STATE OF WASHINGTON
KING COUNTY SUPERIOR COURT

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY, Plaintiff, v. CITY OF BOTHELL, BOTHELL SERVICE CENTER ASSOCIATES, NORMAN OLSEN, NANCY OLSEN, LANCE CROSS, ANITA CROSS, ROSS LUNDE, and ESTATE OF MERCER RHODES, Defendants.	NO. 18-2-02852-3 SEA FIRST AMENDMENT TO CONSENT DECREE RE: BOTHELL SERVICE CENTER SIMON & SONS SITE

Pursuant to Section XV of the CONSENT DECREE RE: BOTHELL SERVICE CENTER SIMON & SONS SITE, entered by this Court on February 2, 2018, Plaintiff, State of Washington, Department of Ecology (Ecology), and Defendants City of Bothell, Bothell Service Center Associates, Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and Estate of Mercer Rhodes (Defendants), hereby stipulate to amend the Consent Decree. Set forth below is the text of the Consent Decree as amended.

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
360-586-6770

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PO Box 40117
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I. INTRODUCTION

1. The mutual objective of the State of Washington, Department of Ecology (Ecology), the Defendants City of Bothell (City), Bothell Service Center Associates (BSCA), Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and the Estate of Mercer Rhodes (collectively "Defendants") under this Decree is to provide for remedial action at a facility where there has been a release or threatened release of hazardous substances. This Decree requires the BSCSS Potentially Liable Person (PLP) Group to implement the Bothell Service Center Simon & Sons (BSCSS) Cleanup Action Plan (CAP) (Exhibit C) and requires the Wexler PLP Group to implement the Wexler CAP (Exhibit F).

2. Ecology has determined that these actions are necessary to protect human health and the environment.

3. The Complaint in this action is being filed simultaneously with this Decree. An Answer has not been filed, and there has not been a trial on any issue of fact or law in this case. However, the Parties wish to resolve the issues raised by Ecology's Complaint. In addition, the Parties agree that settlement of these matters without litigation is reasonable and in the public interest, and that entry of this Decree is the most appropriate means of resolving these matters.

4. By signing this Decree, the Parties agree to its entry and agree to be bound by its terms.

5. By entering into this Decree, the Parties do not intend to discharge non-settling parties from any liability they may have with respect to matters alleged in the Complaint. The Parties retain the right to seek reimbursement, in whole or in part, from any liable persons for sums expended under this Decree.

6. This Decree shall not be construed as proof of liability or responsibility for any releases of hazardous substances or cost for remedial action nor an admission of any facts; provided, however, that Defendants shall not challenge the authority of the Attorney General and Ecology to enforce this Decree.

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Ecology Division
PO Box 40117
Olympia, WA 98504-0117
360-586-6770

7. The Court is fully advised of the reasons for entry of this Decree, and good cause having been shown:

Now, therefore, it is HEREBY ORDERED, ADJUDGED, AND DECREED as follows:

II. JURISDICTION

1. This Court has jurisdiction over the subject matter and over the Parties pursuant to the Model Toxics Control Act (MTCA), RCW 70.105D.

2. Authority is conferred upon the Washington State Attorney General by RCW 70.105D.040(4)(a) to agree to a settlement with any PLP if, after public notice and any required hearing, Ecology finds the proposed settlement would lead to a more expeditious cleanup of hazardous substances. RCW 70.105D.040(4)(b) requires that such a settlement be entered as a consent decree issued by a court of competent jurisdiction.

3. Ecology has determined that a release or threatened release of hazardous substances has occurred at the BSCSS Site, which includes the Wexler Settlement Area, that is the subject of this Decree.

4. Each member of the BSCSS PLP Group waives the procedural requirements of WAC 173-340-500 and accepts PLP status for the BSCSS Site for purposes of this Decree.

5. Each member of the Wexler PLP Group waives the procedural requirements of WAC 173-340-500 and accepts PLP status for the Wexler Settlement Area for purposes of this Decree.

6. The actions to be taken pursuant to this Decree are necessary to protect public health and the environment.

7. This Decree has been subject to public notice and comment.

8. Ecology finds that this Decree will lead to a more expeditious cleanup of hazardous substances at the BSCSS Site in compliance with the cleanup standards established under RCW 70.105D.030(2)(e) and WAC 173-340.

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9. The BSCSS PLP Group and Wexler PLP Group have agreed to undertake the actions specified in this Decree as set out below and consent to the entry of this Decree under MTCA.

III. PARTIES BOUND

This Decree shall apply to and be binding upon the Parties to this Decree, their successors and assigns. The undersigned representative of each party hereby certifies that he or she is fully authorized to enter into this Decree and to execute and legally bind such party to comply with this Decree. Defendants agree to undertake all actions required by the terms and conditions of this Decree as set out in this Decree. No change in ownership or corporate status shall alter Defendants' responsibility under this Decree. Defendants shall provide a copy of this Decree to all agents, contractors, and subcontractors retained to perform work required by this Decree, and shall ensure that all work undertaken by such agents, contractors, and subcontractors complies with this Decree.

IV. DEFINITIONS

Unless otherwise specified herein, all definitions in RCW 70.105D.020 and WAC 173-340-200 shall control the meanings of the terms in this Decree.

A. BSCSS Site: The BSCSS Site is generally located at 18107 Bothell Way NE, Bothell, Washington, in the location shown on the BSCSS Site Location Diagram (Exhibit A). The currently documented boundaries of the BSCSS Site are more particularly described in the BSCSS Settlement Area Diagram (Exhibit B). The BSCSS Site constitutes a facility under RCW 70.105D.020(8). RCW 70.105D.020(8) defines a "facility" as including any site or area where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located. As a result, the boundary of the BSCSS Site may expand beyond the boundaries shown in the BSCSS Settlement Area Diagram (Exhibit B) if

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Ecology finds that the facility boundaries must expand to meet the statutory definition. The BSCSS Site includes the Wexler Settlement Area.

B. BSCSS Settlement Area: The BSCSS Settlement Area is limited to the area where the Remedial Investigation/Feasibility Study (RI/FS) for the BSCSS Site (Kane Environmental, Inc., *Remedial Investigation/Feasibility Study Report, Bothell Service Center, Bothell, WA* (October 4, 2017)) has documented the release of hazardous substances (which the RI/FS refers to as contaminants of concern) from the former drycleaner at the northwest corner of the BSCSS Site, and Ecology has agreed to provide a Covenant Not to Sue as provided in Section XVIII. The BSCSS Settlement Area is depicted in the BSCSS Settlement Area Diagram (Exhibit B). The BSCSS Settlement Area is only a portion of the BSCSS Site, and its boundaries do not necessarily reflect the boundaries of the BSCSS Site as defined by MTCA.

C. Parties: Refers to the State of Washington, Department of Ecology, the City, BSCA, Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and the Estate of Mercer Rhodes.

D. Defendants: Refers to the City, BSCA, Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and the Estate of Mercer Rhodes. For the avoidance of doubt, references to "Defendants" in the context of the BSCSS Settlement Area shall mean the BSCSS PLP Group and references to "Defendants" in the context of the Wexler Settlement Area shall mean the Wexler PLP Group.

E. Consent Decree or Decree: Refers to this Consent Decree and each of the exhibits to this Decree. All exhibits are integral and enforceable parts of this Consent Decree. The terms "Consent Decree" or "Decree" shall include all exhibits to this Consent Decree.

F. Former Wexler Property: The Former Wexler Property includes several parcels of property located adjacent to and partially overlapping with the BSCSS Site, as

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shown on the Wexler Settlement Area Diagram (Exhibit E). It includes the petroleum plume for which the Wexler PLP Group has prepared a Remedial Investigation/Feasibility Study (RI/FS) (Kane Environmental, Inc., *Remedial Investigation/Feasibility Study Report, Als Auto Bothell Wexler Property, Bothell, WA* (July, 2019)) and Cleanup Action Plan (CAP) (Exhibit F).

G. Wexler Settlement Area: The Wexler Settlement Area is the portion of the BSCSS Site where the Wexler RI/FS documented the release of hazardous substances (which the RI/FS refers to as "contaminants of concern") from the former gasoline service station, and Ecology has agreed to provide a Covenant Not to Sue as provided in Section XVIII with respect to the Wexler Settlement Area. The Wexler Settlement Area is depicted in the Wexler Settlement Area Diagram (Exhibit E).

H. BSCSS PLP Group: The BSCSS PLP Group includes the City of Bothell, Bothell Service Center Associates, Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and the Estate of Mercer Rhodes.

I. Wexler PLP Group: The Wexler PLP Group includes the City of Bothell.

V. FINDINGS OF FACT

Ecology makes the following findings of fact without any express or implied admissions of such facts by Defendants.

A. The BSCSS Site is located in Bothell, Washington, and consists of approximately four acres. The BSCSS Site is currently expected to be within a city block generally bounded by 98th Avenue NE, SR 522, Bothell Way NE, and Main Street (extension). It includes the Wexler Settlement Area. A diagram of the BSCSS Site location is attached as Exhibit A.

B. Between approximately 1988 and 2015, the BSCSS Site was used by various tenants for a variety of commercial uses, including dry cleaning operations. Soil, groundwater, and soil vapor samples have been collected at the BSCSS Site and

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chlorinated solvents, such as Tetrachloroethene (PCE), have been detected at levels that represent a risk to human health and the environment and require remedial action.

C. A series of investigations have been performed, including the RI/FS.

D. The contaminants of concern at the BSCSS Site that exceed MTCA cleanup levels include chlorinated solvents, i.e., Tetrachloroethene (PCE), Trichloroethene (TCE), Cis-1,2-Dichloroethene (DCE), and Vinyl Chloride (VC) in soil and groundwater. Petroleum-related contaminants above cleanup levels are co-mingled with these solvents on the Former Wexler property. Ecology has not assigned the BSCSS Site an overall priority ranking pursuant to MTCA.

E. As documented in the BSCSS CAP (Exhibit C), the cleanup action to be implemented for the BSCSS Settlement Area includes a combination of electrical resistance heating, soil vapor extraction, biological groundwater treatment and circulation, monitoring, targeted soil removal, and institutional controls as required by WAC 173-340-360.

F. The City is the current "owner or operator" of the BSCSS Site (as that term is defined in RCW 70.105D.020(22)), and is a PLP.

G. BSCA was an "owner or operator" at the time of initial release of hazardous substances at the BSCSS Site (as that term is defined in RCW 70.105D.020(22)), and is a PLP.

H. Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and the Estate of Mercer Rhodes are current or former partners in BSCA, a Washington general partnership, were "owners or operators" of the BSCSS Site (as that term is defined in RCW 70.105D.020(22)) during the time period that BSCA was an "owner or operator," and are PLPs.

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I. The Former Wexler Property is located in Bothell, Washington, adjacent to and overlapping with the BSCSS Site (as depicted in Exhibits B and E), and consists of approximately 0.8 acres. The Wexler Settlement Area is a portion of the BSCSS Site that is currently located within a city block generally bounded by 98th Avenue NE, SR-522, Bothell Way NE, and NE 183rd Street. In the future, this block will be bounded by 98th Avenue NE, SR-522, Bothell Way NE, and the future Main Street (extension). The Main Street (extension) will occupy a portion of the Former Wexler Property north of the Wexler Settlement Area.

J. Because of the overlap and commingling of contamination between the BSCSS Site and the Wexler Settlement Area, the Wexler PLP Group and Ecology cannot address the contamination within the Wexler Settlement Area without amending the Decree for the BSCSS Site. The Wexler Settlement Area is entirely within the boundaries of the BSCSS Site.

K. The Wexler Settlement Area is located on a tax parcel which is currently owned by the City. This parcel is currently vacant and used for equipment and material staging. Historically, the Wexler Settlement Area was the location of a gasoline service station (from 1947 to 1970). The Wexler Settlement Area contamination is related to the gasoline service station.

L. Releases of hazardous substances occurred in the vicinity of three gasoline Underground Storage Tanks (USTs) formerly located within the Wexler Settlement Area.

M. Prior remedial action within the Wexler Settlement Area occurred in 1989 when the USTs were removed, soil was excavated, and a groundwater treatment system was installed.

N. The City prepared an RI/FS for the Former Wexler Property to characterize the contamination which remained after these remedial actions. Soil and

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groundwater samples collected in 2018 identified levels of hazardous substances within the Wexler Settlement Area that represent a risk to human health and the environment and require remedial action.

O. Petroleum contamination in groundwater within the Wexler Settlement Area exceeds MTCA cleanup levels in the area to the east of the gasoline UST excavation, extending approximately 25-30 feet east-southeast of the eastern boundary of the former UST excavation, but does not extend beyond the Wexler Settlement Area boundaries. Dry-cleaning solvents migrating in groundwater from the adjacent and upgradient BSCSS source are commingled with the petroleum contamination within the Wexler Settlement Area.

P. The contaminants of concern within the Wexler Settlement Area that exceed MTCA cleanup levels are gasoline, ethylbenzene, xylenes, napthalene, and HVOCs in soil and gasoline and HVOCs in groundwater. Benzene was also reported above cleanup levels in groundwater as recently as 2010, and is a contaminant of concern.

Q. As documented in the Wexler CAP (Exhibit F), the cleanup action to be implemented for the Wexler Settlement Area includes targeted soil removal, groundwater pumping, applied bioremediation, and institutional controls (if necessary) as required by WAC 173-340-360. The Wexler remediation will focus on removal of petroleum hydrocarbon contaminants (including gasoline, benzene, ethylbenzene, total xylenes, naphthalene). Incidental, but limited remediation of dry cleaning solvents is anticipated during the Wexler remediation. PCE, TCE, DCE, and VC in the Wexler Settlement Area will be addressed through implementation of the BSCSS CAP (Exhibit C).

R. The City is the current "owner or operator" (as that term is defined in RCW 70.105D.020(22)) of the Former Wexler Property , and is a PLP.

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S. In addition to amendment of this Decree to address the Wexler Settlement Area, the Amended Decree also incorporates an amended BSCSS CAP (Exhibit C). The original BSCSS CAP listed the soil cleanup level for Cis-1,2 DCE (DCE) at 160 mg/kg and cleanup level for Vinyl Chloride (VC) at 175 mg/kg. These cleanup levels for DCE and VC in the CAP are protective of direct human contact. Ecology finds that these cleanup levels must be reduced further in order to protect groundwater as well. The cleanup levels are so amended in the BSCSS CAP (Exhibit C).

VI. WORK TO BE PERFORMED

1. This Decree contains a program designed to protect human health and the environment from the known release, or threatened release, of hazardous substances or contaminants at, on, or from the BSCSS Site. All remedial action(s) conducted by Defendants at the Site shall be done in accordance with WAC 173-340.

2. The BSCSS PLP Group shall implement the activities in the BSCSS CAP (Exhibit C) and BSCSS Schedule (Exhibit D) at the BSCSS Site. The Wexler PLP Group shall implement the activities in the Wexler CAP (Exhibit F) and Wexler Schedule (Exhibit G) within the Wexler Settlement Area. Implementation of the CAPs includes producing engineering documentation meeting the requirements of WAC 173-340-400.

3. Defendants agree not to perform any remedial actions outside the scope of this Decree unless the BSCSS PLP Group and Ecology agree to modify the BSCSS CAP (Exhibit C) and BSCSS Schedule (Exhibit D) or the Wexler PLP Group and Ecology agree to modify the Wexler CAP (Exhibit F) and Wexler Schedule (Exhibit G) to cover these actions.

4. All plans or other deliverables submitted by Defendants for Ecology's review and approval under the BSCSS CAP (Exhibit C) and BSCSS Schedule (Exhibit D) or the Wexler CAP (Exhibit F) and Wexler Schedule (Exhibit G) shall, upon Ecology's approval, become integral and enforceable parts of this Decree.

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5. If Defendants learn of a significant change in conditions at the BSCSS Site, including but not limited to a statistically significant increase in contaminant and/or chemical concentrations in media (e.g., soil, groundwater, air), Defendants, within seven (7) days of learning of the change in condition, shall notify Ecology in writing of said change and provide Ecology with any reports or records (including laboratory analyses, sampling results) relating to the change in conditions.

VII. DESIGNATED PROJECT COORDINATORS

1. The project coordinator for Ecology is:

Jerome Cruz
Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008-5452
Phone: 425-649-7094
Email: jcru461@ecy.wa.gov

2. The project coordinator for Defendant City is:

Nduta Mbuthia
Senior Capital Project Engineer
City of Bothell Public Works Department
18415 101st Avenue NE
Bothell, WA 98011
Phone: 425-806-6829
Email: nduta.mbuthia@bothellwa.gov

3. The project coordinator for Defendants BSCA, Norman Olsen, Nancy Olsen, Lance Cross, Anita Cross, Ross Lunde, and the Estate of Mercer Rhodes is:

Norm Olsen
NLO Property Management, LLC
3035 170th Place SE
Bellevue, WA 98008
Phone: 425-890-3908
Email: nloproperties@hotmail.com

4. Each project coordinator shall be responsible for overseeing the implementation of this Decree. Ecology's project coordinator will be Ecology's designated representative for the BSCSS remedial actions and the Wexler remedial actions. To the maximum extent possible,

communications between Ecology and Defendants and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Decree shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff contacts for all or portions of the implementation of the work to be performed required by this Decree.

5. Any party may change its respective project coordinator. Written notification shall be given to the other party at least ten (10) calendar days prior to the change.

VIII. PERFORMANCE

1. All geologic and hydrogeologic work performed pursuant to this Decree shall be under the supervision and direction of a geologist or hydrogeologist licensed by the State of Washington or under the direct supervision of an engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43 and 18.220.

2. All engineering work performed pursuant to this Decree shall be under the direct supervision of a professional engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

3. All construction work performed pursuant to this Decree shall be under the direct supervision of a professional engineer or a qualified technician under the direct supervision of a professional engineer. The professional engineer must be registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

4. Any documents submitted containing geologic, hydrogeologic, or engineering work shall be under the seal of an appropriately licensed professional as required by RCW 18.43 and 18.220.

5. Defendants shall notify Ecology in writing of the identity of any engineer(s) and geologist(s), contractor(s) and subcontractor(s), and others to be used in carrying out the terms of this Decree, in advance of their involvement at the BSCSS Site.

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IX. COOPERATION AND PROPERTY ACCESS

1. Each Defendant agrees to cooperate fully with Ecology and further agrees not to interfere with remedial actions performed at the BSCSS Site by Ecology or potentially liable persons operating under an Order or Decree with Ecology for performance of remedial action (hereinafter "Performing Parties"). Cooperation includes, but is not limited to, a Defendant placing an environmental (restrictive) covenant on property which the Defendant owns within the BSCSS Site if required by Ecology.

2. Defendants shall, with respect to all property at the BSCSS Site that Defendants either own, control, or have access rights to, provide Ecology, Performing Parties, and their representatives, contractors, and subcontractors, with access at all reasonable times to its property to conduct any activity relating to response actions at the Site. Ecology, any Ecology authorized representative, or Performing Parties shall give reasonable notice before entering any Site property owned or controlled by another Defendant unless an emergency prevents such notice. Ecology, any Ecology authorized representative, or any party who accesses the BSCSS Site pursuant to this section shall comply with any applicable health and safety plan(s). Ecology employees and their representatives shall not be required to sign any liability release or waiver as a condition of Site property access.

3. Ecology or any Ecology authorized representative shall have access to enter and freely move about all property at the BSCSS Site that Defendants either own, control, or have access rights to at all reasonable times for the purposes of, *inter alia*: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Decree; reviewing Defendants' progress in carrying out the terms of this Decree; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Decree; and verifying the data submitted to Ecology by Defendants. Defendants shall make all reasonable efforts to

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secure access rights for those properties within the BSCSS Site not owned or controlled by Defendants where remedial activities or investigations will be performed pursuant to this Decree.

4. Defendants shall, with respect to all property at the BSCSS Site that Defendants either own, control, or have access rights to, refrain from using its property in any manner that Ecology determines will (1) pose an unacceptable risk to human health or the environment due to exposure to hazardous substances, or (2) interfere with or adversely affect the implementation, integrity, or protectiveness of remedial actions at the BSCSS Site.

5. In the event that Defendants become aware of any action or occurrence that causes or threatens a release of hazardous substances, pollutants, or contaminants at or from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Defendants shall immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall, in addition to complying with any applicable notification requirements under the MTCA, or any other law, immediately notify Ecology of such release or threatened release.

X. SAMPLING, DATA SUBMITTAL, AND AVAILABILITY

1. With respect to the implementation of this Decree, Defendants shall make the results of all sampling, laboratory reports, and/or test results generated by them or on their behalf available to Ecology by submitting data as detailed in this section. Pursuant to WAC 173-340-840(5), all sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section XI (Progress Reports), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal.

2. If requested by Ecology, Defendants shall allow Ecology and/or its authorized representative to take split or duplicate samples of any samples collected by Defendants pursuant to the implementation of this Decree. Defendants shall notify Ecology seven (7) days in advance of any sample collection or work activity at the BSCSS Site. Ecology shall, upon request, allow

Defendants and/or its authorized representative to take split or duplicate samples of any samples collected by Ecology pursuant to the implementation of this Decree, provided that doing so does not interfere with Ecology's sampling. Without limitation on Ecology's rights under Section IX (Cooperation and Property Access), Ecology shall notify Defendants prior to any sample collection activity unless an emergency prevents such notice.

3. In accordance with WAC 173-340-830(2)(a), all hazardous substance analyses shall be conducted by a laboratory accredited under WAC 173-50 for the specific analyses to be conducted, unless otherwise approved by Ecology.

XI. PROGRESS REPORTS

1. Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall submit to Ecology written quarterly Progress Reports that describe the actions taken at the BSCSS Site and/or the Wexler Settlement Area during the previous quarter to implement the requirements of this Decree. The Progress Reports shall include the following:

A. A list of on-site activities that have taken place during the month;

B. Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

C. Description of all deviations from the BSCSS CAP (Exhibit C) and BSCSS Schedule (Exhibit D) or the Wexler CAP (Exhibit F) and Wexler Schedule (Exhibit G), whichever is applicable, during the current month and any planned deviations in the upcoming month;

D. For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule;

E. All raw data (including laboratory analyses) received by Defendants during the past month and an identification of the source of the sample; and

F. A list of deliverables for the upcoming month if different from the schedule.

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2. All Progress Reports shall be submitted quarterly by the tenth (10th) day of the month in which they are due after the effective date of this Decree. Unless otherwise specified, Progress Reports and any other documents submitted pursuant to this Decree shall be sent by certified mail, return receipt requested, to Ecology's project coordinator.

XII. RETENTION OF RECORDS

1. During the pendency of this Decree, and for ten (10) years from the date this Decree is no longer in effect as provided in Section XXVIII (Duration of Decree), Defendants shall preserve all records, reports, documents, and underlying data in its possession relevant to the implementation of this Decree and shall insert a similar record retention requirement into all contracts with project contractors and subcontractors. Upon request of Ecology, Defendants shall make all records available to Ecology and allow access for review within a reasonable time.

2. Nothing in this Decree is intended by Defendants to waive any right it may have under applicable law to limit disclosure of documents protected by the attorney work-product privilege and/or the attorney-client privilege. If Defendants withhold any requested records based on an assertion of privilege, Defendants shall provide Ecology with a privilege log specifying the records withheld and the applicable privilege. No data related to the BSCSS Site collected pursuant to this Decree shall be considered privileged.

XIII. TRANSFER OF INTEREST IN PROPERTY

1. No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the BSCSS Site shall be consummated by Defendants without provision for continued operation and maintenance of any containment system, treatment system, and/or monitoring system installed or implemented pursuant to this Decree.

2. Prior to Defendants' transfer of any interest in all or any portion of the BSCSS Site, and during the effective period of this Decree, Defendants shall provide a copy of this Decree to any prospective purchaser, lessee, transferee, assignee, or other successor in said interest; and, at least thirty (30) days prior to any transfer, Defendants shall notify Ecology of

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said transfer. Upon transfer of any interest, Defendants shall notify all transferees of the restrictions on the activities and uses of the property under this Decree and incorporate any such use restrictions into the transfer documents.

XIV. RESOLUTION OF DISPUTES

1. In the event that Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) elects to invoke dispute resolution, Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) must utilize the procedure set forth below.

A. Upon the triggering event (receipt of Ecology's project coordinator's written decision or an itemized billing statement), Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) have fourteen (14) calendar days within which to notify Ecology's project coordinator in writing of its dispute (Informal Dispute Notice).

B. The Parties' project coordinators shall then confer in an effort to resolve the dispute informally. The parties shall informally confer for up to fourteen (14) calendar days from receipt of the Informal Dispute Notice. If the project coordinators cannot resolve the dispute within those 14 calendar days, then within seven (7) calendar days Ecology's project coordinator shall issue a written decision (Informal Dispute Decision) stating: the nature of the dispute; the Defendants' (or, for the Wexler Settlement Area, the Wexler PLP Group's) position with regard to the dispute; Ecology's position with regard to the dispute; and the extent of resolution reached by informal discussion.

C. Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) may then request regional management review of the dispute. This request (Formal Dispute Notice) must be submitted in writing to the Northwest Region Toxics Cleanup Section Manager within seven (7) calendar days of receipt of Ecology's Informal Dispute Decision. The Formal Dispute Notice shall include a written statement of dispute setting

forth: the nature of the dispute; the disputing Party's position with respect to the dispute; and the information relied upon to support its position.

D. The Section Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute (Decision on Dispute) within thirty (30) calendar days of receipt of the Formal Dispute Notice.

E. If Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) find Ecology's Regional Section Manager's decision unacceptable, Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) may then request final management review of the decision. This request (Final Review Request) shall be submitted in writing to the Toxics Cleanup Program Manager within seven (7) calendar days of Defendants' (or, for the Wexler Settlement Area, the Wexler PLP Group's) receipt of the Decision on Dispute. The Final Review Request shall include a written statement of dispute setting forth: the nature of the dispute; the disputing Party's position with respect to the dispute; and the information relied upon to support its position.

F. Ecology's Toxics Cleanup Program Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute (Final Decision on Dispute) within thirty (30) calendar days of receipt of the Final Review Request. The Toxics Cleanup Program Manager's decision shall be Ecology's final decision on the disputed matter.

2. If Ecology's Final Decision on Dispute is unacceptable to Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group), Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) have the right to submit the dispute to the Court for resolution. The Parties agree that one judge should retain jurisdiction over this case and shall, as necessary, resolve any dispute arising under this Decree. Under RCW 70.105D.060, Ecology's investigative and remedial decisions shall be upheld unless they are arbitrary and capricious.

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3. The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used. Where either party utilizes the dispute resolution process in bad faith or for purposes of delay, the other party may seek sanctions.

4. Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Decree, unless Ecology agrees in writing to a schedule extension or the Court so orders.

5. In case of a dispute, failure to either proceed with the work required by this Decree or timely invoke dispute resolution may result in Ecology's determination that insufficient progress is being made in preparation of a deliverable, and may result in Ecology undertaking the work under Section XXV (Implementation of Remedial Action).

XV. AMENDMENT OF DECREE

1. The project coordinators may agree to minor changes to the work to be performed without formally amending this Decree. Minor changes will be documented in writing by Ecology.

2. Substantial changes to the work to be performed shall require formal amendment of this Decree. This Decree may only be formally amended by a written stipulation among the Parties that is entered by the Court, or by order of the Court. Ecology will provide its written consent to a formal amendment only after public notice and opportunity to comment on the formal amendment. Such amendment shall become effective upon entry by the Court. Agreement to amend the Decree shall not be unreasonably withheld by any party.

3. When requesting a change to the Decree, Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall submit a written request to Ecology for approval. Ecology shall indicate its approval or disapproval in writing and in a timely manner after the written request is received. If Ecology determines that the change is substantial, then the Decree must be formally amended. Reasons for the disapproval of a proposed change to this Decree

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PO Box 40117
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shall be stated in writing. If Ecology does not agree to the requested change, the disagreement may be addressed through the dispute resolution procedures described in Section XIV (Resolution of Disputes).

XVI. EXTENSION OF SCHEDULE

1. Defendants' request for an extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least thirty (30) days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify:

A. The deadline that is sought to be extended.

B. The length of the extension sought.

C. The reason(s) for the extension.

D. Any related deadline or schedule that would be affected if the extension were granted.

2. The burden shall be on Defendants to demonstrate to the satisfaction of Ecology that the request for such extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause may include, but may not be limited to:

A. Circumstances beyond the reasonable control and despite the due diligence of Defendants including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by Defendants.

B. Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty.

C. Endangerment as described in Section XVII (Endangerment).

3. However, neither increased costs of performance of the terms of this Decree nor changed economic circumstances shall be considered circumstances beyond the reasonable control of Defendants.

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4. Ecology shall act upon any written request for extension in a timely fashion. Ecology shall give Defendants written notification of any extensions granted pursuant to this Decree. A requested extension shall not be effective until approved by Ecology or, if required, by the Court. Unless the extension is a substantial change, it shall not be necessary to amend this Decree pursuant to Section XV (Amendment of Decree) when a schedule extension is granted.

5. An extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. Ecology may grant schedule extensions exceeding ninety (90) days only as a result of one of the following:

A. Delays in the issuance of a necessary permit which was applied for in a timely manner.

B. Other circumstances deemed exceptional or extraordinary by Ecology.

C. Endangerment as described in Section XVII (Endangerment).

XVII. ENDANGERMENT

1. In the event Ecology determines that any activity being performed at the BSCSS Site under this Decree is creating or has the potential to create a danger to human health or the environment, Ecology may direct Defendants to cease such activities for such period of time as it deems necessary to abate the danger. Defendants shall immediately comply with such direction.

2. In the event Defendants determine that any activity being performed at the BSCSS Site under this Decree is creating or has the potential to create a danger to human health or the environment, Defendants may cease such activities. Defendants shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after making such determination or ceasing such activities. Upon Ecology's direction, Defendants shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with Defendants' cessation of activities, it may direct Defendants to resume such activities.

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3. If Ecology concurs with or orders a work stoppage pursuant to this section, Defendants' (or, for the Wexler Settlement Area, the Wexler PLP Group's) obligations with respect to the ceased activities shall be suspended until Ecology determines the danger is abated, and the time for performance of such activities, as well as the time for any other work dependent upon such activities, shall be extended, in accordance with Section XVI (Extension of Schedule), for such period of time as Ecology determines is reasonable under the circumstances.

4. Nothing in this Decree shall limit the authority of Ecology, its employees, agents, or contractors to take or require appropriate action in the event of an emergency.

XVIII. COVENANT NOT TO SUE

1. BSCSS Covenant Not to Sue:

A. In consideration of the BSCSS PLP Group's compliance with the terms and conditions of this Decree, Ecology covenants not to institute legal or administrative actions against the BSCSS PLP Group regarding the release or threatened release of hazardous substances covered by this Decree that are: (1) within the BSCSS Settlement Area detailed in the BSCSS Settlement Area Diagram (Exhibit B), and (2) are Tetrachloroethene (PCE), Trichloroethene (TCE), Cis-1,2 Dichloroethene (DCE), or Vinyl Chloride (VC) from the former drycleaners at the northwest corner of the BSCSS Site and subject to remediation pursuant to the BSCSS CAP.

B. This BSCSS Covenant Not to Sue does not cover any other hazardous substances including but not limited to hazardous substances originating at the Bothell Hertz MTCA site and/or the Former Wexler Property which may have come to be located within the BSCSS Settlement Area. This Covenant Not to Sue does not cover any area other than the BSCSS Settlement Area. Ecology retains all of its authority relative to any hazardous substance(s) or area(s) not covered by this BSCSS Covenant Not to Sue.

This BSCSS Covenant Not to Sue shall have no applicability whatsoever to:

i. Criminal liability.

ii. Liability for damages to natural resources.

iii. Any Ecology action, including cost recovery, against PLPs not a party to this Decree.

C. Pursuant to RCW 70.105D.040(4)(c), the Court shall amend this BSCSS Covenant Not to Sue if factors not known at the time of entry of this Decree are discovered and present a previously unknown threat to human health or the environment.

D. BSCSS Reopeners: Ecology specifically reserves the right to institute legal or administrative action against the BSCSS PLP Group to require them to perform additional remedial actions at the BSCSS Site and to pursue appropriate cost recovery, pursuant to RCW 70.105D.050 under the following circumstances:

i. Upon the BSCSS PLP Group's failure to meet the requirements of this Decree with respect to the BSCSS Settlement Area.

ii. Failure of the remedial action to meet the cleanup standards identified in the BSCSS CAP (Exhibit C).

iii. Upon Ecology's determination that remedial action beyond the terms of this Decree is necessary to abate an imminent and substantial endangerment to human health or the environment at the BSCSS Site.

iv. Upon the availability of new information regarding factors previously unknown to Ecology, including the nature, quantity, migration, pathway, or mobility of hazardous substances at the BSCSS Site, and Ecology's determination, in light of this information, that further remedial action is necessary at the BSCSS Site to protect human health or the environment.

v. Upon Ecology's determination that additional remedial actions are necessary at the BSCSS Site to achieve cleanup standards within the reasonable restoration time frame set forth in the BSCSS CAP.

2. Wexler Covenant Not to Sue:

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A. In consideration of the Wexler PLP Group's compliance with the terms and conditions of this Decree, Ecology covenants not to institute legal or administrative actions against the Wexler PLP Group regarding the release or threatened release of hazardous substances covered by this Decree that are: (1) within the Wexler Settlement Area detailed in the Wexler Settlement Area Diagram (Exhibit E), and (2) are gasoline, ethylbenzene, xylenes, and napthalene in soil, and gasoline and benzene in groundwater from the former gas station on the Wexler Settlement Area and subject to remediation pursuant to the Wexler CAP.

B. This Wexler Covenant Not to Sue does not cover any other hazardous substances including but not limited to hazardous substances originating at the Bothell Hertz MTCA Site or the BSCSS source which may have come to be located within the Wexler Settlement Area. This Covenant Not to Sue does not cover any area other than the Wexler Settlement Area. Ecology retains all of its authority relative to any hazardous substance(s) or area(s) not covered by this Wexler Covenant Not to Sue.

This Wexler Covenant Not to Sue shall have no applicability whatsoever to:

i. Criminal liability.

ii. Liability for damages to natural resources.

iii. Any Ecology action, including cost recovery, against PLPs not a party to this Decree.

C. Pursuant to RCW 70.105D.040(4)(c), the Court shall amend this Wexler Covenant Not to Sue if factors not known at the time of entry of this Decree are discovered and present a previously unknown threat to human health or the environment.

D. Wexler Reopeners: Ecology specifically reserves the right to institute legal or administrative action against the Wexler PLP Group to require it to perform additional remedial actions at the Wexler Settlement Area and to pursue appropriate cost recovery, pursuant to RCW 70.105D.050 under the following circumstances:

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i. Upon the Wexler PLP Group's failure to meet the requirements of this Decree with respect to the Wexler Settlement Area.

ii. Failure of the remedial action to meet the cleanup standards identified in the Wexler CAP (Exhibit F).

iii. Upon Ecology's determination that remedial action beyond the terms of this Decree is necessary to abate an imminent and substantial endangerment to human health or the environment at the Wexler Settlement Area.

iv. Upon the availability of new information regarding factors previously unknown to Ecology, including the nature, quantity, migration, pathway, or mobility of hazardous substances at the Wexler Settlement Area, and Ecology's determination, in light of this information, that further remedial action is necessary at the Wexler Settlement Area to protect human health or the environment.

v. Upon Ecology's determination that additional remedial actions at the Wexler Settlement Area are necessary to achieve cleanup standards within the reasonable restoration time frame set forth in the Wexler CAP.

3. Except in the case of an emergency, prior to instituting legal or administrative action against Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) pursuant to this section, Ecology shall provide Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) with fifteen (15) calendar days' notice of such action.

XIX. CONTRIBUTION PROTECTION

With regard to claims for contribution against the BSCSS PLP Group, the Parties agree that the BSCSS PLP Group is entitled to protection against claims for contribution for matters addressed in this Decree with respect to the BSCSS Settlement Area as provided by RCW 70.105D.040(4)(d). With regard to claims for contribution against the Wexler PLP Group, the Parties agree that the Wexler PLP Group is entitled to protection against claims for

contribution for matters addressed in this Decree with respect to the Wexler Settlement Area as provided by RCW 70.105D.040(4)(d).

XX. LAND USE RESTRICTIONS

1. Defendant(s) and Ecology will negotiate (a) draft Environmental (Restrictive) Covenant(s) for the BSCSS Site consistent with WAC 173-340-440 and RCW 64.70, and any policies or procedures specified by Ecology. The Environmental (Restrictive) Covenant(s) shall restrict future activities and uses of the BSCSS Site as agreed to by Ecology and Defendants.

2. After approval by Ecology, Defendants shall record the Environmental (Restrictive) Covenant(s) for affected properties they own with the office of the King County Auditor according to the Schedules (Exhibits D and G). Defendants shall provide Ecology with the original recorded Environmental (Restrictive) Covenant(s) within thirty (30) days of the recording date.

3. Institutional controls may be required on properties not owned by Defendants. Defendants will request that the owner of each affected property record an Ecology-approved Environmental (Restrictive) Covenant as detailed in the Schedules (Exhibits D and G). Upon a showing that Defendants have made a good faith effort to secure an Environmental (Restrictive) Covenant for an affected property and failed to do so, Ecology may provide assistance to Defendants. Defendants shall provide Ecology with the original recorded Environmental (Restrictive) Covenant(s) within thirty (30) days of the recording date.

XXI. FINANCIAL ASSURANCES

1. Pursuant to WAC 173-340-440(11), Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall maintain sufficient and adequate financial assurance mechanisms to cover all costs associated with the operation and maintenance of the remedial action at the BSCSS Site, including institutional controls, compliance monitoring, and corrective measures.

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2. Within sixty (60) days of the effective date of this Decree, the BSCSS PLP Group shall submit to Ecology for review and approval an estimate of the costs that it will incur in carrying out the terms of this Decree for the BSCSS Site, including operation and maintenance, and compliance monitoring. Within sixty (60) days of the effective date of the amendment to this Decree to incorporate the Wexler Settlement Area, the Wexler PLP Group shall submit to Ecology for review and approval an estimate of the costs that it will incur in carrying out the terms of this Decree for the Wexler Settlement Area, including operation and maintenance, and compliance monitoring. Within sixty (60) days after Ecology approves the aforementioned cost estimates, Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall provide proof of financial assurances sufficient to cover all such costs in a form acceptable to Ecology.

3. Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall adjust the financial assurance coverage and provide Ecology's project coordinator with documentation of the updated financial assurance for:

A. Inflation, annually, within thirty (30) days of the anniversary date of the entry of this Decree; or if applicable, the modified anniversary date established in accordance with this section, or if applicable, ninety (90) days after the close of Defendants' fiscal year if the financial test or corporate guarantee is used.

B. Changes in cost estimates, within thirty (30) days of issuance of Ecology's approval of a modification or revision to the applicable CAP that result in increases to the cost or expected duration of remedial actions. Any adjustments for inflation since the most recent preceding anniversary date shall be made concurrent with adjustments for changes in cost estimates. The issuance of Ecology's approval of a revised or modified CAP will revise the anniversary date established under this section to become the date of issuance of such revised or modified CAP.

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XXII. INDEMNIFICATION

Defendants agree to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action (1) for death or injuries to persons, or (2) for loss or damage to property to the extent arising from or on account of acts or omissions of Defendants, their respective officers, employees, agents, or contractors in entering into and implementing this Decree at the BSCSS Site. The Wexler PLP Group agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action (1) for death or injuries to persons, or (2) for loss or damage to property to the extent arising from or on account of acts or omissions of Defendants, their respective officers, employees, agents, or contractors in entering into and implementing this Decree for the Wexler Settlement Area. However, Defendants shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action to the extent arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the State, in entering into or implementing this Decree.

XXIII. COMPLIANCE WITH APPLICABLE LAWS

1. *Applicable Law.* All actions carried out by Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) pursuant to this Decree shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits, except as provided in RCW 70.105D.090. The permits or other federal, state, or local requirements that the agency has determined are applicable and that are known at the time of entry of this Decree have been identified in the BSCSS CAP (Exhibit C) and the Wexler CAP (Exhibit F). Defendants have a continuing obligation to identify additional applicable federal, state, and local requirements which apply to actions carried out pursuant to this Decree, and to comply with those requirements. As additional federal, state, and local requirements are identified by Ecology or the Defendants, Ecology will document in writing if they are applicable

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to actions carried out pursuant to this Decree, and the Defendants must implement those requirements.

2. *Relevant and Appropriate Requirements.* All actions carried out by Defendants pursuant to this Decree shall be done in accordance with relevant and appropriate requirements identified by Ecology. The relevant and appropriate requirements that Ecology has determined apply have been identified in the BSCSS CAP (Exhibit C) and the Wexler CAP (Exhibit F). If additional relevant and appropriate requirements are identified by Ecology or the Defendants, Ecology will document in writing if they are applicable to actions carried out pursuant to this Decree and the Defendants must implement those requirements.

3. Pursuant to RCW 70.105D.090(1), Defendants may be exempt from the procedural requirements of RCW 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 and of any laws requiring or authorizing local government permits or approvals. However, Defendants shall comply with the substantive requirements of such permits or approvals. For permits and approvals covered under RCW 70.105D.090(1) that have been issued by local government, the Parties agree that Ecology has the non-exclusive ability under this Decree to enforce those local government permits and/or approvals. The exempt permits or approvals and the applicable substantive requirements of those permits or approvals, as they are known at the time of the execution of this Decree, have been identified in the BSCSS CAP (Exhibit C) and the Wexler CAP (Exhibit F).

4. Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) have a continuing obligation to determine whether additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Decree. In the event either Ecology or Defendants determine that additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Decree, it shall promptly notify the other party of this determination. Ecology shall determine whether Ecology or Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall be

responsible to contact the appropriate state and/or local agencies. If Ecology so requires, Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall promptly consult with the appropriate state and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) and on how Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) must meet those requirements. Ecology shall inform Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Decree. Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

5. Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70.105D.090(1) would result in the loss of approval from a federal agency that is necessary for the state to administer any federal law, the exemption shall not apply and Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090(1), including any requirements to obtain permits or approvals.

XXIV. REMEDIAL ACTION COSTS

1. Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall pay to Ecology costs incurred by Ecology pursuant to this Decree and consistent with WAC 173-340-550(2). These costs shall include work performed by Ecology or its contractors for, or on, the BSCSS Site and/or the Wexler Settlement Area under RCW 70.105D, including remedial actions and Decree preparation, negotiation, oversight, and administration. These costs shall

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include work performed both prior to and subsequent to the entry of this Decree. Ecology's costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2).

2. For the BSCSS Site, Ecology has accumulated $6,749.10 in remedial action costs plus $6,359.73 in unpaid remedial action costs under VCP Project No. NW2946 related to this facility as of September 26, 2017, for a total owed to Ecology of $13,108.83. Payment for this amount shall be submitted within thirty (30) days of the effective date of this Decree.

3. For the Wexler Settlement Area, Ecology has accumulated $8,618.38 in remedial action costs as of March 31, 2019. Payment for this amount shall be submitted within thirty (30) days of the effective date of the Amendment to this Decree incorporating the Wexler Settlement Area.

4. For all costs incurred for work under this Decree for the BSCSS Site or the Wexler Settlement Area subsequent to September 26, 2017, (for the BSCSS Site), or March 31, 2019, (for the Wexler Settlement Area), Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall pay the required amount within thirty (30) days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, and the amount of time spent by involved staff members on the project. A general statement of work performed will be provided upon request. Itemized statements shall be prepared quarterly. Pursuant to WAC 173-340-550(4), failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement of costs will result in interest charges at the rate of twelve percent (12%) per annum, compounded monthly.

5. In addition to other available relief, pursuant to RCW 19.16.500, Ecology may utilize a collection agency and/or, pursuant to RCW 70.105D.055, file a lien against real property subject to the remedial actions to recover unreimbursed remedial action costs.

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Ecology Division
PO Box 40117
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XXV. IMPLEMENTATION OF REMEDIAL ACTION

1. If Ecology determines that the Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) have failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after notice to Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group), perform any or all portions of the remedial action or at Ecology's discretion allow the Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) opportunity to correct. In an emergency, Ecology is not required to provide notice to Defendants, or an opportunity for dispute resolution. The Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall reimburse Ecology for the costs of doing such work in accordance with Section XXIV (Remedial Action Costs).

2. Except where necessary to abate an emergency situation, Defendants shall not perform any remedial actions at the BSCSS Site outside those remedial actions required by this Decree, unless Ecology concurs, in writing, with such additional remedial actions pursuant to Section XV (Amendment of Decree). In the event of an emergency, or where actions are taken as required by law, Defendants must notify Ecology in writing of the event and remedial action(s) planned or taken as soon as practical but no later than within twenty-four (24) hours of the discovery of the event.

XXVI. PERIODIC REVIEW

So long as remedial action, including groundwater monitoring, continues at the BSCSS Site, the Parties agree to review the progress of remedial action at the BSCSS Site, and to review the data accumulated as a result of monitoring the BSCSS Site as often as is necessary and appropriate under the circumstances. Unless otherwise agreed to by Ecology, at least every five (5) years after the initiation of cleanup action at the BSCSS Site the Parties shall confer regarding the status of the BSCSS Site and the need, if any, for further remedial action at the BSCSS Site. At least ninety (90) days prior to each periodic review, Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) shall submit a report to Ecology that documents whether human

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health and the environment are being protected based on the factors set forth in WAC 173-340-420(4). Under Section XVIII (Covenant Not to Sue), Ecology reserves the right to require further remedial action at the BSCSS Site under appropriate circumstances. This provision shall remain in effect for the duration of this Decree.

XXVII. PUBLIC PARTICIPATION

1. A Public Participation Plan is required for the BSCSS Site. Ecology shall review any existing Public Participation Plan to determine its continued appropriateness and whether it requires amendment, or if no plan exists, Ecology shall develop a Public Participation Plan alone or in conjunction with Defendants. The Public Participation Plan for the BSCSS Site shall also govern the Wexler Settlement Area.

2. Ecology shall maintain the responsibility for public participation at the BSCSS Site. However, Defendants shall cooperate with Ecology, and shall:

A. If agreed to by Ecology, develop appropriate mailing lists, prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans, remedial investigation/feasibility study reports, cleanup action plans, and engineering design reports. As appropriate, Ecology will edit, finalize, and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings.

B. Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before major meetings with the interested public and local governments. Likewise, Ecology shall notify Defendants prior to the issuance of all press releases and fact sheets, and before meetings related to remedial action at the Site with the interested public and/or local governments. For all press releases, fact sheets, meetings, and other outreach efforts by Defendants that do not receive prior Ecology approval, Defendants shall clearly indicate to its audience that the press release, fact sheet, meeting, or other outreach effort was not sponsored or endorsed by Ecology.

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C. When requested by Ecology, participate in public presentations on the progress of the remedial action at the BSCSS Site and/or Wexler Settlement Area. Participation may be through attendance at public meetings to assist in answering questions, or as a presenter.

D. When requested by Ecology, arrange and/or continue information repositories at the following locations:

i. King County Library
18215 98th Avenue NE
Bothell, WA 98011

ii. Ecology's Northwest Regional Office
Central Records Office
3190 160th Avenue SE
Bellevue, WA 98008

Call for an appointment:
Sally Perkins
Phone: 425-649-7109
Fax: 425-649-4450
Email: nwro_public_request@ecy.wa.gov

iii. City of Bothell – City Hall
18415 101st Avenue NE
Bothell, WA 98011
Phone: 425-806-6100

iv. Bothell Public Library
18215 98th Avenue NE
Bothell, WA 98011
Phone: 425-486-7811

At a minimum, copies of all public notices, fact sheets, and documents relating to public comment periods shall be promptly placed in these repositories. A copy of all documents related to the BSCSS Site shall be maintained in the repository at Ecology's Northwest Regional Office in Bellevue, Washington.

XXVIII. DURATION OF DECREE

The remedial program required pursuant to this Decree shall be maintained and continued until Defendants (or, for the Wexler Settlement Area, the Wexler PLP Group) have received written notification from Ecology that the requirements of this Decree have been satisfactorily completed. This Decree shall remain in effect until dismissed by the Court. When dismissed, Section XII (Retention of Records), Section XVIII (Covenant Not to Sue), and Section XIX (Contribution Protection) shall survive.

XXIX. CLAIMS AGAINST THE STATE

Defendants hereby agree that they will not seek to recover any costs accrued in implementing the remedial action required by this Decree from the State of Washington or any of its agencies; and further, that Defendants will make no claim against the State Toxics Control Account, the local Toxics Control Account, the Environmental Legacy Stewardship Account, or a MTCA Cleanup Settlement Account for any costs incurred in implementing this Decree. Except as provided above, however, Defendants expressly reserve their right to seek to recover any costs incurred in implementing this Decree from any other PLP. This section does not limit or address funding that may be provided under WAC 173-322A.

XXX. EFFECTIVE DATE

This Decree is effective upon the date it is entered by the Court.

XXXI. WITHDRAWAL OF CONSENT

If the Court withholds or withdraws its consent to this Decree, it shall be null and void at the option of any party and the accompanying Complaint shall be dismissed without costs and without prejudice. In such an event, no party shall be bound by the requirements of this Decree.

XXXII. GRANT FUNDING

Ecology hereby incorporates into this Consent Decree the previous remedial actions described in the RI/FS for the BSCSS Site and the RI/FS for the Former Wexler Property. Reimbursement for specific project tasks under a grant agreement with Ecology is contingent

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
360-586-6770

upon a determination by Ecology's Toxics Cleanup Program that the retroactive costs are eligible under WAC 173-322A-320(6), the work performed complies with the substantive requirements of WAC 173-340, and the work is consistent with the remedial actions required under this Consent Decree. The costs associated with Ecology's determination on past independent remedial actions described in the RI/FS for the BSCSS Site and the RI/FS for the Former Wexler Property are recoverable under this Decree. Unless and until Ecology agrees to provide grant funding under WAC 173-322A, this paragraph is inoperative.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

_____
Jim Pendowski
Program Manager
Toxics Cleanup Program
425-649-7054

Date: _____

ROBERT W. FERGUSON
Attorney General

_____
Kara J. Tebeau WSBA #49923
Assistant Attorney General
360-586-3633

Date: _____

CITY OF BOTHELL

_____
Jennifer Phillips
City Manager
425-806-6100

Date: _____

BOTHELL SERVICE CENTER ASSOCIATES
By Norman Olsen

_____

Date: _____

NORMAN OLSEN

_____

Date: _____

NANCY OLSEN

_____

Date: _____

LANCE CROSS

_____

Date: _____

ANITA CROSS

_____

Date: _____

ROSS LUNDE

_____

Date: _____

ESTATE OF MERCER RHODES
By Robert Hackman

_____

Date: _____

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
360-586-6770

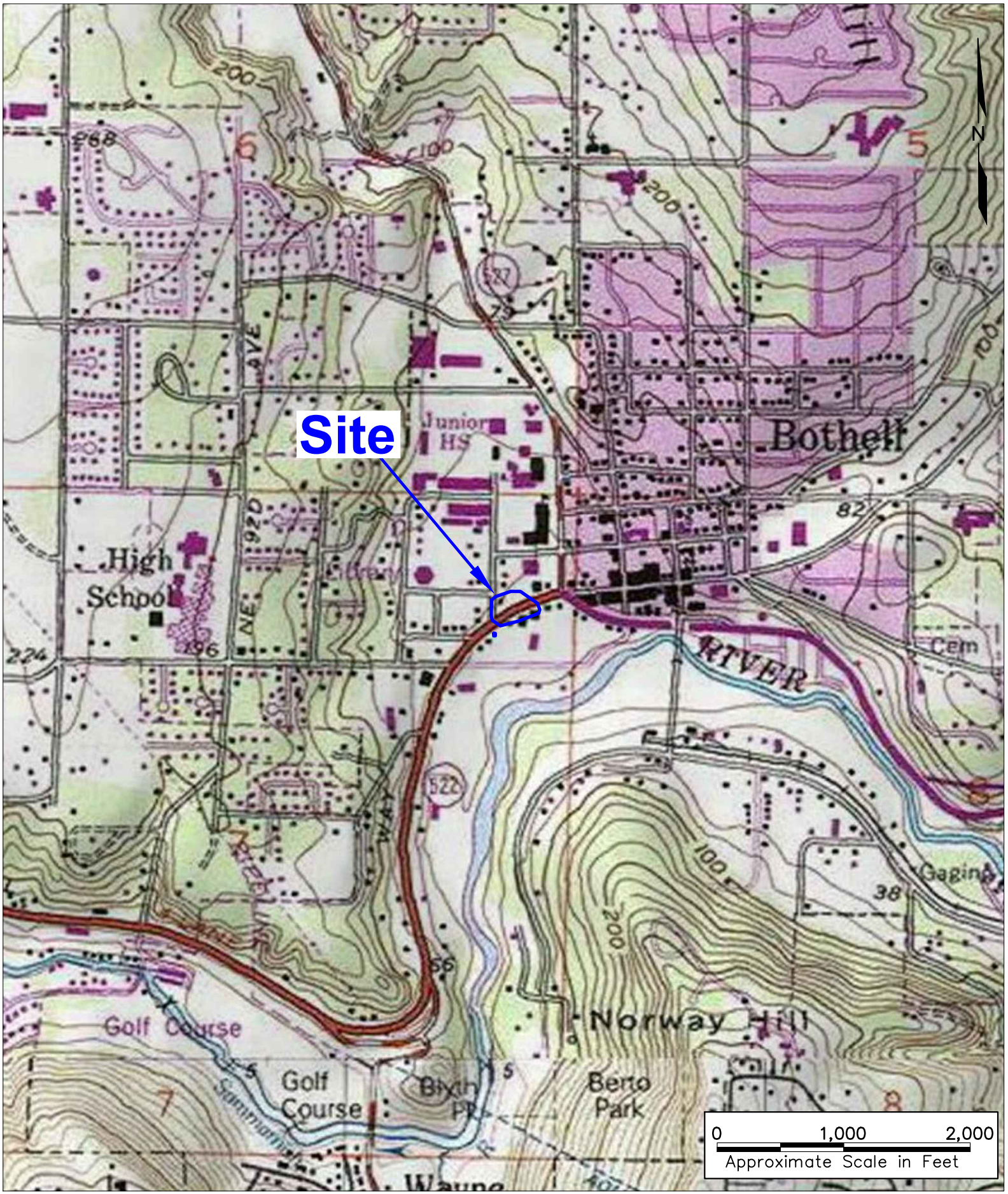
ENTERED this _____ day of _____ 20____.

_____

JUDGE
King County Superior Court

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
360-586-6770

EXHIBIT A

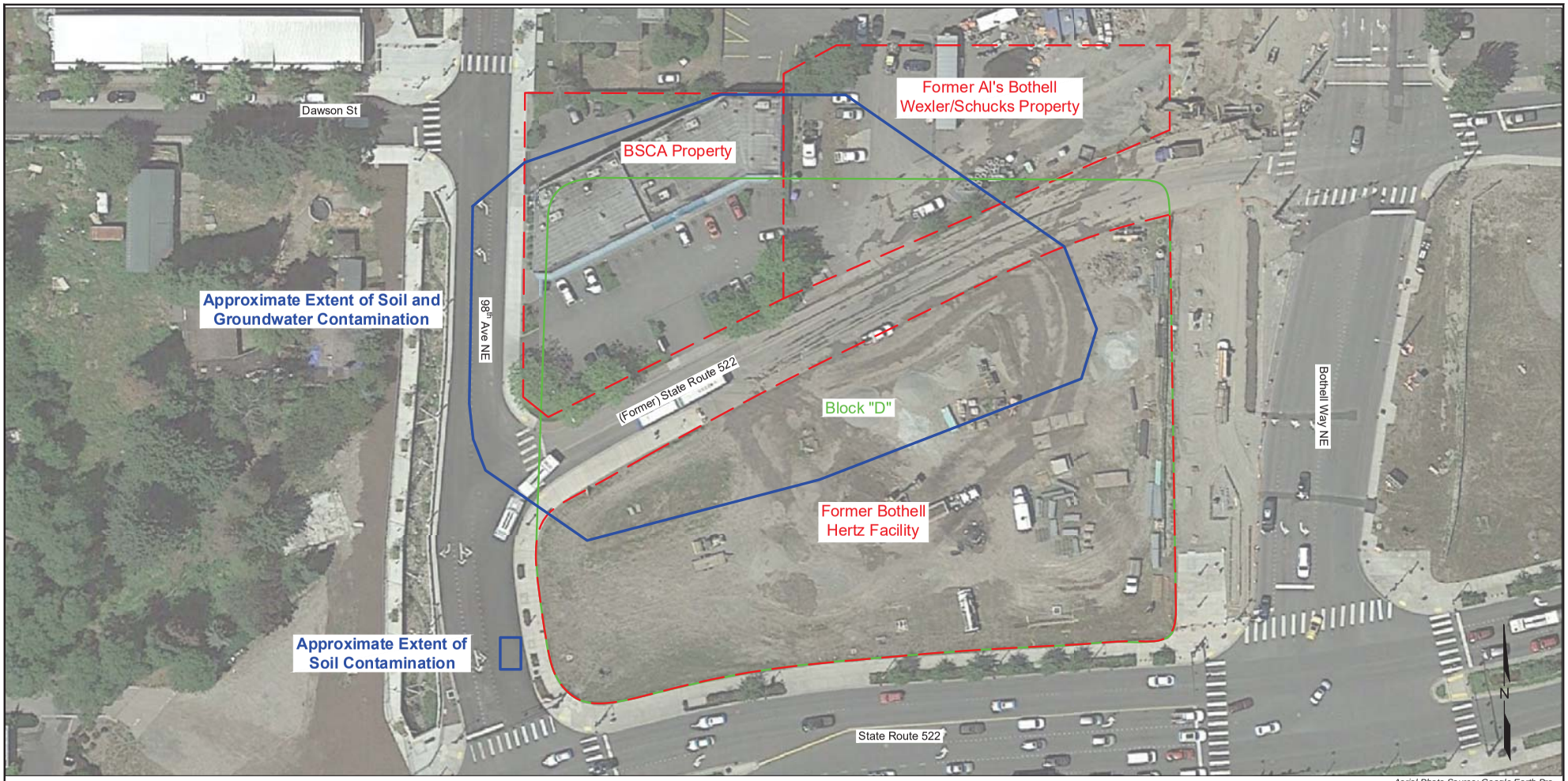


KANE ENVIRONMENTAL INC
3815 Woodland Park Avenue North, Suite 102
Seattle, WA - 206-691-0476
www.kane-environmental.com

Bothell Service Center
18107 Bothell Way NE
Bothell, Washington

EXHIBIT A
Site Location Diagram

EXHIBIT B



Aerial Photo Source: Google Earth Pro
Aerial Photo Date: June 27, 2016

LEGEND

- Approximate Boundary of Settlement Area
- Various Property Boundaries
- Block "D" Boundary

0 60 120
Approximate Scale in Feet

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EXHIBIT B
Settlement Area Diagram

EXHIBIT D

Exhibit D

Site Schedule of Work and Deliverables

	Deliverables	Due (Calendar Days)[1]
	A. Administrative	
A.1	Consent Decree entered by the King County Superior Court (Effective Date of the CD)	Within 5 days of the execution by the Parties
A.2	Notification of selected contractor name and qualifications	Within 5 days of the effective date of Consent Decree (A.1)
A.3	Progress Reports	Quarterly on the 10th of the month beginning after the effective date of the Consent Decree (A.1)
A.4	Financial Assurances – submit cost estimate for Ecology review and approval	Within 60 days of the effective date of Consent Decree
A.5	Financial Assurances - provide proof of financial assurances	Within 60 days after Ecology approves cost estimate (A.4)
	B. Design	
B.1	Draft Pre-Remedial Design (PRDI) Project Plans[2]	Within 5 days of the effective date of Consent Decree (A.1)
B.2	Draft PRDI Data Report and Draft Engineering Design Report (EDR)[3]	Within 5 days of Ecology approval of Final PRDI Project Plans (B.1)
B.3	Final PRDI Data Report and EDR Report	Within 5 days of receipt of Ecology's comments on the Draft PRDI Data and EDR Reports (B.2)
B.4	90 % Plans and Specs [per WAC 173-340-400(4)(b)]	Within 5 days of receipt of Ecology comments on Final EDR Report (B.3)
B.5	100 % Plans and Specs	Within 5 days of receipt of Ecology comments on 90 % plans and specifications (B.4)
	C. Field Construction	
C.1	Complete Construction Procurement	Within 5 days of completion of the 100% plans and specifications (B.1)
C.2	ERH System installation	Within 2 months of the effective date of Consent Decree
	ERH Operation	Within 6 to 8 months of the effective date of Consent Decree
C.3	Start install and begin operation of bioremediation-groundwater recirculation/SVE systems	Within 2 months of the effective date of Consent Decree
C.4	Install compliance monitoring well network	Within 2 months of the effective date of Consent Decree
C.5	Complete Construction	Within 2 months of the effective date of Consent Decree
C.6	ERH soil performance sampling	Within 6 to 8 months of the effective date of Consent Decree
C.7	Contingent soil excavation in ERH treatment area	Within 6 to 9 months of the ERH system shutdown

C.8	Decommission ERH; install and operate SVE system	Within 4 to 6 weeks of ERH system final shutdown. SVE system operation beginning March 2019.
C.9	Cleanup Action Report and As-Built Drawings and Report; Draft Environmental Covenant(s); and an updated Title Report	Within 60 days of decommission of SVE systems
D. Post Construction Work		
D.1	Final Environmental Covenant(s)	Within 30 days of receipt of Ecology comments on the Draft Environmental Covenant(s).
D.2	Record Final Environmental Covenant(s) with King County Auditor	Within 5 days after completion of the Final Environmental Covenant or Ecology's signature as grantee of the Final Environmental Covenant(s), whichever occurs last.
D.3	Performance Groundwater Monitoring Quarterly Performance Monitoring Biannual Performance Monitoring	Quarterly performance monitoring for one year starting Summer 2019; Biannual performance monitoring until PCE, and its breakdown products reach their applicable cleanup levels in the selected performance monitoring wells provided in CAP
D.4	Decommission Bioremediation/Groundwater Recirculation system	Upon attainment of cleanup levels in performance monitoring wells
D.5	Indoor Air Sampling (two rounds)	1st round - post-construction and pre-occupation of buildings 2nd round - upon completion of Groundwater Closure report per Section 7.0 of the BSCSS Final CAP
D.6	Groundwater Confirmation Monitoring Quarterly Compliance Monitoring	Quarterly for two years following completion of performance monitoring. As described in CAP, contingency of an additional year of quarterly sampling if cleanup levels not attained. After one additional year, if COC groundwater cleanup levels have not been reached, include a 5-year compliance sampling event for the duration of the environmental covenant.
D.7	As Built Drawings and Report of vapor intrusion mitigation measures (vapor barrier and passive venting systems), and other engineering and institutional controls (if any).	Within 30 days of the City's receipt from the developer
D.8	Five Year Compliance Monitoring and Periodic Review reports	To follow Groundwater compliance monitoring (D.6). Groundwater monitoring required once every five years for the duration of the institutional controls on groundwater (if present) under the environmental covenant.

1) *Schedule is in calendar days. Deliverable due date may be modified with Ecology concurrence without amendment to the Consent Decree.*
2) *Project Plans include the following: Work Plan, Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan, to be submitted for Ecology review and approval. All plans will include a schedule for implementation as applicable.*
3) *The Engineering Design Report includes: a Construction Quality Assurance Project Plan, a Compliance Monitoring and Contingency Response Plan, Proposed Best Management Practices, Water Quality Monitoring Plan, and Substantive Requirements of Procedurally Exempt Permits. Ecology will not approve the Final EDR until the required permits have been obtained.*

EXHIBIT C

Final Cleanup Action Plan

Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington
FSID # 33215922
VCP # NW2946

Issued By:

Washington State Department of Ecology
Toxics Cleanup Program
Northwest Regional Office
3190 160th Avenue SE
Bellevue, Washington 98008

DEPARTMENT OF
ECOLOGY
State of Washington

Revised July 19, 2019

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FIGURES

ATTACHMENTS

1.0 INTRODUCTION

This Cleanup Action Plan (CAP) was prepared by Kane Environmental, Inc., (Kane Environmental) for the Bothell Service Center Simon & Son Site (BSCSS; the Site) in Bothell, Washington. This CAP was prepared for the Washington State Department of Ecology (Ecology) in collaboration with the City of Bothell. A vicinity map and Site location are shown on Figure 1. This CAP has been prepared to meet the requirements of the Model Toxics Control Cleanup Act (MTCA) administered by Ecology under Chapter 173-340 of the Washington Administrative Code (WAC). This CAP describes Ecology's proposed cleanup action for this site and sets forth the requirements that the cleanup must meet.

The property containing the source of contamination was previously owned by Bothell Service Center Associates (BSCA) and managed by NLO Property Management (BSCA property). The City of Bothell is the current owner of the BSCSS property and the City owns roadways and other parcels adjacent to the BSCSS property which are also part of the Site. The City is in the process of obtaining a Consent Decree to implement this Cleanup Action Plan for the Site with Ecology and the Attorney General's Office.

The BSCSS property address is 18107 Bothell Way NE, Bothell, WA 98011. The King County Assessor's Office lists the parcel number as 237420-0065. The BSCSS property previously included a one-story, masonry, commercial building approximately 8,410 square feet in area, containing five tenant suites. The building on the BSCSS property and associated aboveground features were demolished in August 2016. The BSCSS property currently contains the concrete at-grade floor of the previous demolished building, and the asphalt paving is also still present.

Kane Environmental completed a draft Remedial Investigation and Feasibility Study for the Site dated August 25, 2017. The Remedial Investigation delineated the extent of halogenated volatile organic compound (HVOC) impacts to both soil and groundwater at the site. The primary source of current HVOC contamination on the Site is from releases associated with historical dry cleaning operations on the BSCA property. The Contaminants of Concern (COCs) in soil and groundwater are Tetrachloroethene (PCE), Trichloroethene (TCE), Cis-1,2 Dichloroethene (DCE) and Vinyl Chloride (VC).

Four remedial alternatives were evaluated in the draft Feasibility Study (draft FS) and are summarized below:

Alternative 1 – Limited Source Soil Excavation and Bioremediation. Emulsified oil product (EOS®) is injected into the groundwater in order to remediate the groundwater through reductive dechlorination.

Alternative 2 – Electrical Resistance Heating (ERH) Bioremediation and Recirculation. Electrical resistance heating (ERH) is used to heat the soil and ground water at the source area. The volatilized

contaminants are removed by soil vapor extraction. An array of wells will remove contaminated groundwater and treat it with activated carbon, amended with a bioremediation product, Carbstrate© . It is then re-injected into the aquifer to stimulate anaerobic bioremediation of PCE and its breakdown products.

Alternative 3 – Air Sparging and Soil Vapor Extraction (AS/SVE). Air sparging introduces compressed air into the groundwater to enhance volatilization of contaminants in groundwater and soils. Volatilized contaminants are then recovered via vapor extraction of the overlying vadose zone. The vapors are run through a remediation system, and then discharged into the atmosphere following state and local permit requirements.

Alternative 4 – Excavation to Depth of Glacial Till and Monitored Natural Attenuation. Excavation would remove the source of contamination to its full vertical extent (down to 55 feet). Clean, compacted imported fill material will replace the excavated contaminated soil. Following source soil removal activity, monitored natural attenuation (MNA) would be implemented to remediate the groundwater plume.

Preferred Alternative

Alternative 2 – Electrical Resistance Heating (ERH) Bioremediation and Recirculation

Based on the results of the remedial investigation and feasibility study conducted under MTCA and the application of the selection of remedy criteria, the Preferred Alternative chosen is Alternative 2, Electrical Resistance Heating (ERH) Bioremediation and Recirculation, developed in accordance with WAC 173-340-350 through 173-340-390. Alternative 2 will be the primary alternative supplemented with limited and targeted soil excavation and disposal, and soil vapor extraction in the vadose zone. Additionally, contingency-based focused and targeted excavations may be utilized if post-ERH soil confirmation sampling determines that residual HVOC-impacted soils remain in the vadose zone soils in the area of the ERH activity on the BSCA property. Use of engineering controls and institutional controls are included on a contingency basis and may be used after the remedial action has been completed. Potential vapor intrusion, associated with future development, will be mitigated by the installation of vapor barriers and passive venting systems, or other vapor intrusion mitigation methods and documented in an environmental covenant.

1.1 Purpose

This document is the Cleanup Action Plan (CAP) for the Bothell Service Center Simon & Son Site located Bothell, Washington. The general location of the Site is shown in Figures 1 and 2. A CAP is required as part of the site cleanup process under Chapter 173-340 WAC, Model Toxics Control Act (MTCA) Cleanup

Regulations. The purpose of the CAP is to describe the preferred cleanup alternative for the Site determined from the RI/FS. More specifically, this plan:

- Describes the Site;
- Summarizes current site conditions;
- Summarizes the cleanup action alternatives considered in the remedy selection process;
- Describes the selected cleanup action for the Site and the rational for selecting this alternative;
- Identifies site-specific cleanup levels and points of compliance for each hazardous substance and medium of concern for the proposed cleanup action;
- Identifies applicable state and federal laws for the proposed cleanup action;
- Discusses performance and compliance monitoring requirements; and
- Presents the schedule for implementing the CAP.

Ecology has made a preliminary determination that a cleanup conducted in conformance with this CAP will comply with the requirements for selection of a remedy under WAC 173-340-360.

1.2 Regulatory Framework

The Site is listed in Ecology's database as Bothell Service Center (BSC), and also as Simon & Son Fine Drycleaning. The Site is assigned facility number 33215922 for dry cleaning solvent contamination in soil and groundwater. The VCP number for the Site is NW2946 and Cleanup Site ID No. 427. It should be noted that the Site was formerly in the VCP as project number NW0794 from 2001 to 2006.

Ecology lists the Site Discovery/Release Report having been received on August 1, 2001 (Ecology, 2015a). On February 16, 2015, the City of Bothell entered the Site into Ecology's Voluntary Cleanup Program.

Implementation of this cleanup plan will be under a consent decree that settles only for the Bothell Service Center Simon & Son Site HVOC contamination and does not ascribe regulatory compliance and settlement for other contaminated sites located on Lot D such as the Schuck's/Wexler and Bothell Former Hertz sites.

2.0 SITE DESCRIPTION

2.1 Site History

The property containing the source of contamination was previously owned by Bothell Service Center Associates (BSCA) and managed by NLO Property Management (BSCA property). The City of Bothell is the current owner of the BSCSS property and the City owns roadways and other parcels adjacent to the BSCSS property, which are also part of the Site. The City is in the process of obtaining a Consent Decree to implement a Cleanup Action Plan for the Site with Ecology and the Attorney General's Office.

The BSCSS property address is 18107 Bothell Way NE, Bothell, WA 98011. The King County Assessor's Office lists the parcel number as 237420-0065. The BSCSS property previously included a one-story, masonry, commercial building approximately 8,410 square feet in area, containing five tenant suites. The building on the BSCA property and associated aboveground features were demolished in August 2016. The BSCA property currently contains the concrete at-grade floor of the previous building, and the asphalt paving is also still present.

Per MTCA, a “Site” is “any site or area where a hazardous substance…has been deposited, stored, disposed of, or placed, or otherwise come to be located”. Figure 2 shows the approximate extent of the Site as defined by the extent of HVOC, primarily the dry cleaning solvent PCE, at concentrations greater than Washington’s Model Toxics Control Act (MTCA) Method A groundwater and soil cleanup levels. The HVOC plume originating from the former Simon & Son Fine Drycleaning facility on the BSCSS property is known to exist beneath the BSCSS property and extend onto adjacent and downgradient properties, including (from up- to down-gradient):

- 98th Avenue NE, located to the west and southwest of the BSCA property;
- The vacated portion of State Route 522 located immediately south of the BSCA property;
- The adjoining former Al’s Auto Bothell Wexler property to the east, now owned by the City;
- The location of the Bothell Former Hertz Facility (former Hertz property) south of the vacated portion of SR522, now vacant, undeveloped, and also owned by the City.

2.2 Human Health and Environmental Concerns

The RI/FS identified exposure pathways of COCs at the Site. Based on the nature and the extent of contamination, the likely greatest potential risk to human receptors is dermal contact of soil and/or groundwater to construction workers during soil-disturbing activities. The second most likely exposure risk is inhalation of vapors during soil-disturbing activities or by commercial workers.

These risks can be mitigated under a cleanup action that either removes the contaminants to levels that are protective to receptors or that places institutional or engineering controls to prevent exposure, following MTCA requirements.

Based on the nature and extent of contamination, the likely greatest potential risk to ecological receptors include incidental soil ingestion and dermal contact, as well as ingestion and direct contact with groundwater. Based on the exposure pathways analysis, the land use on the Site and the surrounding area make wildlife exposure unlikely.

See Figure 3 for the Conceptual Site Model.

2.3 Cleanup Standards

The COCs in soil and groundwater are Tetrachloroethene (PCE), Trichloroethene (TCE), Cis-1,2 Dichloroethene (DCE) and Vinyl Chloride (VC).

The selected cleanup levels for the identified Constituents of Concern in soil are as follows:

- MTCA Method A Soil Cleanup Levels for Unrestricted Land Uses (WAC 173-340-900, Table 740-1), and Protection of Groundwater Saturated:
    - PCE 0.05 mg/kg
    - TCE 0.03 mg/kg
    - Cis-1,2 DCE 0.00515 mg/kg (Protection of Groundwater Saturated)
    - VC 0.0000885 mg/kg (Protection of Groundwater Saturated)
- MTCA Method A Cleanup Levels for Groundwater (WAC 173-340-900, Table 720-1), and MTCA Method B Noncancer:
    - PCE 5 ug/L
    - TCE 5 ug/L
    - Cis-1,2 DCE 16 ug/L (MTCA Method B)
    - VC 0.2 ug/L

The points of compliance are the locations at which cleanup levels for the Contaminants of Concern (COCs) must be attained to meet the requirements of MTCA and support issuance of a satisfaction of Order or Decree for the Site and subsequent delisting. In accordance with WAC 173-340-740(6), the point of compliance for soil is all soil within the boundaries of the Site. In accordance with WAC 173-

340-720(8), the point of compliance for groundwater is all groundwater within the boundaries of the Site.

A Remediation Level of 1 ppm for PCE in soil will be used in case the MTCA Method A Soil Cleanup Level is not achieved in the ERH remedial action area.

3.0 DESCRIPTION OF SELECTED REMEDY

An array of electrical resistance heating (ERH) wells will be installed in the area of the former dry cleaning operation, and will extend to the west along the east side of 98th Avenue NE, south beyond the former BSC building footprint, and east to approximately half the distance of the former BSC building footprint. The ERH system will operate for approximately six months. Concurrently, injection and extraction wells will be installed in the remaining area of the PCE plume. The injection wells will place a bioremediation product into the subsurface groundwater, and at the same time, remove groundwater from edge of the plume. This will create groundwater recirculation cycle will be controlled by pumps located in an aboveground trailer. The extracted groundwater will be run through activated carbon, and then this clean groundwater will be amended with the bioremediation product, and re-injected into the groundwater. Groundwater performance monitoring will be conducted during both activities (ERH and Bioremediation). There is also an area of PCE contaminated soil in the eastern portion and adjacent to the east perimeter of the former BSC building, that will be removed by soil vapor extraction (SVE). The SVE system will be separate from the ERH and Bioremediation systems and operate for approximately six months. Also, localized, targeted soil excavation of PCE contaminated soil will be conducted in near-surface soil in the eastern area of the former BSC building footprint that was identified during site characterization.

3.1 General Description of the Cleanup Action

Based on the results of the remedial investigation and feasibility study conducted under MTCA (Kane Environmental, 2017) and the application of the selection of remedy criteria, the Preferred Alternative is Alternative 2 (Electrical Resistive Heating/Bioremediation with Groundwater Recirculation), augmented by targeted soil excavation and soil vapor extraction, developed in accordance with WAC 173-340-350 through 173-340-390. Alternative 2 will be implemented as the primary alternative for source control and plume remediation. Figure 4 shows the layout for the ERH thermal remediation, Soil Vapor Extraction, and Groundwater Bioremediation and Recirculation systems.

Remediation of other areas of contamination outside of the electrical resistive heating (ERH) remediation zone will be addressed by groundwater bioremediation and recirculation, targeted soil excavation and disposal, and soil vapor extraction in the vadose zone. Use of additional vadose soil excavation and removal in the source area (ERH treatment zone) engineering controls and institutional controls are included on a contingency basis if the MTCA Method A soil cleanup levels in the vadose zone soils are

not met. Furthermore, a vapor barrier and passive venting system, or other vapor intrusion mitigation measures, will be implemented in the areas of the building development as part of the environmental covenant.

3.2 Electrical resistance heating (ERH)

ERH involves heating the soil and groundwater using electrodes installed in wells in the source area, and connected to a source of electricity, resulting in heating of the subsurface soil and groundwater. The subsurface is heated to a range of 80 to 100 degrees Centigrade (°C), which then volatilizes the contaminants into the unsaturated zone where they are removed by soil vapor extraction.

Installation of the ERH system includes drilling boreholes, installing electrodes and temperature monitoring probes, and soil vapor extraction screens in each borehole, and staging and connecting operating equipment (power control unit, transformer, power cables, vapor recovery lines, activated carbon, steam condenser, blower, and cooling tower). One of the six 55-foot deep ERH electrode will be placed at monitoring well location MW-9 where DNAPL was encountered. The boreholes are drilled in a triangular grid pattern (typically 15-foot spacing) that is located to optimize electrical and thermal distribution in the subsurface. The backfill around the electrode/vapor screen consists of a conducting material such as a sand and graphite or sand and steel shot mix. The electrodes are in electrical contact with the soil matrix throughout the target soil zone. The vapor extraction screen would be positioned over the target interval, in the unsaturated zone.

Once the electrode and vapor recovery system is constructed, including connection of all electrical and vapor lines at the surface, then the system would undergo functional testing. After testing is successfully completed, the system would be turned on. Electrical power is supplied continuously to the electrodes to heat up the subsurface. Heating the soil to the target temperature of 80°C to 100°C usually takes about 1 month. After the target temperature is achieved in approximately one month, it would be maintained for a period of 4 to 5 months to complete the thermal treatment. During the entire heating period, the vapor extraction system would be operating. As the soil is heated, contaminant vapor flow in the recovery system would progressively increase as the volatility of the contaminants increases. When the soil temperatures get close to the target, a significant amount of water would start to vaporize, which creates a steam-stripping effect for the volatiles. This steam is subsequently condensed in the steam condenser. Because of the heat and the steam-stripping effect, the removal of volatile contaminants from low-permeability silty soils is much more effective than standard air sparging and soil vapor extraction.

The progress of treatment with ERH is monitored through soil temperature monitoring of the subsurface, periodic collection and analysis of extracted vapors, and soil sampling for treatment confirmation. Thermocouples located at 5-foot intervals spanning the vertical target treatment zone would be used to track the subsurface soil temperature profile as it approaches and attains the target temperature. Air samples

collected weekly from the vapor recovery line, after the condenser and before the activated carbon treatment, would be used along with vapor recovery stream flow-rate readings, to track the total amount of volatile contaminants removed from the subsurface as thermal treatment progresses. Performance air samples will provide data to ensure that the activated carbon treatment system is not saturated by elevated recovery. The soil samples, typically collected at 60, 90, and 100 percent of the thermal treatment cycle, would be used to verify the extent of contaminant removal indicated by the air sampling results. The soil compliance sampling is conducted approximately 4 to 6 months after starting the system. The soil compliance monitoring plan will be included in the Engineering Design Report.

3.3 Post-ERH Remediation

Although the ERH treatment is expected to attain MTCA cleanup levels for groundwater and soil under optimal conditions, a remediation level of 1 ppm PCE in soil will be set as a targeted remediation goal for this component of the cleanup. If this is not met at the end of the treatment schedule, a decision can be made to either extend the duration of thermal treatment for a limited time or implement a contingency involving targeted vadose soil excavation in the ERH treatment area. Following this step, residual soil and groundwater contamination in the ERH treatment area will be addressed by engineered and institutional controls using an environmental covenant. Similarly, other areas of the site containing residual contamination not in compliance with cleanup levels despite remediation efforts in the CAP (bioremediation, groundwater treatment and recirculation, SVE) will also have engineered and institutional controls (environmental covenant) in order to be protective.

3.4 Bioremediation and Groundwater Recirculation System Approach

3.4.1 Process Overview

The groundwater recirculation system is an automated, programmable treatment process to extract contaminated groundwater, run the groundwater through activated carbon to remove HVOCs, add a remedial substrate (bioremediation), and reinject the groundwater/substrate mixture back into the aquifer. This recirculation provides a continuous supply of remedial substrate to be utilized by the established microbial community responsible for the Reductive Dechlorination (RD) process. Through operating injection vertical wells in conjunction with vertical extraction wells, artificial groundwater gradients can be produced within a groundwater plume to induce the cycling of biologically-active and remedial substrate-rich treatment water uniformly throughout the contaminated zone. In addition, the substrate injections promote desorption of the majority contaminant mass present on the soil matrix, thereby dissolving this mass into the groundwater and furthering the overall RD remedial process. The microbial community responsible for RD requires dissolved contamination as mass adsorbed to the soil matrix is not readily bioavailable to these microbes. The recirculation loop has the added benefit of providing a degree of hydraulic control to mitigate downgradient migration of the contaminated groundwater plume.

One groundwater recirculation system will be installed and used to operate in the Shallow, Intermediate and Deep portion of the aquifer at the same time. In addition, when the system is initially turned on and the extraction pumps are all extracting, groundwater elevations will be collected to evaluate the degree of communication with key monitoring locations and radius of influence.

As an example, dextrose is a substrate that binds to certain microbial enzymes and, in the presence of oxygen (what the microorganisms need to "breathe"), produces carbon dioxide and water (i.e. mineralization). This process is called aerobic oxidation. Anaerobic biodegradation can occur also, but is significantly different because the microorganisms have to use other compounds, in the absence of oxygen, to "breathe". Microorganisms have a preference for which compounds they want to use for respiration, and these are referred to as terminal electron acceptors (TEAs). The generally accepted order of these TEAs, from most desired to least desired, are as follows:

Oxygen > Nitrate > Manganese (+4) > Iron (+3) > Sulfate > Carbon Dioxide

Since this is a predictable and reliable sequence these parameters can be measured/observed in groundwater to evaluate and characterize the microbial community in impacted saturated zones. Chlorinated solvents can be utilized by microorganisms as a TEA also, but their placement in this sequence varies widely. However, general academic research has shown that PCE and TCE tend to be utilized as a TEA at about the same time as nitrate and iron/manganese, while cis-DCE and VC tend to utilize about the same time as sulfate and carbon dioxide. So, complete dechlorination to ethene requires either sulfate-reducing or methanogenic conditions (i.e. when carbon dioxide is reduced to methane).

When all of the TEAs are utilized for microbial respiration they are 'reduced' because they are taking on electrons (negative charge) that come from the utilization of the primary substrate (i.e. electron donor and energy source). The reduction of these compounds causes the formation of different products. For instance, nitrate is reduced to nitrogen gas, ferric iron is reduced to ferrous iron (soluble form), sulfate is reduced to hydrogen sulfide, and carbon dioxide is reduced to methane. For the chlorinated solvents, a chlorine atom is replaced with a hydrogen atom, causing a change in the molecular structure (i.e. dechlorination). The final byproducts are ethene and/or ethane, which are benign, and are not recalcitrant because they are rapidly mineralized by microbes as a carbon/energy source.

The ultimate goal is to obtain contact between the substrate and the >95% chlorinated solvent mass sorbed to the organic fraction of the soil matrix in order to stimulate ERD where the bulk of the contaminant are sorbed. Without contact there is no reaction. Therefore, delivery of the substrate to the subsurface is paramount, which is why a groundwater recirculation approach was selected. Slug injections fail to achieve effective contact due to the generation of preferential flow pathways, while a long-term recirculation approach minimizes this problem. By inducing hydraulic gradients via

injection/extraction, a user can push/pull the amended groundwater to any location desired, even under existing buildings/roads. The most transmissive zones in the saturated zone will be the first to receive the amended groundwater, which will cause microbes to grow in the effective pore space. As they grow in the pore space they foul it with biomass, reducing the effective porosity in that zone, and facilitating fluid transport to the less transmissive zones.

The initial substrate, Carbstrate product, initiates the ERD process and causes the bulk of the pore space to be lightly fouled with biomass. At the end of the system operation substrate addition ceases causing the microbial death rate to increase, and the dead biomass begins to decay. This biomass then becomes a secondary, long-term substrate that sustains ERD for at least 1.5 - 2 years due to the rotting/decaying biomass generated from the substrate (behaves like an electron donor). Academic literature (Yang and McCarty, 2004) supports this concept that decaying biomass yields better ethene/ethane generation rates than primary substrates like lactate or soybean oil.

Chlorinated solvent retardation rates decrease from PCE to VC, so there will be varying rates of contaminant migration towards the extraction wells. Typically, cis-DCE and VC are observed at higher concentrations at the extraction well locations due to their higher solubility values and lower sorption coefficients. Each location is going to have its own unique baseline conditions, and we will be plotting the VOC data over time to evaluate contaminant transport/breakthrough and biotransformation at all locations. The main benefit of anaerobic dechlorination is that it enhances the desorption of the VOCs, making them more soluble and bioavailable.

One potential risk with this method is the possibility for biofouling, which occurs when bacteria, supported by the injected substrate, accumulate and grow around the well screen, inhibiting the productivity and function of the well. However, the proposed recirculation system is designed with precautionary measures and operational procedures in place to prevent biofouling, by adding the substrate using weekly injections, not on an on-going basis.

3.4.2 Substrate

Carbstrate™, a nutrient-amended carbohydrate amendment, is proposed as the electron donor substrate. Its qualities include high water solubility, no particulate matter, low viscosity, and a low retardation factor in order to ensure mobility within the target treatment zone. If the substrate has a low solubility or significant retardation factor, then delivery via induced hydraulic gradients would require multiple pore volumes of recirculation prior to achieving site-wide delivery. In addition to its solubility and low-retardation factor, it is a non-toxic, food-grade product that includes the macro-nutrients that will be necessary for effective microbial growth (i.e. nitrogen and phosphate) as well as a specific suite of trace

metals that have been shown to be critical for active anaerobic microbial activity. It is also a dry substrate, which helps prevent fouling of injection points and equipment components.

3.4.3 Substrate Concentrations

The proposed remedial approach is to pulse-inject a nutrient-amended carbohydrate to a re-circulating groundwater system to overcome the terminal electron acceptor (TEA) sinks (i.e. dissolved oxygen, nitrate, sulfate, etc.) and create sulfate-reducing and/or methanogenic conditions throughout the desired saturated zone. Either of these conditions will promote the transfer of electrons to the chlorinated solvents, which will reduce their concentrations and remediate the target area. The Site-wide delivery of the substrate throughout the saturated zone will be optimized via groundwater recirculation facilitated by the automated system.

The desired substrate concentration was calculated using stoichiometric ratios of carbohydrate to TEAs and chlorinated solvents at the Site. Terminal Electron Acceptors are estimated and the mass of substrate is calculated to overcome this estimate (Attachment B). Vendor experience, system capacity, and ongoing data will be used for substrate dosing. The proposed system will *pulse-inject* a higher concentration of nutrient/carbohydrate-amended groundwater throughout the target zone (saturated and smear zones) to achieve a 50-200 mg/L TOC concentration. This concentration of TOC has been shown to be the effective concentration to achieve robust anaerobic dechlorination. The goal is to not only fully dechlorinate the minor mass of chlorinated solvents dissolved in groundwater, but also fully dechlorinate the majority of the chlorinated solvent mass sorbed onto the organic fraction in the soil as it partitions into the groundwater. A copy of the Material Safety Data Sheets (SDS) for Carbstrate™ is located in Attachment C.

3.4.4 Groundwater Recirculation System

This section describes the groundwater recirculation pilot system to be installed and operated at the Site. This full-scale system will include: a remediation equipment enclosure; vertical injection wells; vertical extraction wells; monitoring wells; and conveyance/conduit lines.

The drawdowns observed during the aquifer tests indicate that hydraulic control at the BSCA property is feasible at modest pumping rates. The proposed remedial approach will utilize six extraction wells in the Shallow zone, four extraction wells for the Intermediate zone, and four extraction wells for the Deep zone (Figure 4). Pump test data is provided in Attachment D. The remedial approach uses hydraulic control/capture to primarily distribute the substrate across a large area via displacement and advective flow at very low flow rates (<10 gpm total combined flow). The low system flow rate, and programmed injection timeframes in the system, keep injection wells only receiving flow for a limited time (usually a few minutes) before it ceases injection and allows the well to pressurize and sit idle for 15 to 20 minutes. This

pulsed, low flow delivery approach is more a volumetric approach that needs to recirculate at least 3 to 6 pore volumes in order to achieve effective distribution/contact of the substrate across the bulk of the impacted soil matrix (where the bulk of the solvents are sorbed) to achieve remedial goals. For the Shallow aquifer zone (dimensions of 150 feet x 100 feet x 10 feet saturated thickness, 0.15 effective porosity), there are approximately 170,000 gallons of groundwater in one pore volume. A recirculation system operating at 3 to 6 gpm will recirculate one pore volume in 0.65 to 1.3 months. Over the anticipated bioremediation remedial timeframe of an estimated 2 to 3 years, the system will recirculate dozens of pore volumes, obtaining a high degree of contact/distribution, without generating significant hydraulic head to drive the plume offsite. Lower groundwater extraction rates in the Shallow zone will not inhibit the remedial process, and will help remediate that upper solvent mass without pulling it deeper (or causing short-circuiting) into the Intermediate zone. Heated water flushing may not be prevented, but it is not considered a major concern. The concern is substrate distribution across a large area under slow flow conditions in the pore space, and active displacement is the only way obtain mixing/contact with the substrate can be achieved.

All extraction wells will be four-inch diameter wells, which will increase the yield and hydraulic control at the BSCA property during full-scale remediation. The bulk of the contaminant mass resides in the Shallow zone, where the groundwater extraction rates were the lowest (<0.2 to 0.6 gpm) and the drawdown was the highest. As mentioned, MW-06 is screened deeper than the other Shallow wells, which is why it had a higher sustainable yield. MW-25 did not yield a sustainable extraction rate at less than 2 gpm (only operated for 4 minutes, yielding 7 to 8 gallons), but it did recharge 6.5 feet in one minute during the recovery phase, showing groundwater extraction at that location with a programmable submersible pump is feasible. A programmable pump will have a dwell time entry to pulse the extraction wells on and off, which could be set at 1 to 5 minutes for this site. If the wells recharge that quickly, they will yield a moderate extraction rate with a fixed system. The larger diameter extraction wells will likely yield at least 0.5 to 1 gpm sustainable pumping rates, and a large radius of influence (ROI) as it is pumped on over a large timeframe. The placement of the three extraction wells on Figure 4 are approximately on 50 foot centers along the western BSCA property line between MW-9 to MW-39, which will provide a high degree of hydraulic control on this end of the plume. The 50-foot centers were chosen based on the lithology and drawdown information. The Shallow zone test showed an influence of at least a 50-foot ROI using a 2-inch diameter well. Based on this data, the hydraulic control in this area will be very high. The extraction wells at 25 feet away will come into competition with the other well, reducing their yields, but providing a higher degree of hydraulic control. If the extraction wells are moved too close together they will start to dewater each other. Therefore, the three proposed extraction wells and their placement are appropriate. These three wells pumping at the same time will create a larger ROI, that will extend beyond the known VOC impacts in the Shallow zone, based on the total observed ROI during pumping tests. In addition, there are three extraction wells distributed to the east and south of the BSCA

property to provide hydraulic control and substrate distribution at the distal end of the plume. Both the Intermediate and Deep zones have four extraction wells that are placed in accordance with the contaminant plumes onsite to provide a high degree of hydraulic control/capture. We expect these extraction wells to yield a much higher pumping rate (4 to 6 gpm), and maintain a high degree of hydraulic control/capture.

Remedial product injection into the vertical injection wells will be feasible due to the sufficient hydraulic conductivity and medium dense nature of the soils. The ability to extract groundwater at sustainable rates, and then re-inject that groundwater containing the amendments is implementable and appropriate for this site.

The placement of the extraction wells surrounding the injection wells is done in a manner that will provide a high degree of plume containment. With these low flow rates and the highly sorbed nature of the chlorinated solvents, chlorinated solvent mass will not migrate beyond the extraction wells. Extraction wells will be monitored for VOC concentrations. In addition, selected monitoring wells downgradient of the extraction wells will be used as performance monitoring wells for off-property plume migration and treatment.

3.4.5 Remediation Equipment Enclosure

The groundwater recirculation system will be operated using aboveground equipment housed in a secure weatherproof enclosure. The remediation equipment enclosure will be situated on the Site. Equipment contained within this enclosure will include: a 200-gallon poly tank to contain the concentrated Substrate injection solution (“solution tank”); an air compressor; a programmable logic controller (PLC) system; and injection and extraction manifolds, with their respective pressure gauges, ball valves, flow meters and sampling ports. In addition, a 1,000-gallon poly tank to hold the extracted groundwater (“holding tank”) and a 150-gallon activated carbon drum will be located immediately outside the enclosure.

The groundwater extraction pumps located in an aboveground trailer, approximately 10 feet long, 8 feet wide, and 8 feet high, will send groundwater from the extraction wells to the pre-treatment holding tank. The pre-treatment holding tank will contain a high/high, high, and low float for logic control. A transfer pump will pump the groundwater from the pre-treatment tank through GAC vessels (in series), and into the post-treatment holding tank (also containing three floats for logic control). The in-situ delivery (ISD) system will pull treated groundwater from the post-treatment holding tank, and amend it automatically using a metering peristaltic pump connected to a small substrate solution/mixing 50-gallon tank located inside the aboveground trailer. The concentrated substrate solution will be metered into the injection header at a specified rate when the system is in the injection mode. The ISD system will inject the groundwater containing the substrate to the desired injection wells, based on set times and rates dictated

by the operator. The proposed injection schedule, and the performance and confirmation monitoring plans will be included in the Engineering Design Report. Substrate will be added one time per week to the solution/mixing tank via field technicians during their weekly site visits.

Attachment F provides the general layout of the remediation equipment enclosure and presents the process and instrumentation diagram of this bioremediation system.

3.4.6 Well Installations

The bioremediation system will include the installation of vertical injection wells and vertical extraction wells. These wells will be installed by a Washington state licensed well driller. Prior to conducting the well installations, Underground Service Alert (USA) will be notified as required by Washington law at least 48 hours in advance of the field activities.

3.4.7 Vertical Injection and Extraction Wells

Vertical injection wells will be used for the Intermediate and Deep portion of the aquifer. The wells will be installed in an array that will provide substrate throughout the entire Intermediate and Deep HVOC plume. It is possible that some of the existing groundwater monitoring wells will be used as injection wells, which will be evaluated in the Engineering Design report.

Because the existing monitoring wells on Site are either not the proper diameter, or not screened to the target pilot system depths, or not strategically located in the most optimal location, a series of new Shallow, Intermediate, and Deep extraction wells will be installed for the remedial approach. An estimated six new 4-inch diameter Shallow extraction wells (SEWs) will be installed and screened from 5-20 ft bgs. An estimated six 4-inch diameter Intermediate extraction wells (IEWs) will also be installed and screened from 25-35 ft bgs. An estimated four 4-inch diameter Deep extraction wells (DEWs) will be installed and screened from 40-55 ft bgs. The vertical extraction well locations were selected to correspond for the Shallow portion of the aquifer, and are spaced based on the observed ROIs for each zone during the 2017 pump tests. Figure 4 depicts the preliminary locations of the injection and extraction wells.

The vertical extraction wells will be installed using sonic drilling technology, which advances a non-perforated steel conductor casing, thereby mitigating potential cross-contamination of the aquifer zones. In addition, sonic drilling will limit the exposure of vapors emanating from the open borehole and generated from the soil cuttings. The vertical extraction wells will be constructed in 8-inch diameter borings using 4-inch diameter, Schedule 40 PVC. The screened sections for all zones will be constructed using 0.010-inch machine slotting. Each well will be hung within the center of the borehole, with sand filter pack (#2/12 sand, or equivalent) placed within the annular space as the conductor casing is removed.

The sand filter pack will extend 1 ft. above the screen intervals, followed by 1 foot of hydrated bentonite, and then cement to the ground surface. Each well will be completed in a concrete vault, with camlock fittings installed on the well heads for connecting with the remediation system's conveyance lines.

The down-hole drilling equipment will be decontaminated following each well installation using a high-pressure rinse. The used decontamination rinse water will be stored within 55-gallon steel drums or a poly tank pending offsite disposal.

Development of the extraction wells will proceed no sooner than 48 hours following the well installation activities to allow time for the cement surface seal to set. Each well will be developed using a surge block to remove the fines from the filter pack. Following the surging, groundwater within each well will be pumped out and monitored for pH, turbidity, electrical conductivity (EC) and temperature. The pumping will continue until these parameters stabilize to within a 10 percent fluctuation or until a maximum of 10 well casing volumes are purged.

Following the completion of the development activities, each well head will be retrofitted to support the extraction equipment. For the pilot system, this equipment will include: a 3-inch diameter, stainless steel submersible pump (Grunfos Redi-Flo3, or equivalent); electrical line; and 1-inch diameter discharge hose.

3.4.8 Groundwater Monitoring Wells

Because all of the vertical extraction wells will be used for extraction only, selected extraction wells may be utilized as groundwater compliance monitoring locations in addition to selected existing groundwater wells. These wells may be sampled for MNA parameters and VOCs to assess the performance of the remedial action. Groundwater performance samples will be collected from all key monitoring locations throughout the ERH and bioremediation remedial action. See Section 3.7 for chemical parameters and analytes to assess the bioremediation treatment performance.

3.4.9 Conveyance Lines

Below ground conveyance lines will be installed connecting to the injection and extraction wells. The lines will be installed in trenches approximately 16-inches wide by 2 feet deep. The conveyance lines will merge into a common trench near the treatment system compound that will be approximately 3 feet wide by 2 feet deep. These conveyance lines will be constructed using 1-inch diameter PVC pipe electrical conduit for the extraction well pumps will also be included within the conveyance line trenches. Waste material associated with trenching activity, including concrete and soil, will be assumed to be investigation derived waste (IDW). The handling and disposal of IDW is discussed below.

3.5 IDW

Investigation derived waste (IDW) generated from the installation of the remediation system trenching and drilling activities will include drill cuttings from extraction and injection well installation, soil and concrete excavated from the construction of the directional drilling entry pits and the injection trenches, well development water, and decontamination rinse water. This IDW will be stored in either water-proof roll-off containers or 55-gallon drums that will be labeled, and sampled for waste characterization and profiling, and stored on Site pending receipt of the analytical data. It is assumed that the generated IDW may be disposed as Contained-In designation, and some IDW may potentially require disposal as RCRA hazardous waste.

3.6 Permitting

The installation of the ERH and groundwater Bioremediation/Recirculation system will be properly permitted through the appropriate regulatory agencies. An electrical permit will be obtained by from the City of Bothell to install the 100 amp 120/240v single-phase temporary service required for the operation of this system. In addition, a UIC permit from the Washington State Department of Ecology will be required to re-inject extracted and treated groundwater containing Carbstrate.

3.7 System Performance Criteria and Performance Monitoring

For baseline and system performance monitoring data, groundwater samples will be collected from the key monitoring wells proposed herein. The performance and compliance groundwater monitoring plan will be included in the Engineering Design report. All key monitoring wells will be analyzed for the following:

- VOCs (limited chlorinated solvent suite, EPA 8260B).
- Ammonia-nitrogen (EPA 350.1).
- Sulfate-sulfur (EPA 375.4 MOD).
- Methane/ethene/ethane (low level analysis via Microseeps, Inc.).
- Total organic carbon (TOC, multiple methods).
- Dissolved iron and chloride

In addition, groundwater quality parameters (i.e. Conductivity, ORP and pH) should be taken during sampling events. These parameters will be sampled and analyzed every month the first quarter, followed by quarterly collection. The key groundwater monitoring wells to be sampled are provided in Attachment E.

Extraction wells may be sampled in a manner to minimize any aeration of groundwater samples. The extraction pumps can be operated manually using the PLC of the system by the field technicians. Each extraction well conveyance line will have its own flow meter and gate valve to control the extraction flow rate. In addition, each line will have its own sample port and tubing to collect samples from. Once the pump is turned on, the conveyance line will be evacuated/filled and the pump flow rate will be reduced using the gate valve (to about 1-2 gpm). Once the flow rate is reduced, the sample port will be opened to flush the line and check for air bubbles. If no air bubbles are observed, then a sample will be collected. If bubbles are observed, the flow rate will be reduced until no bubbles are observed. Extraction wells may be sampled for baseline conditions prior to system startup.

3.8 Schedule

The construction of the infrastructure and subsequent installation of the groundwater recirculation system will immediately commence following the approval of this Cleanup Action Plan. It is anticipated that the permitting and mobilization activities will require up to one month. The well installation and development activities are expected to require another 4 to 6 weeks, which will be followed by the initial system start-up (2 weeks).

3.9 Targeted Soil Excavation and SVE System

Limited soil excavation will be conducted during the installation of the remediation systems on the BSCSS property. Limited Soil Excavation has been included in the Preferred Alternative to address any potential additional HVOC soil that may be found during system installations. Soils will be sampled and designated for disposal following Ecology requirements. See Figure 4 for locations. These limited vadose zone soil excavation locations are the PCE hot spots discussed in the RI/FS report.

Following thermal (ERH) treatment, confirmation vadose zone soil samples will be collected in the ERH treatment and Bioremediation/Groundwater Recirculation areas to confirm if remediation levels and/or cleanup standards were met in the soil vadose zone source area. This hot soil sampling will be completed following a specific health & safety protocol for hot soil sampling. As a contingency, if soil cleanup standards and/or remediation levels were not attained, targeted vadose zone soil excavation and removal will be carried out to achieve cleanup standards in the ERH treatment area as much as

practicable and following a work plan to be approved by Ecology. See also Section 7.0 for additional details on performance and compliance monitoring.

A Soil Vapor Extraction system will be installed in the eastern portion of the BSCA property to remediate vadose zone soils contaminated and impacted by PCE, found in proximity to the former BSC sewer line near the sewer manhole to the east of the former building. The SVE system installation would occur at the same time as the Bioremediation system, and air blowers will be connected to electrical power for the Bioremediation system. Compliance air sampling will be conducted on a monthly basis until concentrations are synoptic, then confirmation soil sampling will be conducted. See Figure 4 for locations of the SVE systems. Detailed engineering specifications will be provided in the Engineering Design Report.

4.0 HEALTH AND SAFETY PLAN

Kane Environmental has prepared a Site-specific Health and Safety Plan (HASP) to be followed when performing field activities at the Site. This HASP, which will be available in the Engineering Design Report, was prepared to comply with the requirements of Title 29 of the Code of Federal Regulations, Part 1910 (20 CFR 1910), collectively referred to as "Hazardous Waste Operations and Emergency Response (HAZWOPER)". The HASP identifies physical, industrial, chemical and biological hazards, establishes hazard monitoring action levels, specifies the required Personal Protective Equipment (PPE), and includes a map showing the route to the nearest hospital with an emergency medical facility. A copy of the HASP will be maintained on the Site, and all visitors to the Site will be provided a health and safety briefing prior to commencing with their activities.

5.0 APPLICABLE, RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Potential ARARs were identified for each medium of potential concern. The primary ARARs relating to the cleanup action include:

- MTCA, Chapter 70.105D of the Revised Code of Washington (RCW);
- Cleanup Regulations, WAC 173-340;
- Dangerous Waste Regulations, WAC 173-303, and
- State Environmental Policy Act (SEPA) Checklist [RCW 43.21C.030(2)(a) and (2)(b)].

These primary ARARs are anticipated to be the most applicable to the cleanup action because they provide the framework for the cleanup action, including applicable and relevant regulatory guidelines, cleanup standards, waste disposal criteria, references for additional ARARs, and standards for documentation of the cleanup action.

Other applicable ARARs and guidance documents for cleanup of the Site may include:

- Occupational Safety and Health Act, Part 1910 of Title 29 of the Code of Federal Regulations;
- Safety Standards for Construction Work, WAC 296-155;
- Solid Waste Management, Reduction and Recycling, RCW 70.95;
- Construction Stormwater General Permit
- Minimum Functional Standards for Solid Waste Handling, WAC 173-304;
- Criteria for Municipal Solid Waste Landfills, WAC 173-351;
- Minimum Standards for Construction and Maintenance of Wells, WAC 173-160
- Accreditation of Environmental Laboratories, WAC 173-50; and
- Underground Injection Control Program, WAC 173-218.

6.0 RESTORATION TIMEFRAME

The ERH operation is estimated to take 6 months from site mobilization to ERH system demobilization. The bioremediation process will start at approximately the same time as the ERH start, and will be operational for an estimated 2 to 3 years. Performance groundwater monitoring will be conducted during the remedial action activity, and groundwater compliance monitoring will be conducted after completion of the performance groundwater monitoring. The estimated timeframe for the total remedial action is 5 to 6 years, including groundwater performance and compliance monitoring.

7.0 PERFORMANCE AND COMPLIANCE MONITORING

Groundwater performance monitoring will be conducted in selected wells during the ERH system operation, at approximately 4 to 6 months after system startup. Up to two groundwater performance wells will be installed within the ERH treatment zone to monitoring PCE and its breakdown products concentrations during the treatment activity. The wells will be designed to withstand the heated water and have special surface completions for sampling following health and safety requirements.

Soil performance monitoring will only be conducted in the area of the ERH system approximately 4 months after ERH startup and following shutdown of the ERH system, approximately 6 months after ERH startup in vadose zone soils. Vadose zone soil samples will be collected in selected areas in the ERH treatment area to determine if the ERH system has reduced PCE, and its breakdown products, to concentrations below their cleanup levels. The soil sampling will be conducted using hot soil sampling techniques following health and safety requirements. Soil samples will be collected and sent to an Ecology-approved environmental laboratory for analysis of Halogenated VOCs (HVOCs) by EPA Method

8260. Results at the end of thermal treatment will be evaluated according to whether the remediation level and/or cleanup standards are achieved by the thermal remediation. Contingent vadose zone soil excavation and removal will be conducted at the soil source area based on the results, based on a work plan to be approved by Ecology.

Performance groundwater monitoring will be continued during the Bioremediation system operation until PCE, and its breakdown products, concentrations in groundwater are below their applicable cleanup levels.

Groundwater compliance monitoring will start at the time when PCE, and its breakdown products, groundwater concentrations have reached their applicable cleanup levels in the selected performance monitoring wells. Groundwater compliance monitoring will be conducted quarterly for 2 years. A groundwater compliance monitoring contingency will be provided in the Engineering Design Report in case groundwater compliance monitoring is continued after 2 years. The City of Bothell and Ecology will have long-term access to the extent necessary to operate, maintain and monitoring remedial systems and the cleanup, and compliance groundwater monitoring.

Selected groundwater wells are provided in Attachment E, based on the horizontal extent of the PCE plume from groundwater sampling results conducted in Spring 2019, to provide performance and compliance groundwater monitoring for the Site. A groundwater compliance contingency, which would extend the groundwater biannual compliance monitoring for one year, will be started at the end of the proposed compliance monitoring in June 2022 if COC groundwater cleanup levels have not been reached. After one additional year, if COC groundwater cleanup levels have not been reached, the Potentially Liable Persons will include a 5-year compliance sampling event for the duration of the environmental covenant. This shall be documented in the Compliance Monitoring and Contingency Response Plan in the Engineering Design Report. Groundwater analytical results are needed for the 5-year periodic review. The five year groundwater compliance monitoring is only required if cleanup levels are not achieved and institutional controls through the environmental covenant on groundwater use are needed.

The cleanup will include a total of two rounds of indoor air sampling. The first round of indoor air sampling will occur post-construction and pre-occupation of the buildings. The sampling procedures, and the analyses for both HVOCs and petroleum COCs, will follow sampling protocol provided in Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Review Draft Revised February 2016) or the current guidance at the time of sampling. If indoor air HVOC and petroleum hydrocarbon COCs concentrations are above their respective screening levels in the first indoor air sampling round, a confirmational sampling round will be conducted within two weeks of the first round, to confirm the findings. If the confirmational sampling confirms the presence of HVOC and/or petroleum COCs in the indoor air, additional indoor air mitigation will be implemented. The details of the indoor air mitigation will be included in a corrective action report.

The second round of indoor air compliance sampling will occur prior to the completion of the draft Groundwater Closure Report. The indoor air sampling methodology, indoor air sampling results, and corrective actions for any additional indoor air mitigation (if any) for the first and second rounds of indoor air sampling will be documented in the Groundwater Closure Report.

8.0 SCHEDULE FOR REMEDIATION SYSTEMS IMPLEMENTATION

The schedule for the implementation is provided in the Consent Decree.

9.0 INSTITUTIONAL/ENGINEERING CONTROLS

If residual contamination remains on the BSCSS property after cleanup, or any of the other criteria for triggering an institutional control under WAC 173-340-440 are met, institutional controls may be implemented, and included in an environmental covenant. Institutional controls may also be implemented prior to completion of remedial actions at the BSCSS property.

Vapor intrusion risks at the site will be addressed by the active remediation of contaminated soil and groundwater at the site and direct mitigation through engineering controls. Engineering controls, such as vapor barriers and passive venting, or other vapor intrusion mitigation methods, will be implemented for the new development structures and included in the environmental covenant.

10.0 PUBLIC PARTICIPATION

This criterion considers whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, federal and state agencies, or any other organization that may have an interest in or knowledge of the Site. A Public Participation Plan and Fact Sheet has been prepared for review during the public comment period for the consent decree as required under MTCA.

11.0 REFERENCES

AFCEE, 2004. Principles and Practices of Enhanced Anaerobic Bioremediation of Chlorinated Solvents. Air Force Center for Environmental Excellence (AFCEE), Naval Facilities Engineering Service Center (NFESC), and the Environmental Security Technology Certification Program (ESTCP). Prepared by the Parsons Corporation, Denver, Colorado. August 2004.

AFCEE. 2007. Protocol for in situ bioremediation of chlorinated solvents using edible oil.

Dalton, Olmsted, and Fuglevand, 2014, *Results of October Ground water Sampling, Bothell Service Center, Bothell, Washington.* Memorandum to Norm Olsen dated November 10, 2014.

ERM, 2001, Letter to Norman L. Olsen. *Interim Site Characterization Summary Report, Bothell Service Center, 18107 Bothell Way Northeast, Bothell, Washington*, Dated October 17, 2001.

ERM, 2002, Letter to Norman L. Olsen. *Interim Site Remediation Summary Report, Bothell Service Center, 18107 Bothell Way Northeast, Bothell, Washington*, Dated March 25, 2002.

Farallon Consulting, 2003, *Subsurface Investigation Report, 18107 Bothell Way Northeast, Bothell, Washington*, Dated January 27, 2003.

Farallon Consulting, 2008a, *Cleanup Action Progress Report, June 2006 Through June 2007, Bothell Service Center, 18107 Bothell Way Northeast, Bothell, Washington*, Dated March 12, 2008.

Farallon Consulting, 2008b, *Interim Action Status Report, November 2007 through August 2008, Bothell Service Center, 18107 Bothell Way Northeast, Bothell, Washington,* Dated November 4, 2008.

Farallon Consulting, 2011, *Project Status Summary, Bothell Service Center Associates Property, 18107 Bothell Way Northeast, Bothell, Washington*, Dated November 18, 2011.

Floyd & Snider, Inc, 2010, *Phase II Environmental Site Assessment, Shuck's Auto Supply, Bothell, Washington*, Dated September 10, 2010.

GroundwaterSoftware.com, Bower and Rice Slug Test Method & Single Well Solutions, http://www.groundwatersoftware.com/v8_n2_bouwer_rice.htm, accessed February 3, 2017.

Halford, K.J. et al, Interpretation of Transmissivity Estimates from Single-Well, Pumping Aquifer Tests, https://nevada.usgs.gov/tech/article.pdf.

HWA GeoSciences, 2008a, *Limited Phase II Environmental Site Assessment, Highway 522 Right-of-Way, 18030 Bothell Way NE, Bothell, WA*. Prepared for City of Bothell, April 15, 2008.

HWA GeoSciences, 2008b, *Phase II Site Assessment, Hertz Rentals Property, Bothell, WA*. Prepared for City of Bothell, October 10, 2008.

HWA GeoSciences, 2012, Remedial Investigation Feasibility Study Final Work Plan, Bothell Former Hertz Facility, Bothell, Washington, prepared for City of Bothell, September 10, 2012.

HWA, 2015, Remedial Investigation Feasibility Study Work Plan (Rev. 1), Bothell Service Center Site Bothell, Washington, August 10, 2015.

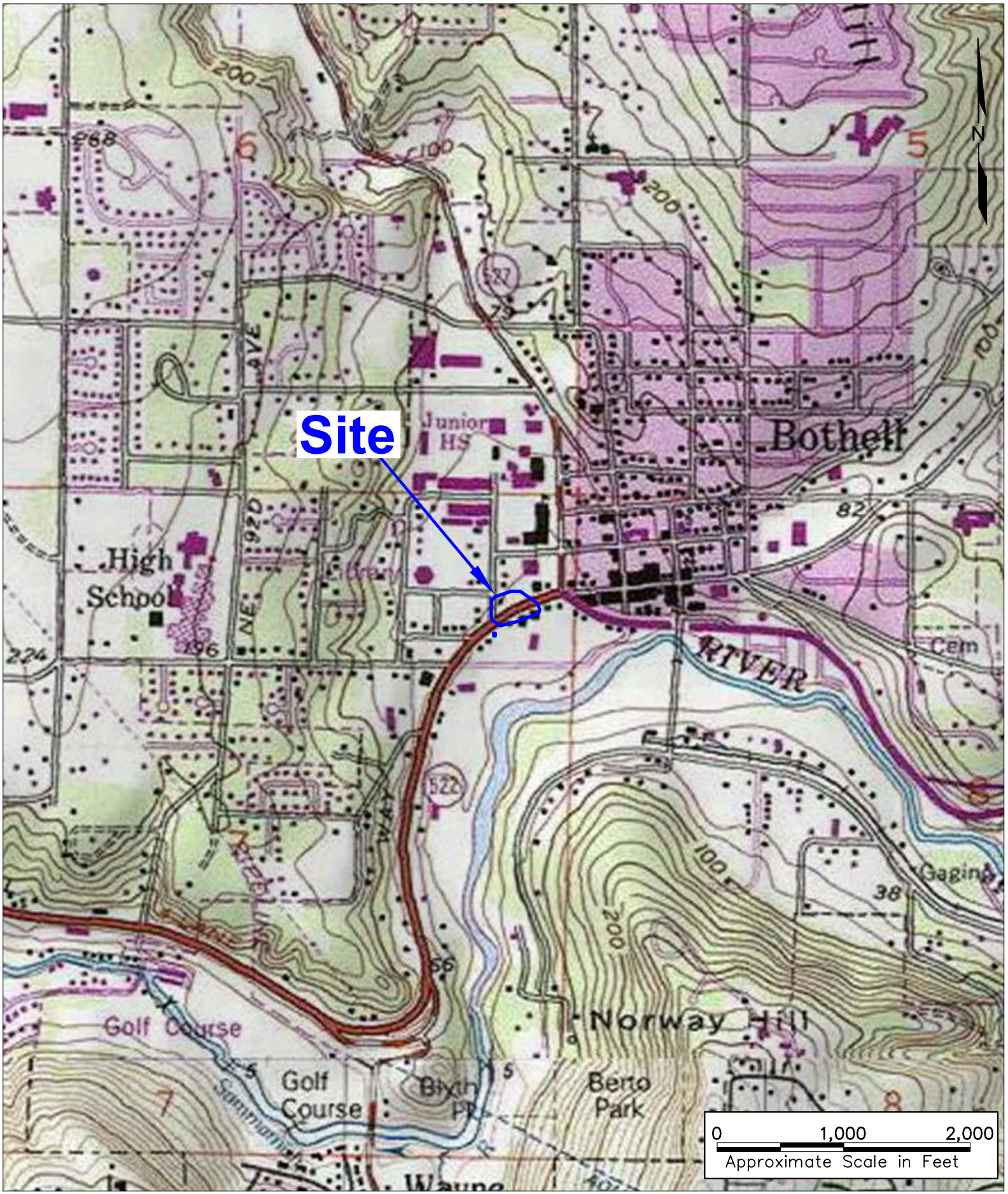
Liesch, B.A., C.E. Price, and K. Walters. 1963. *Geology and Ground-Water Resources of Northwestern King County, Washington.* US Geological Survey.

Shannon & Wilson, *Focused Soil and Groundwater Investigation, Horse Creek Project, Bothell, Washington,* Dated May 7, 2013.

U.S.G.S., 2002, https://pubs.usgs.gov/of/2002/ofr02197/spreadsheets/Pumping_Cooper-Jacob_RECOVERY.xls

Washington Department of Ecology, 2009, *Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, Washington State Department of Ecology, Toxics Cleanup Program, Publication no. 09-09-047, Review DRAFT Revised, February 2016.

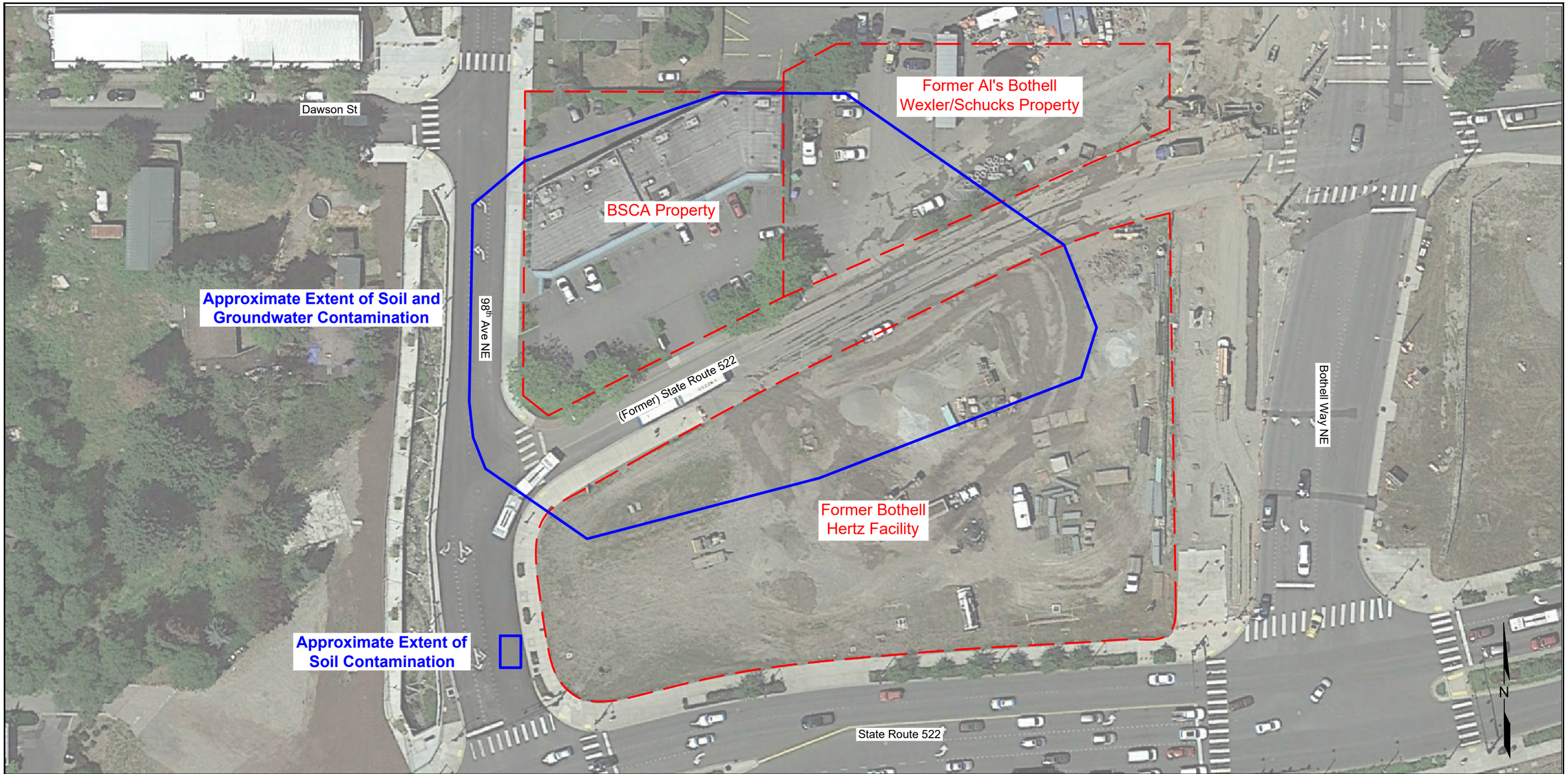
Figures



KANE ENVIRONMENTAL INC
3815 Woodland Park Avenue North, Suite 102
Seattle, WA - 206-691-0476
www.kane-environmental.com

CAP
Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, Washington

Figure 1
Vicinity Map



LEGEND

Approximate Location of Site Boundary

Various Property Boundaries

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: June 27, 2016

0 60 120
Approximate Scale in Feet

KANE ENVIRONMENTAL INC
3815 Woodland Park Avenue North, Suite 102
Seattle, WA - 206-691-0476
www.kane-environmental.com

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18107 Bothell Way NE
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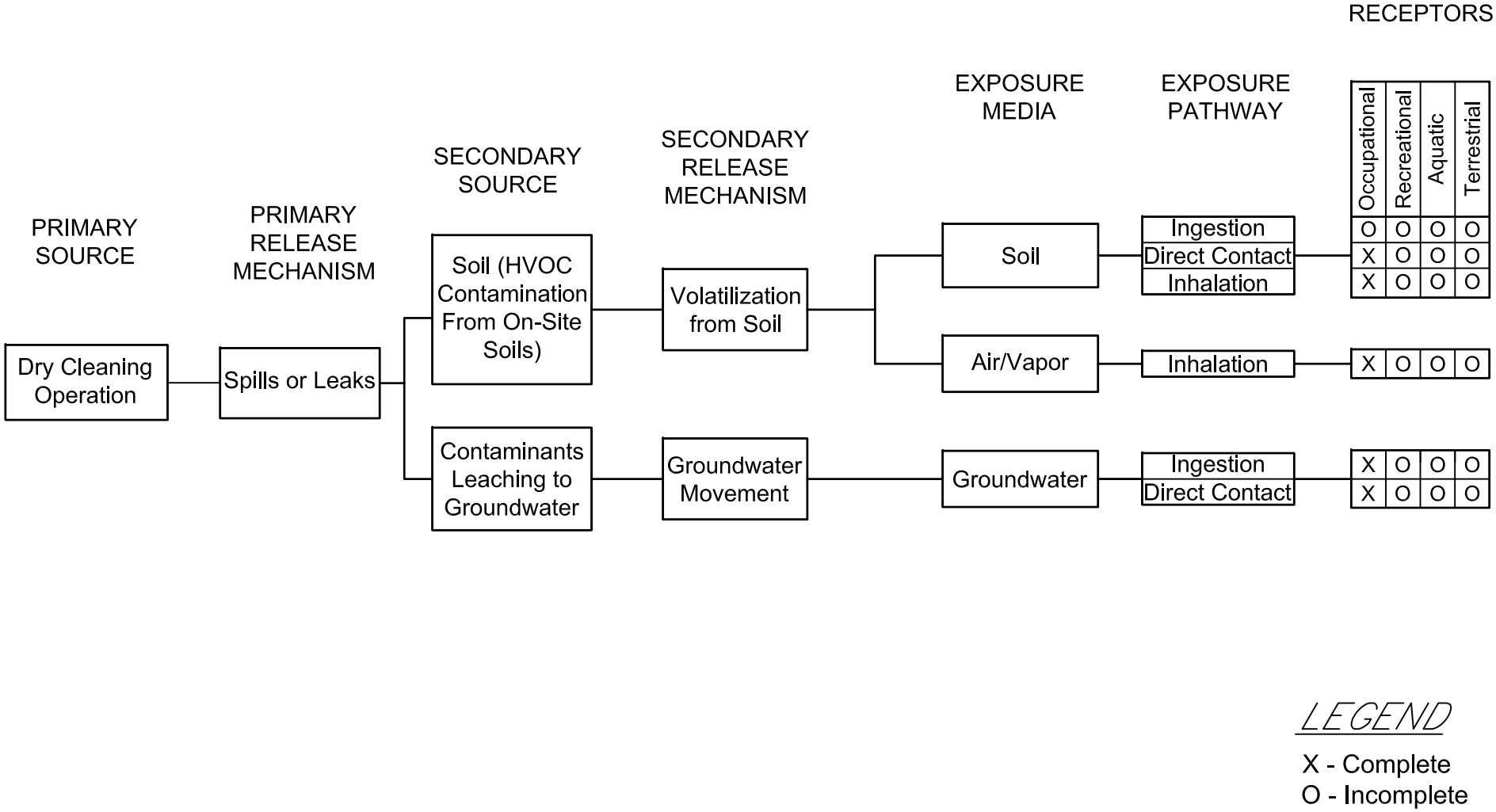
Figure 2
Site Plan



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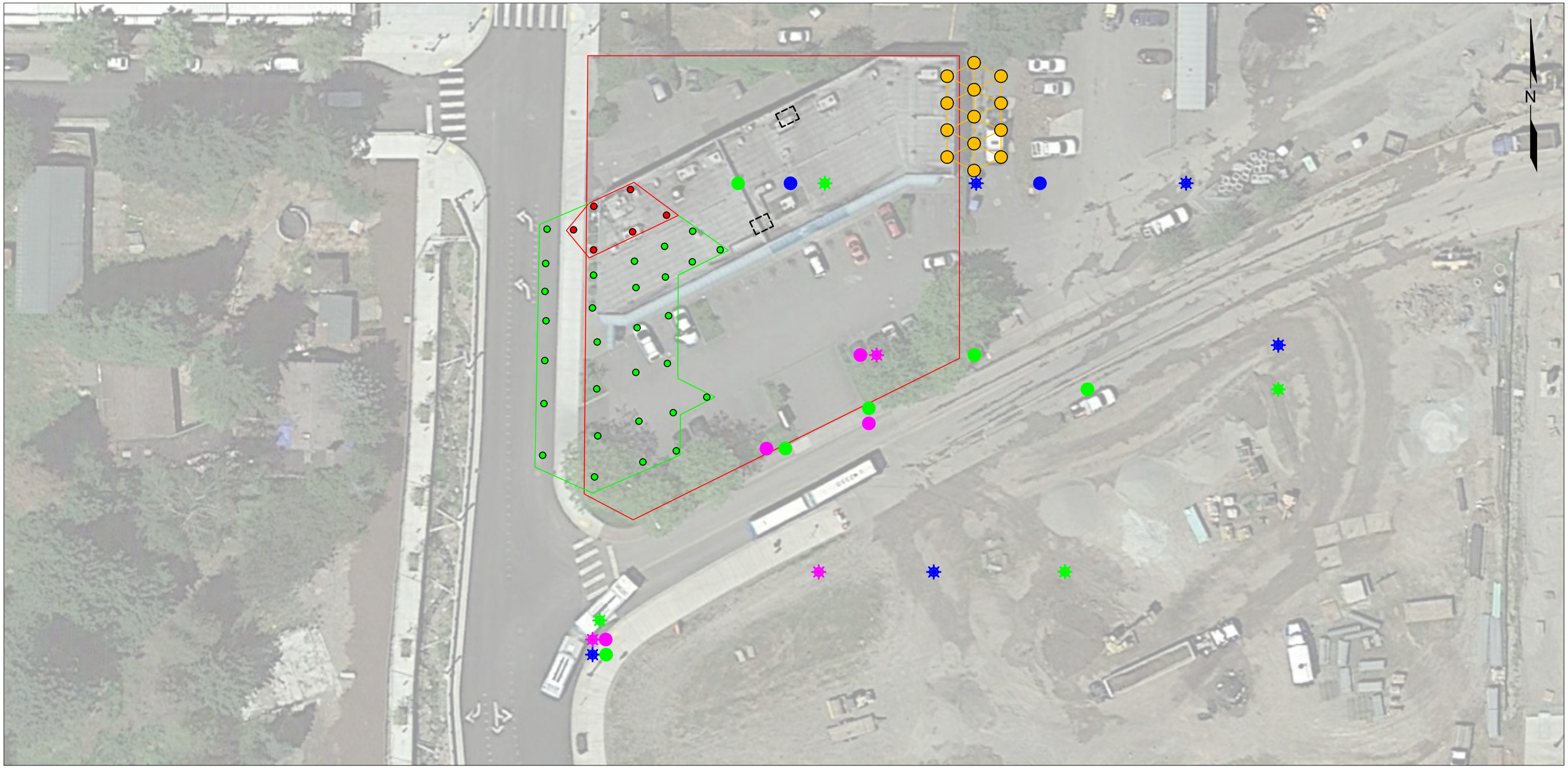
Seattle, WA - 206-691-0476
www.kane-environmental.com

CAP
Bothell Service Center Simon & Son
18107 Bothell Way NE
Bothell, WA

Figure 3
Conceptual Site Model



LEGEND

- BSCA Property Boundary
- Approximate Location of ERH Probe (5-25 ft bgs)
- Approximate Location of ERH Probe (5-55 ft bgs)
- Approximate Location of Soil Excavation
- Approximate Location of Soil Vapor Extraction (SVE) Well
- Proposed Extraction Well (Shallow 5-25 ft bgs)
- Proposed Injection Well (Shallow 5-25 ft bgs)
- Proposed Extraction Well (Intermediate 25-35 ft bgs)
- Proposed Injection Well (Intermediate 25-35 ft bgs)
- Proposed Extraction Well (Deep 35-55 ft bgs)
- Proposed Injection Well (Deep 35-55 ft bgs)

Aerial Photo Source: Google Earth Pro
Aerial Photo Date: June 27, 2016

0 40 80
Approximate Scale in Feet

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Figure 4
Preferred Remedial Alternative

Attachment A
Previous Studies Summary

Previous Site Assessments and Remedial Activities

This section is adapted from Farallon Consulting's 2011 letter report to Ecology (Farallon, 2011), and HWA Geosciences 2008 environmental assessment reports.

Interim Site Characterization Summary, Environmental Resources Management (ERM), October 17, 2001.

ERM conducted subsurface soil and groundwater investigation activities at the Site between December 1999 and July 2001 (ERM, 2001). Hand-auger borings HA-l, HA-2, and HA-3 were advanced in December 1999 to assess soil conditions in the vicinity of the former dry cleaning equipment in the Bothell Service Center building. PCE was detected at concentrations exceeding the current MTCA Method A soil cleanup level of 0.05 milligrams per kilogram (mg/kg) in soil samples collected from depths of 1 to 2 feet below ground surface (bgs) in each of the boring locations, confirming that a release of PCE had occurred at the Site.

In June and July 2000, ERM conducted subsurface investigations that involved collection of soil and groundwater samples from direct-push borings B-4 through B-11 and GP-1 through GP-3. The work in June 2000 entailed chemical analyses of soil samples collected from depths up to 4.2 feet bgs. PCE was detected at concentrations exceeding the MTCA Method A soil cleanup level, with the highest concentration of 392 mg/kg detected in a soil sample collected at a depth of 2.5 feet bgs from boring B-9 in the former dry cleaning equipment area. Work later in the summer of 2000 included chemical analyses of soil samples that confirmed PCE in excess of the MTCA Method A soil cleanup level at depths to 9 feet bgs approximately 20 feet southwest (soil boring GP-3) and 50 feet southeast (boring GP-2) of the former dry cleaning equipment area.

PCE and TCE were detected at concentrations exceeding current MTCA Method A groundwater cleanup levels in reconnaissance groundwater samples collected from borings GP-2 and GP-3. Chloroform and 1,1-dichloroethene (1,1-DCE) were also detected at concentrations exceeding current MTCA Method B groundwater cleanup levels in the reconnaissance sample collected from boring GP-3.

To further delineate the extent of PCE and related degradation compounds at the Site, ERM conducted supplemental investigation activities in 2001 that involved advancing and sampling additional direct-push Geoprobe temporary borings SP-1 through SP-12, and installing groundwater monitoring wells MW-1 through MW-7. The groundwater samples collected included both "shallow" and "deep" reconnaissance groundwater samples (exact depths were not indicated in the information available), with results used to support the selection of monitoring well locations. Findings of the supplemental investigation indicated that PCE concentrations in groundwater increased with depth, and PCE and its degradation compounds exceeded MTCA Method A or Method B cleanup levels. Chloroform also was detected at concentrations exceeding the MTCA Method B groundwater cleanup level.

Interim Site Remediation Summary, ERM, March 25, 2002.

In 2001 and 2002, after a technology feasibility evaluation process, ERM conducted two remedial action events consisting of application of in-situ chemical oxidation at the Site to address concentrations of PCE in soil and groundwater. During the first event in 2001, potassium permanganate solution was applied directly to soil exposed by the removal of a section of the floor in the vicinity of the former dry cleaning equipment in the Bothell Service Center building. Also in 2001, ERM applied potassium permanganate directly into the water-bearing zone at depths ranging from 10 to 20 feet bgs at eleven soil boring locations outside the south side of the building using a direct-push drill rig. Approximately 100 to 250 gallons of a 2.5 percent potassium permanganate solution was injected into each boring, with a total injection volume of 1,800 gallons of solution. Groundwater monitoring indicated that HVOC concentrations were reduced in some areas 17 days after injection; however, concentrations rebounded after approximately four months.

***Subsurface Investigation Report*, Farallon Consulting (Farallon), January 27, 2003.**

Farallon conducted a subsurface investigation at the Site in September and October 2002 that included drilling and installation of groundwater monitoring wells MW-8 and MW-9, and one groundwater monitoring event. PCE was detected at concentrations exceeding MTCA Method A cleanup levels in a soil sample collected from boring MW-9, in groundwater samples collected from boring SB-1, and in the borings for groundwater monitoring wells MW-8 and MW-9. PCE degradation compounds TCE and DCE were detected at concentrations exceeding their respective MTCA groundwater cleanup levels in groundwater samples collected from borings for monitoring wells MW-8 and MW-9. PCE was detected at concentrations exceeding the MTCA Method A groundwater cleanup level in samples collected from groundwater monitoring wells MW-1 through MW-9, with the exception of well MW-3, located north of the former dry cleaning equipment area. PCE degradation compounds were also detected at concentrations exceeding MTCA groundwater cleanup levels in samples collected from groundwater monitoring wells MW-1, MW-4, MW-5, and MW-6. The subsurface investigation activities are documented in Farallon's report (Farallon, 2003).

***Engineering Design Report*, Farallon, July 9, 2004.**

Farallon performed additional subsurface investigations at the Site in September and October 2003 to address data gaps and provide information for the design of a remediation system. The additional subsurface investigations included advancing soil borings SB-2 through SB-6; advancing boring MW-10 to a total depth of 47.5 feet bgs and completing the boring as a 25-foot-deep groundwater monitoring well; advancing borings VE-l and VE-2 to total depths of 21.5 feet bgs and completing the borings as vapor extraction wells; conducting a soil vapor extraction (SVE) pilot test; and collecting soil and groundwater samples for laboratory analyses. PCE was detected at elevated concentrations in saturated soil samples collected below the groundwater table from borings VE-l (17 feet bgs) and VE-2 (15 feet bgs), and the boring for monitoring well MW-10 (8 and 32 feet bgs). PCE also was detected at concentrations exceeding the MTCA Method A groundwater cleanup level in the groundwater samples collected from borings SB-3, MW-10, VE-l, and VE-2.

***Cleanup Action Progress Report June 2006 through June 2007*, Farallon, March 12, 2008.**

Based on results from the subsurface investigations, the ERM remedial action, and a soil vapor extraction (SVE) pilot test, Farallon implemented an additional remedial action approach incorporating several elements, including a SVE system to remove soil vapors containing concentrations of PCE in the subsurface, injection of a chemical oxidant into groundwater in three monitoring wells at the Site to reduce residual HVOC concentrations in groundwater, and long-term monitoring of the natural attenuation of HVOCs in groundwater.

In September 2004, Farallon installed a SVE system at the Site consisting of a remediation compound on the west end of the Bothell Service Center building housing above-ground piping, a blower, electrical controls, and a vent stack. Trenching and installation of underground piping connecting the vacuum blower to vertical SVE wells VE-l and VE-2 and horizontal SVE well HVE-1 extended approximately 20 feet east into the westernmost tenant space, south of the former dry cleaning machine. The SVE system did not extend into any of the other tenant spaces, and no records of any vapor intrusion investigations were found in any prior reports for the BSCA property.

Farallon conducted tracer dye injection tests at the Site in 2005 to evaluate migration pathways to facilitate planning for in-situ treatment alternatives (Farallon, 2008a). The first dye injection test was conducted in February 2005 and included introducing dye through the toilet in the former dry cleaner suite into the sanitary sewer system (sewer dye test). The results of the sewer dye test indicated that there may be leaks in the sewer line directly beneath the building that are impacting groundwater, indicated by tracer detected at monitoring well MW-2. A second dye injection test was conducted in March 2005 and included injection of dye into monitoring well MW-2 (hydrogeologic tracer test). The results of the hydrogeologic tracer test indicated that the dye traveled a distance of approximately 45 to 65 feet from monitoring well MW-2 to MW-1 and MW-6 in 5 days (i.e., 9 to 13 feet per day).

In May 2005, Farallon conducted additional cleanup activities at the Site using in-situ chemical oxidation via hydrogen peroxide injection into monitoring wells MW-2 and MW-9. Because hydrogen peroxide degrades much more rapidly than the permanganate used by ERM in 2001 and 2002, it was unlikely to affect down-gradient surface water receptors if transported through preferential pathways. The injection included a total of 300 gallons of a solution consisting of 10 percent hydrogen peroxide and 90 percent water. Approximately 200 gallons of the solution was injected into monitoring well MW-2.

Selected monitoring wells at the Site were sampled in August 2005 to evaluate post-chemical oxidation injection concentrations of PCE in groundwater. Concentrations of PCE in groundwater had increased at the monitoring wells where hydrogen peroxide was injected (MW-2 and MW-9), and at monitoring wells MW-1 and MW-6, located downgradient of the injection wells. Injection of hydrogen peroxide likely immediately consumed PCE mass in the well boring and in soil surrounding the injection well for several feet prior to breakdown of the hydrogen peroxide. In addition to consuming PCE mass, the hydrogen peroxide oxidized native organic material in this zone. The increased PCE concentrations are attributable

to release of dense non-aqueous-phase liquid (DNAPL) HVOC that previously was sorbed to the native organic material, and increased dissolution of the DNAPL to groundwater.

PCE as DNAPL was initially discovered at the bottom of monitoring well MW-9 in late August 2005. Between June 2006 and June 2007, DNAPL was periodically removed from monitoring well MW-9 using a peristaltic pump and dedicated polyethylene tubing. Approximately 450 milliliters of DNAPL was recovered during September 2005. An additional 40 milliliters of DNAPL was removed in February 2006, approximately 500 milliliters each in September 2006 and May 2007, and approximately 200 milliliters in June 2007, for a total of approximately 1,690 milliliters (approximately 0.5 gallon) of DNAPL removed from monitoring well MW-9.

Farallon conducted additional cleanup action via in-situ chemical oxidation between September 2006 and May 2007 at the Site by installing chemical oxidation cells in selected monitoring wells. The chemical oxidation cells were constructed of 1-inch diameter slotted polyvinyl chloride with two end caps glued in place. Each cell consisted of two portions: a lower portion approximately 6 inches in length and filled with chelated iron; and an upper portion approximately 12 inches in length and filled with sodium persulfate. Chelated iron acts as a catalyst to activate the chemical oxidation process by sodium persulfate. The chemical oxidation cells were suspended in monitoring wells MW-1 and MW-4 through MW-9 using polyethylene cord and fully submerged in groundwater.

Interim Action Status Report November 2007 through August 2008, **Farallon, November 4, 2008.**

In 2007, Farallon evaluated the progress of the chemical oxidation cells and reconsidered the range of remedial technologies assessed in November 2002. The feasibility assessment concluded that Site conditions appeared to be amenable to enhanced in-situ bioremediation and that a bioremediation approach had potential to be more effective in a shorter restoration time frame than chemical oxidation. Farallon implemented a pilot-scale in-situ enhanced bioremediation approach that entailed the following:

- Installation of six new injection wells in November 2007 for introducing a bioremediation edible oil substrate (EOS), an emulsified vegetable oil product produced by EOS Remediation, LLC into the subsurface at monitoring wells MW-14, MW-15, and MW-18, screened in the Intermediate portion of the water-bearing zone, and monitoring wells MW-13, MW-16, and MW-17, screened in the Deep portion.
- Injection of approximately 1,700 gallons of a 20-percent mixture of substrate and water to enhance biodegradation of PCE in the water-bearing zone at the six injection wells and eight temporary borings in February 2008. Results of the injections are discussed in Farallon's 2011 *Project Status Summary*.
- Bioaugmentation to supplement the existing population of *Dehalococcoides* (DHC) bacteria that are responsible for the reductive dechlorination of PCE and its degradation byproducts in groundwater in July 2008.

- Continued operation of the SVE system at the Site to address residual concentrations of PCE in soil above the water table and to mitigate the potential for vapor intrusion into the existing Site building.

***Limited Phase II Environmental Site Assessment, Highway 522 Right-of-Way*, HWA Geosciences (HWA), April 15, 2008, and *Phase II Environmental Site Assessment, Hertz Rentals Property*, HWA, October 10, 2008**

In 2008, HWA performed soil and groundwater investigations south of the BSCA property and installed monitoring wells in the SR522 right-of-way and former Hertz property. The investigations indicated that HVOC contamination had migrated south of the Site onto those properties (HWA, 2008a, 2008b). HWA performed quarterly groundwater monitoring for one year from wells located in the vacated portion of SR522 and former Hertz property south of the Site, and also in the former Al's Auto / Wexler / Schucks property immediately east of the BSCA property, as part of the RI activities described under the Bothell Landing and Bothell Hertz Agreed Orders. Groundwater samples collected by HWA at these properties have consistently had HVOC concentrations exceeding MTCA groundwater cleanup levels, indicating that the release at the BSCA property has migrated downgradient and off property.

***Phase II Environmental Site Assessment, Schuck's Auto Supply,* Floyd & Snider, September 10, 2010.**

Floyd & Snider conducted a Phase II investigation in August 2010, associated with three former gasoline USTs located on the former Schucks property, immediately adjacent to the east of the BSCA property (Floyd & Snider, 2010). The investigation also sought to analyze for potential HVOC impacts to the former Schucks property, from the BSCA property. Borings were predominantly advanced in the area of the former USTs, approximately 34 feet to the east of the BSCA property. Soil and groundwater samples were collected from the boring locations. One boring location (GP-12, 32.5 feet to the east of the BSCA property) reported soils at 6 feet bgs with gasoline concentrations (5,900 ppm) in exceedance of the MTCA Method A cleanup level (100 ppm). None of the other boring locations reported petroleum concentrations in soil above state cleanup levels. None of the groundwater samples collected reported concentrations of petroleum products in exceedance of state cleanup levels. However, groundwater samples collected from GP-12 reported concentrations of gasoline (940 ppb) just below the state cleanup level (1,000 ppb). The investigation also reported HVOC impacts to both soil and water at concentrations in exceedance of MTCA Method A cleanup levels. It should be noted that soil samples with reported HVOC exceedances were collected at 8 and 9 feet bgs, below the observed depth of groundwater (approximately 4 to 7 feet bgs).

***Project Status Summary,* Farallon, November 18, 2011.**

Farallon released a summary of remedial activities conducted at the BSCA property since the November 2008 report (Farallon, 2011). These activities included a second injection event in 2010 and continued groundwater monitoring. Farallon stated that groundwater monitoring at the site indicated that PCE

degradation rates had increased in the vicinity of the injection wells. These effects had been most prominent at MW-2 and MW-6. Farallon did note that the effects of the PCE degradation were not evident in the down gradient wells MW-4, MW-5, MW-7 or near the cross-gradient MW-1. The report recommended a larger scale in-situ bioremediation system at the Site.

Farallon also stated that while the removal rate of PCE via the SVE system had initially been high following the installation of the system in 2004, the system had reached near non-detectable concentrations of PCE by 2011. The report stated that while PCE emissions were low, the system helped to mitigate the potential for vapor intrusion into the existing structure at the BSCA property.

Prior to 2011, the system was extracting approximately 0.5 liters of PCE per year. After 2011, little or no HVOCs were reportedly being detected in the off-gas. The SVE system has therefore removed some PCE mass from the vadose zone within its area of operation. The system is currently not in operation since the building was demolished in August 2016.

Focused Soil and Groundwater Investigation, Horse Creek Project, **Shannon & Wilson, Inc., May 7, 2013.**

In October of 2012, Shannon & Wilson advanced several borings along the proposed alignment of the relocated Horse Creek channel. Three borings (GP-7 through GP-9) were located to the west of 98th Avenue NE, west of the BSCA property, which has since been excavated and contains the relocated Horse Creek channel. Soil and groundwater samples were collected from each location and analyzed for HVOCs. HVOCs were reportedly not detected at concentrations above the laboratory reporting limit in any of the groundwater or soil samples analyzed.

Request for "Contained In" Determination for Soils, Storm and Sanitary Sewer System Construction, 98th Avenue Northeast, **HWA, June 11, 2014.**

In May of 2014, HWA advanced three borings (98-B1 through 98-B3) along 98th Avenue NE, just west of the BSCA property. The borings were sited to assess potential HVOC impacts from the BSCA property and request a "Contained In" determination from Ecology for soils excavated during the installation of new utility lines along 98th Avenue NE. Soil samples were collected at 8 feet bgs and analyzed for HVOCs. The northernmost boring, (98-B1) reported concentrations of PCE below the MTCA Method A cleanup level and the central and southern borings (98-B2 and 98-B3, respectively) both reported concentrations of PCE in exceedance of the MTCA Method A cleanup level.

Results of October Groundwater Sampling, **Dalton, Olmsted, and Fugelvand, Inc. (DOF), November 10, 2014.**

In the spring of 2014, DOF performed groundwater monitoring and data analyses for the Site (DOF, 2014). DOF stated that historic groundwater monitoring data, coupled with the October 2014 monitoring results, provided strong evidence that the EOS injection product was successfully facilitating the degradation of PCE at the Bothell Service Center Site.

In summary and prior to 2016, the results of prior subsurface investigations conducted indicated the following:

- A release of an unknown quantity of PCE occurred at the Site between 1989 and 1999 during operation of Simon & Son Fine Drycleaning, and a residual source of PCE remains beneath the northwest corner of the former structure on the BSCA property,
- The PCE release(s) affected the soil above and below the water table as well as groundwater at the Site,
- PCE as DNAPL has been encountered on the Site at depths of approximately 45 to 50 feet bgs.
- Groundwater is affected to a depth of at least 50 feet where a silty stratum occurs in the source area, and at a depth of 30 to 40 feet down-gradient and across much of the Site, and
- The groundwater plume migrated across the Site via east and east-southeasterly flowing groundwater across city rights-of-way, and as far as the City-owned Al's Auto Bothell Wexler property and the former Hertz property parcel.

Attachment B
Estimated Substrate Mass and System Flow Calculations

Attachment B
Estimated Substrate Mass and System Flow Calculations

ESTIMATED TREATMENT AREA

150	ft
200	ft
50	ft
1500000	ft3
55555.6	CY
0.15	
47222.2	CY
225000	ft^3
6373.9	m^3
6373937.677	L
1683999.4	gal

TYPE OF SYSTEM

Ext. Rate 6 **gpm**

8640 gal/day **259200 gal/month**
60480 gal/week
194.9 days to recirculate one PV
6.5 months to recirc one PV

PCE	TCE	DCE	
2000	1000	2000	
2000.00	1000.00	2000.00	
364	126	59	
0.02			
14560	2520	2360	ug/kg
14.56	2.52	2.36	mg/kg
1.8			
3031.2			
1376146789			
1376.146789			
		Total	
566.2744578	123.66742	157.05015	**846.99203 lbs**

MW (g/mol)		Est. GW Concentration		Molar Ratio (mol dextrose/mol EA)
32	Avg. DO	4	mg/L	0.16
62	Avg. Nitrate	5	mg/L	0.21
55.9	Avg. iron	10	mg/L	0.04
54.9	Avg. Mn	10	mg/L	0.08
96	Avg. Sulfate	50	mg/L	0.33
180.2	Dextrose			

GROUNDWATER TEA DEMAND

MASS OF DEXTROSE REQ'D	**Moles**	**g dextose**	**lbs dextrose**
Oxygen	796.7422096	22971.67139	50.59839513
Nitrate	514.027232	19297.439	42.50537225
Iron	1140.239298	8561.296731	18.85748179
Manganese	1161.008684	17434.48041	38.40193923
Sulfate	3319.759207	199406.8697	439.2221799
		Sum	**589.5853683 lbs**

GROUNDWATER VOC DEMAND

10.17257642	PCE
4.813393753	TCE
8.702854339	DCE
23.68882451	**lbs**

TOTAL DEXTROSE DEMAND **1460.27 lbs.**
The McCarty Factor (30% used) **4867.55 lbs.**
ETEC Factor of 5-10 FOLD **24338** **48676 lbs**
1734 mg/L dextrose in 1 PV

Attachment C
MSDS Substrate

3830 S Truman Rd. Bldg. 12
Washougal, WA 98671
(971) 222-3903 Fax
www.etecllc.com

Safety Data Sheet

Revision Date: 05/12/15

Section 1: Product and Company Identification

Product Name: **CarBstrate ™**
MSDS Number: Not Assigned
Chemical Name: Proprietary
Chemical Family: Substrate Mixture

Recommended Use: Anaerobic bioremediation product
Restrictions on Use: No Data

Company: ETEC, LLC
3830 S Truman Rd. Bldg. 12
Washougal, WA 98671
USA

Telephone: (971) 222-3616

Emergency Telephone: (800) 535-5053
Medical Emergencies: (800) 301-7976
U.S. Coast Guard National Response Center: (800) 424-8802

Section 2: GHS Hazards Identification

This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Skin Irritant	Category 2
Eye Irritant	Category 2
Specific Target Organ Toxicity - Single Exposure (Respiratory system)	Category 3

Label Elements:

Signal Word: Warning

Hazard Statements:

Causes skin irritation.
Causes eye irritation.
May cause respiratory irritation.

Precautionary Statements:

Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
Wash skin thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/ eye protection/ face protection.
IF ON SKIN: Wash with plenty of soap and water.
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
Call a POISON CENTER or doctor/ physician if you feel unwell.
Specific treatment (see supplemental first aid instructions on this label).
If skin irritation occurs: Get medical advice/ attention.
If eye irritation persists: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Dispose of contents/ container to an approved waste disposal plant.

Hazards not otherwise classified (HNOC) or not covered by GHS - none

Section 3: Composition/Information on Ingredients

Ingredients as defined by 29 CFR 1910.1200:

Chemical Ingredients:	CAS Number:	Percent Range:
Trade Secret	-	~20%

The specific chemical identity and/or exact percentage of the composition has been withheld as Trade Secret in accordance with paragraph (i) of §1910.1200.

Section 4: First Aid Measures

Description of first aid measures:

Inhalation: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, give artificial respiration. Call a poison center or doctor/physician if you feel unwell.

Skin Contact: Wash with plenty of soap and water. Take off contaminated clothing and wash before reuse. If skin irritation occurs: Get medical advice/attention.

Eye Contact: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

Ingestion: Never give anything by mouth to an unconscious person. Rinse mouth with water.

Most important symptoms and effects, both acute and delayed: See sections 2 and/or 11.

Indication of any immediate medical attention and special treatment needed: No data available.

Section 5: Fire Fighting Measures

Suitable Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Unsuitable Extinguishing Media: No known information.

Specific Hazards Arising from the chemical/substance: May decompose upon heating to produce corrosive and/or toxic fumes.

Hazardous Combustion Products: Nitrogen oxides, phosphorous oxides, ammonia.

Protective Equipment and Precautions for Fire-Fighters: As in any fire, wear self-contained breathing apparatus and full protective gear.

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Ensure adequate ventilation. Use personal protective equipment. Avoid dust formation. Do not breathe dust/fume/gas/mist/vapors/spray.

Environmental Precautions: Do not release to the environment. See section 12 for further environmental data.

Methods for Containment/Cleaning Up: Avoid dust formation. Pick up and transfer to properly labeled containers. Ventilate area and wash spill site after material pickup is complete.

Section 7: Handling and Storage

Precautions for Safe Handling: Avoid breathing dust. Use only outdoors or in a well-ventilated area. Wash thoroughly after handling. Keep out of reach of children. Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities:

Storage: Store locked up. Keep in tightly closed container, store in a cool, dry, ventilated place.

Section 8: Exposure Controls/Personal Protection

Exposure Limits: There are no OSHA PEL's, NIOSH REL's, or ACGIH TLV's applicable to this material.

Engineering Controls: Ensure adequate ventilation, especially in confined areas. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal Protective Equipment:

Eye Protection: Wear appropriate eye protection/face protection.

Hand Protection: Wear appropriate protective gloves.

Skin and Body Protection: Wear appropriate protective clothing to prevent skin exposure. Take off contaminated clothing and wash before reuse.

Respiratory Protection: Use only in a well-ventilated area. Avoid breathing dust. Wear appropriate NIOSH approved respirator if exposure limits are exceeded or irritation occurs.

Hygiene Measures: Wash thoroughly after handling. Handle in accordance with good industrial hygiene and safety practice.

Section 9: Physical and Chemical Properties

Appearance/Physical State:	Crystals
Color:	White to Yellow
Odor:	Not Available
Odor Threshold:	Not Available
pH:	Not Applicable
Melting/Freezing Point:	Not Available
Initial Boiling Point:	Not Available
Flash Point:	Not Available
Evaporation Rate:	Not Applicable
Flammability (solid, gas):	Not Available
Lower Explosive Limit:	Not Available
Upper Explosive Limit:	Not Available
Vapor Pressure:	Not Available
Vapor Density:	Not Applicable
Relative Density:	1.00
Solubility:	Completely soluble in water
Partition Coefficient:	Not Available
Autoignition Temperature:	Not Available
Decomposition Temperature:	Not Available

Section 10: Stability and Reactivity

Reactivity: No information available.

Stability: Stable under ordinary conditions of use and storage.

Possibility of hazardous reactions: No information available.

Conditions to Avoid: Extremes in temperature and direct sunlight.

Incompatible Materials: Strong oxidizing agents, strong acids, strong bases, Magnesium.

Hazardous Decomposition Products: Other decomposition products - No data available. In case of fire: see section 5.

Hazardous Polymerization: Will not occur.

Section 11: Toxicological Information

Information on Likely Routes of Exposure:

Inhalation: May cause respiratory irritation if inhaled.
Ingestion: No information available.
Skin Contact: Causes skin irritation.
Eye Contact: Causes eye irritation.

Toxicity Data:

Chemical Name	LD50 ORAL	LD50 DERMAL	LC50 INHALATION
Trade Secret	6500 mg/kg (Rat)	7950 mg/kg (Rabbit)	No data

Symptoms: No information available.

Delayed and Immediate Effects, Chronic Effects from Short and Long Term Exposure:

Sensitization: No information available.
Mutagenic Effects: No information available.
Reproductive Toxicity: No information available.
STOT – Single Exposure: Respiratory system.
STOT – Repeated Exposure: No information available.
Aspiration Hazard: No information available.
Chronic Exposure: No information available.
Aggravation of Pre-existing Conditions: Asthma

Carcinogenicity:

Component	CAS	NTP	IARC	OSHA
Trade Secret	N/A	Not listed	Not listed	Not listed

Additional Information: To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Section 12: Ecological Information

Ecotoxicity:

This product is safe for the environment at the concentrations predicted under normal use conditions.

Persistance and Degradability: No information available.

Bioaccumulative Potential: No information available.

Mobility in Soil: No information available.

Other Adverse Effects: No information available.

Section 13: Disposal Considerations

Dispose of contents/container in accordance with all applicable local, state and federal regulations.

Section 14: Transport Information

For Transportation Emergencies Involving This Material, Call:
ChemTrec 1-800-424-9300 Company Code: E419

DOT (LAND): Not regulated.

Section 15: Regulatory Information

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 311/312 Hazard Categories:

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

SARA 313: The Trade Secret component is subject to reporting levels (>1.0%) established by SARA Title III, Section 313:

State Right-to-Know:

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Trade Secret	-	X	X	-	-

TSCA: Not Applicable

California Prop. 65 Components: This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

Section 16: Other Information

NFPA Rating:

Health Hazard:	2
Fire:	0
Reactivity Hazard:	1

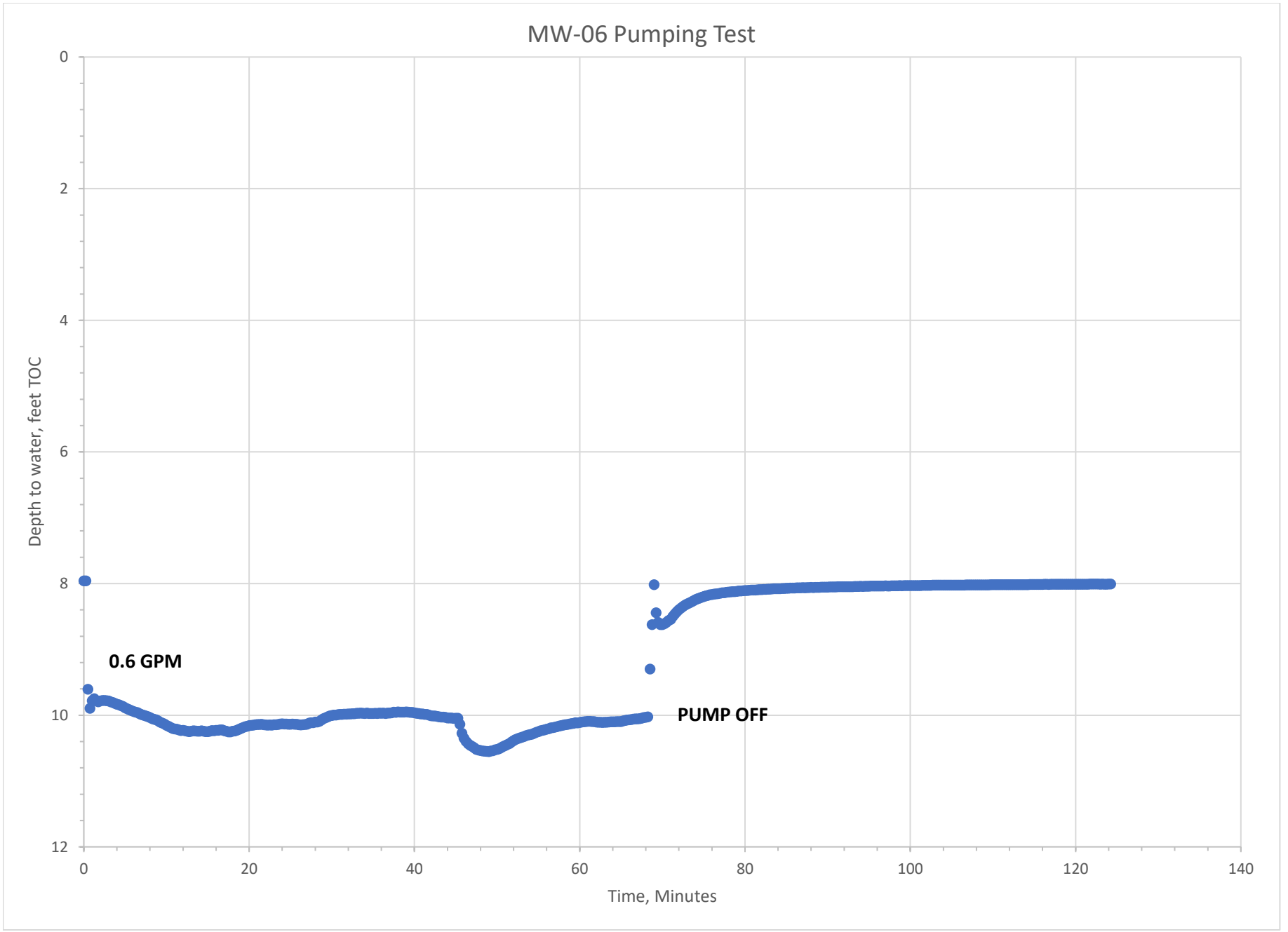
Legend:

ACGIH: American Conference of Governmental & Industrial Hygienists
CAS: Chemical Abstract Service
CFR: Code of Federal Regulations
DOT: Department of Transportation
DSL/NDSL: Domestic Substances List/Non-Domestic Substances List
IARC: International Agency for the Research of Cancer
IATA: International Air Traffic Association
ICAO: International Civil Aviation Organization
IMDG: International Maritime Dangerous Goods

IMO: International Maritime Organizations
NFPA: National Fire Protection Association Health, Flammability & Reactivity; Hazard Scale 0 =minimal/none 4= significant
NTP: National Toxicology Program
OSHA: Occupational Safety & Health Administration
PEL: Permissible Exposure Limits
RCRA: Resource Conservation & Recovery Act
RQ: Reportable Quantity
RTK: Right-To-Know
SARA: Superfund Amendments & Reauthorization Act
STEL: Short Term Exposure Limit
TLV: Threshold Limit Value
TSCA: Toxic Substances Control Act
TWA: Time Weighted Average
TCLP: Toxicity Characteristic Leaching Procedure
VOC: Volatile Organic Compounds

Disclaimer: The information contained in this SDS is presented in good faith and believed to be accurate based on the information provided. The SDS does not purport to be all inclusive, and shall be used only as a guide. While ETEC, LLC believes that the data contained herein comply with 29 CFR 1910.1200, they are not to be taken as a warranty or representation for which ETEC, LLC assumes legal responsibility. ETEC, LLC shall not be held liable or accountable for any loss or damage associated with the use of this material and information. The recommended industrial hygiene and safe use, handling, storage, and disposal procedures are believed to be generally applicable. However, since the use, handling, storage, and disposal are beyond ETEC, LLC control, it is the responsibility of the user both to determine safe conditions for use of this product and to assume liability of loss, damage, or expense arising out of the material's improper use.

Attachment D
Pump Test Results


MW-06 Pumping Test
Depth to water, feet TOC
0
2
4
6
8
10
12
0
20
40
60
80
100
120
140
Time, Minutes
0.6 GPM
PUMP OFF

WELL ID: MW-06-Recovery

Local ID: MW-06
Date: 2/1/2017
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	7.96	Feet
Top of Aquifer	10	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	
FLOW RATE	0.6	GPM

COMPUTED

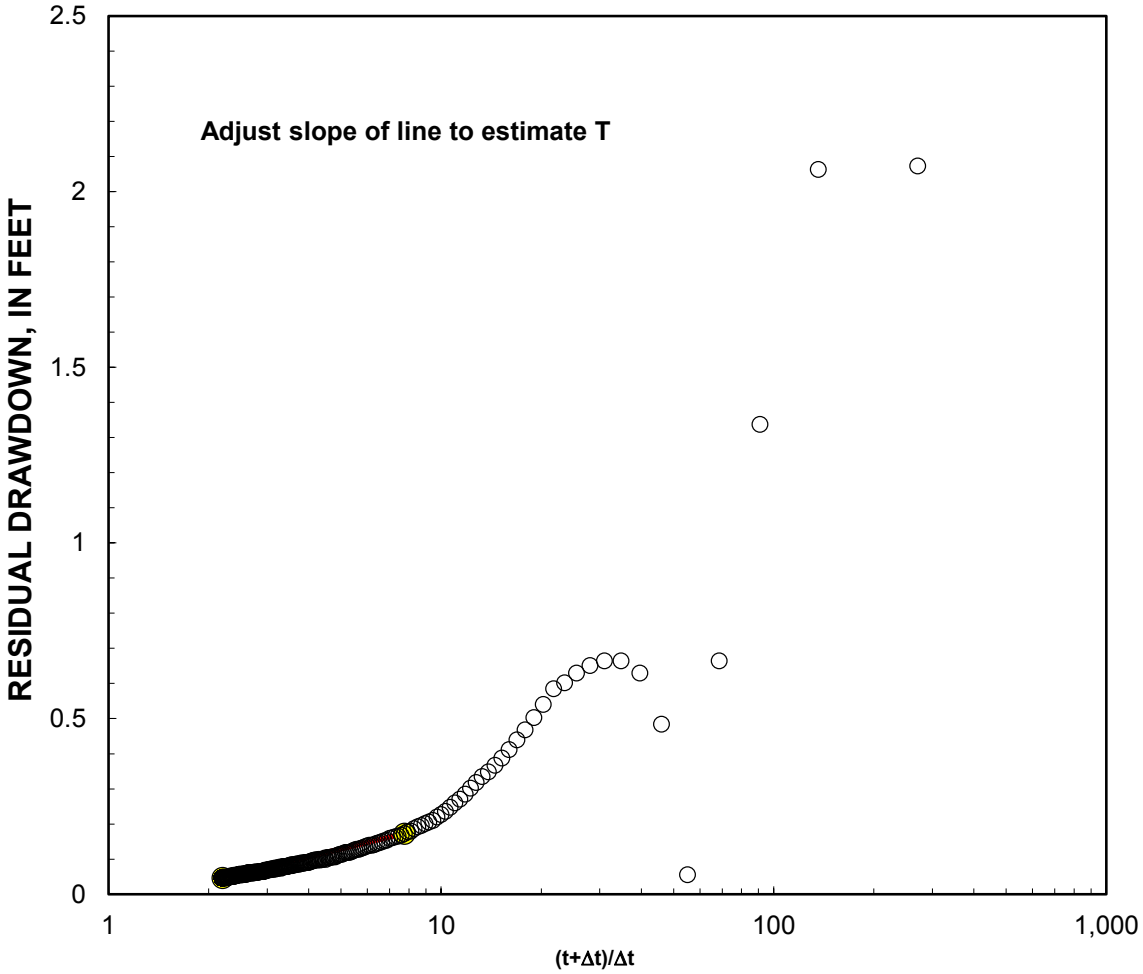
Aquifer thickness = 45 Feet

Slope = 0.230398 Feet/log10

Input is consistent.

K =	2	Feet/Day
T =	92	Feet²/Day

K= 2 is less than likely minimum of 3 for Fine Sand



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	7.96	51	1/0/00 1:32:15	8.05
2	1/0/00 1:07:45	10.03	52	1/0/00 1:32:45	8.05
3	1/0/00 1:08:15	9.30	53	1/0/00 1:33:15	8.04
4	1/0/00 1:08:45	8.02	54	1/0/00 1:33:45	8.04
5	1/0/00 1:09:15	8.59	55	1/0/00 1:34:15	8.04
6	1/0/00 1:09:45	8.63	56	1/0/00 1:34:45	8.04
7	1/0/00 1:10:15	8.59	57	1/0/00 1:35:15	8.04
8	1/0/00 1:10:45	8.55	58	1/0/00 1:35:45	8.04
9	1/0/00 1:11:15	8.46	59	1/0/00 1:36:15	8.04
10	1/0/00 1:11:45	8.40	60	1/0/00 1:36:45	8.04
11	1/0/00 1:12:15	8.35	61	1/0/00 1:37:15	8.04
12	1/0/00 1:12:45	8.31	62	1/0/00 1:37:45	8.04
13	1/0/00 1:13:15	8.28	63	1/0/00 1:38:15	8.04
14	1/0/00 1:13:45	8.25	64	1/0/00 1:38:45	8.04
15	1/0/00 1:14:15	8.22	65	1/0/00 1:39:15	8.03
16	1/0/00 1:14:45	8.20	66	1/0/00 1:39:45	8.03
17	1/0/00 1:15:15	8.18	67	1/0/00 1:40:15	8.03
18	1/0/00 1:15:45	8.17	68	1/0/00 1:40:45	8.03
19	1/0/00 1:16:15	8.16	69	1/0/00 1:41:15	8.03
20	1/0/00 1:16:45	8.15	70	1/0/00 1:41:45	8.03
21	1/0/00 1:17:15	8.14	71	1/0/00 1:42:15	8.03
22	1/0/00 1:17:45	8.13	72	1/0/00 1:42:45	8.03
23	1/0/00 1:18:15	8.12	73	1/0/00 1:43:15	8.03
24	1/0/00 1:18:45	8.12	74	1/0/00 1:43:45	8.03
25	1/0/00 1:19:15	8.11	75	1/0/00 1:44:15	8.03
26	1/0/00 1:19:45	8.11	76	1/0/00 1:44:45	8.02
27	1/0/00 1:20:15	8.10	77	1/0/00 1:45:15	8.02
28	1/0/00 1:20:45	8.10	78	1/0/00 1:45:45	8.02
29	1/0/00 1:21:15	8.10	79	1/0/00 1:46:15	8.02
30	1/0/00 1:21:45	8.09	80	1/0/00 1:46:45	8.02
31	1/0/00 1:22:15	8.09	81	1/0/00 1:47:15	8.02
32	1/0/00 1:22:45	8.08	82	1/0/00 1:47:45	8.02
33	1/0/00 1:23:15	8.08	83	1/0/00 1:48:15	8.02
34	1/0/00 1:23:45	8.08	84	1/0/00 1:48:45	8.02
35	1/0/00 1:24:15	8.07	85	1/0/00 1:49:15	8.02
36	1/0/00 1:24:45	8.07	86	1/0/00 1:49:45	8.02
37	1/0/00 1:25:15	8.07	87	1/0/00 1:50:15	8.02
38	1/0/00 1:25:45	8.07	88	1/0/00 1:50:45	8.02
39	1/0/00 1:26:15	8.07	89	1/0/00 1:51:15	8.02
40	1/0/00 1:26:45	8.06	90	1/0/00 1:51:45	8.02
41	1/0/00 1:27:15	8.06	91	1/0/00 1:52:15	8.02
42	1/0/00 1:27:45	8.06	92	1/0/00 1:52:45	8.02
43	1/0/00 1:28:15	8.06	93	1/0/00 1:53:15	8.02
44	1/0/00 1:28:45	8.06	94	1/0/00 1:53:45	8.02
45	1/0/00 1:29:15	8.06	95	1/0/00 1:54:15	8.01
46	1/0/00 1:29:45	8.05	96	1/0/00 1:54:45	8.01
47	1/0/00 1:30:15	8.05	97	1/0/00 1:55:15	8.01
48	1/0/00 1:30:45	8.05	98	1/0/00 1:55:45	8.01
49	1/0/00 1:31:15	8.05	99	1/0/00 1:56:15	8.01
50	1/0/00 1:31:45	8.05	100	1/0/00 1:56:45	8.01

Inch	0.083333	Second	1.16E-05			GPM	192.5134
Feet	1	Minute	0.000694			ft3/d	1
Meter	3.28084	Hour	0.041667			ft3/s	86400
cm	0.032808	Day	1			m3/d	35.39525
mm	0.003281					m3/s	3058149
PSI	2.31					liters/s	3058.149
						liters/min	50.96915
Out Units =						cc/s	3.058149
Convert =	1	Feet2/Day					
Convert =	1	Feet/Day					

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	10	Feet	
Depths to:			
water level (DTW)	7.96	Feet	
Top of Aquifer	10	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Fine Sand		
wetted hole	10	Feet	
Aquifer thickness =	45	Feet	
Aquifer thickness =	45	feet	
Aquifer thickness =	45	Feet	1
Aquifer thickness =	45	Feet	**45**

Fraction penetrated = 0.222222

slope points	7.75	0.173
	2.2	0.047

FLOW RATE	0.60	GPM	
FLOW RATE	115.508	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	
Slope =	0.230398	Feet	$/log_{10}$
Slope =	0.230398	$feet/log_{10}$	
T =	92	ft2/d	
	91.75946	Feet2/Day	1
	92	Feet2/Day	**92**
K =	2.039099	ft/d	
	2.039099	Feet/Day	0.1
K =	2	Feet/Day	**20**

Absolute Shut Down

Input is consistent.

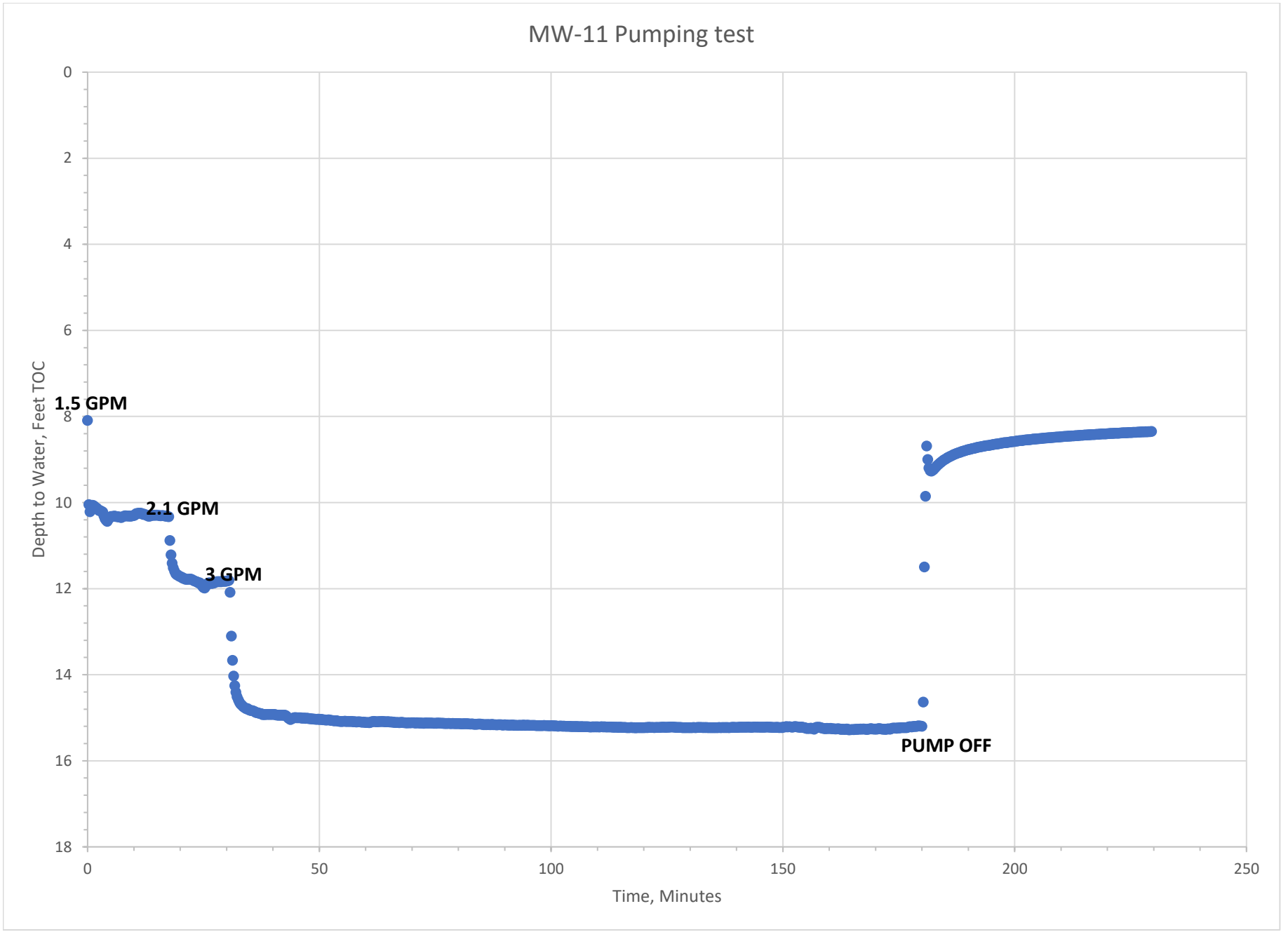
Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is less than 1 Feet	1		
0	Slope will produce a negative K			
0	K = 2 is less than extreme minimum of 0.05 for Fine Sand	0.05	-2	0.05
0	K = 2 is greater than extreme maximum of 20 for Fine San	20	1	20
1	Input is consistent.			

Error

WARNING

K= 2 is less than likely minimum of 3 for Fine Sand

Decision	Option			
0				
1	K = 2 is less than likely minimum of 3 for Fine Sand	3	0	3
1	K = 2 is greater than likely maximum of 20 for Fine Sand	20	1	20
2				


MW-11 Pumping test
Depth to Water, Feet TOC
Time, Minutes
0
2
4
6
8
10
12
14
16
18
0
50
100
150
200
250
1.5 GPM
2.1 GPM
3 GPM
PUMP OFF

WELL ID: MW-11-Recovery

Local ID: MW-11
Date: 1/30/2017
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	8.09	Feet
Top of Aquifer	10	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	
FLOW RATE	3	GPM

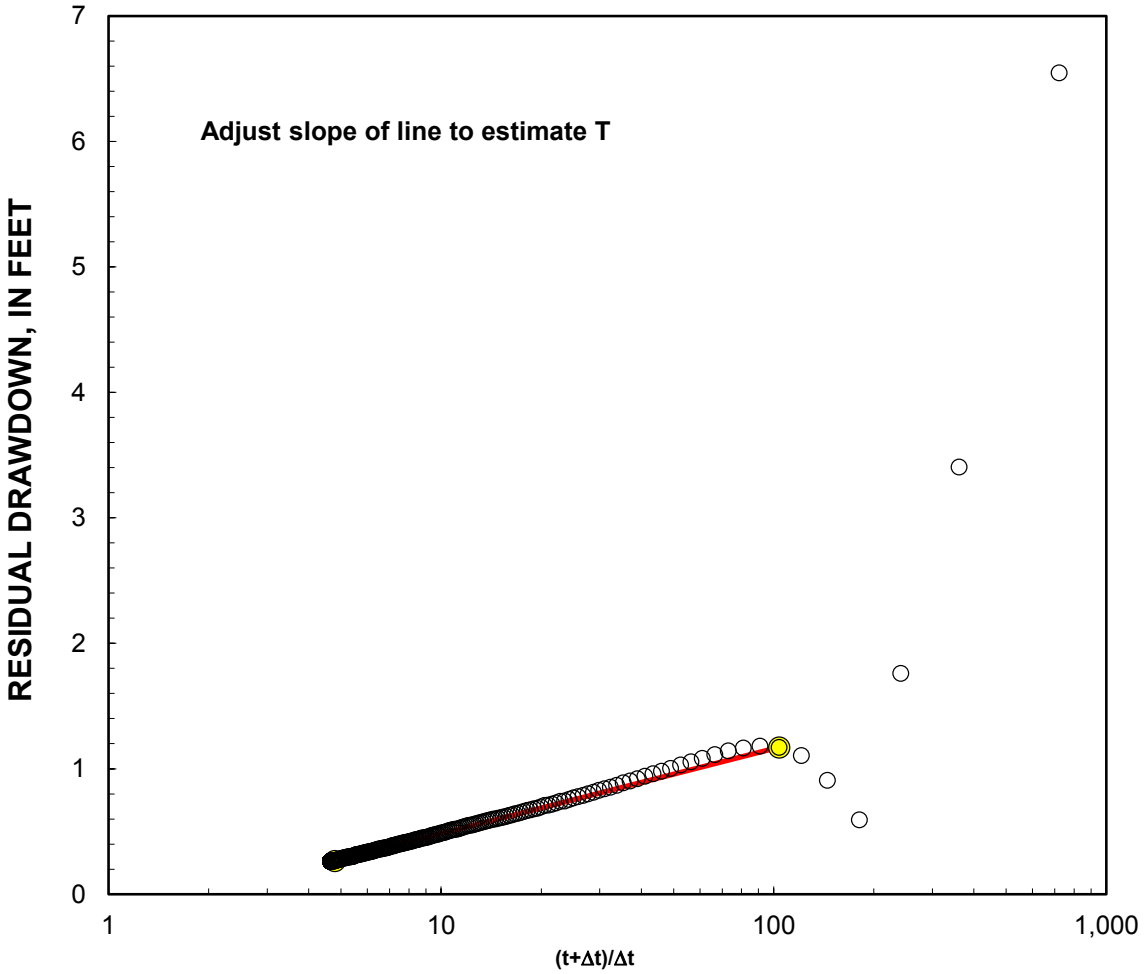
COMPUTED

Aquifer thickness = 45 Feet

Slope = 0.67732 Feet/log10

Input is consistent.

K =	3.5	Feet/Day
T =	160	Feet²/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	8.09	51	1/0/00 3:12:15	8.71
2	1/0/00 3:00:00	15.20	52	1/0/00 3:12:30	8.71
3	1/0/00 3:00:15	14.64	53	1/0/00 3:12:45	8.70
4	1/0/00 3:00:30	11.50	54	1/0/00 3:13:00	8.70
5	1/0/00 3:00:45	9.85	55	1/0/00 3:13:15	8.69
6	1/0/00 3:01:00	8.69	56	1/0/00 3:13:30	8.69
7	1/0/00 3:01:15	9.00	57	1/0/00 3:13:45	8.68
8	1/0/00 3:01:30	9.20	58	1/0/00 3:14:00	8.68
9	1/0/00 3:01:45	9.26	59	1/0/00 3:14:15	8.67
10	1/0/00 3:02:00	9.27	60	1/0/00 3:14:30	8.67
11	1/0/00 3:02:15	9.26	61	1/0/00 3:14:45	8.66
12	1/0/00 3:02:30	9.23	62	1/0/00 3:15:00	8.66
13	1/0/00 3:02:45	9.20	63	1/0/00 3:15:15	8.66
14	1/0/00 3:03:00	9.18	64	1/0/00 3:15:30	8.65
15	1/0/00 3:03:15	9.15	65	1/0/00 3:15:45	8.65
16	1/0/00 3:03:30	9.12	66	1/0/00 3:16:00	8.64
17	1/0/00 3:03:45	9.10	67	1/0/00 3:16:15	8.64
18	1/0/00 3:04:00	9.07	68	1/0/00 3:16:30	8.63
19	1/0/00 3:04:15	9.05	69	1/0/00 3:16:45	8.63
20	1/0/00 3:04:30	9.03	70	1/0/00 3:17:00	8.62
21	1/0/00 3:04:45	9.01	71	1/0/00 3:17:15	8.62
22	1/0/00 3:05:00	9.00	72	1/0/00 3:17:30	8.62
23	1/0/00 3:05:15	8.98	73	1/0/00 3:17:45	8.61
24	1/0/00 3:05:30	8.96	74	1/0/00 3:18:00	8.61
25	1/0/00 3:05:45	8.95	75	1/0/00 3:18:15	8.61
26	1/0/00 3:06:00	8.93	76	1/0/00 3:18:30	8.60
27	1/0/00 3:06:15	8.92	77	1/0/00 3:18:45	8.60
28	1/0/00 3:06:30	8.90	78	1/0/00 3:19:00	8.59
29	1/0/00 3:06:45	8.89	79	1/0/00 3:19:15	8.59
30	1/0/00 3:07:00	8.88	80	1/0/00 3:19:30	8.59
31	1/0/00 3:07:15	8.87	81	1/0/00 3:19:45	8.58
32	1/0/00 3:07:30	8.86	82	1/0/00 3:20:00	8.58
33	1/0/00 3:07:45	8.85	83	1/0/00 3:20:15	8.57
34	1/0/00 3:08:00	8.84	84	1/0/00 3:20:30	8.57
35	1/0/00 3:08:15	8.83	85	1/0/00 3:20:45	8.57
36	1/0/00 3:08:30	8.82	86	1/0/00 3:21:00	8.56
37	1/0/00 3:08:45	8.81	87	1/0/00 3:21:15	8.56
38	1/0/00 3:09:00	8.80	88	1/0/00 3:21:30	8.56
39	1/0/00 3:09:15	8.80	89	1/0/00 3:21:45	8.55
40	1/0/00 3:09:30	8.79	90	1/0/00 3:22:00	8.55
41	1/0/00 3:09:45	8.78	91	1/0/00 3:22:15	8.55
42	1/0/00 3:10:00	8.77	92	1/0/00 3:22:30	8.55
43	1/0/00 3:10:15	8.76	93	1/0/00 3:22:45	8.54
44	1/0/00 3:10:30	8.76	94	1/0/00 3:23:00	8.54
45	1/0/00 3:10:45	8.75	95	1/0/00 3:23:15	8.54
46	1/0/00 3:11:00	8.74	96	1/0/00 3:23:30	8.53
47	1/0/00 3:11:15	8.74	97	1/0/00 3:23:45	8.53
48	1/0/00 3:11:30	8.73	98	1/0/00 3:24:00	8.53
49	1/0/00 3:11:45	8.73	99	1/0/00 3:24:15	8.53
50	1/0/00 3:12:00	8.72	100	1/0/00 3:24:30	8.52

Inch	0.083333	Second	1.16E-05			GPM	192.5134
Feet	1	Minute	0.000694			ft3/d	1
Meter	3.28084	Hour	0.041667			ft3/s	86400
cm	0.032808	Day	1			m3/d	35.39525
mm	0.003281					m3/s	3058149
PSI	2.31					liters/s	3058.149
						liters/min	50.96915
Out Units =						cc/s	3.058149
Convert =	1	Feet2/Day					
Convert =	1	Feet/Day					

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	10	Feet	
Depths to:			
water level (DTW)	8.09	Feet	
Top of Aquifer	10	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Fine Sand		
wetted hole	10	Feet	
Aquifer thickness =	45	Feet	
Aquifer thickness =	45	feet	
Aquifer thickness =	45	Feet	1
Aquifer thickness =	45	Feet	**45**

Fraction penetrated = 0.222222

slope points	4.789474	0.267
	103.8571	1.172

FLOW RATE	3.00	GPM	
FLOW RATE	577.5401	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	

Slope =	0.67732	Feet	$/\log_{10}$
Slope =	0.67732	$feet/\log_{10}$	
T =	156	ft2/d	
	156.0653	Feet2/Day	10
	160	Feet2/Day	**16**
K =	3.468117	ft/d	
	3.468117	Feet/Day	0.1
K =	3.5	Feet/Day	**35**

Absolute Shut Down

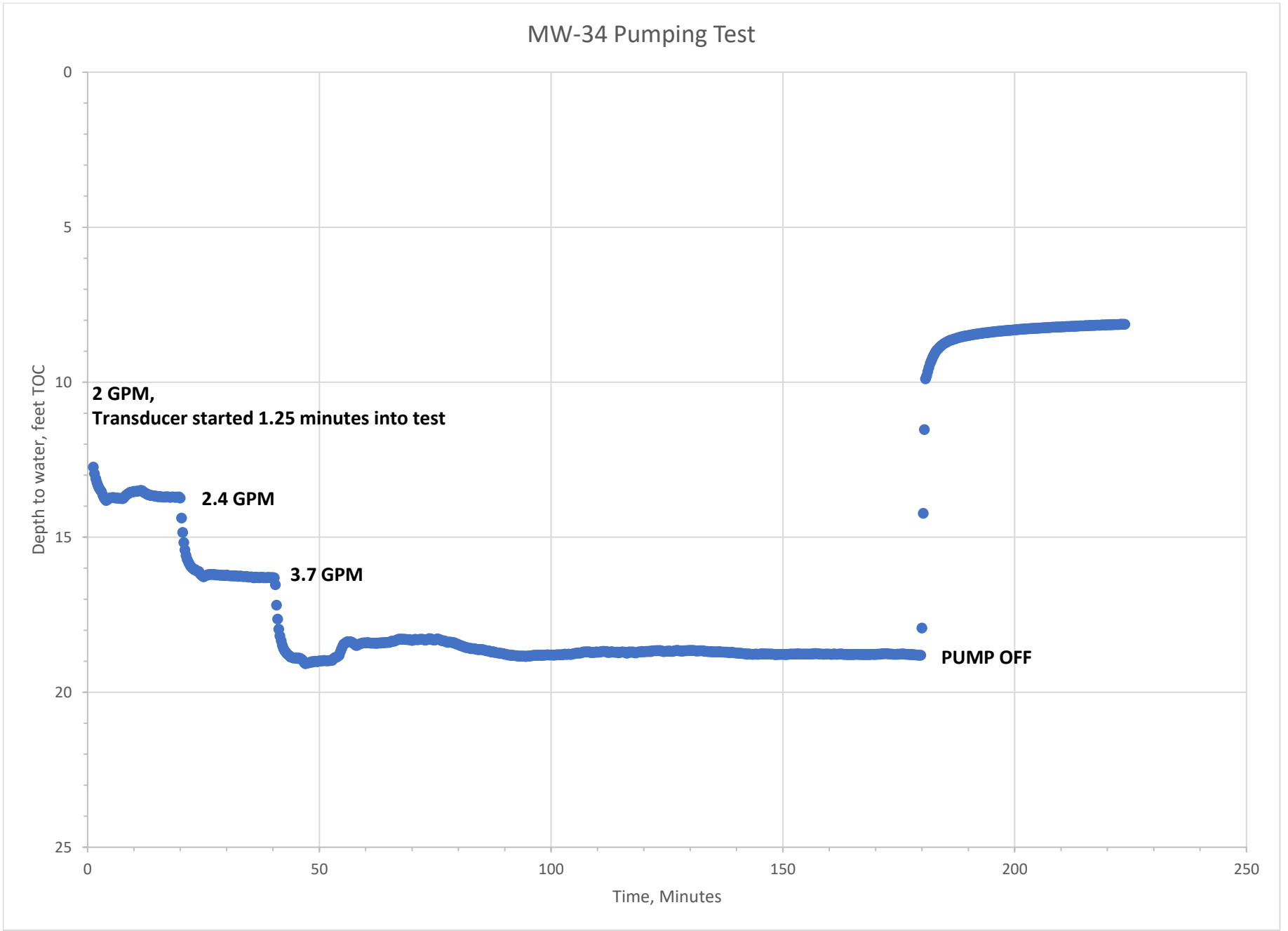
Input is consistent.

Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is less than 1 Feet	1		
0	Slope will produce a negative K			
0	K = 3.5 is less than extreme minimum of 0.05 for Fine Sand	0.05	-2	0.05
0	K = 3.5 is greater than extreme maximum of 20 for Fine Sa	20	1	20
1	Input is consistent.			

Error

WARNING

Decision	Option			
0				
0	K = 3.5 is less than likely minimum of 3 for Fine Sand	3	0	3
0	K = 3.5 is greater than likely maximum of 20 for Fine Sand	20	1	20
1				


MW-34 Pumping Test
Depth to water, feet TOC
0
5
10
15
20
25
0
50
100
150
200
250
Time, Minutes
2 GPM,
Transducer started 1.25 minutes into test
2.4 GPM
3.7 GPM
PUMP OFF

WELL ID: MW-34-Recovery

Local ID: MW-34
Date: 2/2/2017
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	8.05	Feet
Top of Aquifer	10	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	
FLOW RATE	3.7	GPM

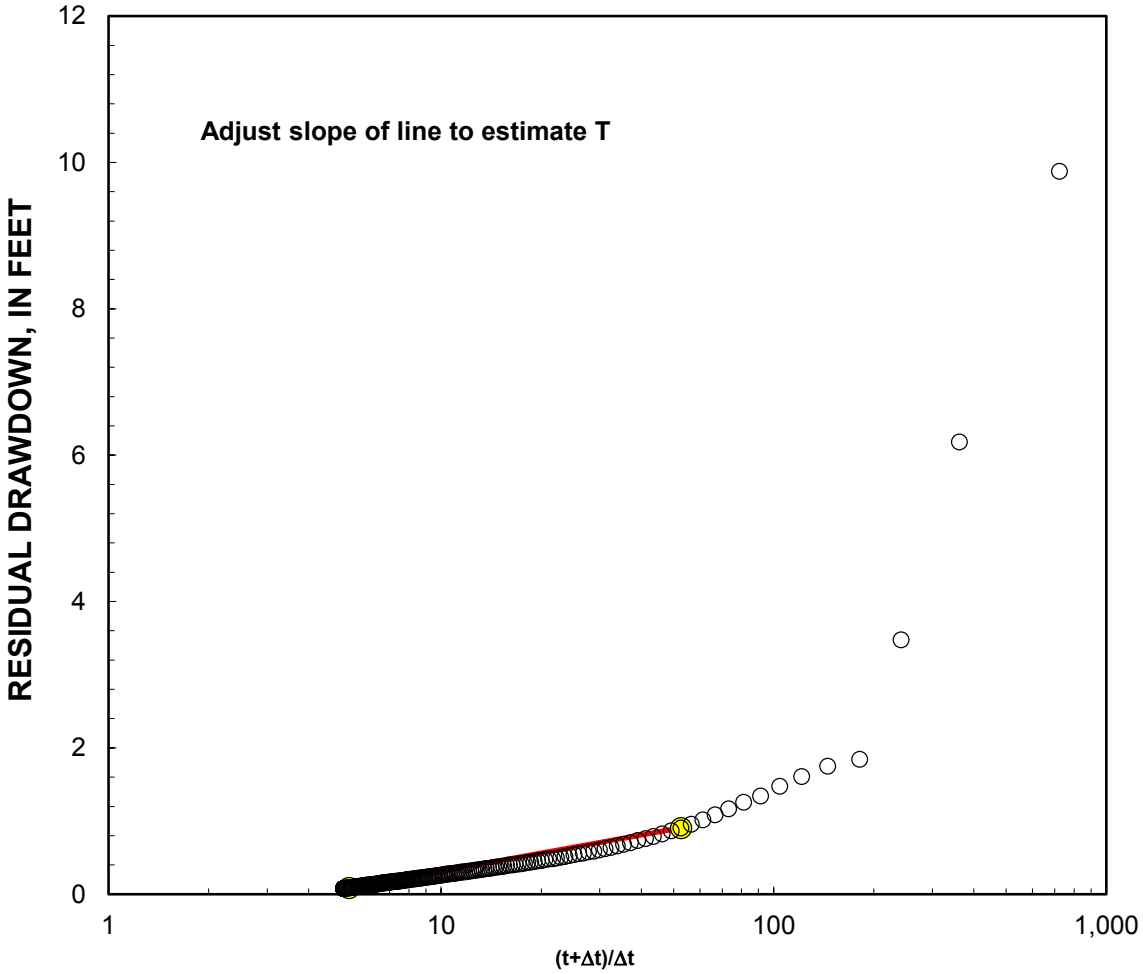
COMPUTED

Aquifer thickness = 45 Feet

Slope = 0.821019 Feet/log10

Input is consistent.

K =	3.5	Feet/Day
T =	160	Feet²/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	8.05	51	1/0/00 3:12:45	8.44
2	1/0/00 3:00:30	18.81	52	1/0/00 3:13:00	8.44
3	1/0/00 3:00:45	17.93	53	1/0/00 3:13:15	8.43
4	1/0/00 3:01:00	14.23	54	1/0/00 3:13:30	8.43
5	1/0/00 3:01:15	11.53	55	1/0/00 3:13:45	8.42
6	1/0/00 3:01:30	9.90	56	1/0/00 3:14:00	8.42
7	1/0/00 3:01:45	9.80	57	1/0/00 3:14:15	8.41
8	1/0/00 3:02:00	9.66	58	1/0/00 3:14:30	8.40
9	1/0/00 3:02:15	9.53	59	1/0/00 3:14:45	8.40
10	1/0/00 3:02:30	9.39	60	1/0/00 3:15:00	8.40
11	1/0/00 3:02:45	9.31	61	1/0/00 3:15:15	8.39
12	1/0/00 3:03:00	9.22	62	1/0/00 3:15:30	8.39
13	1/0/00 3:03:15	9.14	63	1/0/00 3:15:45	8.38
14	1/0/00 3:03:30	9.07	64	1/0/00 3:16:00	8.38
15	1/0/00 3:03:45	9.01	65	1/0/00 3:16:15	8.37
16	1/0/00 3:04:00	8.96	66	1/0/00 3:16:30	8.37
17	1/0/00 3:04:15	8.92	67	1/0/00 3:16:45	8.37
18	1/0/00 3:04:30	8.88	68	1/0/00 3:17:00	8.36
19	1/0/00 3:04:45	8.84	69	1/0/00 3:17:15	8.36
20	1/0/00 3:05:00	8.81	70	1/0/00 3:17:30	8.36
21	1/0/00 3:05:15	8.78	71	1/0/00 3:17:45	8.35
22	1/0/00 3:05:30	8.76	72	1/0/00 3:18:00	8.35
23	1/0/00 3:05:45	8.74	73	1/0/00 3:18:15	8.34
24	1/0/00 3:06:00	8.71	74	1/0/00 3:18:30	8.34
25	1/0/00 3:06:15	8.69	75	1/0/00 3:18:45	8.34
26	1/0/00 3:06:30	8.67	76	1/0/00 3:19:00	8.33
27	1/0/00 3:06:45	8.66	77	1/0/00 3:19:15	8.33
28	1/0/00 3:07:00	8.64	78	1/0/00 3:19:30	8.33
29	1/0/00 3:07:15	8.63	79	1/0/00 3:19:45	8.33
30	1/0/00 3:07:30	8.62	80	1/0/00 3:20:00	8.32
31	1/0/00 3:07:45	8.60	81	1/0/00 3:20:15	8.32
32	1/0/00 3:08:00	8.59	82	1/0/00 3:20:30	8.32
33	1/0/00 3:08:15	8.58	83	1/0/00 3:20:45	8.31
34	1/0/00 3:08:30	8.57	84	1/0/00 3:21:00	8.31
35	1/0/00 3:08:45	8.56	85	1/0/00 3:21:15	8.30
36	1/0/00 3:09:00	8.55	86	1/0/00 3:21:30	8.30
37	1/0/00 3:09:15	8.54	87	1/0/00 3:21:45	8.30
38	1/0/00 3:09:30	8.53	88	1/0/00 3:22:00	8.29
39	1/0/00 3:09:45	8.52	89	1/0/00 3:22:15	8.29
40	1/0/00 3:10:00	8.51	90	1/0/00 3:22:30	8.29
41	1/0/00 3:10:15	8.51	91	1/0/00 3:22:45	8.29
42	1/0/00 3:10:30	8.50	92	1/0/00 3:23:00	8.29
43	1/0/00 3:10:45	8.49	93	1/0/00 3:23:15	8.28
44	1/0/00 3:11:00	8.48	94	1/0/00 3:23:30	8.28
45	1/0/00 3:11:15	8.48	95	1/0/00 3:23:45	8.28
46	1/0/00 3:11:30	8.47	96	1/0/00 3:24:00	8.27
47	1/0/00 3:11:45	8.46	97	1/0/00 3:24:15	8.27
48	1/0/00 3:12:00	8.46	98	1/0/00 3:24:30	8.27
49	1/0/00 3:12:15	8.45	99	1/0/00 3:24:45	8.27
50	1/0/00 3:12:30	8.45	100	1/0/00 3:25:00	8.26

Inch	0.083333	Second	1.15741E-05		GPM	192.5134
Feet	1	Minute	0.000694444		ft3/d	1
Meter	3.28084	Hour	0.041666667		ft3/s	86400
cm	0.032808	Day	1		m3/d	35.39525
mm	0.003281				m3/s	3058149
PSI	2.31				liters/s	3058.149
					liters/min	50.96915
Out Units =					cc/s	3.058149
Convert =	1	Feet2/Day				
Convert =	1	Feet/Day				

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	10	Feet	
Depths to:			
water level (DTW)	8.05	Feet	
Top of Aquifer	10	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Fine Sand		
wetted hole	10	Feet	
Aquifer thickness =	45	Feet	
Aquifer thickness =	45	feet	
Aquifer thickness =	45	Feet	1
Aquifer thickness =	45	Feet	45

Fraction penetrated = 0.222222

slope points	52.57143	0.907
	5.272189	0.087

FLOW RATE	3.70	GPM	
FLOW RATE	712.2995	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	
Slope =	0.821019	Feet	$/log_{10}$
Slope =	0.821019	$feet/log_{10}$	
T =	159	ft2/d	
	158.7915	Feet2/Day	10
	160	Feet2/Day	16
K =	3.528701	ft/d	
	3.528701	Feet/Day	0.1
K =	3.5	Feet/Day	35

Absolute Shut Down

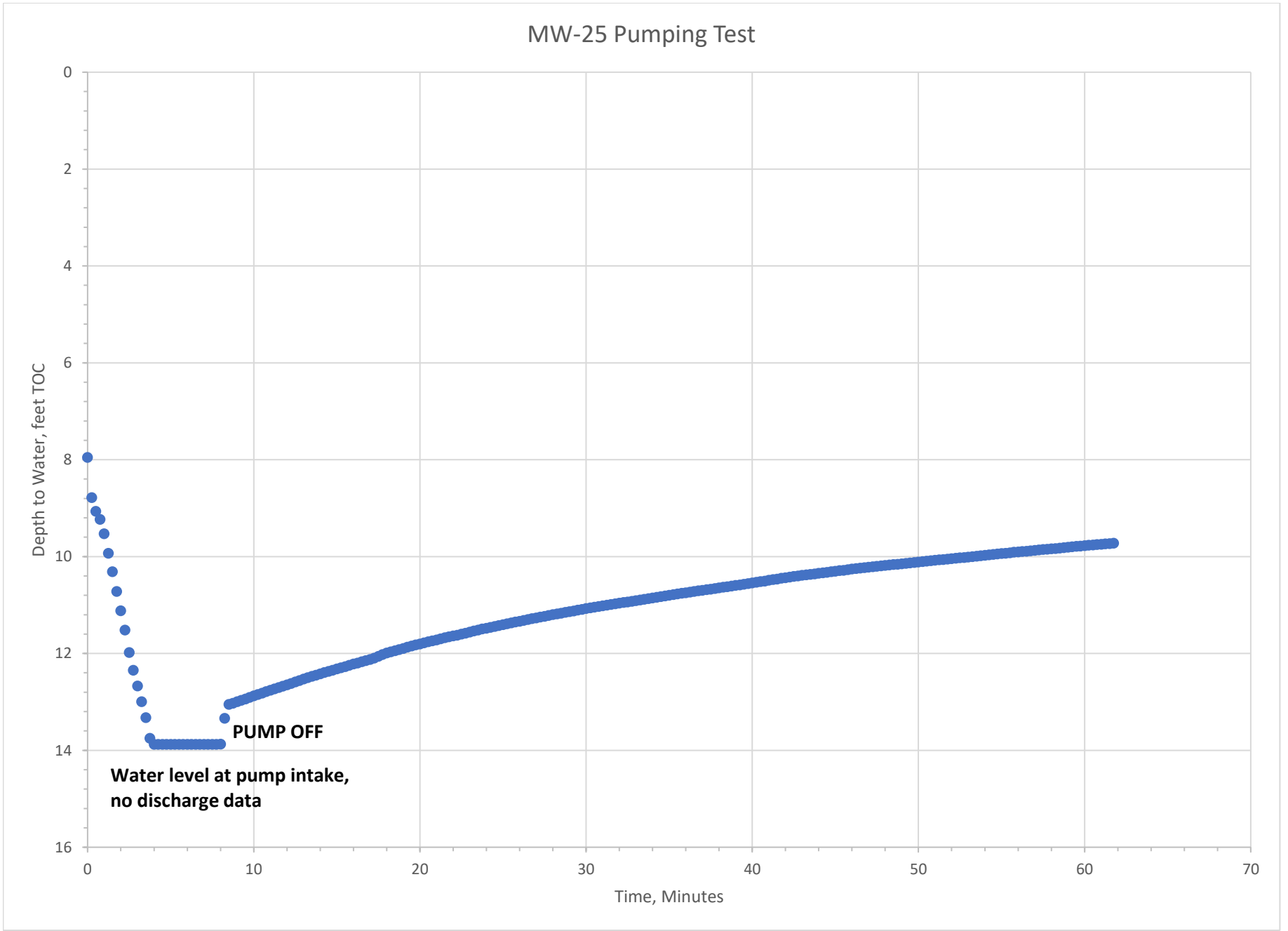
Input is consistent.

Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is less than 1 Feet	1		
0	Slope will produce a negative K			
0	K= 3.5 is less than extreme minimum of 0.05 for Fine Sand	0.05	-2	0.05
0	K= 3.5 is greater than extreme maximum of 20 for Fine Sand	20	1	20
1	Input is consistent.			

Error

WARNING

Decision	Option			
0				
0	K= 3.5 is less than likely minimum of 3 for Fine Sand	3	0	3
0	K= 3.5 is greater than likely maximum of 20 for Fine Sand	20	1	20
1				


MW-25 Pumping Test
Depth to Water, feet TOC
0
2
4
6
8
10
12
14
16
0
10
20
30
40
50
60
70
Time, Minutes
PUMP OFF
Water level at pump intake,
no discharge data

GroundwaterSoftware.com
520 Chicopee Row
Groton, MA, 01450
Tel: (978) 502-6001
Fax: (978) 477-0250
E-mail Us Here

Streamlines
The Monthly Newsletter of GroundwaterSoftware.com

Vol. 8 No. 2

BOUWER AND RICE SLUG-TEST METHOD & SINGLE WELL SOLUTIONS

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Bouwer and Rice Slug-Test Method

Bouwer and Rice (1976) developed a method of determining the hydraulic conductivity of an unconfined aquifer. This method can be used for both fully and partially penetrating wells. While originally developed for unconfined aquifers, it has been found that it can also be used in confined aquifers, provided the top of the well screen is some distance below the bottom of the upper confining layer.

The equations used to determine the hydraulic conductivity with the Bouwer and Rice method are as follows:

$$K = \frac{r_c^2 \ln(Re/r_w)}{2L_e} \frac{1}{t} \ln\left(\frac{h_0}{h}\right)$$

where :

K is hydraulic conductivity (L/T)

r_c is the radius of the well casing (L)

r_w is the radius of the well (including gravel envelope) (L)

R_e is the radial distance over which head is dissipated (L)

L_e is the length of the screen (L)

t is the time since h=h_0 (T)

h_0 is the drawdown at time t=0 (L)

h is the drawdown at time t=t (L)

Bouwer has presented a method of estimating $\ln(R_e/r_w)$:

For partially penetrating wells:

$$\ln(R_e/r_w) = \left[\frac{1.1}{\ln(L_w/r_w)} + \frac{A + B\ln[(b - L_w)/r_w]}{L_e/r_w}\right]^{-1}$$

For fully penetrating wells:

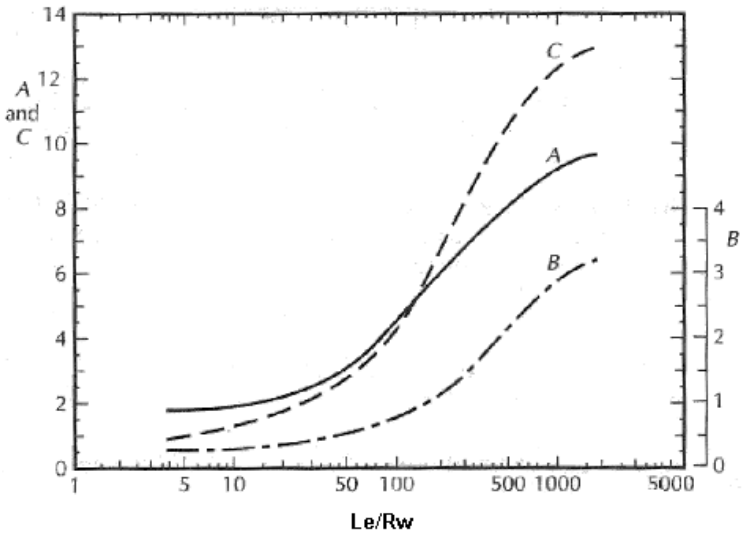
$$\ln(R_e/r_w) = \left[\frac{1.1}{\ln(L_w/r_w)} + \frac{C}{L_e/r_w}\right]^{-1}$$

where:

L_w is the length of the well in the aquifer

b is the thickness of the saturated material

A,B,C are dimensionless numbers represented in the following diagram:

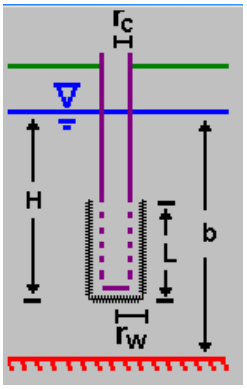


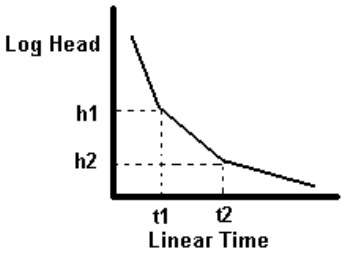
There are many programs available for analyzing slug tests results, including Single Well Solutions

Bouwer and Rice Slug Test

Calculating conductivity using the Bouwer and Rice slug test method

Graphical Display of Inputs





h_1 (head at time $t=t_1$): 11.846

h_2 (head at time $t=t_2$): 10.976

t_1 (time at head h_1): .007986

t_2 (time at head h_2): .016493

How to get this data

Well Type: partially penetrating well

b (Aquifer saturated thickness): 47

H (distance from water table to bottom of pack): 9.55

L (length of the screened interval): 10

r_c (radius of casing): .0833

r_w (radius of well): .333

KEEP UNITS CONSISTENT

Calculate

Results

Conductivity: 0.00659529

References

Batu, V. (1998). Aquifer Hydraulics; A Comprehensive Guide to Hydrogeologic Data Analysis. Published by John Wiley & Sons, Inc. New York, NY.

Fetter, C.W. (1994). Applied Hydrogeology; Third Edition. Published by Prentice-Hall, Inc. , Englewood Cliffs, NJ.

Schwartz, F.W. and Zhang, H. (2003). Fundamentals of Groundwater. Published by John Wiley & Sons, Inc. New York, NY.

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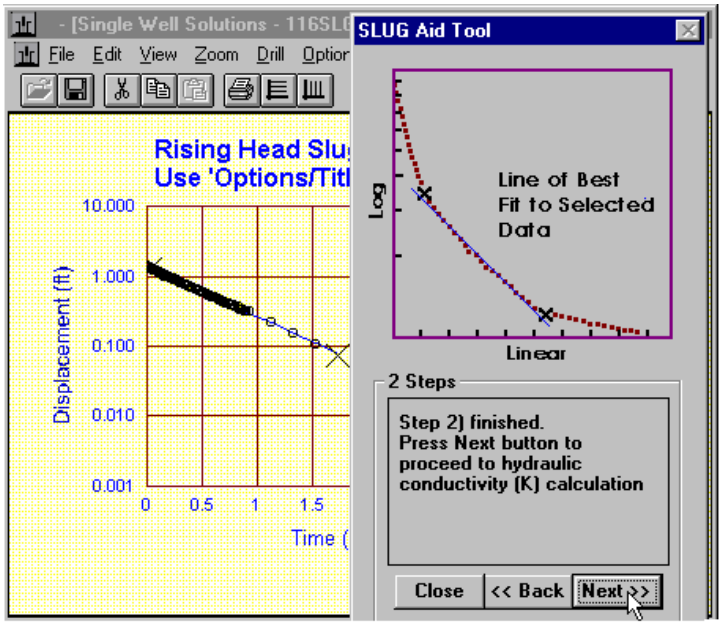
Single Well Solution

Single Well Solutions is a powerful Windows software product that contains a collection of the most popular analytical solutions from "Analysis and Evaluation of Pumping Test Date," by G.P. Kruseman and N.A. deRidder, second edition (1990), for determining aquifer hydraulic conductivity and pumping well efficiency from single well test data



Wide selection of analysis methods

Single Well Solutions is capable of analyzing single well test data with a variety of methods. These methods include:

Slug Tests:

- Bouwer and Rice (1976)
- Cooper et al. (1967)

Constant Discharge

- Hurr and Worthington (1981)
- Hantush (1964)

Variable Discharge

- Bisroy and Summers (1980) (both Intermittent and Uninterrupted Pumping)

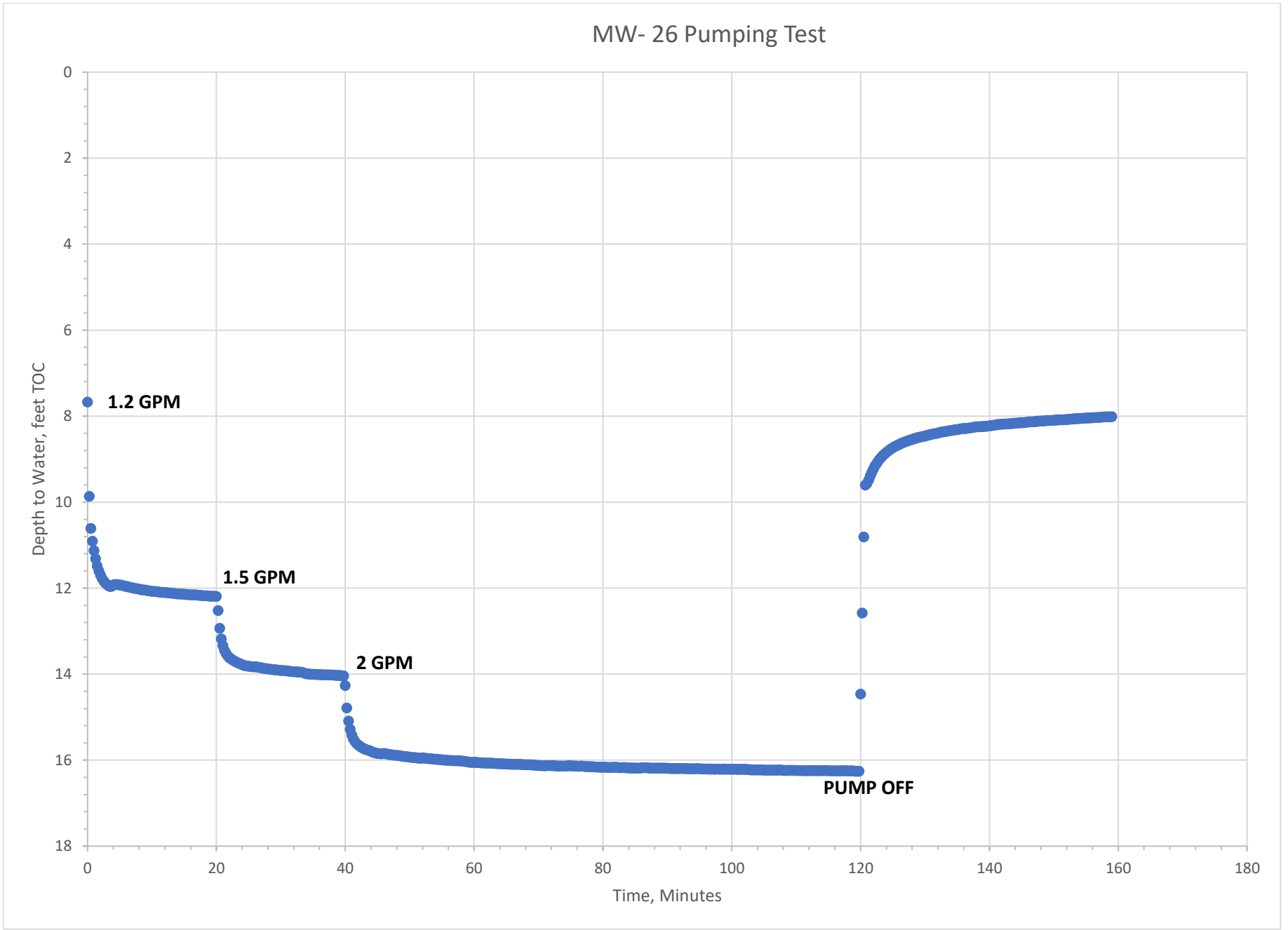
Step Drawdown

- Hantush and Bierschenk (1964)

Constant Discharge Recovery

- Theis (1935)

For more info click here: Single Well Solutions
To demo software click here: Demo


MW- 26 Pumping Test
Depth to Water, feet TOC
Time, Minutes
0
2
4
6
8
10
12
14
16
18
0
20
40
60
80
100
120
140
160
180
1.2 GPM
1.5 GPM
2 GPM
PUMP OFF

WELL ID: MW-26-Recovery

Local ID: MW-25
Date: 2/2/2017
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	7.67	Feet
Top of Aquifer	10	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	
FLOW RATE	2	GPM

COMPUTED

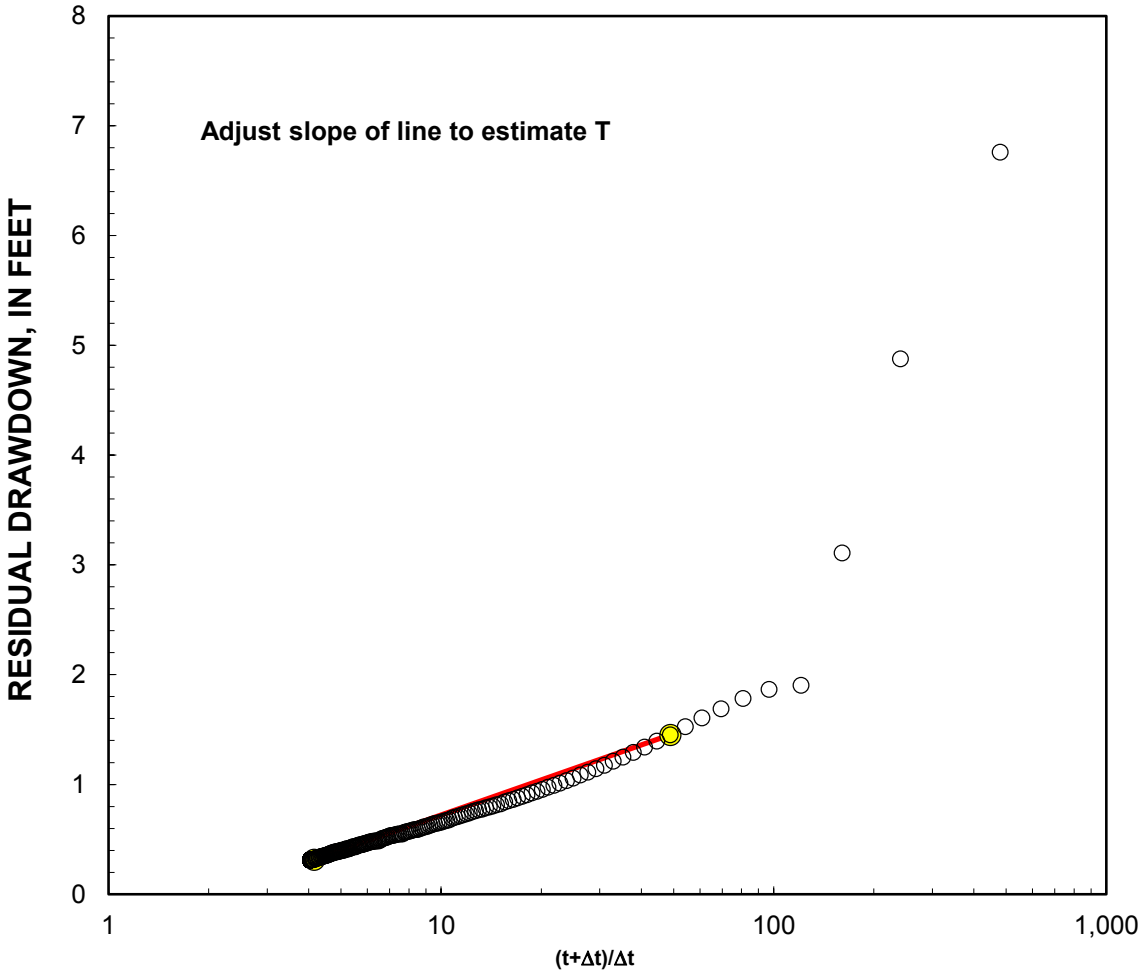
Aquifer thickness = 45 Feet

Slope = 1.060569 Feet/log10

Input is consistent.

K =	1.5	Feet/Day
T =	66	Feet²/Day

K= 1.5 is less than likely minimum of 3 for Fine Sand



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	7.70	51	1/0/00 2:12:00	8.39
2	1/0/00 1:59:45	16.26	52	1/0/00 2:12:15	8.38
3	1/0/00 2:00:00	14.46	53	1/0/00 2:12:30	8.37
4	1/0/00 2:00:15	12.58	54	1/0/00 2:12:45	8.37
5	1/0/00 2:00:30	10.81	55	1/0/00 2:13:00	8.36
6	1/0/00 2:00:45	9.60	56	1/0/00 2:13:15	8.35
7	1/0/00 2:01:00	9.57	57	1/0/00 2:13:30	8.35
8	1/0/00 2:01:15	9.48	58	1/0/00 2:13:45	8.34
9	1/0/00 2:01:30	9.39	59	1/0/00 2:14:00	8.34
10	1/0/00 2:01:45	9.31	60	1/0/00 2:14:15	8.33
11	1/0/00 2:02:00	9.23	61	1/0/00 2:14:30	8.32
12	1/0/00 2:02:15	9.15	62	1/0/00 2:14:45	8.32
13	1/0/00 2:02:30	9.10	63	1/0/00 2:15:00	8.31
14	1/0/00 2:02:45	9.04	64	1/0/00 2:15:15	8.30
15	1/0/00 2:03:00	8.99	65	1/0/00 2:15:30	8.30
16	1/0/00 2:03:15	8.95	66	1/0/00 2:15:45	8.29
17	1/0/00 2:03:30	8.91	67	1/0/00 2:16:00	8.29
18	1/0/00 2:03:45	8.88	68	1/0/00 2:16:15	8.29
19	1/0/00 2:04:00	8.84	69	1/0/00 2:16:30	8.28
20	1/0/00 2:04:15	8.81	70	1/0/00 2:16:45	8.28
21	1/0/00 2:04:30	8.79	71	1/0/00 2:17:00	8.27
22	1/0/00 2:04:45	8.76	72	1/0/00 2:17:15	8.27
23	1/0/00 2:05:00	8.74	73	1/0/00 2:17:30	8.26
24	1/0/00 2:05:15	8.71	74	1/0/00 2:17:45	8.25
25	1/0/00 2:05:30	8.69	75	1/0/00 2:18:00	8.25
26	1/0/00 2:05:45	8.68	76	1/0/00 2:18:15	8.25
27	1/0/00 2:06:00	8.66	77	1/0/00 2:18:30	8.25
28	1/0/00 2:06:15	8.64	78	1/0/00 2:18:45	8.24
29	1/0/00 2:06:30	8.62	79	1/0/00 2:19:00	8.24
30	1/0/00 2:06:45	8.61	80	1/0/00 2:19:15	8.24
31	1/0/00 2:07:00	8.59	81	1/0/00 2:19:30	8.24
32	1/0/00 2:07:15	8.58	82	1/0/00 2:19:45	8.23
33	1/0/00 2:07:30	8.57	83	1/0/00 2:20:00	8.23
34	1/0/00 2:07:45	8.55	84	1/0/00 2:20:15	8.22
35	1/0/00 2:08:00	8.54	85	1/0/00 2:20:30	8.22
36	1/0/00 2:08:15	8.53	86	1/0/00 2:20:45	8.21
37	1/0/00 2:08:30	8.52	87	1/0/00 2:21:00	8.21
38	1/0/00 2:08:45	8.50	88	1/0/00 2:21:15	8.20
39	1/0/00 2:09:00	8.50	89	1/0/00 2:21:30	8.19
40	1/0/00 2:09:15	8.49	90	1/0/00 2:21:45	8.19
41	1/0/00 2:09:30	8.48	91	1/0/00 2:22:00	8.19
42	1/0/00 2:09:45	8.47	92	1/0/00 2:22:15	8.18
43	1/0/00 2:10:00	8.46	93	1/0/00 2:22:30	8.18
44	1/0/00 2:10:15	8.45	94	1/0/00 2:22:45	8.18
45	1/0/00 2:10:30	8.44	95	1/0/00 2:23:00	8.18
46	1/0/00 2:10:45	8.43	96	1/0/00 2:23:15	8.18
47	1/0/00 2:11:00	8.43	97	1/0/00 2:23:30	8.17
48	1/0/00 2:11:15	8.42	98	1/0/00 2:23:45	8.17
49	1/0/00 2:11:30	8.41	99	1/0/00 2:24:00	8.17
50	1/0/00 2:11:45	8.40	100	1/0/00 2:24:15	8.16

Inch	0.083333	Second	1.15741E-05		GPM	192.5134
Feet	1	Minute	0.000694444		ft3/d	1
Meter	3.28084	Hour	0.041666667		ft3/s	86400
cm	0.032808	Day	1		m3/d	35.39525
mm	0.003281				m3/s	3058149
PSI	2.31				liters/s	3058.149
					liters/min	50.96915
Out Units =					cc/s	3.058149
Convert =	1	Feet2/Day				
Convert =	1	Feet/Day				

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	10	Feet	
Depths to:			
water level (DTW)	7.67	Feet	
Top of Aquifer	10	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Fine Sand		
wetted hole	10	Feet	
Aquifer thickness =	45	Feet	
Aquifer thickness =	45	feet	
Aquifer thickness =	45	Feet	1
Aquifer thickness =	45	Feet	**45**

Fraction penetrated = 0.222222

slope points	48.9	1.453	
	4.151316	0.317	

FLOW RATE	2.00	GPM	
FLOW RATE	385.0267	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	

Slope =	1.060569	Feet	$/log_{10}$	
Slope =	1.060569	$feet/log_{10}$		
T =	66	ft2/d		
	66.44616	Feet2/Day		1
	66	Feet2/Day		**66**
K =	1.476581	ft/d		
	1.476581	Feet/Day		0.1
K =	1.5	Feet/Day		**15**

Absolute Shut Down

Input is consistent.

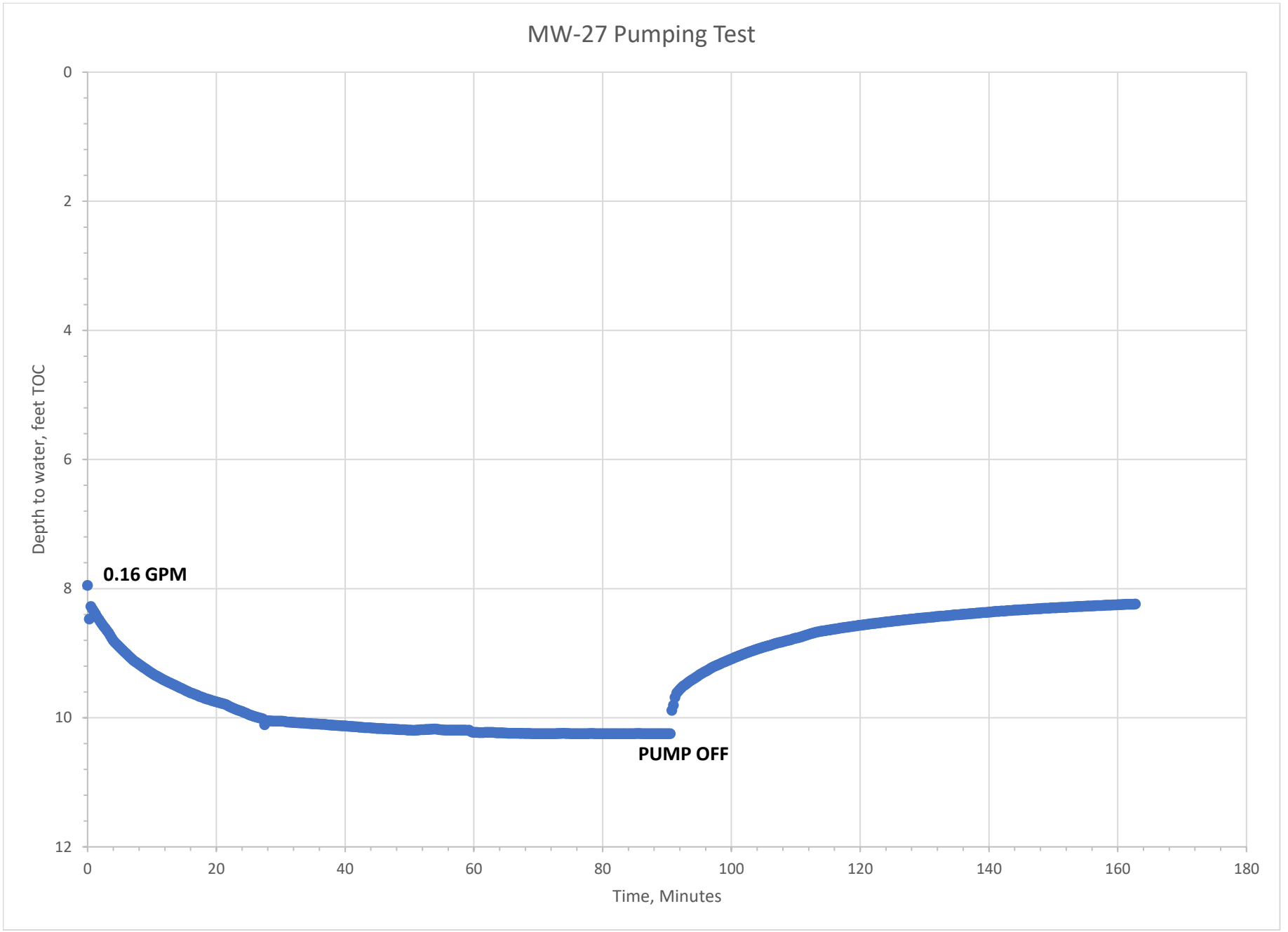
Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is lessthan 1 Feet	1		
0	Slope will produce a negative K			
0	K= 1.5 is lessthan extreme minimum of 0.05 for Fine Sand	0.05	-2	0.05
0	K= 1.5 is greater than extreme maximum of 20 for Fine Sand	20	1	20
1	Input is consistent.			

Error

WARNING

K= 1.5 is less than likely minimum of 3 for Fine Sand

Decision	Option			
0				
1	K= 1.5 is lessthan likely minimum of 3 for Fine Sand	3	0	3
1	K= 1.5 is greater than likely maximum of 20 for Fine Sand	20	1	20
2				


MW-27 Pumping Test
Depth to water, feet TOC
0
2
4
6
8
10
12
0.16 GPM
PUMP OFF
0
20
40
60
80
100
120
140
160
180
Time, Minutes

WELL ID: MW-27-Recovery

Local ID: MW-27
Date: 2/1/2017
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	7.95	Feet
Top of Aquifer	10	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	
FLOW RATE	0.16	GPM

COMPUTED

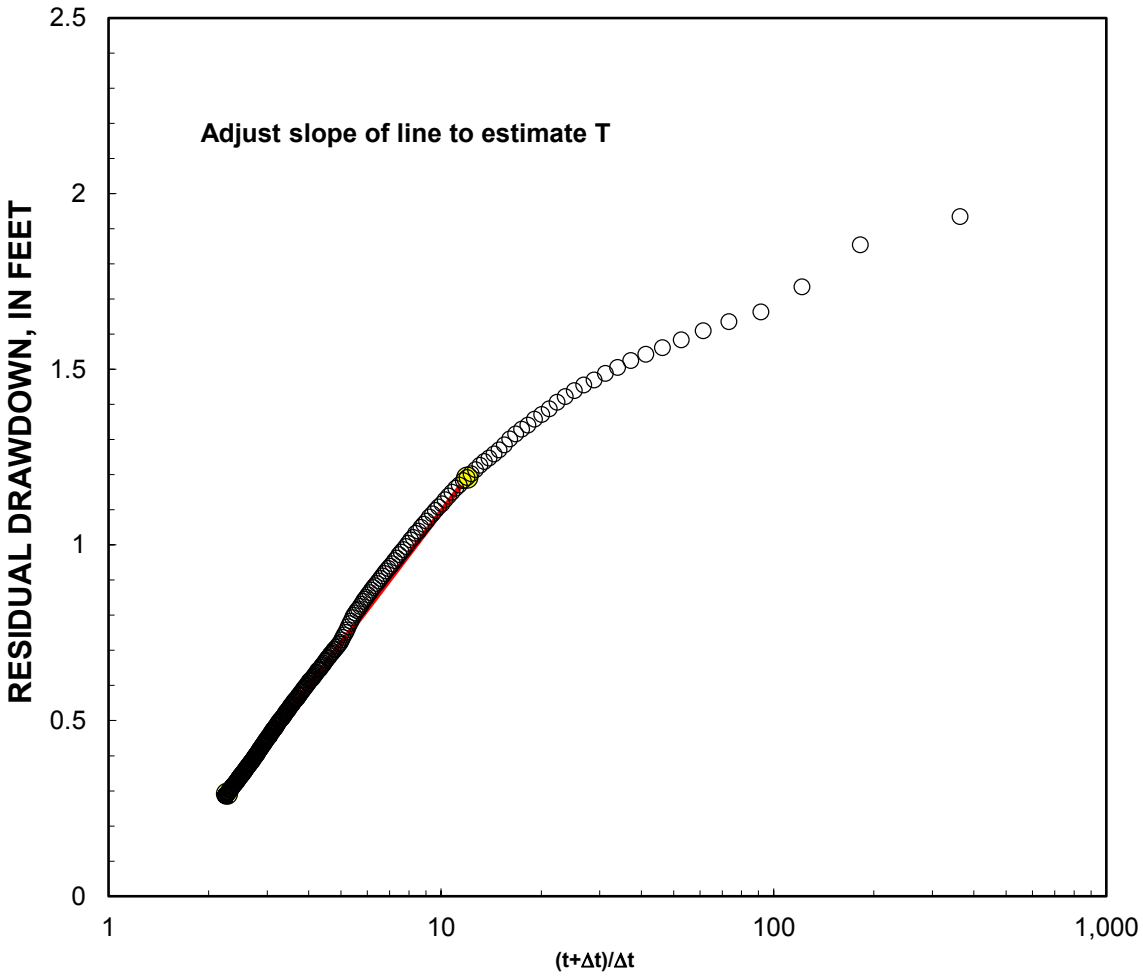
Aquifer thickness = 45 Feet

Slope = 1.246496 Feet/log10

Input is consistent.

K =	0.1	Feet/Day
T =	4.5	Feet²/Day

K= 0.1 is less than likely minimum of 3 for Fine Sand



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	7.95	51	1/0/00 1:55:15	8.64
2	1/0/00 1:30:45	9.89	52	1/0/00 1:55:45	8.63
3	1/0/00 1:31:15	9.69	53	1/0/00 1:56:15	8.62
4	1/0/00 1:31:45	9.59	54	1/0/00 1:56:45	8.61
5	1/0/00 1:32:15	9.53	55	1/0/00 1:57:15	8.61
6	1/0/00 1:32:45	9.49	56	1/0/00 1:57:45	8.60
7	1/0/00 1:33:15	9.46	57	1/0/00 1:58:15	8.59
8	1/0/00 1:33:45	9.42	58	1/0/00 1:58:45	8.58
9	1/0/00 1:34:15	9.39	59	1/0/00 1:59:15	8.58
10	1/0/00 1:34:45	9.36	60	1/0/00 1:59:45	8.57
11	1/0/00 1:35:15	9.32	61	1/0/00 2:00:15	8.57
12	1/0/00 1:35:45	9.29	62	1/0/00 2:00:45	8.56
13	1/0/00 1:36:15	9.27	63	1/0/00 2:01:15	8.55
14	1/0/00 1:36:45	9.24	64	1/0/00 2:01:45	8.54
15	1/0/00 1:37:15	9.21	65	1/0/00 2:02:15	8.54
16	1/0/00 1:37:45	9.19	66	1/0/00 2:02:45	8.53
17	1/0/00 1:38:15	9.17	67	1/0/00 2:03:15	8.53
18	1/0/00 1:38:45	9.14	68	1/0/00 2:03:45	8.52
19	1/0/00 1:39:15	9.12	69	1/0/00 2:04:15	8.51
20	1/0/00 1:39:45	9.10	70	1/0/00 2:04:45	8.51
21	1/0/00 1:40:15	9.08	71	1/0/00 2:05:15	8.50
22	1/0/00 1:40:45	9.06	72	1/0/00 2:05:45	8.50
23	1/0/00 1:41:15	9.04	73	1/0/00 2:06:15	8.49
24	1/0/00 1:41:45	9.02	74	1/0/00 2:06:45	8.49
25	1/0/00 1:42:15	9.00	75	1/0/00 2:07:15	8.48
26	1/0/00 1:42:45	8.98	76	1/0/00 2:07:45	8.48
27	1/0/00 1:43:15	8.97	77	1/0/00 2:08:15	8.47
28	1/0/00 1:43:45	8.95	78	1/0/00 2:08:45	8.46
29	1/0/00 1:44:15	8.93	79	1/0/00 2:09:15	8.46
30	1/0/00 1:44:45	8.91	80	1/0/00 2:09:45	8.46
31	1/0/00 1:45:15	8.90	81	1/0/00 2:10:15	8.45
32	1/0/00 1:45:45	8.88	82	1/0/00 2:10:45	8.45
33	1/0/00 1:46:15	8.87	83	1/0/00 2:11:15	8.44
34	1/0/00 1:46:45	8.86	84	1/0/00 2:11:45	8.43
35	1/0/00 1:47:15	8.84	85	1/0/00 2:12:15	8.43
36	1/0/00 1:47:45	8.83	86	1/0/00 2:12:45	8.43
37	1/0/00 1:48:15	8.82	87	1/0/00 2:13:15	8.42
38	1/0/00 1:48:45	8.80	88	1/0/00 2:13:45	8.42
39	1/0/00 1:49:15	8.79	89	1/0/00 2:14:15	8.41
40	1/0/00 1:49:45	8.78	90	1/0/00 2:14:45	8.41
41	1/0/00 1:50:15	8.76	91	1/0/00 2:15:15	8.40
42	1/0/00 1:50:45	8.75	92	1/0/00 2:15:45	8.40
43	1/0/00 1:51:15	8.73	93	1/0/00 2:16:15	8.39
44	1/0/00 1:51:45	8.72	94	1/0/00 2:16:45	8.39
45	1/0/00 1:52:15	8.70	95	1/0/00 2:17:15	8.39
46	1/0/00 1:52:45	8.69	96	1/0/00 2:17:45	8.38
47	1/0/00 1:53:15	8.67	97	1/0/00 2:18:15	8.38
48	1/0/00 1:53:45	8.66	98	1/0/00 2:18:45	8.37
49	1/0/00 1:54:15	8.65	99	1/0/00 2:19:15	8.37
50	1/0/00 1:54:45	8.65	100	1/0/00 2:19:45	8.37

Inch	0.083333	Second	1.16E-05			GPM	192.5134
Feet	1	Minute	0.000694			ft3/d	1
Meter	3.28084	Hour	0.041667			ft3/s	86400
cm	0.032808	Day	1			m3/d	35.39525
mm	0.003281					m3/s	3058149
PSI	2.31					liters/s	3058.149
						liters/min	50.96915
Out Units =						cc/s	3.058149
Convert =	1	Feet2/Day					
Convert =	1	Feet/Day					

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	10	Feet	
Depths to:			
water level (DTW)	7.95	Feet	
Top of Aquifer	10	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Fine Sand		
wetted hole	10	Feet	
Aquifer thickness =	45	Feet	
Aquifer thickness =	45	feet	
Aquifer thickness =	45	Feet	1
Aquifer thickness =	45	Feet	**45**

Fraction penetrated = 0.222222

slope points	11.9697	1.192
	2.270175	0.292

FLOW RATE	0.16	GPM	
FLOW RATE	30.80214	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	

Slope =	1.246496	Feet	$/\log_{10}$	
Slope =	1.246496	$feet/\log_{10}$		
T =	5	ft2/d		
	4.522804	Feet2/Day		0.1
	4.5	Feet2/Day		**45**
K =	0.100507	ft/d		
	0.100507	Feet/Day		0.01
K =	0.1	Feet/Day		**10**

Absolute Shut Down

Input is consistent.

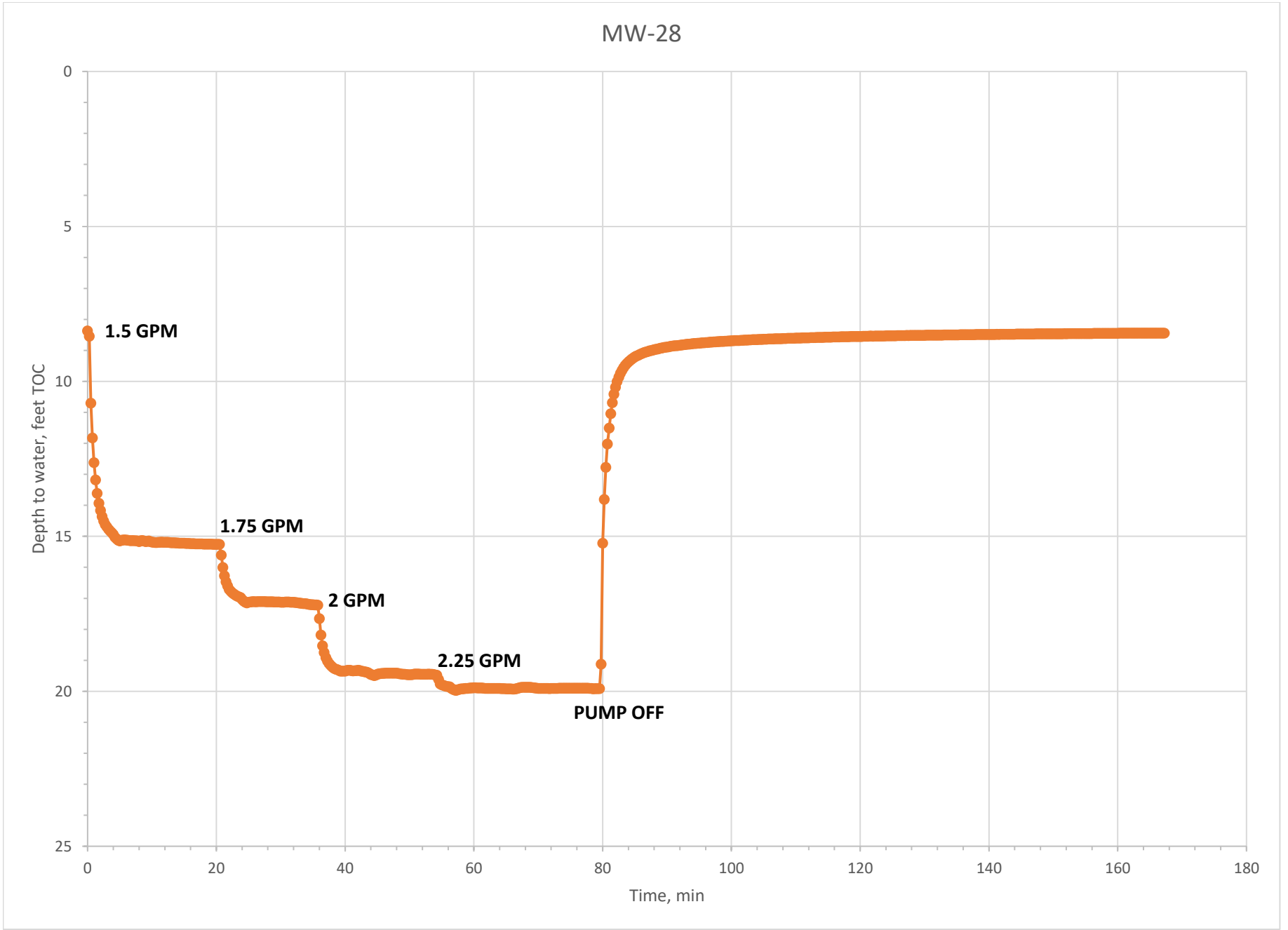
Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is less than 1 Feet	1		
0	Slope will produce a negative K			
0	K = 0.1 is less than extreme minimum of 0.05 for Fine Sand	0.05	-2	0.05
0	K = 0.1 is greater than extreme maximum of 20 for Fine Sa	20	1	20
1	Input is consistent.			

Error

WARNING

K= 0.1 is less than likely minimum of 3 for Fine Sand

Decision	Option			
0				
1	K = 0.1 is less than likely minimum of 3 for Fine Sand	3	0	3
1	K = 0.1 is greater than likely maximum of 20 for Fine Sand	20	1	20
2				


MW-28
Depth to water, feet TOC
0
5
10
15
20
25
1.5 GPM
1.75 GPM
2 GPM
2.25 GPM
PUMP OFF
0
20
40
60
80
100
120
140
160
180
Time, min

WELL ID: MW-28

Local ID: Hypo-1
Date: 4/4/2001
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	10	Feet
Depths to:		
water level (DTW)	8.37	Feet
Top of Aquifer	8	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Fine Sand	
FLOW RATE	2.25	GPM

COMPUTED

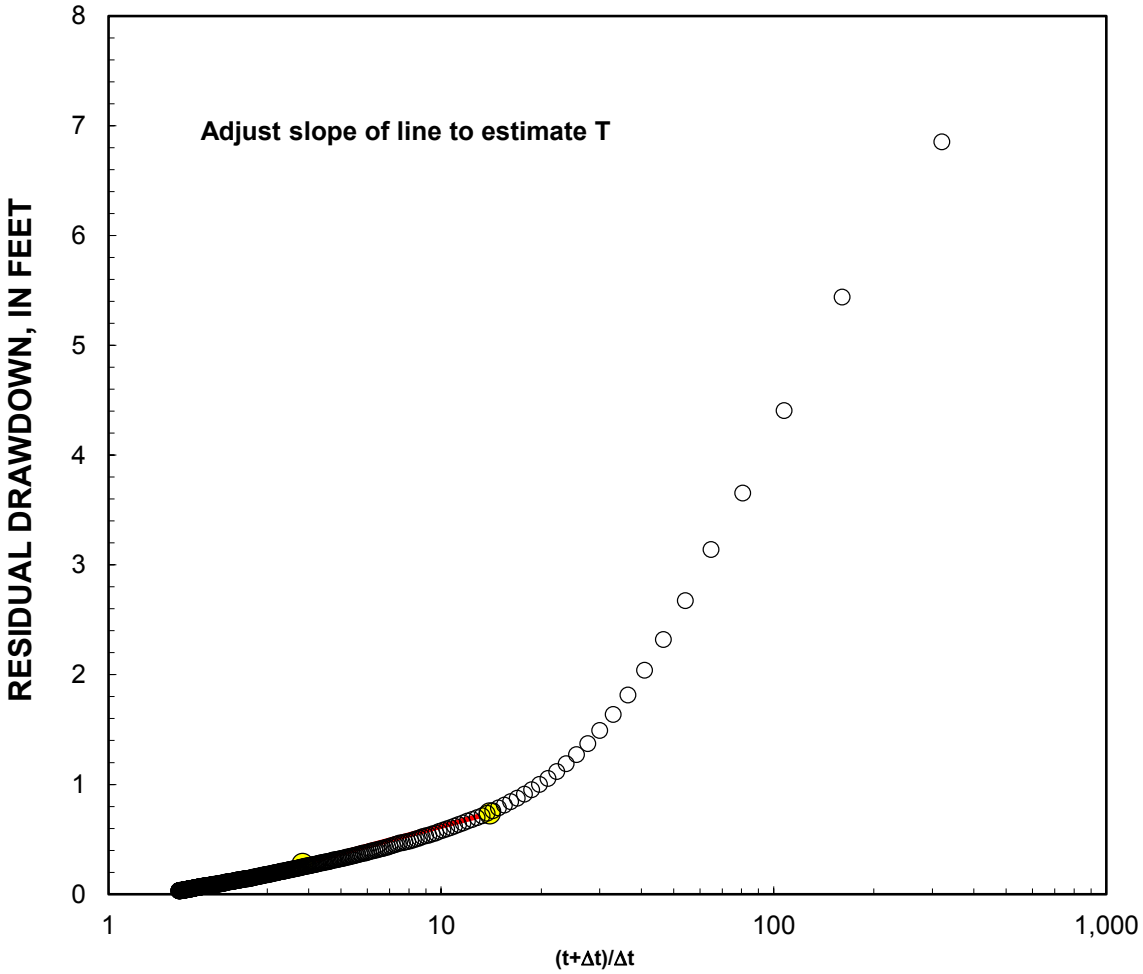
Aquifer thickness = 47 Feet

Slope = 0.813601 Feet/log10

Input is consistent.

K =	2.1	Feet/Day
T =	97	Feet²/Day

K= 2.1 is less than likely minimum of 3 for Fine Sand



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet	Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	0.00	51	1/0/00 2:22:00	0.11
2	1/0/00 1:20:45	3.65	52	1/0/00 2:23:15	0.11
3	1/0/00 1:22:00	1.82	53	1/0/00 2:24:30	0.10
4	1/0/00 1:23:15	1.19	54	1/0/00 2:25:45	0.10
5	1/0/00 1:24:30	0.91	55	1/0/00 2:27:00	0.10
6	1/0/00 1:25:45	0.76	56	1/0/00 2:28:15	0.10
7	1/0/00 1:27:00	0.67	57	1/0/00 2:29:30	0.10
8	1/0/00 1:28:15	0.59	58	1/0/00 2:30:45	0.09
9	1/0/00 1:29:30	0.54	59	1/0/00 2:32:00	0.09
10	1/0/00 1:30:45	0.50	60	1/0/00 2:33:15	0.09
11	1/0/00 1:32:00	0.47	61	1/0/00 2:34:30	0.09
12	1/0/00 1:33:15	0.43	62	1/0/00 2:35:45	0.09
13	1/0/00 1:34:30	0.40	63	1/0/00 2:37:00	0.08
14	1/0/00 1:35:45	0.38	64	1/0/00 2:38:15	0.08
15	1/0/00 1:37:00	0.36	65	1/0/00 2:39:30	0.08
16	1/0/00 1:38:15	0.34	66	1/0/00 2:40:45	0.08
17	1/0/00 1:39:30	0.33	67	1/0/00 2:42:00	0.08
18	1/0/00 1:40:45	0.31	68	1/0/00 2:43:15	0.07
19	1/0/00 1:42:00	0.30	69	1/0/00 2:44:30	0.07
20	1/0/00 1:43:15	0.29	70	1/0/00 2:45:45	0.07
21	1/0/00 1:44:30	0.28	71	1/0/00 2:47:00	0.07
22	1/0/00 1:45:45	0.26	72	1/0/00 2:48:15	0.07
23	1/0/00 1:47:00	0.26	73	1/0/00 2:49:30	0.07
24	1/0/00 1:48:15	0.25	74	1/0/00 2:50:45	0.07
25	1/0/00 1:49:30	0.24	75	1/0/00 2:52:00	0.07
26	1/0/00 1:50:45	0.23	76	1/0/00 2:53:15	0.06
27	1/0/00 1:52:00	0.22	77	1/0/00 2:54:30	0.06
28	1/0/00 1:53:15	0.21	78	1/0/00 2:55:45	0.06
29	1/0/00 1:54:30	0.21	79	1/0/00 2:57:00	0.06
30	1/0/00 1:55:45	0.20	80	1/0/00 2:58:15	0.06
31	1/0/00 1:57:00	0.19	81	1/0/00 2:59:30	0.06
32	1/0/00 1:58:15	0.19	82	1/0/00 3:00:45	0.06
33	1/0/00 1:59:30	0.18	83	1/0/00 3:02:00	0.05
34	1/0/00 2:00:45	0.18	84	1/0/00 3:03:15	0.05
35	1/0/00 2:02:00	0.17	85	1/0/00 3:04:30	0.05
36	1/0/00 2:03:15	0.16	86	1/0/00 3:05:45	0.05
37	1/0/00 2:04:30	0.16	87	1/0/00 3:07:00	0.05
38	1/0/00 2:05:45	0.15	88	1/0/00 3:08:15	0.05
39	1/0/00 2:07:00	0.15	89	1/0/00 3:09:30	0.05
40	1/0/00 2:08:15	0.15	90	1/0/00 3:10:45	0.04
41	1/0/00 2:09:30	0.15	91	1/0/00 3:12:00	0.04
42	1/0/00 2:10:45	0.14	92	1/0/00 3:13:15	0.04
43	1/0/00 2:12:00	0.14	93	1/0/00 3:14:30	0.04
44	1/0/00 2:13:15	0.13	94	1/0/00 3:15:45	0.04
45	1/0/00 2:14:30	0.13	95	1/0/00 3:17:00	0.04
46	1/0/00 2:15:45	0.13	96	1/0/00 3:18:15	0.04
47	1/0/00 2:17:00	0.12	97	1/0/00 3:19:30	0.04
48	1/0/00 2:18:15	0.12	98	1/0/00 3:20:45	0.04
49	1/0/00 2:19:30	0.12	99	1/0/00 3:22:00	0.04
50	1/0/00 2:20:45	0.11	100	#N/A	#N/A

Inch	0.083333	Second	1.16E-05		GPM	192.5134
Feet	1	Minute	0.000694		ft3/d	1
Meter	3.28084	Hour	0.041667		ft3/s	86400
cm	0.032808	Day	1		m3/d	35.39525
mm	0.003281				m3/s	3058149
PSI	2.31				liters/s	3058.149
					liters/min	50.96915
Out Units =					cc/s	3.058149
Convert =	1	Feet2/Day				
Convert =	1	Feet/Day				

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	10	Feet	
Depths to:			
water level (DTW)	8.37	Feet	
Top of Aquifer	8	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Fine Sand		
wetted hole	9.63	Feet	
Aquifer thickness =	46.63	Feet	
Aquifer thickness =	46.63	feet	
Aquifer thickness =	46.63	Feet	1
Aquifer thickness =	47	Feet	**47**

Fraction penetrated = 0.206519

slope points	14	0.738
	3.83	0.28

FLOW RATE	2.25	GPM	
FLOW RATE	433.1551	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	
Slope =	0.813601	Feet	$/log_{10}$
Slope =	0.813601	$feet/log_{10}$	
T =	97	ft2/d	
	97.44279	Feet2/Day	1
	97	Feet2/Day	**97**
K =	2.089702	ft/d	
	2.089702	Feet/Day	0.1
K =	2.1	Feet/Day	**21**

Absolute Shut Down

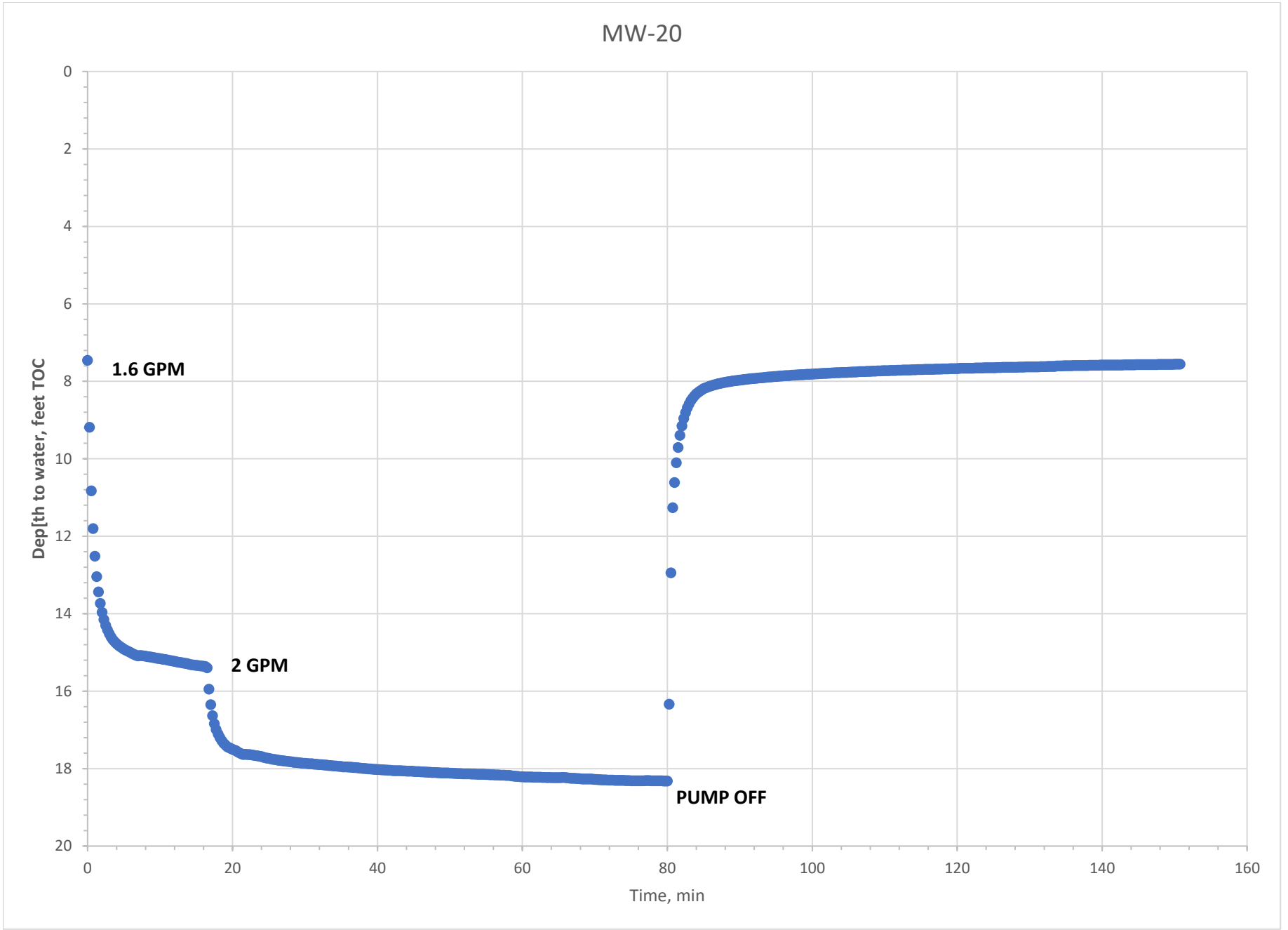
Input is consistent.

Decision		Option			
	0	Water level is below Base of Aquifer			
	0	Casing diameter is greater than the Annulus			
	0	Top of Aquifer is deeper than Base of Aquifer			
	0	Screen length is less than 1 Feet	1		
	0	Slope will produce a negative K			
	0	K = 2.1 is less than extreme minimum of 0.05 for Fine Sand	0.05	-2	0.05
	0	K = 2.1 is greater than extreme maximum of 20 for Fine Sa	20	1	20
	1	Input is consistent.			
		Error			

WARNING

K= 2.1 is less than likely minimum of 3 for Fine Sand

Decision		Option			
	0				
	1	K = 2.1 is less than likely minimum of 3 for Fine Sand	3	0	3
	1	K = 2.1 is greater than likely maximum of 20 for Fine Sand	20	1	20
	2				


MW-20
Dep[th to water, feet TOC
Time, min
1.6 GPM
2 GPM
PUMP OFF
0
2
4
6
8
10
12
14
16
18
20
0
20
40
60
80
100
120
140
160

WELL ID: MW-20

Local ID: Hypo-1
Date: 4/4/2001
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	5	Feet
Depths to:		
water level (DTW)	7.7	Feet
Top of Aquifer	8	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Silt, Loess	
FLOW RATE	0.5	GPM

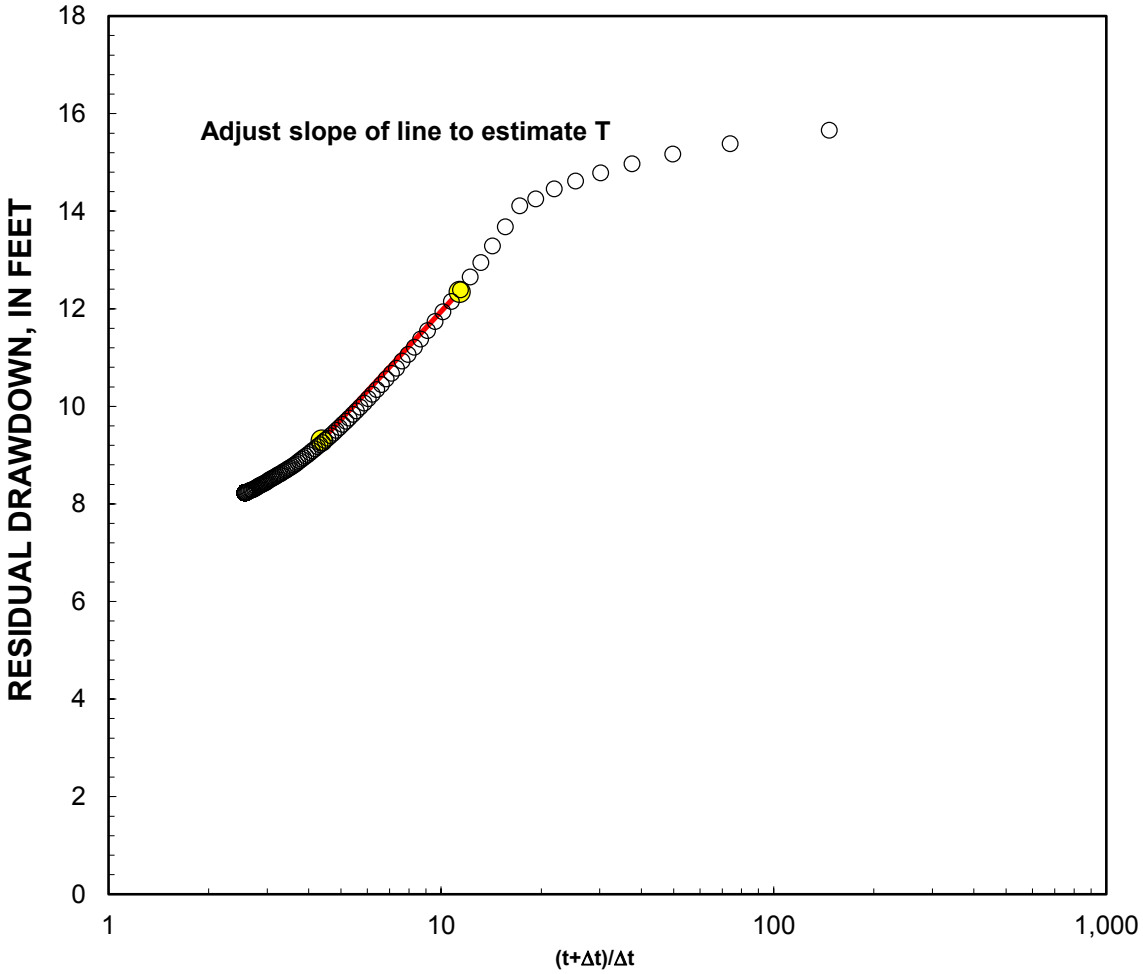
COMPUTED

Aquifer thickness = 47 Feet

Slope = 7.356781 Feet/log10

Input is consistent.

K = 0.051 Feet/Day
T = 2.4 Feet²/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	0.00
2	1/0/00 0:36:30	15.96
3	1/0/00 0:36:45	15.66
4	1/0/00 0:37:00	15.39
5	1/0/00 0:37:15	15.17
6	1/0/00 0:37:30	14.98
7	1/0/00 0:37:45	14.79
8	1/0/00 0:38:00	14.62
9	1/0/00 0:38:15	14.46
10	1/0/00 0:38:30	14.26
11	1/0/00 0:38:45	14.11
12	1/0/00 0:39:00	13.68
13	1/0/00 0:39:15	13.29
14	1/0/00 0:39:30	12.95
15	1/0/00 0:39:45	12.65
16	1/0/00 0:40:00	12.39
17	1/0/00 0:40:15	12.15
18	1/0/00 0:40:30	11.94
19	1/0/00 0:40:45	11.74
20	1/0/00 0:41:00	11.55
21	1/0/00 0:41:15	11.38
22	1/0/00 0:41:30	11.21
23	1/0/00 0:41:45	11.06
24	1/0/00 0:42:00	10.93
25	1/0/00 0:42:15	10.79
26	1/0/00 0:42:30	10.68
27	1/0/00 0:42:45	10.56
28	1/0/00 0:43:00	10.45
29	1/0/00 0:43:15	10.34
30	1/0/00 0:43:30	10.25
31	1/0/00 0:43:45	10.16
32	1/0/00 0:44:00	10.07
33	1/0/00 0:44:15	9.99
34	1/0/00 0:44:30	9.91
35	1/0/00 0:44:45	9.84
36	1/0/00 0:45:00	9.76
37	1/0/00 0:45:15	9.70
38	1/0/00 0:45:30	9.63
39	1/0/00 0:45:45	9.57
40	1/0/00 0:46:00	9.51
41	1/0/00 0:46:15	9.45
42	1/0/00 0:46:30	9.40
43	1/0/00 0:46:45	9.35
44	1/0/00 0:47:00	9.30
45	1/0/00 0:47:15	9.26
46	1/0/00 0:47:30	9.21
47	1/0/00 0:47:45	9.17
48	1/0/00 0:48:00	9.13
49	1/0/00 0:48:15	9.09
50	1/0/00 0:48:30	9.05
51	1/0/00 0:48:45	9.02
52	1/0/00 0:49:00	8.98
53	1/0/00 0:49:15	8.95
54	1/0/00 0:49:30	8.92
55	1/0/00 0:49:45	8.89
56	1/0/00 0:50:00	8.86
57	1/0/00 0:50:15	8.83
58	1/0/00 0:50:30	8.80
59	1/0/00 0:50:45	8.77
60	1/0/00 0:51:00	8.74
61	1/0/00 0:51:15	8.72
62	1/0/00 0:51:30	8.70
63	1/0/00 0:51:45	8.68
64	1/0/00 0:52:00	8.66
65	1/0/00 0:52:15	8.64
66	1/0/00 0:52:30	8.62
67	1/0/00 0:52:45	8.60
68	1/0/00 0:53:00	8.59
69	1/0/00 0:53:15	8.57
70	1/0/00 0:53:30	8.55
71	1/0/00 0:53:45	8.53
72	1/0/00 0:54:00	8.52
73	1/0/00 0:54:15	8.50
74	1/0/00 0:54:30	8.48
75	1/0/00 0:54:45	8.46
76	1/0/00 0:55:00	8.44
77	1/0/00 0:55:15	8.43
78	1/0/00 0:55:30	8.42
79	1/0/00 0:55:45	8.40
80	1/0/00 0:56:00	8.39
81	1/0/00 0:56:15	8.38
82	1/0/00 0:56:30	8.36
83	1/0/00 0:56:45	8.35
84	1/0/00 0:57:00	8.33
85	1/0/00 0:57:15	8.32
86	1/0/00 0:57:30	8.31
87	1/0/00 0:57:45	8.29
88	1/0/00 0:58:00	8.29
89	1/0/00 0:58:15	8.28
90	1/0/00 0:58:30	8.28
91	1/0/00 0:58:45	8.26
92	1/0/00 0:59:00	8.25
93	1/0/00 0:59:15	8.24
94	1/0/00 0:59:30	8.23

Inch	0.083333	Second	1.16E-05			GPM	192.5134
Feet	1	Minute	0.000694			ft3/d	1
Meter	3.28084	Hour	0.041667			ft3/s	86400
cm	0.032808	Day	1			m3/d	35.39525
mm	0.003281					m3/s	3058149
PSI	2.31					liters/s	3058.149
						liters/min	50.96915
Out Units =						cc/s	3.058149
Convert =	1	Feet2/Day					
Convert =	1	Feet/Day					

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	5	Feet	
Depths to:			
water level (DTW)	7.7	Feet	
Top of Aquifer	8	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Silt, Loess		
wetted hole	5	Feet	
Aquifer thickness =	47	Feet	
Aquifer thickness =	47	feet	
Aquifer thickness =	47	Feet	1
Aquifer thickness =	47	Feet	47

Fraction penetrated = 0.106383

slope points	11.357	12.353
	4.372	9.303

FLOW RATE	0.50	GPM	
FLOW RATE	96.25668	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	
Slope =	7.356781	Feet	$/\log_{10}$
Slope =	7.356781	feet/$\log_{10}$	
T =	2	ft2/d	
	2.394755	Feet2/Day	0.1
	2.4	Feet2/Day	24
K =	0.050952	ft/d	
	0.050952	Feet/Day	0.001
K =	0.051	Feet/Day	51

Absolute Shut Down

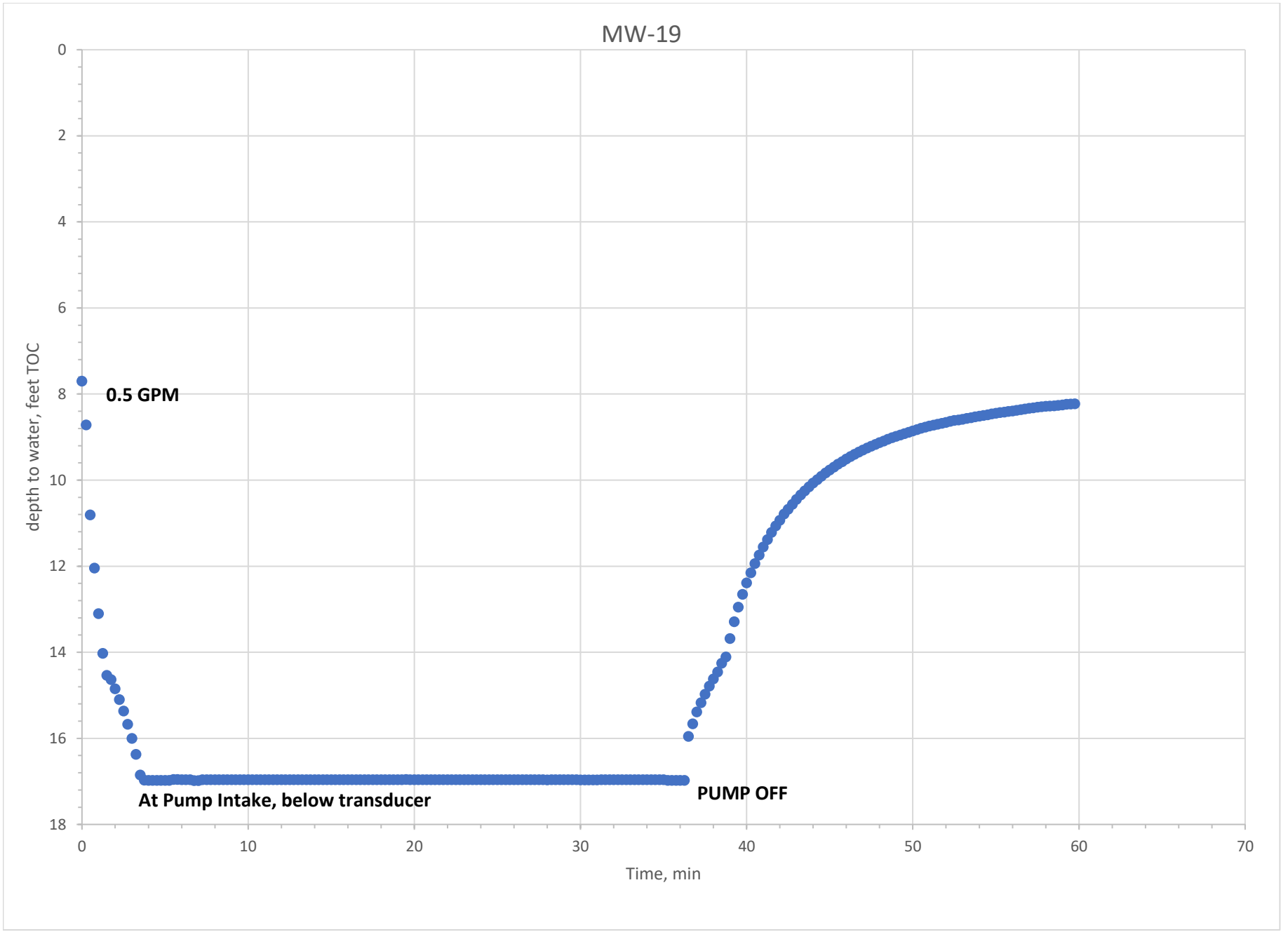
Input is consistent.

Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is less than 1 Feet	1		
0	Slope will produce a negative K			
0	K = 0.051 is less than extreme minimum of 0.0003 for Silt , L	0.0003	-4	0.0003
0	K = 0.051 is greater than extreme maximum of 6 for Silt , L	6	0	6
1	Input is consistent.			

Error

WARNING

Decision	Option			
0				
0	K = 0.051 is less than likely minimum of 0.001 for Silt , Loes	0.001	-3	0.001
0	K = 0.051 is greater than likely maximum of 0.1 for Silt , Lo	0.1	-1	0.1
1				


MW-19
depth to water, feet TOC
0
2
4
6
8
10
12
14
16
18
0.5 GPM
At Pump Intake, below transducer
PUMP OFF
0
10
20
30
40
50
60
70
Time, min

WELL ID: MW-19

Local ID: Hypo-1
Date: 4/4/2001
Time: 0:00

INPUT

Construction:		
Casing dia. (d_c)	2	Inch
Annulus dia. (d_w)	8	Inch
Screen Length (L)	5	Feet
Depths to:		
water level (DTW)	7.7	Feet
Top of Aquifer	8	Feet
Base of Aquifer	55	Feet
Annular Fill:		
across screen --	Coarse Sand	
above screen --	Bentonite	
Aquifer Material --	Silt, Loess	
FLOW RATE	0.5	GPM

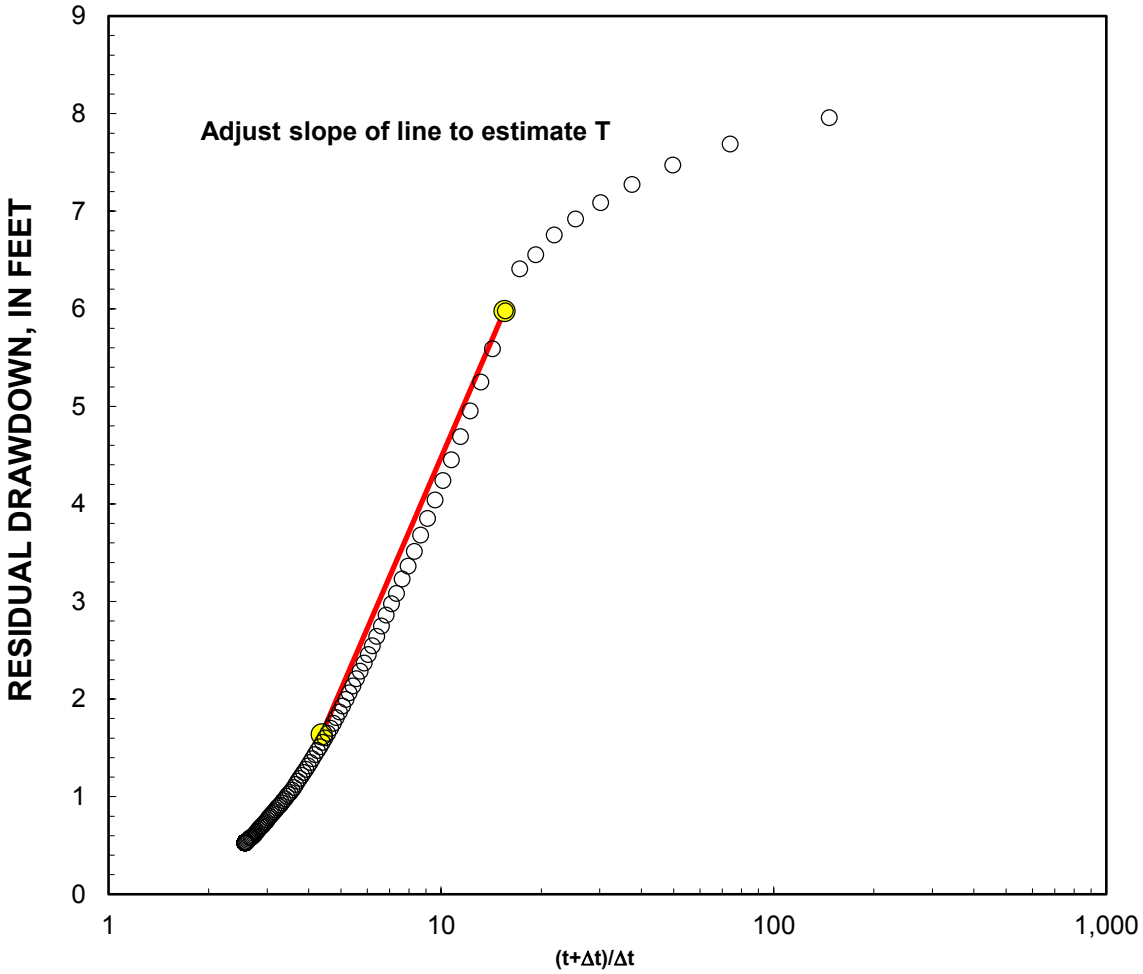
COMPUTED

Aquifer thickness = 47 Feet

Slope = 7.894092 Feet/log10

Input is consistent.

K = 0.047 Feet/Day
T = 2.2 Feet²/Day



REMARKS: Cooper-Jacob recovery analysis of single-well aquifer test

Reduced Data

Entry	Time, Date Hr:Min:Sec	Water Level Feet
1	1/0/00 0:00:00	7.70
2	1/0/00 0:36:30	15.96
3	1/0/00 0:36:45	15.66
4	1/0/00 0:37:00	15.39
5	1/0/00 0:37:15	15.17
6	1/0/00 0:37:30	14.98
7	1/0/00 0:37:45	14.79
8	1/0/00 0:38:00	14.62
9	1/0/00 0:38:15	14.46
10	1/0/00 0:38:30	14.26
11	1/0/00 0:38:45	14.11
12	1/0/00 0:39:00	13.68
13	1/0/00 0:39:15	13.29
14	1/0/00 0:39:30	12.95
15	1/0/00 0:39:45	12.65
16	1/0/00 0:40:00	12.39
17	1/0/00 0:40:15	12.15
18	1/0/00 0:40:30	11.94
19	1/0/00 0:40:45	11.74
20	1/0/00 0:41:00	11.55
21	1/0/00 0:41:15	11.38
22	1/0/00 0:41:30	11.21
23	1/0/00 0:41:45	11.06
24	1/0/00 0:42:00	10.93
25	1/0/00 0:42:15	10.79
26	1/0/00 0:42:30	10.68
27	1/0/00 0:42:45	10.56
28	1/0/00 0:43:00	10.45
29	1/0/00 0:43:15	10.34
30	1/0/00 0:43:30	10.25
31	1/0/00 0:43:45	10.16
32	1/0/00 0:44:00	10.07
33	1/0/00 0:44:15	9.99
34	1/0/00 0:44:30	9.91
35	1/0/00 0:44:45	9.84
36	1/0/00 0:45:00	9.76
37	1/0/00 0:45:15	9.70
38	1/0/00 0:45:30	9.63
39	1/0/00 0:45:45	9.57
40	1/0/00 0:46:00	9.51
41	1/0/00 0:46:15	9.45
42	1/0/00 0:46:30	9.40
43	1/0/00 0:46:45	9.35
44	1/0/00 0:47:00	9.30
45	1/0/00 0:47:15	9.26
46	1/0/00 0:47:30	9.21
47	1/0/00 0:47:45	9.17
48	1/0/00 0:48:00	9.13
49	1/0/00 0:48:15	9.09
50	1/0/00 0:48:30	9.05
51	1/0/00 0:48:45	9.02
52	1/0/00 0:49:00	8.98
53	1/0/00 0:49:15	8.95
54	1/0/00 0:49:30	8.92
55	1/0/00 0:49:45	8.89
56	1/0/00 0:50:00	8.86
57	1/0/00 0:50:15	8.83
58	1/0/00 0:50:30	8.80
59	1/0/00 0:50:45	8.77
60	1/0/00 0:51:00	8.74
61	1/0/00 0:51:15	8.72
62	1/0/00 0:51:30	8.70
63	1/0/00 0:51:45	8.68
64	1/0/00 0:52:00	8.66
65	1/0/00 0:52:15	8.64
66	1/0/00 0:52:30	8.62
67	1/0/00 0:52:45	8.60
68	1/0/00 0:53:00	8.59
69	1/0/00 0:53:15	8.57
70	1/0/00 0:53:30	8.55
71	1/0/00 0:53:45	8.53
72	1/0/00 0:54:00	8.52
73	1/0/00 0:54:15	8.50
74	1/0/00 0:54:30	8.48
75	1/0/00 0:54:45	8.46
76	1/0/00 0:55:00	8.44
77	1/0/00 0:55:15	8.43
78	1/0/00 0:55:30	8.42
79	1/0/00 0:55:45	8.40
80	1/0/00 0:56:00	8.39
81	1/0/00 0:56:15	8.38
82	1/0/00 0:56:30	8.36
83	1/0/00 0:56:45	8.35
84	1/0/00 0:57:00	8.33
85	1/0/00 0:57:15	8.32
86	1/0/00 0:57:30	8.31
87	1/0/00 0:57:45	8.29
88	1/0/00 0:58:00	8.29
89	1/0/00 0:58:15	8.28
90	1/0/00 0:58:30	8.28
91	1/0/00 0:58:45	8.26
92	1/0/00 0:59:00	8.25
93	1/0/00 0:59:15	8.24
94	1/0/00 0:59:30	8.23

Inch	0.083333	Second	1.16E-05			GPM	192.5134
Feet	1	Minute	0.000694			ft3/d	1
Meter	3.28084	Hour	0.041667			ft3/s	86400
cm	0.032808	Day	1			m3/d	35.39525
mm	0.003281					m3/s	3058149
PSI	2.31					liters/s	3058.149
						liters/min	50.96915
Out Units =						cc/s	3.058149
Convert =	1	Feet2/Day					
Convert =	1	Feet/Day					

Casing dia. (dc)	2	Inch	
Annulus dia. (dw)	8	Inch	
Screen Length (L)	5	Feet	
Depths to:			
water level (DTW)	7.7	Feet	
Top of Aquifer	8	Feet	
Base of Aquifer	55	Feet	
Annular Fill:			
across screen --	Coarse Sand		
above screen --	Bentonite		
Aquifer Material --	Silt, Loess		
wetted hole	5	Feet	
Aquifer thickness =	47	Feet	
Aquifer thickness =	47	feet	
Aquifer thickness =	47	Feet	1
Aquifer thickness =	47	Feet	47

Fraction penetrated = 0.106383

slope points	15.5	5.979
	4.372	1.64

FLOW RATE	0.50	GPM	
FLOW RATE	96.25668	ft^3/d	
Rc =	0.083333	ft	
Rw =	0.333333	ft	
Slope =	7.894092	Feet	$/\log_{10}$
Slope =	7.894092	feet/$\log_{10}$	
T =	2	ft2/d	
	2.231756	Feet2/Day	0.1
	2.2	Feet2/Day	22
K =	0.047484	ft/d	
	0.047484	Feet/Day	0.001
K =	0.047	Feet/Day	47

Absolute Shut Down

Input is consistent.

Decision	Option			
0	Water level is below Base of Aquifer			
0	Casing diameter is greater than the Annulus			
0	Top of Aquifer is deeper than Base of Aquifer			
0	Screen length is less than 1 Feet	1		
0	Slope will produce a negative K			
0	K = 0.047 is less than extreme minimum of 0.0003 for Silt , L	0.0003	-4	0.0003
0	K = 0.047 is greater than extreme maximum of 6 for Silt , L	6	0	6
1	Input is consistent.			

Error

WARNING

Decision	Option			
0				
0	K = 0.047 is less than likely minimum of 0.001 for Silt , Loes	0.001	-3	0.001
0	K = 0.047 is greater than likely maximum of 0.1 for Silt , Lo	0.1	-1	0.1
1				

ATTACHMENT E

GROUNDWATER PERFORMANCE AND COMPLIANCE MONITORING WELLS

Groundwater Performance and Compliance Monitoring Well List*

MW-4
MW-6
MW-8
MW-11
MW-12
MW-20
MW-27
MW-29
MW-35
MW-40
MW-43

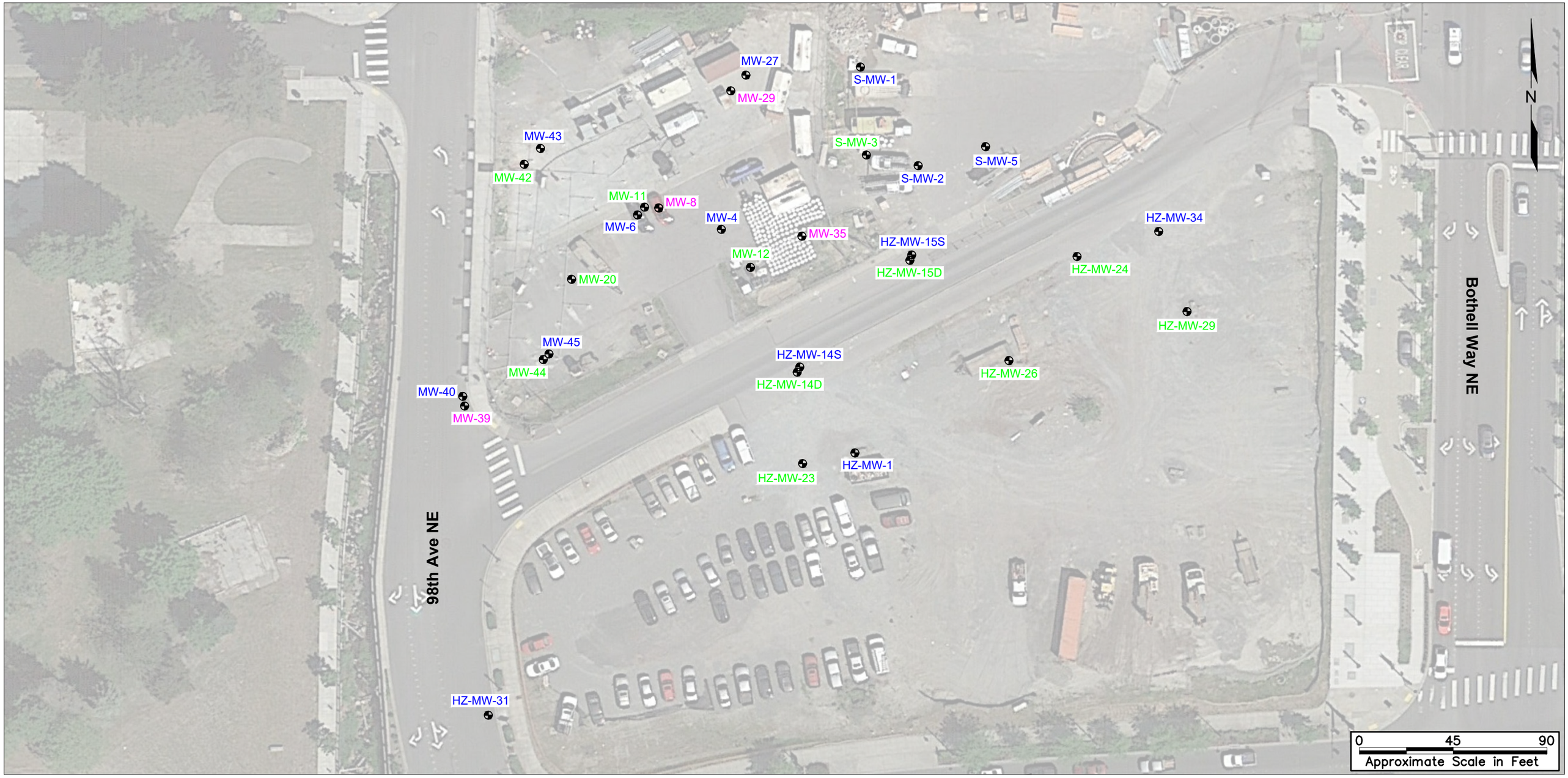
S-MW-1
S-MW-2
S-MW-3
S-MW-5

HZ-MW-1
HZ-MW-14D
HZ-MW-15S
HZ-MW-15D
HZ-MW-24
HZ-MW-26
HZ-MW-29
HZ-MW-31
HZ-MW-34

The following wells will be sampled on a limited basis. These wells will be sampled for four (4) consecutive quarters, starting on the Summer 2019 quarterly sampling event, and if 4 consecutive quarters groundwater analytical results are below cleanup levels for PCE, TCE, cis 1,2-DCE and VC, the wells will be decommissioned.

HZ-MW-14S
HZ-MW-23
MW-39
MW-42
MW-44
MW-45

*Selected groundwater monitoring wells may be moved and replaced or decommissioned due to physical obstructions prior to, during and after site development, per review and approval by Ecology as required in the environmental covenant. Selected groundwater monitoring wells may be permanently decommissioned from the quarterly groundwater compliance monitoring list based on attaining MTCA cleanup levels for COCs anytime during groundwater compliance monitoring, per review and approval by Ecology.



LEGEND

MW-1 — Location of shallow monitoring well (screened 5-25 ft bgs) to be used for groundwater performance and compliance monitoring

MW-2 — Location of intermediate monitoring well (screened 25-35 ft bgs) to be used for groundwater performance and compliance monitoring

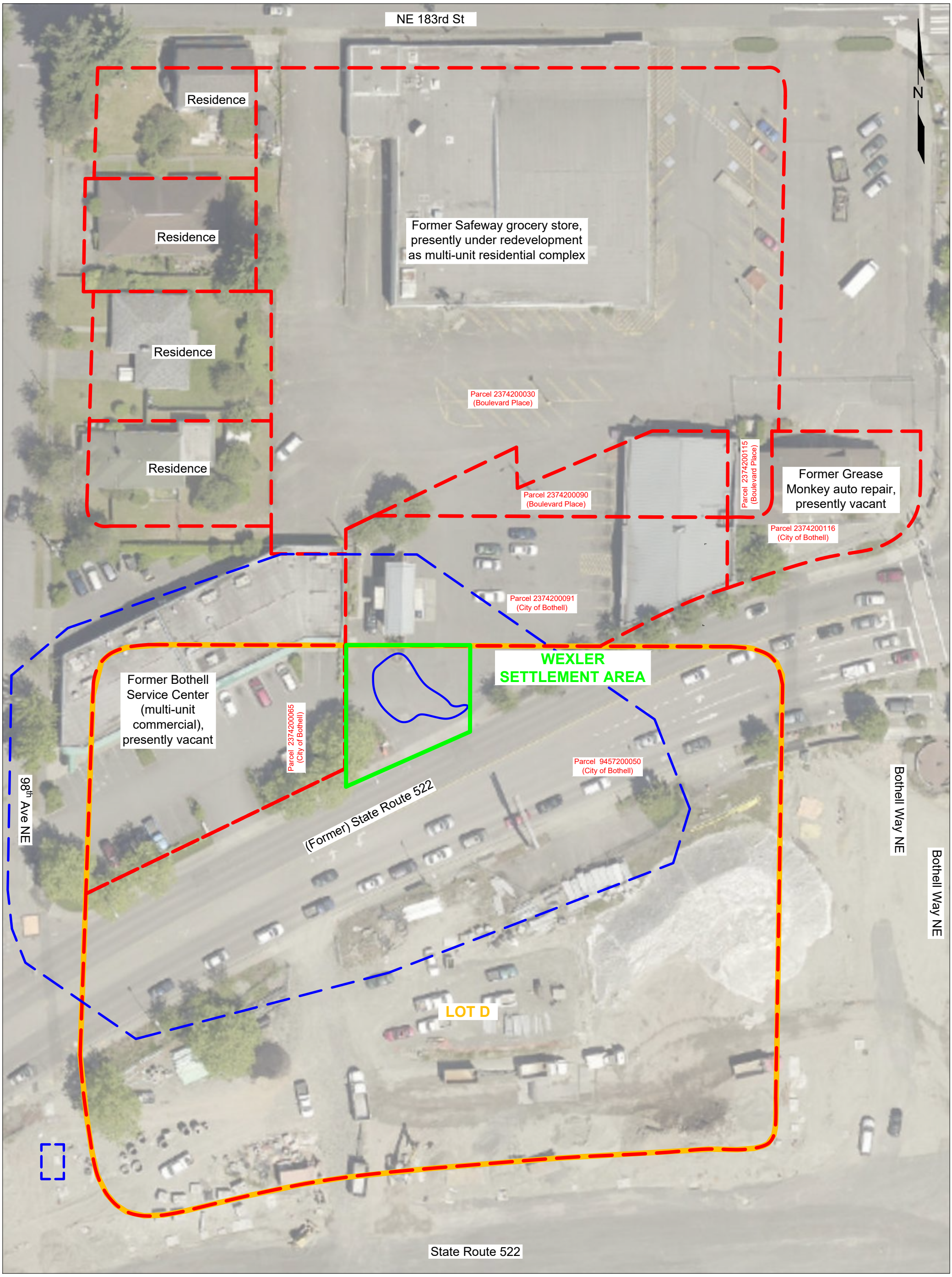
MW-3 — Location of deep monitoring well (screened 35-55 ft bgs) to be used for groundwater performance and compliance monitoring

KANE ENVIRONMENTAL INC

Project No. 82305

Cleanup Action Plan
Former Wexler Property Site
Bothell, Washington 98011

Attachment A
Groundwater Performance and Compliance Monitoring Wells



LEGEND

Aerial Photo Date: 2013

- Approximate location of Wexler Settlement Area
- Approximate location of Lot D
- Approximate location of parcel boundary, with label indicating parcel number and ownership
- Approximate location of Wexler Petroleum Contamination boundary
- Approximate location of BSCSS Site boundary

0 50 100
Approximate Scale in Feet

KANE ENVIRONMENTAL INC

Project No. 82305

DRAFT Supplemental Remedial Investigation / Feasibility Study
Wexler Settlement Area
Bothell, Washington 98011

Figure 3
Area Site Plan

Exhibit G
Wexler Schedule of Work and Deliverables

	Deliverables	Due (Calendar Days)[1]
	A. Administrative	
A.1	File first amendment to Consent Decree with the King County Superior Court	Within 5 days of the execution by the Parties
A.2	Notification of selected contractor name and qualifications	Within 5 days of the effective date of First Amendment to Consent Decree
A.3	Progress Reports	Quarterly on the 10th of the month beginning after the effective date of the First Amendment to Consent Decree
A.4	Financial Assurances – submit cost estimate for Ecology review and approval	Within 60 days of the effective date of First Amendment to Consent Decree
A.5	Financial Assurances - provide proof of financial assurances	Within 60 days after Ecology approves cost estimate (A.4)
	B. Design	
B.1	Draft Project Plans(2) and EDR Report(3)	Within 30 days of the effective date of First Amendment to Consent Decree
B.2	Final Project Plans and EDR Report	Within 5 days of receipt of Ecology's comments on the Draft EDR Report (B.1)
B.3	90 % Plans and Specs [per WAC 173-340-400(4)(b)]	Within 30 days of receipt of Ecology comments on Final EDR Report (B.2)
B.4	100 % Plans and Specs	Within 15 days of receipt of Ecology comments on 90 % plans and specifications (B.3)
	C. Field Construction	
C.1	Complete Construction Procurement	Within 45 days of completion of the 100% plans and specifications (B.4)
C.2	Complete Construction	Within 9 months of the effective date of First Amendment to Consent Decree
C.3	Cleanup Action Report and As-Built Drawings and Report [per WAC 173-340-400(6)(b)]	Within 60 days of completing construction (C.2)
	D. Post Construction Work	
D.1	Draft Environmental Covenant or Covenant Amendment (if required)	Within 30 days of receipt of Ecology request for Draft Environmental Covenant or Covenant Amendment
D.2	Record Final Environmental Covenant or Covenant Amendment with King County (if required)	Within 10 days after Ecology's approval of the Draft Covenant or Covenant Amendment (if required)
D.3	Protection Monitoring, Quarterly Compliance Monitoring (Performance and Confirmation)	Per the Compliance Monitoring Plan and Contingency Response Plan

1) *Schedule is in calendar days. Deliverable due date may be modified with Ecology concurrence without amendment to the Consent Decree.*

2) *Project Plans include the following: Work Plan, Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan, to be submitted for Ecology review and approval. All plans will include a schedule for implementation as applicable.*
3) *The Engineering Design Report includes: a Construction Quality Assurance Project Plan, a Compliance Monitoring and Contingency Response Plan, an Operation and Maintenance Plan, Proposed Best Management Practices, Water Quality Monitoring Plan, and Substantive Requirements of Procedurally Exempt Permits. Ecology will not approve the Final EDR until the required permits have been obtained.*