Gauge (Dwyer Series 679 model 679-2) - this is a weather-rated pressure transmitter in the 0-100 psi range (300 psi overpressure), 4-20mA output, 9-30VAC input.
19) Well Tank drain valve - 1" Sch. 40 PVC drain ball valve mounted to tank wall 1 ½" off of the base of the Well Tank
20) Well Tank Flooding Float sensor (Dwyer model F7-HPS-21 - through tank mount) - this float will be set in the normally open (NO) position at a level 2" off of the base of the Well Tank. This sensor will alert the system that the Well Tank is filling with water and it will shut off the RW Pump.
21) Well Tank (Harrington model 12000-0085) - this is the secondary containment for the RW Pump Line and houses all of the RW Pump Line equipment (160-gallon, 48"x24"x36", HDPE)
22) RW Pump Line Flow Sensor (USA Bluebook stock #65454) - this is an electronic flow meter and totalizer reading in a range of 20-200 gpm (4-20mA output, 1500-psi rating, SS housing, battery powered, 2" NPT female fittings, 20x pipe size inlet and 5x pipe size outlet). This meter will send an analog signal to the control panel to indicate the pump's current flow rate.
23) RW Groundwater Level Sensors (USA Bluebook PlantPro 1730 Series Submersible Level Transmitters model 10290) - two of these pressure transmitters will be installed in the well at a depth of 15 feet below the top of the RW Casing. Both of these pressure transmitters have a range of 0 - 11.55 feet of H2O and require 9-30 VDC (2-wire loop-powered) and send a 4-20mA signal. Operating range of pressure is 2-900 psi. Diameter of sensor is 0.59".
24) Sensor J-Box - This is a NEMA rated (weather-rated) junction box to collect all of the low voltage sensor lines so that they can be feed back to the RW Compound Shed. No lines with voltages above 100V should be allowed into this box. The sensor lines get their own electrical conduit line (E-3 conduit line). Appropriate shielding should be utilized to minimize any induced voltages from the higher voltage lines.
25) Power / RW Pump J-Box - this is a NEMA rate (weather-rated) junction box to collect all of the power lines (from electrical conduits E-1 and E-2). The power line to the pump will be routed through this line (after coming out of conduit E-1) and power for the KPM Metering Pump, RW Vault Light, RW Vault Outlet #1, RW Vault Outlet #2, and RW Vault Sump Pump (after coming out of conduit E-2). All of the 110V or higher voltage lines should be kept at least 12" from any of the low voltage lines.
26) Packer Line Mechanical Pressure Gauge - this is a mechanical pressure gauge that reads the Packer Line pressure.
27) Packer Line (BraidFLEX 70 model 8470-4340) - this is the ¼" tubing that supplies pressurized nitrogen to the RW Packer.



LEGEND

- FLOAT SWITCH
- P — MECHANICAL PRESSURE GAUGE
- EP — ELECTRONIC PRESSURE GAUGE
- FM — ELECTRONIC FLOW METER
- BALL VALVE
- CHECK VALVE
- UNION
- 110V RECEPTACLE

NPM SODIUM PERMANGANATE
HDPE HIGH DENSITY POLYETHYLENE

AMEC 008951

FIGURE 12

amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-L T-1
DESIGN	PS
DRAWN	DD
DATE	APRIL 2004
SCALE	NOT TO SCALE

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

RGRW UTILITY VAULT SCHEMATIC AND EQUIPMENT SPECIFICATIONS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 0404 \ FIG-12. DWG

NOTES:

1) RW SHED TANK HIGH HIGH FLOAT SENSOR. (DWYER MODEL F7-HPS-21 THROUGH TANK MOUNT). THIS FLOAT WILL BE SET IN THE NORMALLY OPEN (NO) POSITION AT A LEVEL 12" OFF OF THE TOP OF THE RW SHED TANK. THIS SENSOR WILL ALERT THE SYSTEM THAT THE RW SHED TANK IS FILLING AND IT WILL SHUT OFF THE RW VAULT SUMP PUMP.

2) RW SHED TANK HIGH FLOAT SENSOR. (DWYER MODEL F7-HPS-21 THROUGH TANK MOUNT). THIS FLOAT SWITCH WILL BE SET IN THE NORMALLY OPEN (NO) POSITION AT A LEVEL 1 FOOT OFF OF THE TOP OF THE RW SHED TANK. THIS SENSOR WILL ALERT THE SYSTEM THAT THE RW SHED TANK IS FILLING AND IT WILL SEND SIGNAL TO SENSAPHONE.

3) WATER FROM RW VAULT SUMP PUMP.

4) TANK WATER DISCHARGING INTO SANITARY SEWER. (NOT CURRENTLY CONNECTED TO SANITARY SEWER).

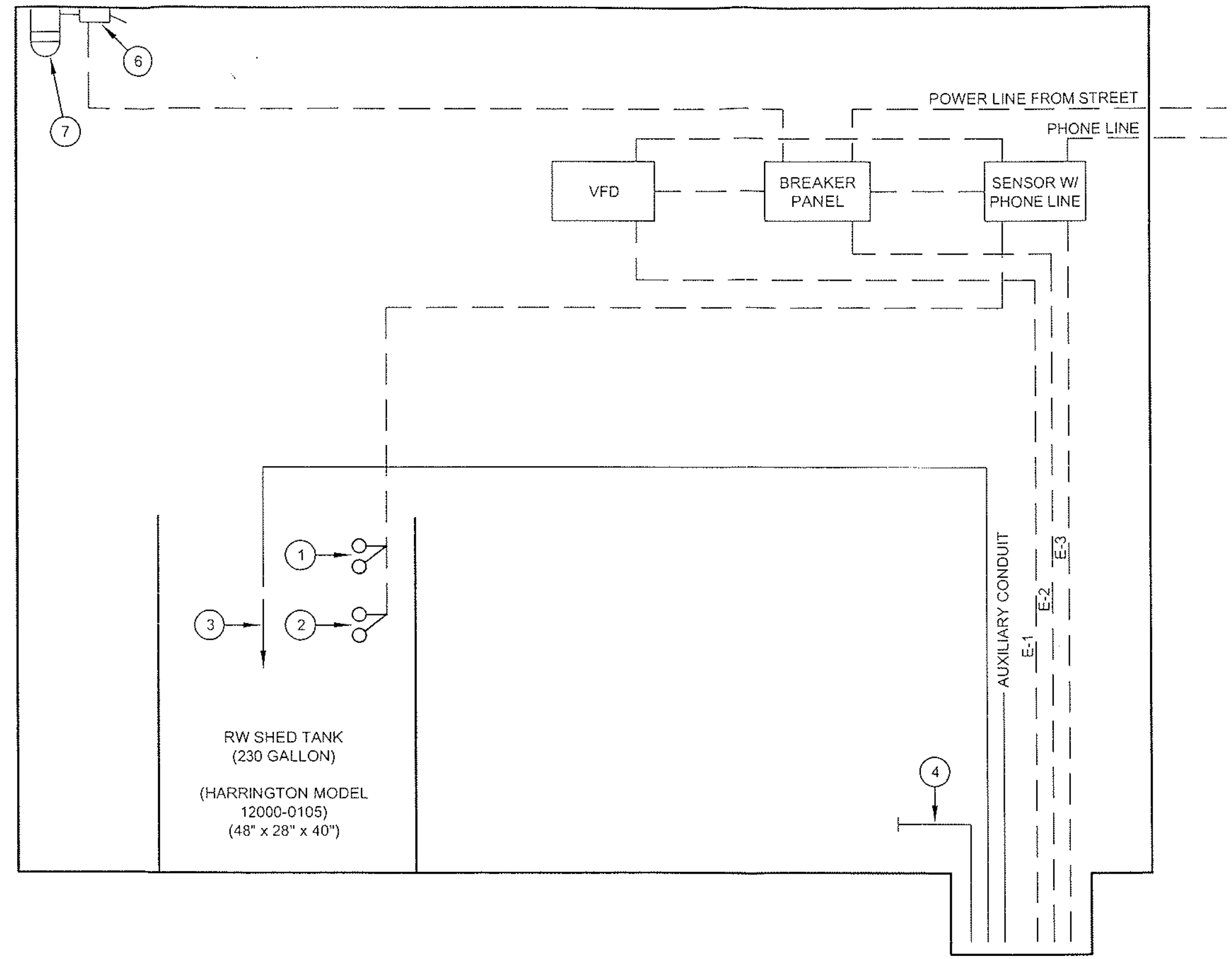
5) RW SHED LIGHT SWITCH (110V-1 PH WEATHER-RATED).

6) RW SHED LIGHT (110V-1 PH 75W WEATHER-RATED).

7) E-1 = ELECTRICAL CONDUIT FOR RW PUMP

8) E-2 = ELECTRICAL CONDUIT FOR RW VAULT OUTLETS / SUMP PUMP.

9) E-3 = ELECTRICAL CONDUIT FOR RW VAULT SENSORS.



LEGEND

FLOAT SWITCH

FM MECHANICAL FLOW METER

BALL VALVE

VFD VARIABLE FREQUENCY DRIVE

PH PHASE

AMEC 008952

FIGURE 13

amec

7376 S.W. Durham Road Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-L T-1
DESIGN	STP
DRAWN	DD
DATE	APRIL 2004
SCALE	NOT TO SCALE

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

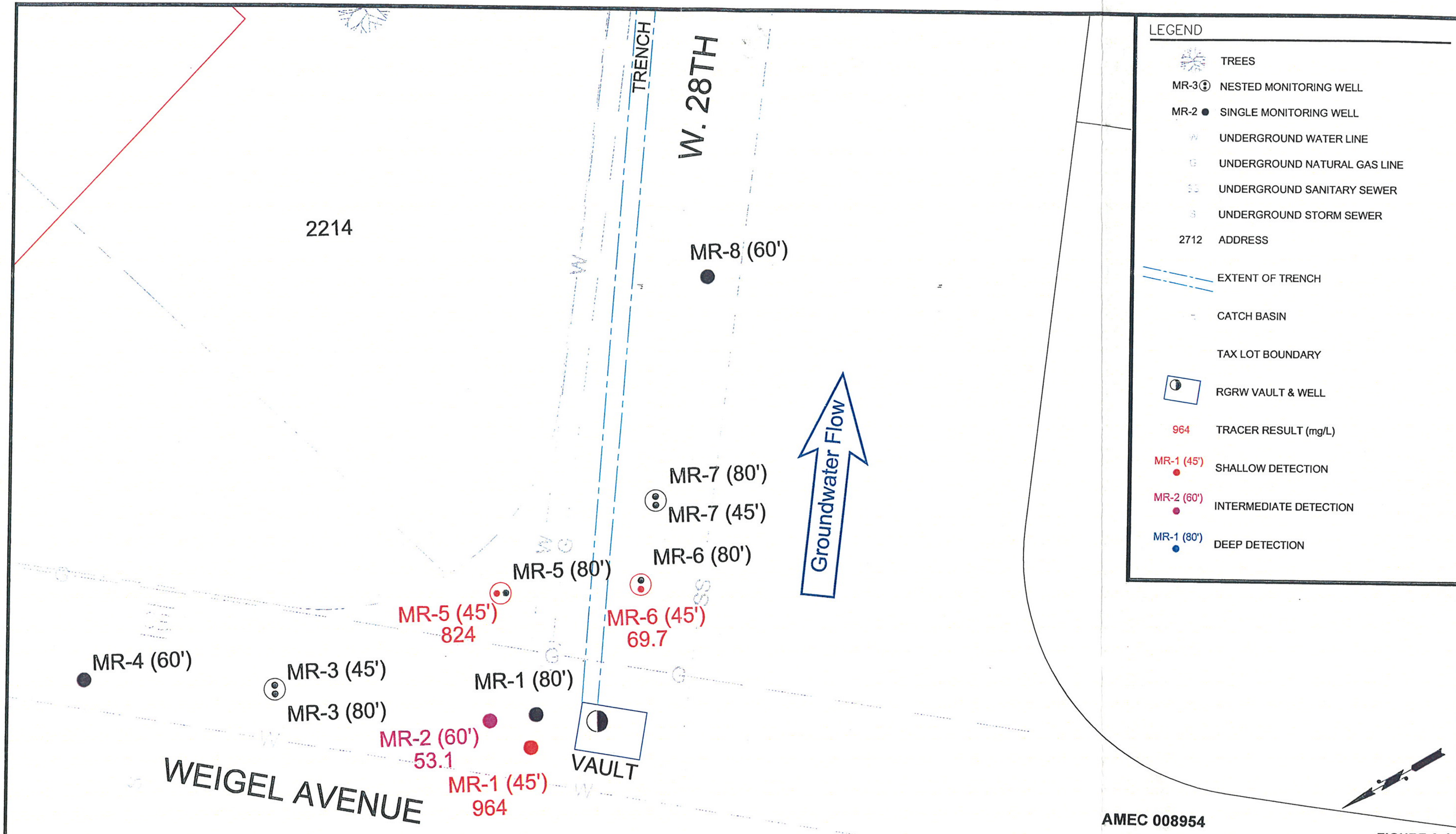
EQUIPMENT COMPOUND SCHEMATIC AND EQUIPMENT SPECIFICATIONS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ RECIRCULATING WELL DESIGN \ DWG \ DWG REVISIONS 0404 \ FIG-13. DWG

amec

APPENDIX A

Tracer Results for the Existing RGRW



AMEC 008954

FIGURE A-1

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-J
DESIGN	STP
DRAWN	DD / BRJ
DATE	MARCH 2004
SCALE	1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 1 (FEB. 25, 2004)

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-02-25.dwg

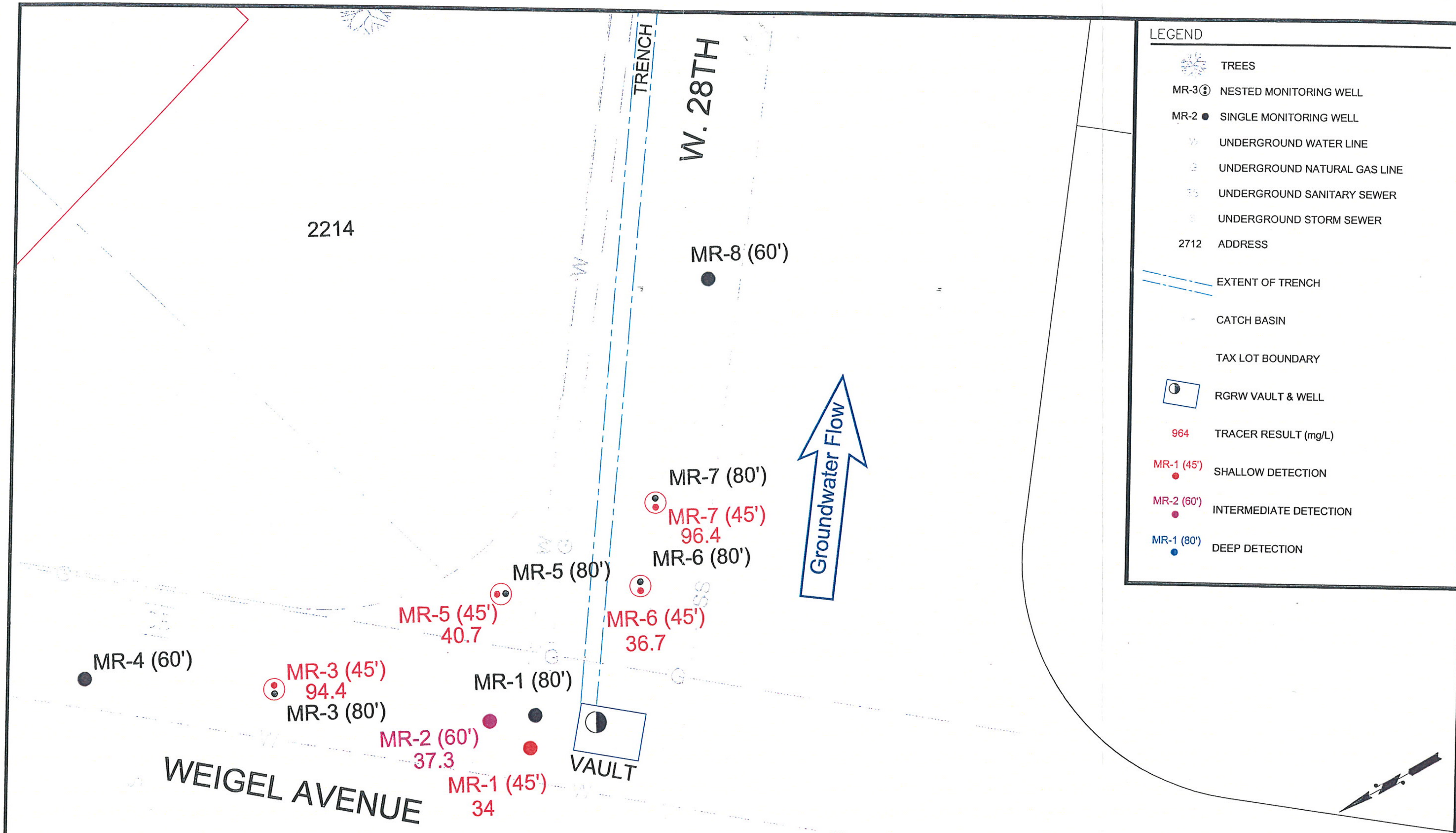


FIGURE A-2

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-J
DESIGN	STP
DRAWN	DD / BRJ
DATE	MARCH 2004
SCALE	1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 2 (FEB. 26, 2004)

AMEC 008955

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-02-26.dwg

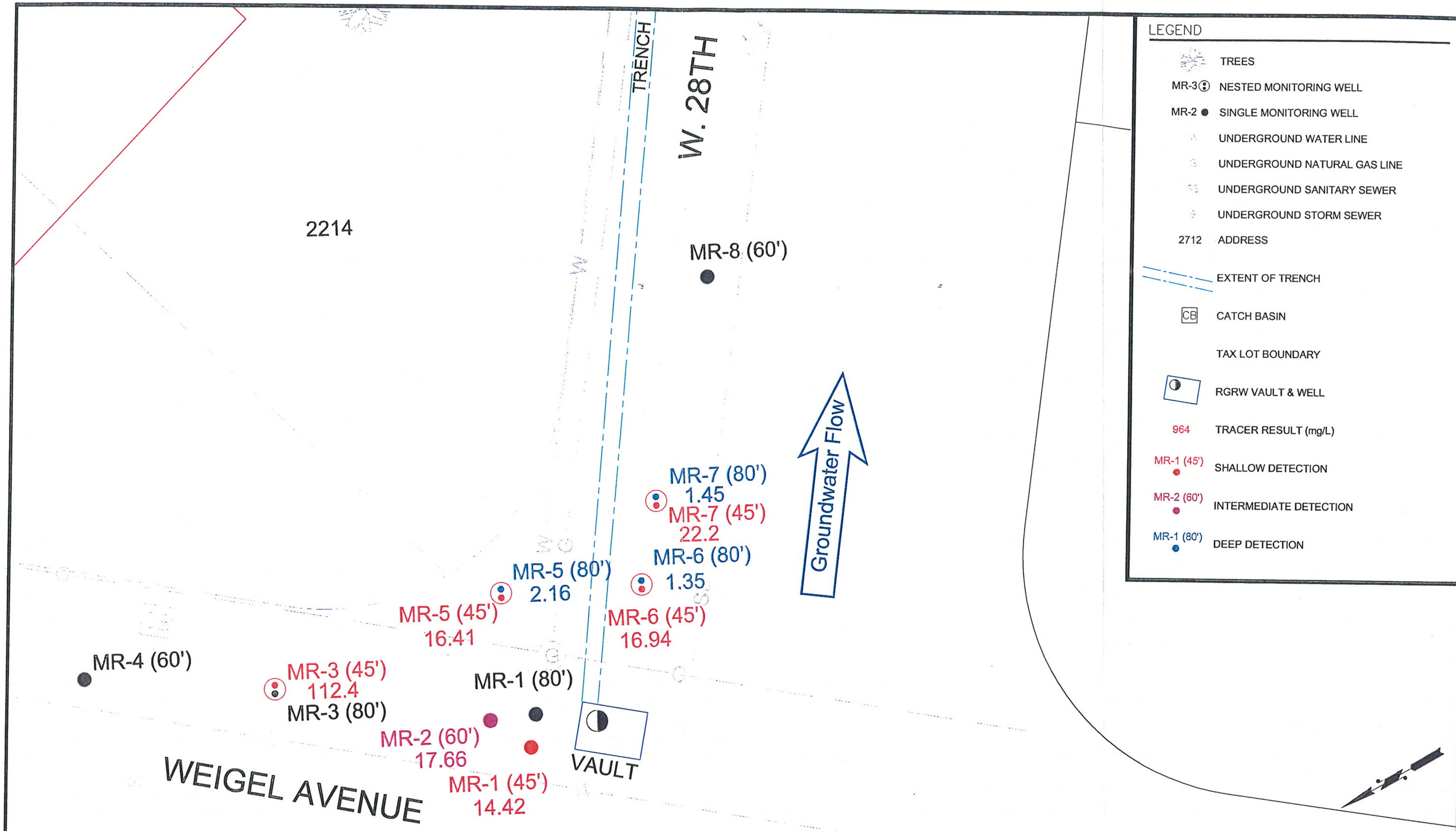


FIGURE A-3

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O. 4-61M-10135-J
DESIGN STP
DRAWN DD / BRJ
DATE MARCH 2004
SCALE 1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

AMEC 008956

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 3 (FEB. 27, 2004)

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-02-27.dwg

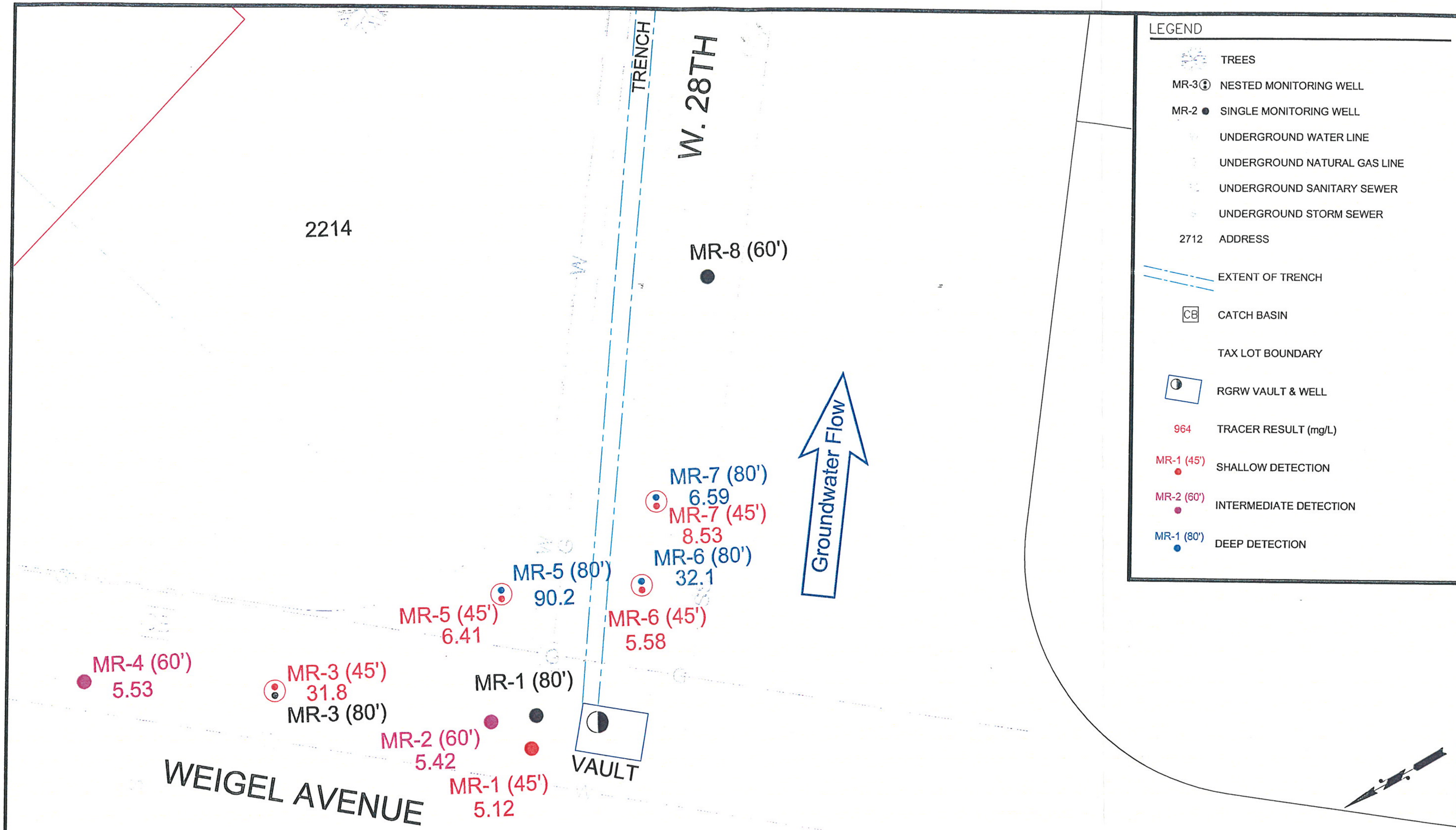


FIGURE A-4

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-J
DESIGN	STP
DRAWN	DD / BRJ
DATE	MARCH 2004
SCALE	1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

AMEC 008957

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 6 (MARCH 1, 2004)

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-03-01.dwg

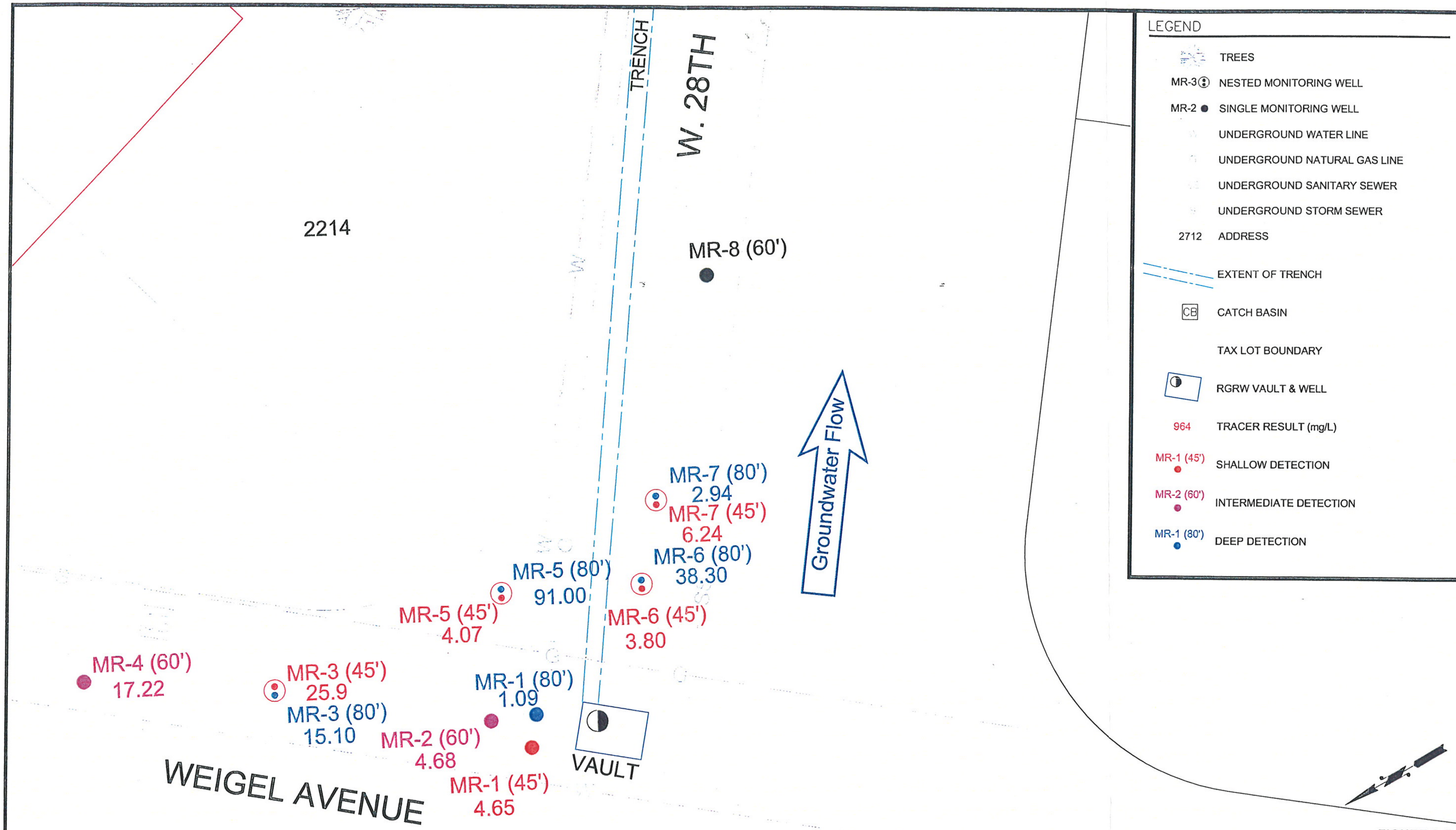


FIGURE A-5

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-J
DESIGN	STP
DRAWN	DD / BRJ
DATE	MARCH 2004
SCALE	1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

AMEC 008958

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 7 (MARCH 2, 2004)

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-03-02.dwg

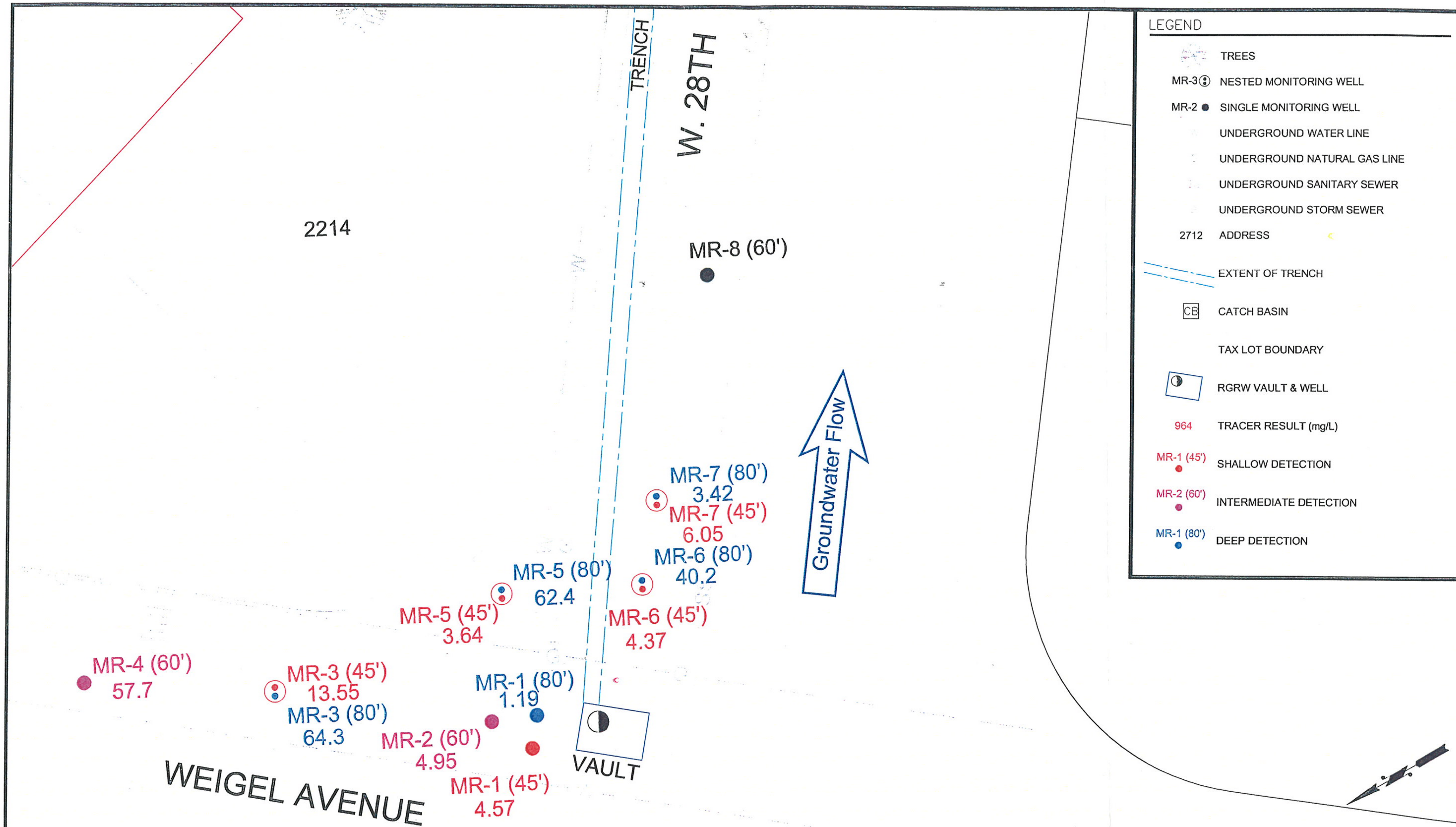


FIGURE A-6

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

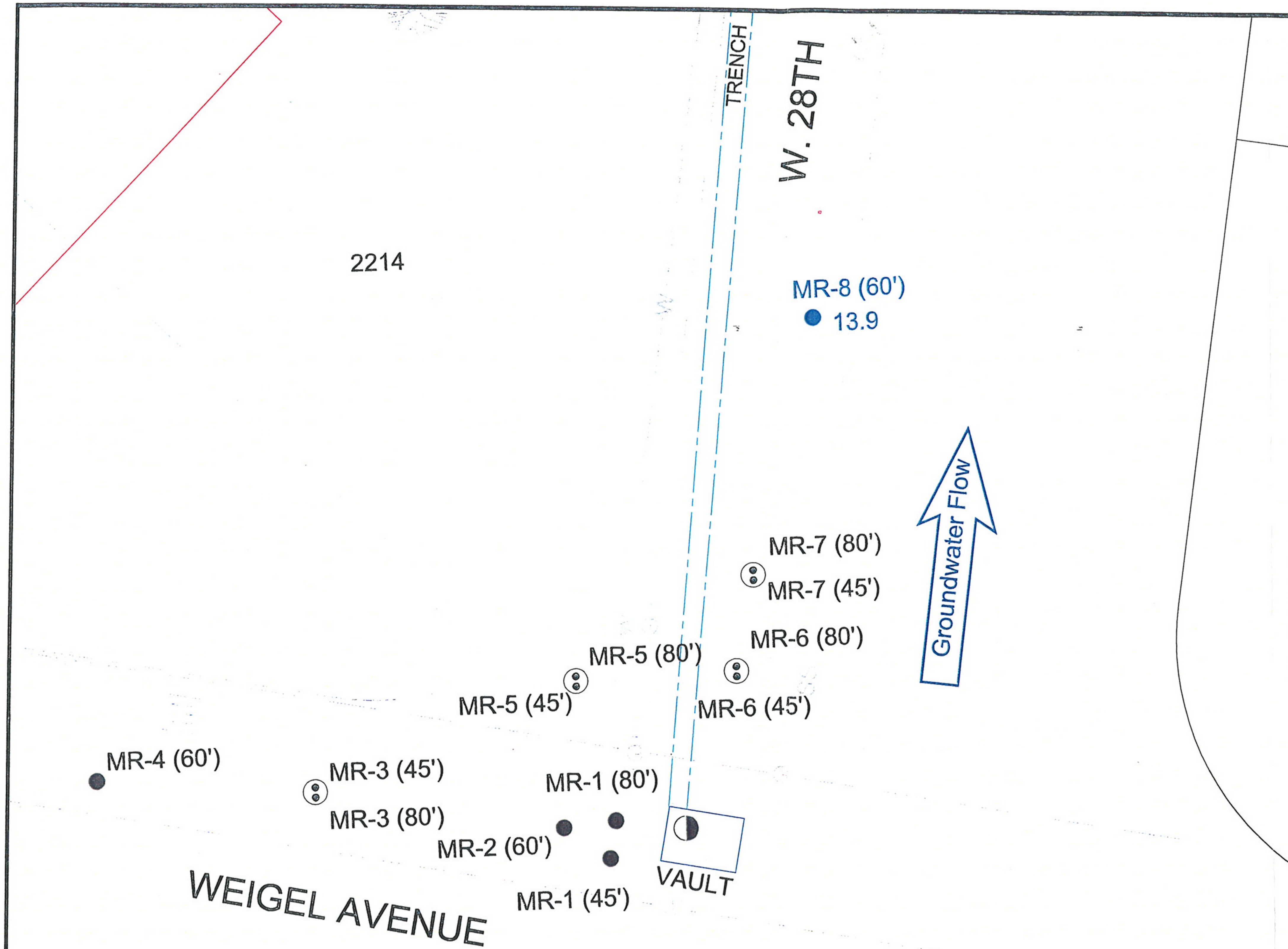
W.O.	4-61M-10135-J
DESIGN	STP
DRAWN	DD / BRJ
DATE	MARCH 2004
SCALE	1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
VANCOUVER, WASHINGTON

AMEC 008959

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 8 (MARCH 3, 2004)

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-03-03.dwg



LEGEND

- TREES
- MR-3 NESTED MONITORING WELL
- MR-2 SINGLE MONITORING WELL
- UNDERGROUND WATER LINE
- UNDERGROUND NATURAL GAS LINE
- UNDERGROUND SANITARY SEWER
- UNDERGROUND STORM SEWER
- 2712 ADDRESS
- EXTENT OF TRENCH
- CB CATCH BASIN
- TAX LOT BOUNDARY
- RGRW VAULT & WELL
- 964 TRACER RESULT (mg/L)
- MR-1 (45') SHALLOW DETECTION
- MR-2 (60') INTERMEDIATE DETECTION
- MR-1 (80') DEEP DETECTION

NOTE: Sampling was done only at MR-8 on day 13.

FIGURE A-7

amec

7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-J
DESIGN	STP
DRAWN	DD / BRJ
DATE	MARCH 2004
SCALE	1" = 10'

CADET MANUFACTURING COMPANY - FVN SITE
2214 W. 28TH STREET
AMEC 008960 VANCOUVER, WASHINGTON

TRACER DETECTIONS IN RGRW MONITORING WELLS DAY 13 (MARCH 8, 2004)

AMEC DRAWING NO. K:\10000\10100\10135\Recirculating Well Design\Dwg\Tracer\Tracer Detections 2004-03-08.dwg

WORK PLAN AND SPECIFICATIONS FOR DESIGN AND INSTALLATION OF FOUR RECIRCULATING GROUNDWATER REMEDIATION WELL SYSTEMS IN THE FRUIT VALLEY NEIGHBORHOOD AND AT THE CADET FACILITY

CADET MANUFACTURING COMPANY
2500 WEST FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

Submitted to:
Washington State Department of Ecology
Vancouver Field Office
2108 Grand Boulevard
Vancouver, Washington 98661-4622

Submitted by:
AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

On Behalf of:
Cadet Manufacturing Company
2500 West Fourth Plain Boulevard
Vancouver, Washington 98660

4-61M-10135-S

October 2004

006713

amec

October 19, 2004

4-61M-10135-S

Mr. Craig Rankine
Site Manager/Hydrogeologist
Toxics Cleanup Program
Washington State Department of Ecology
2108 Grand Boulevard, MS: S-70
Vancouver, Washington 98661-4622

Dear Mr. Rankine:

Re: Work Plan and Specifications for Design and Installation of Four Recirculating Groundwater Remediation Well Systems in the Fruit Valley Neighborhood and at the Cadet Facility
Cadet Manufacturing Company
2500 West Fourth Plain Boulevard
Vancouver, Washington

On behalf of Cadet Manufacturing Company (Cadet), AMEC Earth & Environmental, Inc. (AMEC), presents this Work Plan and Specifications for Design and Installation of Four Recirculating Groundwater Remediation Well Systems in the Fruit Valley Neighborhood (FVN) and at the Cadet Facility, Vancouver, Washington. The work scope partially fulfills the requirements described in the Washington State Department of Ecology (Ecology) Agreed Order (00TCPVA-847) for the Cadet Site by completing an interim remedial action measure (IRAM) for mitigating elevated levels of chlorinated solvents beneath the FVN.

If you have any questions or desire further information, please feel welcome to contact the undersigned at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

J. R. Field

John L. Kuiper, R.G.
Principal

SP/jm/ads

c: Craig Peterson, Cadet Manufacturing Company
Ms. Barbara Trejo, Washington State Department of Health

AMEC Earth & Environmental, Inc.
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Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

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List of Abbreviations, Acronyms, and Key Terms

AMEC	AMEC Earth & Environmental, Inc.
AS/SVE	air sparging/soil vapor extraction
bgs	below ground surface
Cadet	Cadet Manufacturing Company
Ecology	Washington State Department of Ecology
ft/day	feet per day
FVN	Fruit Valley Neighborhood
FS	Feasibility Study
gpm	gallons per minute
HASP	Health and Safety Plan
HVOC	halogenated volatile organic compound
mg/L	milligrams per liter
ml/minute	milliliter per minute
MNA	Monitored Natural Attenuation
MTCA	Model Toxics Control Act
O&M	Operations and Maintenance
PLC	programmable logic controller
Project Area	Area that currently includes the Cadet facility, the L-Shaped Parcel, and the FVN to the north and east of the Site, north of West Fourth Plain Boulevard
PVC	poly-vinyl chloride
RGRW	recirculating groundwater remediation well
Site	Cadet Manufacturing Company, 2500 West Fourth Plain Boulevard, Vancouver, Washington
SS	stainless steel
TCE	trichloroethene
TGA	Troutdale Gravel Aquifer
µg/L	micrograms per liter
USA	Unconsolidated Sedimentary Aquifer
WAC	Washington State Administrative Code
WP	Work Plan

1.0 INTRODUCTION

AMEC Earth & Environmental, Inc. (AMEC) has prepared this Work Plan and Specifications for Design and Installation of Four Recirculating Groundwater Remediation Well (RGRW) Systems in the Fruit Valley Neighborhood (FVN) and at the Cadet Facility (Work Plan [WP]) for the Cadet Manufacturing Company (Cadet). The Cadet Facility is located at 2500 West Fourth Plain Boulevard, Vancouver, Washington ([Site] Figure 1). This WP was developed in general compliance with:

- Washington State Department of Ecology (Ecology) Agreed Order (00TCPVA-847), entered into between Ecology and Cadet dated January 13, 2000; and
- Model Toxics Control Act (MTCA) Cleanup Regulations for interim actions, as specified in Washington State Administrative Code (WAC) 173-340-430 and specifically WAC 173-340-430(7).

The scope of work under this Work Plan includes design and installation of four additional RGRWs (RGRW-4 through RGRW-7), the locations of which have been approved by Ecology on August 19, 2004. RGRW-4 will be located at the Cadet facility and RGRWs 5 through 7 in the FVN. The proposed locations of these wells are presented in Figure 2 and a typical construction detail is provided in Figure 3.

The locations of the proposed RGRWs are based on three considerations: 1) to provide direct treatment of contaminated groundwater in the areas where elevated levels of HVOCs have been detected; 2) to prevent any further migration of HVOCs away from the Site and the vicinity of the sewer line junction in Weigel Street; and 3) to prevent HVOCs from moving south across West Fourth Plain Boulevard. These four new RGRWs, coupled with the three existing RGRWs, potentially constitute the complete RGRW network for treating the Site and FVN (Project Area). Once all seven wells are operating, it is anticipated that at least 1 year of treatment would occur prior to completing a Feasibility Study (FS) that would identify the final remedy for the Project Area. At this time, AMEC believes the final remedy would include operation of the seven RGRWs, operation of the existing air sparging (AS)/soil vapor extraction (SVE) system, and monitored natural attenuation (MNA).

RGRW-4 will be located in the east parking lot of the Cadet facility near the eastern property boundary. A sewer line runs eastward through this area towards monitoring well MW-5s, where the highest off-Site groundwater trichloroethene (TCE) levels have been detected. RGRW-4 is expected to treat groundwater in the source area around the sewer line as well as beneath the residences located east of the parking lot. The treated groundwater combined with the oxidant will naturally flow towards MW-5s.

The proposed location of RGRW-5 is within West 27th Street. RGRW-5 is expected to treat HVOC-impacted groundwater beneath residences where levels of HVOCs were detected in indoor air. RGRW-6 and RGRW-7 are proposed further downgradient at the intersections of Fruit Valley Road and Thompson Avenue with West Fourth Plain Boulevard. These two RGRWs are expected to intercept remaining contaminated groundwater prior to prevent migration South across West Fourth Plan Boulevard. The location of RGRW-7 is approximate and will be finalized based on the results of five direct-push borings. The five direct-push borings will be completed at and near the intersection of Fruit Valley Road and West 27th Street. One boring will be completed at the southern end (dead end) of Unander Avenue. Analytical data from these borings will be used to aid in selecting an appropriate location for RGRW-7.

AMEC is currently operating and conducting pilot testing of three RGRWs in the FVN. The overall design of the proposed RGRWs will be similar to the existing RGRWs operating in the FVN with some modifications.

The RGRW pilot test was conducted slightly north of the area where the highest levels of TCE have been observed beneath the FVN. In February 2004, AMEC completed installation of the RGRW-1 system at the intersection of Weigel Avenue and West 28th Street. The purpose of this well was to evaluate the RGRW technology in an area of the FVN known to contain HVOCs.

System operation initially consisted of a tracer test conducted to evaluate the RGRW's radius of influence. Once the tracer test was complete, permanganate injection was initiated to oxidize HVOCs in groundwater, within both the well and the surrounding aquifer. Initial reductions in TCE levels were observed after only 1 week of permanganate injection. On average, TCE levels declined about 50% in deep monitoring wells (80 feet below ground surface [bgs]) and 100% in shallow wells (60 to 45 feet bgs) over a 2-month period.

Considering the positive results of the pilot test, AMEC continued the operation of RGRW-1 and installed two additional RGRW systems (RGRW-2 and RGRW-3) in the FVN. RGRW-2 was installed in West 28th street and RGRW-3 in Unander Avenue (Figure 2). The analytical results from RGRW-2 and RGRW-3 have indicated a reduction in TCE levels to non-detectable levels in most of the surrounding shallow monitoring wells. The halogenated volatile organic compound (HVOC) data collected from the RGRWs and surrounding monitoring wells are provided in Table 1 and the TCE data in these wells are presented on Figure 4. Geochemical data collected from these wells is presented in Table 2. A construction summary of the existing RGRWs and their associated monitoring wells is provided in Table 3.

2.0 SITE LOCATION, GEOLOGY, AND HYDROGEOLOGY

2.1 Location

The Project Area consists of the Cadet Site, the L-Shaped Parcel, and the FVN. The L-Shaped Parcel is undeveloped land located immediately north and west of the Cadet Site. The FVN is the residential area immediately north and east of the Cadet Site.

Residential lots in the FVN typically accommodate single-family residences. The portion of the FVN considered part of the project area extends east to the Burlington Northern Santa Fe Railroad property, north to West 39th Street (east of Fruit Valley Road), north to La Frambois Road (west of Fruit Valley Road), west to Yeoman Avenue, and south to West Fourth Plain Boulevard. Industrial property owned by the Port of Vancouver is located immediately south of the Site, across West Fourth Plain Boulevard.

2.2 Geology

The geology in the Project Area is consistent with regional geology, as shown by borehole data obtained during installation of monitoring wells and direct-push borings. Borehole information indicates the silt and sand of Columbia River alluvium extends from the ground surface to approximately 25 feet bgs. The coarse sand and sandy gravel of the underlying Missoula Flood deposits range in thickness from approximately 150 to 230 feet across the Project Area, with local beds of silt, sand, and gravel.

The depth to the Troutdale Formation varies with the land-surface elevation and the degree to which the Troutdale Formation was eroded before its burial beneath the Missoula Flood deposits. At the Site, the top of the Troutdale Formation was encountered at depths of 173 feet or greater and was identified based on the presence of cemented gravel, decreased water production, and the more difficult drilling characteristic of this unit.

In the northern portion of the FVN, the top of the Troutdale Formation was encountered at depths of 173 feet in MW-19d, and 198.5 feet in MW-18d. The Troutdale Formation was not encountered at the Site in boreholes MW-1d, MW-2d, and MW-3d, and in the eastern portion of the FVN in borehole MW-10d, even though these boreholes were drilled to 228 feet bgs or deeper. At the latter locations, the upper surface of the Troutdale Formation was apparently eroded to greater depths.

2.3 Hydrogeology

The hydrostratigraphic system in the Project Area consists of two units. The uppermost unit is the Unconsolidated Sedimentary Aquifer (USA). The second unit is the Troutdale Formation, also known as the Troutdale Gravel Aquifer (TGA). To date, a confining layer separating these two units has not been identified. The TGA was encountered at depths of 173 and 198.5 feet in boreholes MW-19d and MW-18d, respectively. The top of the TGA at these locations consists of cemented gravel, or weathered clay overlying slightly cemented gravel. The top of the TGA usually corresponds to reduced water production. Shallow, unconfined groundwater occurs in the USA within the Project Area. Semi-annual monitoring shows that the water table in the Project Area fluctuates approximately 10 feet seasonally.

The horizontal groundwater flow direction varies at different depths but generally appears to be toward the east in the FVN. Groundwater velocity calculated during the October 2001 tracer test ranges from 1 to 44 feet per day (ft/day).

3.0 EVALUATION OF EXISTING RGRWs

The three existing RGRWs were installed to conduct feasibility testing of the RGRW technology combined with permanganate. As described in the following paragraphs, the testing results indicate that the RGRWs have successfully reduced HVOC levels over wide areas. As a result, these systems will be integrated into the proposed full-scale system.

Feasibility testing was conducted to evaluate two aspects of the proposed technology: 1) to evaluate the RGRW's radius of influence; and 2) to evaluate the efficiency of permanganate in treating HVOCs.

3.1 Radius of Influence of RGRWs

Following installation of RGRW-1 and its associated monitoring well network (MR series wells), a tracer test was performed in February 2004. Sodium iodide and potassium bromide were utilized as tracers. Figure 5 shows the flow cell crossgradient of RGRW-1 based on tracer detection in all but one of the MR monitoring wells on the seventh day of tracer injection. Within 13 days, the tracer was detected in all shallow (45 feet), intermediate (60 feet), and deep (80 feet) MR monitoring wells. The most distant MR wells from RGRW-1 in crossgradient and downgradient directions are approximately 50 feet from the RGRW-1.

Approximately 2 months following permanganate injection, TCE levels in compliance monitoring well MW-5s had dropped significantly. Manganese levels in MW-5s also increased by an order of magnitude during this time period. This appears to indicate that RGRW-1 is influencing MW-5s, located approximately 120 feet (crossgradient) from RGRW-1.

The RGRW-1 test data indicated that permanganate could also be utilized as a tracer. Therefore, a separate tracer test was not necessary and was not conducted at RGRW-2 and RGRW-3. Sodium permanganate solution has a dark purple color and if detected at levels as low as 2 milligrams per liter (mg/L) it can be visually observed in groundwater samples. Groundwater was also analyzed for permanganate ion and manganese by an independent laboratory to confirm the visual indications of effective radius of influence. Both analytical methods were consistent with one another. Figure 6 shows where purple color was observed in the monitoring wells on the 10th day following permanganate injection in RGRW-2 and RGRW-3. The most distant well observed with purple color was MW-25s, located 120 feet downgradient of RGRW-2.

3.2 Oxidation of HVOCs with Permanganate

Elevated HVOC levels have been observed in shallow groundwater in the FVN. The highest TCE level of 5,010 micrograms per liter (µg/L) was detected in MW-5s in May 2001. When sampled in May 2003, the TCE levels reduced to 220 µg/L in MW-5s. Reductions in TCE levels in MW-5s are mainly attributable to the operation of RGRW-1. A graph showing the historical trend of TCE in MW-5s is presented as Figure 7. Monitoring well MW-5s is located in Weigel Avenue, approximately 120 feet crossgradient from RGRW-1.

Background analytical data from the RGRW-1 monitoring well network prior to permanganate injection indicated TCE levels ranging from 20 to 40 µg/L. Within 1 week of permanganate injection, TCE levels in most of the shallow monitoring wells were reduced to non-detectable levels, and an approximate 50% reduction was observed in deep wells (Table 1). On May 22, 2004, permanganate injection was discontinued to evaluate groundwater mounding in RGRW-1. On June 6, 2004, the RGRW-1 system was temporarily shutdown for rehabilitation of the well's upper screen interval. Subsequent groundwater quality monitoring indicated 50% to 75% rebound in TCE levels in all nearby monitoring wells, which would be expected given the fact that groundwater upgradient of RGRW-1 still contains HVOCs.

Several geochemical parameters also were analyzed to establish baseline conditions for groundwater prior to permanganate injection (Table 2). Groundwater samples collected following permanganate injection indicated that total and dissolved manganese levels increased significantly, and that total and dissolved iron decreased to non-detect levels in most of the shallow monitoring wells. Permanganate is known to oxidize iron present in groundwater. These changes are indicative of permanganate being successfully distributed in the groundwater. Chromium VI (Cr VI) was non-detect before and after permanganate injection except for one well (MR-07) where Cr VI level slightly increased after permanganate injection. Follow-up sampling of this well indicated that Cr VI had returned to non-detectable levels. Only slight variations were observed in all other geochemical parameters.

In June 2004, prior to startup of RGRW-2 and RGRW-3, background groundwater samples were collected for HVOCs and geochemical analyses. TCE levels in shallow monitoring wells around RGRW-2 ranged from 71 to 146 µg/L. Deep monitoring wells, including RGRW-2, had TCE levels from 10 to 15 µg/L. Background TCE levels in shallow and deep monitoring wells around RGRW-3 ranged from 67 to120 µg/L.

A subsequent round of groundwater sampling was conducted on July 15 and 16, 2004 following 1 week of RGRW-2 and RGRW-3 operation without permanganate injection. Samples collected from the RGRWs and surrounding monitoring wells were analyzed for HVOCs and selected geochemical parameters to evaluate the effect of dilution as a result of groundwater circulation in the RGRWs. Analytical results indicated that HVOC levels in shallow wells decreased by approximately 22% to 75%. However, some deep wells exhibited increased levels of TCE, as would be expected. TCE levels in RGRW-2 (95 feet bgs) increased from 16.5 to 62.7 µg/L (a 280% increase) as a result of recirculation. None of the wells exhibited non-detect levels of HVOCs as a result of dilution. Following 10 days of permanganate injection, TCE levels in most of the shallow wells were reduced to non-detect levels with a few exceptions, these exceptions being: TCE levels in shallow well MW-6s, located approximately 60 feet southwest of RGRW-3, which were reduced from 114 to 1.4 µg/L and shallow well MR-13 (40), located approximately 80 feet south of RGRW-3 where TCE decreased from 112 to 33.5 µg/L.

RGRW-2 and RGRW-3 are currently operating at a pumping rate ranging from 300 to 400 gallons per minute (gpm). Permanganate feed rate was initially set at 60-65 milliliter per minute (ml/minute). As a result of non-detect levels of TCE observed in shallow monitoring wells during the recent sampling event, the feed rate was reduced and is currently at 25 ml/minute.

4.0 WORK SCOPE

The locations of the proposed four RGRWs are provided on Figure 2. Three of these wells will be located in the FVN and one at the Cadet facility. The depth of RGRWs will be approximately 100 feet with the upper screen located at approximately 30 to 45 feet bgs and lower screen at approximately 80 to 100 feet bgs. The depths and screen intervals of the proposed RGRWs may be modified based on the lithology observed during drilling of these wells. It is anticipated that the groundwater pumping rate at the proposed RGRWs will be similar to the high rates achieved in RGRW-2 and RGRW-3 (over 300 gpm). Pumping rates at these wells also will be dependent on the results of pumping and injection tests during the well development process.

Sodium permanganate will continue to be used as an oxidant to degrade HVOCs in groundwater. Using a pulse-feed pump, the permanganate will be injected into the extracted groundwater as it is discharged through the upper screen interval back to the surrounding formation. A submersible pump and packer will be suspended inside each RGRW above the lower screen. Primary and secondary chemical tanks, a feed pump, and a compressor to inflate the packer will be housed in flush-grade vaults along with the RGRW.

The schedule for design and installation of the proposed RGRWs will likely span a period of approximately 18 weeks. The schedule will involve approximately 2 weeks of engineering design, permitting, and contractor bid administration activities, as well as approximately 16 weeks of system installation activities. As before, AMEC will attempt to address the concerns of residents during the system installation process and will coordinate with the FVN residents concerning street access during the construction work. Informational flyers will be distributed in the neighborhood prior to beginning the Site activities.

A work scope for the permitting, installation, and startup of the proposed RGRW systems in the FVN is described below.

4.1 RGRW System Plans and Specifications

The RGRW preliminary plans and specifications are provided in attached figures (Figures 8 through 13). The RGRW design is based on the previous groundwater flow modeling results as well as the field data acquired during the operation of the existing RGRWs. The modifications to the design of the proposed RGRWs are made to improve the functionality of these systems, minimize operations and maintenance (O&M) efforts, and provide flexibility in selecting the rehabilitation techniques for these wells.

Trench locations are not shown on the attached design drawings. These locations will be provided to Ecology at a later date following the completion of lease agreements with the property owners and identifying the appropriate locations for the vaults, tuffsheds, and trenching. For RGRW-4, proposed in the parking lot of the Cadet facility, the former SVE controls location will be utilized as the equipment compound. RGRW-5 is proposed in the public right-of-way (West 27th Street); however, the associated tuffshed would need to be located on a private property in the FVN. This will require a lease agreement with the property owner. The proposed location of the vault for RGRW-6 is in Thompson Street and the associated tuffshed is likely to be on some nearby property. The location of RGRW-7 will be determined based on the groundwater results from five geoprobe points proposed in Fruit Valley Road, W. 27th Street, and South of Unander Avenue. AMEC is currently in the process of contacting the property owners to sign the lease agreements.

The design modifications will rely on the approval from Ecology as well as the necessary permits from other administrative agencies. The main changes to the proposed design include:

- Eliminating the sum pump in the vault and storm water tank located in the tuffshed. At the exisiting RGRWs, a sump pump is located in the vault to pump any accumulated water to the storm water tank. At the proposed RGRWs, a bottomless utility vault will be used. An approximately 12 inch layer of clean crushed rock will be placed at the bottom of the vault to provide infiltration for water. With this setup, a smaller tuffshed may be sufficient to house an electrical control panel, neutralizing agent, spill kit, and Health and Safety Plan (HASP) and other documentation. This would also minimize the O&M cost associated with the handling of the chemical and/or water that otherwise would accumulate in the stormwater tank in the tuffshed.

- Use of stainless steel (SS) for the RGRW casing. After feasibility evaluation of the existing RGRWs, AMEC has decided to utilize SS Grade 316 for the well casing. The first RGRW (RGRW-1A) with SS casing was installed in the FVN in September 2004 to replace the old RGRW-1. The use of SS for the well casing and screen intervals is expected to provide higher strength and corrosion resistance as well as the flexibility in using rehabilitation techniques, if needed.

Other minor modifications may include the change in logics of the electrical control panel and utilizing different types and sizes of the piping and connections. The as-built drawings will be submitted to Ecology following the completion of the system installation.

Based on the conditions encountered during the installation of the existing RGRWs, AMEC expects that the work to install the proposed RGRWs (RGRW-4 and RGRW-7) would require at least three subcontractors: a well drilling subcontractor, an excavation subcontractor, and an electrical subcontractor. AMEC would obtain competitive bids from at least three subcontractors for the installation of the proposed RGRWs and associated systems.

AMEC will provide geological and engineering construction oversight during well installation, trenching, electrical installation, and compound construction activities.

4.2 RGRW Systems Permitting and Bid Administration

During Ecology's review of this WP, AMEC will pursue obtaining the necessary permits for the proposed work. Final permits will be based on approval of the plans and specifications by Ecology. Permitting and approval required for the proposed RGRW systems likely will include:

1. Ecology's Water Resource Division for underground injection of permanganate;

2. City of Vancouver's building permits for construction of the equipment sheds;

3. City of Vancouver right-of-way and long-term use permit for drilling and construction in West 27th Street, Fruit Valley Road, and Thompson Avenue; and

4. City of Vancouver discharge permit for discharge of water generated during the well installation into the City sewer.

The contractor selection process and contract administration for the installation of the RGRW systems will be completed by AMEC. The selection process will consist of sending "Request for Bid" packages that will include bidding documents and a set of completed plans and specifications to several contractors in a competitive bidding process. Once the bidding process is complete, contracts will be signed between the selected contractors and AMEC. AMEC will provide oversight to confirm that the work is performed in accordance with the plans and specifications and AMEC's engineering judgment.

4.3 RGRW System Installation

4.3.1 RGRW Well Construction

The locations of the proposed four RGRWs are indicated on Figure 2. The RGRWs will be installed using Air Rotary technology. The total depth of the RGRWs will be approximately 100 feet (Figure 3). The actual depth will be dependent upon the lithological contact between the overburden silts and the USA and will be evaluated during installation of these wells. Per Ecology's request, soil samples will be collected for sieve analysis. The results of sieve analysis will be used to design the sand filter pack that will be installed around the upper screen interval. Native fill material may be used around the lower screen interval based on the results of sieve analysis.

AMEC will make all reasonable attempts to locate any potential subsurface utilities prior to drilling and well installation activities in the FVN. These efforts would include contacting a local public utility notification service, contracting a private utility locating service, and reviewing any available site records, utility blueprints or construction drawings. The first 5 feet of drilling will be performed using air knifing techniques to avoid damage to the underground utility lines.

The well casing will be constructed of SS Grade 316. Although two of the three existing RGRWs currently operating in the FVN were constructed of poly-vinyl chloride (PVC), SS Grade 316 was selected because of its superior strength and high corrosion resistance properties. SS Grade 316 is also currently in use at RGRW-1A. It is anticipated that SS will allow more rigorous cleaning of well screens in case of clogging and will result in lower operation and maintenance costs.

The lower screen interval of the proposed RGRWs will be constructed of 0.050-inch slotted stainless steel. The borehole surrounding the lower screen interval of each RGRW will be either backfilled with native fill material or 6/9 silica sand. The upper screen interval will be constructed of 0.020-inch slotted SS. The borehole surrounding the upper screen interval of each RGRW will be backfilled with 8/12 Colorado silica sand. Bentonite chips and fine grained 20/30 silica sand will be used to form a seal in the well, effectively isolating the lower well screen from the upper well screen. An additional bentonite/grout seal will be placed above the water table screened interval extending to the existing grade to provide a watertight seal, and to prevent any potential surface contamination from entering the well.

Development of each new RGRW will be performed in such a manner that any fine-grained material removed from one screened interval during purging does not infiltrate and clog the other. This will be accomplished by inserting a packer between screened intervals during development. An injection test will also be performed at the upper screen. AMEC will obtain a permit from the City of Vancouver to use municipal water from a nearby fire hydrant in performing these injection tests.

Soil cuttings generated during RGRW installation will be temporarily stored on-Site and pending the results of analytical testing, will be transported to the Hillsboro, Oregon landfill for disposal. Purge water and decontamination water will be stored on-Site in a tank provided by AMEC and, depending on the volume of water generated and/or chemical characterization, will be disposed of either under permit to the sanitary sewer or off-Site to an approved treatment facility.

4.3.2 Direct-Push Boring Installation

Five direct-push borings will be completed in Fruit Valley Road, W. 27th Street, and South of Unander Avenue (Figure 2). The groundwater HVOC data collected from these borings will be used to select the appropriate location for RGRW-7. The borings will be approximately 40 feet deep. One of the direct-push points will be constructed as a monitoring well with schedule 40 PVC and 2-inch diameter casing. This well will be used for monitoring the efficiency of RGRW-7.

4.3.3 Oversight of Drilling and Well Installations

AMEC will provide continuous oversight during drilling and RGRW installation activities. It is anticipated that an AMEC geologist will be on-Site for approximately 7 days per well, during the drilling activities. A Site-specific HASP will be reviewed by all AMEC field personnel providing the oversight and will also be provided to the sub-contractor for review. Prior to starting work each day, AMEC will conduct a brief meeting with the subcontractors to review applicable portions of the HASP and promote safe working conditions.

4.3.4 Trenching, Utility Vault, and Equipment Compound Construction

The general contractor selected during the bid administration task will perform the trenching and subsurface piping installation activities. The scope of work to be executed by the general contractor will include asphalt and concrete cutting, soil excavation and trenching, subsurface piping installation from the flush-grade RGRW vaults to the aboveground equipment sheds, backfill, compaction, and pavement replacement. The general contractor will dispose of excavated soils and pavement cuttings off-Site. Prior to disposal of excavated soil, AMEC will collect soil samples to evaluate the most appropriate disposal option. Any water generated during construction activities will be temporarily stored in on-Site storage tanks until proper disposal. AMEC will collect water samples for analytical testing to help evaluate the method of disposal.

An equipment compound will be constructed for each RGRW to house the electrical control panel; neutralizing agent for permanganate and spill kit; necessary documents such as the HASP, spill plan, hospital map, and emergency phone numbers; and miscellaneous equipment used for operation and maintenance of the system. A local contractor will be hired to construct the equipment compounds. Compound construction activities will likely take about 2 weeks and will coincide with the trenching and piping installation activities.

An excavation contractor will install the vaults for access to the RGRW (Figures 8 and 9). Access into the concrete utility vaults (approximately 8 feet x 6 feet x 5 feet) will be provided by a traffic-rated utility cover. The vaults will be installed flush-mounted to the existing street grade to allow access to the RGRWs for pump maintenance and treatment media application. Soil excavated during construction activities will be managed by the contractor for disposal at a demolition landfill.

The utility vaults overlying the RGRW wellheads will be installed well above the water table (approximately 20 feet bgs). Subsequently, they will not be vulnerable to the infiltration and migration of dissolved-phase HVOCs. Pressure transducers and high water level float switches will be placed inside the RGRW casings to prevent casing overflow of groundwater and record water level at specified intervals. Since the extraction and re-injection of groundwater will occur below the static water table, and the oxidation of dissolved-phase HVOCs will occur primarily within the aquifer, not in the RGRW, we do not anticipate generating measurable quantities of vapor-phase HVOCs inside the vault. However, because of its size (i.e., depth > 4 feet) and content (i.e., permanganate), the vaults will be considered as confined spaces. A permit will be required prior to entering the vault. The confined space entry procedures, prepared for the existing RGRW vault, will be followed for the proposed vaults.

Oversight of Trenching and Piping

AMEC will provide an environmental technician and engineering construction oversight during trenching and RGRW piping installation activities. AMEC engineering staff will be available to respond to construction-related questions or issues.

4.3.6 Equipment Acquisition and Installation

AMEC will specify, order, and purchase the RGRW system equipment and arrange for on-Site delivery. AMEC engineers and technicians will install the equipment in the vaults and equipment sheds. The equipment in the vaults will include piping, permanganate tanks, chemical feed pumps, compressors, and various valves and gauges necessary for the operation. It is anticipated that technicians from AMEC will complete the installation task in approximately 4 to 6 weeks. AMEC engineering staff will be on-Site periodically to assist with equipment installation.

4.3.7 Electrical Service and Installation

Electrical installation work will be completed by a licensed electrical contractor. The scope of electrical work includes providing required power to equipment compounds and installing proper electrical conduits and connections for the pumps, sensors, and control panels. A separate electrical drop will be required for each RGRW system. A separate electrical contractor will install the electrical control panel at all equipment compounds and will coordinate with the main electrical contractor. The design and specifications of the electrical control panel will be provided by AMEC. The electrical control panel will consist of a programmable logic controller (PLC) and a sensaphone.

All the main equipment and sensors will be connected to the PLC and will be remotely accessible through sensaphone from the AMEC Portland office. A phone line will also be obtained for each RGRW to provide remote access to system performance.

4.3.8 RGRW System Startup

Given the size of each system, AMEC estimates that each will require approximately 2 days for system startup, testing, and monitoring by two technicians with oversight by an engineer. The startup activities will include testing of all the controls and logics of the system, setting feed rate of permanganate injection, and conducting a pumping step test by gradually increasing the groundwater pumping rate.

4.4 Schedule

It is anticipated that the RGRW installation activities will be started in mid-October 2004. The RGRW systems will be operated until the HVOC levels in groundwater and in soil gas in the vadose zone have been mitigated.

AMEC is pleased to present this Work Plan. If you have any questions or concerns, please contact the undersigned at (503) 639-3400.

AMEC Earth & Environmental, Inc.

J. R. Field

John L. Kuiper, R.G.
Principal

amec

TABLES

TABLE 1
RGRW System HVOC Analytical Results (EPA Method 8260B)
Demonstrating Effectiveness of RGRWs

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Chloroform	1,1-Dichloroethane 1,1-DCA	cis-1,2-Dichloroethene cis-1,2-DCE	Tetrachloroethene PCE	1,1,1-Trichloroethane 1,1,1-TCA	Trichloroethene TCE
	(feet bgs)	(feet)		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
RGRW-1 Network									
RGRW-1	80	0	02/06/04	0.5 U	0.8	9.83	35.5	1.58	41
RGRW-1	80	0	03/22/04	0.5 U	0.5 U	4.43	20	0.89	16.6
RGRW-1	80	0	04/06/04	0.5 U	0.51	1.97	16.3	1.02	9.69
RGRW-1	80	0	05/06/04	1 U	1 U	2.18	15.2	1 U	11.2
RGRW-1	80	0	06/04/04	0.5 U	0.57	6.73	24.3	0.8	18.6
MR-01-45	45	7	02/03/04	0.5 U	0.74	9.45	31.3	1.01	23.1
MR-01-45	45	7	03/22/04	0.5 U	0.5 U	0.5 U	16	0.92	1.4
MR-01-45	45	7	04/06/04	0.5 U	0.5 U	0.5 U	10.6	0.99	0.5 U
MR-01-45	45	7	07/14/04	0.5 U	0.5	4.43	15.2	0.73	13
MR-01-80	80	7	02/03/04	0.5 U	0.83	11.1	30.3	0.95	20.4
MR-01-80	80	7	03/22/04	0.5 U	0.5 U	5.92	18.2	0.96	20.8
MR-01-80	80	7	04/06/04	0.5 U	0.5 U	4.51	15	1.08	19.8
MR-01-80	80	7	05/06/04	1 U	1 U	1.36	7.44	1 U	7.39
MR-01-80	80	7	06/04/04	0.5 U	0.51	5.56	18.1	0.83	18
MR-01-80	80	7	07/14/04	0.5 U	0.53	4.95	12.7	0.79	12.6
MR-02-60	60	12	02/03/04	0.5 U	0.61	6.8	23	0.82	18.6
MR-02-60	60	12	03/22/04	0.5 U	0.5 U	0.5 U	15	0.9	0.5 U
MR-02-60	60	12	07/14/04	0.5 U	0.56	4.91	14.2	0.82	13.2
MR-03-45	45	35	02/03/04	0.74	0.5 U	3.03	14.3	1.33	28.3
MR-03-45	45	35	03/23/04	0.5 U	0.51	0.5 U	9.42	0.91	0.5 U
MR-03-45	45	35	07/14/04	0.5 U	0.52	5.07	16	0.76	13.9
MR-03-80	80	35	02/03/04	0.5 U	0.81	10.7	28.9	0.89	19.8
MR-03-80	80	35	03/23/04	0.5 U	0.5 U	4.63	17.7	0.96	16
MR-03-80	80	35	04/06/04	0.5 U	0.55	2.64	13.3	1.03	10
MR-03-80	80	35	05/06/04	1 U	1 U	1 U	4.41	1 U	2.43
MR-03-80	80	35	06/04/04	0.5 U	0.5 U	0.5 U	4.02	0.89	0.51
MR-03-80	80	35	07/14/04	0.5 U	0.5 U	4.43	12.8	0.78	11.6
MR-04-60	60	55	02/03/04	0.5 U	0.67	8.43	27	0.86	18.7
MR-04-60	60	55	03/23/04	0.5 U	0.5 U	3.38	15	0.9	11.3
MR-04-60	60	55	04/06/04	0.5 U	0.54	0.5 U	7.58	0.95	0.5 U
MR-04-60	60	55	05/20/04						
MR-04-60	60	55	07/14/04	0.5 U	0.6	4.87	15.6	0.89	13.6
MR-05-45	45	10	02/03/04	0.62	0.5 U	4.5	22.1	1.16	25.2
MR-05-45	45	10	03/22/04	0.5 U	0.5 U	0.5 U	15.7	0.9	0.5 U
MR-05-45	45	10	07/14/04	0.5 U	0.53	4.95	15.6	0.84	14

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TABLE 1

RGRW System HVOC Analytical Results (EPA Method 8260B)

Demonstrating Effectiveness of RGRWs

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Chloroform	1,1-Dichloroethane 1,1-DCA	cis-1,2-Dichloroethene cis-1,2-DCE	Tetrachloroethene PCE	1,1,1-Trichloroethane 1,1,1-TCA	Trichloroethene TCE
	(feet bgs)	(feet)		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MR-05-80	80	10	02/05/04	0.5 U	0.76	9.5	24.6	0.78	18
MR-05-80	80	10	03/22/04	0.5 U	0.5 U	3.68	16.4	0.82	12.3
MR-05-80	80	10	04/06/04	0.5 U	0.54	1.02	10.4	0.9	3.53
MR-05-80	80	10	05/06/04	1 U	1 U	5.1	17.4	1 U	15.2
MR-05-80	80	10	06/04/04	0.5 U	0.57	5.92	22.3	0.83	16.5
MR-05-80	80	10	07/14/04	0.5 U	0.57	5.3	15.4	0.83	13.2
MR-06-45	45	15	02/05/04	0.5 U	0.72	8.97	30.4	1.15	28.8
MR-06-45	45	15	03/23/04	0.5 U	0.5 U	0.5 U	13.6	0.85	0.5 U
MR-06-45	45	15	07/14/04	0.5 U	0.5 U	4.6	15.1	0.79	13.8
MR-06-80	80	15	02/05/04	0.5 U	0.82	10.1	27.4	0.83	19.4
MR-06-80	80	15	03/23/04	0.5 U	0.59	6.13	22.1	0.97	18.7
MR-06-80	80	15	04/06/04	0.5 U	0.56	2.34	13.5	1.02	7.47
MR-06-80	80	15	05/06/04	1 U	1 U	6.76	29.2	1.08	19.8
MR-06-80	80	15	06/04/04	0.5 U	0.65	8.02	27.2	0.82	18.9
MR-06-80	80	15	07/14/04	0.5 U	0.51	4.77	15.5	0.79	11.8
MR-07-45	45	25	02/05/04	0.62	0.5 U	6.12	24.7	1.25	29.7
MR-07-45	45	25	03/23/04	0.5 U	0.5 U	0.5 U	11.5	0.96	0.5 U
MR-07-45	45	25	07/14/04	0.5 U	0.5 U	5.36	17.4	0.79	14.1
MR-07-80	80	25	02/05/04	0.5 U	0.82	9.63	26.7	0.81	19.1
MR-07-80	80	25	03/23/04	0.5 U	0.55	5.69	21.4	0.97	18.3
MR-07-80	80	25	04/06/04	0.5 U	0.55	2.38	13.3	0.99	7.2
MR-07-80	80	25	05/06/04	1 U	1 U	5.52	23.4	1 U	14.8
MR-07-80	80	25	06/07/04	0.5 U	0.61	7.08	23.7	0.91	15.4
MR-07-80	80	25	07/15/04	0.5 U	0.5 U	4.22	15.7	0.79	11.2
MR-08-60	60	50	02/06/04	0.54	0.5 U	3.54	15.6	1.02	20.2
MR-08-60	60	50	03/23/04	0.5 U	0.51	3.48	17.3	0.88	12.8
MR-08-60	60	50	04/06/04	0.5 U	0.5 U	0.5 U	8.23	0.96	0.89
MR-08-60	60	50	05/06/04	1 U	1 U	1 U	4.1	1 U	1 U
MR-08-60	60	50	07/15/04	0.5 U	0.5 U	3.48	13.6	0.86	10.8
MR-09-30	30	30	05/06/04	1 U	1 U	1 U	5.02	1 U	1 U
MR-09-30	30	30	06/07/04	0.5 U	0.57	6.49	19.2	0.5 U	15.9
MR-09-30	30	30	07/15/04	1.93	0.5 U	1.38	8.17	0.8	7.81
MW-05S	25	120	11/16/99						
MW-05S	25	120	11/17/99	0.63	0.7	11.1	290	143	3300
MW-05S	25	120	07/17/00	100 U	20 U	11	330	120	3800
MW-05S	25	120	02/08/01	100 U	20 U	20 U	225	84	2900
MW-05S	25	120	05/16/01	25 U	25 U	25 U	463	120	5010
MW-05S	25	120	08/28/01	5 U	5 U	5.2	169	39.5	1420
MW-05S	25	120	10/16/01						
MW-05S	25	120	11/07/01			13	289	61.6	2020

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TABLE 1
RGRW System HVOC Analytical Results (EPA Method 8260B)
Demonstrating Effectiveness of RGRWs

Site ID	Screen Bottom Depth (feet bgs)	Distance from RGRW (feet)	Sample Date	Chloroform µg/L	1,1-Dichloroethane 1,1-DCA µg/L	cis-1,2-Dichloroethene cis-1,2-DCE µg/L	Tetrachloroethene PCE µg/L	1,1,1-Trichloroethane 1,1,1-TCA µg/L	Trichloroethene TCE µg/L
MW-05S	25	120	01/29/02	25 U	25 U	25 U	890	232	2990
MW-05S	25	120	05/30/02	10 U	10 U	12.8	1030	268	2600
MW-05S	25	120	08/22/02	5 U	5 U	12.7	340	93.4	1960
MW-05S	25	120	11/21/02						
MW-05S	25	120	11/21/02	2.5 U	2.5 U	4.1	216	41.4	763
MW-05S	25	120	02/04/03	10 U	10 U	11.8	871	79.2	1880
MW-05S	25	120	05/26/03	10 U	10 U	13.8	1180	162	2600
MW-05S	25	120	08/08/03						
MW-05S	25	120	08/08/03	10 U	10 U	10.4	480	88.2	1930
MW-05S	25	120	11/10/03	2.5 U	2.5 U	2.9	287	21.8	522
MW-05S	25	120	01/27/04	25 U	25 U	25 U	1620	117	4780
MW-05S	25	120	05/05/04	2 U	2 U	2 U	172	11.8	220
MW-05S	25	120	05/20/04						
MW-05S	25	120	06/29/04	2.5 U	2.5 U	3.85	344	26	867
MW-05S	25	120	07/15/04	5 U	5 U	7.2	371	28.5	882
MW-05S	25	120	07/27/04	5 U	5 U	5.1	496	38.3	1290
MW-05S	25	120	08/10/04	5 U	5 U	5 U	300	34	1010
MW-26S	30	55	05/06/04	1 U	1 U	1 U	3.79	1 U	1 U
MW-26S	30	55	06/07/04	0.5 U	0.5 U	4.43	15.1	0.8	13
MW-26S	30	55	07/15/04	0.64	0.5 U	1.07	12.5	1.44	17.8
RGRW-2 Network									
RGRW-2	95	0	06/07/04	0.5 U	1.31	11	10.2	1.04	16.5
RGRW-2	95	0	07/15/04	0.5 U	1.38	14.3	47.1	4.58	62.7
RGRW-2	95	0	07/26/04	0.5 U	1.36	0.5 U	31.9	4.72	1.32
RGRW-2	95	0	08/09/04	0.5 U	1.43	0.74	31.4	5.1	12.4
MR-10-100	100	15	06/07/04	0.5 U	1.08	8.78	13.8	1.07	15.1
MR-10-100	100	15	07/16/04	2 U	2 U	8.92	18.8	2.33	32.1
MR-10-100	100	15	07/26/04	0.5 U	0.5 U	3.89	3.71	0.56	7.57
MR-10-100	100	15	08/09/04	0.5 U	1.47	0.5 U	23	5.25	0.5 U
MR-10-40	40	15	06/07/04	1.46	0.61	5.93	78.1	7.67	121
MR-10-40	40	15	06/29/04						
MR-10-40	40	15	07/16/04	2 U	2 U	12.3	37.7	4.39	53.4
MR-10-40	40	15	07/26/04	0.5 U	1.43	0.5 U	16.5	4.75	0.5 U
MR-10-40	40	15	08/09/04	0.5 U	1.49	0.5 U	23.8	5.49	0.5 U
MR-11-40	40	25	06/07/04	1.12	0.68	6.36	59	5.43	94.5
MR-11-40	40	25	07/15/04	0.5 U	1.39	13.7	45.4	4.6	62.8
MR-11-40	40	25	07/26/04	0.5 U	1.4	0.5 U	18.4	4.96	0.5 U
MR-11-40	40	25	08/09/04	0.5 U	1.41	0.5 U	25.6	5.25	0.5 U
MR-12-100	100	55	06/07/04	0.54	0.72	5.08	6.79	0.85	10.2
MR-12-100	100	55	07/15/04	0.5 U	0.5 U	2.86	2.87	0.5 U	5.33
MR-12-100	100	55	07/26/04	0.5 U	1.4	0.5 U	13.3	4.72	0.5 U
MR-12-100	100	55	08/09/04	0.5 U	0.73	5.33	5.04	1.23	18.3

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TABLE 1
RGRW System HVOC Analytical Results (EPA Method 8260B)
Demonstrating Effectiveness of RGRWs

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Chloroform	1,1-Dichloroethane 1,1-DCA	cis-1,2-Dichloroethene cis-1,2-DCE	Tetrachloroethene PCE	1,1,1-Trichloroethane 1,1,1-TCA	Trichloroethene TCE
	(feet bgs)	(feet)		μg/L	μg/L	μg/L	μg/L	μg/L	μg/L
MR-12-40	40	55	06/07/04	0.75	1.06	12.2	59	3.14	71.3
MR-12-40	40	55	06/28/04						
MR-12-40	40	55	07/15/04	0.5 U	1.32	12.7	35.6	4.36	55.3
MR-12-40	40	55	07/26/04	0.5 U	1.41	0.5 U	15.8	4.88	0.5 U
MR-12-40	40	55	08/09/04	0.5 U	1.39	0.5 U	26	5.18	0.5 U
MW-25S	30	120	01/27/04	1.92	0.76	9.63	72.7	8.59	167
MW-25S	30	120	05/05/04	1.34	1 U	9.9	60.7	6.25	146
MW-25S	30	120	06/08/04	1.43	0.64	7.45	57.4	5.94	103
MW-25S	30	120	06/28/04						
MW-25S	30	120	07/16/04	2 U	2 U	11.3	37.9	3.85	54.8
MW-25S	30	120	07/26/04	0.5 U	1.39	0.5 U	12.8	4.91	0.5 U
MW-25S	30	120	08/09/04	0.5 U	1.44	0.5 U	23.9	5.28	1
RGRW-3 Network									
RGRW-3	100	0	06/08/04	1.06	0.93	11.4	47.9	5.67	121
RGRW-3	100	0	07/16/04	2 U	2 U	6.36	14.4	2 U	26.6
RGRW-3	100	0	07/27/04	0.5 U	0.9	7.64	21	2.26	34.3
RGRW-3	100	0	08/10/04	0.5 U	0.93	0.5 U	19.1	2.37	1.44
MR-13-40	40	80	06/08/04	0.76	0.69	8.32	44.2	6.51	112
MR-13-40	40	80	06/28/04						
MR-13-40	40	80	07/16/04	2 U	2 U	5.45	22.7	3.8	62.2
MR-13-40	40	80	07/27/04	0.5 U	1.08	3.22	19.1	3.07	33.5
MR-13-40	40	80	08/10/04	0.5 U	1.01	1.09	15.6	2.56	20.7
MR-13-95	95	80	06/08/04	0.5 U	2.24	19.2	21.6	7.41	97.5
MR-13-95	95	80	07/16/04	2 U	2 U	14.3	19.8	4.06	72.2
MR-13-95	95	80	07/27/04	0.5 U	1.91	19.2	27.8	4.67	83.9
MR-13-95	95	80	08/10/04	0.5 U	1.68	17.1	26.3	4.32	86.2
MR-14-40	40	30	06/08/04	0.75	0.59	7.32	39.9	5.2	101
MR-14-40	40	30	06/28/04						
MR-14-40	40	30	07/16/04	2 U	2 U	6.51	14	2 U	28.6
MR-14-40	40	30	07/27/04	0.5 U	0.99	0.5 U	7.29	2.31	0.5 U
MR-14-40	40	30	08/10/04	0.5 U	0.98	0.5 U	15.8	2.54	0.5 U
MR-15-40	40	60	06/08/04	0.63	0.5 U	5.92	28.3	3.29	92
MR-15-40	40	60	06/28/04						
MR-15-40	40	60	07/16/04	2 U	2 U	6.51	9.82	2 U	23.2
MR-15-40	40	60	07/27/04	0.5 U	1.01	0.5 U	12.9	2.24	0.5 U
MR-15-40	40	60	08/10/04	0.5 U	0.97	0.5 U	14.2	2.51	0.5 U
MR-16-40	40	20	06/08/04	0.55	0.5 U	3.81	18.2	2.72	67
MR-16-40	40	20	07/16/04	2 U	2 U	6.21	14.5	2 U	32.2
MR-16-40	40	20	07/27/04	0.5 U	0.96	0.5 U	11.2	2.34	0.5 U
MR-16-40	40	20	08/10/04	0.5 U	0.99	0.5 U	16.5	2.48	0.5 U

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TABLE 1
RGRW System HVOC Analytical Results (EPA Method 8260B)
Demonstrating Effectiveness of RGRWs

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Chloroform	1,1-Dichloroethane 1,1-DCA	cis-1,2-Dichloroethene cis-1,2-DCE	Tetrachloroethene PCE	1,1,1-Trichloroethane 1,1,1-TCA	Trichloroethene TCE
	(feet bgs)	(feet)		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
MR-16-95	95	20	06/08/04	0.5 U	1.08	10.9	17.4	5.82	83.1
MR-16-95	95	20	07/16/04	2 U	2 U	6.88	11.3	2 U	33.9
MR-16-95	95	20	07/27/04	0.5 U	1.04	1.66	12.2	2.29	9.8
MR-16-95	95	20	08/10/04	0.5 U	1.02	0.86	15.2	2.49	9.27
MW-06S	34.5	55	06/20/00	5 U	5 U	5.2	81	47	680
MW-06S	34.5	55	03/02/01	25 U	5 U	5 U	37.3	55.1	611
MW-06S	34.5	55	08/28/01	2.5 U	2.5 U	8.55	78.5	49.2	636
MW-06S	34.5	55	11/07/01			9.55	132	61.5	807
MW-06S	34.5	55	01/30/02	5 U	5 U	10	149	51.6	824
MW-06S	34.5	55	05/30/02	2.5 U	2.5 U	11.7	108	34.8	552
MW-06S	34.5	55	08/21/02	2.5 U	2.5 U	12.8	103	32.2	557
MW-06S	34.5	55	11/21/02						
MW-06S	34.5	55	11/21/02	2.5 U	2.5 U	12	83.4	25.4	465
MW-06S	34.5	55	02/07/03	1.12	1.1	14.3	99.4	19.3	363
MW-06S	34.5	55	08/06/03						
MW-06S	34.5	55	08/06/03	1.42	1 U	10.3	70.2	15.2	296
MW-06S	34.5	55	01/26/04	1.13	0.91	10.4	62.9	7.79	169
MW-06S	34.5	55	06/08/04	0.94	0.8	10.3	54.9	6.07	114
MW-06S	34.5	55	06/28/04						
MW-06S	34.5	55	07/16/04	2 U	2 U	7.31	17.8	2.17	36.4
MW-06S	34.5	55	07/27/04	0.5 U	0.99	0.5 U	18	2.41	1.37
MW-06S	34.5	55	08/10/04	0.5 U	0.95	0.5 U	17	2.46	0.5 U

Notes:
µg/L = micrograms per liter

1. U = Not detected at method reporting limit
2. NM = Not Measured
3. RGRW-1 started pumping on 2/24/04.
4. Permanganate injection in RGRW-1 started on 3/10/04.
5. Stopped injecting permanganate in RGRW-1 on 5/22/04 due to rising groundwater level in the well.
6. Turned off RGRW-1 pump on 6/8/04 for videotaping.
7. Restarted RGRW-1 pump on 6/15/04 without permanganate injection.
8. Turned off RGRW-1 pump for rehabilitation on 6/28/04.
9. RGRW-2 and RGRW-3 started pumping on 7/8/04.
10. Permanganate injection in RGRW-2 and RGRW-3 started on 7-16-04.

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TABLE 2
RGRW System Geochemical Analytical Results

				Total Metals					Dissolved Metals				
Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Chromium (VI)	Chromium	Iron	Manganese	Sodium	Chromium (Dissolved)	Iron (Dissolved)	Manganese (Dissolved)	Sodium (Dissolved)	Permanganate
				Cr +6	Cr	Fe	Mn	Na	Cr	Fe	Mn	Na	
	(feet bgs)	(feet)		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RGRW-1 Network													
RGRW-1	80	0	02/06/04	0.01 UJ	0.0011	0.23	0.0151	8.72	--	0.1 U	0.0152	8	--
RGRW-1	80	0	03/22/04	0.01 UR	0.00299	0.1 U	0.895	11	--	0.1 U	0.763	9.36	--
RGRW-1	80	0	04/06/04	--	--	--	--	--	--	--	--	--	--
RGRW-1	80	0	05/06/04	--	--	--	--	--	--	--	--	--	--
RGRW-1	80	0	06/04/04	0.01 U	--	0.1 U	0.00507	9.91	--	--	--	--	--
MR-01-45	45	7	02/03/04	0.01 UJ	0.0023	6.95	0.119	9.25	--	0.156	0.0263	7.64	--
MR-01-45	45	7	03/22/04	0.01 UJ	0.00365	0.1 U	6.28	18.4	--	0.1 U	12.4 J	15.5 J	--
MR-01-45	45	7	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-01-45	45	7	07/14/04	0.01 U	--	0.1 U	0.179	9.91	--	--	--	--	0.5 U
MR-01-80	80	7	02/03/04	0.01 UJ	0.00302	4.41	0.186	8.28	--	0.43	0.0928	8.36	--
MR-01-80	80	7	03/22/04	0.01 UR	0.001 U	0.1 U	0.00479	9.35	--	0.184	0.0219	10.2	--
MR-01-80	80	7	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-01-80	80	7	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-01-80	80	7	06/04/04	0.01 U	--	0.1 U	0.004	9.8	--	--	--	--	--
MR-01-80	80	7	07/14/04	0.01 U	--	0.126	0.0517	11.7	--	--	--	--	0.5 U
MR-02-60	60	12	02/03/04	0.01 UJ	0.00104	2.96	0.0665	8.94	--	0.1 U	0.0113	9.14	--
MR-02-60	60	12	03/22/04	0.01 UJ	0.00473	0.1 U	7.61	15.8	--	0.1 U	13 J	15.1 J	--
MR-02-60	60	12	07/14/04	0.01 U	--	0.152	0.0377	10.4	--	--	--	--	0.5 U
MR-03-45	45	35	02/03/04	0.01 UJ	0.00286	5.2	0.131	9.45	--	0.301	0.0316	7.66	--
MR-03-45	45	35	03/23/04	0.01 U	0.00997	0.1 U	8.01	16	--	0.1 U	8.42	15.1	--
MR-03-45	45	35	07/14/04	0.01 U	--	0.145	0.0411	12.1	--	--	--	--	0.5 U
MR-03-80	80	35	02/03/04	0.01 UJ	0.001 U	2.13	0.0623	8.69	--	0.117	0.0388	8.07	--
MR-03-80	80	35	03/23/04	0.01 U	0.0135	2.65	0.0747	13.8	--	0.1 U	0.0361	12.7	--
MR-03-80	80	35	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-03-80	80	35	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-03-80	80	35	06/04/04	0.01 U	--	4.2	0.956	10.9	--	--	--	--	--
MR-03-80	80	35	07/14/04	0.01 U	--	0.137	0.055	11.2	--	--	--	--	0.5 U
MR-04-60	60	55	02/03/04	0.01 UJ	0.00168	2.74	0.0871	9.1	--	0.1 U	0.04	8.01	--
MR-04-60	60	55	03/23/04	0.01 U	0.00642	3.02	0.0882	12.2	--	0.1 U	0.0594	12.2	--
MR-04-60	60	55	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-04-60	60	55	05/20/04	--	--	--	0.891	--	--	--	--	--	--
MR-04-60	60	55	07/14/04	0.01 U	--	0.145	0.023	12.5	--	--	--	--	0.5 U
MR-05-45	45	10	02/03/04	0.01 UJ	0.001 U	0.68	0.0762	9.86	--	0.1 U	0.0805	8.31	--
MR-05-45	45	10	03/22/04	0.01 UJ	0.00457	0.1 U	9.87	17.8	--	0.1 U	0.0409 J	10.6 J	--
MR-05-45	45	10	07/14/04	0.01 U	--	0.847	0.343	10.6	--	--	--	--	0.5 U
MR-05-80	80	10	02/05/04	0.01 UJ	0.001 U	0.63	0.0443	8.06	--	0.1 U	0.0433	8.18	--
MR-05-80	80	10	03/22/04	0.01 UR	0.00413	0.316	0.108	12.3	--	0.1 U	0.0386	9.35	--
MR-05-80	80	10	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-05-80	80	10	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-05-80	80	10	06/04/04	0.01 U	--	1.42	0.277	9.49	--	--	--	--	--
MR-05-80	80	10	07/14/04	0.01 U	--	0.202	0.118	12.5	--	--	--	--	0.5 U
MR-06-45	45	15	02/05/04	0.01 UJ	0.00127	1.45	0.072	9.6	--	0.1 U	0.0724	9.3	--
MR-06-45	45	15	03/23/04	0.01 U	0.00501	0.303	7.11	18.1	--	0.1 U	6.4	16.8	--
MR-06-45	45	15	07/14/04	0.01 U	--	1.24	0.322	10.3	--	--	--	--	0.5 U

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TABLE 2
RGRW System Geochemical Analytical Results

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Total Metals: Chromium (VI)	Chromium	Iron	Manganese	Sodium	Dissolved Metals: Chromium (Dissolved)	Iron (Dissolved)	Manganese (Dissolved)	Sodium (Dissolved)	Permanganate
				Cr +6	Cr	Fe	Mn	Na	Cr	Fe	Mn	Na	
	(feet bgs)	(feet)		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MR-06-80	80	15	02/05/04	0.01 UJ	0.001	0.636	0.0156	8.28	--	0.1 U	0.0116	8.02	--
MR-06-80	80	15	03/23/04	0.01 U	0.001 U	0.534	0.264	11.3	--	0.1 U	0.0472	11	--
MR-06-80	80	15	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-06-80	80	15	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-06-80	80	15	06/04/04	0.01 U	--	1.9	0.716	9.16	--	--	--	--	--
MR-06-80	80	15	07/14/04	0.01 U	--	0.292	0.105	11.3	--	--	--	--	0.5 U
MR-07-45	45	25	02/05/04	0.01 UJ	0.00242	5.61	0.13	11.3	--	0.1 U	0.106	10.2	--
MR-07-45	45	25	03/23/04	0.014	0.00828	2.46	9.37	16.6	--	0.1 U	6.94	17	--
MR-07-45	45	25	07/14/04	0.01 U	--	4.55	0.855	9.89	--	--	--	--	0.5 U
MR-07-80	80	25	02/05/04	0.01 UJ	0.00524	13.6	0.184	9.45	--	0.1 U	0.0333	8.11	--
MR-07-80	80	25	03/23/04	0.01 U	0.001 U	0.291	0.0111	12	--	0.1 U	0.01 U	11.1	--
MR-07-80	80	25	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-07-80	80	25	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-07-80	80	25	06/07/04	0.01 U	--	0.1	0.0382	8.5	--	--	--	--	--
MR-07-80	80	25	07/15/04	0.01 U	--	5.56	1.16	10.5	--	--	--	--	0.5 U
MR-08-60	60	50	02/06/04	0.01 UJ	0.00363	6.26	0.0871	10.1	--	0.1 U	0.0278	9.17	--
MR-08-60	60	50	03/23/04	0.01 U	0.00278	0.64	0.0681	12	--	0.1 U	0.0346	11	--
MR-08-60	60	50	04/06/04	--	--	--	--	--	--	--	--	--	--
MR-08-60	60	50	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-08-60	60	50	07/15/04	0.01 U	--	0.22	0.0661	11.2	--	--	--	--	0.5 U
MR-09-30	30	30	05/06/04	--	--	--	--	--	--	--	--	--	--
MR-09-30	30	30	06/07/04	0.01 U	--	0.488	0.0215	9.42	--	--	--	--	--
MR-09-30	30	30	07/15/04	0.01 U	--	1.74	0.0626	8.59	--	--	--	--	0.5 U
MW-05S	25	120	11/16/99	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	11/17/99	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	07/17/00	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	02/08/01	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	05/16/01	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	08/28/01	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	10/16/01	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	11/07/01	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	01/29/02	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	05/30/02	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	08/22/02	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	11/21/02	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	11/21/02	0.01 U	0.001 U	0.117	0.0059	--	--	--	--	--	--
MW-05S	25	120	02/04/03	0.01 U	0.0011	0.1 U	0.00219	--	--	--	--	--	--
MW-05S	25	120	05/26/03	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	08/08/03	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	08/08/03	0.01 U	0.001 U	5.61	0.01 U	--	--	--	--	--	--
MW-05S	25	120	11/10/03	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	01/27/04	0.01 UJ	0.00298	0.1 U	0.002 U	--	--	--	--	--	--
MW-05S	25	120	05/05/04	--	--	--	--	--	--	--	--	--	--
MW-05S	25	120	05/20/04	--	--	--	0.0137	--	--	--	--	--	--

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TABLE 2
RGRW System Geochemical Analytical Results

				Total Metals					Dissolved Metals				
Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Chromium (VI)	Chromium	Iron	Manganese	Sodium	Chromium (Dissolved)	Iron (Dissolved)	Manganese (Dissolved)	Sodium (Dissolved)	Permanganate
				Cr +6	Cr	Fe	Mn	Na	Cr	Fe	Mn	Na	
	(feet bgs)	(feet)		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-05S	25	120	06/29/04	--	--	--	--	--	--	0.1 U	0.01 U	9.24	0.5 U
MW-05S	25	120	07/15/04	0.01 U	--	0.912	0.0172	8.53	--	--	--	--	0.5 U
MW-05S	25	120	07/27/04	--	--	--	0.01 U	--	--	--	--	--	--
MW-05S	25	120	08/10/04	--	--	--	--	--	--	--	--	--	--
MW-26S	30	55	05/06/04	--	--	--	--	--	--	--	--	--	--
MW-26S	30	55	06/07/04	0.01 U	--	3.01	0.0933	10.4	--	--	--	--	--
MW-26S	30	55	07/15/04	0.0109	--	3.35	0.0917	9.58	--	--	--	--	0.5 U
RGRW-2 Network													
RGRW-2	95	0	06/07/04	0.01 U	0.001 U	0.1 U	0.154	7.28	--	--	--	--	--
RGRW-2	95	0	07/15/04	--	--	0.1 U	--	--	--	--	--	--	--
RGRW-2	95	0	07/26/04	0.01 U	0.05 U	0.5 U	3.03	7.91	0.1 U	1 U	2.63	10 U	7.6
RGRW-2	95	0	08/09/04	--	--	1 U	0.684	10 U	--	--	--	--	2.5
MR-10-100	100	15	06/07/04	0.01 U	0.009	14.7	0.406	7.31	--	--	--	--	--
MR-10-100	100	15	07/16/04	--	--	0.705	--	--	--	--	--	--	--
MR-10-100	100	15	07/26/04	0.01 U	0.05 U	28.1	0.794	8.26	0.01 U	0.1 U	0.241	6.73	0.5 U
MR-10-100	100	15	08/09/04	--	--	1 U	2.47	10 U	--	--	--	--	7.57
MR-10-40	40	15	06/07/04	0.01 U	0.00877	7.12	0.182	7.97	--	--	--	--	--
MR-10-40	40	15	06/29/04	--	--	--	--	--	--	0.1 U	0.0973	9.52	0.5 U
MR-10-40	40	15	07/16/04	--	--	3.04	--	--	--	--	--	--	--
MR-10-40	40	15	07/26/04	0.0127	0.05 U	5.27	10.5	11.5	0.1 U	1 U	9.02	10 U	32.5
MR-10-40	40	15	08/09/04	--	--	3.03	3.8	10 U	--	--	--	--	10.9
MR-11-40	40	25	06/07/04	0.01 U	0.0102	2.9	0.0615	7.81	--	--	--	--	--
MR-11-40	40	25	07/15/04	--	--	2.23	--	--	--	--	--	--	--
MR-11-40	40	25	07/26/04	0.01 U	0.05 U	0.5 U	14.6	12	0.1 U	1 U	13.4	11.2	45
MR-11-40	40	25	08/09/04	--	--	8.08	3.85	10 U	--	--	--	--	10.6
MR-12-100	100	55	06/07/04	0.01 U	0.0137	23.9	1.06	7.84	--	--	--	--	--
MR-12-100	100	55	07/15/04	--	--	39.8	--	--	--	--	--	--	--
MR-12-100	100	55	07/26/04	0.011	0.05 U	0.5 U	10	8.97	0.1 U	1 U	8.79	10 U	29.9
MR-12-100	100	55	08/09/04	--	--	71.8	1.44	9.3	--	--	--	--	0.5 U
MR-12-40	40	55	06/07/04	0.01 U	0.00343	4.33	0.548	9.03	--	--	--	--	--
MR-12-40	40	55	06/28/04	--	--	--	--	--	--	0.1 U	0.453	10.5	0.5 U
MR-12-40	40	55	07/15/04	--	--	48.2	--	--	--	--	--	--	--
MR-12-40	40	55	07/26/04	0.01 U	0.05 U	0.5 U	16.8	11.9	0.1 U	1 U	15.4	11.1	51.4
MR-12-40	40	55	08/09/04	--	--	7.57	2.81	10 U	--	--	--	--	6.84
MW-25S	30	120	01/27/04	--	--	--	--	--	--	--	--	--	--
MW-25S	30	120	05/05/04	--	--	--	--	--	--	--	--	--	--
MW-25S	30	120	06/08/04	0.01 U	0.00267	0.1 U	0.03	9.13	--	--	--	--	--
MW-25S	30	120	06/28/04	--	--	--	--	--	--	0.1 U	0.0262	8.72	0.5 U
MW-25S	30	120	07/16/04	--	--	0.238	--	--	--	--	--	--	--
MW-25S	30	120	07/26/04	0.0229	0.05 U	0.5 U	7.77	8.5	0.1 U	1 U	6.82	10 U	23.9
MW-25S	30	120	08/09/04	--	--	0.383	0.757	9.43	--	--	--	--	2.18

AMEC 054650

TABLE 2
RGRW System Geochemical Analytical Results

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Total Metals: Chromium (VI)	Chromium	Iron	Manganese	Sodium	Dissolved Metals: Chromium (Dissolved)	Iron (Dissolved)	Manganese (Dissolved)	Sodium (Dissolved)	Permanganate
				Cr +6	Cr	Fe	Mn	Na	Cr	Fe	Mn	Na	
	(feet bgs)	(feet)		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RGRW-3 Network													
RGRW-3	100	0	06/08/04	0.01 U	0.00132	0.1 U	0.00928	8.54	--	--	--	--	--
RGRW-3	100	0	07/16/04	--	--	0.1 U	--	--	--	--	--	--	--
RGRW-3	100	0	07/27/04	0.01 U	0.01 U	0.1 U	0.0554	7.88	0.01 U	0.1 U	0.05	7.68	0.5 U
RGRW-3	100	0	08/10/04	--	--	1 U	2.51	10 U	--	--	--	--	7.63
MR-13-40	40	80	06/08/04	0.01 U	0.00342	4.79	0.276	8.94	--	--	--	--	--
MR-13-40	40	80	06/28/04	--	--	--	--	--	--	0.1 U	0.452	9.63	0.5 U
MR-13-40	40	80	07/16/04	--	--	30.1	--	--	--	--	--	--	--
MR-13-40	40	80	07/27/04	0.0216	0.0332	44.2	1.15	10.4	0.01	0.1 U	0.0693	9.07	0.5 U
MR-13-40	40	80	08/10/04	--	--	12.7	0.271	9.98	--	--	--	--	0.5 U
MR-13-95	95	80	06/08/04	0.01 U	0.0138	21.6	0.712	9.55	--	--	--	--	--
MR-13-95	95	80	07/16/04	--	--	1.08	--	--	--	--	--	--	--
MR-13-95	95	80	07/27/04	0.01 U	0.01 U	0.284	0.0233	6.72	0.01 U	0.1 U	0.0236	6.76	0.5 U
MR-13-95	95	80	08/10/04	--	--	0.652	0.0388	7.01	--	--	--	--	0.5 U
MR-14-40	40	30	06/08/04	0.01 U	0.00533	8.71	0.146	8.35	--	--	--	--	--
MR-14-40	40	30	06/28/04	--	--	--	--	--	--	0.1 U	0.025	8.17	0.5 U
MR-14-40	40	30	07/16/04	--	--	0.236	--	--	--	--	--	--	--
MR-14-40	40	30	07/27/04	0.01 U	0.1 U	1 U	17.7	12.8	0.1 U	1 U	17.5	12.7	58.4
MR-14-40	40	30	08/10/04	--	--	1 U	5.22	10 U	--	--	--	--	15.1
MR-15-40	40	60	06/08/04	0.01 U	0.00246	2.28	0.055	7.93	--	--	--	--	--
MR-15-40	40	60	06/28/04	--	--	--	--	--	--	0.1 U	0.0349	8.58	0.5 U
MR-15-40	40	60	07/16/04	--	--	2.41	--	--	--	--	--	--	--
MR-15-40	40	60	07/27/04	0.01 U	0.1 U	4.61	3.02	10 U	0.1 U	1 U	2.84	10 U	9.44
MR-15-40	40	60	08/10/04	--	--	1 U	2.37	10 U	--	--	--	--	7.43
MR-16-40	40	20	06/08/04	0.01 U	0.00494	8.35	0.315	7.8	--	--	--	--	--
MR-16-40	40	20	07/16/04	--	--	22.1	--	--	--	--	--	--	--
MR-16-40	40	20	07/27/04	0.0109	0.1 U	24.5	12.8	13	0.1 U	1 U	12.4	11.5	40.9
MR-16-40	40	20	08/10/04	--	--	21.2	4.69	10.6	--	--	--	--	11
MR-16-95	95	20	06/08/04	0.01 U	0.00657	10.9	0.613	8.99	--	--	--	--	--
MR-16-95	95	20	07/16/04	--	--	1.3	--	--	--	--	--	--	--
MR-16-95	95	20	07/27/04	0.0135	0.0139	2.09	0.0753	7.74	0.0128	0.1 U	0.0358	7.36	0.5 U
MR-16-95	95	20	08/10/04	--	--	1.44	0.0588	8.07	--	--	--	--	0.5 U
MW-06S	34.5	55	06/20/00	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	03/02/01	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	08/28/01	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	11/07/01	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	01/30/02	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	05/30/02	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	08/21/02	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	11/21/02	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	55	11/21/02	--	--	--	--	--	--	--	--	--	--

AMEC 054651

TABLE 2
RGRW System Geochemical Analytical Results

Site ID	Screen Bottom Depth	Distance from RGRW	Sample Date	Total Metals					Dissolved Metals				
				Chromium (VI)	Chromium	Iron	Manganese	Sodium	Chromium (Dissolved)	Iron (Dissolved)	Manganese (Dissolved)	Sodium (Dissolved)	Permanganate
				Cr +6	Cr	Fe	Mn	Na	Cr	Fe	Mn	Na	
	(feet bgs)	(feet)		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
MW-06S	34.5	**55**	02/07/03	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	**55**	08/06/03	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	**55**	08/06/03	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	**55**	01/26/04	--	--	--	--	--	--	--	--	--	--
MW-06S	34.5	**55**	06/08/04	0.01 U	**0.00103**	0.1 U	**0.00205**	**8.58**	--	--	--	--	--
MW-06S	34.5	**55**	06/28/04	--	--	--	--	--	--	0.1 U	0.01 U	**8.37**	0.5 U
MW-06S	34.5	**55**	07/16/04	--	--	**0.496**	--	--	--	--	--	--	--
MW-06S	34.5	**55**	07/27/04	0.01 U	0.1 U	1 U	**2.46**	10 U	0.1 U	1 U	**2.41**	10 U	**8.26**
MW-06S	34.5	**55**	08/10/04	--	--	1 U	**3.14**	10 U	--	--	--	--	**9.8**

Notes:
mg/L = milligrams per liter
µg/L = micrograms per liter
bgs = below ground surface
1. U = Not detected at method reporting limit
   J = The associated value is considered estimated.
   N = Presumptive identification.
   UJ = Not detected at or above the estimated reporting limit.
   R = Rejected, result is unusable.
   NM = Not measured
2. RGRW-1 started pumping on 2/24/04.
3. Permanganate injection in RGRW-1 started on 3/10/04.
4. Stopped injecting permanganate in RGRW-1 on 5/22/04 due to rising groundwater level in the well.
5. Turned off RGRW-1 pump on 6/8/04 for videotaping.
6. Restarted RGRW-1 pump on 6/15/04 without permanganate injection.
7. Turned off RGRW-1 pump for rehabilitation on 6/28/04.
8. RGRW-2 and RGRW-3 started pumping on 7/8/04.
9. Permanganate injection in RGRW-2 and RGRW-3 started on 7-16-04.

AMEC 054652

TABLE 3
Construction Detail of RGRWs and Monitoring Wells

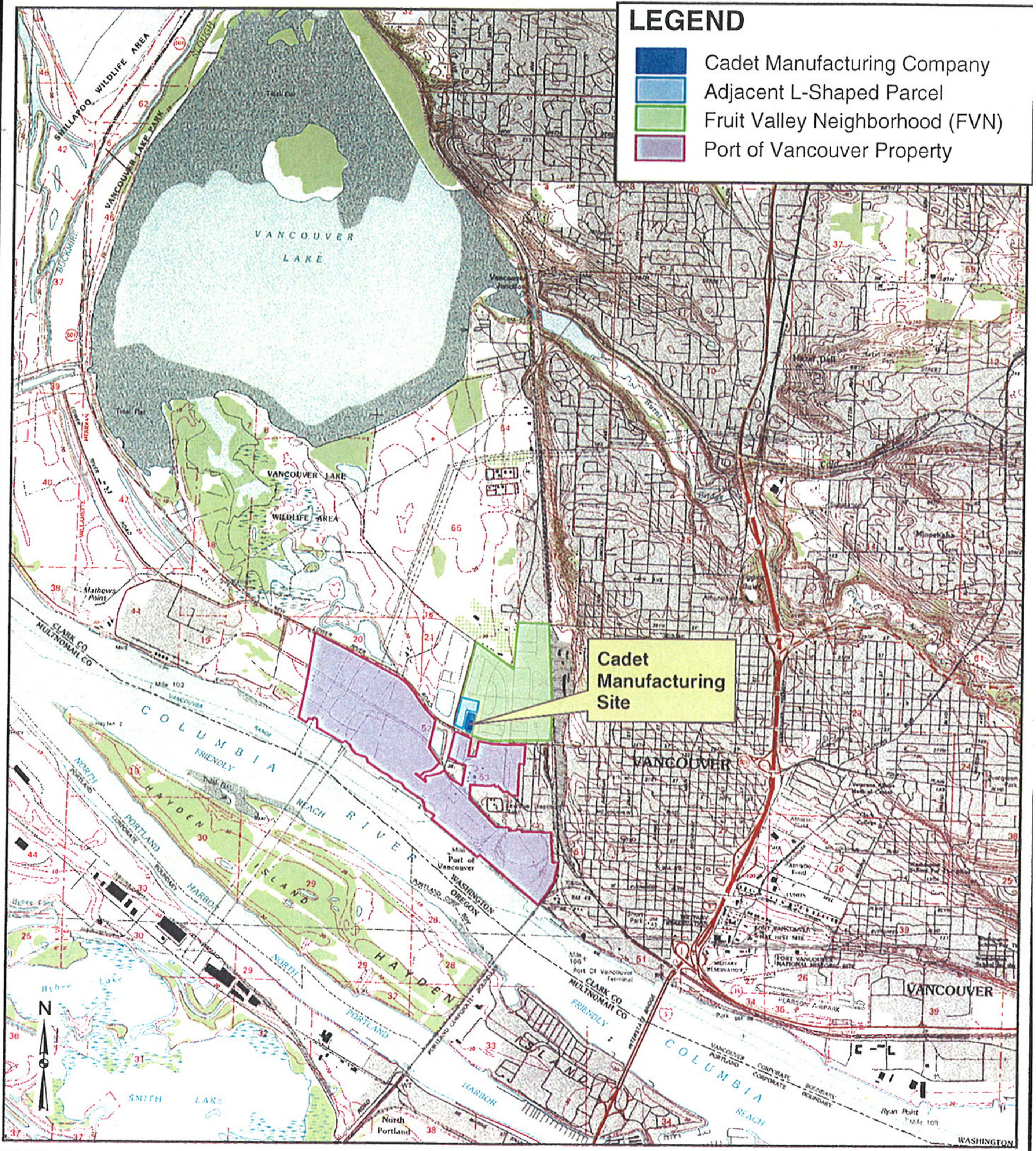
Monitoring Well ID	Date Completed	Total Depth (feet)	Diameter (inches)	Screened Interval (feet bgs)	Surface Elevation (feet MSL)	Top of Well Casing Elevation (feet MSL)	Northing	Easting
RGRW-1	12/1/03	80	8	32-47 discharge 75-80 intake	27.2	26.92	120302.19	1078738.05
RGRW-2	4/21/04	95	12	26-41 discharge 65-95 intake	28.38	NM	120252.46	1079065.46
RGRW-3	4/22/04	100.5	12	29-44 discharge 80.5-100.5 intake	31.54	NM	120297.10	1079465.76
MR-1/45	11/17/03	45	2	35-45	27.2	26.98	120308.08	1078735.81
MR-1/80	11/13/03	80	2	75-80	27.1	26.87	120308.08	1078735.81
MR-2	11/12/03	60	2	50-60	27.13	26.85	120312.31	1078738.67
MR-3/45	11/14/03	45	2	35-45	26.92	26.68	120335.01	1078742.62
MR-3/80	11/14/03	80	2	75-80	26.92	26.56	120335.01	1078742.62
MR-4	11/10/03	60	2	49-59	26.79	26.51	120355.05	1078744.20
MR-5/45	11/13/03	45	2	35-45	26.69	26.33	120310.81	1078751.96
MR-5/80	11/13/03	80	2	75-80	26.69	26.12	120310.81	1078751.96
MR-6/45	11/12/03	45	2	35-45	26.93	26.63	120295.98	1078752.38
MR-6/80	11/12/03	80	2	75-80	26.93	26.63	120295.98	1078752.38
MR-7/45	11/11/03	45	2	35-45	26.71	26.42	120294.13	1078761.05
MR-7/80	11/11/03	80	2	75-80	26.71	26.42	120294.13	1078761.05
MR-8	11/10/03	60	2	50-60	26.55	26.28	120288.02	1078784.57
MR-9	4/29/04	30	2	15-30	26.71	26.27	120291.28	1078765.98
MR-10/42	5/3/04	42	2	23-42	28.01	27.58	120238.14	1079062.81
MR-10/99	5/3/04	99	2	67-99	28.01	27.43	120238.14	1079062.81
MR-11	4/29/04	39.5	2	19.5-39.5	28.3	27.94	120251.49	1079092.91
MR-12/40	4/30/04	40	2	20-40	28.45	28.23	120250.39	1079118.63
MR-12/101	4/30/04	101.5	2	70-101	28.45	28.21	120250.39	1079118.63
MR-13/40	5/10/04	42	2	22-42	30.89	29.91	120221.18	1079437.36
MR-13/95	5/10/04	95	2	74-94	30.89	30.11	120221.18	1079438.36
MR-14	5/7/04	40	2	20-40	30.97	30.67	120266.32	1079459.53
MR-15	5/7/04	40	2	20-40	31.50	31.22	120358.37	1079473.04
MR-16/40	5/11/04	40	2	20-40	31.29	30.67	120304.37	1079485.11
MR-16/95	5/11/04	94.5	2	74-94	31.29	30.87	120304.37	1079485.11
MW-5s	11/12/99	25	2	15-25	26.92	26.58	120183.78	1078713.06
MW-6s	2/21/01	34.5	2	19-34	NM	30.44	120250.85	1079437.56
MW-25s	1/21/04	30	2	15-30	28.82	28.62	120248.56	1079188.25
MW-26s	4/29/04	30	2	15-30	26.61	26.4	120286.00	1078793.02

Notes:
bgs = below ground surface
MSL = mean sea level
NM = not measured
Northings and Eastings based on state plane coordinates for the State of Washington.

AMEC 054653

amec

FIGURES



USGS Quads
45122E6 / 45122E7
45122F6 / 45122F7

0 2,000 4,000 8,000 12,000 16,000 Feet

1 inch equals 4,000 feet

FIGURE 1

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

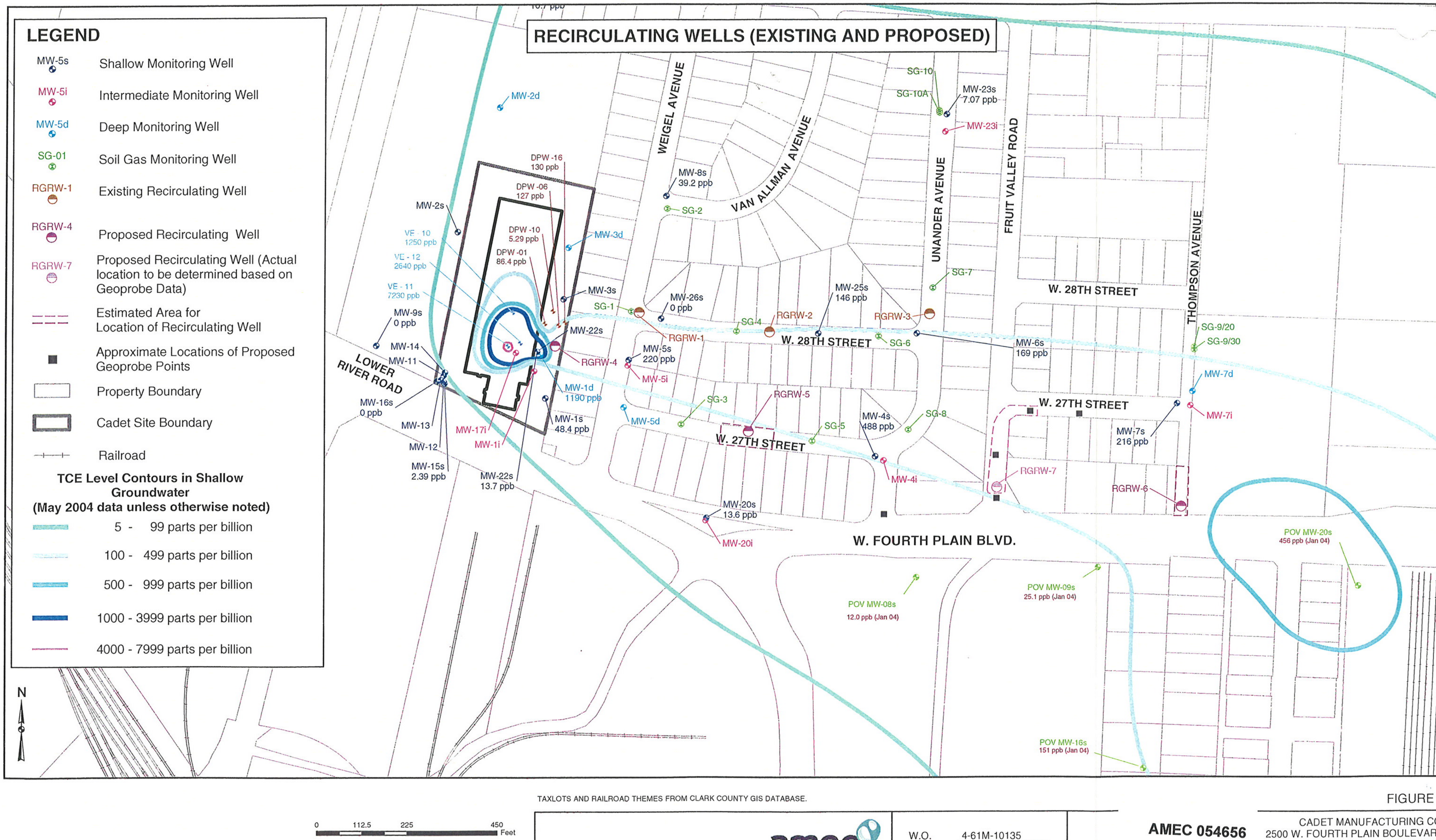
W.O. 2-61M-10135
DESIGN BEL
DRAWN BRJ
DATE JUNE 2003

CADET MANUFACTURING CO.
2500 W FOURTH PLAIN BLVD.
VANCOUVER, WASHINGTON

AMEC 054655

SITE LOCATION

K:\10000\10100\10135\Workplans\RGRW 4-5-6-7\Figures\Figure 1 Site Location.mxd



TAXLOTS AND RAILROAD THEMES FROM CLARK COUNTY GIS DATABASE.

FIGURE 2

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

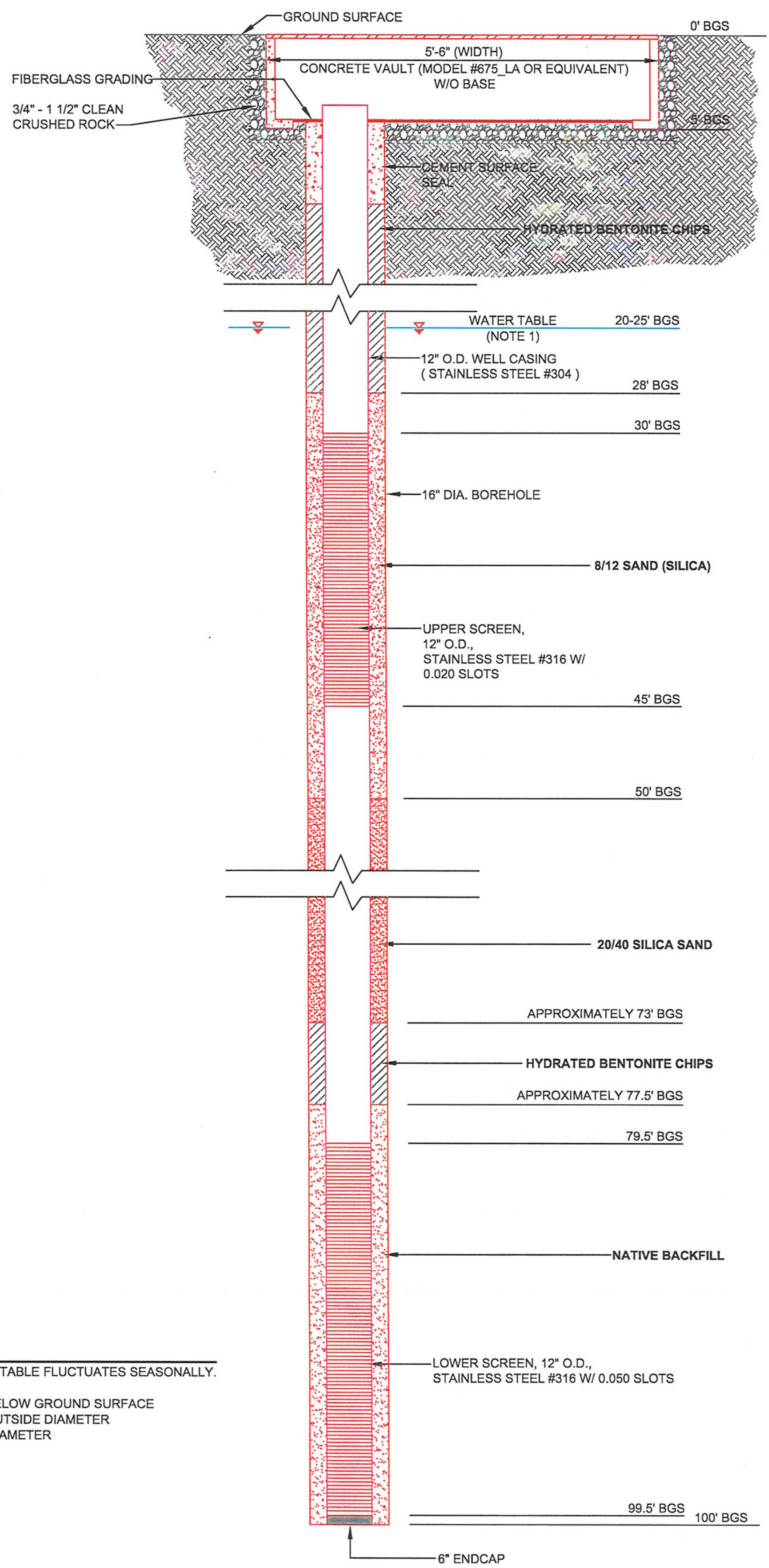
W.O.	4-61M-10135
DESIGN	JF
DRAWN	LM / BRJ
DATE	OCTOBER 2004

AMEC 054656

CADET MANUFACTURING CO.
2500 W. FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

LOCATIONS OF EXISTING AND PROPOSED RECIRCULATING WELLS AND PROPOSED GEOPROBE POINTS AT THE CADET FACILITY AND IN THE FRUIT VALLEY NEIGHBORHOOD WITH MAY 2004 INFERRED TCE CONTOURS

K:\10000\10100\10135\WorkPlans\RGRW 4-5-6-7\Figures\Figure 2 Existing and Proposed RGRW and TCE Contours rev1.mxd



NOTES

1. WATER TABLE FLUCTUATES SEASONALLY.

BGS BELOW GROUND SURFACE
O.D. OUTSIDE DIAMETER
DIA. DIAMETER

FIGURE 3

amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

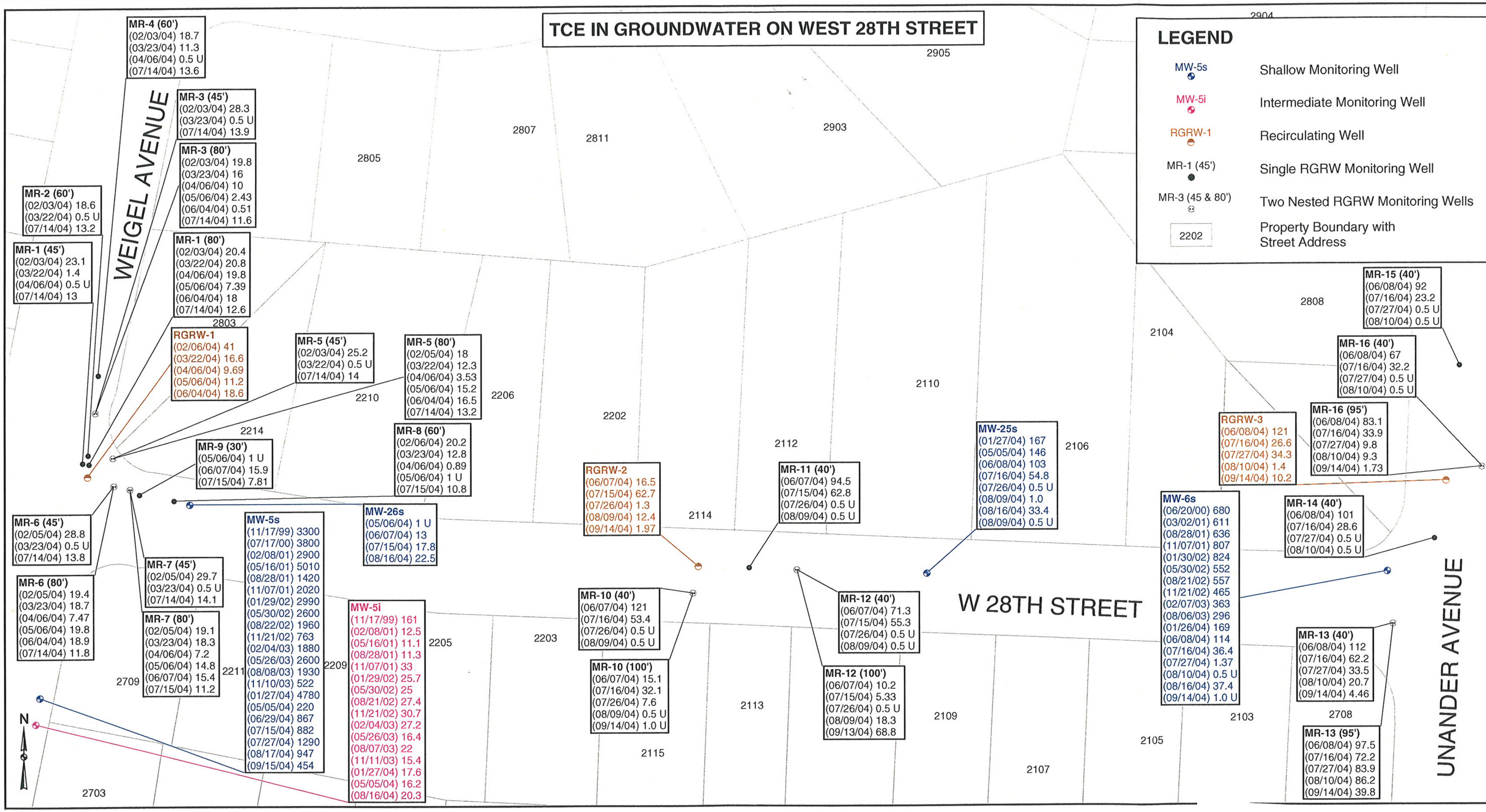
W.O.	4-61M-10135-S
DESIGN	STP
DRAWN	DD
DATE	SEPTEMBER 2004
SCALE	NOT TO SCALE

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

RGRW CONSTRUCTION DETAIL (TYPICAL)

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ WORKPLANS \ RGRW 4-5-6-7 \ FIGURES \ FIG-3. Dwg

AMEC 054657



0 25 50 100 Feet
1 inch equals 50 feet

Taxlots layer from Clark County GIS Database.

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135
DESIGN	STP
DRAWN	BRJ
DATE	OCTOBER 2004

AMEC 054658

FIGURE 4

CADET MANUFACTURING CO.
2500 W FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

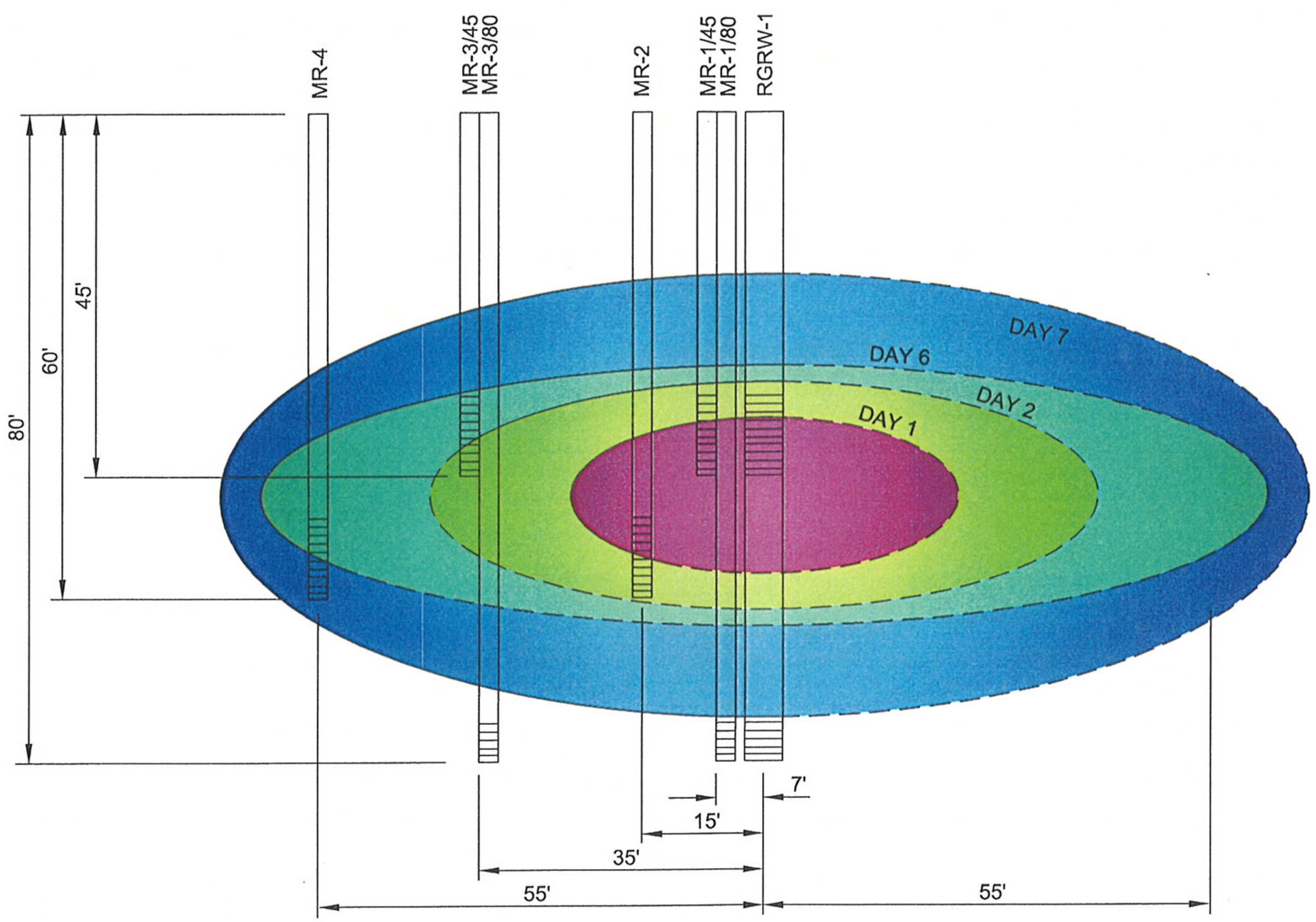
TRICHLORETHENE IN MICROGRAMS PER LITER (ug/L)
IN GROUNDWATER ON WEST 28TH STREET

K:\10000\10100\10135\WorkPlans\RGRW 4-5-6-7\Figures\Figure 4 TCE in Water on W28th Street 2004-09.mxd

ACTUAL RADIUS OF INFLUENCE OF RECIRCULATING WELL
BASED ON TRACER RESULTS

LEGEND

RGRW-1	RECIRCULATING GROUNDWATER REMEDIATION WELL
MR-1/45	MONITORING WELL 45 FEET DEEP
DAY 1	TRACER DETECTED ON DAY 1
	MIRROR IMAGE OF RADIUS OF INFLUENCES
	WELL SCREEN



AMEC 054659

NOTE:
GROUNDWATER FLOW IS INTO PAGE

FIGURE 5

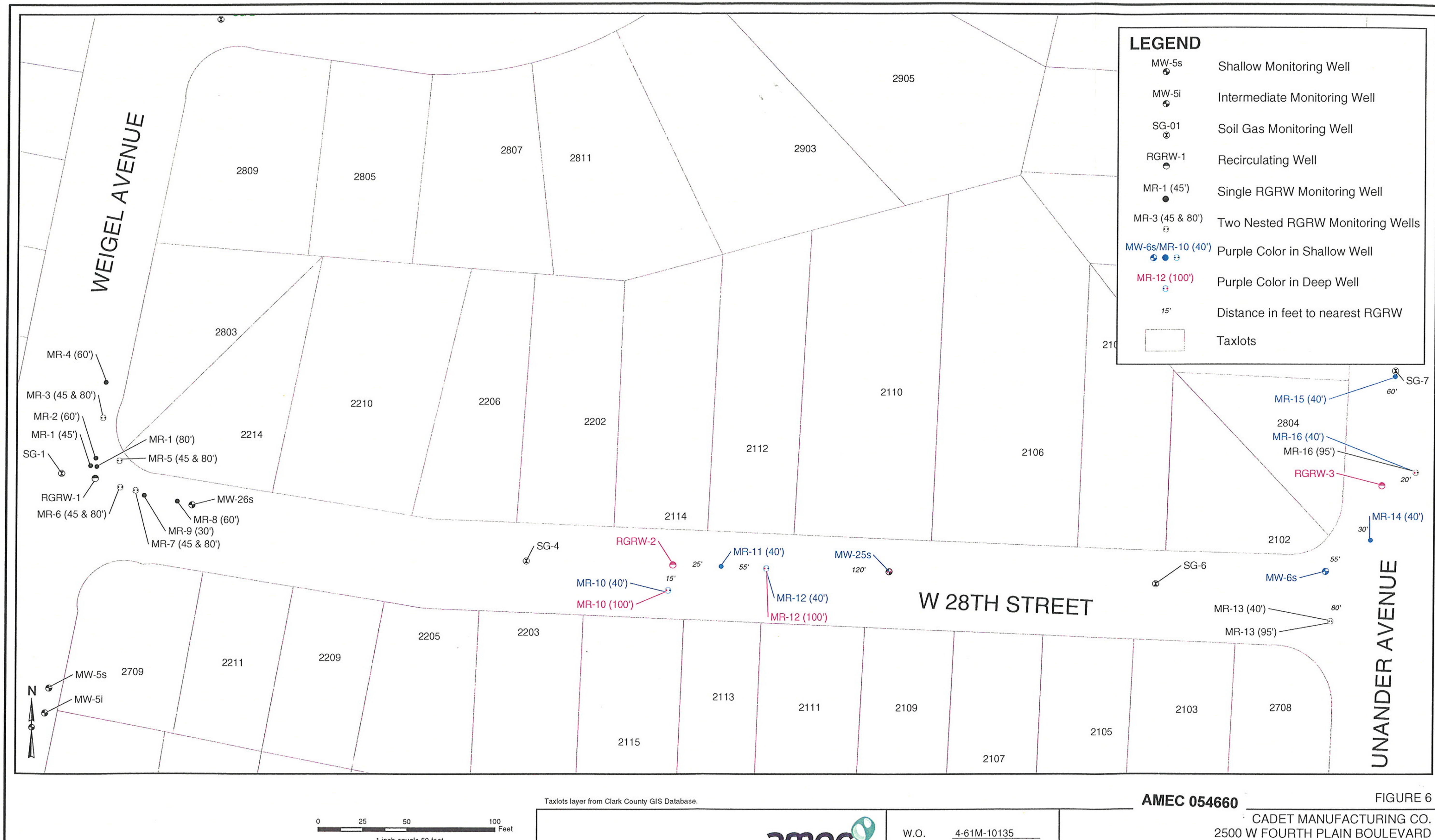
amec
7376 S.W. Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135-S
DESIGN	STP
DRAWN	DD
DATE	SEPTEMBER 2004
SCALE	1" = 20'

CADET MANUFACTURING CO. - FVN SITE
2500 W FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

ACTUAL RADIUS OF INFLUENCE OF RECIRCULATING WELL (RGRW-1) BASED ON TRACER RESULTS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ WORKPLANS \ RGRW 4-5-6-7 \ FIGURES \ FIG-5. DWG



Taxlots layer from Clark County GIS Database.

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	4-61M-10135
DESIGN	STP
DRAWN	BRJ
DATE	SEPTEMBER 2004

AMEC 054660

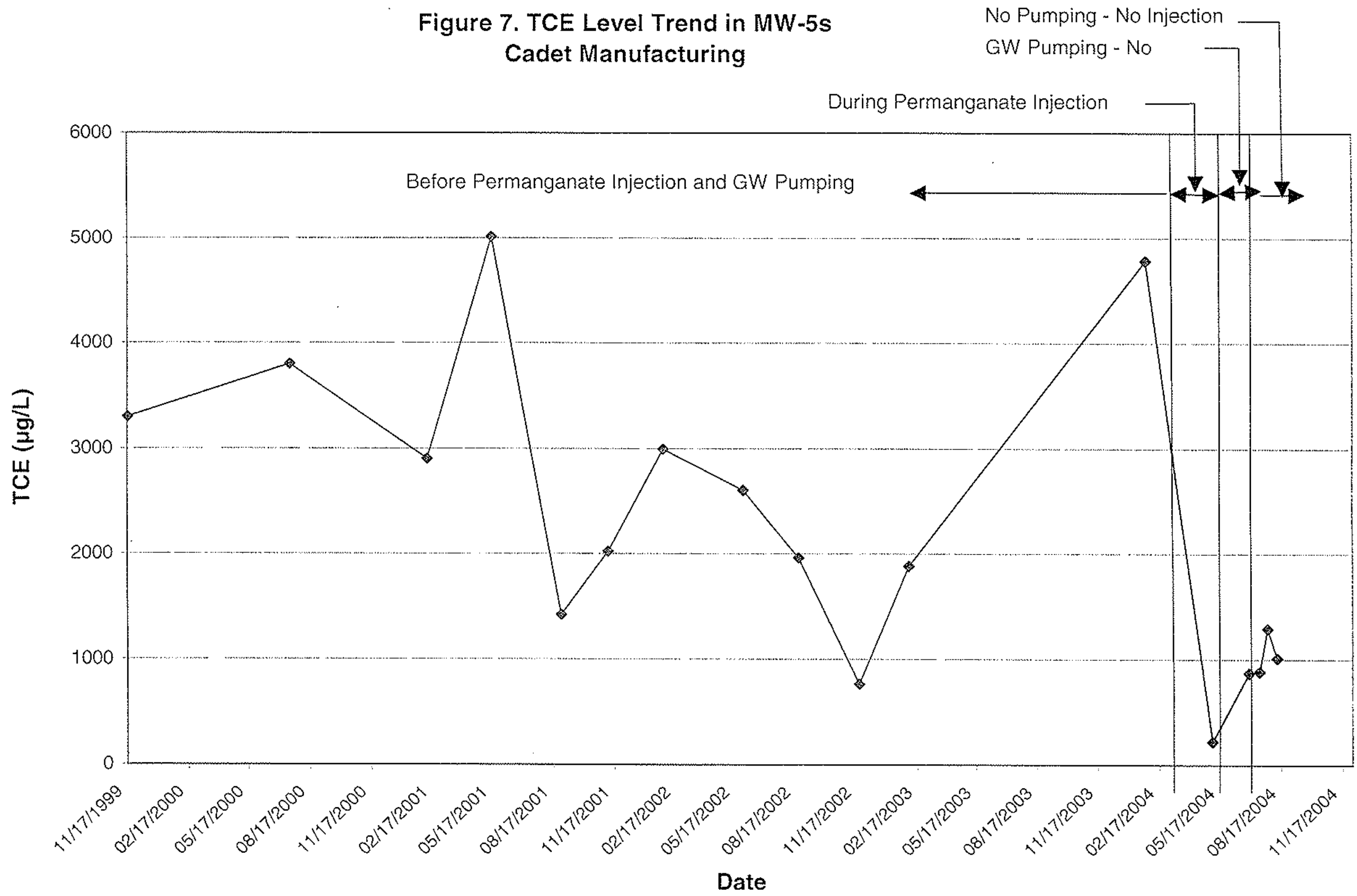
FIGURE 6

CADET MANUFACTURING CO.
2500 W FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

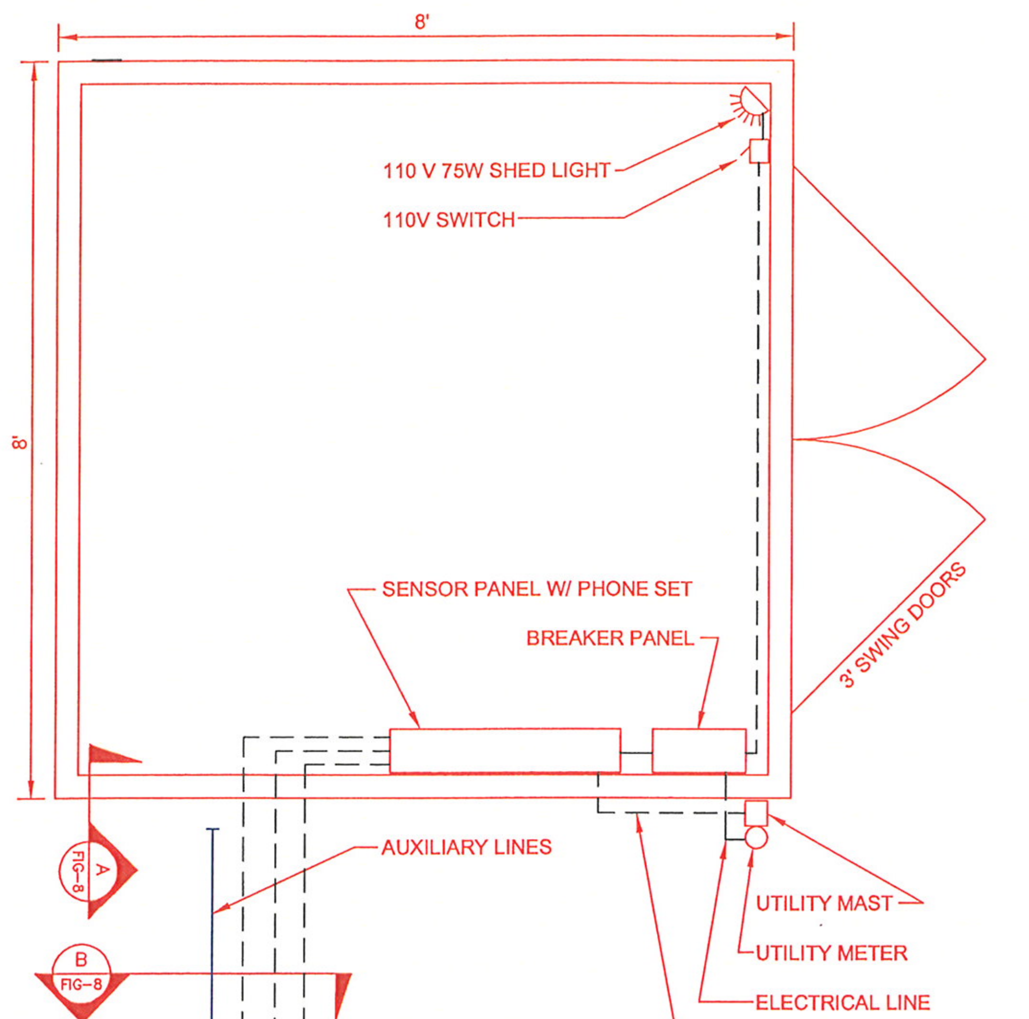
PURPLE COLOR IN RGRWs AND MONITORING WELLS
IN 3 WEEKS OF PERMANGANATE INJECTION

K:\10000\10100\10135\Workplans\RGRW 4-5-6-7\Figures\Figure 6 Permanganate Detections.mxd

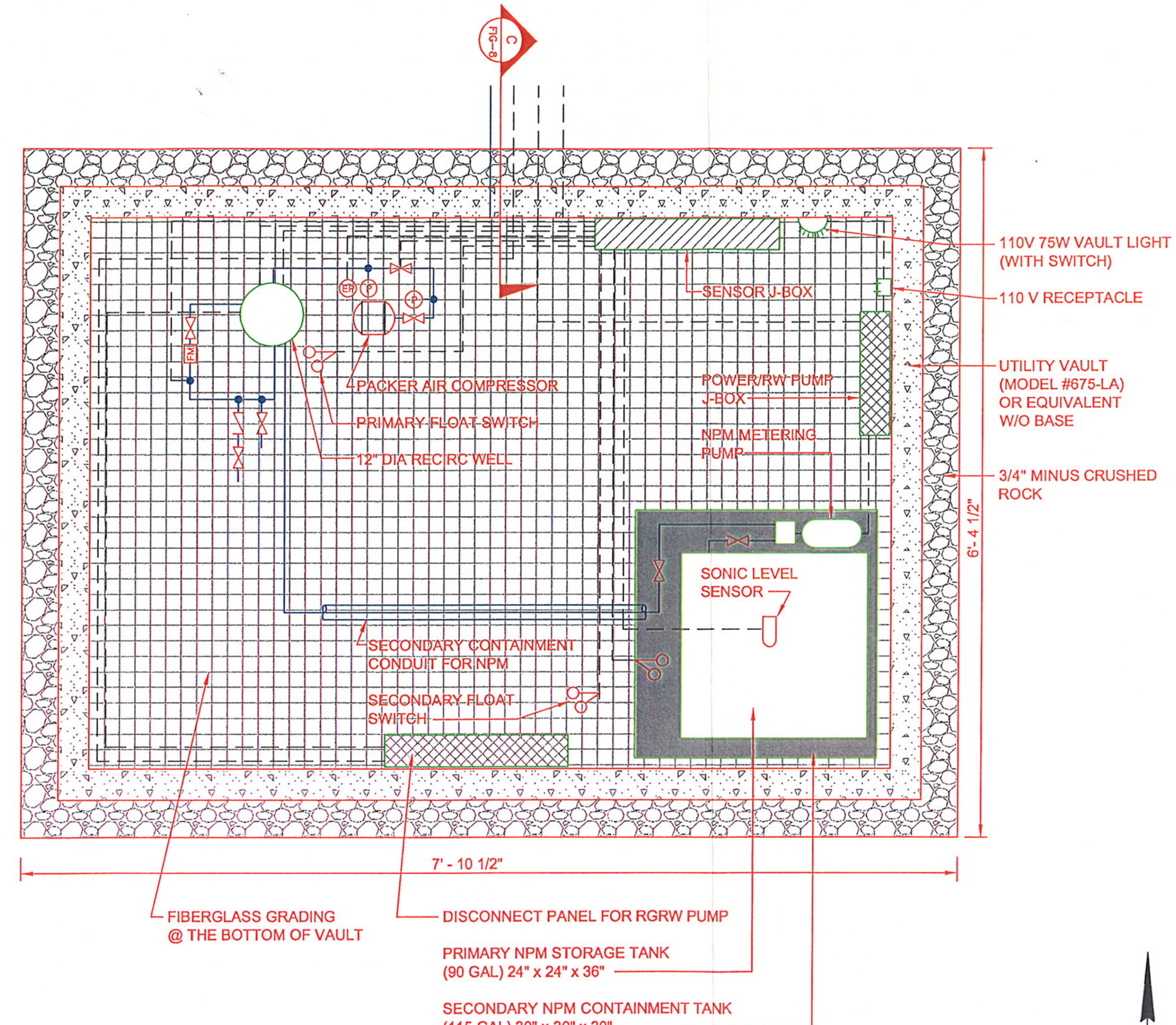
Figure 7. TCE Level Trend in MW-5s
Cadet Manufacturing



K:\10000\10100\10135\Work Plans\RGRW 4-5-6-7\Figures\Figure 7



EQUIPMENT COMPOUND "TUFF SHED" - PLAN VIEW
NOT TO SCALE



UTILITY VAULT - PLAN VIEW
NOT TO SCALE

NOTES:

1) ENGINEER SHALL PROVIDE WOODEN SHED AND INSTALLATION.

2) CONTRACTOR SHALL REINFORCE CRIPPLE JOISTS UNDERNEATH THE SUMP.

PVC POLYVINYL CHLORIDE
SCH SCHEDULE
VFD VARIABLE FREQUENCY DRIVE
GAL GALLON
NPM SODIUM PERMANGANATE

LEGEND:

FM	FLOWMETER
P	MECHANICAL PRESSURE GAUGE
EP	ELECTRONIC PRESSURE GAUGE
	FLOAT SWITCH
	BALL VALVE
	CHECK VALVE

AMEC 054662

FIGURE 8

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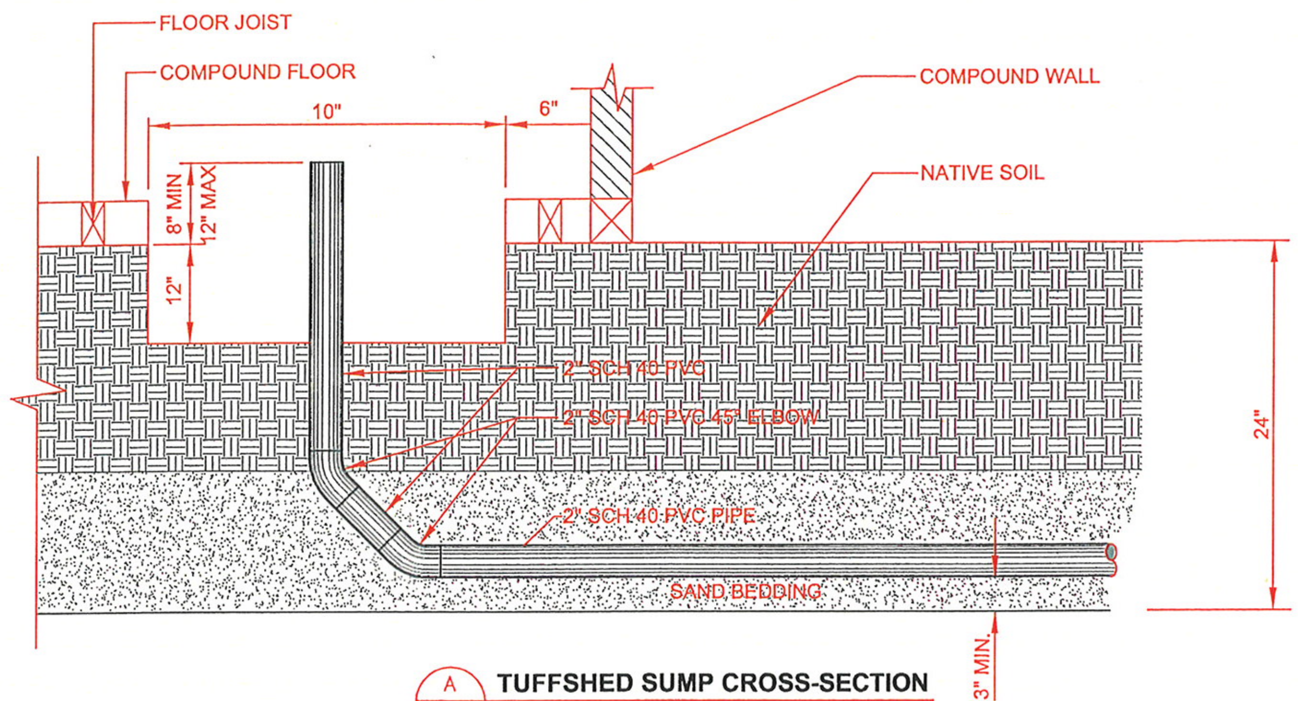
DRAWN	DD
DATE	SEPTEMBER 2004
SCALE	AS NOTED

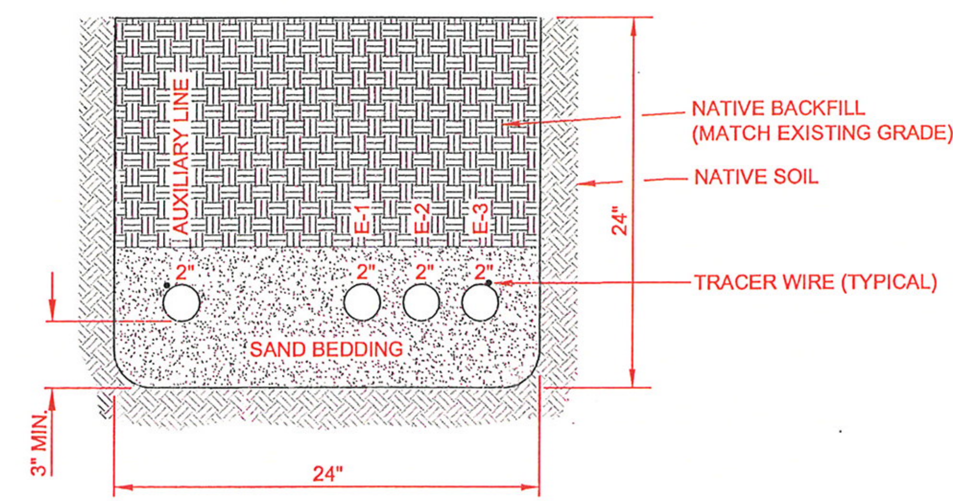
CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

EQUIPMENT COMPOUND AND
UTILITY VAULT PLAN VIEWS



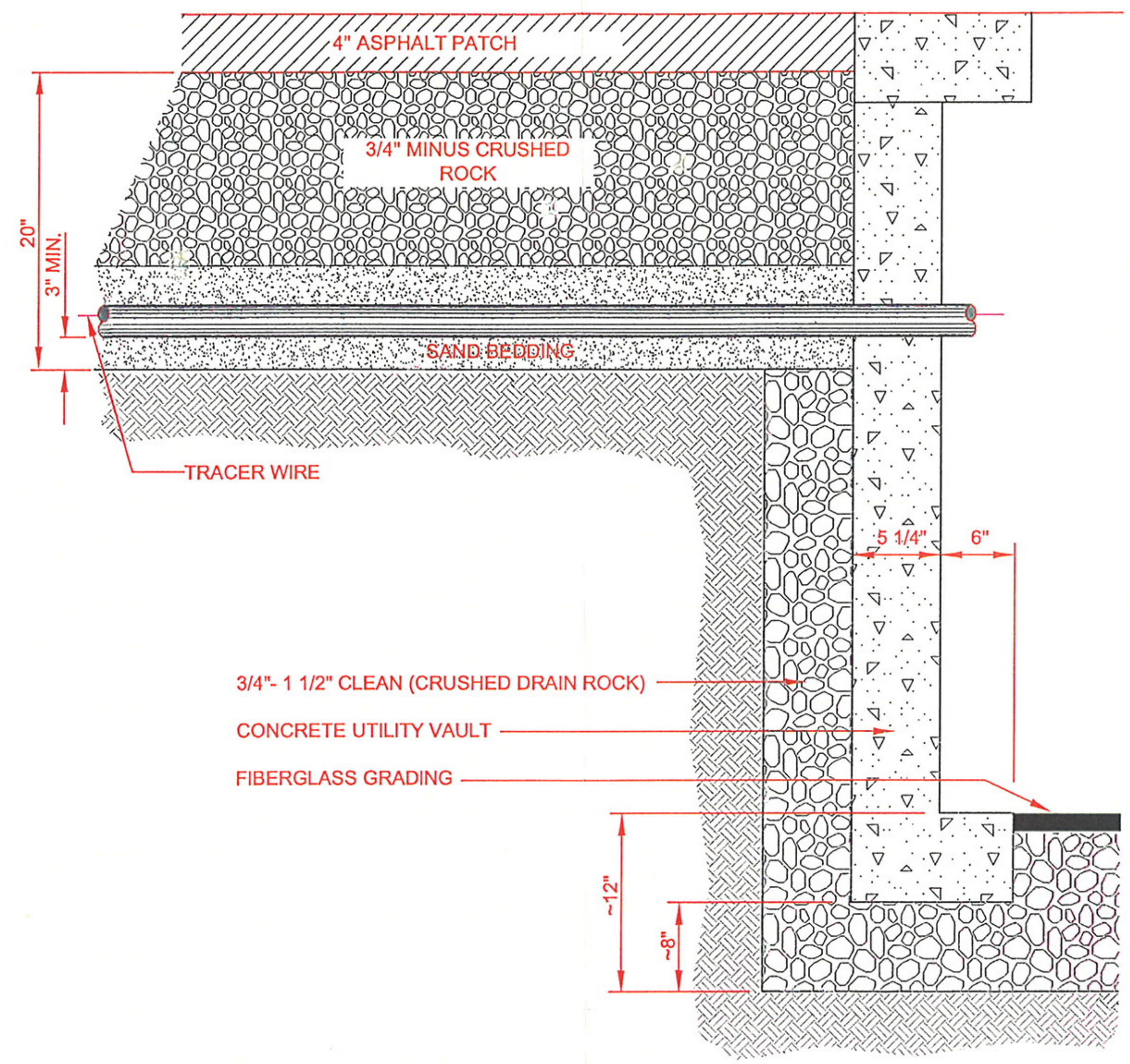
A FIG-8 **TUFFSHED SUMP CROSS-SECTION**

SCALE: 1" = 1'



B FIG-8 **TRENCH CROSS-SECTION**

SCALE: 1" = 1'



C FIG-8 LONGITUDINAL TRENCH CROSS-SECTION

SCALE: 1" = 1'

NOTES:

E-1; CONDUIT FOR RGRW PUMP POWER LINE

E-2; CONDUIT FOR OUTLETS

E-3; CONDUIT FOR SENSOR LINES

AMEC 054663

FIGURE 9

amec

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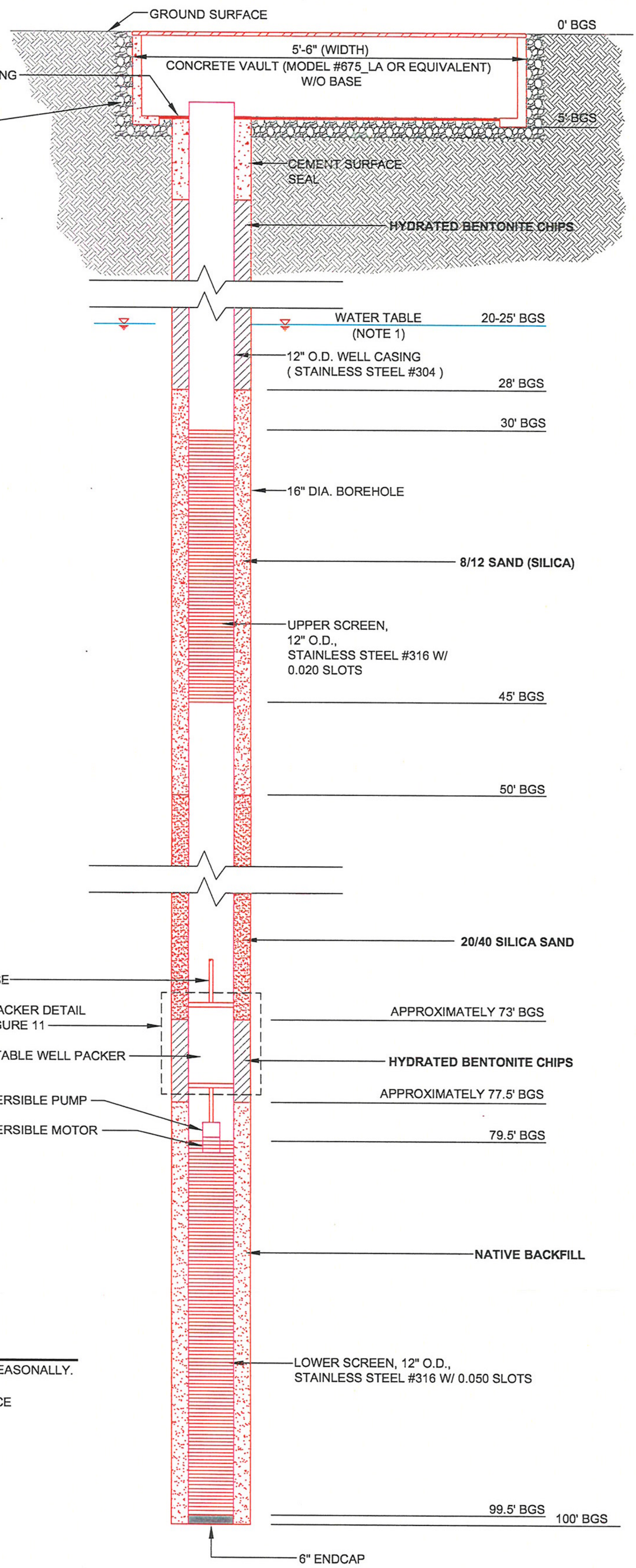
W.O.	4-61M-10135-S
DESIGN	ME
DRAWN	DD
DATE	SEPTEMBER 2004
SCALE	AS NOTED

CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

UNDERGROUND PIPING CONSTRUCTION DETAILS



NOTES

1. WATER TABLE FLUCTUATES SEASONALLY.

BGS	BELOW GROUND SURFACE
O.D.	OUTSIDE DIAMETER
DIA.	DIAMETER

FIGURE 10

amec

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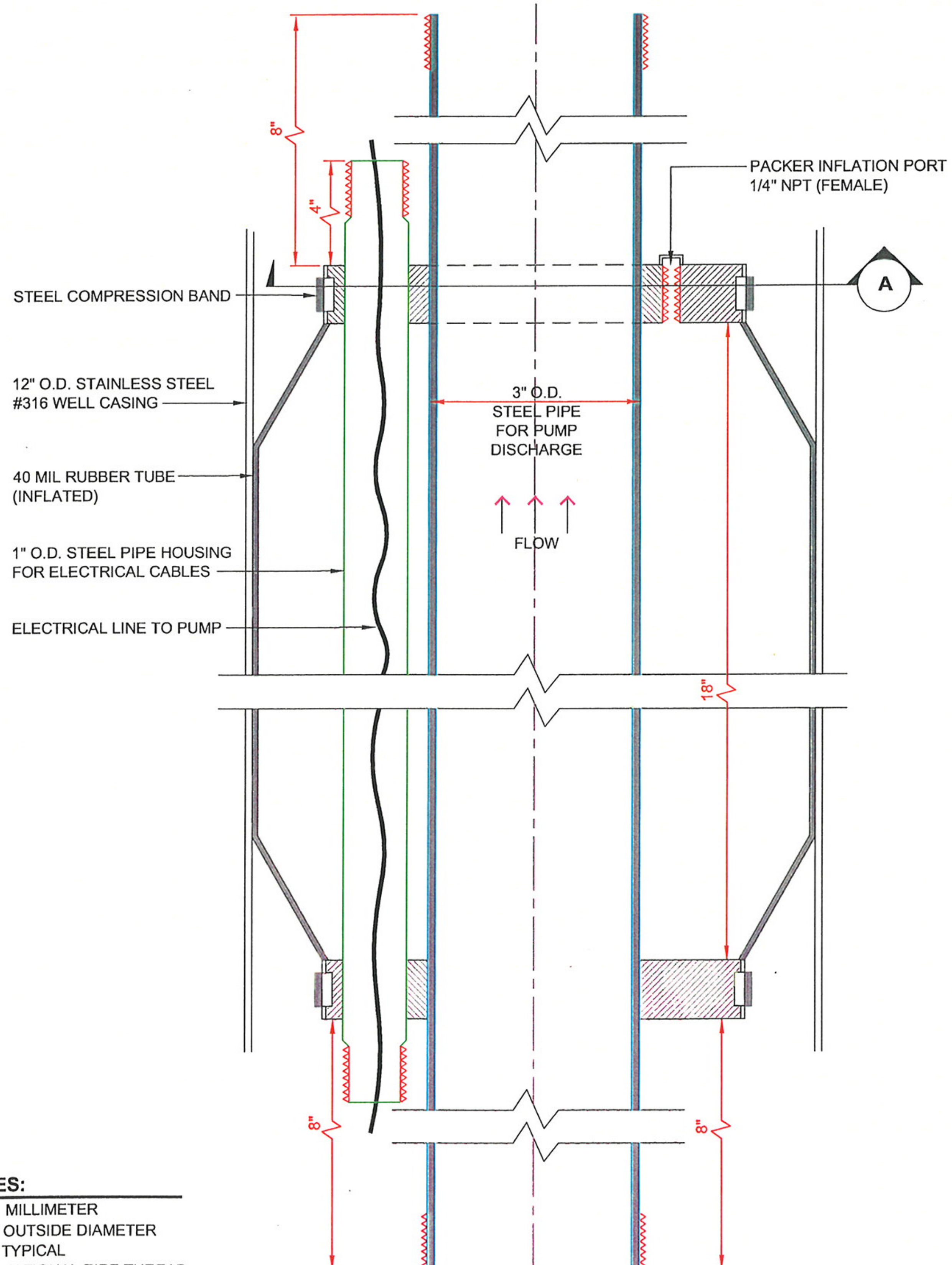
RGRW IN-WELL EQUIPMENT DETAIL

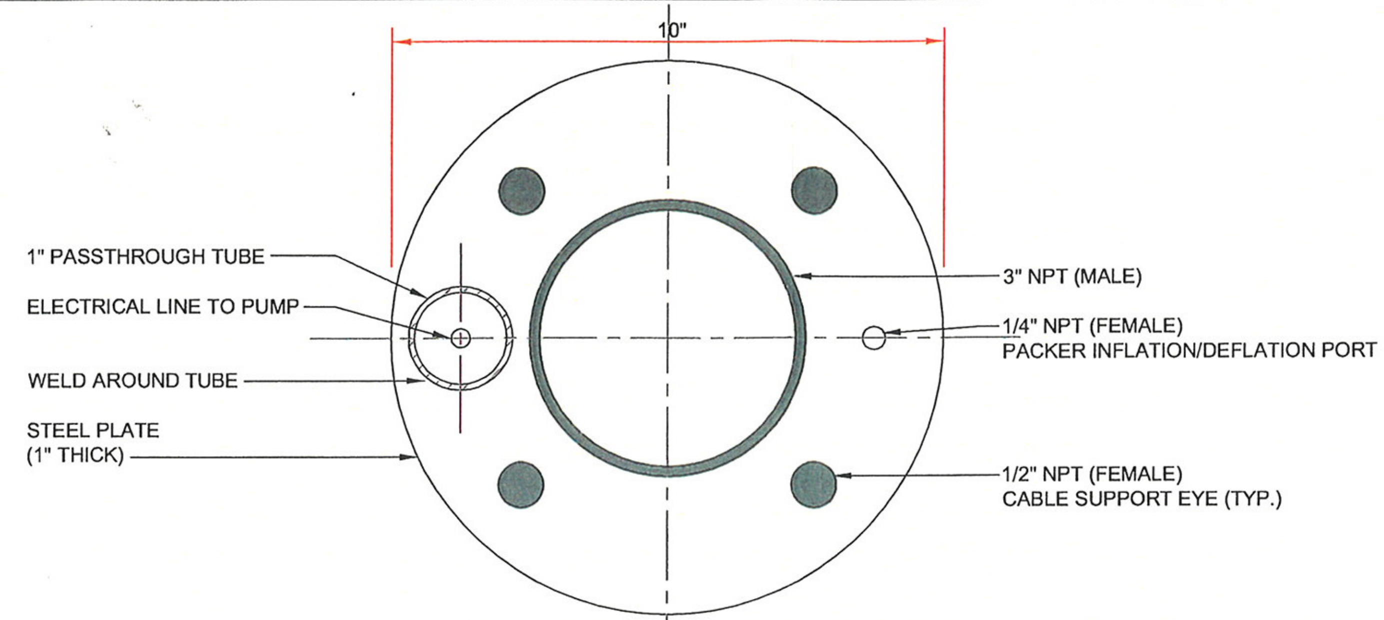
AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ WORKPLANS \ RGRW 4-5-6-7 \ FIGURES \ FIG-10. Dwg

AMEC 054664



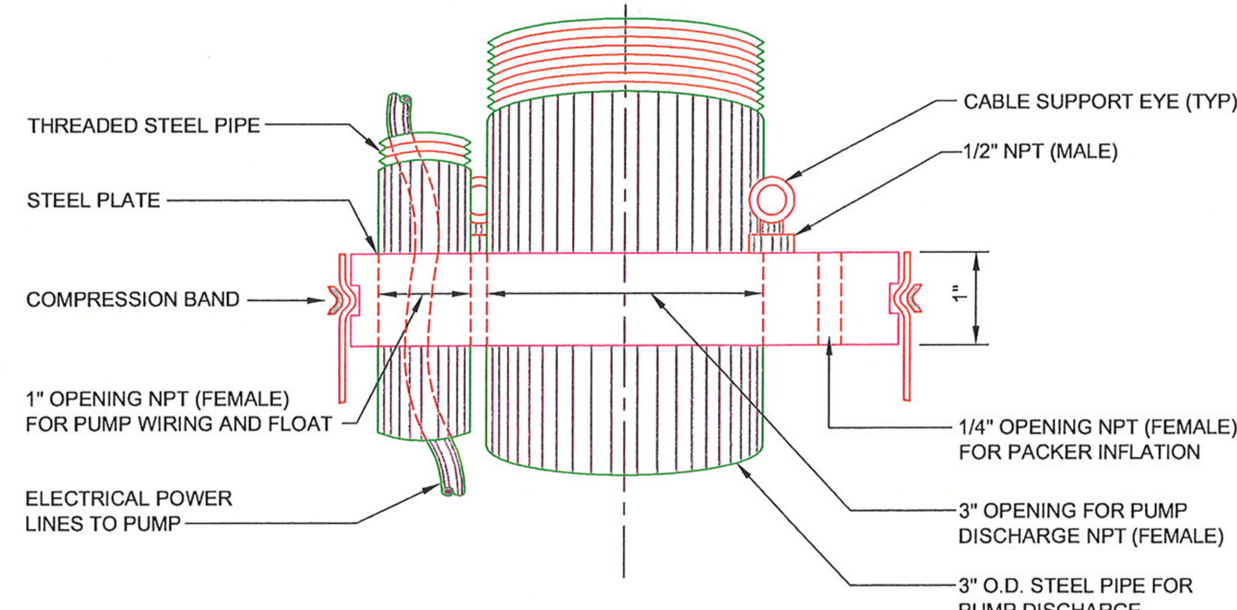
SIDE VIEW

NOT TO SCALE



A **TOP VIEW**

NOT TO SCALE



A **ALTERNATE SIDE VIEW**

NOT TO SCALE

AMEC 054665

NOTES:

MIL	MILLIMETER
O.D.	OUTSIDE DIAMETER
TYP.	TYPICAL
NPT	NATIONAL PIPE THREAD

FIGURE 11

amec

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W.O.	4-61M-10135-S
DESIGN	TJ
DRAWN	DD
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FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

RGRW PACKER DETAIL

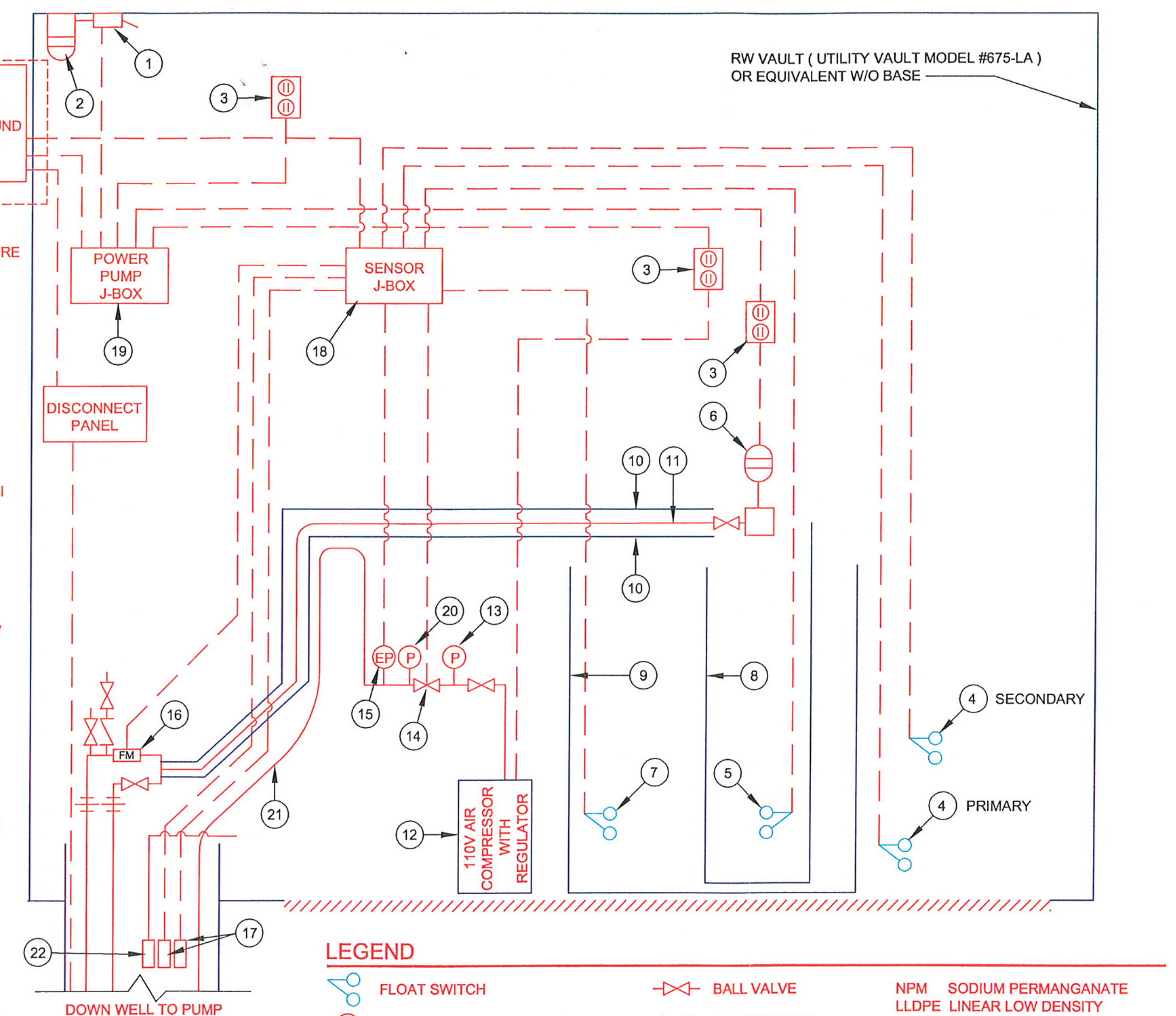
AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ WORKPLANS \ RGRW 4-5-6-7 \ FIGURES \ FIG-11. DWG

Notes

1) RW Vault Light Switch (110V-1PH weather-rated switch for RW Vault Light) - the switch should be accessible from the exterior of the vault (mount switch on the ceiling of the vault)
2) RW Vault Light (110V-1PH 75W weather-rated and protected light) - light should use standard 75W bulb and be on the same circuit as the outlet from Note 3.
3) 110V-1PH 20A weather-rated exterior outlet (RW Vault Outlet #1) - this outlet will be share a single 110V-1PH 20A circuit with the RW Vault Light.
4) RW Vault Flooding Float sensor (Dwyer model F7-HPS-11 - through tank mount) - this float sensor is set in the normally open (NO) position a location 2" above the Secondary NPM Tank (outside of tank)
5) Primary NPM Tank Low Float sensor (USA Bluebook model Avacado #47728 NC suspended) - this float will deactivate the NPM Pump when the level reaches a "low" point. This float will be in the normally closed (NC) position with the weight set at an appropriate level by AMEC.
6) NPM Metering Pump (Harrington PULSATron Series A Plus Model LB64SA-PTC1) - 110V-1PH 0.6A metering pump for NPM mounted to the top of the Primary NPM Tank. Rate for 150-psi, 30 gpd (with a turndown ratio of 100:1) with manual controls.
7) Secondary NPM Tank Flooding Float sensor (Dwyer model F7-HPS-21 - through tank mount) - this float will be set in the normally open (NO) position at a level 2" off of the base of the Secondary NPM Tank. This sensor will alert the system that the Primary NPM Tank has failed.
8) Primary NPM Tank (Harrington model RT242436PE) - this is a 90-gallon LLDPE rectangular tank with the dimensions 24"x24"x36" (LxWxH) with a cover. The NPM Metering Pump will be set on the cover of this tank. The Primary NPM Tank will be placed within the Secondary NPM Tank.
9) Secondary NPM Tank (Harrington model RT203030PE) - this is a 115-gallon LLDPE rectangular tank with dimensions 30"x30"x30" (LxWxH) with a cover. This tank will provide secondary containment for the Primary KPM Tank.
10) NPM Line Secondary Containment Conduit - this is a 2" Sch. 40 PVC conduit that will provide secondary containment for the NPM Line (line will drain back into the Secondary NPM Tank or Well Tank.
11) NPM Line (Harrington BraidFLEX 70 tubing model 8470-4515) - this tubing (1/2", 230-psi, braided reinforced, ID-1/2", OD-3/4") will transport NPM to the RW Pump Line.
12) Packer Air Compressor - that will maintain the packer pressure at a level determined by AMEC. (110V, 1 Phase, 110psi w/ Regulator).
13) Packer Air Compressor Mechanical Pressure Gauge - this is a mechanical pressure gauge that reads the Packer Air Compressor pressure.
14) Packer Electronic Pressure Valve (Dwyer model SAV100-NC) - this is the valve (120VAC, ½", NC, max pressure 290 psi) that is electronically controlled to keep the packer pressure level within a pre-set range. This valve opens (when the pressure in the packer decreases to a level below the acceptable range) to increase pressure in the packer and closes once an upper pressure level is reached.
15) Packer Electronic Pressure Gauge (Dwyer Series 679 model 679-2) - this is a weather-rated pressure transmitter in the 0-100 psi range (300 psi overpressure), 4-20mA output, 9-30VAC input.
16) RW Pump Line Flow Sensor (USA Bluebook stock #65454) - this is an electronic flow meter and totalizer reading in a range of 20-200 gpm (4-20mA output, 1500-psi rating, SS housing, battery powered, 2" NPT female fittings, 20x pipe size inlet and 5x pipe size outlet). This meter will send an analog signal to the control panel to indicate the pump's current flow rate.
17) RW Groundwater Level Sensors (USA Bluebook PlantPro 1730 Series Submersible Level Transmitters model 10290) - two of these pressure transmitters will be installed in the well at a depth of 15 feet below the top of the RW Casing. Both of these pressure transmitters have a range of 0 - 11.55 feet of H2O and require 9-30 VDC (2-wire loop-powered) and send a 4-20mA signal. Operating range of pressure is 2-900 psi. Diameter of sensor is 0.59".
18) Sensor J-Box - This is a NEMA rated (weather-rated) junction box to collect all of the low voltage sensor lines so that they can be feed back to the RW Compound Shed. No lines with voltages above 100V should be allowed into this box. The sensor lines get their own electrical conduit line (E-3 conduit line). Appropriate shielding should be utilized to minimize any induced voltages from the higher voltage lines.
19) Power / RW Pump J-Box - this is a NEMA rate (weather-rated) junction box to collect all of the power lines (from electrical conduits E-1 and E-2). The power line to the pump will be routed through this line (after coming out of conduit E-1) and power for the KPM Metering Pump, RW Vault Light, RW Vault Outlet #1, RW Vault Outlet #2, and RW Vault Sump Pump (after coming out of conduit E-2). All of the 110V or higher voltage lines should be kept at least 12" from any of the low voltage lines.
20) Packer Line Mechanical Pressure Gauge - this is a mechanical pressure gauge that reads the Packer Line pressure.
21) Packer Line (BraidFLEX 70 model 8470-4340) - this is the ¼" tubing that supplies pressurized nitrogen to the RW Packer.
22) Pressure Transducer (Minitroll) (IN_Situ Model 0029200) will be installed 10-20 feet below GW level. Minitroll records water level data at specified intervals. Downloadable to laptop.

RW COMPOUND SHED

SEE FIGURE 13



LEGEND

FLOAT SWITCH
MECHANICAL PRESSURE GAUGE
ELECTRONIC PRESSURE GAUGE
ELECTRONIC FLOW METER
BALL VALVE
CHECK VALVE
UNION
110V RECEPTACLE

NPM SODIUM PERMANGANATE
LLDPE LINEAR LOW DENSITY POLYETHYLENE

AMEC 054666

FIGURE 12

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W.O.	4-61M-10135-S
DESIGN	PS
DRAWN	DD
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CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

RGRW UTILITY VAULT SCHEMATIC AND EQUIPMENT SPECIFICATIONS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ WORKPLANS \ RGRW 4-5-6-7 \ FIGURES \ FIG-12. DWG

NOTES:

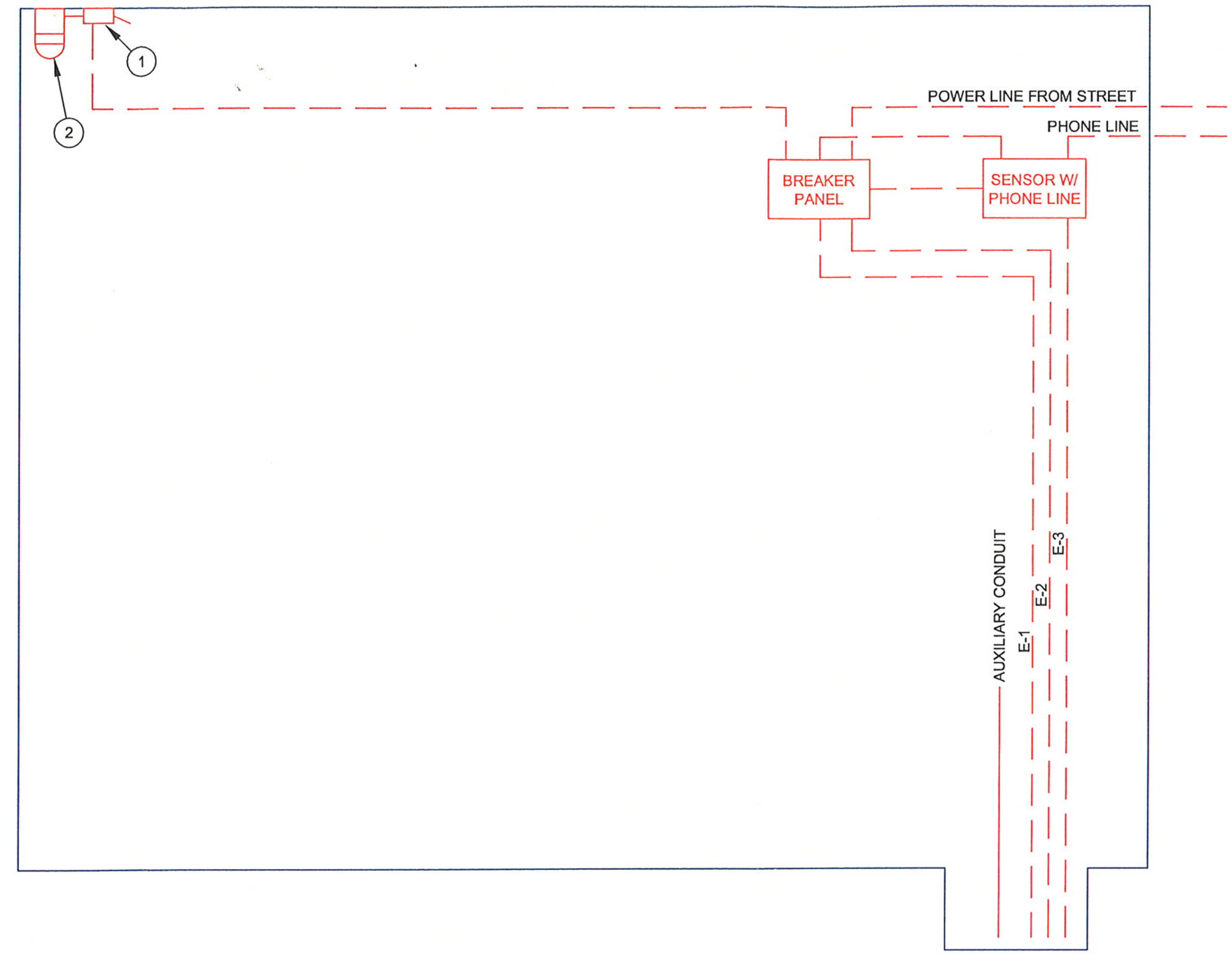
1) RW SHED LIGHT SWITCH (110V-1 PH WEATHER-RATED).

2) RW SHED LIGHT (110V-1 PH 75W WEATHER-RATED).

3) E-1 = ELECTRICAL CONDUIT FOR RW PUMP

4) E-2 = ELECTRICAL CONDUIT FOR RW VAULT OUTLETS / SUMP PUMP.

5) E-3 = ELECTRICAL CONDUIT FOR RW VAULT SENSORS.



AMEC 054667

FIGURE 13

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W.O.	4-61M-10135-S
DESIGN	STP
DRAWN	DD
DATE	SEPTEMBER 2004
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CADET MANUFACTURING COMPANY
FRUIT VALLEY NEIGHBORHOOD
VANCOUVER, WASHINGTON

EQUIPMENT COMPOUND SCHEMATIC AND EQUIPMENT SPECIFICATIONS

AMEC DRAWING NO. K:\ 10000 \ 10100 \ 10135 \ WORKPLANS \ RGRW 4-5-6-7 \ FIGURES \ FIG-13. DWG

APPENDIX G

SVV As-Built Drawings and Supporting Information

RESIDENTIAL SOIL VAPOR VACUUM SYSTEM INSTALLATION AND START-UP REPORT

Cadet Manufacturing Company
Vancouver, Washington

Submitted to:

Washington State Department of Ecology
Vancouver Field Office
2108 Grand Boulevard, MS: S-70
Vancouver, Washington 98661-4622

Submitted by:

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224

3-61M-10135-E

April 2004

April 21, 2004

3-61M-10135-E

Craig Rankine
Site Manager/Hydrogeologist
Toxics Cleanup Program
Washington State Department of Ecology
2108 Grand Boulevard MS: S-70
Vancouver, WA 98661-4622

Dear Mr. Rankine:

Re: Residential Soil Vapor Vacuum System Installation and Start-Up Report
Cadet Manufacturing Company
2500 West Fourth Plain Boulevard
Vancouver, Washington

On behalf of Cadet Manufacturing Company, AMEC Earth & Environmental, Inc. is pleased to submit this installation and start-up report for the soil vapor vacuum systems (SVVS) designed for mitigation of halogenated volatile organic compound vapors at six residences in the Fruit Valley Neighborhood (FVN). This report summarizes the SVVS installation and start-up activities conducted at the six FVN residences between August 2003 and January 2004.

If you have any questions or desire further information, please feel welcome to contact the undersigned at (503) 639-3400.

Sincerely,

AMEC Earth & Environmental, Inc.

John L. Kuiper, L.G.
Principal

Attachments

CLC/vla

c: Craig Peterson, Cadet Manufacturing Company
Barbara Trejo, Washington State Department of Health

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon
USA 97224
Tel +1 (503) 639-3400
Fax +1 (503) 620-7892

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List of Abbreviations, Acronyms, and Key Terms

AEC	Anderson Environmental Contracting
AHERA	Asbestos Hazard Emergency Response Act
AMEC	AMEC Earth & Environmental, Inc.
AO	Agreed Order No. 00TCPVA-847
ART	Advanced Radon Technologies
BNSF	Burlington Northern Santa Fe Railroad
Cadet	Cadet Manufacturing Company
CIH	certified industrial hygienist
cis-1,2-DCE	cis-1,2-dichloroethene
db	decibels
1,1-DCE	1,1-dichloroethene
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
ft^2	square feet
FVN	Fruit Valley Neighborhood
GAC	granular activated carbon
HVOC	halogenated volatile organic compound
in H_2O	inches of water
L-Shaped Parcel	area immediately north and west of the Site
MC	Munitor Construction
MTCA	Model Toxics Control Act
NRHRA	Neighborhood Resident Health Risk Assessment
NVLAP	National Voluntary Accreditation Program
PID	photoionization detector
PCE	tetrachloroethene
PLM	polarized light microscopy
PNE	Pacific Northern Environmental
RMS	Radon Mitigation Standards
SACBM	suspect asbestos-containing building materials
Site	Cadet Manufacturing Company, 2500 W. Fourth Plain Boulevard, Vancouver, Washington
SVVS	soil vapor vacuum systems
TCE	trichloroethene
1,1,1-TCA	1,1,1-trichloroethane
VEC	Varchan Environmental Construction
WC	water column

1.0 INTRODUCTION

This report documents the installation and start-up of soil vapor vacuum systems (SVVS) in six residences located in the Fruit Valley Neighborhood (FVN) in Vancouver, Washington. As a result of FVN indoor air sampling events conducted in 2002, the Washington State Department of Ecology (Ecology) has required that remedial actions occur at the six residences with indoor air vapors exceeding Model Toxics Control Act (MTCA) Method B Air Cleanup Levels. AMEC installed and activated SVVSs at these six residences, with the SVVS between August 26 and September 3, 2003. The SVVSs were installed to mitigate elevated levels of indoor air vapors originating from volatilization of halogenated volatile organic compounds (HVOCs) in groundwater.

1.1 Site Description and Location

The Cadet facility (Site) is located at 2500 West Fourth Plain Boulevard in Vancouver, Washington, approximately 2,500 feet north of the Columbia River (Figure 1). The Cadet facility has operated as an electric heater manufacturing facility since the mid-1960s, and is surrounded by residential and industrial properties. For clarity, the Site is bordered by two other areas that, in combination with the Site, constitute the Project Area: the “L-Shaped Parcel,” which is undeveloped land located immediately north and west of the Site, and the FVN, which is located further to the north and east of the Site.

Residential lots in the FVN typically include a single residence, with some lots also occupied by detached garages. The FVN is bounded to the east by Burlington Northern Santa Fe Railroad (BNSF) property, to the north by West 39th Street (on the east side of Fruit Valley Road) and La Frambois Road (on the west side of Fruit Valley Road), to the west by Yeoman Avenue, and to the south by West Fourth Plain Boulevard (Figure 1).

1.2 Background

Beginning in 1999, Cadet Manufacturing Company (Cadet) retained AMEC Earth & Environmental, Inc. (AMEC) to assess a potential subsurface release of trichloroethene (TCE) and other HVOCs at Cadet’s facility located at 2500 West Fourth Plain Boulevard in Vancouver, Washington.

In January 2000, Cadet entered into an Agreed Order (AO, No. 00TCPVA-847) with Ecology. The AO directed Cadet to complete a remedial investigation, a feasibility study, and an interim remedial action. Specifically, the AO outlines a requirement for Interim Action following remedial investigation and evaluation of risk to human health and the environment. The AO directed Cadet to conduct a Neighborhood Resident

Health Risk Assessment (NRHRA) during the Interim Action. The AO states that the purpose of the NRHRA is to evaluate the potential impacts (i.e., risks) to people living and working in the areas where groundwater contains volatile chlorinated solvents.

1.3 Previous Investigations Relating to FVN Indoor Air Quality

Three subsurface investigations were conducted in 2000 and 2001 and included the collection of soil-gas samples in selected homes within the Project Area (AMEC, 2003c). The soil-gas samples were collected from temporary direct-push borings at the 3- to 4-foot; 4- to 6-foot; and 8- to10-foot depth intervals. HVOCs were detected at concentrations above the method reporting limits in nearly all of the samples.

During January 2002, 65 air samples were collected from 30 residences in the FVN as well as the former Fruit Valley Elementary School, located at 3301 Fruit Valley Road (AMEC, 2002a). A resident living at 2914 Unander Avenue currently provides daycare and this residence was included in the air-sampling program. At least one air sample was collected in the most utilized living spaces (living room or classroom) of each building selected for testing. If the building had a basement or crawlspace, those areas also were sampled.

Results of the January 2002 sampling event are presented in the Remedial Investigation Report (AMEC, 2003a). HVOCs were not detected in the indoor air sample collected from the former school or at the residence in which daycare is provided. HVOC levels exceeded MTCA Method B Air Cleanup Levels (Ecology, 2001) for indoor air at 16 of the 30 residences.

To assess seasonal variations of HVOC concentrations in indoor air, a second round of indoor air sampling was completed in September 2002, for seven of the 30 previously sampled residences (AMEC, 2002b). Six of the seven residences were selected based on previously detected levels of both TCE and 1,1-dichloroethene (1,1-DCE). The presence of 1,1-DCE was selected as a re-sampling criterion because a) it is a breakdown product of tetrachloroethene (PCE), an HVOC previously detected in groundwater within the Project Area, and b) because it is unlikely to have a domestic source. The presence of TCE was selected as a re-sampling criterion because it is an HVOC previously detected in groundwater in the Project Area. The seventh residence, located at 2113 West 27th Street, was re-sampled as a control to evaluate if there was seasonal fluctuation in analytes detected.

Sixteen indoor and basement or crawlspace air samples were collected from seven residences, and included one duplicate sample. At the request of Ecology and the Washington State Department of Health (DOH), four outdoor air samples also were collected during the September 2002 sampling event. One outdoor air sample was collected west of the Site, near groundwater monitoring well MW-9. This location was selected to represent "background" levels for the area, because groundwater near MW-9 does not contain elevated levels of HVOCs. Three additional outdoor air samples were collected in the FVN in the backyards of the selected residences (AMEC, 2003a).

For the September 2002 sampling event, HVOCs exceeded MTCA Method B Air Cleanup Levels (Ecology, 2001) at all but one (2113 West 27th Street) of the seven residences. HVOC levels decreased from the January 2002 sampling event in all but one of the re-sampled residences (2202 West 28th Street).

By agreement with Ecology, DOH assumed responsibility for interpreting the air sampling data from the FVN. Based upon the analytical data generated during previous indoor air sampling events, the Final Health Consultation Report by the DOH (May 6, 2003) stated that three residences in the FVN required indoor vapor mitigation (DOH, 2003). Ecology added three more residences to the list based upon exceedances of MTCA Method B values for HVOCs in indoor air (Ecology, 2003). Therefore, the three residences requiring indoor air vapor mitigation by the DOH combined with the three residences added by Ecology comprise the six FVN residences where SVVSs were installed.

2.0 PRE-INSTALLATION ACTIVITIES

The following section describes pre-installation activities including the initial reconnaissance of the six residences, preparation of bid plans and specifications, and selection of the remediation contractor.

2.1 Location of the Six Residences

Table 2.1 contains a list of the six residences where SVVSs were installed and a corresponding letter designation for each location. For clarity, residential addresses are used throughout the remainder of this report when referring to a particular residence. The letter designations were used during the installation and start-up activities, and are also used in the field notes attached at the end of this report. Figure 2 shows the locations of the six residences in the FVN where SVVSs were installed.

Table 2.1: Address and Letter Designation of SVVS Installations

Address	Letter Designation
2809 Unander Avenue	Site A
2805 Unander Avenue	Site B
2206 West 28th Street	Site C
2202 West 28th Street	Site D
2105 West 28th Street	Site E
2103 West 28th Street	Site F

2.2 Initial Reconnaissance of Residences

An AMEC engineer, an AMEC certified industrial hygienist (CIH), and an AMEC environmental technician conducted the initial inspections of the six residences during June 2003. The purpose of the inspections was to collect information about the configuration and condition of each residence prior to design of the SVVS and to coordinate scheduling with the owners/occupants. During the initial reconnaissance, AMEC noted the type of building construction for each residence including the foundation type as well as siding and roof construction. Table 2.2 includes the foundation type for each residence.

Table 2.2: Initial Reconnaissance Observations of the Six Residences

Letter Designation	Address	Approximate Footprint (ft^2)	Foundation Type	Foundation Condition*
Site A	2809 Unander Avenue	720	Semi-finished basement	Acceptable
Site B	2805 Unander Avenue	910	Semi-finished basement	Fair to Acceptable
Site C	2206 West 28th Street	820	Crawlspace	Good
Site D	2202 West 28th Street	1,056	Unfinished basement with crawlspace addition	Acceptable
Site E	2105 West 28th Street	1,196	Semi-finished basement with crawlspace addition	Good
Site F	2103 West 28th Street	910	Semi-finished basement	Fair to Acceptable

ft^2 square feet

* Foundation condition is based only on a subjective, qualitative visual assessment of the accessible areas on the inside and exterior of the homes. Ratings of “good”, “acceptable”, and “fair” (with ”good” being the best rating) were based on visual observations of structural condition including cracks in concrete, evidence of water seepage, fracturing of the concrete and signs of structural failure. Varying degrees of these conditions resulted in the various ratings.

In addition to the building construction, several other things were noted during the initial reconnaissance; the presence, location, and condition of sump pumps; household appliances; personal belongings; circuit breaker panels; sewer connections; vapor barriers; exposed soils; and heating and cooling systems. AMEC also conducted interviews with each of the residents to collect their input regarding the installation of the SVVS. AMEC utilized the information gathered in these interviews in the design of the SVVS.

Following the initial reconnaissance of the six residences, an accredited Environmental Protection Agency (EPA) Asbestos Hazard Emergency Response Act (AHERA) inspector from AMEC collected samples of suspect asbestos-containing building materials (SACBM) that had the potential to be disturbed during installation of the SVVS. These samples were collected for the purpose of protecting worker/occupant health and safety during the SVVS installation activities.

Eight SACBM samples were collected from two of the six residences, including two samples of flooring material from 2206 West 28th Street and six samples from 2805 Unander Avenue (four roofing material samples, one wallboard sample, and one plaster sample). The SACBM samples were sent to RJ Lee Group, Inc. in San Leandro, California, an accredited National Voluntary Accreditation Program (NVLAP, participant number 1208-2). The samples were analyzed using polarized light microscopy (PLM) for quantification of asbestos content. The PLM analytical results indicated that none of the eight samples submitted contained asbestos. Copies of the analytical reports and chain-of-custody documentation are presented in Appendix A.

2.3 Vapor Mitigation System Design

Following the initial reconnaissance of the six residences, AMEC prepared residence-specific initial SVVS designs. During this initial design process, the DOH requested that AMEC review the EPA's Radon Mitigation Standards (RMS, EPA, 1994) for guidelines that could be useful in designing the indoor air mitigation systems for the residences.

The purpose of the RMS is to ensure quality and effectiveness in the design, installation, and evaluation of radon mitigation systems in detached and attached residential buildings three stories or less in height. The RMS includes guidelines for the design and installation of radon remediation systems; however, according to the RMS, guidance for the design and installation of radon mitigation systems is not strict and can be amended as necessary. The RMS also provides a basis for evaluating the quality of the installations. The RMS describes active (i.e., use of a fan-powered vent to draw air from beneath the slab) and passive (i.e., use of a vent pipe connected to the sub-slab area) sub-slab depressurization techniques for the control of radon vapors in residential buildings. The sub-slab depressurization techniques used for radon mitigation have been adapted at other sites for mitigation of HVOC vapors in indoor air (Folkes and Kurtz, 2002; PSC, 2003; Pioneer Technologies Corporation, 2003).

During the design process, AMEC reviewed the design of the SVVS planned for use at the Georgetown site in Seattle, Washington. The design of the SVVS in the six FVN residences was amended due to differences in the site conditions including the FVN subsurface geology, the residents' preferences for the vapor mitigation systems, installation of granular activated carbon (GAC) filter units and other factors that are discussed in Section 3.0.

The SVVSs were designed to have an expected lifetime of 4 to 5 years, during which time other remedial measures to reduce groundwater contamination are anticipated to be installed and in operation. The sub-slab depressurization design includes boring through the concrete floor slab of a residence to install horizontal, slotted vacuum pipes. A moderate vacuum is induced in the sub-slab and recovers soil vapors that are vented to the atmosphere through an exhaust stack mounted to the roof of the residence. The crawlspace systems are similar to the sub-slab systems, with the exception that the vacuum is induced in the crawlspace to sweep the air across the area to the blower.

2.4 Remediation Contractor Selection Process

Prior to beginning installation of the SVVSs in the six residences, AMEC prepared a comprehensive set of plans and specifications that were specific to each residence. For each residence, the plans included a system layout, a system schematic, and pre-installation residence photographs. The residence photographs were annotated with the planned locations of the SVVS components and associated piping. The SVVS were designed based on observations made during the initial reconnaissance and on residents' design preferences.

The plans, specifications, and bid forms were submitted to five remediation contractors: Advanced Radon Technologies (ART, Spokane, Washington), Pacific Northern Environmental (PNE, Longview, Washington), Anderson Environmental Contracting (AEC, Kelso, Washington), Varchan Environmental Construction (VEC, Cornelius, Oregon), and Munitor Construction (MC, Portland, Oregon). Upon receipt of the invitation to bid, two of the contractors, PNE and VEC, declined to bid due to the project schedule.

Prior to submittal of bids, ART, AEC, and MC attended a pre-bid conference on August 13, 2003. During this meeting, the contractors and representatives of AMEC toured the six FVN residences. At this time, the contractors were able to view the configuration and condition of the six residences where the SVVSs would be installed. Additionally, AMEC considered questions posed by the contractors during this meeting.

Following the August 13, 2003 meeting, AMEC received bids from ART, AEC, and MC for installation of the SVVSs. A single remediation contractor was selected for the entire SVVS installation project in order to expedite the installation and maintain consistency in the work performed. Based on price and schedule, AEC was selected as the remediation contractor for the SVVS installation in the six residences. AEC was the lowest bidder among the three contractors and was the only contractor that could comply with the proposed schedule. AEC indicated that the work could be completed in nine days, whereas MC and ART indicated much longer timeframes (4 weeks and 45 days, respectively).

2.5 Remediation Contractor Scope of Work

As stipulated in the specifications, with the oversight of AMEC, AEC was responsible for furnishing of labor, materials, tools, equipment, services, and incidentals for the installation of the SVVSs in the six residences. The scope of work included the following general tasks: permitting and inspections, utility locates, concrete saw-cutting/coring, concrete demolition and disposal, trenching, soil excavation and disposal, piping installation, backfill and compaction, concrete paving, installation of the SVVS equipment, and other components (electrical connections, sump systems, and breaker panels), clean-up, and related safety provisions.

3.0 INSTALLATION OF VAPOR MITIGATION SYSTEMS

The SVVSs were installed by AEC with oversight from AMEC from August to October 2003. Minor modifications to the original design plans were made during the installations in response to residence conditions and residents' preferences. These modifications are described in Section 3.3, and are shown in the as-built drawings presented in Appendix B. AMEC installed GAC filter units on each of the SVVSs in January 2004 to remove HVOCs recovered by the systems prior to discharge into the atmosphere. See Appendix C for installation photographs.

3.1 General Description of Installations

The active sub-slab depressurization techniques described in Section 2.3 formed the basis for the SVVS installations in the six FVN residences. All six installations included mounting a GAST model R2103 blower and installing a soundproofing enclosure, intake and discharge piping, electrical conduit and wiring, and gauges. The scope of work for the SVVS installation included the following general tasks, which are described in more detail in the bid plans and specifications:

- Repair or replacement of existing plastic vapor barriers within the crawlspaces to limit passive vapor infiltration.
- Install sub-slab vacuum-type vapor collection equipment in basements to induce negative pressure and vapor collection in the sub-slab soils. The required air discharge stacks were plumbed to discharge the recovered soil vapors to the atmosphere (away from the home).
- Install GAC filters to recover HVOCs from the air stream prior to final discharge.
- Installation of air venting equipment in crawlspaces to pull ambient outdoor air across the crawlspaces, thereby flushing the crawlspaces. The required air discharge stacks were installed outside the homes along the roofline.
- All of the existing electrical breaker panels were replaced with new panels to ensure that the SVVS complied with current electrical codes and could be operated on isolated circuits.
- Exposed soils in the basement of the residence located at 2805 Unander were covered with an appropriate concrete/masonry barrier to limit passive vapor infiltration and eliminate vacuum short circuit points.
- Significant cracks observed within basement walls or floors were sealed to limit passive vapor infiltration into the living spaces and eliminate vacuum short circuit points.

3.2 Punch List Items

In accordance with the design specifications, AMEC conducted several inspections of the SVVS installations from August through October 2003. During these inspections, AMEC created punch lists of items that AEC was required to complete. Typically, these punch list items included portions of the installations that were incomplete, equipment that was not installed according to the design plans and specifications, equipment that required repair or replacement, or equipment that needed to be painted to match the exterior of the residence. During subsequent AMEC inspections, the punch list items had been completed by AEC.

Other minor operational issues have also been completed by AMEC since October 2003. These included the installation of additional soundproofing for selected homes, sump pump system repairs (2103 W 28th Street), and the installation of GAC units on all SVVSs.

3.3 Modifications to the Original Design Plans

The following discussion summarizes minor SVVS installation changes to the original design plans/specifications for the six residences. These changes also are noted in the as-built drawings presented in Appendix B.

Site A: 2809 Unander Avenue

Changes to the design of the SVVS at this location involved installation of a new breaker panel and replacement of the existing sump pump. The drain lines entering the sump were altered to allow a shallow layer of water to remain in the sump at all times to alleviate air short-circuiting through the sump pipe system. The furnace condensate liquid discharge line also was routed to the bottom of this sump. A GAC filter unit and shed enclosure were installed adjacent to the outside vent to recover HVOCs from the discharge airline.

Site B: 2805 Unander Avenue

Changes to the design of the SVVS at this location involved sealing a 3 foot by 3 foot section of concrete in the northeast corner of the basement floor, replacement of the electrical circuit breaker panel and a defective sump pump, and installation of a new sump pump system. The new sump pump system is scheduled to be installed in April 2004. A GAC filter unit was installed in the attic to recover HVOCs from the discharge air line.

Site C: 2206 West 28th Street

Changes to the design of the SVVS at this location included relocation of the on/off switch for the blower to a position below the electric breaker panel, coring of a 3-inch hole instead of a 4-inch hole in the foundation wall, placement of an additional 90º turn in the discharge air line, muffler at the discharge point, and hanger system for the Dwyer gauge. AMEC also installed a GAC filter unit and shed enclosure adjacent to the northeast corner of the house to recover HVOCs from the discharge air line.

Site D: 2202 West 28th Street

Changes to the design of the SVVS at this location included installation of a new electric breaker panel, installation of a new 6-millimeter vapor barrier, alteration of the vent piping to encourage air “sweeping” of the crawlspace, and the addition of supplemental layers of insulation in the soundproofing enclosure to improve airflow and reduce noise levels. AMEC also installed a GAC filter unit and shed enclosure adjacent to the southeast corner of the house to recover HVOCs from the discharge air line.

Site E: 2105 West 28th Street

Changes to the design of the SVVS at this location involved the installation of a new electric breaker panel and movement of the location of the sump pump and vertical lines to accommodate the homeowner's future plans for the room. The sump pump and the vertical lines were moved to the north by approximately 2 to 3 feet, such that the vertical lines would be located inside a future wall. AMEC also installed two GAC filter units in the attic adjacent to the blowers to recover HVOCs from the discharge air line.

Site F: 2103 West 28th Street

Changes to the design of the SVVS at this location included installation of a replacement sump pump, a new electrical breaker panel, and movement of the discharge point to the southeast corner of the house along the downspout. AMEC also installed a GAC filter unit and shed enclosure adjacent to the southeast corner of the residence to recover HVOCs from the discharge air line.

4.0 SYSTEM START-UP TESTING

AMEC conducted SVVS start-up tests in the six residences between August and September 2003.

4.1 General Description of Start-Up Tests

Start-up tests began at the Site on August 29, 2003. The general system start-up activities included the following:

- Evaluation of vacuum gauges to observe blower performance and to evaluate for leaks in piping;
- Monitoring noise levels of each SVVS with a dosimeter;
- Photoionization detector (PID) measurements to monitor potential presence of significant levels of organic vapors in the systems;
- Use of differential pressure gauges/air flow sensors in crawlspaces to evaluate for evidence of a pressure drop in the crawlspaces;

- Use of differential pressure gauges in basement influent lines to measure the vacuum in the sub-slab at the recovery screens; and
- Use of differential pressure gauges at up to three monitoring boreholes to measure vacuum influence at various distances from the recovery screens.

4.2 Noise Level Testing Results

Noise level testing was conducted on each SVVS in each of the six residences between August 29 and September 19, 2003. The acceptable noise level for each residence was determined by comparing the sound generated by the SVVS with sound generated by typical household appliances located in the residence (e.g., refrigerator, water heater), and by consideration of the residents' opinion of an acceptable noise level.

Sound level measurements were recorded using a Quest Model Micro 15 Dosimeter. The dosimeter was calibrated each day that measurements were collected. The sound level measurements varied from residence to residence based on the construction of the building (i.e., basement versus crawlspace) and location of the SVVS. The types of sound measurements collected included sound levels inside and outside the residence, in the basement/crawlspace, and in the living space with the blower on and off and with the muffler on and off. The sound level testing in the six residences was observed by a representative from Ecology.

In general, all noise level test results indicated that the sound level increased by only approximately 2 decibels (db) when the blower was turned on in each residence. It also should be noted that the FVN is located near the approach path of commercial jets. The noise from these airplanes is one of the significantly contributing factors for the variances in the ambient sound levels (blower off). The following discussion presents residence-specific sound level measurements.

Site A: 2809 Unander Avenue

Sound level measurements were collected at Site A on August 29, 2003. The ambient sound level measured in the basement was 51.8-52.2 db. With the blower turned on, the sound level measured adjacent to the SVVS was 52.7-53.1 db. The sound levels in the basement reached a maximum of 53.1 db with the blower on. A maximum of 52.2 db was observed in the upstairs living space with the blower on, within the range of ambient sound levels observed in the basement with the blower off.

Site B: 2805 Unander Avenue

Upon SVVS start-up, the sound generated by the blower on the system was considered to be outside that of normal operations. An assessment of the blower indicated that it was defective and required replacement. AMEC promptly returned and replaced the blower. Sound level measurements were collected at Site B on August 29, 2003. The sound level measured in the upstairs living space (directly above the blower, with blower on) was 51.4-51.8 db (within normal ambient range). With the blower turned on, the sound level measured adjacent to the SVVS in the basement was 53.0 db.

Site C: 2206 West 28th Street

Several sound level measurements were collected at Site C on August 29, 2003. The following is a list of the sound level measurements recorded:

- Exterior (within 18 inches of the exhaust port and 6 feet high) with the blower on and the muffler on: 61.2 db;
- Exterior (within 18 inches of the exhaust port and 6 feet high) with the blower on and the muffler off: 64.8-65.2 db;
- Exterior (within 10 feet of the exhaust port and 6 feet high) with the blower on and the muffler on: 55.9 db;
- Interior (room located above blower) with the blower on and the muffler on: 51.9-52.2 db;
- Interior (room located above blower) with the blower off: 51.7-51.9 db; and
- Interior (kitchen near refrigerator) with the blower off: 55.3 db.

When the sound level was measured on the exterior of the residence directly adjacent to the exhaust port with the blower on and the muffler off, the sound level measured was 64.8-65.2 db. The sound level was again measured in the same location with the muffler installed, and the sound level measurement was 61.2 db, indicating a 3-4 db drop in the sound level when the muffler is turned on. In addition, the sound level measurements indicate that the sound generated by the SVVS in the interior of the residence (51.9-52.2 db) is 3-4 db lower than the sound generated by the normal operation of the refrigerator in the kitchen (55.3 db).

Site D: 2202 West 28th Street

Sound level measurements were collected at Site D on August 29, 2003 in the interior of the residence. Two measurements were taken in a bedroom with the crawlspace access door open and at approximately 6 feet above the floor. With the blower off, the sound level measured was 52.1-52.3 db, and with the blower on, the sound level measured was 52.5-52.6 db. A third sound level measurement was collected from the center of the kitchen while the refrigerator was in normal operation and the blower was on. The sound level measured was 52.2-52.4 db. The sound level measurements for the three conditions varied by less than 1 db.

Site E: 2105 West 28th Street

Sound level measurements were collected at various locations in the interior of the residence at Site E on September 3, 2003. A sound level measurement of 51.5 db was collected with the blower off and adjacent to the water heater located in the basement. When the blower was turned on, the sound level measurement was 51.7 db in the same location. Likewise, sound level measurements were collected in the downstairs den with the blower off (51.2 db) and with the blower on (51.5 db). Sound level measurements were collected in the first floor kitchen with the blower off (51.2 db) and with the blower on (51.5 db). Finally, sound level measurements were collected in the closet where the SVVS switches are located with the blower off (51.5 db) and with the blower on (57.8 db). With the exception of the closet, sound level measurements in the various rooms of the residence varied by less than 1 db when the blower was on compared to when it was off.

Site F: 2103 West 28th Street

Sound level measurements were collected at Site F on September 19, 2003. The ambient background sound level in the basement with the blower turned off was 51.5 db. At a location approximately 9 feet from the SVVS, a sound level measurement of 51.9 db was collected with the blower on. A sound level measurement of 52.2 db was collected adjacent to the refrigerator while it was in normal operation and the blower was on. The ambient background sound level collected in the backyard (10 feet from the air discharge point) of the residence with the blower off was 53.0 db. In the same location with the blower on, the sound level measured was 53.2 db (an increase of only 0.2 db). Whether in the interior or on the exterior of the residence, the sound level measurements collected with the blower on versus when it was off varied by less than 0.5 db.

4.3 Vacuum Influence Testing

Vacuum influence testing was conducted on each SVVS to ensure that a vacuum is being generated in the foundations of each residence. According to the EPA's RMS described in Section 2.3, post-mitigation testing should be conducted to verify the integrity of the system and associated piping. In addition, the RMS suggests that testing be conducted between 24 hours and 30 days following installation of the mitigation system.

Vacuum influence testing was conducted between August 29 and September 19, 2003, immediately following installation and activation of the SVVSs in the residences. Three 2-inch boreholes were cored or cut through the basement slab at various distances from the sub-slab recovery screens in four of the six residences. These four residences included: Site A (2809 Unander Avenue); Site B (2805 Unander Avenue); Site E (2105 West 28th Street); and Site F (2103 West 28th Street). Two of the six residences are constructed with a crawlspace foundation and were sealed with visqueen and duct tape prior to the vacuum test. These two residences included Site C (2206 West 28th Street) and Site D (2202 West 28th Street). Vacuum levels were monitored at each residence before and after the SVVSs were activated. AMEC observed vacuum levels rising to equilibrium above ambient conditions at each of the monitoring points. Once equilibrium had been achieved or the vacuum levels exceeded the range of the instruments, AMEC discontinued the test.

The vacuum for the SVVSs was measured using Dwyer magnahelic gauges with ranges from 0 to 0.25" water column (WC) to 0 to 10" WC differential pressure. The Dwyer gauges were calibrated prior to activating the blowers. The vacuum tests conducted in the four residences with basements were observed by a representative from Ecology.

Site A: 2809 Unander Avenue

Vacuum testing was conducted at Site A on August 29, 2003. The three test boreholes were located at 1 foot (Test Port #1), 2 feet (Test Port #2), and 5 feet (Test Port #3) from the underground vent piping. Each test port was equipped with a 0.25-inch magnahelic gauge, which measures the vacuum in inches of water (in H_2O). The SVVS was activated after the gauges were calibrated to ambient conditions. The test was conducted for 20 minutes, and after approximately 2 minutes, a vacuum had been detected in all three boreholes. The vacuum levels in the three boreholes reached steady-state conditions after approximately 3 minutes. At the conclusion of the testing period, the gauges were removed and the test holes filled in with cement.

Site B: 2805 Unander Avenue

Vacuum testing was conducted at Site B on August 29, 2003. The three test boreholes were located at 1 foot (Test Port #1), 3 feet (Test Port #2), and 5 feet (Test Port #3) from the underground vent piping. Each test port was equipped with a 0.25-inch magnahelic gauge. The SVVS was activated after the gauges were calibrated to ambient conditions. The test was conducted for 20 minutes, and after approximately 30 seconds, a vacuum had been detected in Test Ports 1 and 2. Because a vacuum had not registered at Test Port #3 at 5 minutes into the vacuum test, the seal on the sensor assembly was checked and adjusted. The 0.25-inch gauge was changed out for a gauge with a scale of 0-10 in H_2O. Following these modifications, a vacuum registered at Test Port #3. Between 5 and 20 minutes, a significant vacuum registered at all three test ports. At the conclusion of the testing period, the gauges were removed and the test holes were filled in with cement.

Site C: 2206 West 28th Street

The residence at Site C is constructed with a crawlspace foundation. Therefore, prior to the vacuum test, the crawlspace vents were sealed with visqueen and duct tape. After sealing the vents, the SVVS was activated and allowed to run for approximately 30 minutes to induce a measurable pressure differential between the crawlspace and the exterior ambient conditions as measured with a permanent differential pressure gauge installed by the contractor. The results of the vacuum influence testing indicated that a marginal vacuum atmosphere was produced at Site C. The low level of the measured vacuum may be attributed to the inability to seal the crawlspace adequately. AMEC did not expect to observe a significant pressure drop in the crawlspace. A significant pressure drop should not be observed during normal operation.

Site D: 2202 West 28th Street

The residence at Site D is constructed with a crawlspace foundation, and therefore prior to system testing, the crawlspace vents were sealed with visqueen and duct tape. After sealing the vents, the SVVS was activated and allowed to run for approximately 30 minutes to induce a measurable pressure differential between the crawlspace and the exterior ambient conditions as measured with a permanent differential pressure gauge installed by the contractor. The results of the vacuum influence testing indicated that a marginal vacuum atmosphere was produced at Site D. The low level of the measured vacuum may be attributed to the inability to seal the crawlspace adequately. AMEC did not expect to observe a significant pressure drop in the crawlspace. A significant pressure drop should not be observed during normal operation.

Site E: 2105 West 28th Street

Vacuum testing was conducted at Site E on September 3, 2003. The three test boreholes were located at 1 foot (Test Port #1), 2 feet (Test Port #2), and 5 feet (Test Port #3) from the underground vent piping. These test ports were each equipped with

0.25-inch magnahelic gauges. The SVVS was turned on after the gauges were calibrated to ambient conditions (gauges zeroed). As soon as the blowers were started, the gauges immediately registered the maximum values. One of the gauges was replaced with a 10-inch magnahelic gauge, which registered 3.8 in H_2O immediately upon restart of the system. At the conclusion of the testing period, the gauges were removed and the test holes were filled in with cement.

Site F: 2103 West 28th Street

Vacuum testing was conducted at Site F on September 19, 2003. The three test boreholes were located at 1 foot (Test Port #1), 2 feet (Test Port #2), and 3 feet (Test Port #3) from the underground vent piping. Each test port was equipped with a 0.25-inch magnahelic gauge. The SVVS was turned on after the gauges were calibrated to ambient conditions (gauges zeroed). The test was conducted for 30 minutes. A maximum vacuum of 0.01”, 4.5”, and 0.13” WC was observed during the test at Test Ports #1, #2, and #3, respectively. At the conclusion of the testing period, the gauges were removed and the test holes were filled in with cement.

5.0 COMPLIANCE SAMPLING AND REPORTING

AMEC is conducting ongoing compliance sampling and reporting for the SVVSs in the six residences. Generally, the systems have reduced HVOC levels in the residences. To date, AMEC has sampled the indoor air in the six residences following system startup and in January 2004. January was chosen because it is a likely time for homes to be most sealed to the weather, for heating and ventilation systems to be operating at the highest capacity for the year, and for convection mechanisms to be present that may draw vapors into the homes. AMEC’s air sampling and analysis procedures generally follow the same sampling, analysis, and quality assurance/quality control protocols as those outlined in the September 25, 2003 work plan (AMEC, 2003c). Before and during sample collection, observations of meteorological conditions such as barometric pressure, outdoor and indoor air temperature, humidity, and rainfall will be recorded.

As part of the air compliance program, AMEC plans to continue to collect one or more time-weighted samples from each residence on a quarterly basis using 6-liter, evacuated and internally passivated stainless steel Summa canisters. The air samples will be drawn through mechanical flow controllers pre-set for a 24-hour sampling duration. At least one air sample will be collected in a living area (e.g., living room) of each building tested. These samples will be collected near the center of the room where air circulation generally is considered to be greatest and at a height corresponding to a typical breathing zone. The basements or crawlspaces, which constitute probable HVOC infiltration points, also will be sampled.

The air samples will be analyzed for the compounds of interest that include PCE, TCE, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-DCE, cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride.
AMEC will include the results of all testing (to date) in a future report that currently is in preparation.

If you have any questions regarding this report or if you require additional information, please contact the undersigned at (503) 639-3400.

AMEC Earth & Environmental, Inc.

John L. Kuiper, L.G.
Principal

CLC/vla

c: Craig Peterson, Cadet Manufacturing Company
Barbara Trejo, Washington State Department of Health

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LIMITATIONS

This report was prepared exclusively for Cadet Manufacturing Company by AMEC Earth & Environmental, Inc. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This Residential Soil Vapor Vacuum System Installation and Start-Up Report is intended to be used by Cadet Manufacturing Company for the 2500 West Fourth Plain Boulevard facility and vicinity only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

FIGURES

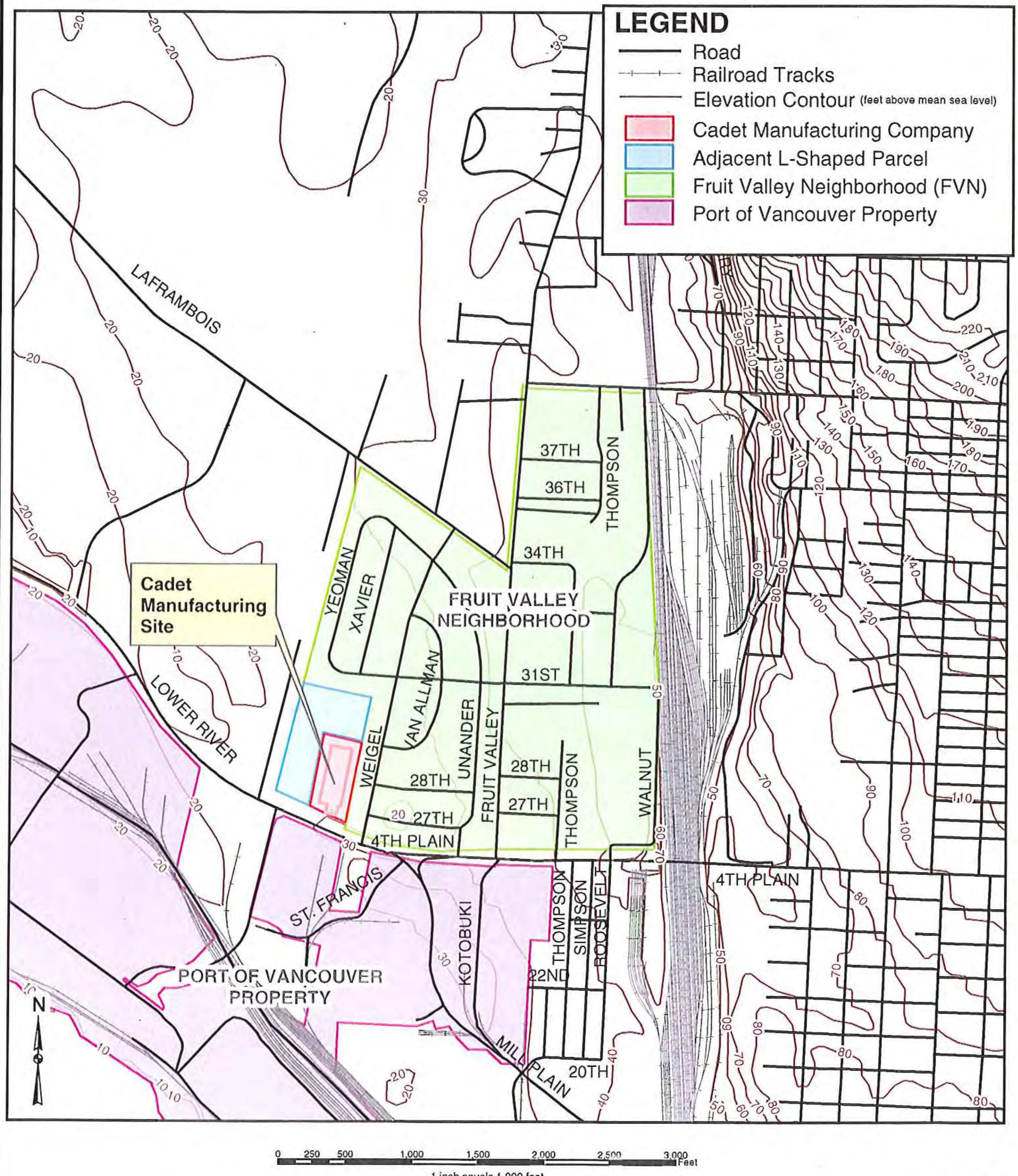


FIGURE 1

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135
DESIGN	BEL
DRAWN	BRJ
DATE	JULY 2003

CADET MANUFACTURING CO.
2500 W FOURTH PLAIN BLVD.
VANCOUVER, WASHINGTON

PROJECT AREA LOCATION

K:\10000\10100\10135\DWG\arcview\FVN Indoor Air\New Phase\Figure 1 Project Area Location.mxd

TAXLOTS AND RAILROAD THEMES FROM CLARK COUNTY GIS DATABASE.

FIGURE 2

amec

7376 SW Durham Road
Portland, OR, U.S.A. 97224

W.O.	3-61M-10135
DESIGN	KL
DRAWN	BRJ/LEM
DATE	MARCH 2004

CADET MANUFACTURING CO.
2500 W. FOURTH PLAIN BOULEVARD
VANCOUVER, WASHINGTON

SOIL VAPOR VACUUM SYSTEM SITES A-F

K:\10000\10100\10135\DWG\arcview\FVN Indoor Air\New Phase\Figure 2 SVVS SITES A-F.mxd

amec

APPENDIX A

Asbestos Sample Results and
Chain-of-Custody Documentation

RJ Lee *Group*, Inc.

530 McCormick Street• San Leandro, CA 94577
(510) 567-0480 • FAX (510) 567-0488

RECEIVED AUG 2 8 2003

August 15, 2003

John Loomis
Amec Earth & Environmental
1376 SW Durham Road
Portland, OR 97224

RE: PLM Standard Asbestos Analysis Results for Samples as Shown on Test Report
RJLeeGroup, Inc. Job No.: AOC308199
Client P.O./Job Number: 361M10135-E
Client Job Name/Location: 2206 W. 28th Street.

Dear Mr.Loomis,

Enclosed are the results from the polarized light microscopy (PLM) asbestos analysis of the above referenced sample(s). Sample(s) were analyzed in accordance with guidelines set forth in the Method for the Determination of Asbestos in Bulk Insulation Samples (EPA/Method 600/R-93/116)

Test Report lists each sample identification number, gross sample description, sample location, type(s) and concentration of asbestos, type(s) and concentration of nonasbestos fibers, major components and concentration of nonfibrous material (NFM), sample run date, analyst, sample homogeneity, and a layer breakdown if applicable. All concentrations are given in area percents (visual estimation).

RJ Lee Group, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) (NVLAP Participant Number 1208-2) for bulk asbestos fiber analysis (PLM), and by the California Department of Health Services, Environmental Laboratory Accreditation Program (CALELAP) for bulk asbestos analysis. Neither the NVLAP Accreditation of this laboratory nor this report may be used to claim product endorsement by NVLAP or any agency of the United States government. The results reported relate only to the items tested. The report shall not be reproduced except in full.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the sample(s) covered by this report, RJ Lee Group will store the sample(s) for a period of ninety (90) days before discarding. A shipping and handling fee will be assessed for the return of any sample(s).

If you have any questions on this report or if RJ Lee Group, Inc. can be of further assistance, please do not hesitate to call.

Sincerely,

Scott Stotler
Geologist

SS/hme
Enclosure

Test Report - Amec Earth & Environmental

Polarized Light Microscopy Analysis Results

Project AOC308199

Sample Number / Sample Appearance	Client Sample Number	Asbestos: Chrysotile	Asbestos: Amosite	Asbestos: Crocidolite	Asbestos: Anthophyllite	Asbestos: Tremolite	Asbestos: Actinolite	Nonasbestos: Cellulose	Nonasbestos: Mineral Wool	Nonasbestos: Fibrous Glass	Nonasbestos: Synthetic Fibers	Nonasbestos: Other Fibers	NonFibrous Material	Run Date Analyst
0046489CPL White flooring ; wht. mastic	2206-01	-	-	-	-	-	-	<1 %	-	-	-	-	99+ % Non Homogeneous	8/15/03 SS
						NFM: Qtz, Carb, Binder, Opaq, Misc. Part.								
0046490CPL Brown flooring ; no mastic	2206-02	-	-	-	-	-	-	10 %	-	5 %	-	-	85 % Homogeneous	8/15/03 SS
						NFM: Qtz, Carb, Binder, Opaq, Misc. Part.								

Samples received on: Wednesday, August 13, 2003

Authorized Signature

Scott Stotler, Geologist

Date Friday, August 15, 2003

RJ Lee Group, Inc.
Bay Area Lab

530 McCormick Street
San Leandro, CA 94577

Phone (510) 567-0480
Fax (510) 567-0488

RJ Lee *Group*, Inc.

530 McCormick Street• San Leandro, CA 94577
(510) 567-0480 • FAX (510) 567-0488

August 15, 2003

John Loomis
Amec Earth & Environmental
1376 SW Durham Road
Portland, OR 97224

RE: PLM Standard Asbestos Analysis Results for Samples as Shown on Test Report
RJLeeGroup, Inc. Job No.: AOC308200
Client P.O./Job Number: 361M-10135-E
Client Job Name/Location: 2805 Unander Avenue.

Dear Mr.Loomis,

Enclosed are the results from the polarized light microscopy (PLM) asbestos analysis of the above referenced sample(s). Sample(s) were analyzed in accordance with guidelines set forth in the Method for the Determination of Asbestos in Bulk Insulation Samples (EPA/Method 600/R-93/116)

Test Report lists each sample identification number, gross sample description, sample location, type(s) and concentration of asbestos, type(s) and concentration of nonasbestos fibers, major components and concentration of nonfibrous material (NFM), sample run date, analyst, sample homogeneity, and a layer breakdown if applicable. All concentrations are given in area percents (visual estimation).

RJ Lee Group, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) (NVLAP Participant Number 1208-2) for bulk asbestos fiber analysis (PLM), and by the California Department of Health Services, Environmental Laboratory Accreditation Program (CALELAP) for bulk asbestos analysis. Neither the NVLAP Accreditation of this laboratory nor this report may be used to claim product endorsement by NVLAP or any agency of the United States government. The results reported relate only to the items tested. The report shall not be reproduced except in full.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions and no responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified in writing to return the sample(s) covered by this report, RJ Lee Group will store the sample(s) for a period of ninety (90) days before discarding. A shipping and handling fee will be assessed for the return of any sample(s).

If you have any questions on this report or if RJ Lee Group, Inc. can be of further assistance, please do not hesitate to call.

Sincerely,

Scott Stotler
Geologist

SS/hme
Enclosure

Test Report - Amec Earth & Environmental

Polarized Light Microscopy Analysis Results

Project AOC308200

Sample Number / Sample Appearance	Client Sample Number	Asbestos: Chrysotile	Asbestos: Amosite	Asbestos: Crocidolite	Asbestos: Anthophyllite	Asbestos: Tremolite	Asbestos: Actinolite	Nonasbestos: Cellulose	Nonasbestos: Mineral Wool	Nonasbestos: Fibrous Glass	Nonasbestos: Synthetic Fibers	Nonasbestos: Other Fibers	NonFibrous Material	Run Date / Analyst
0046491CPL Grey plaster	2805-01	-	-	-	-	-	-	<1 %	-	-	-	-	99+ % Homogeneous	8/15/03 SS
						NFM: Qtz, Carb, Opaq, Mica, Misc. Part.								
0046492CPL White wallboard	2805-02	-	-	-	-	-	-	5 %	-	-	-	-	95 % Homogeneous	8/15/03 SS
						NFM: Qtz, Carb, Opaq, Gyp, Mica, Misc. Part.								
0046493CPL Black roofing material	2805-03	-	-	-	-	-	-	20 %	-	-	10 %	-	70 % Homogeneous	8/15/03 SS
						NFM: Qtz, Tar, Carb, Opaq, Misc. Part.								
0046494CPL Black roofing material	2805-04	-	-	-	-	-	-	20 %	-	-	10 %	-	70 % Homogeneous	8/15/03 SS
						NFM: Qtz, Carb, Opaq, Gyp, Mica, Misc. Part.								
0046495CPL Black roofing material	2805-05	-	-	-	-	-	-	30 %	-	-	-	-	70 % Homogeneous	8/15/03 SS
						NFM: Qtz, Tar, Carb, Opaq, Misc. Part.								
0046496CPL Black roofing material	2805-06	-	-	-	-	-	-	30 %	-	-	-	-	70 % Homogeneous	8/15/03 SS
						NFM: Qtz, Tar, Carb, Opaq, Misc. Part.								

Samples received on: Wednesday, August 13, 2003

Authorized Signature

Scott Stotler, Geologist

Date Friday, August 15, 2003

RJ Lee Group, Inc.
Bay Area Lab

530 McCormick Street
San Leandro, CA 94577

Phone (510) 567-0480
Fax (510) 567-0488

A0C308200

RJ Lee *Group*, Inc. Sample Transmittal Form

Page [ ] of [ ]

Comp Addr Ph	AMEC Earth & Environmental, Inc. 7376 SW Durham Road Portland, Oregon 97224 Attn: John Loomis Phone: 503-639-3400 / Fax: 503-620-7892 E-mail: john.loomis@amec.com	Analysis Type: PLM BULK Turn Around Time: ☒ 8 Hours ☐ 24 Hours ☐ 72 Hours ☐ 3-5 Days ☐ Other

P.O. No.: 361 M-10135-E Job No.:

Project Name/Location: 2805 Ulander Ave

Sampled By: John Loomis Date: 8/14/03

Date: 8/13/2003	Description: Plaster Outer layer
Sample Number: 2805-01	Location: Bathroom Wall
Date: 8/13/2003	Description: Plaster 2nd layer
Sample Number: 2805-02	Location: Bathroom Wall Plaster behind metal lath
Date: 8/13/2003	Description: Top layer
Sample Number: 2805-03	Location: Roofing
Date: 8/13/2003	Description: 2nd layer
Sample Number: 2805-04	Location: Roofing
Date: 8/13/2003	Description: 3rd layer
Sample Number: 2805-05	Location: Roofing
Date: 8/13/2003	Description: 4th Bottom layer.
Sample Number: 2805-06	Location: Roofing
Date:	Description:
Sample Number:	Location:
Date:	Description: RUSH!!
Sample Number:	Location:

Chain of Custody:

Date:	Time:	Relinquished By:	Company:	Recieved By:	Company:
8/14/03	10:30	John Loomis	AMEC	Yaltayn @ 10:15	

Samples Accepted: ☐ Yes ☐ No

Reason Rejected:

RJ LeeGroup, Inc.

Fax Transmittal

530 McCormick Street San Leandro, CA 94577
(510) 567-0480 • Fax (510) 567-0488

TO: John Loomis

Company: Amec Earth & Environmental

FAX: (503) 620-7892

From: Michelle Edwards

Date: Friday, August 15, 2003

RE: 361M-10135-E
AOC308200
361M-10135-E

Total Number of Pages Being Transmitted (including cover page): 3

MESSAGE:

Analysis Requested: PLM Standard

Number of Samples Received: 6

Number of Samples Analyzed: 6

Comments:

A0C308200

RJ Lee Group, Inc. Sample Transmittal Form

Page [ ] of [ ]

Comp
Addr
Ph

AMEC Earth & Environmental, Inc.
7376 SW Durham Road
Portland, Oregon 97224
Attn: John Loomis
Phone: 503-639-3400 / Fax: 503-620-7892
E-mail: john.loomis@amec.com

Analysis Type	Turn Around Time
PLM BULK	☒ 8 Hours ☐ 24 Hours ☐ 72 Hours ☐ 3-5 Days ☐ Other:

P.O. No.: 361 M-10135-E
Job No.:
Project Name/Location: 2805 Uncander Ave
Sampled By: John Loomis
Date: 8/15/2003

Date: 8/13/2003	Description: Plaster Outer layer
Sample Number: 2805-01	Location: Bothroom wall
Date: 8/13/2003	Description: Plaster 2nd layer
Sample Number: 2805-02	Location: Bathroom wall Plaster behind metal lath
Date: 8/13/2003	Description: Top layer
Sample Number: 2805-03	Location: Roofing
Date: 8/13/2003	Description: 2nd layer
Sample Number: 2805-04	Location: Roofing
Date: 8/13/2003	Description: 3rd layer
Sample Number: 2805-05	Location: Roofing
Date: 8/13/2003	Description: 4th Bottom layer
Sample Number: 2805-06	Location: Roofing
Date:	Description:
Sample Number:	Location:
Date:	Description: RUSH!!
Sample Number:	Location:

Chain of Custody:

Date:	Time:	Relinquished By:	Company:	Recieved By:	Company:
8/14/03	10:30	John Loomis	AMEC	Yaitryn @10:10	

Samples Accepted: ☐ Yes ☐ No
Reason Rejected:

Test Report - Amec Earth & Environmental

Polarized Light Microscopy Analysis Results

Project AOC308200

Sample Number / Sample Appearance	Client Sample Number	Asbestos: Chrysotile	Asbestos: Amosite	Asbestos: Crocidolite	Asbestos: Anthophyllite	Asbestos: Tremolite	Asbestos: Actinolite	Nonasbestos: Cellulose	Nonasbestos: Mineral Wool	Nonasbestos: Fibrous Glass	Nonasbestos: Synthetic Fibers	Nonasbestos: Other Fibers	NonFibrous Material	Run Date Analyst
0046491CPL	2805-01	-	-	-	-	-	-	<1 %	-	-	-	-	99+ %	8/15/03
Grey plaster						NFM: Qtz, Carb, Opaq, Mica, Misc. Part.							Homogeneous	SS
0046492CPL	2805-02	-	-	-	-	-	-	5 %	-	-	-	-	95 %	8/15/03
White wallboard						NFM: Qtz, Carb, Opaq, Gyp, Mica, Misc. Part.							Homogeneous	SS
0046493CPL	2805-03	-	-	-	-	-	-	20 %	-	-	10 %	-	70 %	8/15/03
Black roofing material						NFM: Qtz, Tar, Carb, Opaq, Misc. Part.							Homogeneous	SS
0046494CPL	2805-04	-	-	-	-	-	-	20 %	-	-	10 %	-	70 %	8/15/03
Black roofing material						NFM: Qtz, Carb, Opaq, Gyp, Mica, Misc. Part.							Homogeneous	SS
0046495CPL	2805-05	-	-	-	-	-	-	30 %	-	-	-	-	70 %	8/15/03
Black roofing material						NFM: Qtz, Tar, Carb, Opaq, Misc. Part.							Homogeneous	SS
0046496CPL	2805-06	-	-	-	-	-	-	30 %	-	-	-	-	70 %	8/15/03
Black roofing material						NFM: Qtz, Tar, Carb, Opaq, Misc. Part.							Homogeneous	SS

Samples received on: Wednesday, August 13, 2003

Authorized Signature

Scott Stotler, Geologist

Date Friday, August 15, 2003

RJ Lee Group, Inc.
Bay Area Lab

530 McCormick Street
San Leandro, CA 94577

Phone (510) 567-0480
Fax (510) 567-0488

A0C308199

RJ Lee Group Inc. Sample Transmittal Form

Page [ ] of [ ]

Company / Address / Phone		Analysis Type	Turn Around Time
Comp Add: Ph	AMEC Earth & Environmental, Inc. 7376 SW Durham Road Portland, Oregon 97224 Attn: John Loomis Phone: 503-639-3400 / Fax: 503-620-7892 E-mail: john.loomis@amec.com	PLM BULK	☒ 8 Hours ☐ 24 Hours ☐ 72 Hours ☐ 3-5 Days ☐ Other

P.O. No.: 26AA 10135-F Job No.:
Project Name/Location: 2206 W 28th ST
Sampled By: John Loomis Date:

Date: 8/13/2003	Description: Vinyl sheet flooring 1st layer
Sample Number: 2206-01	Location: behind cloths washer
Date: 8/13/2003	Description: Vinyl sheet flooring 2nd layer
Sample Number: 2206-02	Location: behind cloth washer
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:

Chain of Custody:

Date:	Time:	Relinquished By:	Company:	Received By:	Company:
8/14/03	1020	John Loomis		[illegible] 10:15	

Samples Accepted: ☐ Yes ☐ No
Reason Rejected:

Test Report - Amec Earth & Environmental

Polarized Light Microscopy Analysis Results

Project AOC308199

Sample Number / Sample Appearance	Client Sample Number	Asbestos: Chrysotile	Amosite	Crocidolite	Anthophyllite	Tremolite	Actinolite	Nonasbestos: Cellulose	Mineral Wool	Fibrous Glass	Synthetic Fibers	Other Fibers	NonFibrous Material	Run Date Analyst
0046489CPL White flooring ; wht. mastic	2206-01	-	-	-	-	-	-	<1 %	-	-	-	-	99+ %	8/15/03 SS
						NFM: Qtz, Carb, Binder, Opaq, Misc. Part.							Non Homogeneous	
0046490CPL Brown flooring ; no mastic	2206-02	-	-	-	-	-	-	10 %	-	5 %	-	-	85 %	8/15/03 SS
						NFM: Qtz, Carb, Binder, Opaq, Misc. Part.							Homogeneous	

Samples received on: Wednesday, August 13, 2003

Authorized Signature

Date

Scott Stotler, Geologist
Friday, August 15, 2003

RJ Lee Group, Inc.
Bay Area Lab

530 McCormick Street
San Leandro, CA 94577

Phone (510) 567-0480
Fax (510) 567-0488

A0C308199

RJ Lee Group, Inc. Sample Transmittal Form

Page [ ] of [ ]

Company: AMEC Earth & Environmental, Inc.
Address: 7376 SW Durham Road
Portland, Oregon 97224
Attn: John Loomis
Phone: 503-639-3400 / Fax: 503-620-7892
E-mail: john.loomis@amec.com

Analysis Type	Turn Around Time
PLM BULK	☒ 8 Hours ☐ 24 Hours ☐ 72 Hours ☐ 3-5 Days ☐ Other

P.O. No.: 3614 10135-E Job No.:
Project Name/Location: 2206 W 28th ST
Sampled By: John Loomis Date:

Date: 8/13/2003	Description: Vinyl sheet flooring 1st layer
Sample Number: 2206-01	Location: behind cloths washer
Date: 8/13/2003	Description: Vinyl sheet flooring, 2nd layer
Sample Number: 2206-02	Location: behind cloth washer
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:
Date:	Description:
Sample Number:	Location:

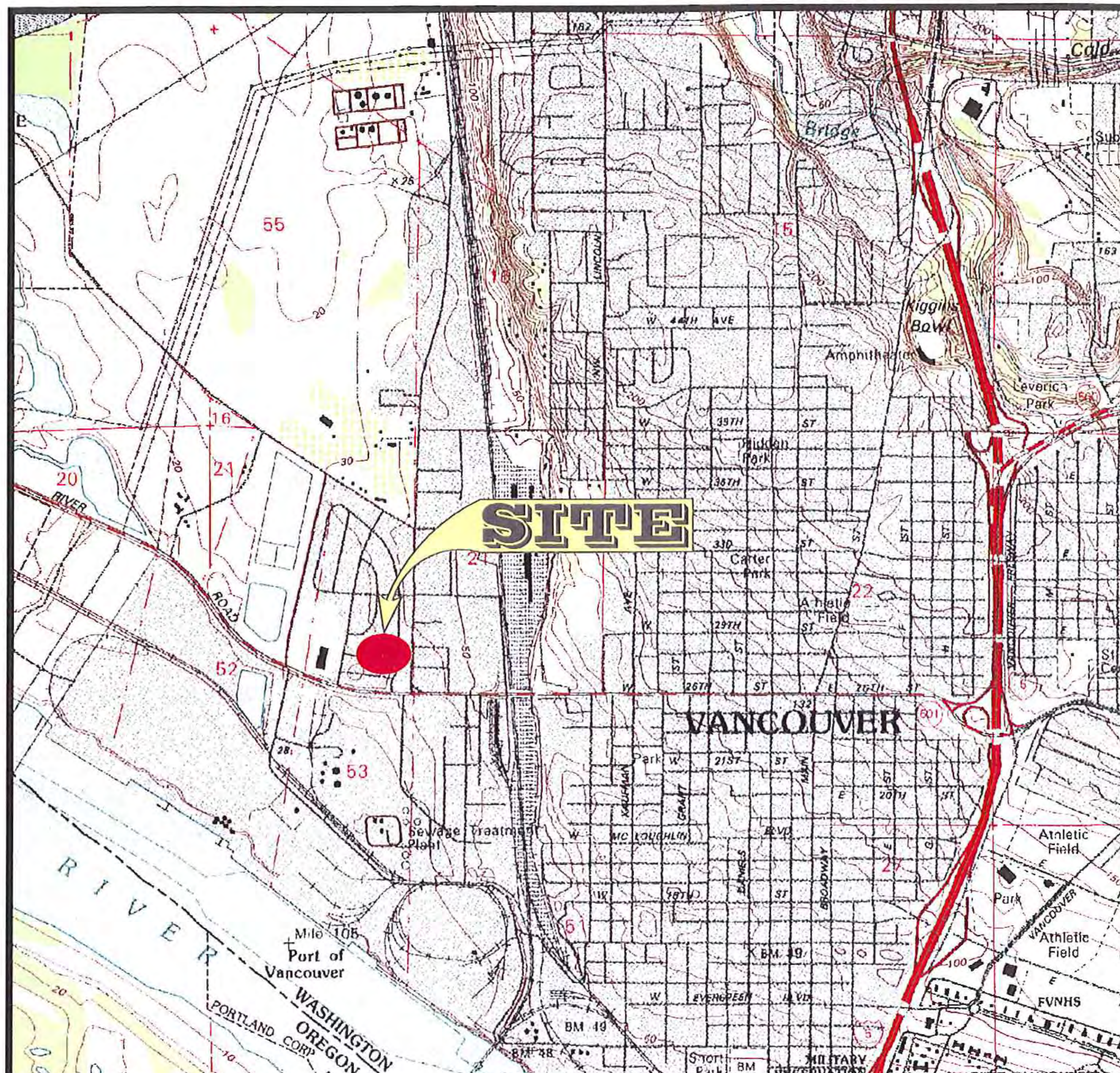
Chain of Custody:

Date:	Time:	Relinquished By:	Company:	Recieved By:	Company:
8/14/2003	1000	John Loomis		[illegible] @ 10:15	

Samples Accepted: ☐ Yes ☐ No
Reason Rejected:

APPENDIX B

Vapor Mitigation As-Built Drawings



VANCOUVER, WA-OR
45122-F6-TF-024
1990
DMA 1475 II NW-SERIES V891

WASHINGTON
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty — Light-duty — U.S. Route — State Route
Medium-duty — Unimproved dirt — Interstate Route

SCALE 1 : 24,000
1 — 1/2 — 0 — 1 MILE
1000 — 0 — 1000 — 2000 — 3000 — 4000 — 5000 — 6000 — 7000 FEET

N

FRUIT VALLEY NEIGHBORHOOD SIX RESIDENCES SOIL VAPOR VACUUM SYSTEMS

AS-BUILT DRAWINGS

UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

INDEX OF DRAWINGS

SHEET NUMBER	DESCRIPTION
GENERAL	
G-1	COVER PAGE
CIVIL	
C-1A	SYSTEM LAYOUT - SITE A
C-2A	SYSTEM LAYOUT - SITE B
C-3A	SYSTEM LAYOUT - SITE C
C-4A	SYSTEM LAYOUT - SITE D
C-5A	SYSTEM LAYOUT - SITE E
C-6A	SYSTEM LAYOUT - SITE F
C-1B	SYSTEM SCHEMATIC / TRENCH SECTION - SITE A
C-2B	SYSTEM SCHEMATIC / TRENCH SECTION - SITE B
C-3B	SYSTEM SCHEMATIC - SITE C
C-4B	SYSTEM SCHEMATIC - SITE D
C-5B	SYSTEM SCHEMATIC / TRENCH SECTION - SITE E
C-6B	SYSTEM SCHEMATIC / TRENCH SECTION - SITE F
C-1C	SITE PHOTOGRAPHS - SITE A
C-2C	SITE PHOTOGRAPHS - SITE B
C-3C	SITE PHOTOGRAPHS - SITE C
C-4C	SITE PHOTOGRAPHS - SITE D
C-5C	SITE PHOTOGRAPHS - SITE E
C-5D	SITE PHOTOGRAPHS - SITE E
C-6C	SITE PHOTOGRAPHS - SITE F

SITE INDEX
SITE A - 2809 UNANDER AVENUE
SITE B - 2805 UNANDER AVENUE
SITE C - 2206 WEST 28th STREET
SITE D - 2202 WEST 28th STREET
SITE E - 2105 WEST 28th STREET
SITE F - 2103 WEST 28th STREET

NOTE

PHOTOGRAPHS IN PLANS ARE PRE-CONSTRUCTION BUT INCLUDE "AS-BUILT" ANNOTATIONS OF ALL INSTALLED SYSTEMS.

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

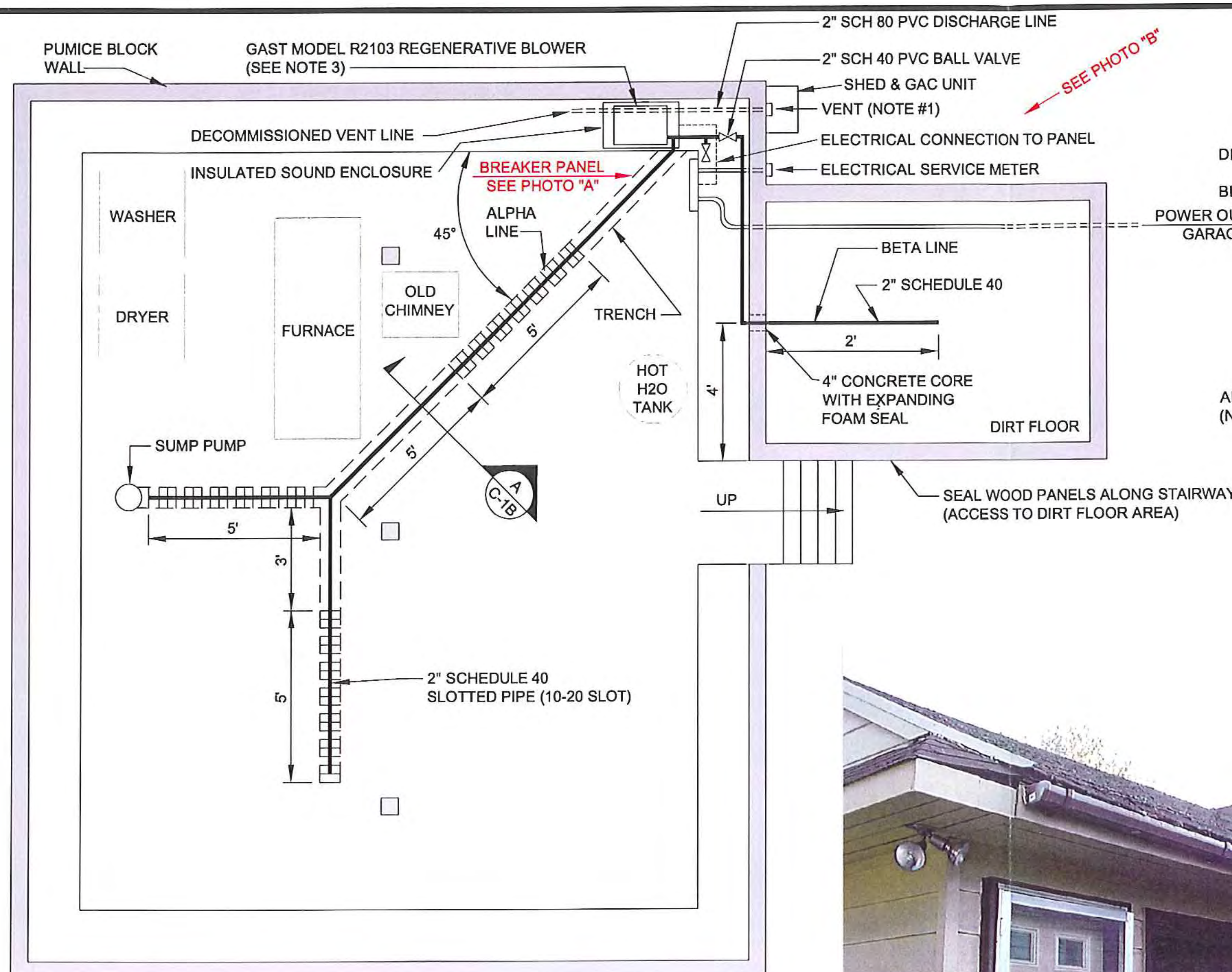
FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

amec
7376 S.W. DURHAM ROAD
PORTLAND, OR 97224

SCALE:	NTS	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

COVER PAGE — FIGURE G-1

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG G-1 COVER PAGE. DWG



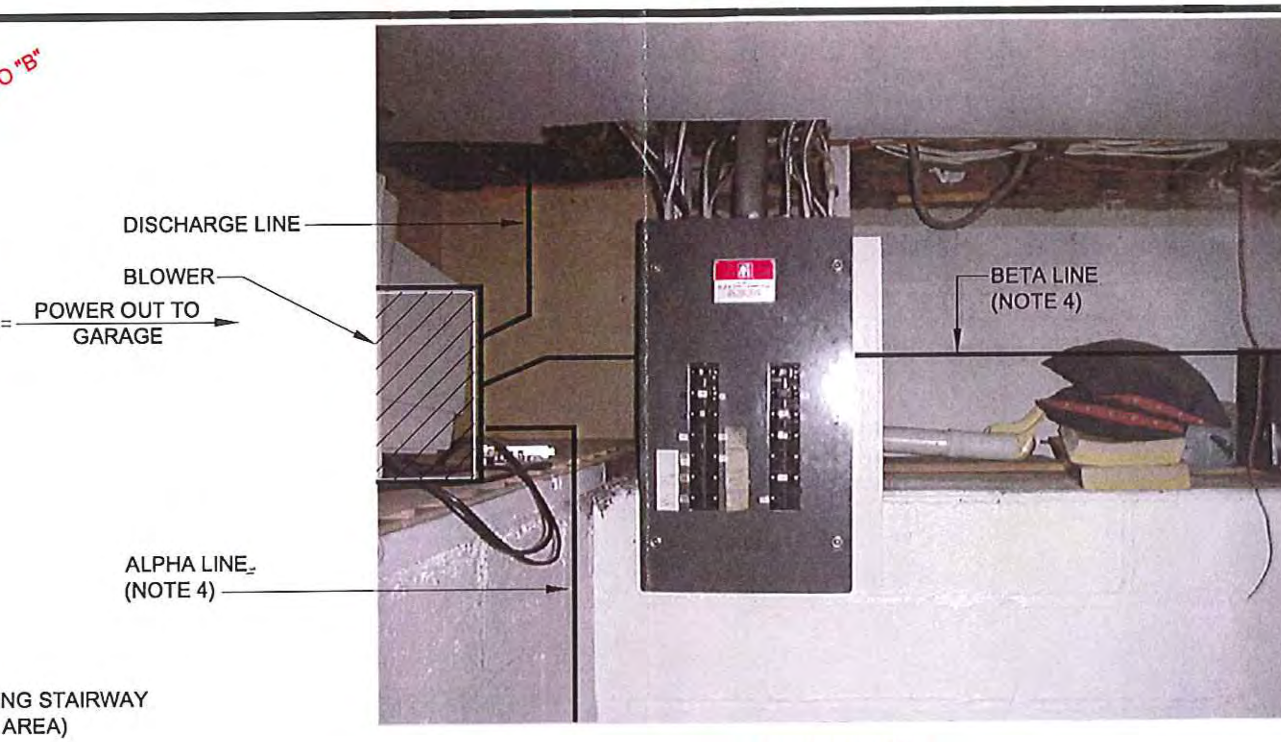


PHOTO "A"

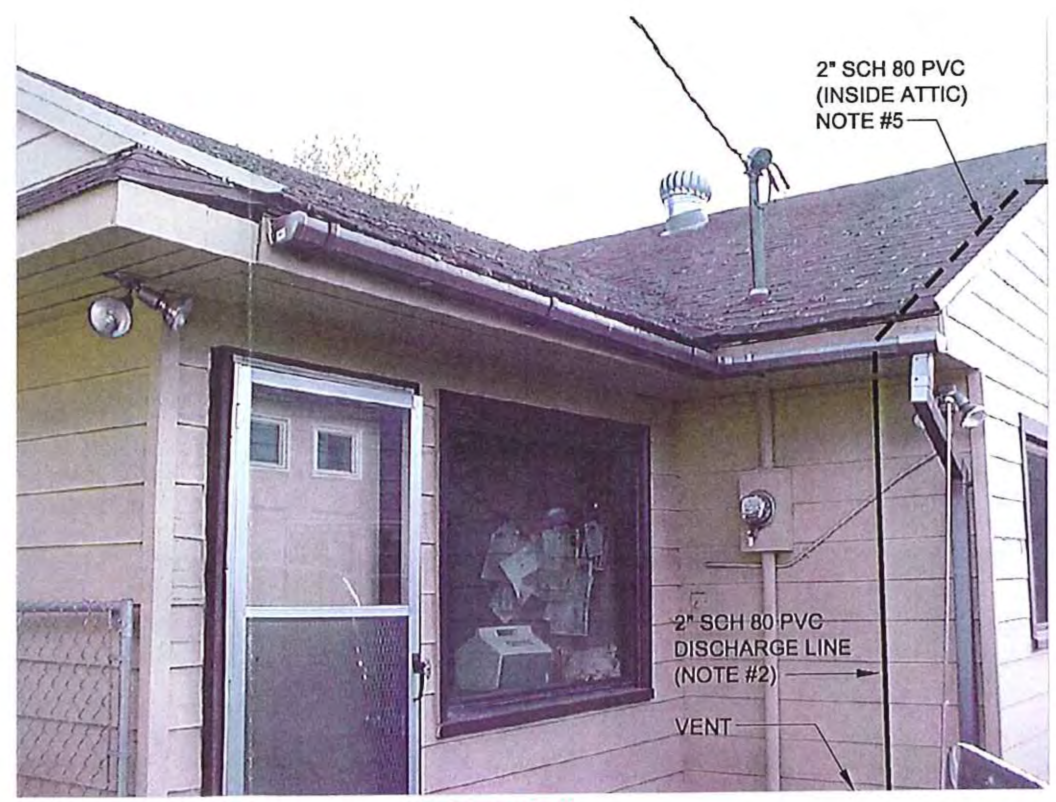


PHOTO "B"

N

SITE A - 2809 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1	MINOR EDITS	HR/ 7-25-03

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

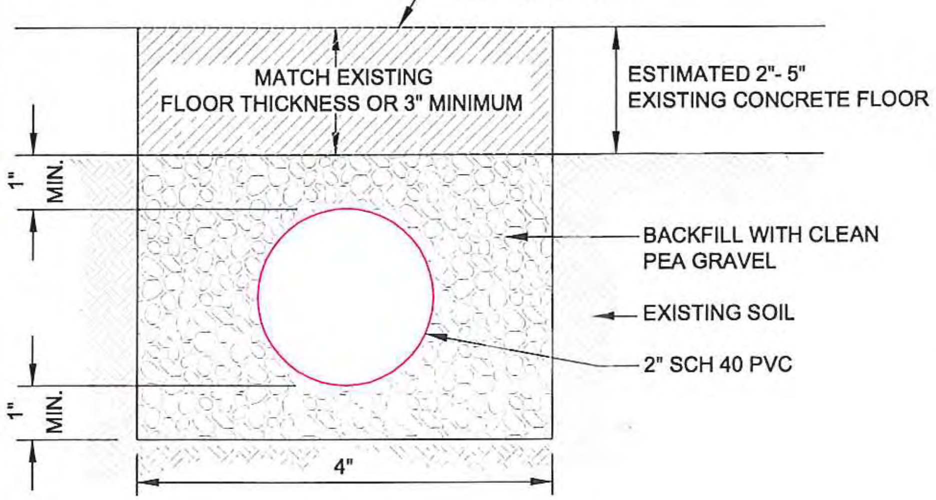
amec

7376 S.W. DURHAM ROAD
PORTLAND, OR 97224

SCALE:	1"=4'-0"	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM LAYOUT — FIGURE C-1A

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-1A. DWG



A
C-1B
TRENCH SECTION
NOT TO SCALE

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTING BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

3) BLOWER IS MOUNTED ON BASEMENT LEDGE WITH SWITCHES AND GAUGES LOCATED IN EASILY ACCESSIBLE LOCATIONS WITHIN 24" OF THE BLOWER.

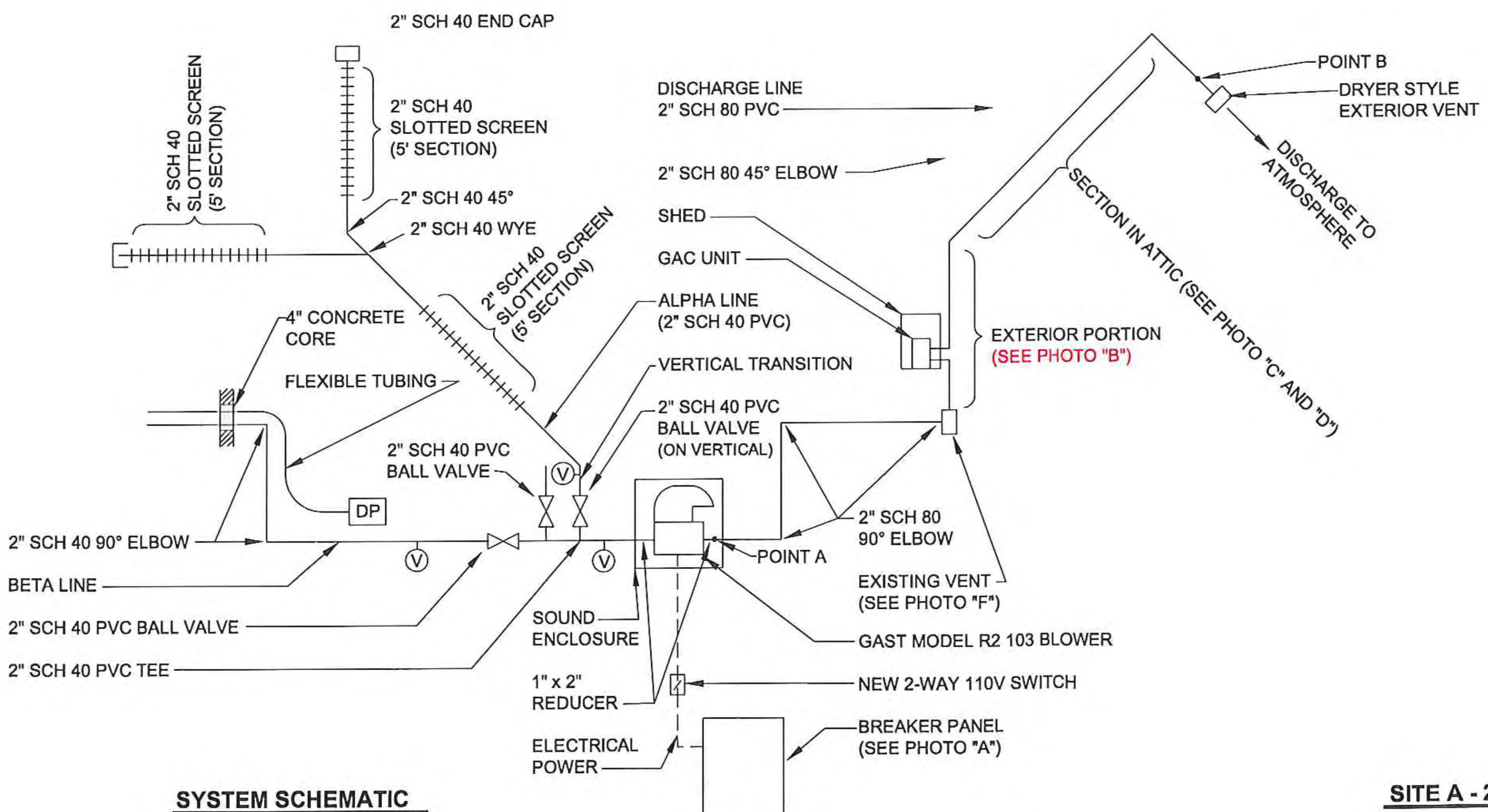
4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) - RIGID FOAM. THE RIGID FOAM IS A MINIMUM OF 1" FOR EVERY SOUND ENCLOSURE CONSTRUCTED UNDER THIS CONTRACT (SITES A - F).

5) V VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

6) THE EXISTING BREAKER PANEL WAS REPLACED TO ACCOMODATE THE BLOWER'S ELECTRICAL REQUIRMENTS.

7) DP DYWER MODEL 300 DURABLOCK SOLID PLASTIC STATIONARY GAGES.

8) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.



SYSTEM SCHEMATIC
NOT TO SCALE

SITE A - 2809 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

amec
7376 S.W. DURHAM ROAD
PORTLAND, OR 97224

SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM SCHEMATIC
TRENCH SECTION

FIGURE
C-1B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-1B. DWG

DRYER STYLE EXTERIOR VENT

PHOTO "A"

VIEW OF BREAKER PANEL

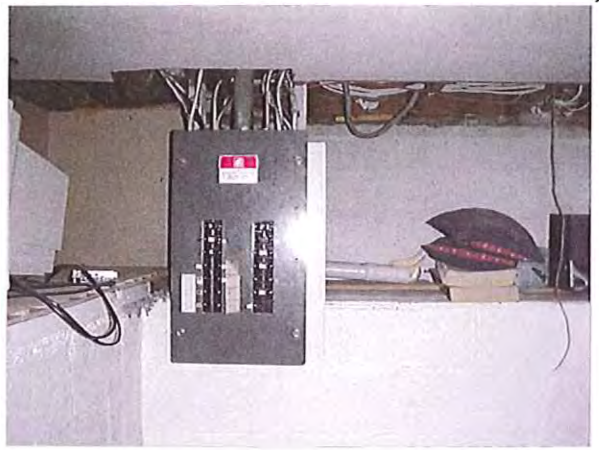


PHOTO "C"

VIEW OF ATTIC SPACE - 1

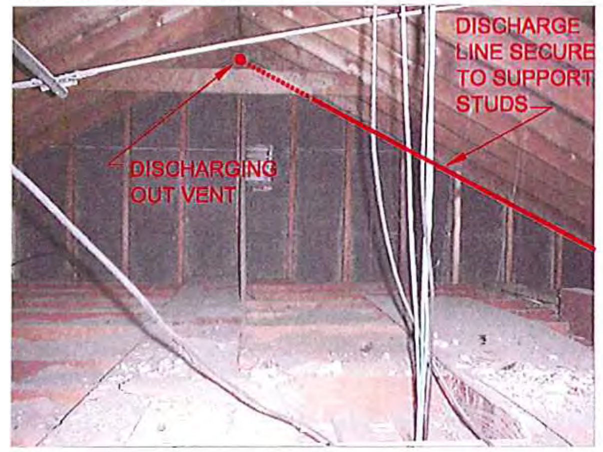


PHOTO "D"

VIEW OF ATTIC SPACE - 2

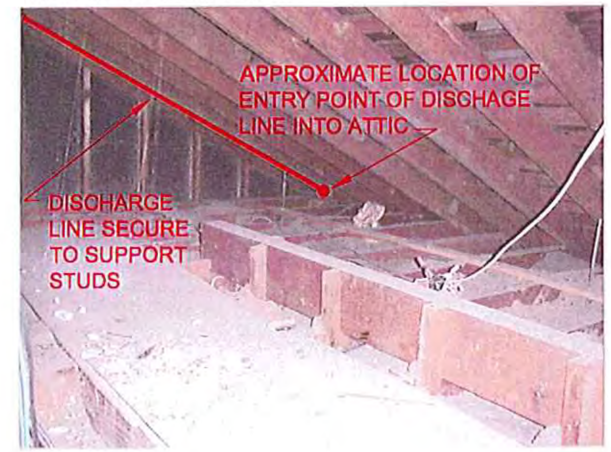


PHOTO "E"

VIEW OF BREAKER PANEL AND LEDGE

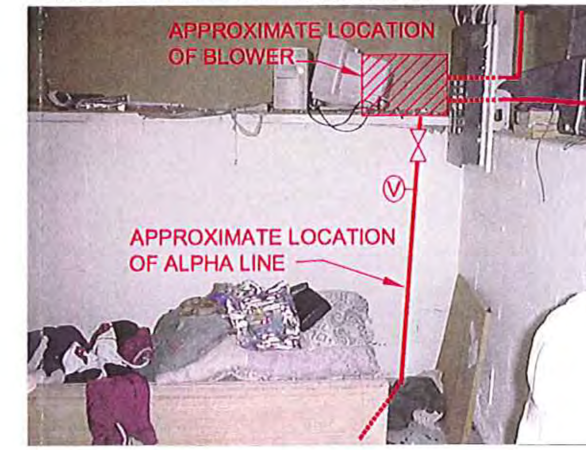


PHOTO "F"

VIEW OF OUTSIDE VENT

PHOTO "G"

VIEW OF BASEMENT

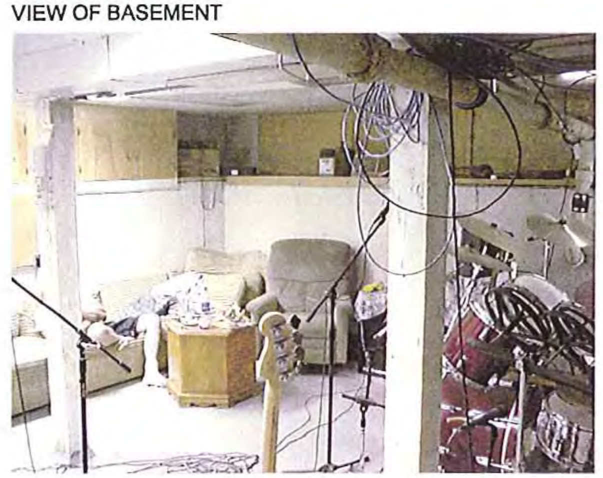


PHOTO "H"

VIEW OF SUMP LINE

SEWER LINE

SUMP LINE

SUMP

DISCHARGE POINT

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

amec

7376 S.W. DURHAM ROAD
PORTLAND, OR 97224

SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

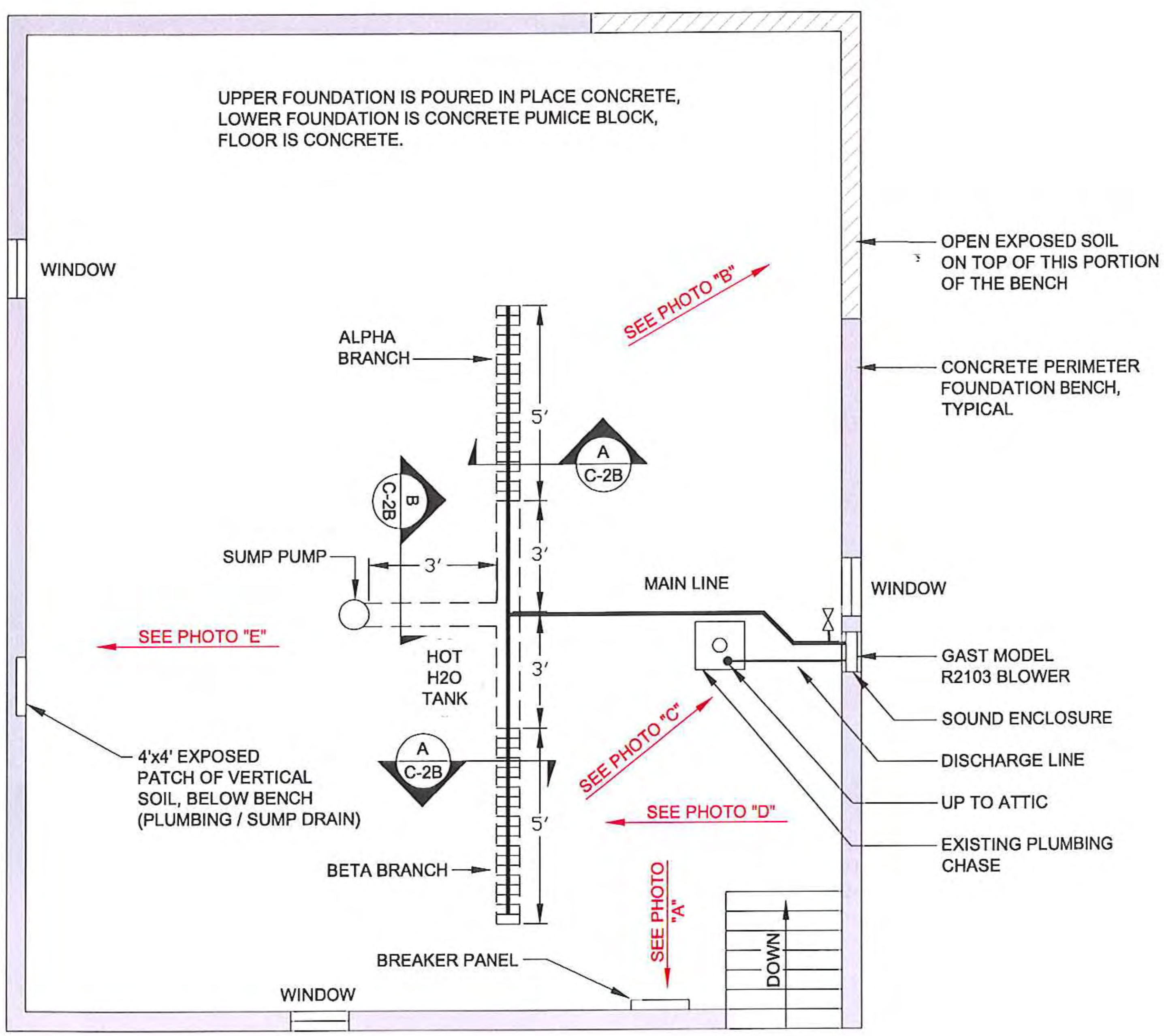
SITE A - 2809 UNANDER AVENUE

SITE PHOTOGRAPHS

FIGURE C-1C

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-1C. DWG

NOTES:
1) GAC UNIT WAS INSTALLED IN THE ATTIC. SEE C-2B.



SITE B - 2805 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

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7378 S.W. DURHAM ROAD
PORTLAND, OR 97224

SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE LAYOUT — FIGURE C-2A

PHOTO "A"

VIEW OF BREAKER PANEL

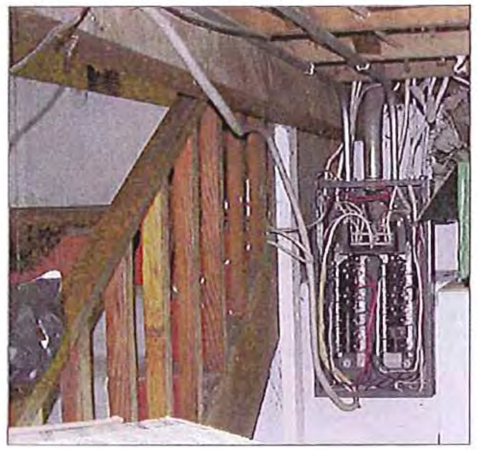
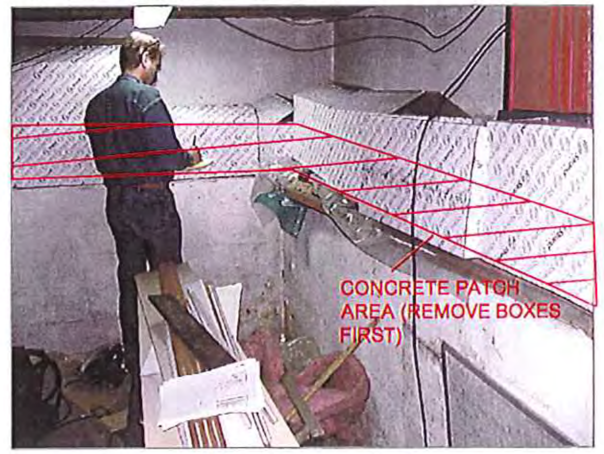


PHOTO "B"

VIEW OF CONCRETE PATCH AREA



1) THE CONCRETE PATCH WAS A MINIMUM THICKNESS OF 2" AND MATCHES THE EXISTING GRADE OF THE ADJACENT CONCRETE BENCH.

2) A PLASTIC VAPOR BARRIER (AT LEAST 6 MIL) WAS INSTALLED PRIOR TO PLACING CONRETE.

PHOTO "C"

VIEW OF PLUMBING CHASE

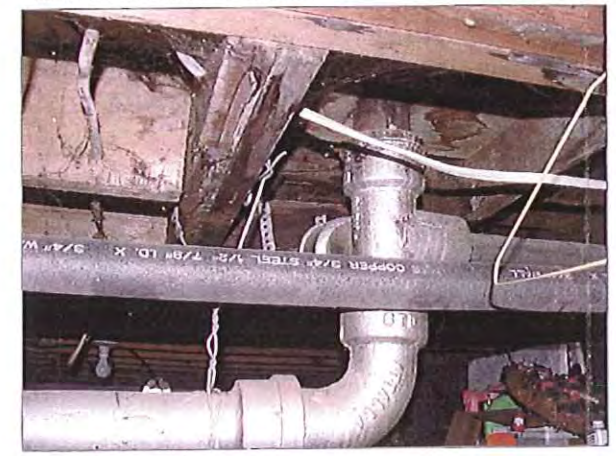


PHOTO "D"

VIEW OF BASEMENT

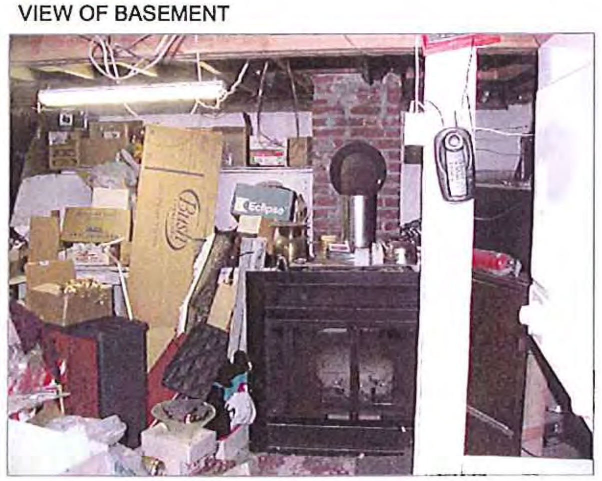
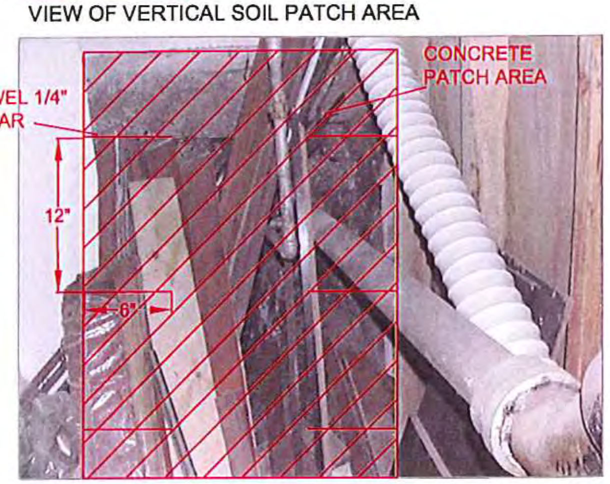


PHOTO "E"

VIEW OF VERTICAL SOIL PATCH AREA



1) CONTRACTOR INSTALLED A VERTICAL CONCRETE PATCH OVER THE EXPOSED AREA.

2) REBAR DOWELS (1/4") INSTALLED AT INTERVALS OF 12" ALONG EACH SIDE OF THE PATCH AREA.

3) THE DOWELS EXTEND A MINIMUM OF 6" INTO THE PATCH AREA AND WERE SET A MINIMUM OF 6" INTO THE EXISTING (ADJOINING) CONCRETE WALL.

4) THE CONCRETE PATCH AREA IS A MINIMUM OF 3" THICK.

SITE B - 2805 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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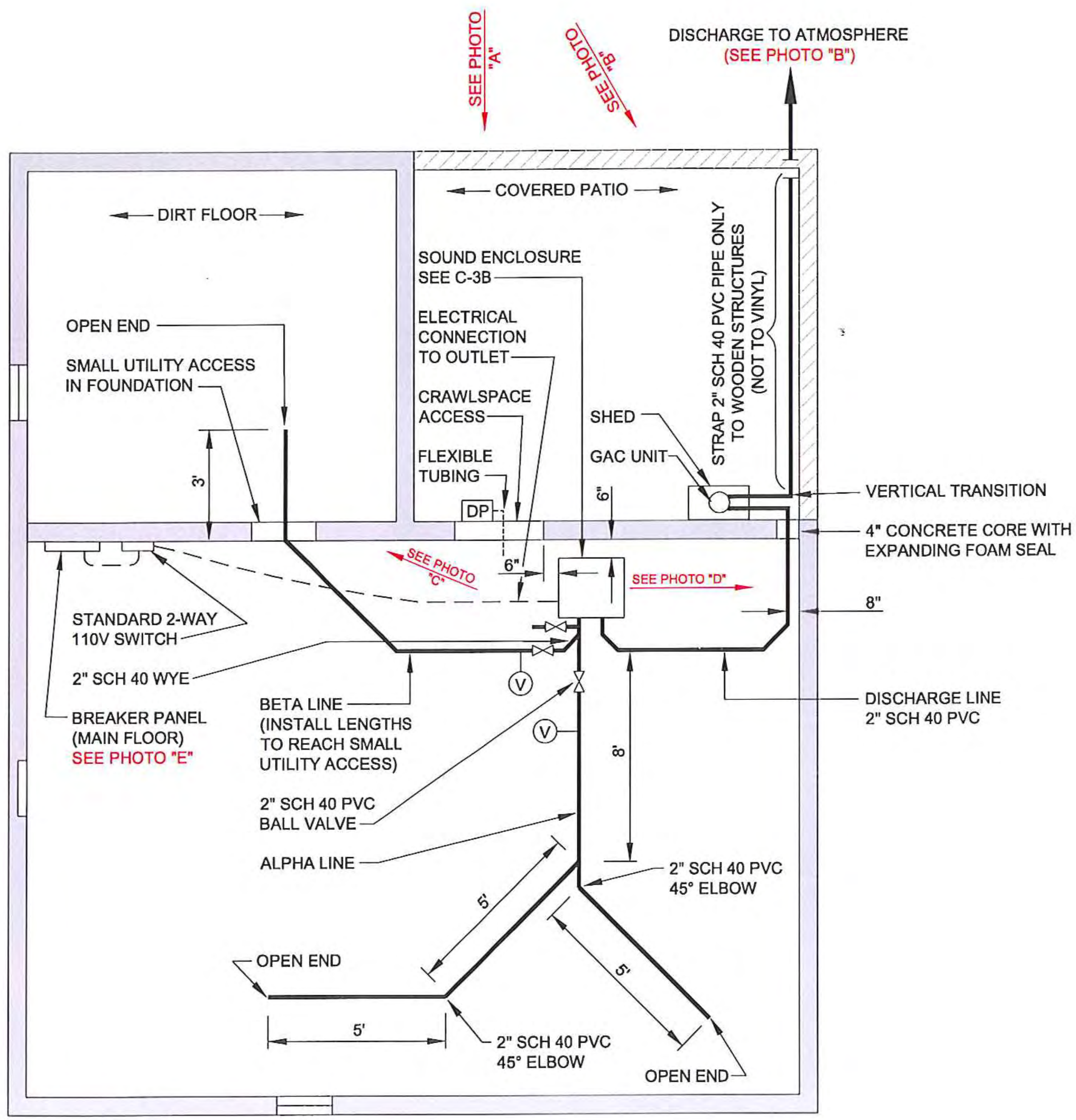
SCALE: NOT TO SCALE	JOB NO. 4-61M-10135-L T-1
DESIGNED: PDS	DATE: APRIL 2004
DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

SITE PHOTOGRAPHS — FIGURE C-2C

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-2C. DWG



NOTES:

1) THE BLOWER WAS MOUNTED UPSIDE DOWN ON THE OVERLYING FLOOR SUPPORTS IN THE CRAWLSPACE WITH A SOUND ENCLOSURE (WOOD WITH RIGID FOAM).

2) EXTEND FLEXIBLE TUBING 6" INTO THE CRAWLSPACE. SEAL HOLE FOR FLEXIBLE TUBING.

3) CONTRACTOR INSTALLED FOAM OR RUBBER GASKETS AROUND THE CRAWLSPACE ACCESS TO MINIMIZE AIR INFILTRATION.

4) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

N

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

SITE C - 2206 WEST 28TH STREET

SITE LAYOUT

FIGURE C-3A

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-3A. DWG

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

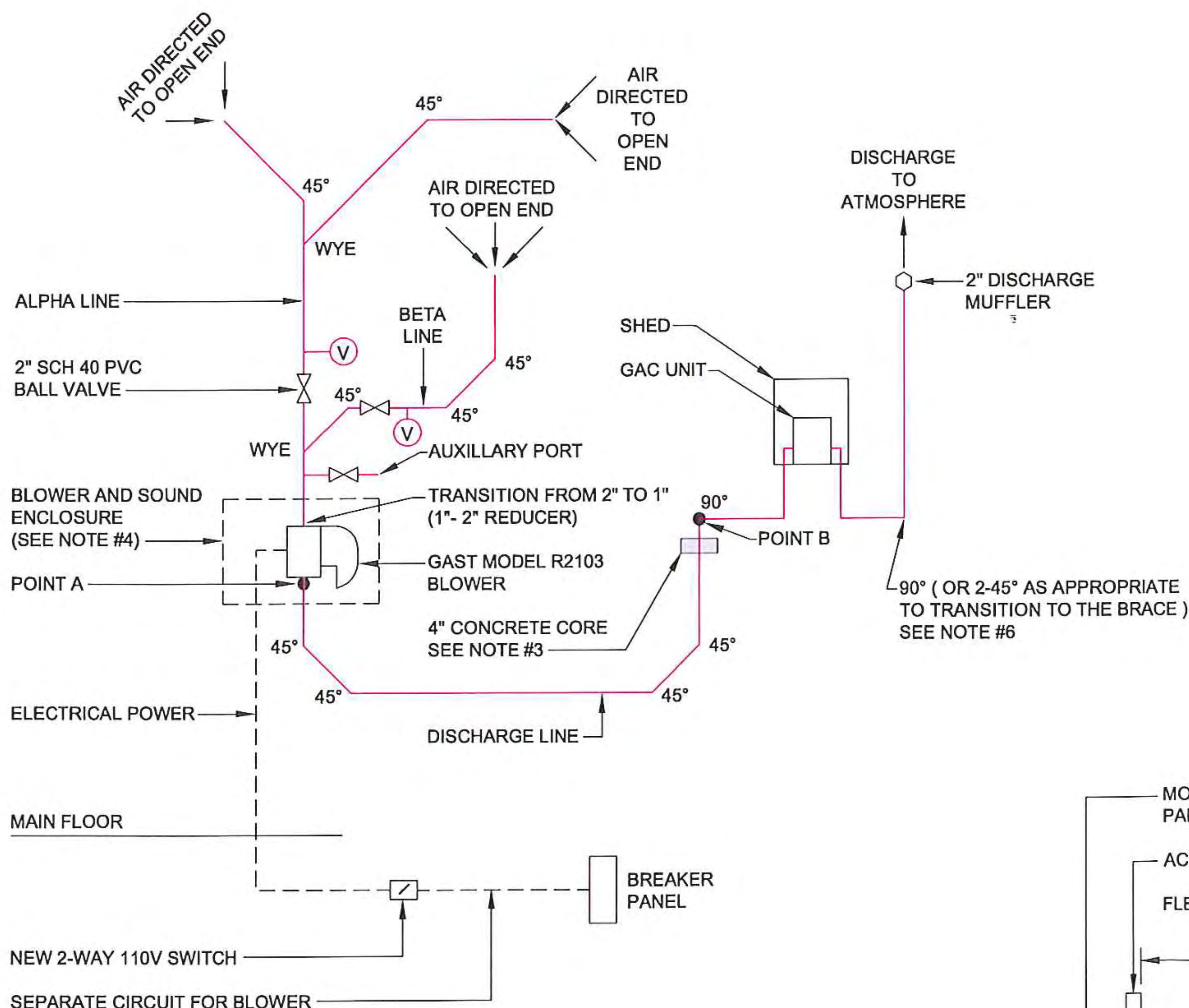
3) CORE A 4" HOLE IN THE FOUNDATION WALL TO TRANSITION THE DISCHARGE LINE OUTSIDE.

4) THE BLOWER WAS MOUNTED UPSIDE DOWN ON THE OVERLYING FLOOR SUPPORTS IN THE CRAWLSPACE WITH A SOUND ENCLOSURE (WOOD WITH RIGID FOAM).

5) V VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

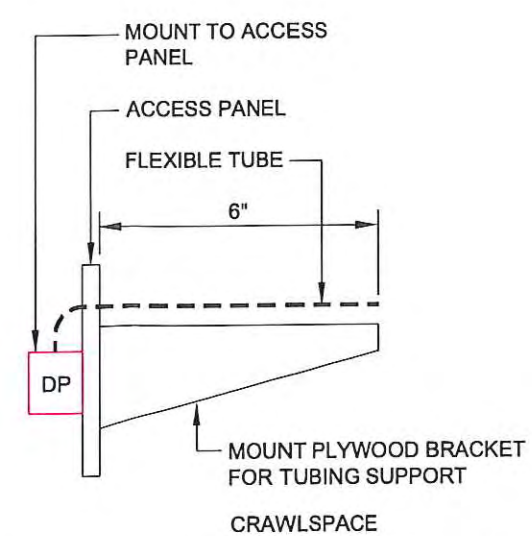
6) DP DYWER MODEL 300 DURABLOCK SOLID PLASTIC STATIONARY GAGES.

7) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.



SYSTEM SCHEMATIC

NOT TO SCALE



DIFFERENTIAL PRESSURE GAUGE SYSTEM

NOT TO SCALE

SITE C - 2206 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
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SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM SCHEMATIC

FIGURE C-3B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-3B. DWG

PHOTO "A"

VIEW OF CRAWLSPACE ACCESS

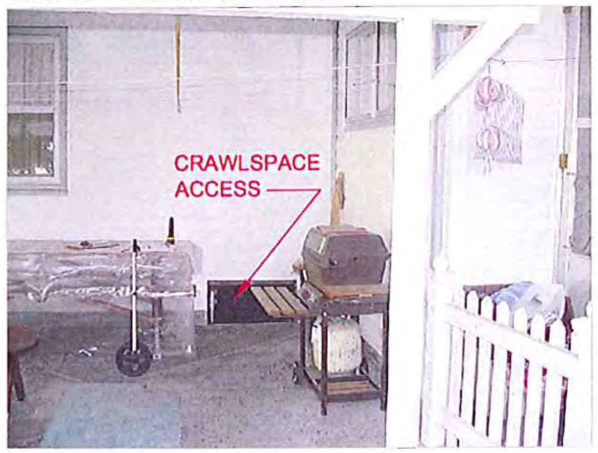


PHOTO "B"

VIEW OF OUTSIDE RUN

PHOTO "C"

VIEW OF UTILITY ACCESS POINT

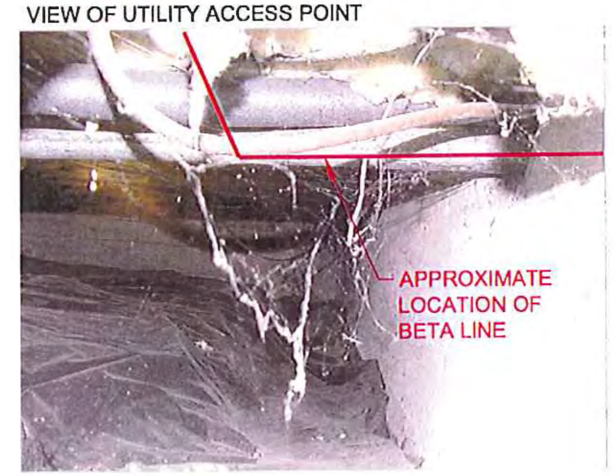


PHOTO "D"

VIEW OF DISCHARGE LOCATION

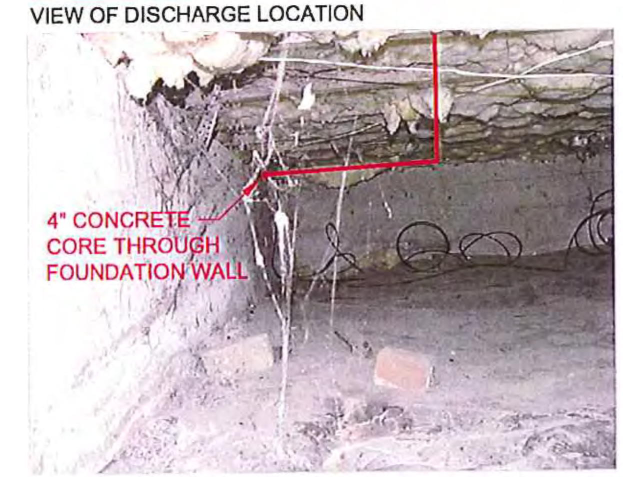
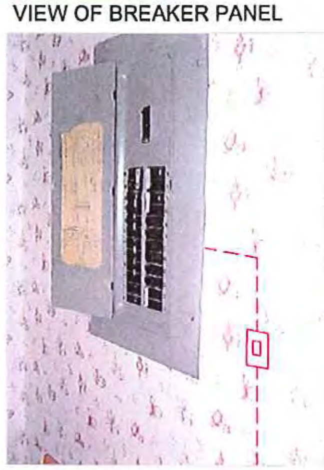


PHOTO "E"

VIEW OF BREAKER PANEL



NEW 2-WAY 110V
SWITCH FOR BLOWER

SITE C - 2206 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
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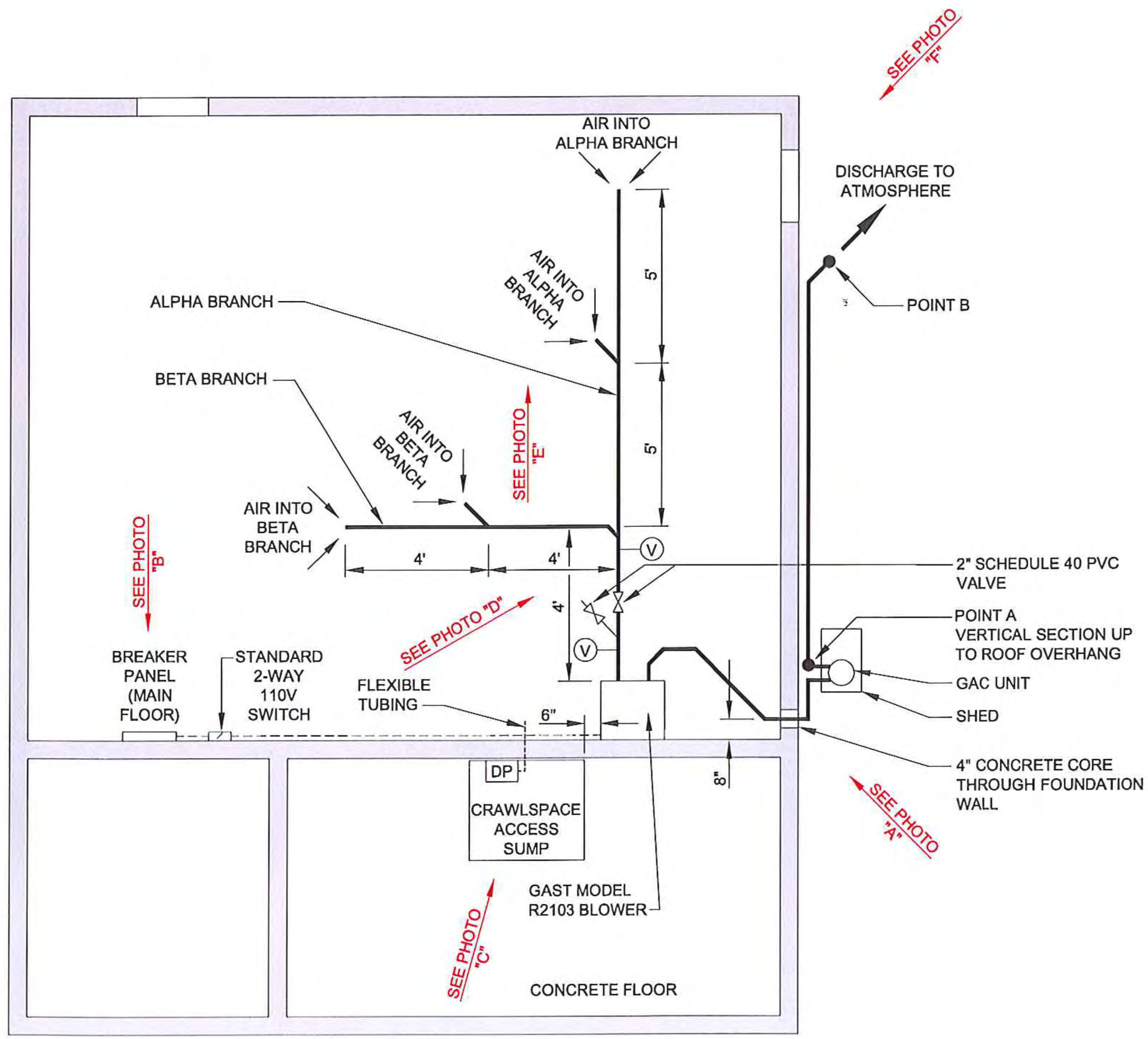
SCALE: NOT TO SCALE	JOB NO. 4-61M-10135-L T-1
DESIGNED: PDS	DATE: APRIL 2004
DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

SITE PHOTOGRAPHS — FIGURE C-3C



NOTES:

1) THE BLOWER WAS MOUNTED UPSIDE DOWN ON THE OVERLYING FLOOR SUPPORTS IN THE CRAWLSPACE WITH A SOUND ENCLOSURE (WOOD WITH RIGID FOAM).

N

SITE D - 2202 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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SCALE: NOT TO SCALE	JOB NO. 4-61M-10135-L T-1
DESIGNED: PDS	DATE: APRIL 2004
DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

SITE LAYOUT — FIGURE C-4A

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

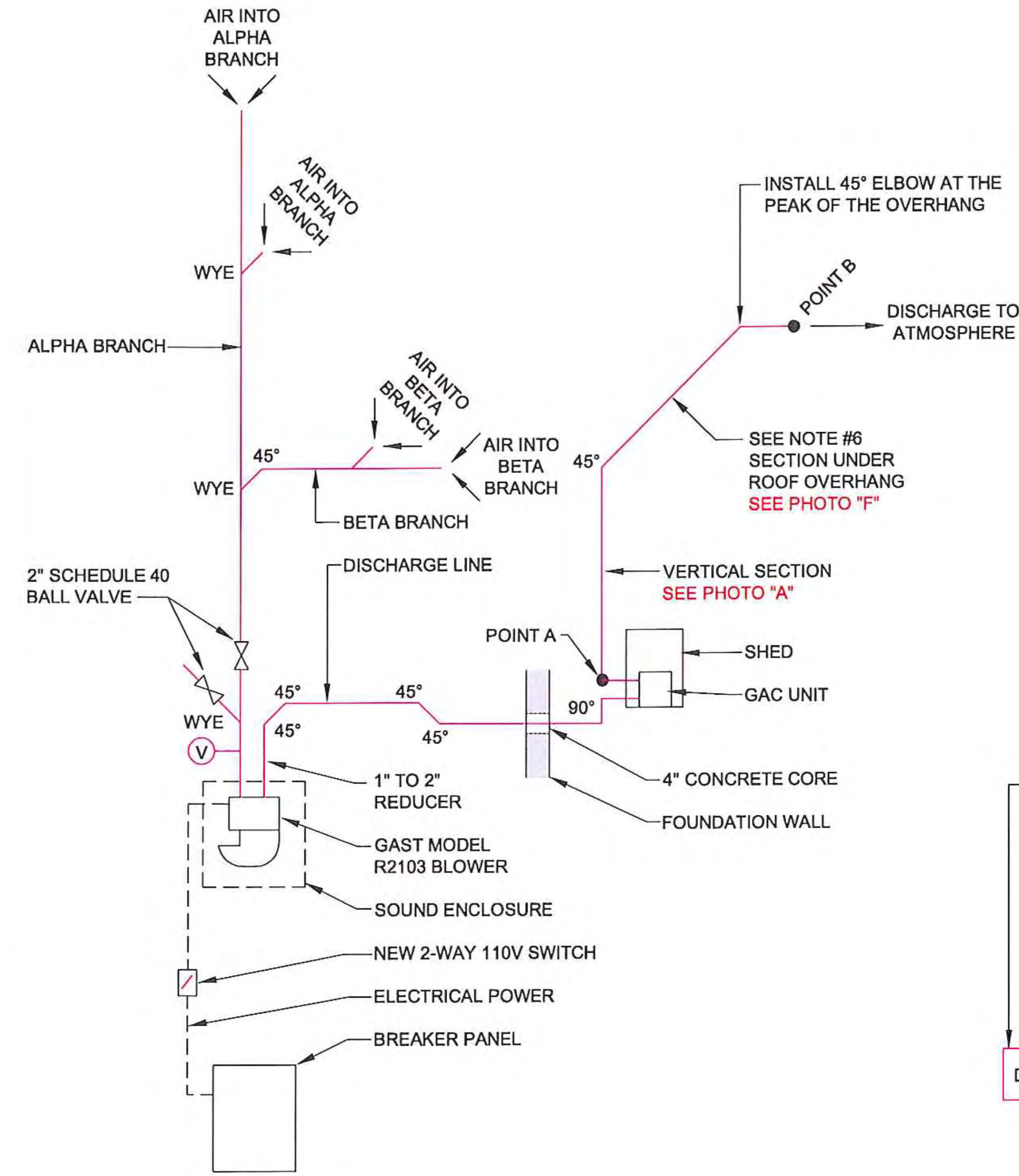
3) CORE A 4" HOLE IN THE FOUNDATION WALL TO TRANSITION THE DISCHARGE LINE OUTSIDE.

4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) AND RIGID FOAM.

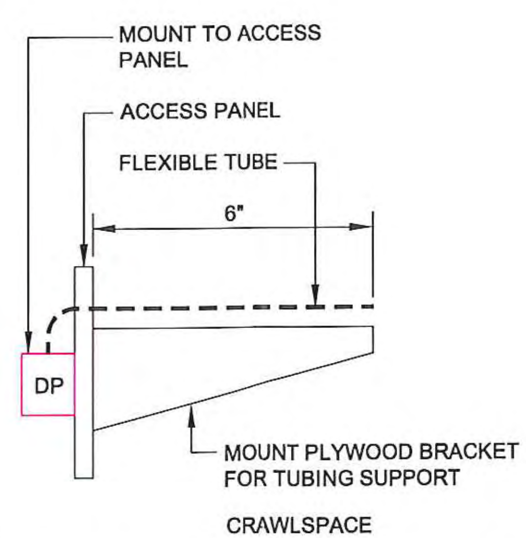
5) V VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

6) DP DWYER MODEL 300 DURABLOCK SOLID PLASTIC STATIONARY GAGES.

7) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.



SYSTEM SCHEMATIC
NOT TO SCALE



DIFFERENTIAL PRESSURE GAUGE SYSTEM
NOT TO SCALE

SITE D - 2202 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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7376 S W DURHAM ROAD
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SCALE: NOT TO SCALE	JOB NO. 4-61M-10135-L T-1
DESIGNED: PDS	DATE: APRIL 2004
DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

SYSTEM SCHEMATIC — FIGURE C-4B

PHOTO "A"

VIEW OF CORING LOCATION

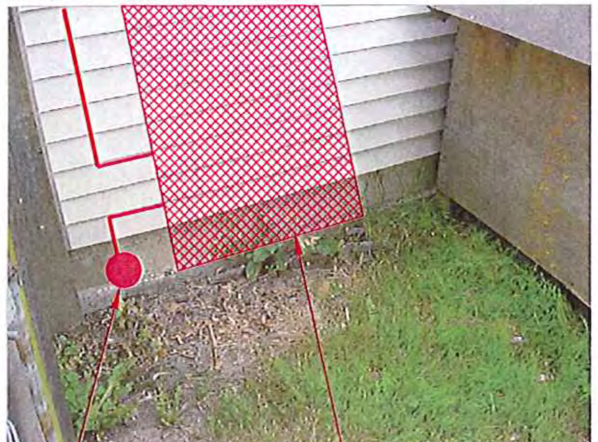


PHOTO "B"

VIEW OF BREAKER PANEL

PHOTO "C"

VIEW OF CRAWL SPACE ACCESS

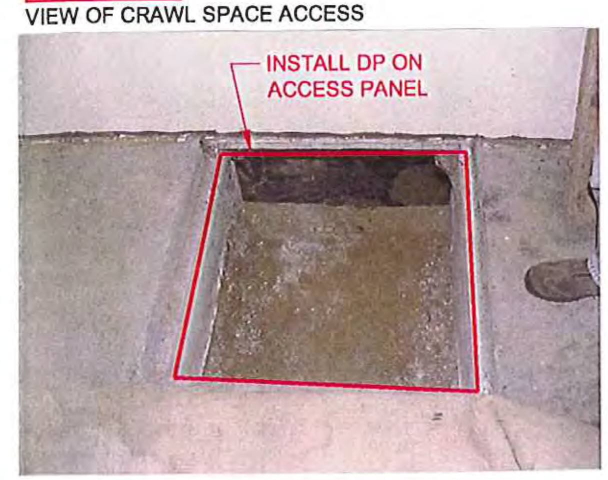


PHOTO "D"

VIEW OF CRAWLSPACE SUMP AREA

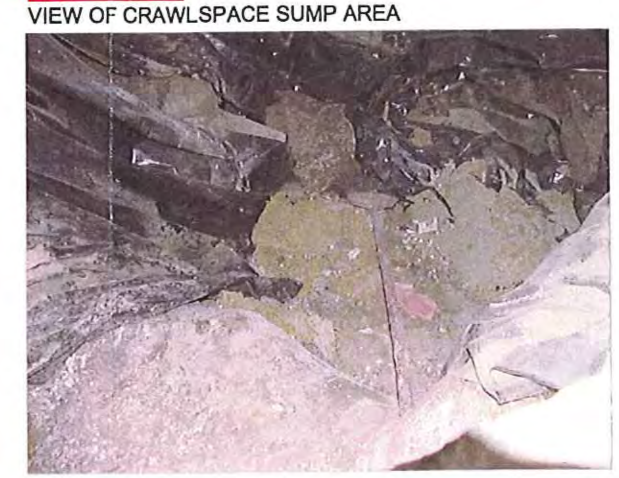


PHOTO "E"

VIEW OF CRAWLSPACE

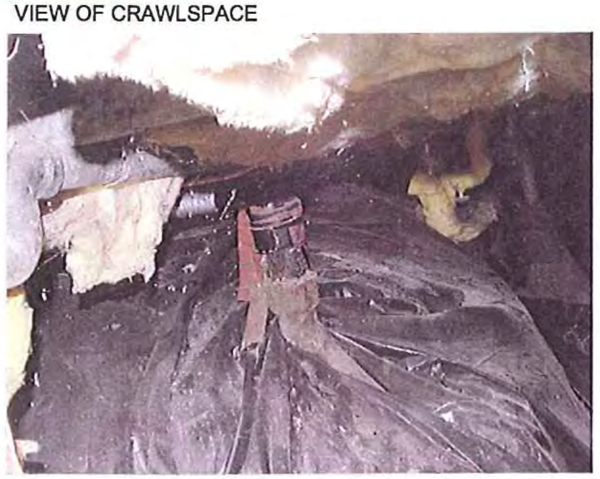
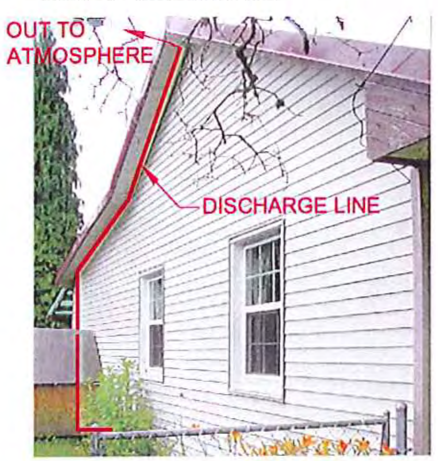


PHOTO "F"

VIEW OF OUTSIDE RUN



SITE D - 2202 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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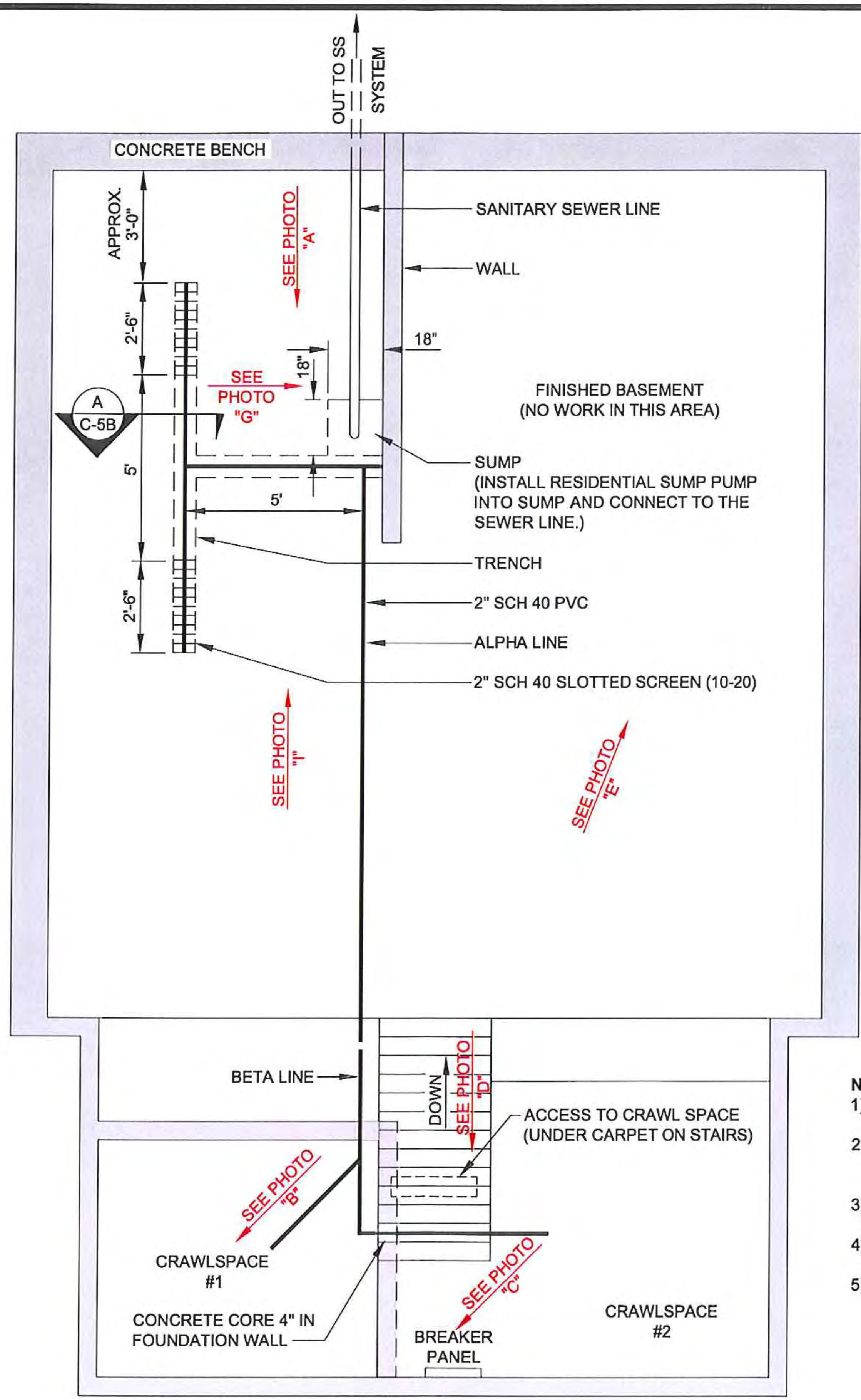
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE PHOTOGRAPHS — FIGURE C-4C



NOTES:

1) DEPTH OF SUMP SHOULD BE AT LEAST 24" BELOW BASEMENT FLOOR.

2) SUMP PUMP DISCHARGE WAS CONNECTED TO THE SANITARY SEWER LINE BY THE CONTRACTOR.

3) ALL VALVES, SWITCHES, AND GAUGES INSTALLED IN THE LAUNDRY CLOSET.

4) GAC UNITS (2) WERE INSTALLED IN THE ATTIC (ADJACENT TO BLOWERS).

5) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

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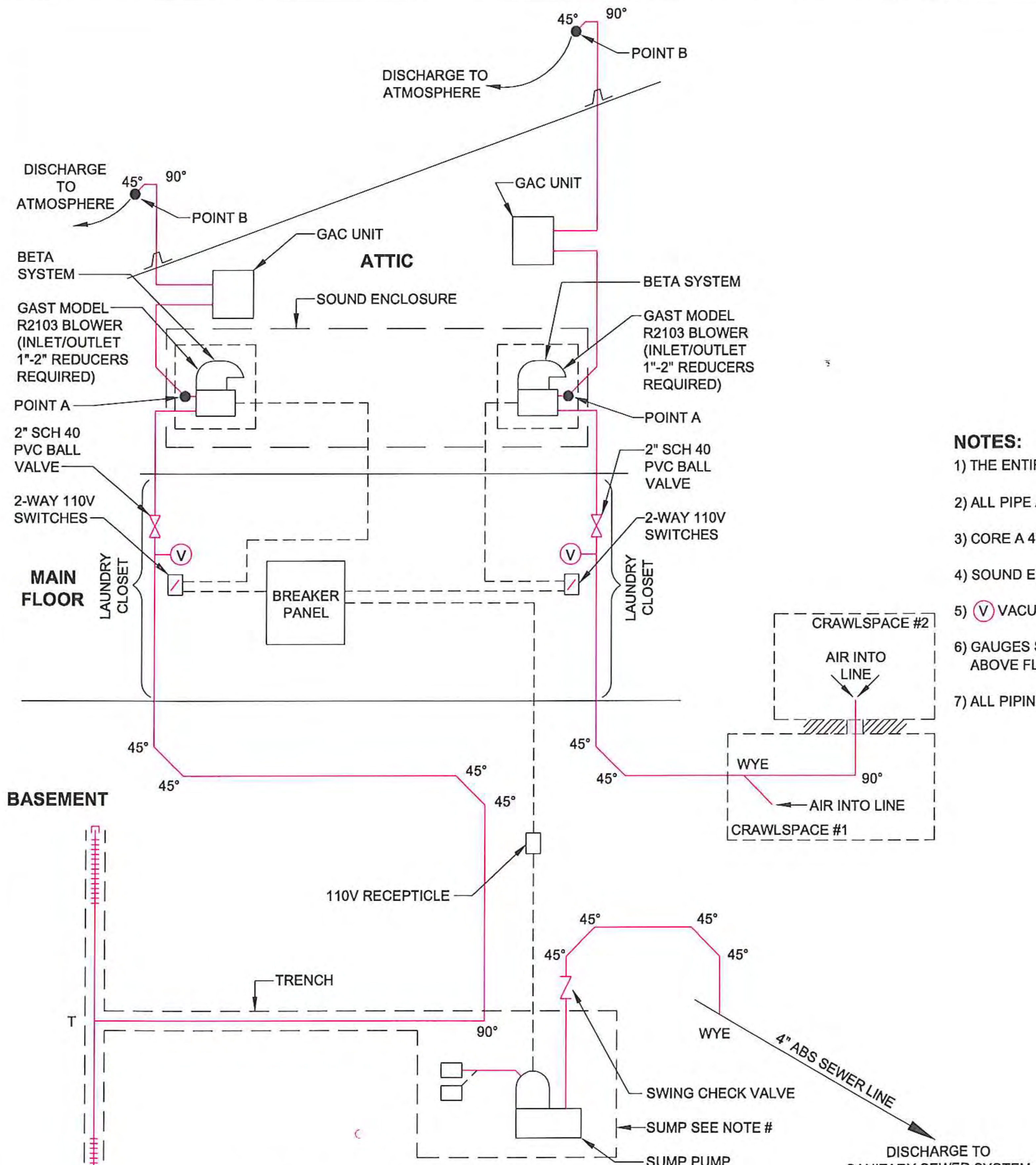
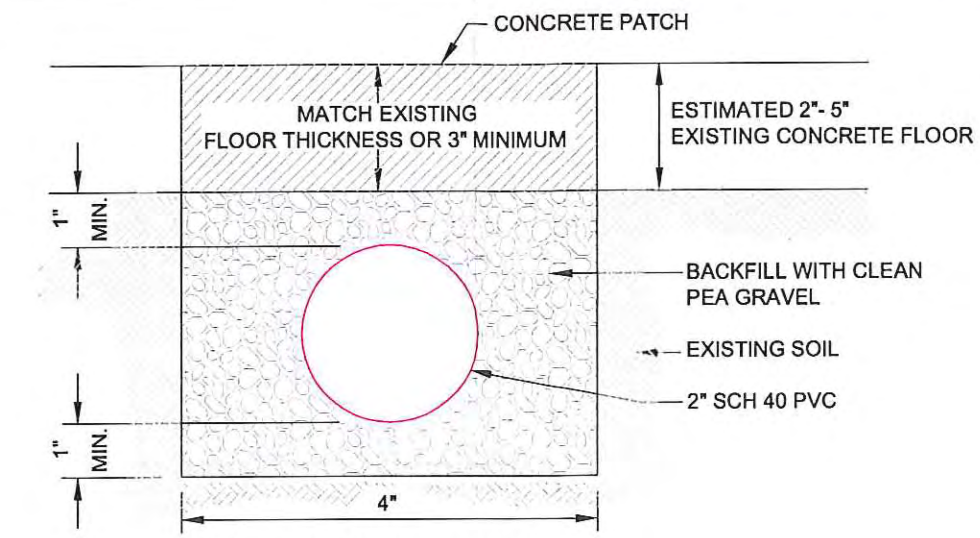
SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE LAYOUT — FIGURE C-5A



SYSTEM SCHEMATIC
NOT TO SCALE



TRENCH SECTION
NOT TO SCALE

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

3) CORE A 4" HOLE IN THE FOUNDATION WALL TO TRANSITION THE BETA SYSTEM LINE INTO CRAWLSPACE #2.

4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) AND RIGID FOAM.

5) (V) VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

6) GAUGES SET 5'-0" ABOVE FLOOR OF THE LAUNDRY CLOSET. BALL VALVES INSTALLED 6'-0" ABOVE FLOOR OF THE LAUNDRY CLOSET.

7) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
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DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM SCHEMATIC
TRENCH SECTION

FIGURE
C-5B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-5B. DWG

PHOTO "A"

BASEMENT VIEW - SOUTH

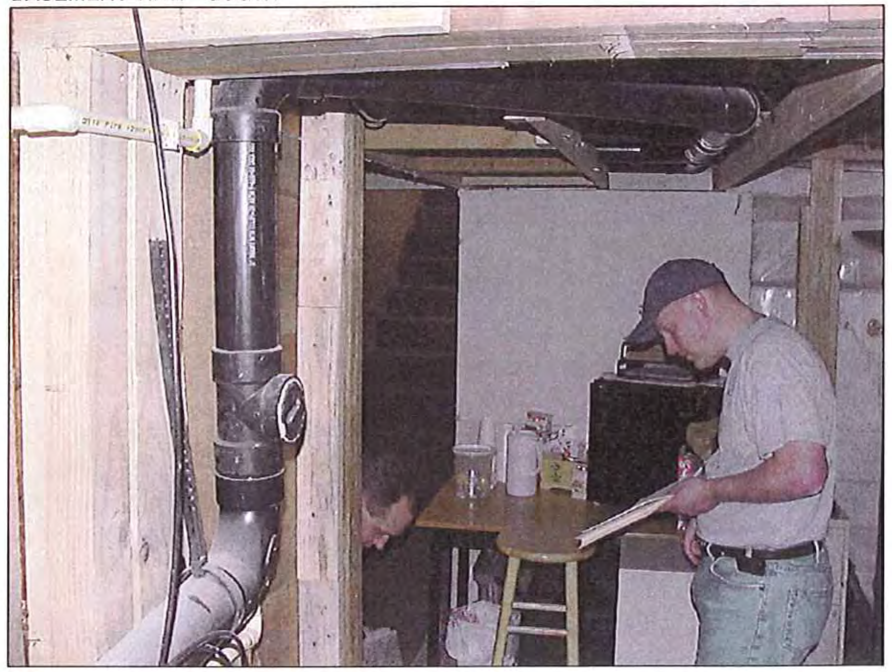

PHOTO "B"

VIEW OF CRAWL SPACE ACCESS - VIEW 1

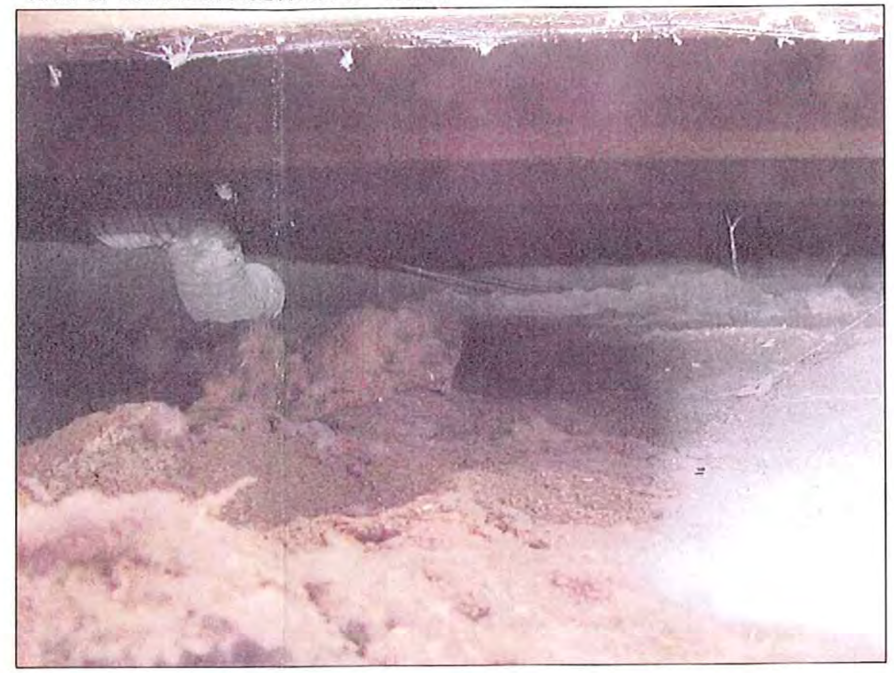

PHOTO "C"

VIEW OF BREAKER PANEL

PHOTO "D"

VIEW OF CRAWLSPACE SUMP AREA - VIEW 2

PHOTO "E"

FINISHED SIDE OF BASEMENT

SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
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DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

SITE PHOTOGRAPHS

FIGURE C-5C

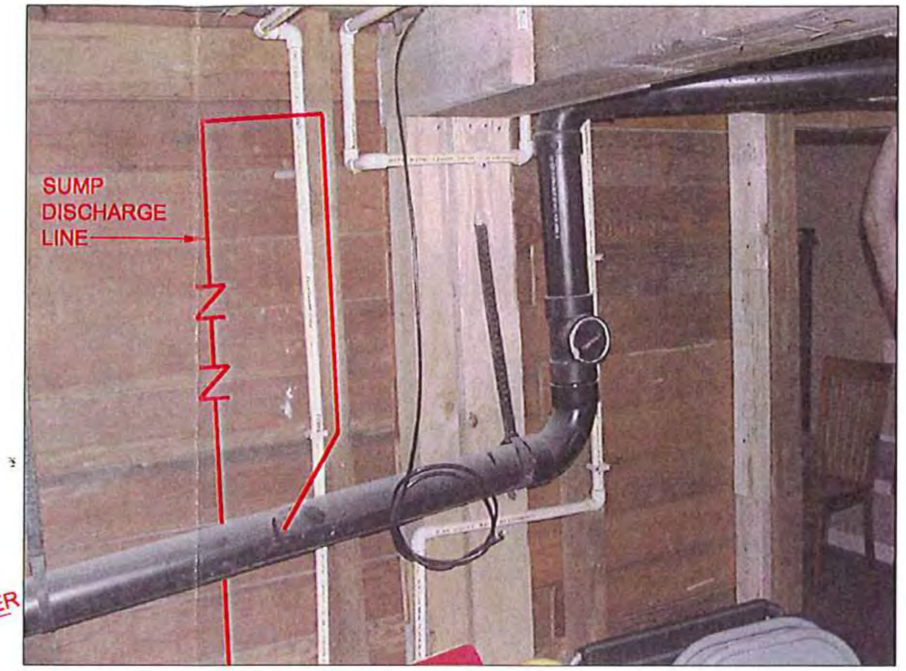
AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-5C. DWG

PHOTO "F"

OUTSIDE VIEW

PHOTO "G"

SANITARY SEWER PLUMBING



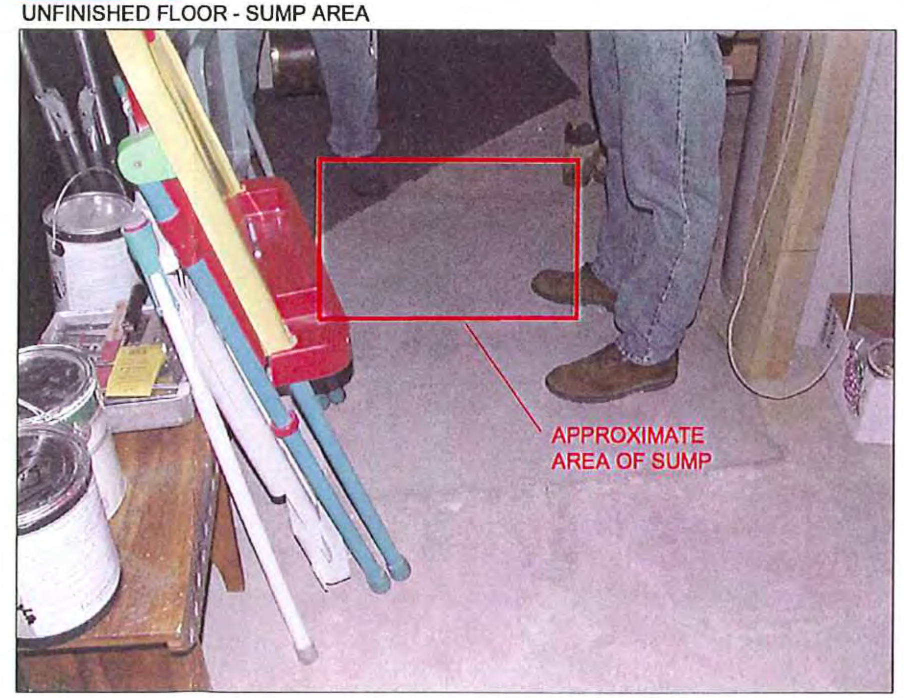
OUT TO SANITARY SEWER

PHOTO "H"

LAUNDRY CLOSET SUBFLOOR ACCESS POINT

PHOTO "I"

UNFINISHED FLOOR - SUMP AREA



SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

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PORTLAND, OR 97224

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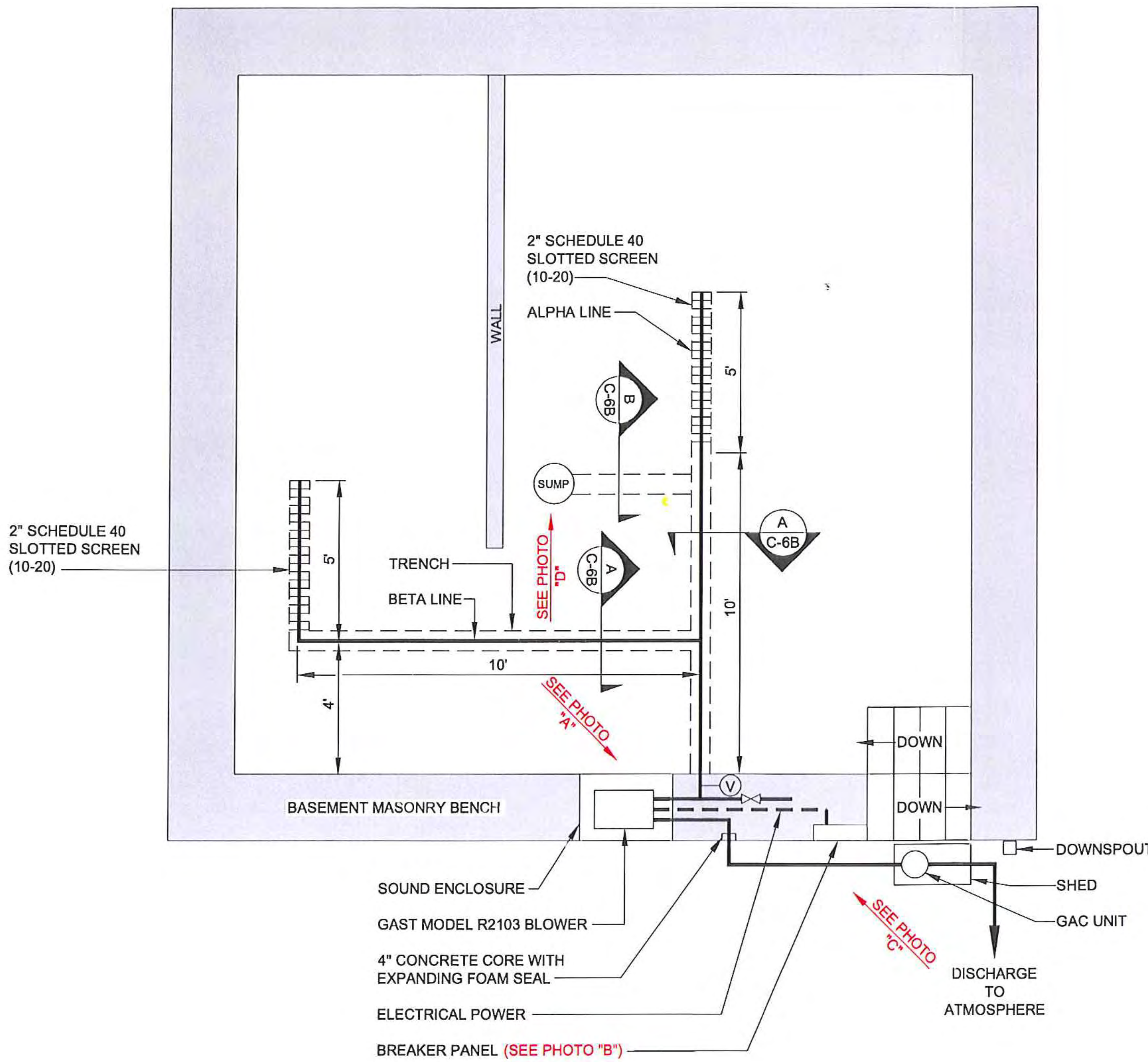
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE PHOTOGRAPHS — FIGURE C-5D



SITE F - 2103 W. 28th STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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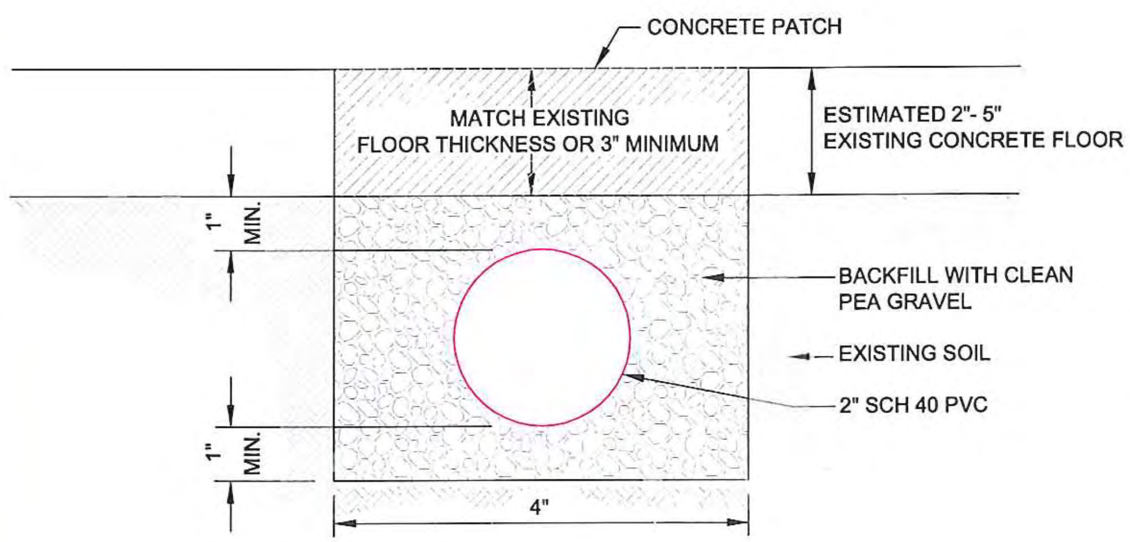
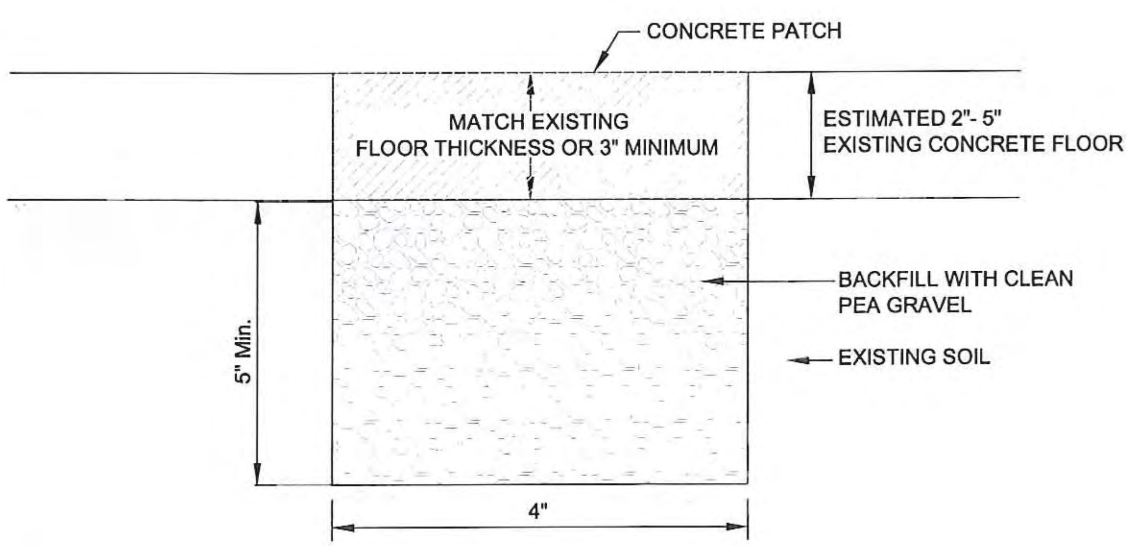
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE LAYOUT

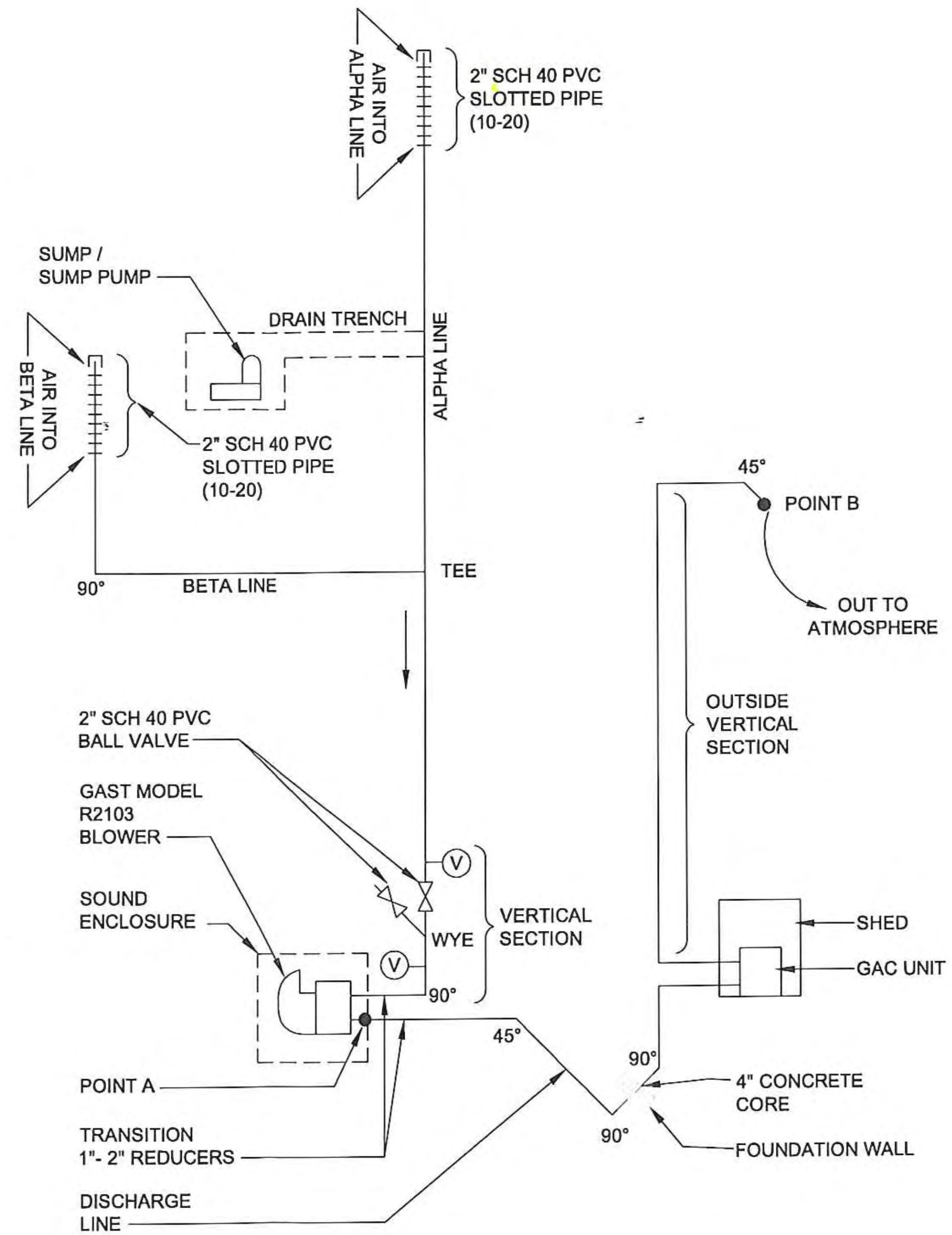
FIGURE C-6A



A
C-6B
TRENCH SECTION
NOT TO SCALE



B
C-6B
TRENCH SECTION
NOT TO SCALE



SYSTEM SCHEMATIC
NOT TO SCALE

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.
2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.
3) BLOWER MOUNTED ON BASEMENT LEDGE WITH SWITCHES AND GAUGES LOCATED IN EASILY ACCESSIBLE LOCATIONS WITHIN 24" OF THE BLOWER.
4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) AND RIGID FOAM.
5) V VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).
6) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

SITE F - 2103 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

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SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
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SYSTEM SCHEMATIC TRENCH SECTION — FIGURE C-6B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-6B. DWG

PHOTO "A"

VIEW OF BLOWER LOCATION

DISCHARGE LINE

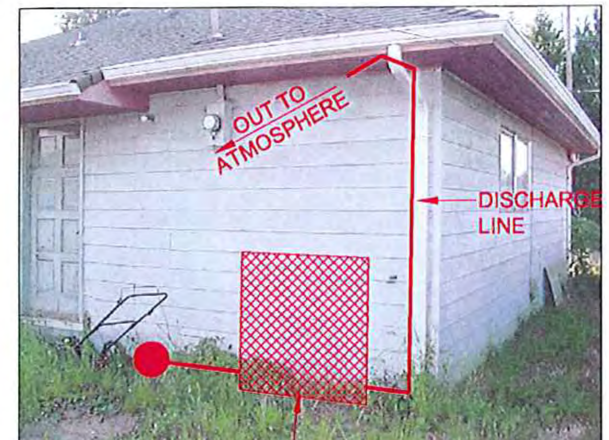
4" CONCRETE CORE

PHOTO "B"

VIEW OF BREAKER PANEL

PHOTO "C"

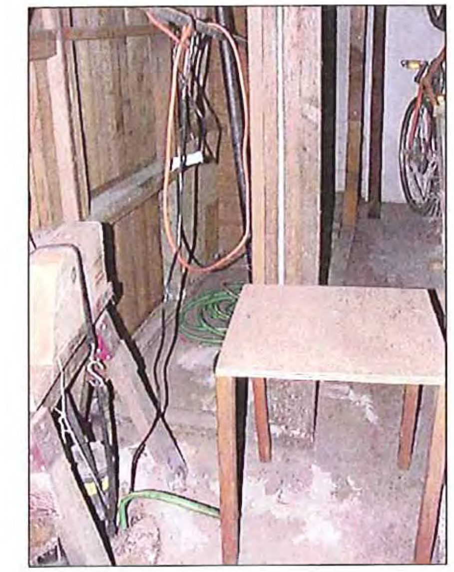
VIEW OF OUTSIDE DISCHARGE POINT



SHED WITH GAC UNIT

PHOTO "D"

VIEW OF SUMP PUMP AREA



SITE F - 2103 WEST 28TH STREET

3		
2		
1		
NO.	DESCRIPTION	INITIALS/DATE
	REVISIONS	

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SITE PHOTOGRAPHS

FIGURE C-6C

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APPENDIX C

Photographs

Photo 1

Site A: Sealed wall to crawlspace

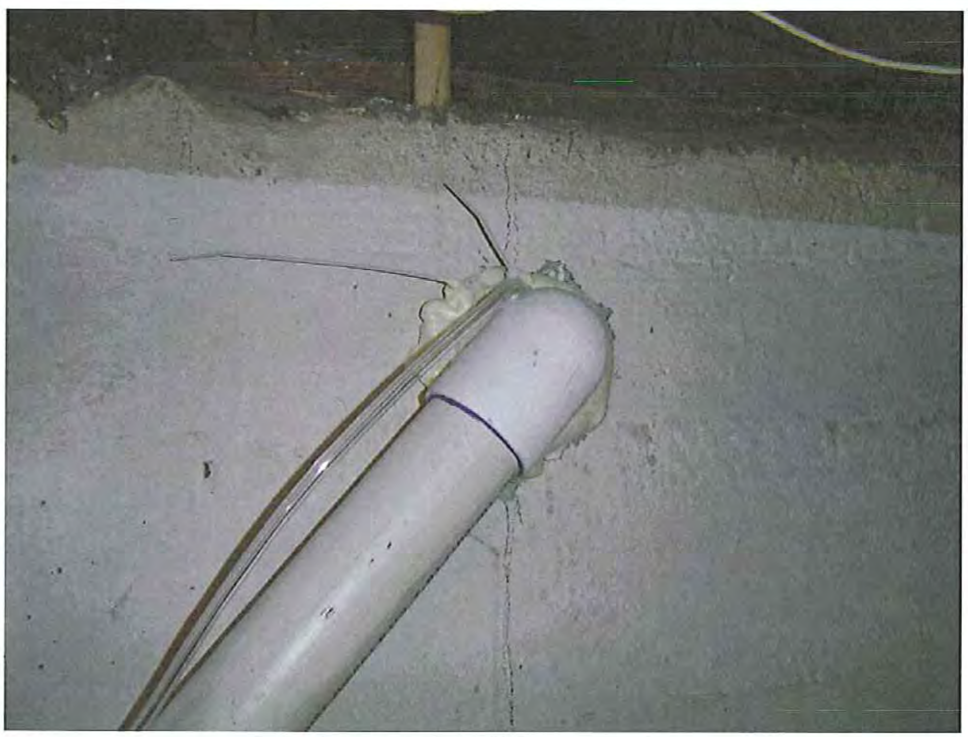

Photo 2

Site A: Entry point to crawlspace

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CADET MANUFACTURING COMPANY
SITES A-F

PHOTOGRAPH LOG

Photo 3

Site A: Horizontal vapor collection lines (trenches)

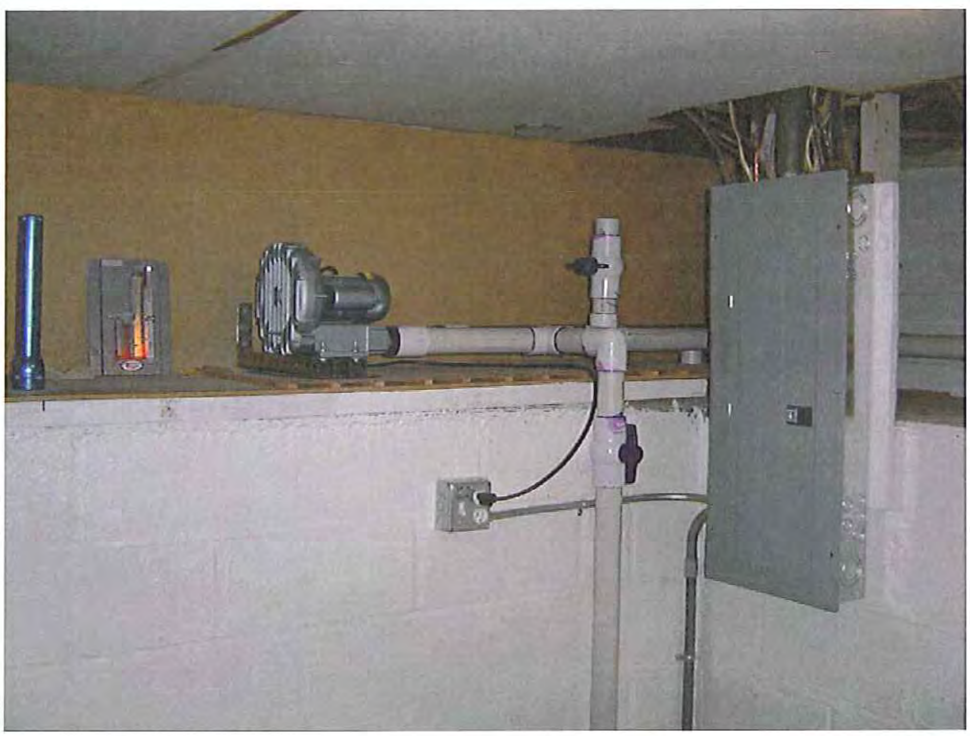

Photo 4

Site A: Vapor mitigation system prior to sound control installation

Photo 5

Site A: View of a system with monitoring equipment

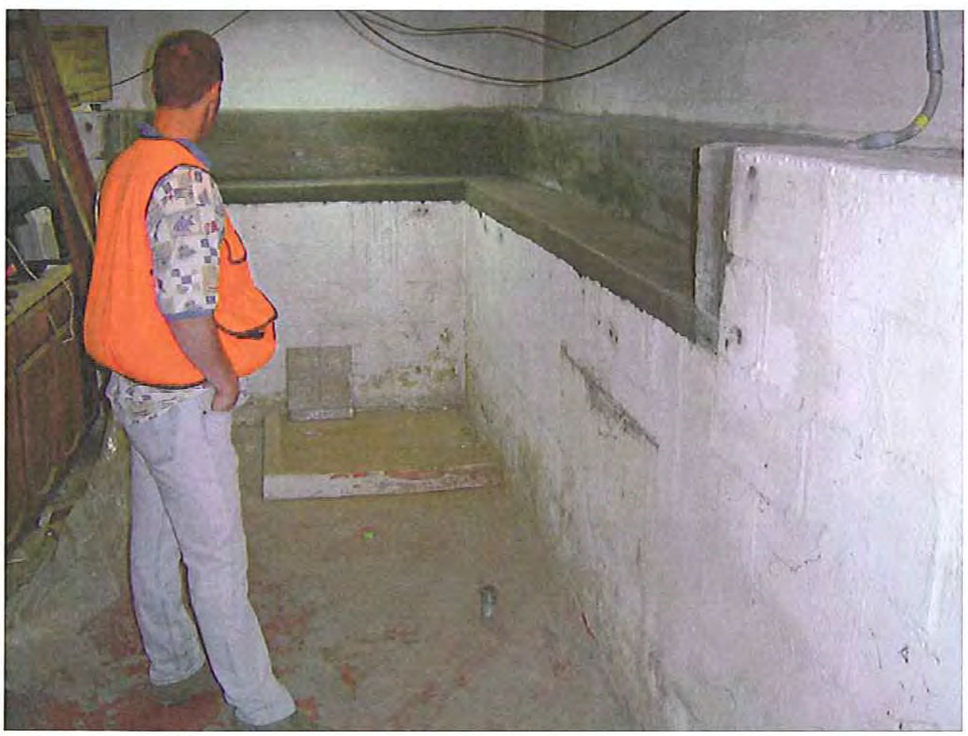

Photo 6

Site B: New concrete covering of previously exposed soil area

Photo 7

Site B: New concrete cover for previously exposed soil (basement)

Photo 8

Site B: Horizontal vapor collection trench prior to backfilling and concrete

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Photo 9

Site B: Air discharge stack

Photo 10

Site C: Vapor mitigation system prior to sound control

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SITES A-F

PHOTOGRAPH LOG

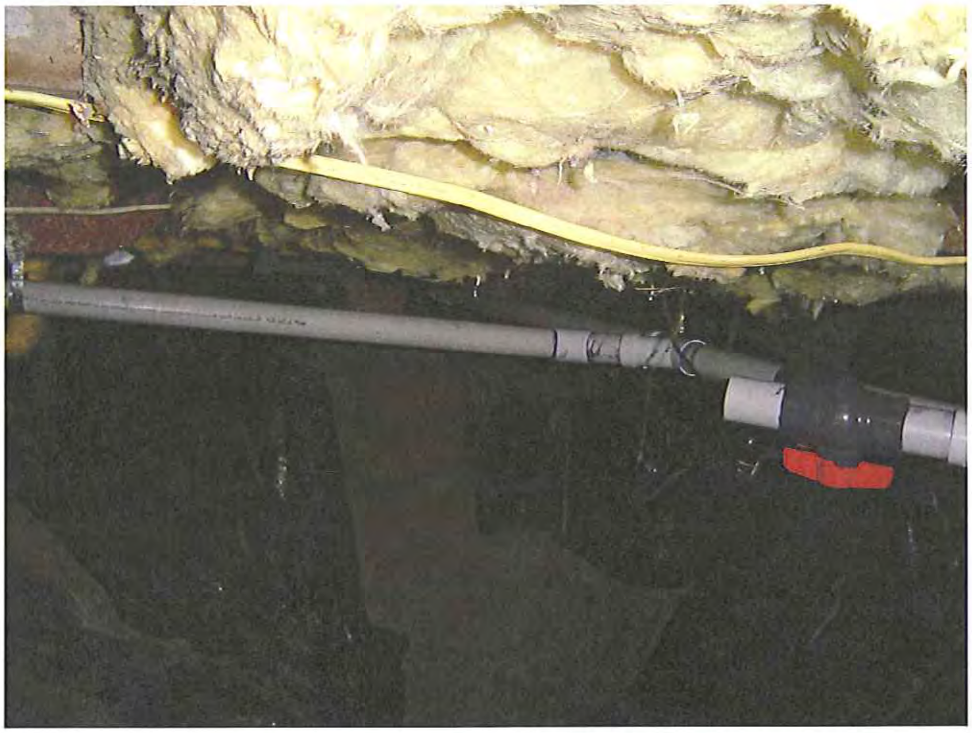

Photo 11

Site D: Air lines and inlet valve

Photo 12

Site E: New sump system and horizontal vapor lines

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Photo 13

Site E: New sump pump sanitary discharge point with dual check valves

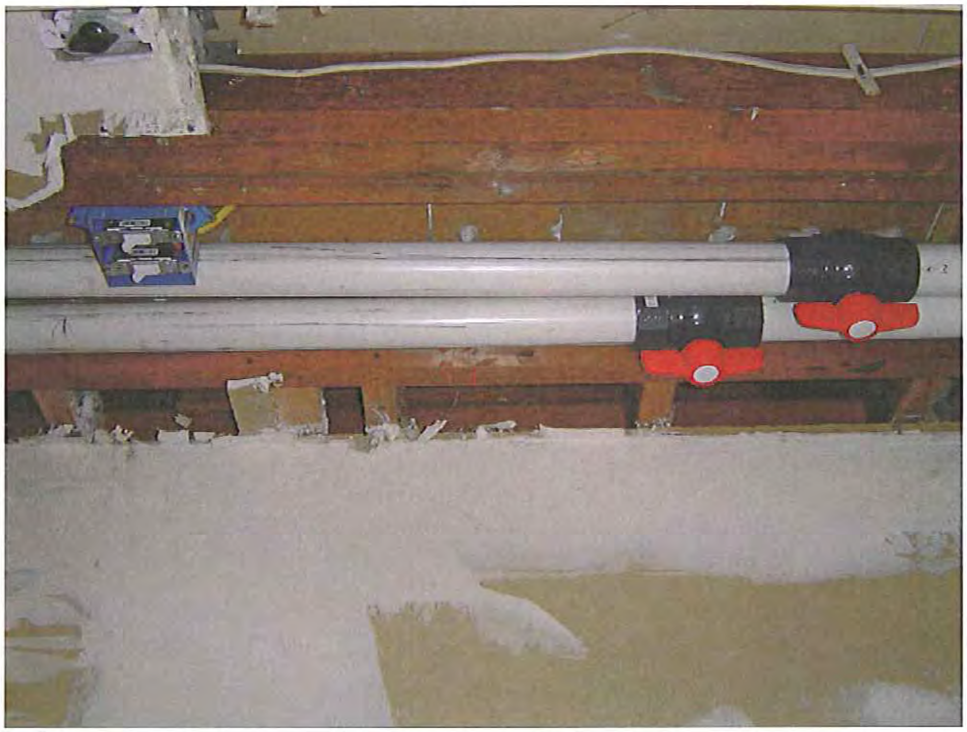

Photo 14

Site E: Power switches and valves

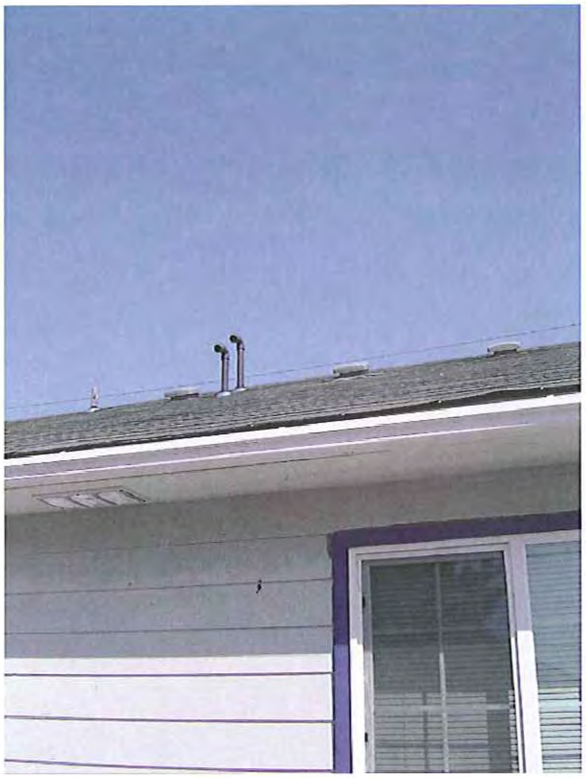

Photo 15

Site E: Air discharge stacks

Photo 16

Site E: Crawlspace venting lines

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SITES A-F

PHOTOGRAPH LOG

Photo 17

Site E: Crawlspace venting lines

Photo 18

Site E: Vapor mitigation blower sound enclosure

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Photo 19

Site E: Vapor mitigation blower showing sound control and blower

Photo 20

Site F: Construction of trenches and horizontal vent lines

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CADET MANUFACTURING COMPANY
SITES A-F

PHOTOGRAPH LOG

Photo 21

Site F: Construction of trenches and horizontal vent lines

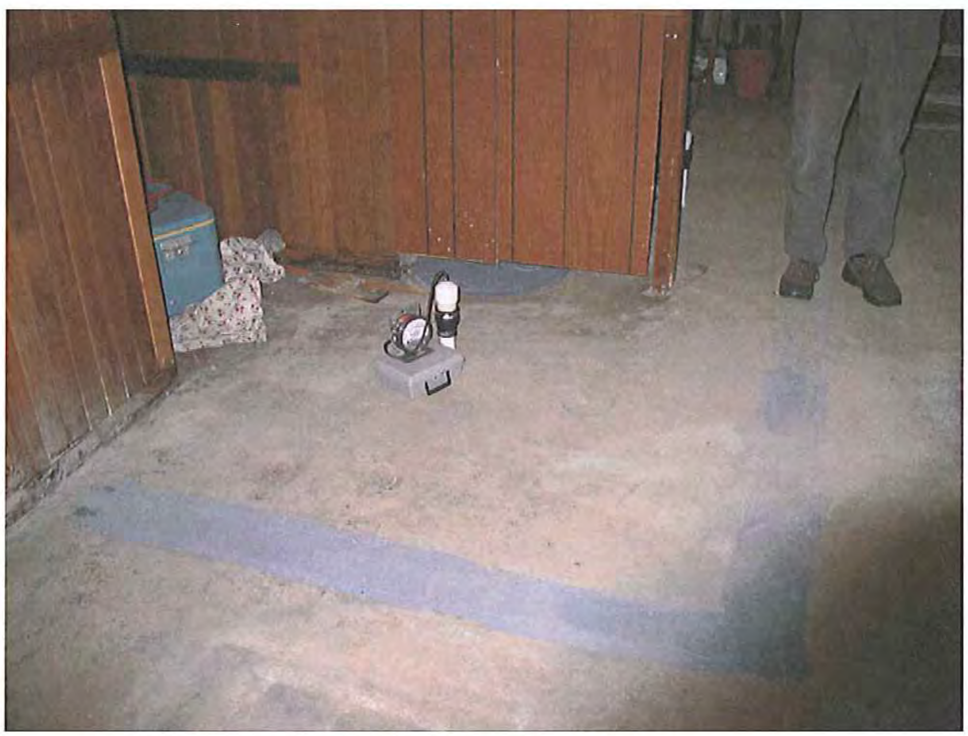

Photo 22

Site F: Trench layout for horizontal vapor collection lines after installation

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SITES A-F

PHOTOGRAPH LOG

Photo 23

Site F: Trench layout for horizontal vapor collection lines after installation

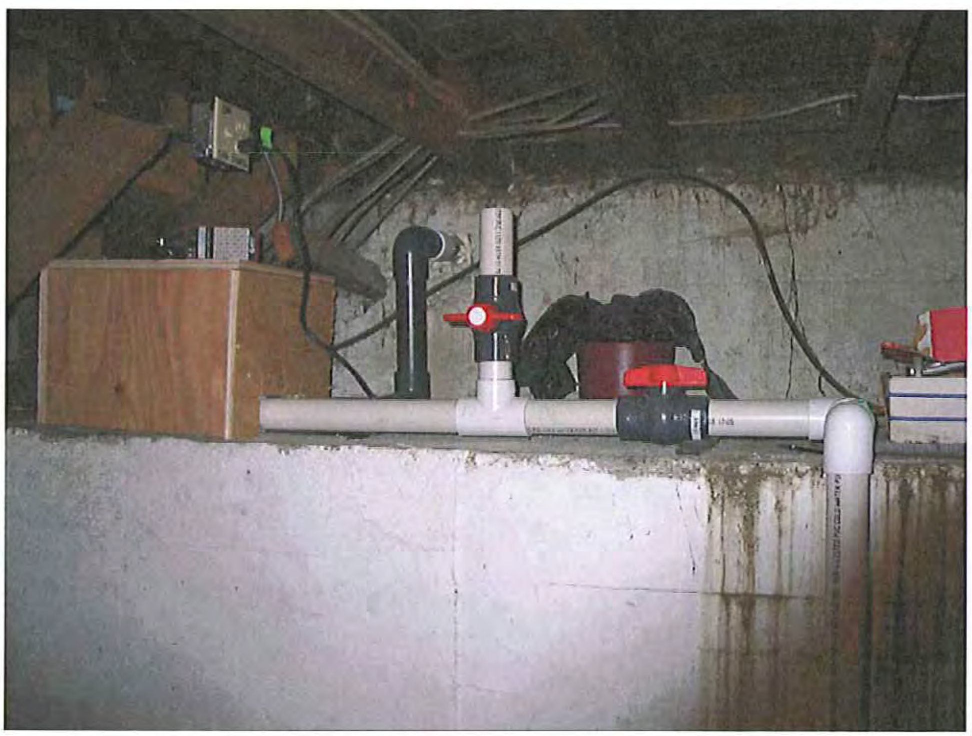

Photo 24

Site F: Vapor mitigation system

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SITES A-F

PHOTOGRAPH LOG

Photo 25

Site F: Washing machine with new drain system to sanitary sewer

Photo 26

Site F: Rebuilt sump system (new sump pump)

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Photo 27

Site F: Outside view of air discharge line

Photo 28

Site F: Outside view of air discharge line

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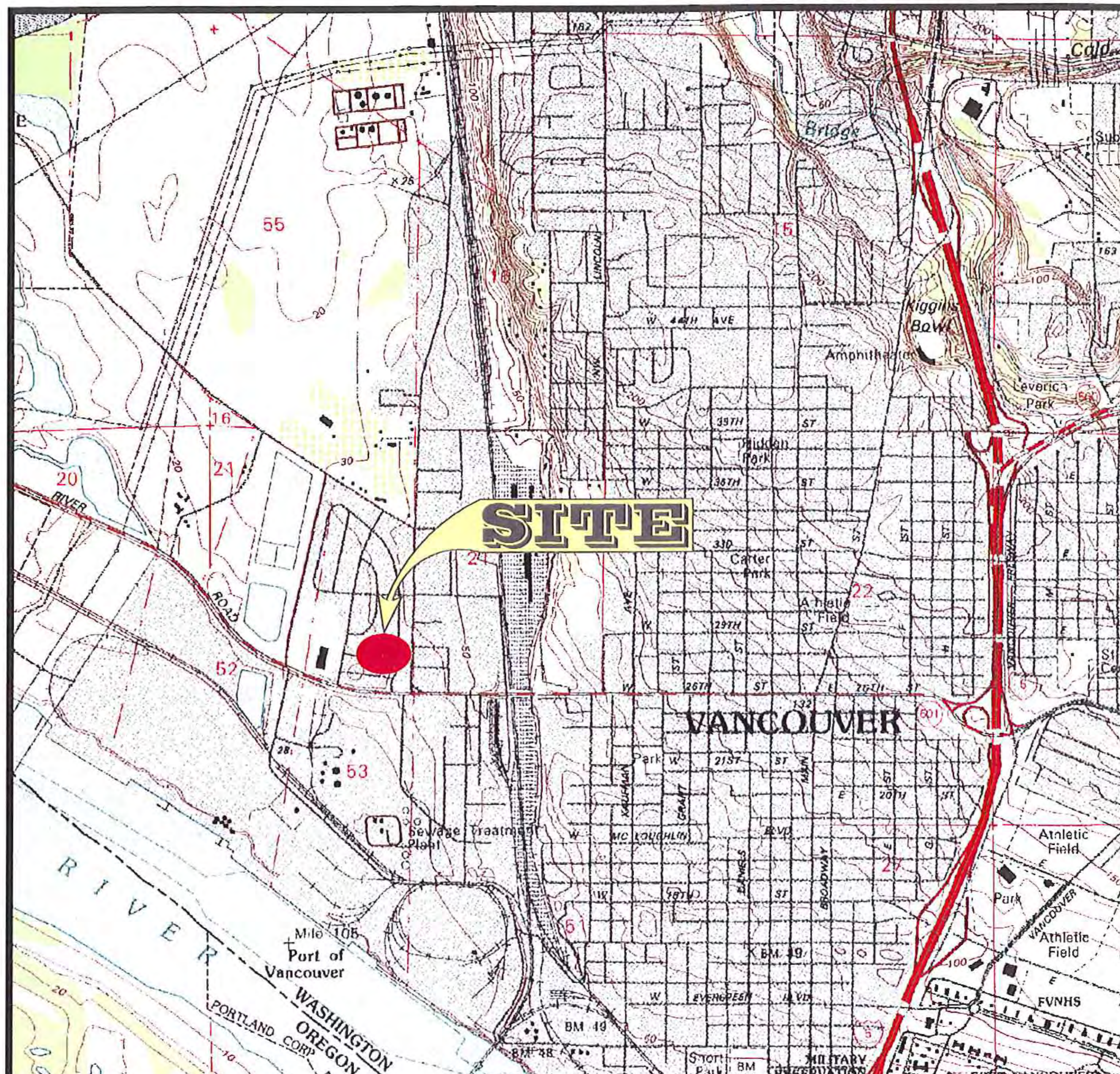
SITES A-F

PHOTOGRAPH LOG



VANCOUVER, WA-OR

45122-F6-TF-024

1990

DMA 1475 II NW-SERIES V891

WASHINGTON

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Heavy-duty		Light-duty		U.S. Route	State Route
Medium-duty		Unimproved dirt		Interstate Route	

SCALE 1 : 24,000

1 1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

N

FRUIT VALLEY NEIGHBORHOOD SIX RESIDENCES SOIL VAPOR VACUUM SYSTEMS

AS-BUILT DRAWINGS

UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

INDEX OF DRAWINGS

SITE INDEX

SITE A - 2809 UNANDER AVENUE
SITE B - 2805 UNANDER AVENUE
SITE C - 2206 WEST 28th STREET
SITE D - 2202 WEST 28th STREET
SITE E - 2105 WEST 28th STREET
SITE F - 2103 WEST 28th STREET

NOTE

PHOTOGRAPHS IN PLANS ARE PRE-CONSTRUCTION BUT INCLUDE "AS-BUILT" ANNOTATIONS OF ALL INSTALLED SYSTEMS.

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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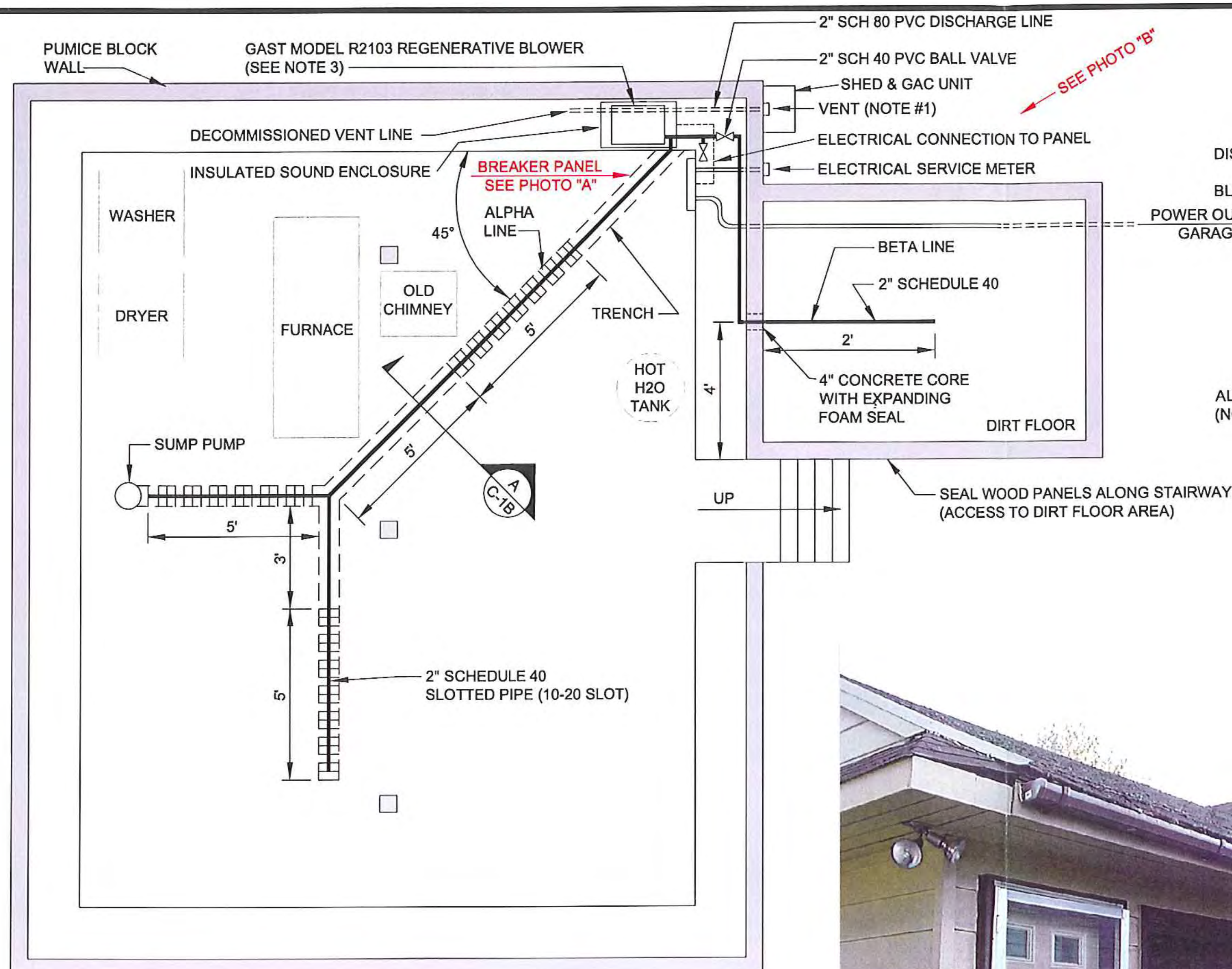
COVER PAGE — FIGURE G-1



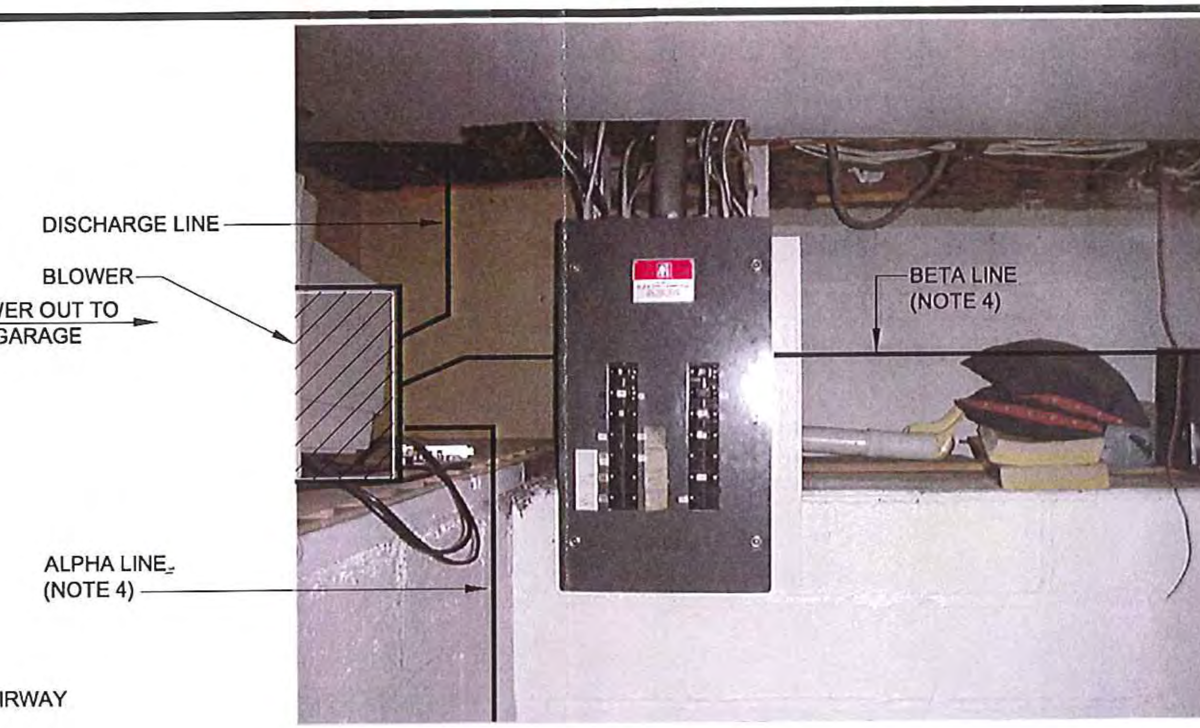


PHOTO "A"

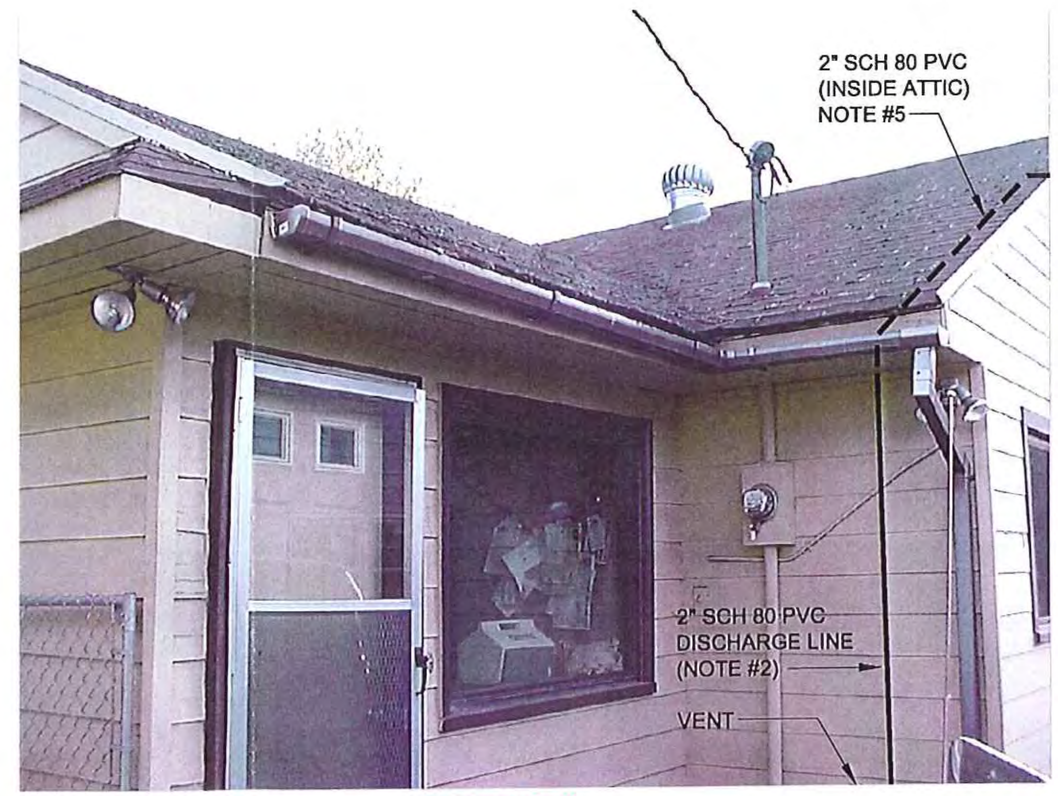


PHOTO "B"

N

SITE A - 2809 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1	MINOR EDITS	HR/ 7-25-03

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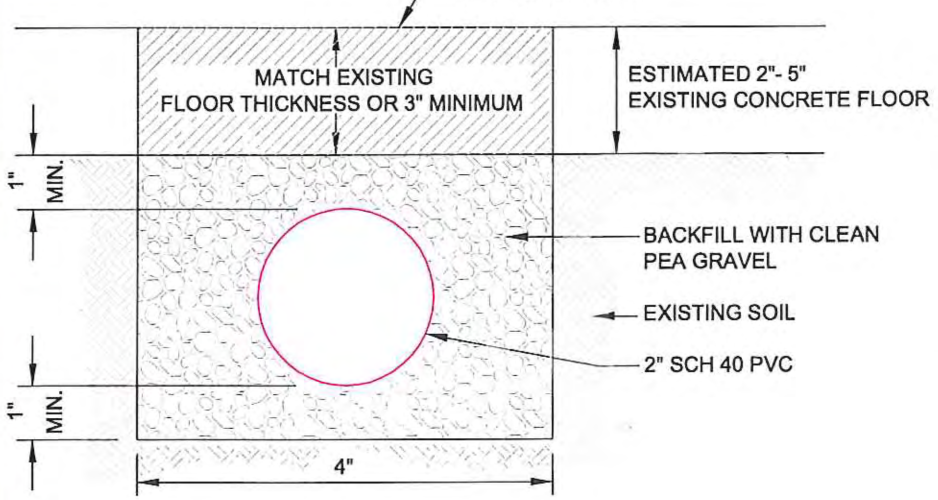
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM LAYOUT

FIGURE C-1A

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-1A. DWG



A
C-1B
TRENCH SECTION
NOT TO SCALE

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTING BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

3) BLOWER IS MOUNTED ON BASEMENT LEDGE WITH SWITCHES AND GAUGES LOCATED IN EASILY ACCESSIBLE LOCATIONS WITHIN 24" OF THE BLOWER.

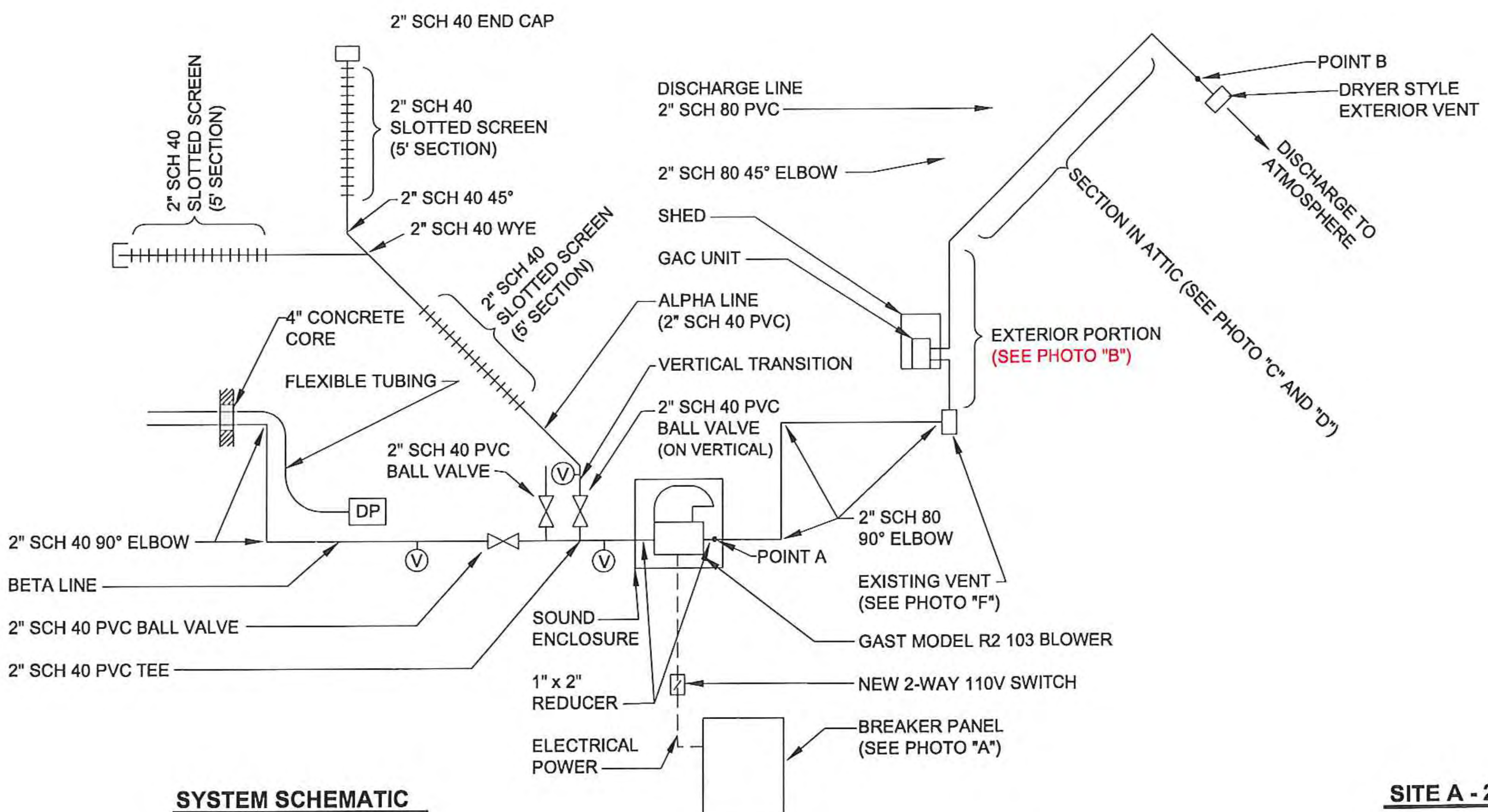
4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) - RIGID FOAM. THE RIGID FOAM IS A MINIMUM OF 1" FOR EVERY SOUND ENCLOSURE CONSTRUCTED UNDER THIS CONTRACT (SITES A - F).

5) (V) VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

6) THE EXISTING BREAKER PANEL WAS REPLACED TO ACCOMODATE THE BLOWER'S ELECTRICAL REQUIRMENTS.

7) DP DYWER MODEL 300 DURABLOCK SOLID PLASTIC STATIONARY GAGES.

8) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.



SYSTEM SCHEMATIC
NOT TO SCALE

SITE A - 2809 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

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SOIL VAPOR VACUUM SYSTEM
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CHECKED:		SIGNED:	
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SYSTEM SCHEMATIC TRENCH SECTION

FIGURE C-1B

PHOTO "A"

VIEW OF BREAKER PANEL

DRYER STYLE EXTERIOR VENT

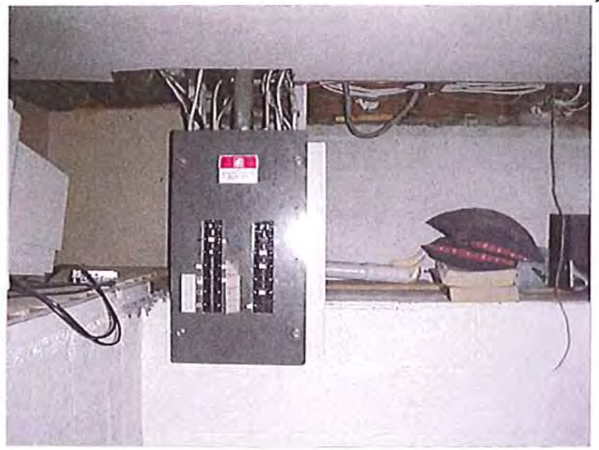

PHOTO "C"

VIEW OF ATTIC SPACE - 1

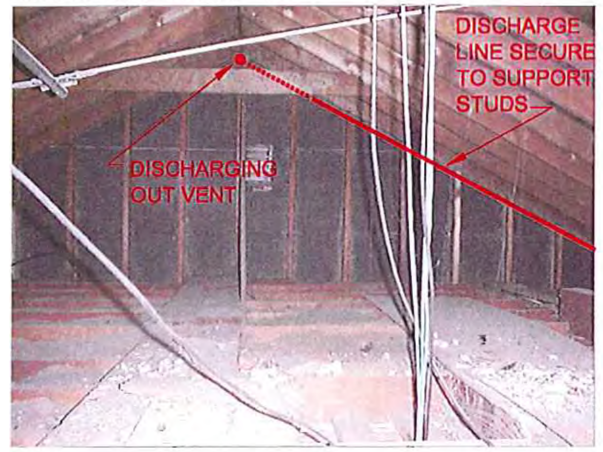

PHOTO "D"

VIEW OF ATTIC SPACE - 2

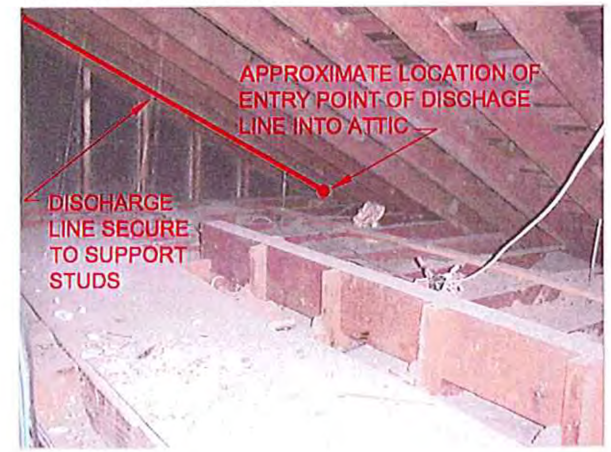

PHOTO "E"

VIEW OF BREAKER PANEL AND LEDGE

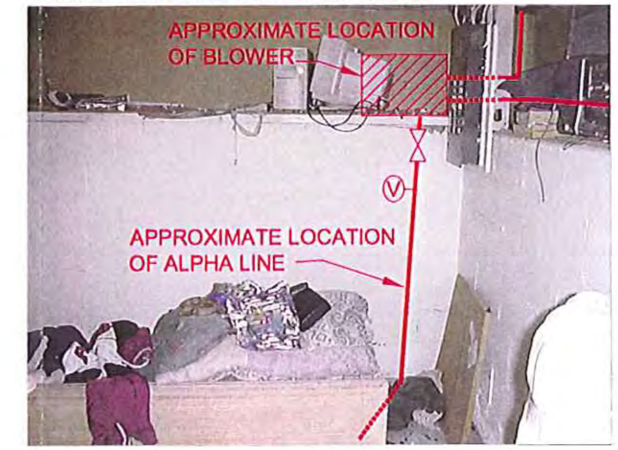

PHOTO "F"

VIEW OF OUTSIDE VENT

PHOTO "G"

VIEW OF BASEMENT

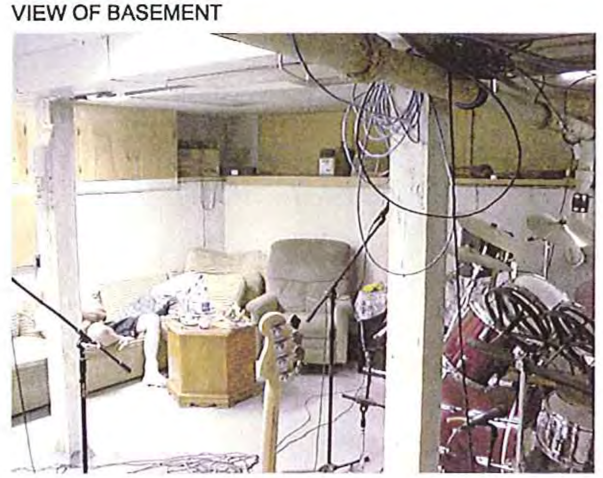

PHOTO "H"

VIEW OF SUMP LINE

SITE A - 2809 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

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SOIL VAPOR VACUUM SYSTEM
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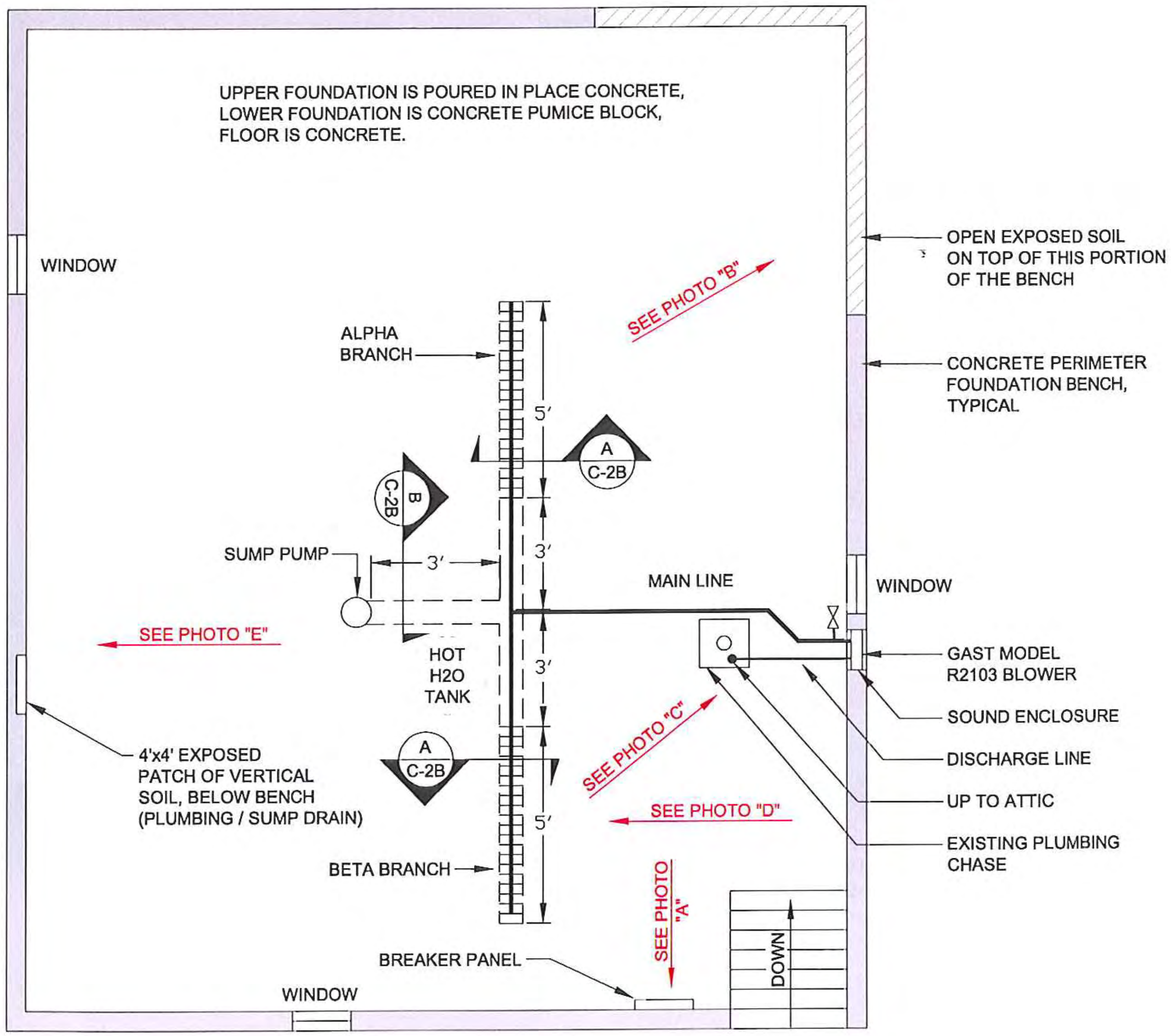
SITE PHOTOGRAPHS

FIGURE C-1C

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-1C. DWG

NOTES:
1) GAC UNIT WAS INSTALLED IN THE ATTIC. SEE C-2B.



SITE B - 2805 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

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SOIL VAPOR VACUUM SYSTEM
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APPROVED:		SIGNED:	

SITE LAYOUT — FIGURE C-2A

PHOTO "A"

VIEW OF BREAKER PANEL

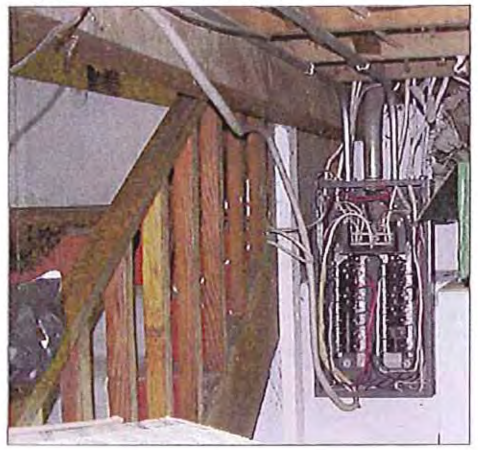
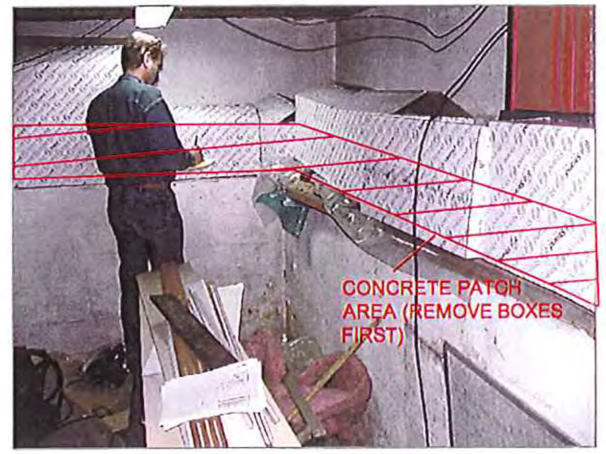


PHOTO "B"

VIEW OF CONCRETE PATCH AREA



1) THE CONCRETE PATCH WAS A MINIMUM THICKNESS OF 2" AND MATCHES THE EXISTING GRADE OF THE ADJACENT CONCRETE BENCH.

2) A PLASTIC VAPOR BARRIER (AT LEAST 6 MIL) WAS INSTALLED PRIOR TO PLACING CONRETE.

PHOTO "C"

VIEW OF PLUMBING CHASE

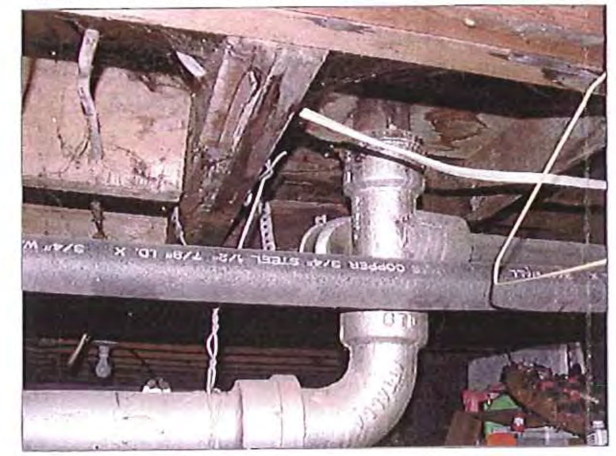


PHOTO "D"

VIEW OF BASEMENT

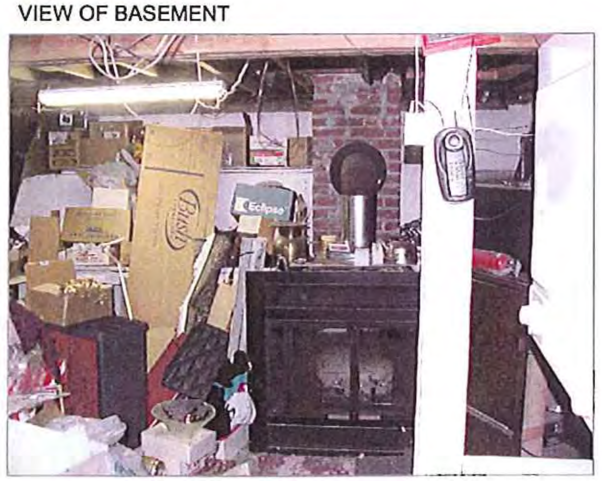
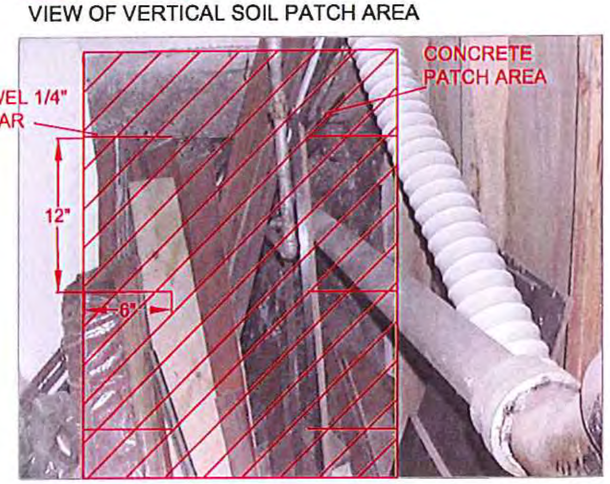


PHOTO "E"

VIEW OF VERTICAL SOIL PATCH AREA



1) CONTRACTOR INSTALLED A VERTICAL CONCRETE PATCH OVER THE EXPOSED AREA.

2) REBAR DOWELS (1/4") INSTALLED AT INTERVALS OF 12" ALONG EACH SIDE OF THE PATCH AREA.

3) THE DOWELS EXTEND A MINIMUM OF 6" INTO THE PATCH AREA AND WERE SET A MINIMUM OF 6" INTO THE EXISTING (ADJOINING) CONCRETE WALL.

4) THE CONCRETE PATCH AREA IS A MINIMUM OF 3" THICK.

SITE B - 2805 UNANDER AVENUE

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

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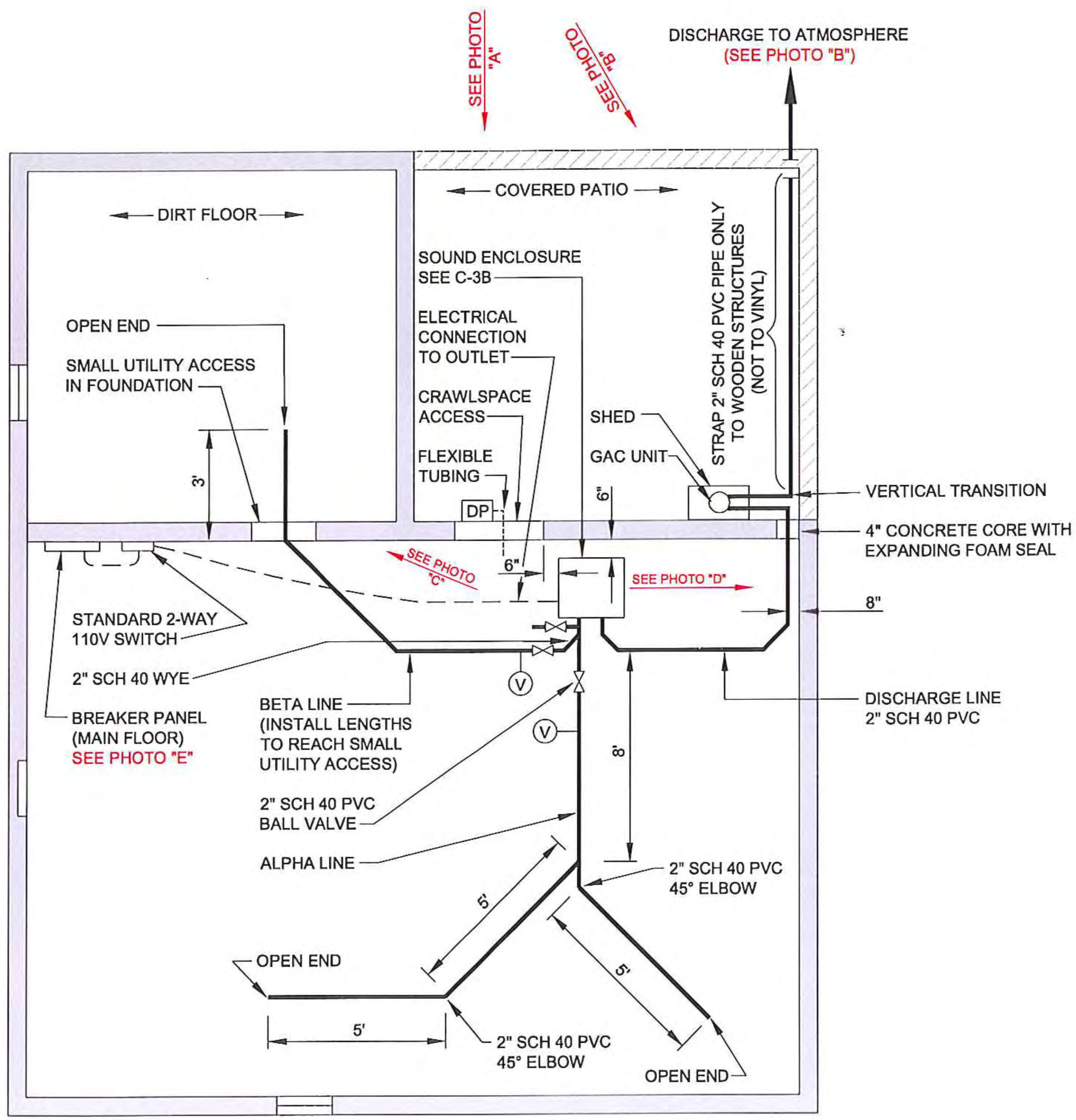
APPROVED:	SIGNED:

SITE PHOTOGRAPHS

FIGURE C-2C

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-2C. DWG



NOTES:

1) THE BLOWER WAS MOUNTED UPSIDE DOWN ON THE OVERLYING FLOOR SUPPORTS IN THE CRAWLSPACE WITH A SOUND ENCLOSURE (WOOD WITH RIGID FOAM).

2) EXTEND FLEXIBLE TUBING 6" INTO THE CRAWLSPACE. SEAL HOLE FOR FLEXIBLE TUBING.

3) CONTRACTOR INSTALLED FOAM OR RUBBER GASKETS AROUND THE CRAWLSPACE ACCESS TO MINIMIZE AIR INFILTRATION.

4) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

N

SITE C - 2206 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

amec

7376 S.W. DURHAM ROAD
PORTLAND, OR 97224

SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE LAYOUT — FIGURE C-3A

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

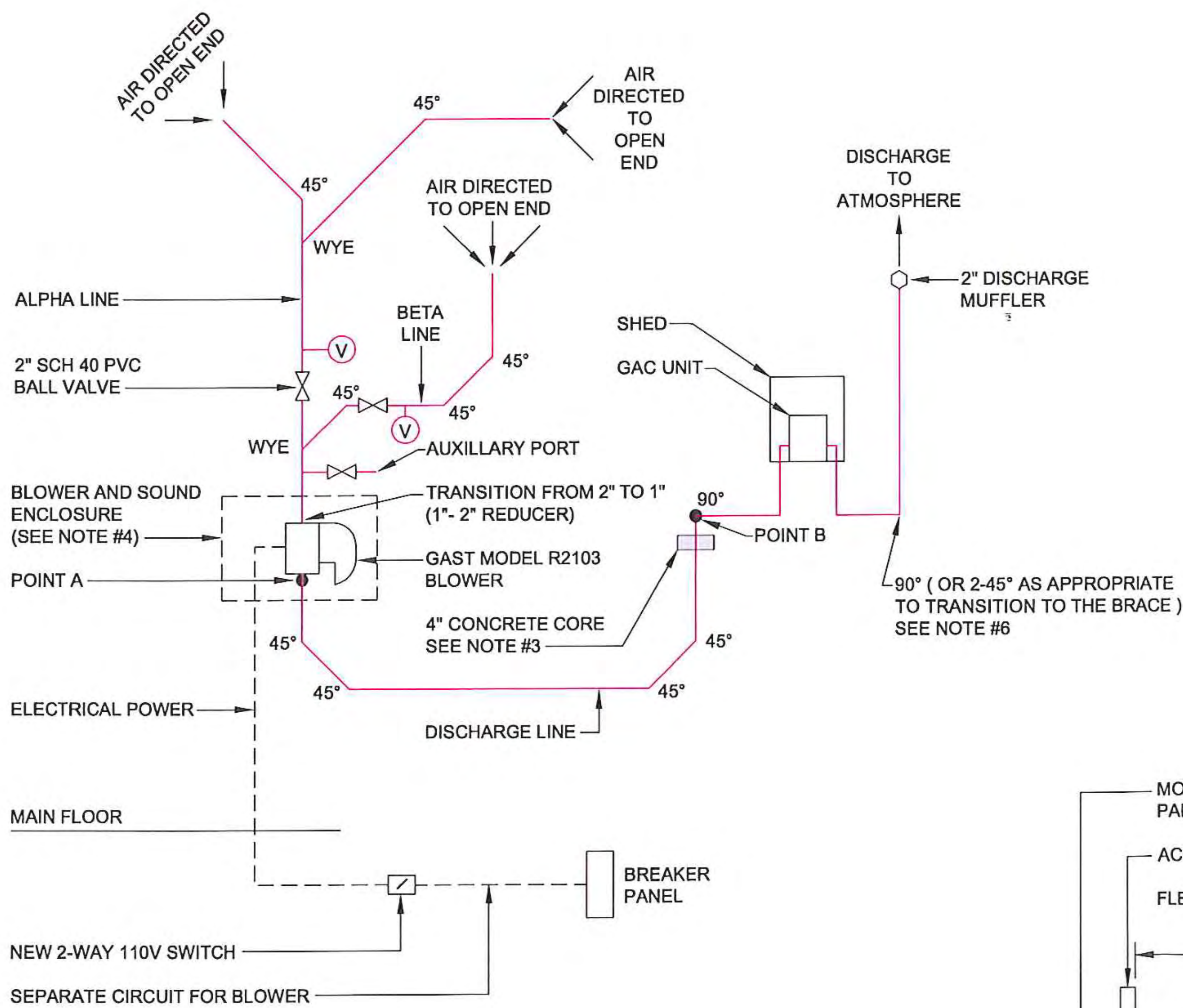
3) CORE A 4" HOLE IN THE FOUNDATION WALL TO TRANSITION THE DISCHARGE LINE OUTSIDE.

4) THE BLOWER WAS MOUNTED UPSIDE DOWN ON THE OVERLYING FLOOR SUPPORTS IN THE CRAWLSPACE WITH A SOUND ENCLOSURE (WOOD WITH RIGID FOAM).

5) (V) VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

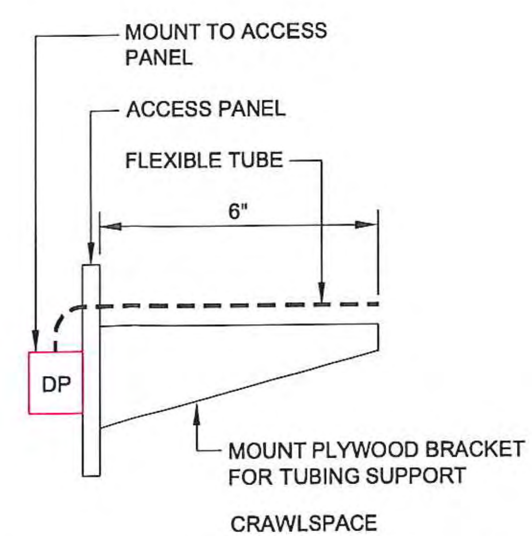
6) DP DYWER MODEL 300 DURABLOCK SOLID PLASTIC STATIONARY GAGES.

7) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.



SYSTEM SCHEMATIC

NOT TO SCALE



DIFFERENTIAL PRESSURE GAUGE SYSTEM

NOT TO SCALE

SITE C - 2206 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
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REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM SCHEMATIC

FIGURE C-3B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-3B. DWG

PHOTO "A"

VIEW OF CRAWLSPACE ACCESS

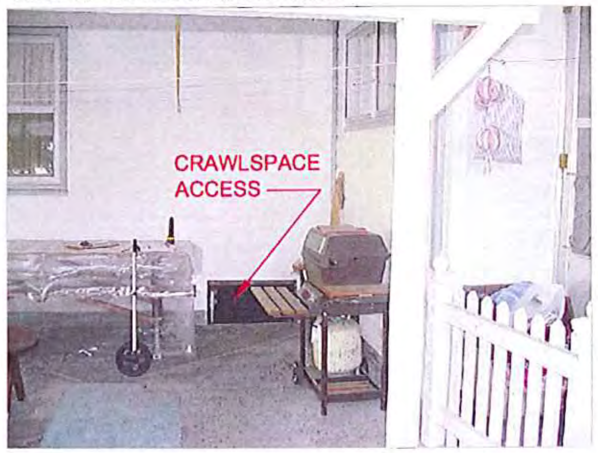


PHOTO "B"

VIEW OF OUTSIDE RUN

PHOTO "C"

VIEW OF UTILITY ACCESS POINT

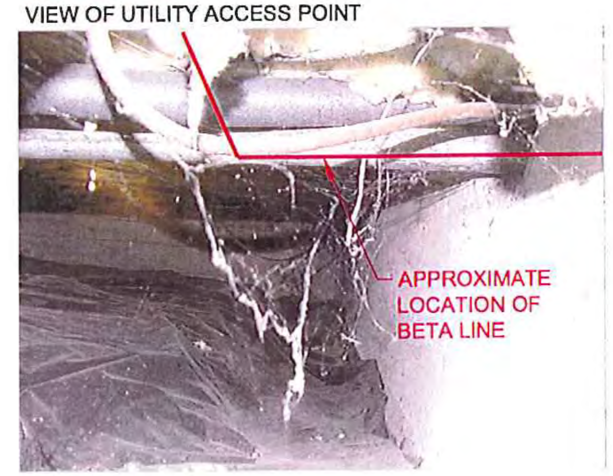
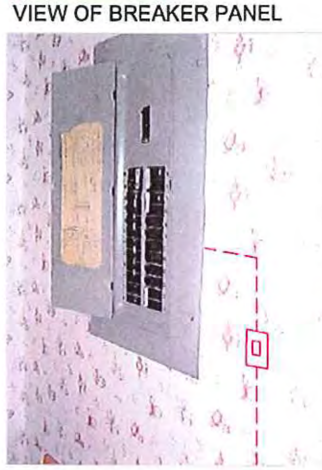


PHOTO "D"

VIEW OF DISCHARGE LOCATION

PHOTO "E"

VIEW OF BREAKER PANEL



SITE C - 2206 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
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REVISIONS

FRUIT VALLEY NEIGHBORHOOD
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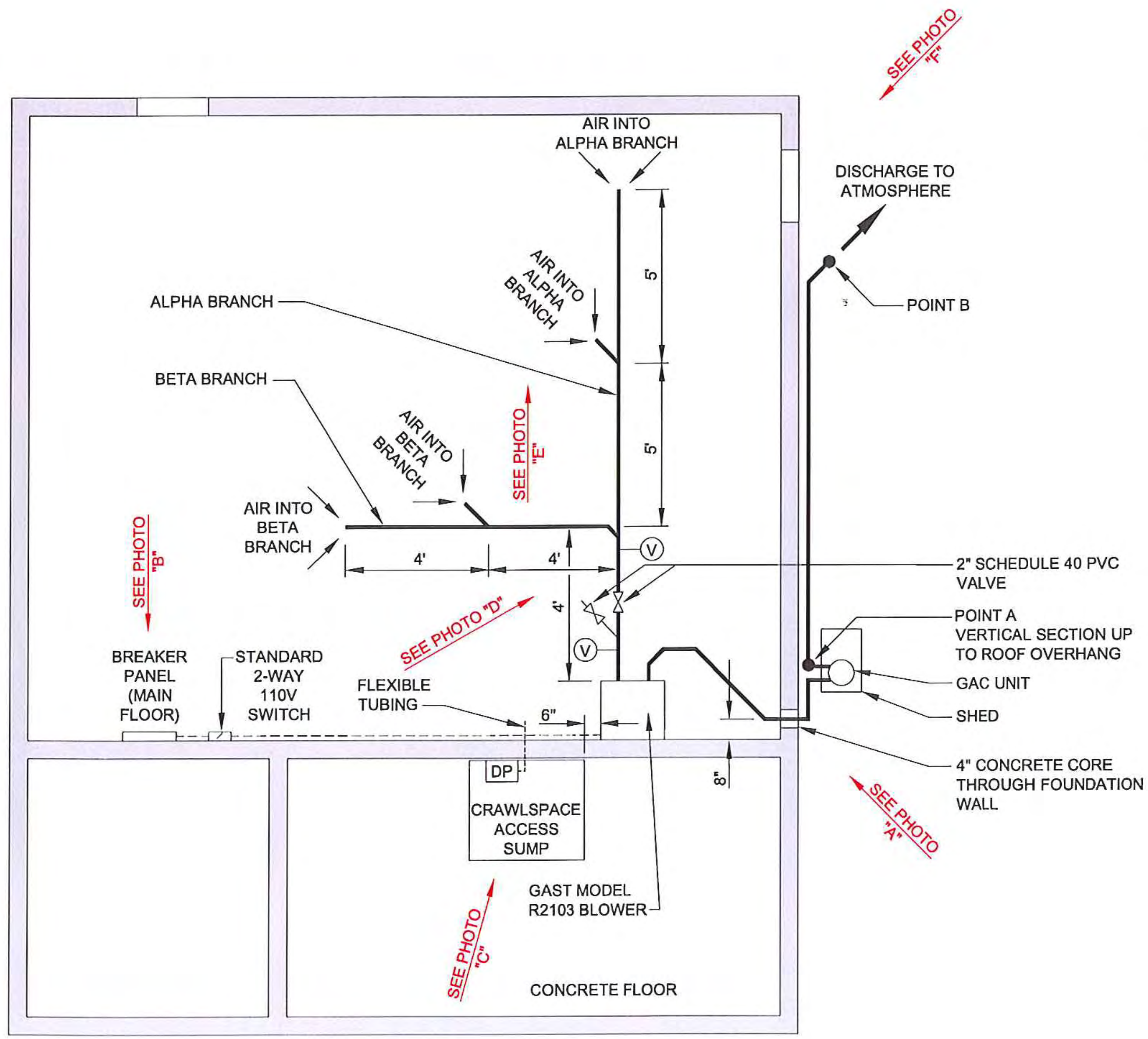
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE PHOTOGRAPHS — FIGURE C-3C

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-3C. DWG



NOTES:

1) THE BLOWER WAS MOUNTED UPSIDE DOWN ON THE OVERLYING FLOOR SUPPORTS IN THE CRAWLSPACE WITH A SOUND ENCLOSURE (WOOD WITH RIGID FOAM).

N

SITE D - 2202 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE LAYOUT

FIGURE C-4A

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-4A. DWG

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

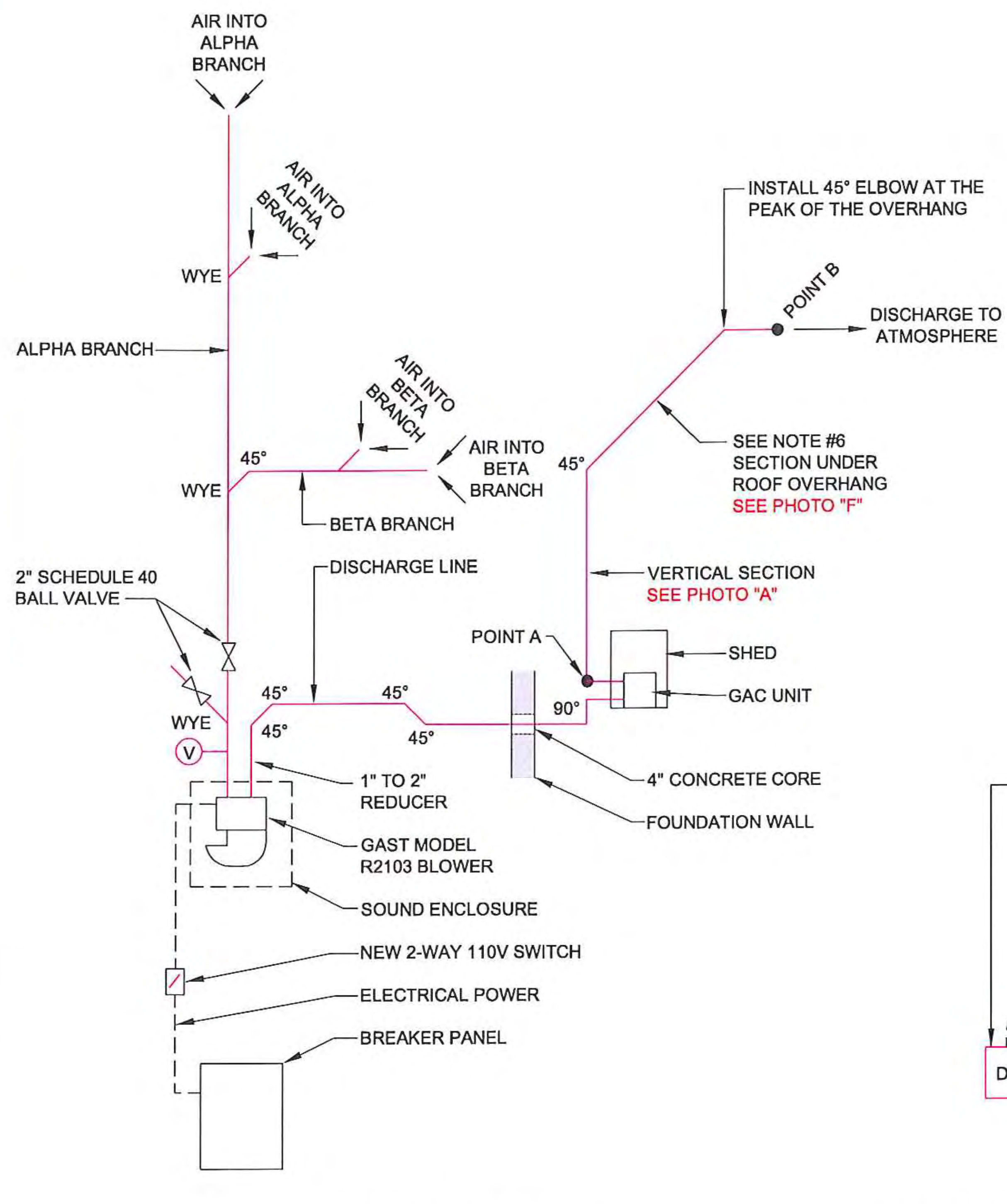
3) CORE A 4" HOLE IN THE FOUNDATION WALL TO TRANSITION THE DISCHARGE LINE OUTSIDE.

4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) AND RIGID FOAM.

5) V VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

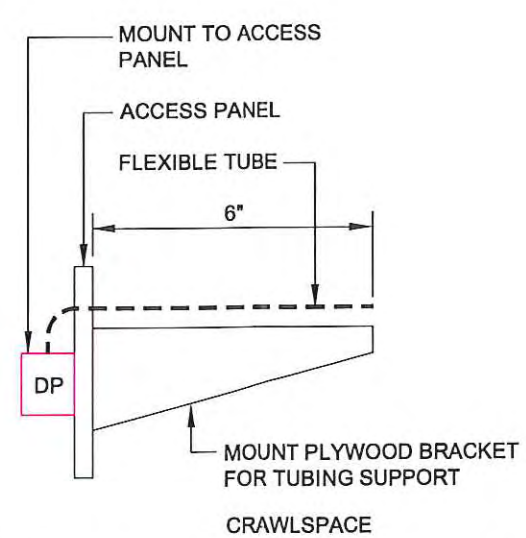
6) $\boxed{\text{DP}}$ DWYER MODEL 300 DURABLOCK SOLID PLASTIC STATIONARY GAGES.

7) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.



SYSTEM SCHEMATIC

NOT TO SCALE



DIFFERENTIAL PRESSURE GAUGE SYSTEM

NOT TO SCALE

SITE D - 2202 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
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REVISIONS

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CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM SCHEMATIC | FIGURE C-4B

PHOTO "A"

VIEW OF CORING LOCATION

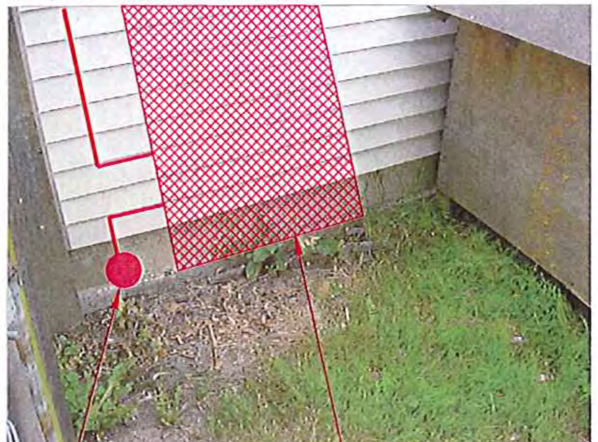


PHOTO "B"

VIEW OF BREAKER PANEL

PHOTO "C"

VIEW OF CRAWL SPACE ACCESS

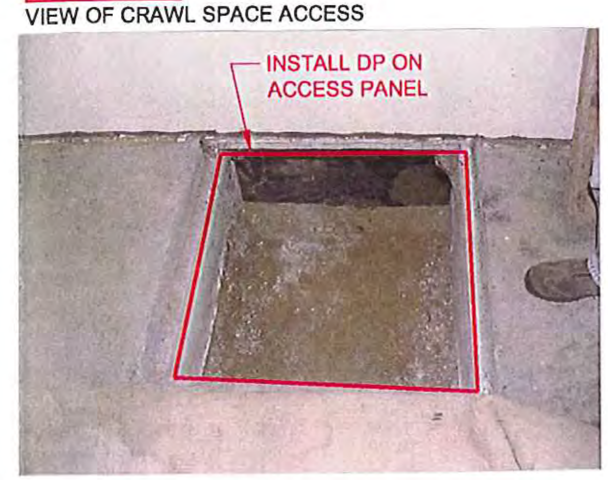


PHOTO "D"

VIEW OF CRAWLSPACE SUMP AREA

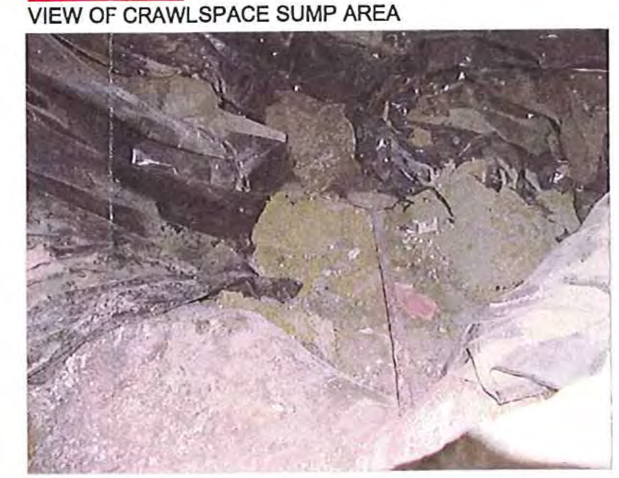
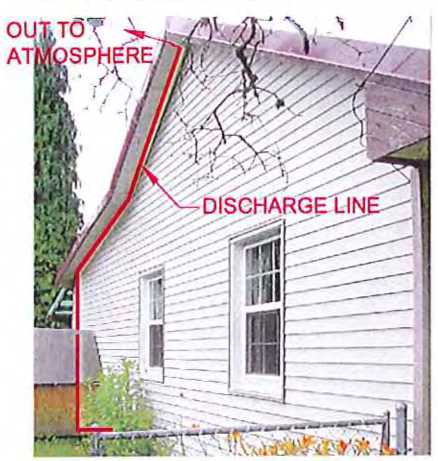


PHOTO "E"

VIEW OF CRAWLSPACE

PHOTO "F"

VIEW OF OUTSIDE RUN



SITE D - 2202 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
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REVISIONS

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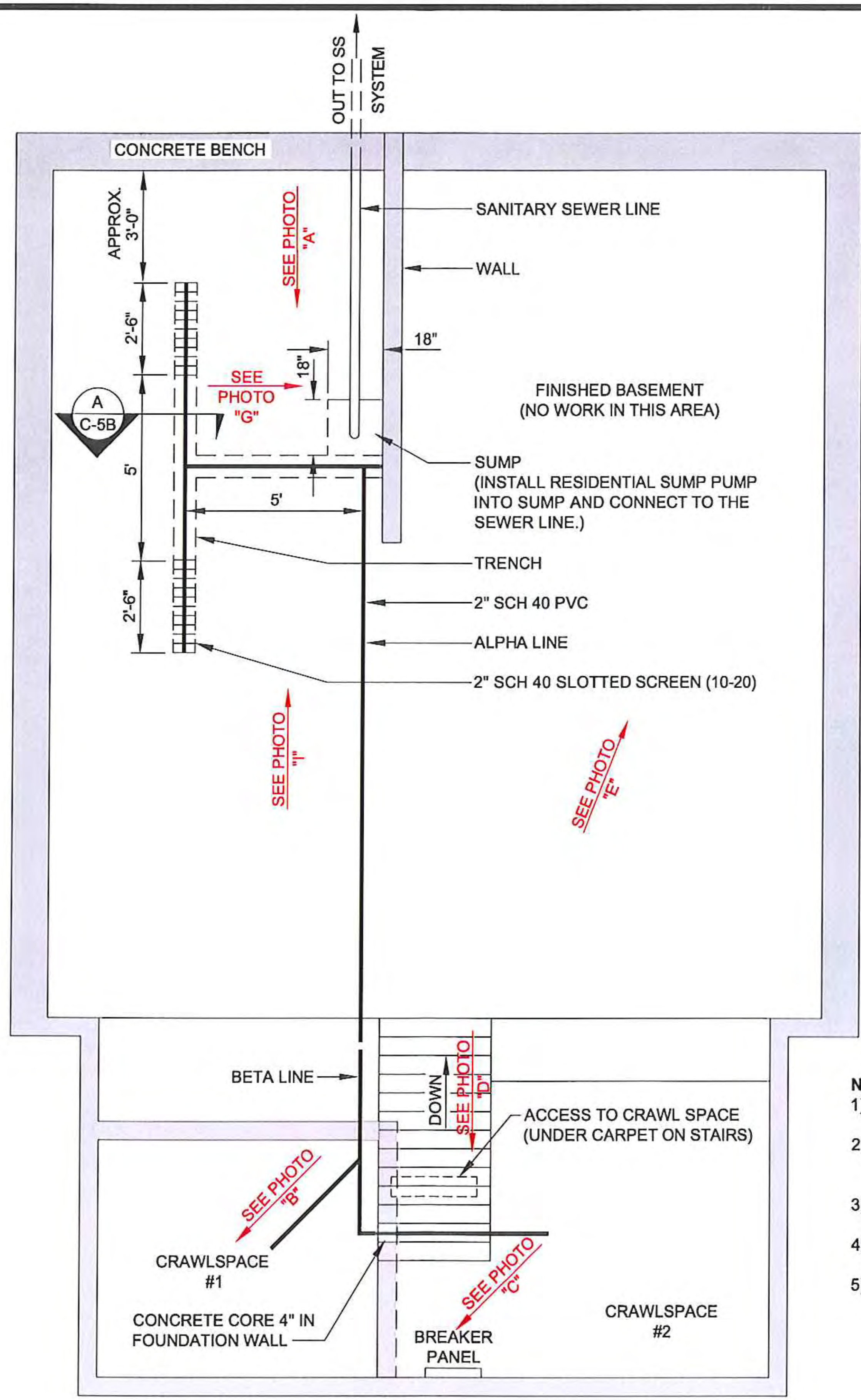
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE PHOTOGRAPHS — FIGURE C-4C



NOTES:

1) DEPTH OF SUMP SHOULD BE AT LEAST 24" BELOW BASEMENT FLOOR.

2) SUMP PUMP DISCHARGE WAS CONNECTED TO THE SANITARY SEWER LINE BY THE CONTRACTOR.

3) ALL VALVES, SWITCHES, AND GAUGES INSTALLED IN THE LAUNDRY CLOSET.

4) GAC UNITS (2) WERE INSTALLED IN THE ATTIC (ADJACENT TO BLOWERS).

5) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

N

SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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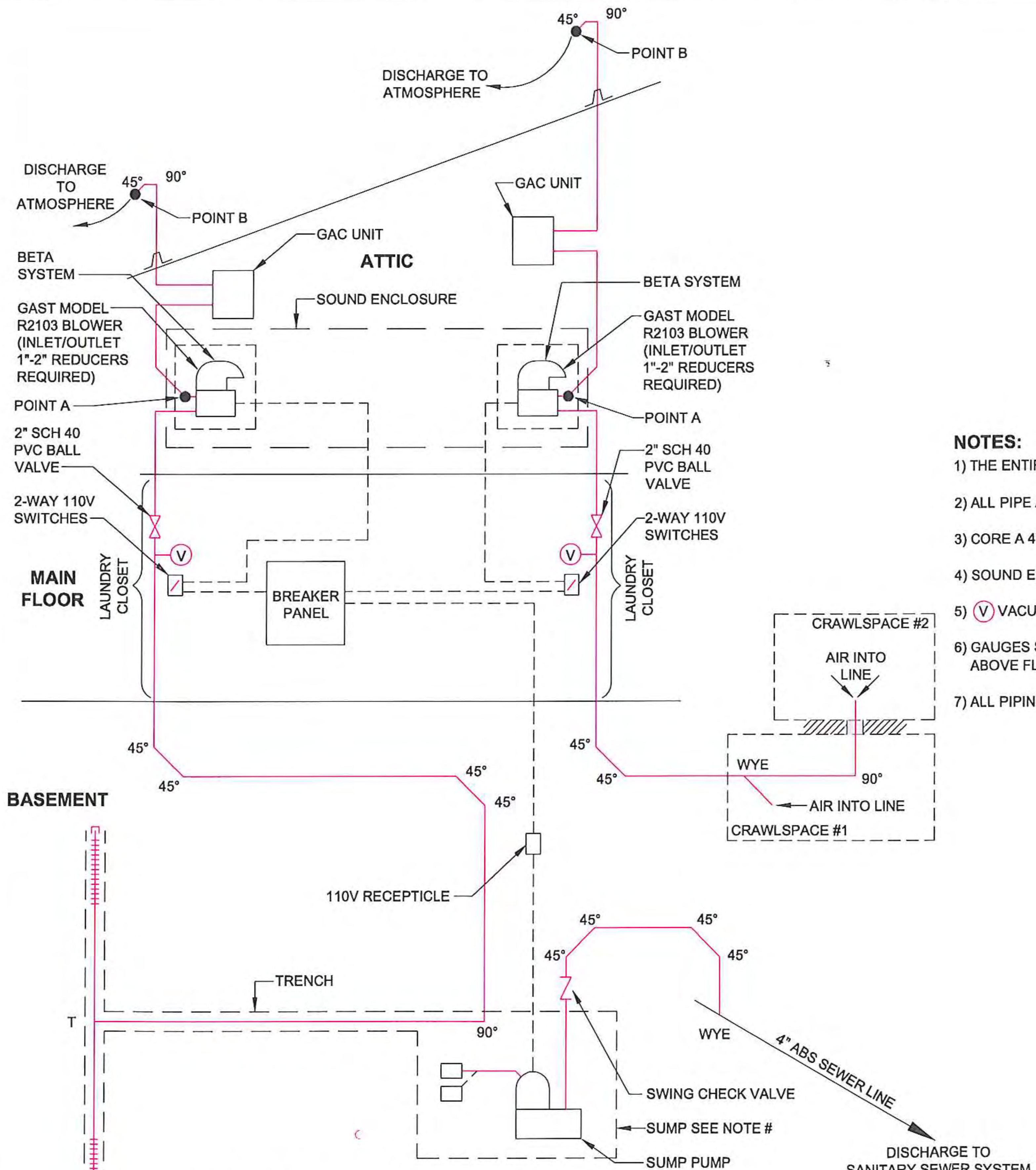
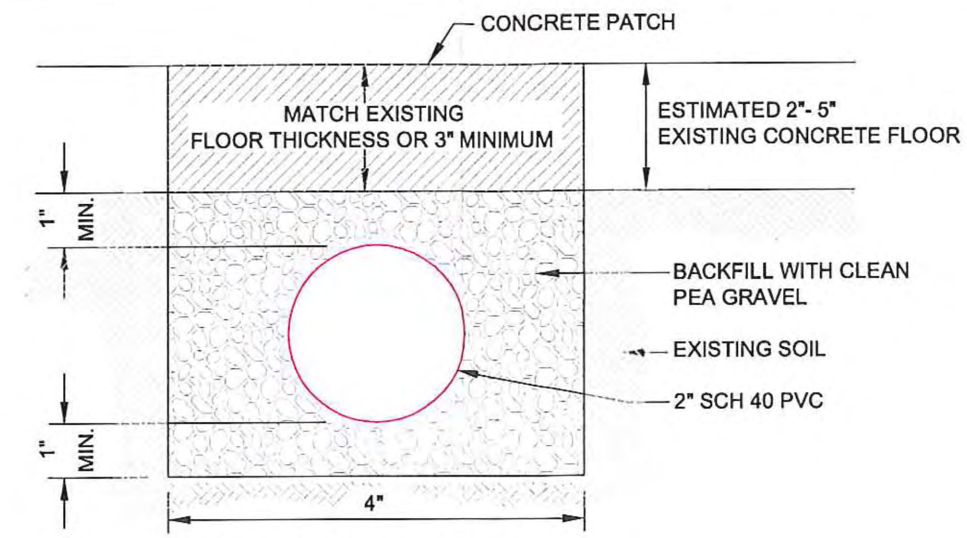
PORTLAND, OR 97224

SCALE:	NOT TO SCALE	JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SITE LAYOUT — FIGURE C-5A



SYSTEM SCHEMATIC
NOT TO SCALE



TRENCH SECTION
NOT TO SCALE

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.

2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.

3) CORE A 4" HOLE IN THE FOUNDATION WALL TO TRANSITION THE BETA SYSTEM LINE INTO CRAWLSPACE #2.

4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) AND RIGID FOAM.

5) (V) VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).

6) GAUGES SET 5'-0" ABOVE FLOOR OF THE LAUNDRY CLOSET. BALL VALVES INSTALLED 6'-0" ABOVE FLOOR OF THE LAUNDRY CLOSET.

7) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
1		

REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
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PORTLAND, OR 97224

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DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

SYSTEM SCHEMATIC
TRENCH SECTION

FIGURE
C-5B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-5B. DWG

PHOTO "A"

BASEMENT VIEW - SOUTH

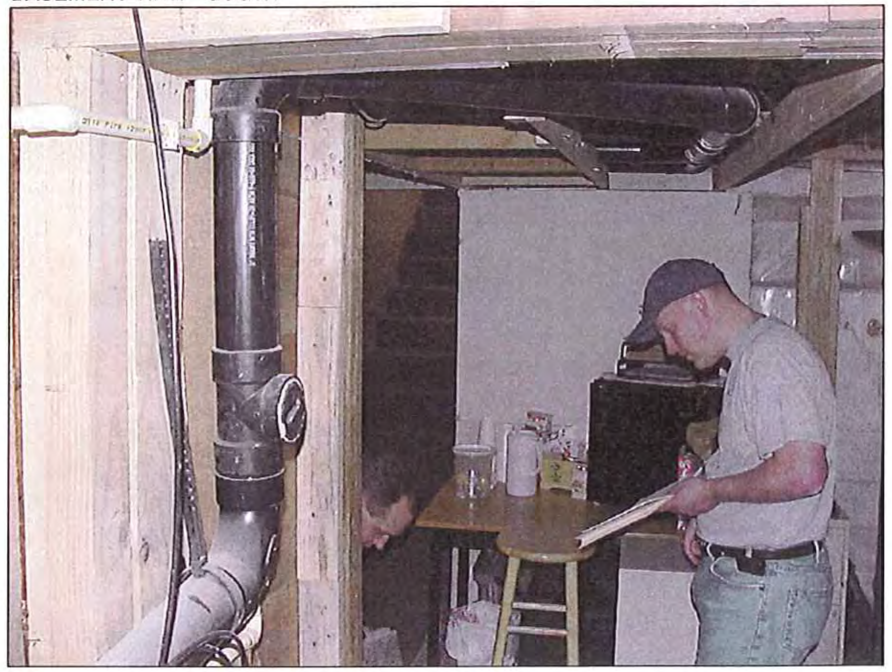

PHOTO "B"

VIEW OF CRAWL SPACE ACCESS - VIEW 1

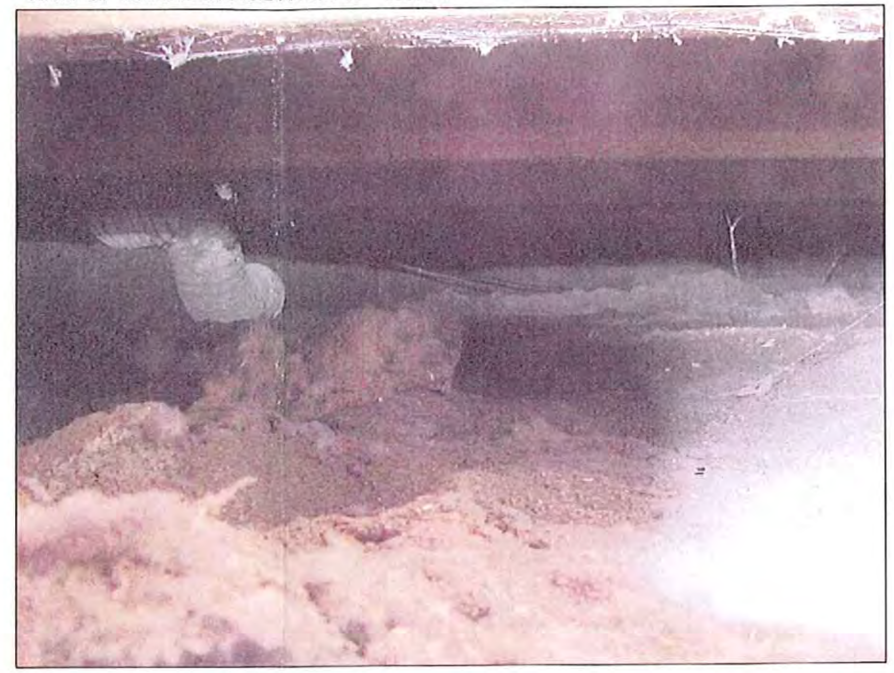

PHOTO "C"

VIEW OF BREAKER PANEL

PHOTO "D"

VIEW OF CRAWLSPACE SUMP AREA - VIEW 2

PHOTO "E"

FINISHED SIDE OF BASEMENT

SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
2		
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REVISIONS

FRUIT VALLEY NEIGHBORHOOD
SOIL VAPOR VACUUM SYSTEM
UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

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SCALE: NOT TO SCALE	JOB NO. 4-61M-10135-L T-1
DESIGNED: PDS	DATE: APRIL 2004
DRAWN: DD	DATE:
CHECKED:	SIGNED:
APPROVED:	SIGNED:

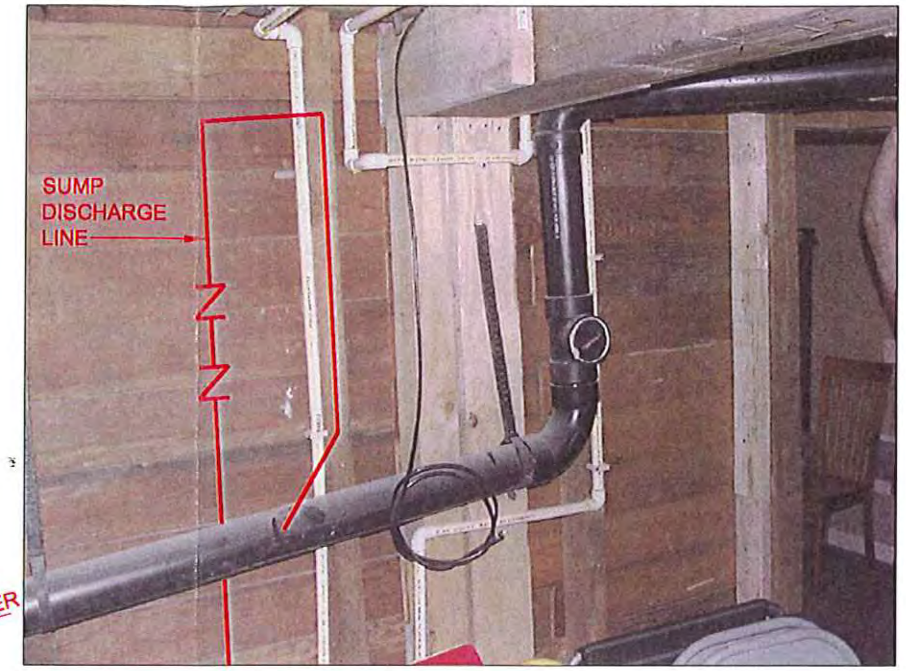
SITE PHOTOGRAPHS — FIGURE C-5C

PHOTO "F"

OUTSIDE VIEW

PHOTO "G"

SANITARY SEWER PLUMBING



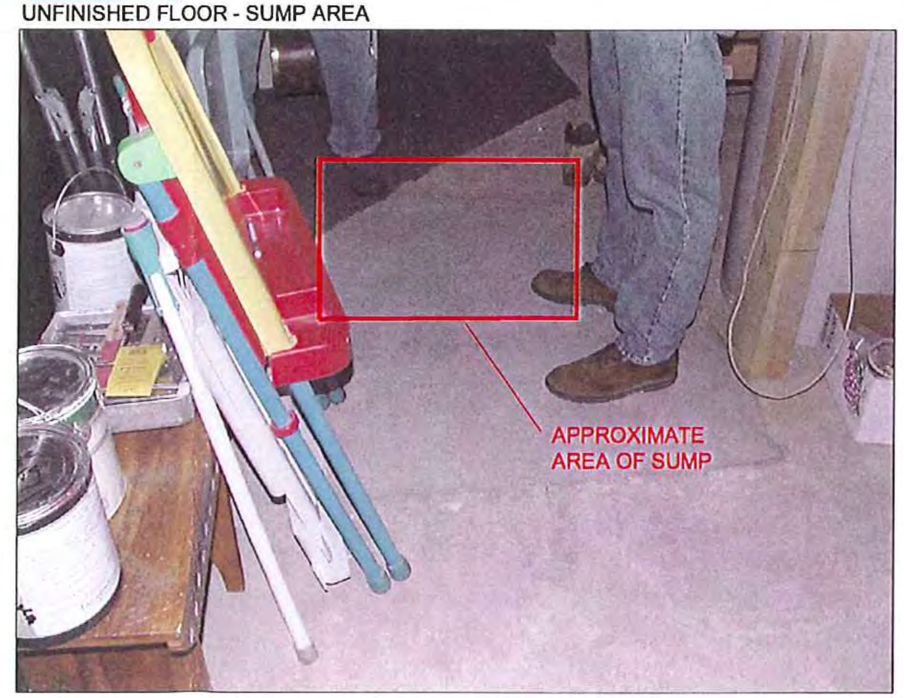
OUT TO SANITARY SEWER

PHOTO "H"

LAUNDRY CLOSET SUBFLOOR ACCESS POINT

PHOTO "I"

UNFINISHED FLOOR - SUMP AREA



SITE E - 2105 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
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REVISIONS

FRUIT VALLEY NEIGHBORHOOD
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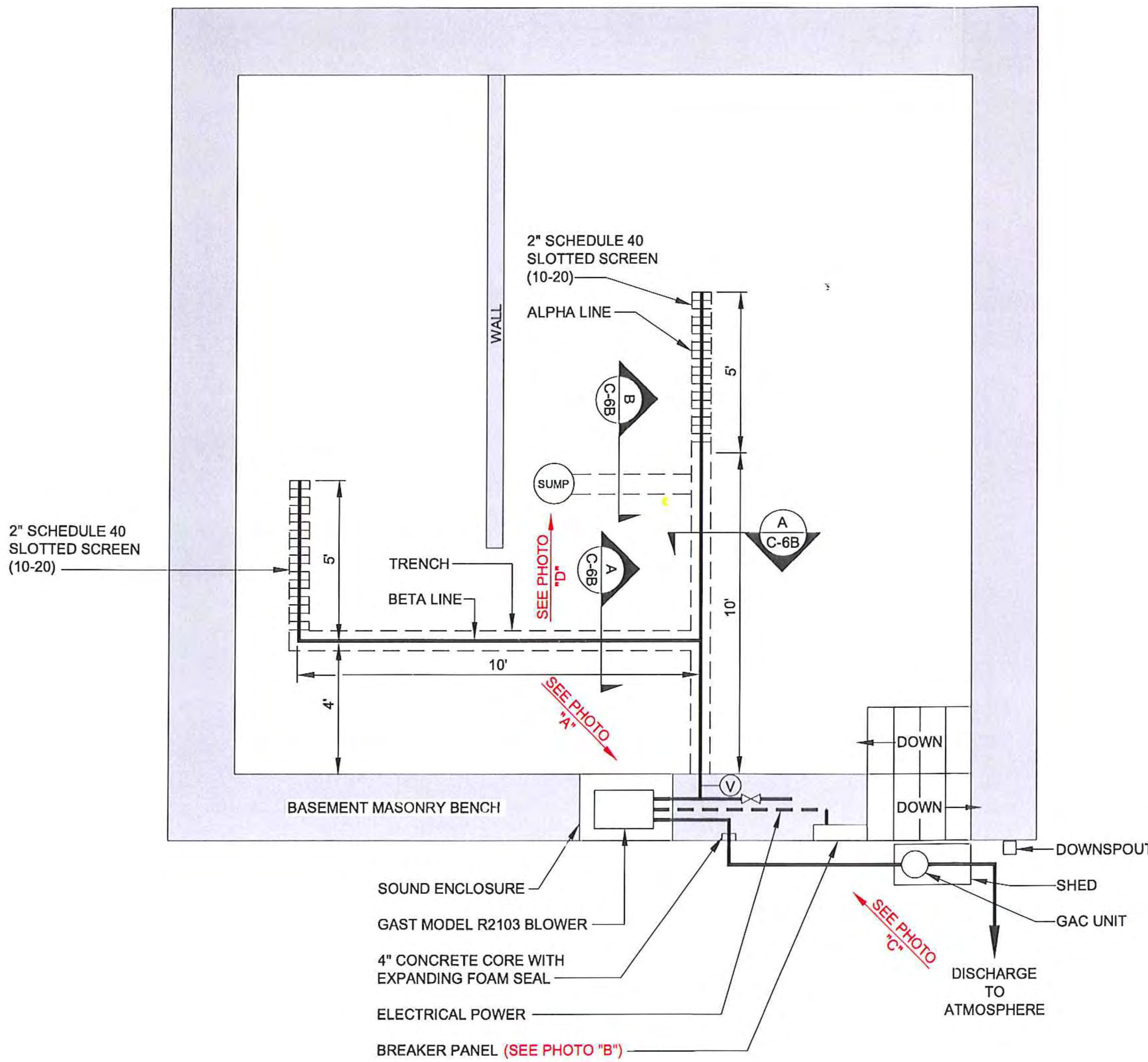
APPROVED:	SIGNED:

SITE PHOTOGRAPHS — FIGURE C-5D

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-5D. DWG



SITE F - 2103 W. 28th STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
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REVISIONS

FRUIT VALLEY NEIGHBORHOOD
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UNANDER AVENUE & W. 28th STREET
VANCOUVER, WASHINGTON

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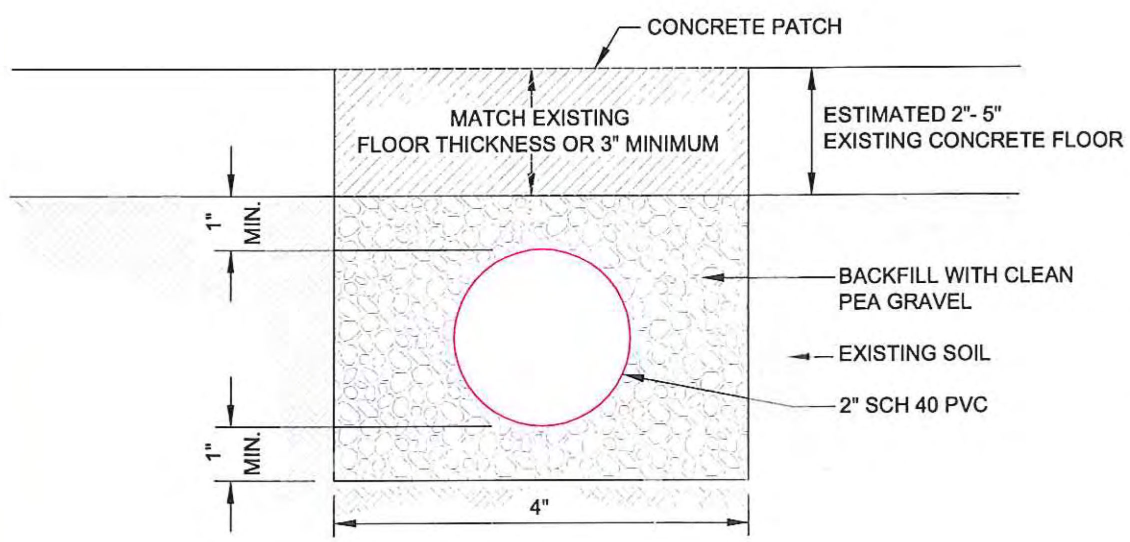
SCALE: NOT TO SCALE		JOB NO.	4-61M-10135-L T-1
DESIGNED:	PDS	DATE:	APRIL 2004
DRAWN:	DD	DATE:	
CHECKED:		SIGNED:	
APPROVED:		SIGNED:	

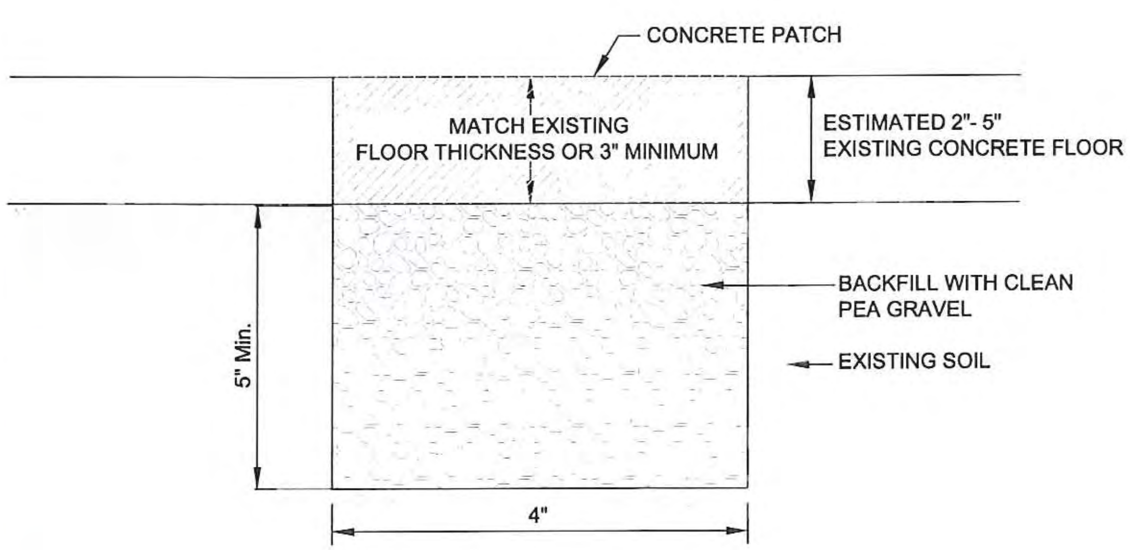
SITE LAYOUT

FIGURE C-6A

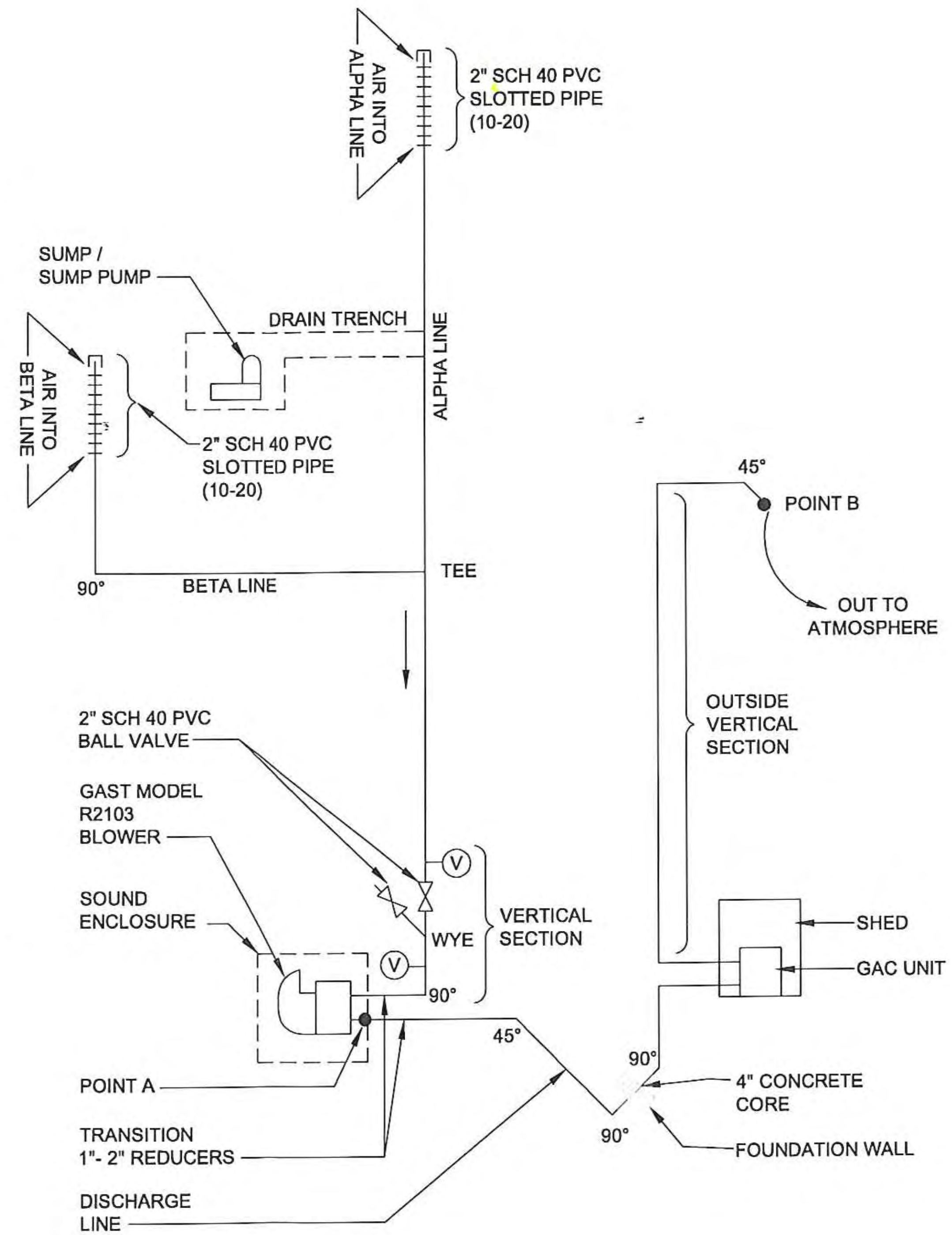
AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-6A. DWG



A
C-6B
TRENCH SECTION
NOT TO SCALE



B
C-6B
TRENCH SECTION
NOT TO SCALE



SYSTEM SCHEMATIC
NOT TO SCALE

NOTES:

1) THE ENTIRE SYSTEM IS SCHEDULE 40 PVC, EXCEPT WHERE INDICATED.
2) ALL PIPE AND FITTINGS BETWEEN POINT A AND POINT B ARE SCHEDULE 80 PVC.
3) BLOWER MOUNTED ON BASEMENT LEDGE WITH SWITCHES AND GAUGES LOCATED IN EASILY ACCESSIBLE LOCATIONS WITHIN 24" OF THE BLOWER.
4) SOUND ENCLOSURE CONSTRUCTED WITH WOOD (PLYWOOD) AND RIGID FOAM.
5) (V) VACUUM GAUGES (0-60" WC) (LIQUID FILLED-MECHANICAL).
6) ALL PIPING 2" DIAMETER UNLESS OTHERWISE NOTED.

SITE F - 2103 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
3		
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REVISIONS

FRUIT VALLEY NEIGHBORHOOD
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APPROVED:		SIGNED:	

SYSTEM SCHEMATIC
TRENCH SECTION

FIGURE
C-6B

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-6B. DWG

PHOTO "A"

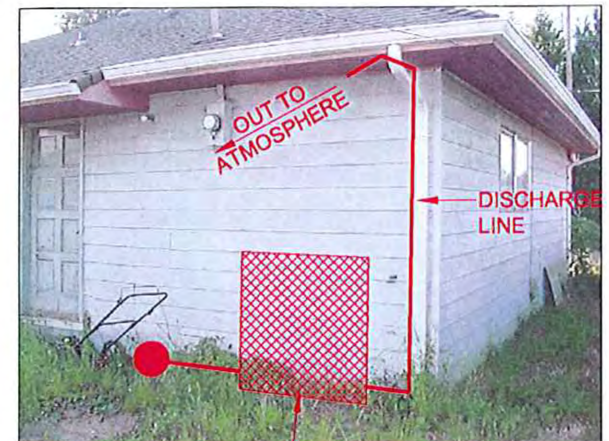
VIEW OF BLOWER LOCATION

PHOTO "B"

VIEW OF BREAKER PANEL

PHOTO "C"

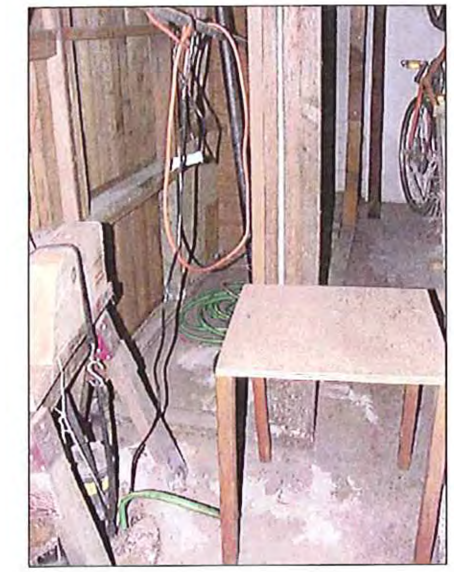
VIEW OF OUTSIDE DISCHARGE POINT



SHED WITH GAC UNIT

PHOTO "D"

VIEW OF SUMP PUMP AREA



SITE F - 2103 WEST 28TH STREET

NO.	DESCRIPTION	INITIALS/DATE
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REVISIONS

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APPROVED:		SIGNED:	

SITE PHOTOGRAPHS | FIGURE C-6C

AMEC DRAWING NO. K: \ 10000 \ 10100 \ 10135 \ FVN SOIL VAPOR \ DWG \ AS BUILTS 0404 \ FIG C-6C. DWG