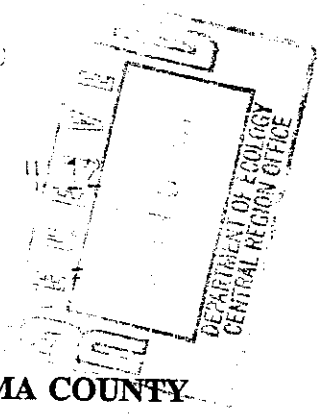
Richardson's Airway B



SUPERIOR COURT OF WASHINGTON FOR YAKIMA COUNTY

STATE OF WASHINGTON, DEPARTMENT OF ECOLOGY,

Plaintiff,

v.

CITY OF YAKIMA, YAKIMA COUNTY, and RALPH RICHARDSON,

Defendants.

No. 97 2 01093 5

CONSENT DECREE

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I. INTRODUCTION

A. In entering into this Consent Decree (Decree), the mutual objective of the Washington State Department of Ecology ("Ecology" or "Department"), and the Defendants (Yakima Air Terminal and Richardson's Airways) 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 Defendants to undertake the following remedial actions:

(1) Conduct long-term groundwater monitoring at the Richardson's Airways facility (the "Site") in accordance with the Cleanup Action Plan ("CAP") attached to this Decree as Exhibit B.

(2) File a restrictive covenant, attached as Exhibit C, with Yakima County, or other appropriate entity, within 120 days of the effective date of this Decree.

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

B. 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.

C. In signing this Decree, the Defendants agree to its entry and agree to be bound by its terms.

D. By entering into this Decree, the parties do not intend to discharge nonsettling 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.

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E. 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 the Defendants shall not challenge the jurisdiction of Ecology in any proceeding to enforce this Decree.

F. The Court is fully advised of the reasons for entry of this Decree, and good cause having been shown: IT IS HEREBY ORDERED, ADJUDGED, AND DECREED AS FOLLOWS:

II. JURISDICTION

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

B. Authority is conferred upon the Washington State Attorney General by RCW 70.105D.040(4)(a) to agree to a settlement with any potentially liable person if, after public notice and hearing, Ecology finds the proposed settlement would lead to a more expediti 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.

C. Ecology has determined that a release or threatened release of hazardous substances has occurred at the Site which is the subject of this Decree.

D. Ecology has given notice to the Defendants, as set forth in RCW 70.105D.020(15), of Ecology's determination that the Defendants are potentially liable persons for the Site and that there has been a release or threatened release of hazardous substances at the Site.

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

F. The Defendants have agreed to undertake the actions specified in this Decree and consent to the entry of this Decree under the MTCA.

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III. PARTIES BOUND

This Decree shall apply to and be binding upon the signatories to this Decree (parties), 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 the Decree. The Defendants agree to undertake all actions required by the terms and conditions of this Decree and not to contest state jurisdiction regarding this Decree. No change in ownership or corporate status shall alter the responsibility of the Defendants under this Decree. The 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 contractors and subcontractors will be in compliance with this Decree.

IV. DEFINITIONS

Except for as specified herein, all definitions in WAC 173-340-200 apply to the terms in this Decree.

A. Site: The Site, referred to as Richardson's Airways, is located at the Yakima Regional Airport, Yakima, Washington. The Site is located on a portion of the Yakima Regional Airport which is administered by the Yakima Air Terminal. The Site is more particularly described in Exhibit A to this Decree, which is a detailed site diagram. Historically the area where the contamination has been found refers to the "washdown site."

B. Parties: Refers to the Washington State Department of Ecology, Yakima Air Terminal, and Richardson's Airways, Inc. The Yakima Air Terminal shall be understood to include the City of Yakima and Yakima County, co-owners of the Yakima Regional Airport.

C. Defendants: Refers to Yakima Regional Airport and Richardson's Airways, Inc.

D. Consent Decree or Decree: Refers to this Consent Decree and each of the exhibits to the Decree. All exhibits are integral and enforceable parts of this Consent

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Decree. The terms "Consent Decree" or "Decree" shall include all exhibits to the Consent Decree.

E. Point of Compliance: The points of compliance for soil at the facility shall be the contiguous contaminated area in its entirety. These points were chosen so that the Site shall not be deemed clean until MTCA Method B cleanup levels, which are protective of groundwater, or other appropriate cleanup levels yet to be determined, are met throughout the Site.

V. STATEMENT OF FACTS

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

A. Yakima Air Terminal presently maintains and owns property on which Richardson's Airways, Inc. operated. The Yakima Air Terminal property is owned jointly by the City of Yakima and Yakima County.

B. The Yakima Air Terminal is an "owner or operator" as defined in RCW 70.105D.020(11) of a "facility" as defined in RCW 70.105D.020(4).

C. Richardson's Airways, Inc. is an "owner or operator" as defined in RCW 70.105D.020(11) of a "facility" as defined in RCW 70.105D.020(4).

D. Mr. Ralph Richardson operated Richardson's Airways, Inc., an aerial pesticide applicator service, on the Site for approximately 38 years between 1954 and 1992. Operations of the facility included filling an applicator airplane spray tank with pesticide solution, then upon completion of aerial spraying washing, cleaning or rinsing the airplane tank at the "washdown site." Waste water from the cleaning procedure was allowed to seep into the surrounding soils and drain into nearby catch basins.

E. Surface soil samples were taken at the "washdown site" in 1989 by Technico & Environmental Services Co., and in 1992 and in 1993 by CH2M-Hill, all environmental consultants retained by the Defendants. Laboratory results of the sampling confirm that

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hazardous substances (pesticides) are present at levels which exceed single-substance cleanup levels, Method B soil, protective of groundwater (WAC 173-340-740(3)(a)(ii)(A)). The results of these sampling activities are on file, and may be reviewed, at the Central Regional Office of the Washington State Department of Ecology in Yakima, Washington.

F. The substances found at the facility as described above are "hazardous substances" as defined by RCW 70.105D.020(7).

G. Based on the presence of these hazardous substances at the Site and all factors known to the Department, there is a release or threatened release of hazardous substances from the Site, as defined by RCW 70.105D.020(19).

H. Pursuant to RCW 70.105D.030(1) and RCW 70.105D.050, the Department may require potentially liable persons to investigate or conduct other remedial action with respect to the release or threatened release of hazardous substances from the Site.

I. By letter dated July 25, 1991, Ecology notified each of the Defendants of its status as a "potentially liable person" under RCW 70.105D.040 after notice and opportunity to comment.

J. Based upon site-specific data, Ecology has identified long-term groundwater monitoring at the Site to be protective of human health and the environment.

VI. WORK TO BE PERFORMED

This Decree contains a program designed to protect public health, welfare and the environment from the known release, or threatened release, of hazardous substances or contaminants at, on, or from the Site.

A. The Defendants shall conduct groundwater monitoring at the Richardson's Airways facility in Yakima, Washington for a period of at least five (5) years. The monitoring will be conducted as described in the Cleanup Action Plan for the Richardson's Airways facility, attached to this Decree as Exhibit B.

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B. The Defendants shall monitor the site groundwater for all organochlorine pesticides and all organophosphorus pesticides found at the facility and identified in the RI/FS.

C. In the event that any of the monitored contaminants are detected in the groundwater above the laboratory practical quantification limit (PQL), the Defendants shall immediately notify the Ecology site manager.

D. Upon receipt of a notification that a PQL has been attained or exceeded, the Department shall evaluate the information. If further information is necessary to assess the nature and extent of the contamination, the Department may require the Defendants to prepare and submit a groundwater monitoring parameter exceedence report within 60 days, unless an alternative deadline is specified in writing by the Department. The report shall assess the cause and significance of the exceedence and shall propose a response. Based on the evaluation of the report, the Department may specify responses to be implemented by the Defendants at the facility.

E. The schedule for implementing this Decree and the Cleanup Action Plan is outlined in Exhibit B. The implementation schedule becomes effective on the effective date of this Decree.

F. Within 120 days of the effective date of this Decree, the Defendants shall record the deed restriction, attached as Exhibit C, with the Yakima County Assessor, or other appropriate county entity, and return the signed copy to the Ecology site manager.

G. Within 15 days after the effective date of this Decree, the Defendants shall submit the name of the contractor who will implement the groundwater monitoring aspect of the CAP.

H. Within 30 days after the effective date of this Decree, the Defendants shall provide a draft Sampling and Analysis Plan for groundwater monitoring as described in WAC 173-340-820. Analytical methods and testing shall be in accordance with WAC 17

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340-830. If a Sampling and Analysis Plan exists from past sampling activities at the Site, it may be modified to reflect the requirements of this Decree, and submitted for Ecology review and approval.

I. Within 30 days of the effective date of this Decree, the Defendants shall submit a draft Quality Assurance/Quality Control Plan (QA/QC) for groundwater sampling and laboratory analysis of groundwater. If a QA/QC Plan exists from past sampling activities at the Site, it may be modified to reflect the requirements of this Decree, and submitted for Ecology review and approval.

J. Within 15 days after the effective date of this Decree, the Defendants shall submit the name of the project coordinator who shall be Ecology's contact at the Site.

K. In accordance with WAC 173-340-840(5), groundwater sampling data shall be submitted according to Exhibit E: GROUND WATER SAMPLING DATA SUBMITTAL REQUIREMENTS. These submittals shall be provided to Ecology as required under the schedule established in provision E, above.

L. The Defendants agree not to perform any remedial actions outside the scope of this Decree, unless the parties agree to amend the scope of work to cover these actions. All work conducted under this Decree shall be done in accordance with ch. 173-340 WAC unless otherwise provided herein.

VII. DESIGNATED PROJECT COORDINATORS

The project coordinator for Ecology is:

Donald Abbott
Washington Department of Ecology
15 West Yakima Ave., Suite 200
Yakima, WA 98902
Phone: (509) 454-7834

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The project coordinator for the Defendants is:

~~Bob Clem~~ Retired
Yakima Air Terminal
2400 West Washington Avenue
Yakima, WA 98903
Phone: (509) 575-6149

Each project coordinator shall be responsible for overseeing the implementation of this Decree. The Ecology project coordinator will be Ecology's designated representative at the Site. To the maximum extent possible, communications between Ecology and the 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 remedial work required by this Decree. The project coordinators may agree to minor modifications to the work to be performed without formal amendments to this Decree. Minor modifications will be documented in writing by Ecology.

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

VIII. PERFORMANCE

All work performed pursuant to this Decree shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or equivalent, with experience and expertise in hazardous waste site investigation and cleanup. Any construction work must be under the supervision of a professional engineer. The Defendants shall notify Ecology in writing as to the identity of such engineer(s) or hydrogeologist(s), or others, and of any contractors and subcontractors to be used in carrying out the terms of this Decree, in advance of their involvement at the Site.

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IX. ACCESS

Ecology or any Ecology-authorized representatives shall have the authority to enter and freely move about all property at the Site 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 the 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 the Defendants. All parties with access to the Site pursuant to this paragraph shall comply with approved health and safety plans.

X. SAMPLING, DATA REPORTING, AND AVAILABILITY

With respect to the implementation of this Decree, the Defendants shall make the results of all sampling, laboratory reports, and/or test results generated by it, or on its behalf available to Ecology and shall submit these results in accordance with Section XI of this Decree.

In accordance with WAC 173-340-840(5), ground water sampling data shall be submitted according to Appendix E: GROUND WATER SAMPLING DATA SUBMITTAL REQUIREMENTS. These submittals shall be provided to Ecology in accordance with Section XI of this Decree.

If requested by Ecology, the Defendants shall allow split or duplicate samples to be taken by Ecology and/or its authorized representatives of any samples collected by the Defendants pursuant to the implementation of this Decree. The Defendants shall notify Ecology seven (7) days in advance of any sample collection or work activity at the Site. Ecology shall, upon request, allow split or duplicate samples to be taken by the Defendants or its authorized representatives of any samples collected by Ecology pursuant to the implementation of this Decree, provided it does not interfere with the Department's

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sampling. Without limitation on Ecology's rights under section IX, Ecology shall endeavor to notify the Defendants prior to any sample collection activity.

XI. PROGRESS REPORTS

The Defendants shall submit to Ecology written quarterly progress reports which describe the actions taken during the previous quarter to implement the requirements of this Decree. The progress reports shall include the following:

A. All data shall be reported in graphical form with concentration over time in addition to reporting in tables, unless sampling results show non-detects at the method detection limit and then the results may be submitted in tables only;

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 schedule during the current sampling period and any deviations in the upcoming sampling period;

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

E. A list of deliverables for the upcoming sampling period if different from the schedule.

All monitoring reports shall be submitted within 45 days of the sampling event. 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

The Defendants shall preserve, 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 XXV, all records, reports, documents, and underlying data in its possession relevant to the implementation of this Decree and shall insert in contracts with project contractors and

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subcontractors a similar record retention requirement. Upon request of Ecology, the Defendants shall make all non-archived records available to Ecology and allow access for review. All archived records shall be made available to Ecology within a reasonable period of time.

XIII. TRANSFER OF INTEREST IN PROPERTY

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

Prior to transfer of any legal or equitable interest in all or any portion of the property, and during the effective period of this Decree, the Defendants shall serve a copy of this Decree upon any prospective purchaser, lessee, transferee, assignee, or other successor in interest of the property; and, at least thirty (30) days prior to any transfer, The Defendants shall notify Ecology of said contemplated transfer.

XIV. RESOLUTION OF DISPUTES

A. In the event a dispute arises as to an approval, disapproval, proposed modification, or other decision or action by Ecology's project coordinator, the parties shall utilize the dispute resolution procedure set forth below.

(1) Upon receipt of the Ecology project coordinator's decision, the Defendants have fourteen (14) days within which to notify Ecology's project coordinator of their objection to the decision.

(2) The parties' project coordinators shall then confer in an effort to resolve the dispute. If the project coordinators cannot resolve the dispute within fourteen (14) days, Ecology's project coordinator shall issue a written decision.

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(3) The Defendants may then request Ecology management review of the decision. This request shall be submitted in writing to the Toxics Cleanup Program Manager within seven (7) days of receipt of Ecology's project coordinator's decision.

(4) Ecology's Program Manager shall conduct a review of the dispute and shall issue a written decision regarding the dispute within thirty (30) days of the Defendants' request for review. The Program Manager's decision shall be Ecology's final decision on the disputed matter.

B. If Ecology's final written decision is unacceptable to the Defendants, the Defendants 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. In the event the Defendants present an issue to the Court for review, the Court shall review the action or decision of Ecology on the basis of whether such action or decision was arbitrary and capricious and render a decision based such standard of review.

C. 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.

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.

XV. AMENDMENT OF CONSENT DECREE

This Decree may only be amended by a written stipulation among the parties to this Decree that is entered by the Court or by order of the Court. Such amendment shall become effective upon entry by the Court. Agreement to amend shall not be unreasonably withheld by any party to the Decree.

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The Defendants shall submit any request for an amendment to Ecology for approval. Ecology shall indicate its approval or disapproval in a timely manner after the request for amendment is received. If the amendment to the Decree is substantial, Ecology will provide public notice and opportunity for comment. Reasons for the disapproval shall be stated in writing. If Ecology does not agree to any proposed amendment, the disagreement may be addressed through the dispute resolution procedures described in section XIV of this Decree.

XVI. EXTENSION OF SCHEDULE

A. An extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least 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 the reason(s) the extension is needed.

An extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. A requested extension shall not be effective until approved by Ecology or the Court. Ecology shall act upon any written request for extension in a timely fashion. It shall not be necessary to formally amend this Decree pursuant to section XV when a schedule extension is granted.

B. The burden shall be on the 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 includes, but is not limited to, the following.

(1) Circumstances beyond the reasonable control and despite the due diligence of the 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 the Defendants; or

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(2) Acts of God, including fire, flood, blizzard, extreme temperature, storm, or other unavoidable casualty; or

(3) Endangerment as described in section XVII.

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

C. Ecology may extend the schedule for a period not to exceed ninety (90) days, except where an extension is needed as a result of:

(1) Delays in the issuance of a necessary permit which was applied for in a timely manner; or

(2) Other circumstances deemed exceptional or extraordinary by Ecology; or

(3) Endangerment as described in section XVII.

Ecology shall give the Defendants written notification in a timely fashion of any extensions granted pursuant to this Decree.

XVII. ENDANGERMENT

In the event Ecology determines that activities implementing or in noncompliance with this Decree, or any other circumstances or activities, are creating or have the potential to create a danger to the health or welfare of the people on the Site or in the surrounding area or to the environment, Ecology may order the Defendants to stop further implementation of this Decree for such period of time as needed to abate the danger or may petition the Court for an order as appropriate. During any stoppage of work under this section, the obligations of the Defendants with respect to the work under this Decree which is ordered to be stopped shall be suspended and the time periods for performance of that work, as well as the time period for any other work dependent upon the work which is

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stopped, shall be extended, pursuant to section XVI of this Decree, for such period of time as Ecology determines is reasonable under the circumstances.

In the event the Defendants determine that activities undertaken in furtherance of this Decree or any other circumstances or activities are creating an endangerment to the people on the Site or in the surrounding area or to the environment, the Defendants may stop implementation of this Decree for such period of time necessary for Ecology to evaluate the situation and determine whether the Defendants should proceed with implementation of the Decree or whether the work stoppage should be continued until the danger is abated. The Defendants shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after such stoppage of work, and thereafter provide Ecology with documentation of the basis for the work stoppage. If Ecology disagrees with the Defendants' determination, it may order the Defendants to resume implementation of this Decree. If Ecology concurs with the work stoppage, the Defendants' obligations shall be suspended and the time period for performance of that work, as well as the time period for any other work dependent upon the work which was stopped, shall be extended, pursuant to section XVI of this Decree, for such period of time as Ecology determines is reasonable under the circumstances. Any disagreements pursuant to the clause shall be resolved through the dispute resolution procedures in section XIV.

XVIII. OTHER ACTIONS

Ecology reserves its rights to institute remedial action(s) at the Site and subsequently pursue cost recovery, and Ecology reserves its rights to issue orders and/or penalties or take any other enforcement action pursuant to available statutory authority under the following circumstances:

(1) Where the Defendants fail, after notice, to comply with any requirement of this Decree;

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(2) In the event or upon the discovery of a release or threatened release not addressed by this Decree;

(3) Upon Ecology's determination that action beyond the terms of this Decree is necessary to abate an emergency situation which threatens public health or welfare or the environment; or

(4) Upon the occurrence or discovery of a situation beyond the scope of this Decree as to which Ecology would be empowered to perform any remedial action or to issue an order and/or penalty, or to take any other enforcement action. This Decree is limited in scope to the geographic site described in Exhibit A and to those contaminants which Ecology knows to be at the Site when this Decree is entered.

Ecology reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances from Richardson's Airways.

Ecology reserves the right to take any enforcement action whatsoever, including a cost recovery action, against potentially liable persons not party to this Decree.

XIX. INDEMNIFICATION

The 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 for death or injuries to persons or for loss or damage to property arising from or on account of acts or omissions of the Defendants, their officers, employees, agents, or contractors in entering into and implementing this Decree. However, the Defendants shall not indemnify the state of Washington, nor save nor hold its employees and agents harmless from any claims or causes of action arising out of the negligent acts or omissions of the state of Washington, or the employees or agents of the state, in implementing the activities pursuant to this Decree.

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XX. COMPLIANCE WITH APPLICABLE LAWS

A. All actions carried out by the Defendants 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 paragraph B of this section.

B. Pursuant to RCW 70.105D.090(1), the substantive requirements of chapters 70.94, 70.95, 70.105, 75.20, 90.48, and 90.58 RCW, and of any laws requiring or authorizing local government permits or approvals for the remedial action under this Decree that are known to be applicable at the time of entry of the Decree have been included in Exhibit B, the Cleanup Action Plan, and are binding and enforceable requirements of the Decree.

The Defendants 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 the Defendants or Ecology determine that additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Decree, they shall promptly notify the other party of this determination. Ecology shall determine whether Ecology or the Defendants shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, the Defendants 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 Defendant and on how the Defendants must meet those requirements. Ecology shall inform the Defendants in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Decree. The Defendants shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

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Ecology shall ensure that notice and opportunity for comment is provided to the public and appropriate agencies prior to establishing the substantive requirements under this section.

C. 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 which is necessary for the state to administer any federal law, the exemption shall not apply, and the Defendants 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.

XXI. REMEDIAL AND INVESTIGATIVE COSTS

The Defendants agree to pay costs incurred by Ecology pursuant to this Decree. These costs shall include work performed by Ecology or its contractors for, or on, the Site under Ch. 70.105D RCW both prior to and subsequent to the issuance of this Decree fo investigations, remedial actions, and Decree preparation, negotiations, oversight and administration. Ecology costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173-340-550(2). The Defendants agree to pay the required amount within ninety (90) 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. Failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement will result in interest charges.

XXII. IMPLEMENTATION OF REMEDIAL ACTION

If Ecology determines that the Defendants have failed, without good cause, to implement the remedial action, Ecology may, after notice to the Defendants, perform any or all portions of the remedial action that remain incomplete. If Ecology performs all o

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portions of the remedial action because of the Defendants' failure to comply with its obligations under this Decree, the Defendants shall reimburse Ecology for the costs of doing such work in accordance with section XXI, provided that the Defendants are not obligated under this section to reimburse Ecology for costs incurred for work inconsistent with or beyond the scope of this Decree.

XXIII. FIVE YEAR REVIEW

As remedial action, including ground water monitoring, continues at the Site, the parties agree to review the progress of remedial action at the Site, and to review the data accumulated as a result of site monitoring as often as is necessary and appropriate under the circumstances. At least once every five years the parties shall meet to discuss the status of the Site and the need, if any, of further remedial action at the Site. Ecology reserves the right to require further remedial action at the Site under appropriate circumstances. This provision shall remain in effect for the duration of the Decree.

XXIV. PUBLIC PARTICIPATION

Ecology shall maintain the responsibility for public participation at the Site. However, the Defendants shall cooperate with Ecology and, if agreed to by Ecology, shall:

A. 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 and engineering design reports. Ecology will finalize (including editing if necessary) 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 the Defendants prior to the issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments;

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
PO Box 40117
Olympia, WA 98504-0117
FAX (360) 438-7743

C. Participate in public presentations on the progress of the remedial action at the Site. Participation may be through attendance at public meetings to assist in answering questions, or as a presenter;

D. In cooperation with Ecology, arrange and/or continue information repositories to be located at the Yakima Valley Regional Library at 102 North 3rd Street, Yakima, Washington, and at Ecology's Central Regional Office located at 15 West Yakima Avenue, Yakima, Washington. At a minimum, copies of all public notices, fact sheets, and press releases; all quality-assured ground water, surface water, soil sediment, and air monitoring data; remedial actions plans, supplemental remedial planning documents, and all other similar documents relating to performance of the remedial action required by this Decree shall be promptly placed in these repositories.

XXV. DURATION OF DECREE

This Decree shall remain in effect and the remedial program described in the Dec shall be maintained and continued until the Defendants have received written notification from Ecology that the requirements of this Decree have been satisfactorily completed.

XXVI. CLAIMS AGAINST THE STATE

The 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 the Defendants will make no claim against the State Toxics Control Account, with the exception of the Local Toxics Control Account, for any costs incurred in implementing this Decree. Except as provided above, however, the Defendants expressly reserve their right to seek to recover any costs incurred in implementing this Decree from any other potentially liable person.

XXVII. EFFECTIVE DATE

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

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Olympia, WA 98504-0117
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XXVIII. PUBLIC NOTICE AND WITHDRAWAL OF CONSENT

This Decree has been the subject of public notice and comment under RCW 70.105D.040(4)(a). As a result of this process, Ecology has found that this Decree will lead to a more expeditious cleanup of hazardous substances at the Site.

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.

Mary E. Burg

MARY BURG
Program Manager
Toxics Cleanup Program
Department of Ecology
Date 2.25 97

STEVEN J. THIELE
Assistant Attorney General
State of Washington
Department of Ecology
Date 2-25-97

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CITY OF YAKIMA

Raymond L. Paolella 4/1/97
City Attorney Date

4/1/97
Date

Date

Date

Date

Date

YAKIMA COUNTY

5/6/97
Deputy Prosecuting Attorney Date

5/7/97
Date

Date

Date

Date

Date

RICHARDSON'S AIRWAYS, INC.

Ralph Richardson
RALPH RICHARDSON, pro se
Dated_____

DATED this 9th day of May, 1997.

Robert M. Hackett, Jr.
JUDGE
Yakima County Superior Court

f:\ \Richair\yakair.Cd

ATTORNEY GENERAL OF WASHINGTON
Ecology Division
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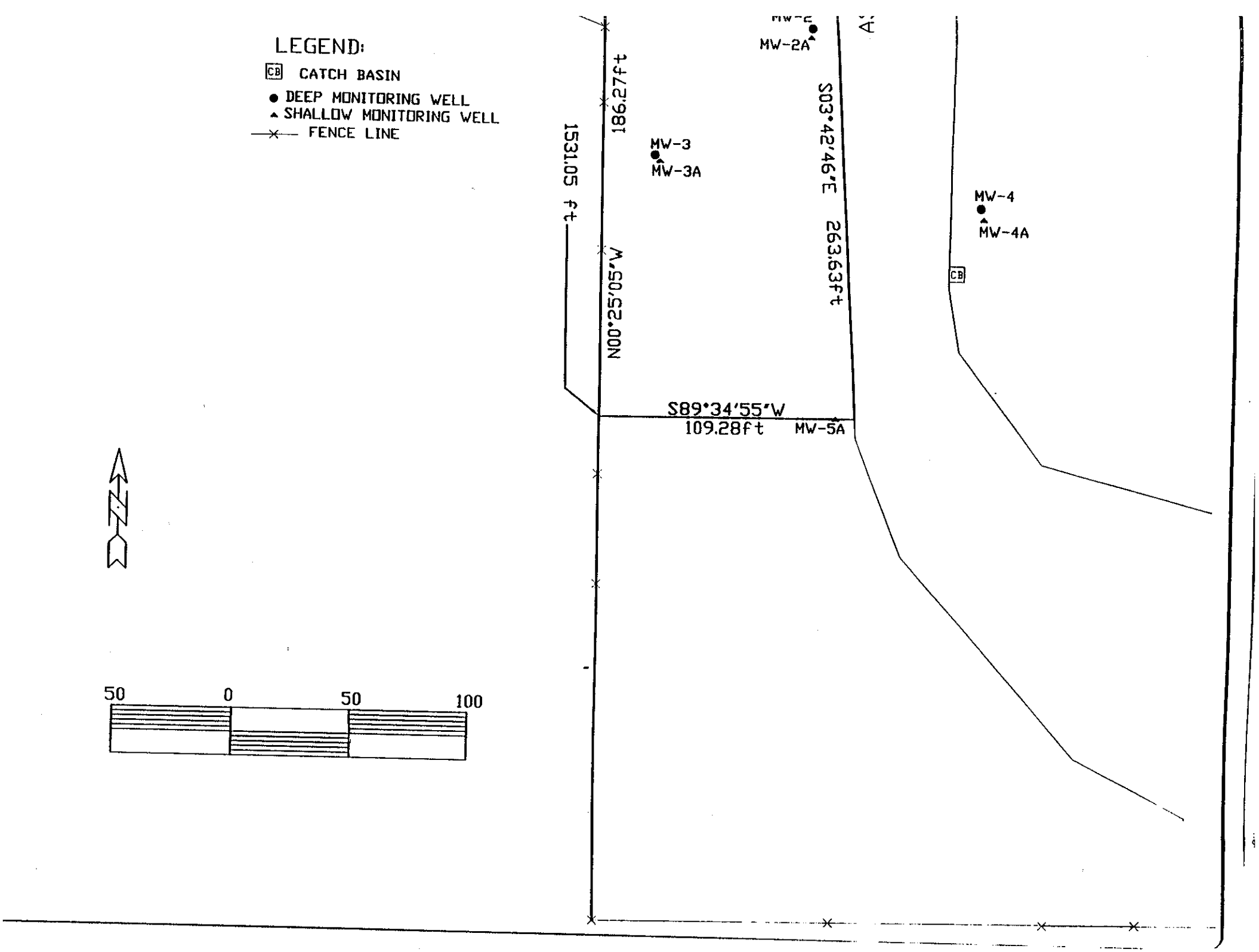
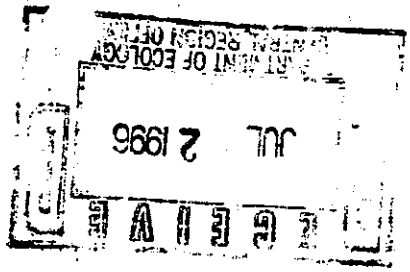
EXHIBIT A

SITE MAP

Richardsons Airways


LEGEND:
CB CATCH BASIN
DEEP MONITORING WELL
SHALLOW MONITORING WELL
FENCE LINE
MW-2A
MW-3
MW-3A
MW-4
MW-4A
MW-5A
CB
186.27ft
1531.05 ft
N00°25'05"W
S03°42'46"E
263.63ft
S89°34'55"W
109.28ft
50
0
50
100

MAXIM
TECHNOLOGIES INC



CLEANUP ACTION PLAN (CAP)

FOR

RICHARDSON AIRWAY INC., WASHDOWN SITE,
2400 WEST WASHINGTON AVENUE, YAKIMA, WASHINGTON

Prepared for:
Potential Liable Persons
Richardson Airway, Inc.

Prepared by:
MAXIM TECHNOLOGIES, INC.
Engineering and Environmental Consultants
402 East Yakima Avenue Suite 750
Yakima, Washington, 98901
(509) 577-8592
(509) 577-8520 FAX

APRIL, 1996

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MAXIM
TECHNOLOGIES INC

1.0 INTRODUCTION

At the request of Potential Liable Persons (PLPs) for the Richardson Airway site in Yakima, Maxim Technologies Inc. (Maxim), prepared a groundwater monitoring Cleanup Action Plan (CAP) for the Richardson Airway Inc., washdown site. The PLPs for this site include Mr. Ralph Richardson, the City of Yakima represented by Mr. Raymond L. Paolella, and Yakima County represented by Mr. Terry Austin. The CAP was prepared in accordance with agreement reached at the October 19, 1995 meeting between Mr. Don Abbott, Washington Department of Ecology (Ecology) Site Manager, Richardson Airway PLPs and Ms. Rachel Tauman, Maxim's Project Manager. The CAP will be attached to the Model Toxics Control Act (MTCA) Consent Decree that will be negotiated between Ecology and the PLPs.

1.1 Site Description

Richardson Airway, Inc., is located at the Yakima Airport at 2400 West Washington Avenue, in Yakima, Washington. The Yakima Airport is managed by the Yakima Air Terminal. The Yakima Air Terminal property (809 acres) is owned jointly by the City of Yakima and Yakima County. Richardson Airway, Inc., was an areal pesticide application service and aircraft storage facility that had leased property from the Yakima Air Terminal from 1953 to 1992. The Richardson Airway site is situated immediately west of an inactive north-south trending taxiway. Richardson Airway's operation was conducted from two active aircraft "T" hangars, an office and shop complex, and a metal shed for equipment storage. The total area leased by Richardson Airway was approximately 157,000 square feet. The area used by Richardson Airway subject to this Work Plan is the washdown site located southeast of the office complex and "T" hangars. The site encompasses approximately 17,000 square feet (CH2MHILL, 1993-Figure 1).

1.2 Site History

At the washdown site, agricultural chemicals (pesticides and herbicides) were added to aerial spray equipment and the spray equipment was rinsed directly onto the soil. Soil contamination above MTCA Method B/protective of groundwater criteria was reported subsequent to sampling of the site soil by Ecology in 1988.

In 1992-1993, a Remedial Investigation/Feasibility Study (RI/FS) was conducted at the site in order to assess potential threats attributable to contamination from past activities. The RI/FS confirmed that the soil was contaminated with low concentrations of pesticides and herbicides. Two groundwater monitoring wells, in the washdown area, were constructed and screened in the gravel section between 9 and 19 ft below grade. The wells intersected contaminated soil in the upper 9 ft. Two rounds of groundwater sampling indicated the groundwater in the gravel section at the site was not contaminated.

The conclusion reached from the analysis of data collected during the RI/FS was that, due to the low concentrations and low mobility of the pesticides and herbicides in the soil, the recommended cleanup should be to contain the soil in place with an impermeable cap or no action. Both cleanup alternatives incorporate groundwater monitoring and institutional controls to limit public access.

In 1995, the site and the RI/FS were reviewed by Ecology and Maxim. During the review, several data gaps became apparent. These data gaps and the data collected to fill them are described below:

- Pesticide contamination in shallow groundwater. Because the wells were screened mostly between 9 and 19 ft below grade in the gravel section and below the zone of contaminated soil, it was not known whether pesticides

were present in groundwater in the overlying silt zone. Because the gravel section has hydraulic conductivities and groundwater flux estimated to be three (3) orders of magnitude greater than the overlying silt zone (Freeze and Cherry 1979; Appendix A), it was important to separately analyze the upper silty interval, between 4 and 9 ft below grade. To accomplish this, additional groundwater monitoring wells were drilled and screened between 4 and 9 ft (Maxim, 1995b).

- Petroleum and volatile organic compounds in groundwater were not analyzed. The presence of petroleum hydrocarbons in the soil immediately up-gradient of the site was a cause of concern as petroleum hydrocarbons are able to mobilize otherwise immobile pesticides present in the soil column. To fill this data gap, additional groundwater samples were collected and tested for petroleum hydrocarbons and volatile organic constituents (VOCs) in addition to pesticides.

Analyses of the above described additional data determined that the groundwater both in the shallow silt zone and the deeper gravel zone was not contaminated with pesticides, petroleum hydrocarbons, or VOCs.

The conclusion from the additional data collected during 1995 was that, due to the low concentrations of pesticides in the soil, their absence from groundwater, the lack of down-gradient receptors, and the inaccessibility of this site to the public, a monitoring program would be an effective method of protecting human health and the environment at the site.

2.0 *REGULATORY REQUIREMENTS*

2.1 Selection of Cleanup Actions

Under WAC 173-340-360(2), the threshold requirements of protectiveness and meeting cleanup standards must be attained by the selected action. The following alternative types of treatment were identified in the RI/FS (CH2MHILL, 1993):

1. Institutional controls and groundwater monitoring. If it can be demonstrated that institutional controls inhibit direct contact exposure and the current soil conditions do not act as a source of cross contamination to other media at unacceptable levels, then the threshold requirements are met.

2. Paving of the washdown site and groundwater monitoring. A pavement cap would prevent direct contact and provide assurance of limited future site use. Paving of the area would serve as an engineering barrier to isolate the remaining contaminated soils from direct contact. It would also remove the possibility of incident precipitation mobilizing the contained contaminants.

3. Excavation and Removal of all affected soil to a local sanitary landfill. If it is determined that MTCA Method B cleanup levels are the applicable standards for the site, then this action would meet the threshold requirements.

4. Excavation and removal/local sanitary landfill - "hot spots" only. This alternative could be consistent with threshold criteria depending on the definition of "hot spots". It could reduce risk by removing the most contaminated soil and also serve to minimize the potential that the washdown site soils would act as a source for contaminant migration or cross media contamination in the future.

The criteria for selection of a cleanup action at contaminated sites are addressed in MTCA. WAC 173-340-360(5)(d) states "Ecology recognizes that a permanent solutions may not be practicable for all sites. A determination that a cleanup action satisfies the requirement to use permanent solutions to the maximum extent practicable is based upon consideration of a number of factors. The following criteria shall be used to determine whether a cleanup action is permanent to the maximum extent practicable":

(i) Overall protectiveness of human health and the environment
(ii) Long term effectiveness
(iii) Short term effectiveness
(vi) Permanent reduction of toxicity, mobility and volume
(v) Ability to implement
(vi) Cleanup costs
(vii) Community concerns

A permanent solution for the cleanup at the Richardson Airway washdown site would entail a permanent reduction of toxicity, mobility and volume. This permanent solution was considered but was determined to be inappropriate for the site. Removal of all contaminated soil above the MTCA Method B/protective of groundwater criteria to a landfill was proposed in Alternative 3 above. Complete soil removal would require excavation of the entire site to 10.5 ft below surface, removal of approximately 7000 cubic yards of soil, and transport to and disposal of contaminated soil in a landfill. This removal would be costly yet it would not provide a sufficiently greater degree of protection to justify its cost. The excavation would then be backfilled with clean material. Even this alternative would not constitute a complete permanent solution. Although contaminated soil would be removed from the site, there would not be any permanent reduction of toxicity, mobility and volume of contamination.

2.2 Substantial and Disproportionate Costs

Ecology has chosen institutional controls and long term monitoring as the remedial action provided minimum requirements are met. Requirements for an adequate monitoring plan include additional monitoring wells screened across the water table, repeating all prior groundwater sampling including additional analyses for VOCs and petroleum hydrocarbons, water level measurements, and annual monitoring. In addition, a restrictive covenant and long term restriction on the land title would be executed (Abbott, 1995)

Institutional controls and long term monitoring for the washdown site are an acceptable alternative consistent with regulatory requirements. Although WAC 173-340-360 (4)(a) (vii) considers institutional controls and monitoring the lowest preference of seven cleanup alternatives, it is acceptable under WAC 173-340-360 (5)(vi) which states "a cleanup action shall not be considered practicable if the incremental cost of the cleanup action is substantial and disproportionate to the incremental degree of protection it would achieve over a lower preference cleanup action." The cost of institutional controls and long term monitoring is estimated at $30,000.00. In comparison, the estimated cost for the higher preference solution consisting of excavation and disposal is estimated to be greater than $300,000.00. Institutional controls and long term monitoring are a practical alternative for the washdown site. To attain the higher preference solution, the excavation of at least 7000 cubic yards of soils contaminated with low levels of pesticides would be required. The excavated soils would than be removed and transported to a landfill. The excavation subsequently would be backfilled with clean material. The $300,000.00

estimated cost of excavation and removal would not be a permanent solution in that the contamination would be moved to another site and future potential liability would result from the disposal. Additionally, excavation and disposal would not provide a significantly greater degree of protection than institutional controls and long term monitoring. The site is not available for public use, and a restrictive covenant will provide that the site will not be disturbed in the future. Pesticides have not been detected in groundwater at, or down-gradient of the site. Therefore, the cleanup cost for complete removal at this site is substantial and disproportionate to the incremental degree of protection it would achieve over institutional controls and long term monitoring.

3.0 *CONTAMINANT AND SITE CHARACTERIZATION*

The selection of institutional controls and long term monitoring as the remedial action at the Richardson Airway washdown site is supported by technical data collected at this site. The distribution of the pesticides in the subsurface, the physicochemical properties of the contaminants, and the hydrogeological characteristics of the site all support the selected remedy.

3.1 Distribution of Organochlorine Pesticides in the Subsurface

Although organochlorine pesticides at concentrations above the MTCA Method B/protective of groundwater criteria have been measured in the soil of the washdown site, they have not been detected in the groundwater. The three major pesticides present at the site are dieldrin, DDT and endosulfan. Aldrin and its decomposition product dieldrin have been detected in the site soil to a depth of 9.0 ft below surface. DDT and its breakdown products DDE (aerobic environment) and DDD (reducing environment) have been detected to 10.5 ft below surface. Endosulfan has been detected to 9.0 below surface. None of these pesticides, however, has been detected in the groundwater. The lack of groundwater contamination may be attributed to the

immobility of these organochlorine pesticides. This immobility is ascribed to the chemical nature of the contaminants and the hydrogeologic characteristics of the site. Factors contributing to the immobility of chlorinated pesticides at the site are described below.

3.2 Physicochemical Properties of the Contaminants

- ***High adsorption capacities of the site soils.*** Organochlorine pesticides such as those present at this site tend to sorb strongly to soils. The clayey nature of the near surface soils further enhances the sorption of the pesticides thus impeding their mobility in the soil column. The physicochemical property found to be most predictive of mobility of chemicals in soil is K_{oc}, the sorption coefficient normalized to organic carbon content. Chemicals with sorption coefficients in the upper hundreds to thousands are generally regarded as immobile in soil (Felsot, 1994). In the case of organochlorine pesticides, the order of magnitude values for K_{oc} range from 10^3 cm^3/g to 10^6 cm^3/g (Howard, 1991; Hazardous Substances Data Bank 1992). For example, the sorption coefficient for DDT is 2,000,000 cm^3/g. These very high values demonstrate that these pesticides will be strongly sorbed to soil. Therefore, their concentrations in groundwater, if any, would probably be below the Practical Quantitation Limits (PQLs) of current detection techniques (Felsot, 1994).

- ***Low solubility of the pesticides at the site.*** Solubility also controls the ability of contaminants to migrate. Organochlorine pesticides have very low solubilities in water. The solubility of the pesticides found at the site range from 10^{-3} mg/L to 10^{-1} mg/L (Howard 1991; Hazardous Substances Data Bank 1992). These concentrations correspond to between one part of contaminant and one hundred parts of contaminant dissolving in one billion parts of water. These very low solubilities decrease the likelihood of migration through groundwater of pesticides that may be sorbed from the soil (Howard, 1991; ADA 1995).

3.3 Hydrogeologic Characteristics of the Site

- ***Low Infiltration Rate.*** The site is located in a relatively low precipitation area, approximately 7.6 inches per year (CH2MHILL 1992), which reduces infiltration of moisture into the soil. This site also has a healthy vegetative ground cover which allows much of the precipitation to transpire back to the atmosphere, rather than infiltrate. The low permeability of the fine grained soils combined with the small amounts of infiltrated water restrict the downward migration of contaminants in the unsaturated zone (Fetter, 1993; Felsot 1994).

- ***Low hydraulic conductivities of the contaminated soil.*** The pesticide contaminated soil at the washdown site is present between the surface and 10.5 ft below the surface. The soil column is mottled and consists largely of discontinuous layers of silt, silty clay and clay. The lower portion of this interval is saturated by groundwater. Typically, these fine grained soils exhibit low hydraulic conductivity. The saturated hydraulic conductivity of the contaminated interval at the site is estimated to be on the order of 0.1 ft/ day (Freeze and Cherry 1979; Fetter, 1993). The groundwater gradient in the vicinity of the washdown area is 0.004 ft/ft (Maxim, 1995). The effective porosity of the this soil matrix is likely to be in the range of 15% due to the high clay content. Consequently, using Darcy's law, the rate of contaminant transport in the contaminated interval beneath the Richardson washdown area is calculated to be less than one foot per year. This low rate of advective transport by groundwater minimizes the probability that any detectable contaminants in groundwater could migrate from the site before being reduced to undetectable concentrations by dispersion and sorption.

- ***Comparison of hydraulic characteristics between the upper and lower aquifers.*** The low hydraulic conductivity of the upper aquifer silty interval is in sharp contrast with the underlying aquifer. This contrast can be seen in the soil

samples where there is a sharp contact between the upper and lower aquifers. The underlying aquifer between 9 ft and 19 ft below grade consists of coarse grain sands and gravels. This coarse grain matrix results in a greater hydraulic conductivity and higher groundwater flux than is seen in the overlying fine grain silty aquifer. The hydraulic conductivity of this aquifer is estimated to be 100 ft/day, about three (3) orders of magnitude greater than the 0.1 ft/day estimated for the overlying silt aquifer (Freeze and Cherry, 1979). The groundwater flux in the lower aquifer is estimated to be approximately 1920 cubic ft/day, about three (3) orders of magnitude greater than the 0.960 cubic ft/day estimated for the overlying silt aquifer (Maxim, 1996-Appendix A).

- ***Lack of preferential flow paths.*** Preferential flow paths in the unsaturated zone, which address the flow of water through macropores characteristic of structured soils, would allow pesticide residues to be found in groundwater within days to weeks after an application. While the most important factors in the mobility of chemicals in the soils are precipitation amounts, infiltration or recharge rates, soil structure, and organic carbon content, preferential flow studies indicate chemicals can move to lower depths very quickly in some circumstances (Felsot, 1994). Such findings are attributed to flow through large, discontinuous macropores even without the soil first being saturated. In these circumstances, a chemical would be detected in groundwater soon after application. The fact that no pesticides were detected in both the shallow (4 ft to 9 ft) and the deeper zones (10 ft to 20 ft), even though pesticides were found in the soil at these depths (to 10.5 ft), suggested that preferential flow is not an operative mechanism at this site (Felsot, 1994). The lack of preferential flow paths, the hydrophobic nature of the material and the sorptive capacities of the soil resulted in the absence of pesticides in the groundwater.

4.0 *DISCUSSION*

The technical information presented in the previous section supports institutional controls and long term monitoring as an appropriate remedial action at this site. Hydrogeological characteristics of the washdown site combined with the physicochemical properties of the organochlorine pesticides limit the likelihood of contaminant transport at this site. The low hydraulic conductivity of the fine-grained soils and low groundwater gradient minimize the velocity and volume of water moving within the subsurface. This reduced volume and velocity of groundwater hinders the advective transport of contaminants even if the contaminated zone is flooded due to seasonal fluctuations in the water table elevation. The physicochemical characteristics of the pesticides found at this site preclude migration of contamination by any of the available transport mechanisms and render them essentially immobile in this environment. The pesticides adsorb strongly to soils, especially the fine-grained, clayey soils at this site, and are highly hydrophobic (insoluble in water). Thus, there is a low probability that these pesticides will leach from the soil into the groundwater.

These characteristics of high adsorbance and low solubility also explain the extended persistence of organochlorine pesticides in soils at the site. Since the pesticides are strongly sorbed to soil particles and are minimally soluble, they are also less available for microbial metabolism which preferentially attacks dissolved constituents. Consequently, pesticides are extremely persistent. Dieldrin, for instance, has been detected in soil more than seven years after its release (Howard, 1991). The molecules of these organochlorine pesticides simply prefer to remain attached to the surfaces of the soil matrix than to dissolve into the groundwater.

5.0 *CONCLUSIONS*

Data collected for the RI/FS and additional work performed during the fall of 1995 show that groundwater is not contaminated with pesticides at the Richardson Airway washdown site. This is true although the soil at this site is contaminated concentrations of pesticides which exceed the MTCA Method B/protective of groundwater concentrations. The hydrogeological characteristics of the Richardson Airway site and the inherent chemistry of the pesticides themselves immobilized the pesticides in the site soil. Since there are no down-gradient receptors and the RI/FS and additional data collected show that the groundwater both in the contaminated upper silty interval and the underlying gravel is not contaminated, a remedial action such as excavation is not required. Institutional controls combined with long term monitoring are sufficiently protective of human health and the environment at this site without the complete removal and disposal. Institutional controls will ensure that future use of the site will minimize exposure to the public to the pesticides through direct contact or groundwater use. Monitoring will be required to confirm that no future groundwater contamination occurs. Institutional controls together with a monitoring program constitute an appropriate and effective method of protecting public health and the environment at this site.

6.0 *WORK TO BE PERFORMED*

This section of the CAP outlines the elements of a long term monitoring program to be implemented at the Richardson Airway washdown site as part of the recommended remedial action.

6.1 Background

Prior to the preparation of the CAP, Maxim drilled two (2) groundwater monitoring wells, MW-2A and MW-3A, completed in the shallow silt zone, in the washdown site, adjacent to the deeper monitoring wells, MW-2 and MW-3. These wells were drilled in the most highly contaminated areas described in the RI/FS. Maxim then sampled pesticides in the two new shallow wells and the four existing deep wells, added analyses for VOCs and petroleum hydrocarbons, measured water level elevations, and prepared groundwater gradient maps (Maxim, 1995a & b). Sample analysis results for pesticides, VOCs, and petroleum hydrocarbons were below detection limits for constituents analyzed. In addition, four (4) new down-gradient monitoring wells, MW-4A, MW-5A, MW-6A, and MW-7A, were completed in the shallow silt zone. Additional work at the site during November 1995, included abandoning the old dry well and the wells at the Burn Pit area, cleanup of the two contaminated catch basins and the removal of the drums from the site. Drums containing contaminated soil were transported to Terrace Heights sanitary landfill subsequent to approval by Yakima County authorities.

6.2 Monitoring Well Network

Figure 2 shows the locations of monitoring wells at the site. The locations of the most recently installed monitoring wells at the washdown site were adjacent to the most contaminated soil at the site. The locations of the newly installed perimeter

wells were chosen based on the flow direction determined from previous sampling events so that any occurrence of pesticide contamination of groundwater would be detected (Maxim, 1995a). Since no groundwater contamination was detected at the site in the area of highest soil contamination, there is no reason to expect groundwater contamination in the down-gradient perimeter wells. If, however, any contamination does occur, Ecology's Site Manager shall be consulted and additional remedial actions will be considered.

6.3 Field sampling Plan

1. Evaluate each well to determine the integrity of the well seal and cap to insure no contamination will enter the well from the surface.

2. Monitor the wells on a quarterly basis. Obtain quarterly water level measurements in all of the wells in the washdown site and perimeter, accurate to one-hundredth of a foot (0.01 ft). Collect representative groundwater samples from the down-gradient shallow wells (MW-4A, MW-5A, MW-6A, MW-7A) twice a year, in the spring and in the fall during seasonal high water table. Obtain twice a year a representative groundwater sample from the deep perimeter down-gradient well (MW-4). The timing for sampling this well will be concurrent with sampling the shallower wells.

3. Analyze groundwater samples for Organochlorine Pesticides per EPA Method 8080.

4. Survey newly installed wells to determine the latitude and longitude and report to Ecology in the first quarterly report.

5. Perform groundwater monitoring for a period of five years. After two years, evaluate the data with Ecology Site Manager and the PLPs. If groundwater analysis results in the first two years are all below detection limits (ND),

consider reducing the groundwater sampling events. Groundwater monitoring including quarterly water level measurements and the preparation of groundwater flow directions will continue for the five year period. If groundwater flow direction will change at any time during the three remaining years, groundwater sampling will resume.

6.4 Reporting Requirements.

All analytical results shall be reported in the following manner:

1. A brief report explaining the procedures used, anything unusual noted during sampling, the condition of each well, and discussion of the data will be submitted within 45 days of each sampling event.

2. All detected constituents will be presented in tables and graphically showing changes over time, if appropriate.

3. Analytical results will be reported in micrograms per Liter (ppb).

4. A water table contour map showing groundwater elevations and flow direction will be prepared for each sampling event.

5. Copies of all data sheets received from the laboratory including all QA/QC will be submitted to Ecology as stand alone documents.

6. The Ecology Site Manager shall be notified within 5 working days of reported results should pesticides be discovered in any of the monitoring wells.

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APPENDIX A

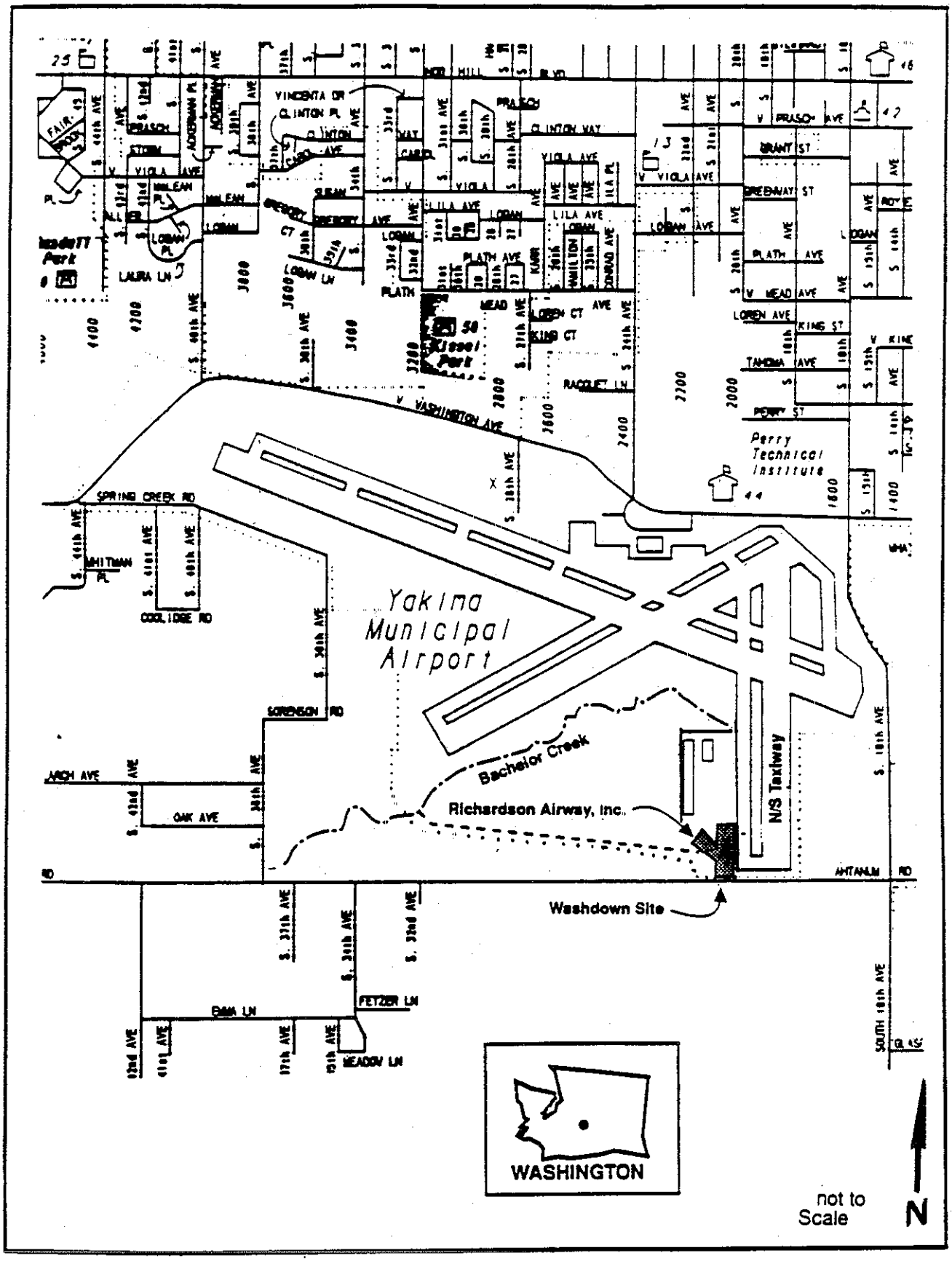
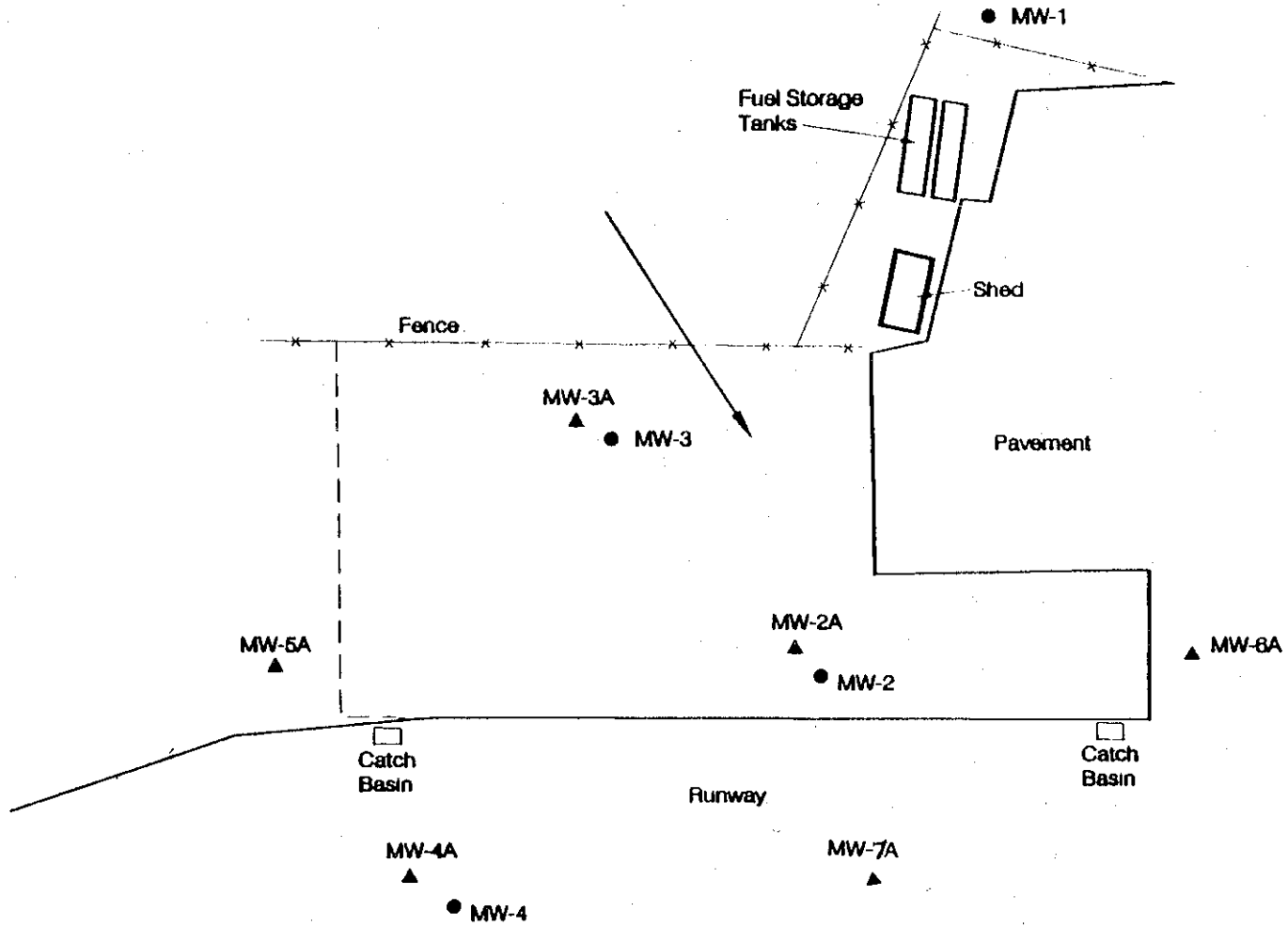


Figure 1

RICHARDSON AIRWAY, INC.
LOCATION - YAKIMA AIR TERMINAL AND RICHARDSON AIR INC.

615-04\Fig2.dwg



N

0 Feet 50

▲ Shallow Monitoring Well
● Deep Monitoring Well
→ Direction of Groundwater Flow

MAXIM 615.04

Site Map
Richardson Airway Inc. Washdown Site
Yakima, Washington
FIGURE 2

Groundwater Flux through Aq 's underlying Richardson Arrays

Darcian Flow:

$$Q = KA\frac{dh}{dl}$$

Cross sectional Area (A)

Estimated Length of Cross section from RI/FS Figure 2-1

$L = 171$ ft

Saturated Thickness of Aquifer (B)

Upper Aquifer 0-10 ft BGS

$B = 10$ ft

Lower Aquifer

$B = 20$ ft ; 50 ft , 100 ft

$A = LB$

Cross-sectional Area of Upper Aquifer

$A = 171\text{ ft}(10\text{ ft}) = 1710\text{ ft}^2$

Cross-sectional Area of Lower Aquifer

$A = 171\text{ ft}(20\text{ ft}) = 3420\text{ ft}^2$

$A_2 = 171\text{ ft}(50\text{ ft}) = 8550\text{ ft}^2$

$A_3 = 171\text{ ft}(100\text{ ft}) = 17{,}100\text{ ft}^2$

Hydraulic Gradient (dh/dl)

dh = Difference in water Levels between MW-1 ; MW-4

dl = Distance between MW-1 & MW-4 estimated from work Plan Figure 2, 9/10-95

$$\frac{dh}{dl} = \frac{1047.52\text{ ft} - 1044.25\text{ ft}}{440\text{ ft}} = 6.07\times10^{-3}$$

$$\frac{dh}{dl} = \frac{1046.17 - 1045.14}{440} = 2.34\times10^{-3}$$

$$\frac{dh}{dl}_{avg} = 4.20\times10^{-3}$$

Hydraulic Gradient of ~~Upper~~ Aquifer is not determined because a datum has not yet been established for the wells completed in this aquifer

MAXIM

Hydraulic Conductivity (K):

Estimated from Freeze & Cherry 979

Upper Aquifer

$K = 1$ gal/d ft²

Lower Aquifer

$K = 10^3$ gal/d ft²

Groundwater Flux:

Upper Aquifer

$$Q = \frac{1\ gal}{d\ ft^2}\left(\frac{1\ ft^3}{7.48\ gal}\right) 1710\ ft^2\ (4.20 \times 10^{-3}) = 0.960\ ft^3/d$$

$= 351\ ft^3/yr$

$= 2620$ gal/yr

Lower Aquifer (assuming same gradient as upper aquifer)

$$Q_1 = \frac{10^3\ gal}{d\ ft^2}\left(\frac{1\ ft^3}{7.48\ gal}\right) 3420\ ft^2\ (4.20 \times 10^{-3}) = 1420\ ft^3/d = 5,250,000\ gal/yr$$ 20'

$$Q_2 = \frac{10^3\ gal}{d\ ft^2}\left(\frac{1\ ft^3}{7.48\ gal}\right) 8550\ ft^2\ (4.20 \times 10^{-3}) = 4800\ ft^3/d = 13,100,000\ gal/yr$$ 50'

$$Q_3 = \frac{10^3\ gal}{d\ ft^2}\left(\frac{1\ ft^3}{7.48\ gal}\right) 1.71 \times 10^4\ ft^2\ (4.20 \times 10^{-3}) = 9600\ ft^3/d = 26,200,000\ gal/yr$$ 100'

-29 1-17-96

EXHIBIT C

RESTRICTIVE COVENANT

Richardsons Airways

AFTER RECORDING RETURN TO:

RESTRICTIVE COVENANT
Yakima Air Terminal
Yakima, Washington

The property that is the subject of this Restrictive Covenant is the subject of a remedial action under chapter 70.105D RCW. The cleanup action to be performed at Richardson's Airways ("Site") is described in the Cleanup Action Plan ("CAP") which is an appendix of Consent Decree No. DE_____. The Site is legally described as follows:

> Commencing at the northwest corner of sec. 2, T. 12 N., R. 18 E.W.M.; thence south 89°53'29" east along the north line of the NW¼ of said section a distance of 2013.08 feet; thence south 00°25'05" east a distance of 1531.05 feet to a point in the north-south fence line west of the north-south runway, said point being the true point of beginning. Thence north 00°25'05" east along said fence line, and the extension thereof a distance of 186.27 feet; thence north 89°02'42" east a distance of 62.17 feet; thence north 03°01'46" east a distance of 77.20 feet; thence north 88°54'21" east a distance of 27.33 feet; thence south 03°42'46" east a distance of 263.63 feet; thence south 89°34'55" west a distance of 109.28 feet to the point of beginning.
>
> Situate in the City of Yakima, Washington, Yakima County, state of Washington.

The remedial action undertaken to clean up the property (hereafter the "cleanup action") is described in the Remedial Investigation/Feasibility Study ("RI/FS") submitted by the Yakima Air Terminal and Richardson's Airways, Inc. to the Washington State Department of Ecology's ("Ecology") Central Regional Office. This document is on file at Ecology's Central Regional Office in Yakima, Washington. This Restrictive Covenant is required by Ecology as defined in WAC 173-340-440 because the cleanup action resulted in residual concentrations of pesticide products which exceed Model Toxics Control Act cleanup levels for soil protective of groundwater established under WAC 173-340-720(2) and 740(2).

The undersigned, City and County of Yakima, are owners as tenants in common of real property in the County of Yakima, state of Washington, hereafter referred to as the "Site". The pesticide contamination that is the subject of this Restrictive Covenant is described in the above-referenced report. The property owners make the following declaration as to limitations, restrictions, and uses to which the Site may be put, and specify that such declarations shall constitute covenants to run with the land, as provided by law, and shall be binding on all parties and all persons claiming under them, including all current and future owners of any portion of or interest in the Site.

Section 1: Pesticide-contaminated soil is located at the "washdown" portion of the property, which location is described above, in meets and bounds, and in the above-mentioned RI/FS.

Remediation or removal of the contaminated soil must be addressed before the owners or successor owners alter, modify, or remove any portion of the identified site in any manner that exposes the contamination. Any plans for alteration, modification, or removal that may expose the contamination shall be submitted to and approved by Ecology or its successor agency prior to such actions.

Section 2: The integrity of monitoring wells placed on the property for the purpose of groundwater monitoring shall be maintained during the period that monitoring is required in Consent Decree No._____. Should future construction activities on the property require abandonment or removal of monitoring wells, such removal or abandonment shall not occur without the prior written approval of Ecology. Said monitoring wells shall be replaced in a manner approved by Ecology.

Section 3: The owners of the property shall not plow, disc, till, or disturb the surface of the Site. The owners shall maintain a vegetative cover on the Site in order to reduce the fugitive dust from the Site. This cover may be "weeds," or any native or exotic vegetation which will grow without the application of irrigation water. The vegetative cover may be mowed.

Section 4: The owners of the property must give written notice to Ecology, or to its successor agency, of the owner's intent to convey any interest in the property. No conveyance of title, easement, lease, or other interest in the property shall be consummated by the property owners without adequate and complete provision for continued groundwater monitoring and compliance with this Restrictive Covenant. Copies of this Restrictive Covenant shall be furnished to any transferee of such real property interest.

Section 5: The owners or successor owners shall allow authorized representatives of Ecology, or its successor agency, the right to enter the property at reasonable times for the purpose of evaluating compliance with the Cleanup Action Plan and carrying out its duties under chapter 70.105D RCW. Duties include but are not limited to the right to take samples, inspect remedial actions conducted at the property relating to the contamination identified in the above-referenced RI/FS, and to inspect records that are related to the cleanup action.

Section 6: Until the Method B cleanup levels, which are protective of groundwater, are attained in the soil, this property shall not be utilized for residential use.

Section 7: The owners of the Site and any successor owners reserve the right under WAC 173-340-440 to record an instrument which provides that this Restrictive Covenant shall no longer be of any further force or effect. However, such an instrument may be recorded only with the consent of Ecology, or its successor agency. Ecology, or its successor agency, may consent to the recording of such an instrument only after appropriate public notice and comment.

Section 8: The owners shall obtain approval from Ecology, or its successor agency, prior to the construction of any well on the property and prior to the withdrawal of any groundwater from

the property. The owners may pump or remove groundwater from the monitoring wells installed on site only for the purpose of purging and collecting groundwater samples for analysis.

Section 9: The owners must notify and obtain approval from Ecology, or its successor agency, prior to any use of the property that is inconsistent with the terms of this Restrictive Covenant, or the Consent Decree and its attachments and amendments. Ecology, or its successor agency, may approve any inconsistent use only after public notice and comment.

_____

SITE OWNER
Yakima Air Terminal

_____

Date

_____

SITE OWNER
Richardson's Airways, Inc.

_____

Date

f:\ ..\Richair\covent Rch

EXHIBIT D

IMPLEMENTATION SCHEDULE

Richardsons Airways

EXHIBIT D
IMPLEMENTATION SCHEDULE
RICHARDSON'S AIRWAYS

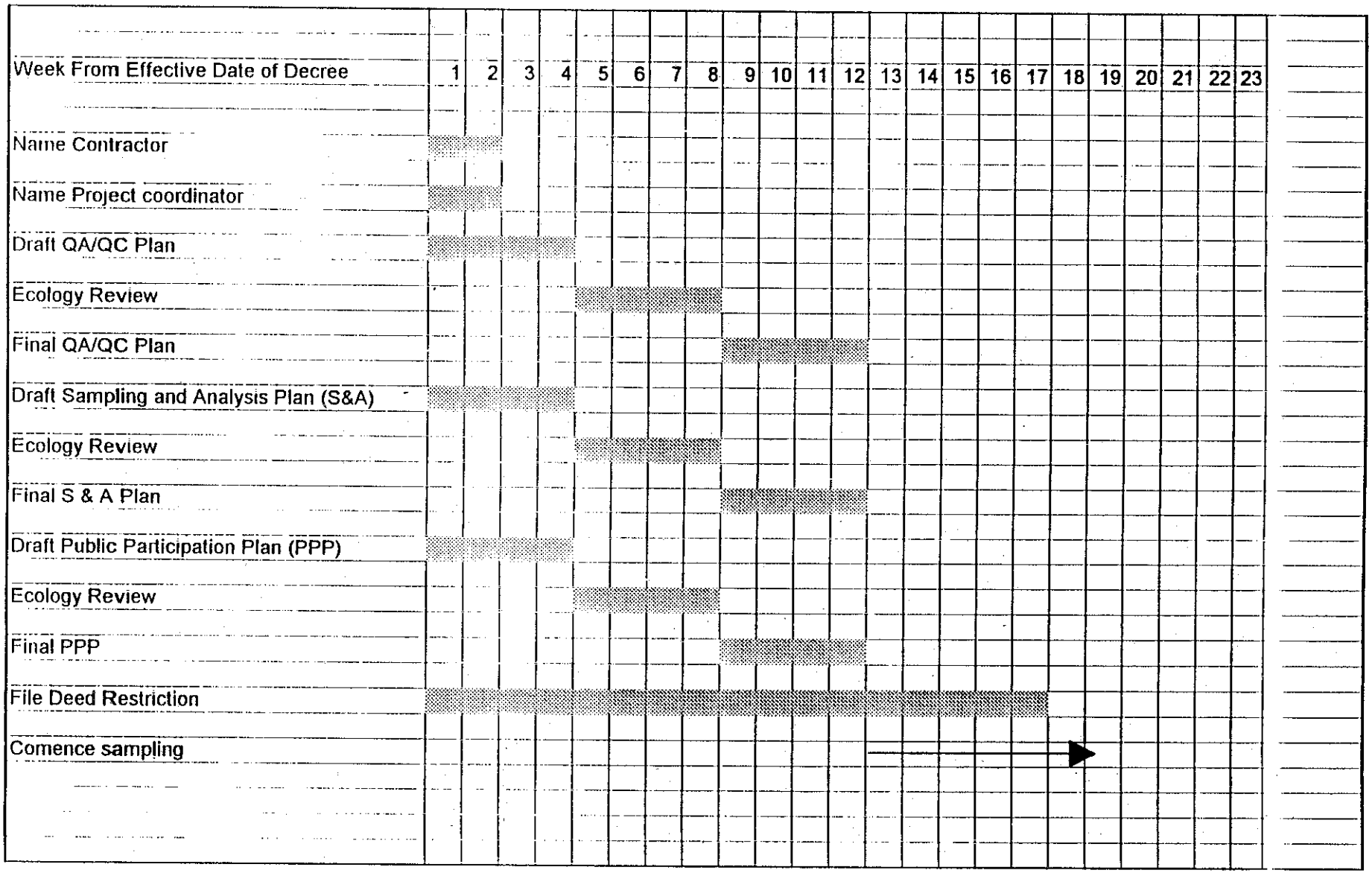


EXHIBIT E

GROUNDWATER SAMPLING DATA SUBMITTAL REQUIREMENTS

Richardsons Airways

January 27, 1993

TO: Persons Collecting Ground Water and Other Data at MTCA Sites

FROM: Carol Fleskes, Program Manager
Toxics Cleanup Program

SUBJECT: Cleanup Information No. 91-1: Ground Water, Soil, Sludge, and Sediment Data (Environmental Data)

Purpose

The purpose of this memorandum is to establish consistency and procedures for organizing, reporting, transmitting, and storing and retrieving surface water, ground water, soil, sludge, and sediment data (environmental data). These procedures will improve Ecology's ability to cleanup contaminated sites by making meaningful data readily available to the public, legislature, management, project managers, and site workers.

Applicability

These procedures apply to all environmental data collection activities required by the Model Toxics Control Act and Regulations. Exceptions may be made for low risk sites as determined by the Ecology project manager.

Background

Currently, very little of the environmental data collected for the state at toxic cleanup sites is available in a readily usable form. With only a few exceptions, these data are submitted to the department in the form of voluminous paper reports. This form precludes the staff from performing rapid, accurate and many times meaningful analysis of spatial and temporal trends of the data. In addition, the evaluation of environmental data cannot always be effective because of missing and/or improper pertinent information.

This procedure establishes appropriate methods to ensure that data submitted to Ecology is encoded, stored, and presented in a magnetic media format (diskette) so that data can be consistently used by our staff. This procedure will reduce data analysis time when compared to using laborious, time consuming hand methods of the past. Today, at most of the larger sites and many of the smaller sites, these data are processed using computers by the PLP's and consultants. This procedure will generally require the data be rearranged and in some cases additional data items collected.

The results of receiving digital data in a consistent manner will allow exchange of environmental data with EPA and between Ecology programs. This format is a super set of that developed by EPA. It is being used by other Ecology Programs.

Standardization of the data will mean that a broad range of computational, statistical, graphical and modeling software will be readily available to summarize and analyze the data. Standardized report will be available for the first time in the program.

Responsibilities

The attached procedures shall be required for all of the environmental data collection activities as follows:

- Directly by TCP
- By any contractors or consultants tasked by TCP
- By "potentially liable parties" acting under terms of a consent decree or order

Implementation of the procedures shall be by incorporation of the appropriate language into contracts, work plans, orders, consent decrees or other appropriate documents by the site project manager or contract officer.

Data shall be entered into the Ecology data base by a data administrator. There is an inter-program team that established new parameters. At this time, Bill Myers at headquarters is acting in this capacity and as the TCP representative to the team.

Depending on the availability of a wide area network, the data would be directly or indirectly available to staff and other data users. At this time, the Site Cleanup Section is developing links from the present data base program to other statistical, graphical and analytical software packages.

Also attached is a model letter which is sent, along with a diskette, to anyone using our format to submit environmental data. These diskettes are also available to staff. To obtain a copy call Bill at the telephone number shown on the letter.

KC:
Attachments

SITE DESCRIPTION AND SAMPLE DATA SUBMITTAL REQUIREMENTS

1. Media

Required data must be submitted on MS-DOS[1](version 5) or compatibly formatted diskettes. The diskettes may be 5 1/4 inch (or 3 1/2 inch) either: double sided, double density; or double sided, high density.

2. Data Formats

The SITE DESCRIPTION FILE, FIELD SAMPLE FILE and the LABORATORY SAMPLE FILE are quote, comma delimited ASCII files used as the standard format for transferring sample data to and from Ecology (LOTUS WK1 files and Ashton Tate DBF files may be substituted for ASCII files). The files will include the fields in the format and order listed (C=Character, N=Numeric, D=date(Character may be substituted in non DBF or WK1 format)).

The following Appendices are attached to standardize information entered into required files (see following appendices):

A. Matrix Codes

B. Sample Source Codes

C. Collection Method Codes

D. Chemical Data Dictionary (Standardizes Spelling, STORET P-codes., etc entered into the SAMPLE ANALYSIS FILE.

E. Laboratory Qualifiers

F. State Plane Zones (N or S)
(NOTE: Copy of RCW 58.20 provided for reference)

G: County Fips Codes

H. Hydrologic Unit Map

3. Submittal

Computer diskettes containing the SITE DESCRIPTION FILE, FIELD SAMPLE FILE and/or the LABORATORY SAMPLE FILE, clearly labeled for Project and Originator shall be submitted in duplicate, along with a backup hard copy of the diskette contents.

[1] Trademark of the Microsoft Corporation

FIELD DEFINITIONS FOR SITE DESCRIPTION FILE

*Wells and Borings must include all Fields except as noted optional. Underlined Fields are required for all stations.

FIELD	TYPE	WIDTH	DEFINITION
REP_DATE	D	10	Reporting date (mm/dd/yyyy).
REP_NAME	C	48	Reporting entity, data submitted by.
PRJ_NAME	C	48	Project, site, or facility name.
STA_TYPE	C	12	Station type (Ground water, Surface wtr, Sediment, Soil, Sludge, Biological or Air).
STA_USE	C	1	Well use (USGS codes) O-observation, W-water withdrawal, X-waste disposal, D-drain, T-test hole, E-geothermal, P-oil/gas, U-unused, R-recharge, Z-destroyed.
WTR_USE	C	1	Water use (USGS codes) W-water quality/level monitoring, D-dewatering, N-industrial, S-stock supply, B-bottling, I-irrigation, Q-aquaculture, U-unused, C-commercial supply, H-domestic supply P-public supply, J-industrial cooling, F-fire protection, Z-other.
DATA_REL	C	1	Data Reliability (USGS codes) C-field checked, L-poor location, U-unchecked.
STA_ID	C	12	Well ID number.
PRI_STA	C	15	Ecology primary station code. To be obtained from Ecology TCP.
SEC_STA1	C	12	Additional station code (previous well numbers, alternate or other well designations).
SEC_STA2	C	12	Additional station code (if any).
SEC_STA3	C	12	Additional station code (if any).
STATE_FIPS	C	2	State FIPS code (WA=53).

SITE DESCRIPTION FILE CONTINUED...

FIELD	TYPE	WIDTH	DEFINITION
COUNTYFIPS	C	3	County FIPS code (use state county code, Appendix F).
STATE_CHAR	C	2	State (WA).
COUNTYCHAR	C	16	County.
OWN_NAME	C	30	Monitoring well owner name.
OWN_DT	D	8	Date of ownership of well (mm/dd/yyyy).
OWN_ADD	C	60	Address of owner.
DRILLER	C	30	Name of Driller.
STA_DESC	C	48	Activity Site, Sample location, or Well location description (for example: "East of Bldg. 2" or "SE corner, intersection 6th & Seneca").
LOC_METHD	C	48	Method of determination of station location coordinates (Note: survey to known horizontal datum is required).
LAT	N	8	Latitude OPTIONAL (degrees-minutes-seconds-tenths).
LONG	N	9	Longitude OPTIONAL (degrees-minutes-seconds-tenths).
STPCO_NORT	N	12	Northerly state plane coordinates REQUIRED (nearest ft).
STPCO_EAST	N	12	Easterly state plane coordinates REQUIRED (nearest ft).
STPCO_ZONE	C	1	State plane coordinates: state plane zone REQUIRED (N or S).
LAND_NET	C	20	Land net location of well (Township, Range, Section, 1/4-1/4 Sec.) Use USGS 1/4-1/4 section alphabetic designator A through R OPTIONAL.

SITE DESCRIPTION FILE CONTINUED...

FIELD	TYPE	WIDTH	DEFINITION
UTM_NORTH	N	9	UTM grid system coordinates: North (meters) OPTIONAL.
UTM_EAST	N	8	UTM grid system coordinates: East (meters) OPTIONAL.
UTM_ZONE	C	2	UTM grid zone.
MAP_NAME	C	24	Name of USGS map and scale covering the sampling location(e.g., Yakima 100K, 1977).
BORE_DEP	N	8	Depth of original hole drilled if applicable (nearest 0.01 ft).
WELL_DEP	N	8	Well depth (nearest 0.01 ft).
WTR_ELEV1	N	8	Water level elevation at time of installation (nearest 0.01 ft).
WLEV_DAT1	D	10	Date of water level elevation measurement (mm/dd/yyyy).
MEAS_ELEV	N	8	Measuring point (reference point) elevation (nearest 0.01 ft).
MEAS_DESC	C	48	Measuring point description.
DATUM	C	48	Measuring point datum (The source of the altitude used to survey in the sampling location altitude i.e. City of Tacoma Sewer Survey 1921).
LEV_COMM	C	240	Comments, depth and water level data.
ALTITUDE	N	8	Approximate land surface elevation XXXXX.XX (ft) at the Station Location.
DEPTOWTR1	N	8	Water depth at time of install. (nearest 0.01 ft).
CONST_DT	D	10	Date of installation (mm/dd/yyyy).
MOREINT	C	1	More than one open interval (Y/N).

SITE DESCRIPTION FILE CONTINUED...

FIELD	TYPE	WIDTH	DEFINITION
UP_DEPTH	N	8	Depth to top of open interval (ft below measuring point).
LOW_DEPTH	N	8	Depth to bottom of open interval (ft below measuring point).
CONST_COMM	C	240	Comments, construction details.
MTD_CON	C	1	Method of construction (USGS WATSTORE codes) A-air rotary, B-bored/augured, C-cable tool, D-dug, H-hydraulic rotary, J-jetted, P-air percussion, T-trenching, V-driven, W-drive wash, R-reverse rotary, X-mud rotary, Z-other.
FILT_LEN	N	5	Length of filter pack (nearest 0.01 ft).
FILT_MAT	C	48	Type of filter pack material and size of material (e.g., Sand 200 mesh).
DIA_BOR	N	8	Boring diameter (in).
DIA_CAS	N	8	Casing diameter (in).
CAS_MAT	C	1	Casing material (USGS WATSTORE codes) B-brick, C-concrete, D-copper, F-teflon/fluorocarbon, G-galvanized iron, I-wrought iron, M-other metal, P-pvc/plastics, R-rock/stone, S-steel, T-tile, W-wood, U-coated steel, Z-other.
DIA_OPN	N	6	Diameter of open interval (in).
LEN_OPN	N	6	Length of open interval (nearest 0.01 ft).
TYP_OPN	C	1	Type of open interval (USGS WATSTORE codes) P-perforated/slotted screen, L-louvered/shuttered screen, S-screen (unknown type), F-fracture, R-wire wound, M-mesh, T-sand point, W-walled, X-open hole, Z-other.

SITE DESCRIPTION FILE CONTINUED...

FIELD	TYPE	WIDTH	DEFINITION
TYP_OMT	C	1	Material type, open interval (USGS WATSTORE codes) R-stainless steel, F-teflon/fluorocarbon, G-galvanized iron, P-pvc/plastic, B-brass/bronze, W-wrought iron, S-steel, T-tile, C-concrete, M-other metal, Z-other.
INT_COMM	C	240	Comments, open interval.
LOG_AVAIL	C	1	Well log data available? (Y/N).
TYP_LOG	C	10	Type of well log (USGS WATSTORE codes) A-time, B-collar, C-caliper, D-driller, E-electric, F-fluid conduction, G-geologist, H-magnetic, I-induction, J-gamma ray, K-dip meter, L-lateral log, M-microlog, N-neutron, O-microlateral log, P-photo/video, Q-radioactive, S-sonic, T-temperature, U-gamma gamma, V-fluid velocity, X-core, Z-other.
LOG_DOC	C	240	Log data source documents (e.g. Remedial Investigation Report).
OTHER_DOC	C	240	Other data source documents.
LOG_LOC	C	60	Location of well log (e.g. Ecology Southwest Regional Office).
AQUI_TEST	C	1	Aquifer testing performed (Y/N).
PUMP_DATA	C	240	Pump data such as: Type, Manufacturer, Horsepower, and depth set .
ANDAT_AVAL	C	1	Analytical or Statistical data available (Y/N).
PROGRAM	C	9	Ecology program (TCP, WQFA, WQ, other).
GEN_COMM	C	240	General comments.
HUCODE	C	8	See US Geological Survey Hydrologic Unit Map 1974-Washington.
AGN_USE	C	1	Agency use (USGS codes) A-Active, I-inactive, O-inventory only.

*** END OF SITE DESCRIPTION FILE ***

FIELD DE ... IONS FOR
FIELD ... FILE

*All ... ds Requir...

FIE...	TY...	WIDTH	...INITION
PRI_		15	...ology Monitoring Well No. will ... assigned by Ecology TCP Program.
STA_		12	...te well ID no. or other ...signation.
X_L...		12	...urveyed coordinates reported in ...a State Plane Coordinates (to ...e nearest foot).
Y_L...		12	
STP...		1	... - North; S - South.
LO_D...		5	...ear of Reference datum either 1929 ...r 1983 and which system L Lat Long ...r S for State Plane Coordinate ...ystem.
LOC_...		48	...eference datum from Map or survey ...e.g., 1983 North American Datum (see Appendix F, RCW 58.20)
DEPT_		8	...epth to water (in 0.01 ft) at time ...f sampling.
UP_DE...		7	...epth (nearest 0.01 ft) to the top of the interval sampled (e.g. Top of well screen or core interval).
LOW_		7	Depth (nearest 0.01 ft) to the bottom of the interval sampled (e.g. Bottom of well screen or core interval).
WTR_...		8	Water level elevation (in 0.01 ft) at the time of sampling.
AGENC...		8	Agency requesting sampling data.
SAMPL...		8	Date of well sampling (mm/dd/yyyy).
SAMP...		4	Time of well sampling in military time.
SAMP...		8	Sample ID code or no.

...UIRED:

FIELD	TYPE	WIDTH	DEFINITION
FILTERED Yes(Y) or	L	1	Was the sample field filtered? No(N)
ANALYSIS_MTHOD	C	15	EPA Analysis method descriptions (i.e EPA Method 601).
MEAS_ELEV	N	8	Surveyed elevation of the measuring point used to determine water level depths and elevations. (nearest 0.01 ft).
MEAS_DESC	C	48	Description of the well measuring point used (e.g., top of casing, file mark on casing, etc.).
DATUM	C	48	Vertical datum used to reference elevations (e.g., MSL and source/date of information).
MATRIX	C	2	Type of sample; water, sediment, soil, other (from Appendix A).
SOURCE_COD	C	2	Physical environment sampled (from Appendix B).
COLLECTMET	C	2	Collection method code (from Appendix C).
FIELD_PH	N	5	The pH value taken at time of sampling (e.g. 11.67)
FIELD_COND	N	7	The conductivity value in umhos.
FIELD_TEMP in	N	5	The field temperature of the sample degrees celsius.
PURGE_METH	C	1	Purging method: B = Bail, P= Pump
PURGE_VOL	C	2	Number of boring volumes removed prior to sampling (liquid).
PRJ_NAME	C	48	Project, site, or facility name.

*** END OF FIELD SAMPLE FILE ***

FIELD DEFINITIONS FOR LABORATORY SAMPLE FILE

*All Fields Required

FIELD	TYPE	WIDTH	DEFINITION
PRI_STA	C	15	Ecology Monitoring Well No. will be assigned by Ecology TCP Program.
STA_ID	C	12	Site well ID no. or other designation.
SAMPLE_DAT	D	8	Date of well sampling (mm/dd/yyyy).
ANALYZ_DAT	D	8	Date the sample was analyzed (mm/dd/yyyy)
SAMPLE_ID	C	8	Sample ID code or no.
LAB_NAME	C	10	Laboratory performing analysis.
LABSAMP_ID	C	10	Sample number assigned by the laboratory.
CONSTITUEN	C	30	Chemical constituent names as defined in Ecology's Chemical Dictionary (see attached Appendix D)
CAS_ID	C	12	Chemical Abstract Systems ID (see Appendix D).
P_CODE	C	5	STORET Parameter Code (see Appendix D).
RESULT	N	12	Detected chemical concentration result.
UNITS	C	10	Units of measurement (e.g., µg/Kg).
QUAL	C	4	Contract Laboratory Program chemical data qualifiers (such as U, J, R, UJ, etc.). Non-Contract Lab Program qualifiers, such as less-than signs ("<") or asterisks, are not acceptable (see Appendix E).
QA_QUAL	C	4	Qualifier associated with QA Review of Lab report (See Appendix E).
LIMIT	C	10	Lab instrument detection limit.

LABORATORY SAMPLE FILE CONTINUED:

FIELD	TYPE	WIDTH	DEFINITION
DILUTION	N	6	Amount the sample was reduced and diluted to accommodate analysis (i.e. 10X,20X).
FILTERED	L	1	Was the sample lab filtered? Yes(Y) or No(N)
ANALYSIS_MTHOD	C	15	EPA Analysis method descriptions (i.e EPA Method 601).
MATRIX	C	2	Type of sample: water, sediment, soil, other (from Appendix A).
PRJ_NAME	C	48	Project, site, or facility name.

*** END OF LABORATORY SAMPLE FILE ***

APPENDIX A: MATRIX CODES

10	Water-Total
11	Water-Dissolved
40	Sediment/Soil
45	Semi-Solid/Sludge
70	Sediment for EP Toxicity
80	Oil/Solvent
00	Other

APPENDIX B: SAMPLE SOURCE CODES AND DESCRIPTIONS

00	Unspecified source
01	Unknown liquid media (drum/tank)
02	Unknown liquid media (spill area)
03	Unknown liquid media (waste pond)
10	Water (general)
12	Ambient stream/river
13	Lake/reservoir
14	Estuary/ocean
15	Spring/seepage
16	Rain
17	Surface runoff/pond (general)
18	Irrigation canal/return flow
20	Well (general)
21	Well (industrial/agricultural)
22	Well (drinking water supply)
23	Well (test/observation/monitoring)
24	Drinking water intake
25	Drinking water (at tap)
30	Effluent wastewater (general)
31	Municipal effluent
32	Municipal inplant waters
33	Sewage runoff/leachate
34	Industrial effluent
35	Industrial inplant waters
36	Industrial surface runoff/pond
37	Industrial waste pond
38	Landfill runoff/pond/leachate
40	Sediment (general)
42	Bottom sediment of deposit
44	Sludge (general)
45	Sludge (waste pond)
46	Sludge (drum/tank)
48	Soil (general)
49	Soil (spill/contaminated area)
50	Bore hole material

Sample Source Codes and Descriptions
(continued)

60	Air (general)
61	Ambient air
62	Source of effluent air
63	Industrial or workroom air
64	Hi-vol filter
70	Tissue (general)
71	Fish tissue
72	Shellfish tissue
73	Bird tissue
74	Mammal tissue
75	Macroinvertebrate
76	Algae
77	Periphyton
78	Plant/vegetation
80	Oil/solvent (general)
81	Oil (transformer/capacitor)
82	Oil/solvent (drum/tank)
83	Oil/solvent (spill area)
84	Oil/solvent (waste pond)
90	Commercial product formulation
95	Well drill water
96	Well drill mud
97	Well sealing material
98	Gravel pack material

APPENDIX C: COLLECTION METHOD CODES

00	Unknown
10	Hand grab
11	Plastic bucket
12	Stainless steel bucket
13	Brass kemmerer
14	PVC kemmerer
15	D.O. dunker
16	DH 48/DH 49 Integrating sampler
17	Van Dorn bottle
18	Glass dip tube
19	Other
20	Automatic sampler (general)
21	ISCO auto sampler
22	Manning auto sampler
23	Hydrostar or similar pump
24	Submersible pump (electric)
25	Well point sampler (pump)
26	Stainless steel bailer (hand)
27	PVC bailer
28	Teflon bailer
29	Peristaltic pump
30	Dredge (unspecified)
31	Dredge (Peterson)
32	Dredge (Van Dorn)
33	Dredge (Van Veen)
34	Core
35	Freeze core
36	Bladder Pump
40	Macroinvertebrate (unspecified)
41	Picked by hand
42	Kick net
43	Surber
44	Modified Hess type sampler
45	Rock basket
46	Hester Dendy sampler
50	Fish (unspecified)
51	Fish (shocking)
52	Fish (netting)
53	Fish (hook & line)
54	Fish (poison)
60	Periphyton (unspecified)
61	Rock scraping
62	Glass slides

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
1,1,1,2-Tetrachloroethane	527.00	77562	630206	µg/L
1,1,1-Trichloroethane	1.00	34506	71556	µg/L
1,1,2,2-Tetrachloroethane	2.00	34516	79345	µg/L
1,1,2,2-Tetrachloroethene	75.05	34475	127184	µg/L
1,1,2-Trichloro2,2,1trifluoroethane	3.00	77652	76131	µg/L
1,1,2-Trichloroethane	4.00	34511	79005	µg/L
1,1-Dichloroethane	5.00	34496	75343	µg/L
1,1-Dichloroethene	6.00	34501	75354	µg/L
1,1-Dichloroethylene	6.01	34501	75354	µg/L
1,1-Dichloropropene	546.00	77168	563586	µg/L
1,2,3-Trichlorobenzene	534.00	77613	87616	µg/L
1,2,3-Trichloropropane	441.00	81610	96184	µg/L
1,2,3-Trinitrobenzene	85.00	73275	99354	µg/Kg
1,2,4-Trichlorobenzene	7.00	34551	120821	µg/L
1,2,4-Trimethylbenzene	536.00	77222	95636	µg/L
1,2,4-Trinitrobenzene	100.00			
1,2-Dibromoethane (EDB)	8.00	77651	106934	µg/L
1,2-Dichlorobenzene	9.00	34536	95501	µg/L
1,2-Dichloroethane	10.00	34531	107062	µg/L
1,2-Dichloromethane	68.01	34423	75092	µg/L
1,2-Dichloropropane	11.00	34541	78875	µg/L
1,2-Diethoxyethane	482.00	81527	629141	µg/L
1,2-Diethylbenzene	548.00	77340	135013	µg/L
1,2-Dimethylbenzene	77.02	77135	95476	µg/L
1,2-Dimethylhydrazine	582.00	73562	540738	µg/L
1,2-Diphenylhydrazine	84.00	34346	122667	µg/L
1,3,5-Trimethylbenzene	541.00	77226	108678	µg/L
1,3,5-Trinitrobenzene	156.00	73275	99354	µg/Kg
1,3-Dichlorobenzene	12.00	34566	541731	µg/L
1,3-Dichloropropene	544.00	34561	542756	µg/L
1,3-Diethylbenzene	549.00	77348	141935	µg/L
1,3-Dimethylbenzene	67.01	77134	108383	µg/L
1,4-Dichlorobenzene	13.00	34571	106467	µg/L
1,4-Diethylbenzene	550.00	77345	105055	µg/L
1,4-Dimethylbenzene	475.03	77133	106423	µg/L
1,4-Dioxane	583.00	82388	123911	mg/L
1-Methylethyl ester carbamic acid	574.00	73615	615532	µg/L
1-Methylnaphthalene	211.00	77418	90120	µg/L
2 Methoxy-5-nitroaniline	584.00	73622	99558	µg/L
2 Methylaniline	585.00	77142	95534	µg/L
2 Methylaniline hydrochloride	586.00	73649	636215	µg/L
2,2,4-Trimethylpentane	545.00		5408401	
2,2-Dichloropropane	547.00	77170	594207	µg/L
2,3,4,6-Tetrachlorophenol	1553.00	77767	4901513	µg/L
2,3,6-Trichloro benzeneacetic acid	575.00	85347		
2,3,7,8-TCDD	87.02	34675	1746016	µg/L

APPENDIX D: CHEMICAL DICTIONARY
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COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
2,3,7,8-Tetrachlorodibenzo-p-dioxin	87.00	34675	1746016	µg/L
2,3-Dichloropropylene	88.00	77168	78886	µg/L
2,4,5-T Methyl Ester	89.00	39740	93765	µg/L
2,4,5-TB	554.00	82650	93801	µg/Kg
2,4,5-TP (Silvex)	91.00	39760	93721	µg/L
2,4,5-TP Methyl Ester	90.00			
2,4,5-Trichlorophenol	14.00	77687	95954	µg/L
2,4,5-Trichlorophenoxyacetic acid	319.00	39740	93765	µg/L
2,4,6-Trichlorophenol	15.00	34621	88062	µg/L
2,4,6-Trimethyl-1-1,3,5-Trioxane	92.00	77322	123637	µg/L
2,4-D	93.00	39730	94757	µg/L
2,4-D Methyl Ester	93.01	39730	94757	µg/L
2,4-DB (Water, Total)	555.00	38745	94826	µg/L
2,4-Dichlorophenol	16.00	34601	120832	µg/L
2,4-Dichlorophenoxy butyric acid	235.00		94826	µg/L
2,4-Dimethylphenol	17.00	34606	105679	µg/L
2,4-Dinitrophenol	18.00	34616	51285	µg/L
2,4-Dinitrotoluene	19.00	34611	121142	µg/L
2,4-Toluenediamine	587.00	78888	95807	µg/L
2,5-Dinitrotoluene	94.00	77637	619158	µg/L
2,6-Dinitrotoluene	20.00	34626	606202	µg/L
2-Butanone	376.03	81595	78933	µg/L
2-Chloroethyl vinyl ether	22.00	34576	110758	µg/L
2-Chloronaphthalene	23.00	34581	91587	µg/L
2-Chlorophenol	24.00	34586	95578	µg/L
2-Chlorotoluene	535.00	38680	95498	µg/L
2-Cyclohexene-1-one	488.00	930697		
2-Ethyl hexanoic acid	196.00	82114	149575	µg/L
2-Hexanone	25.00	77103	591786	µg/L
2-Methyl-2H-benzotriazole	576.00	85813	29385431	µg/L
2-Methyl-4,6-dinitrophenol	96.00	34657	534521	µg/L
2-Methyl-4-chlorophenoxyacetic acid	367.02	39151	94746	µg/L
2-Methyl-4-pentanone	95.00	78133	108101	µg/L
2-Methyl-p-cresol	17.01	34606	105679	µg/L
2-Methylnaphthalene	26.00	77416	91576	µg/L
2-Methylphenol	27.00	77152	95487	µg/L
2-Nitroaniline	28.00	30195	88744	µg/L
2-Nitrophenol	29.00	34591	88755	µg/L
2-Pentanone	97.00	77060	107879	µg/L
2-chloro-1-hydroxybenzene	24.02	34586	95578	µg/L
3,3'-Dichlorobenzidine	98.00	34631	91941	µg/L
3,3-Dimethoxybenzidine	588.00		119904	µg/L
3,3-Dimethylbenzidine	589.00	73580	119937	µg/L
3,4-Benzofluoranthene	99.00	34230	205992	µg/L
3,4-Dichlorobenzyl N-methylcarbama +	571.00		1966581	µg/L
3,5-Dichlorobenzoic acid	240.00		51366	µg/L
3-Chloro-octane	528.00			

APPENDIX D: CHEMICAL DICTIONARY
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COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
3-Nitroaniline	30.00	78300	99092	µg/L
4,4'-DDD	208.01	39360	72548	µg/L
4,4'-DDE	209.01	39365	72559	µg/L
4,4'-DDT	210.01	39370	50293	µg/L
4,4-Methylene bis(n,n-dimethyl) an +	592.00	101611		µg/L
4,6-Dinitro-2-methylphenol	96.01	34657	534521	µg/L
4,6-Dinitrophenol	101.00	82226	88857	µg/L
4,7-Methanoisobenzofuran-1(3H) -one +	570.00			µg/L
4-Bromophenoxybenzene	102.00			
4-Bromophenyl phenyl ether	103.00	34636	101553	µg/L
4-Chloro-2-methyl analine hydrochl +	590.00		3165933	µg/L
4-Chloro-2-methyl aniline	591.00		95692	µg/L
4-Chloro-3-methylphenol	31.00	34452	59507	µg/L
4-Chloro-m-cresol	31.01	34452	59507	µg/L
4-Chloroaniline	464.00	78303	106478	mg/Kg
4-Chlorophenyl phenyl ether	33.00	34641	7005723	µg/L
4-Chlorotoluene	540.00	77277	106434	µg/L
4-Methyl-2-pentanone	34.00	78133	108101	µg/L
4-Methyl-o-cresol	17.02	34606	105679	µg/L
4-Methylphenol	35.00	77146	106445	µg/L
4-Nitroaniline	36.00	73278	100016	µg/Kg
4-Nitrophenol	37.00	34646	100027	µg/L
5-Bromopyrimidine	104.00			µg/L
5-Hydroxy Dicamba	256.00			µg/L
AAtrex	281.01	39033	1912249	µg/L
Acenaphthene	38.00	34205	83329	µg/L
Acenaphthylene	39.00	34200	208968	µg/L
Acephate	385.02	81815	30560191	µg/L
Acetone	40.00	81552	67641	µg/L
Acifluorfen	215.00	79193	6247659	µg/L
Acrolein	105.00	34210	107028	µg/L
Acrylamide	593.00	38576	79061	µg/L
Acrylonitrile	106.00	34215	107131	µg/L
Alachlor	273.00	77825	15972608	µg/L
Alanex	273.01	77825	15972608	µg/L
Aldicarb	274.00	39053	116063	µg/L
Aldicarb sulfone	320.00	82587	1646884	µg/L
Aldicarb sulfoxide	318.00	82586	1646873	µg/L
Aldrin	107.00	39330	309002	µg/L
Alkalinity as CaCO3, Total	453.00	00410	471341	mg/L
Alkalinity, Total (CaCO3)	248.00	00410	471341	mg/L
Alpha Particle Activity, gross	611.00	01519	12587461	pCi/L
Aluminum, Dissolved	511.00	01106	7429905	µg/L
Aluminum, Total	510.00	01105	7429905	µg/L
Aluminum, Total Recoverable	108.00	01104	7429905	µg/L

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Baytex	351.01	38685	55389	µg/L
Benefin	283.01	39002	1861401	µg/L
Benfluralin	283.02	39002	1861401	µg/L
Benlate	285.01	38705	17804352	µg/L
Benomyl	285.00	38705	17804352	µg/L
Bensulide	288.01	82197	741582	µg/L
Bentazon	286.00	38710	25057890	µg/L
Benz(a)anthracene	130.01	34526	56553	µg/L
Benzene	41.00	34030	71432	µg/L
Benzene,	572.00			
1-chloro-4-(methylsulfony +				
Benzidine	125.00	39120	92875	µg/L
Benzo(a)anthracene	130.00	34526	56553	µg/L
Benzo(a)pyrene	126.00	34247	50328	µg/L
Benzo(b)fluoranthene	127.00	34230	205992	µg/L
Benzo(b/k)fluoranthene	531.00	34242	207089	µg/L
Benzo(g,h,i)peryiene	128.00	34521	191242	µg/L
Benzo(ghi)peryiene	128.01	34521	191242	µg/L
Benzo(k)fluoranthene	129.00	34242	207089	µg/L
Benzoic acid	42.00	77247	65850	µg/L
Benzol	41.01	34030	71432	µg/L
Benzotrichloride	596.00		98077	µg/L
Benzyl alcohol	43.00	77147	100516	µg/L
Benzyl chloride	597.00	73520	100447	µg/L
Beryllium, Dissolved	515.00	01010	7440417	µg/L
Beryllium, Total	514.00	01012	7440417	µg/L
Beryllium, Total Recoverable	131.00	00998	7440417	µg/L
Beta Particle Activity, gross	612.00	85817	12587472	pCi/L
Betasan	288.00	82197	741582	µg/L
Bicarbonate as CaCO3	454.00	00425	471341	mg/L
Bicarbonate as HCO3	133.00	00440	71523	mg/L
Bidrin	328.01	38454	141662	µg/L
Bifenox	382.01	78883	42576023	µg/L
Biochemical Oxygen Demand	499.00	00310		mg/L
Bis(2-chloroethoxy)methane	44.00	34278	111911	µg/L
Bis(2-chloroethyl)ether	45.00	34273	111444	µg/L
Bis(2-chloroisopropyl)ether	46.00	34283	108601	µg/L
Bis(2-ethylhexyl) ester	577.00	103321		
hexanedioi +				
Bis(2-ethylhexyl)phthalate	140.00	39100	117817	µg/L
Bis(chloromethyl)ether	598.00	34268	542881	µg/L
Bis(n-octyl)phthalate	465.01	34596	117840	µg/L
Boron	134.00	01020	7440428	µg/L
Bravo	313.02	70314	1897456	µg/L
Bromacil	289.00	82198	314409	µg/L
Bromex	386.01	38855	300765	µg/L
Bromide(dissolved)	135.00	82298	24959679	µg/L
Bromobenzene	542.00	81555	108861	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Ametryn	275.00	82184	834128	µg/L
Amiben	276.00	82051	133904	µg/L
Aminocarb	277.00	38404	2032599	µg/L
Aminotriazole	278.00	73509	61825	µg/L
Amitrole	278.01	73509	61825	µg/L
Ammonia-N, Total as-N	109.00	00610	17778880	mg/L
Aniline	110.00	77089	62533	µg/L
Anion Balance	111.00			
Anthracene	112.00	34220	120127	µg/L
Antimony, Dissolved	524.00	01095	7440360	µg/L
Antimony, Total	113.00	01097	7440360	µg/L
Antimony, Total Recoverable	21.00	01268	7440360	µg/L
Aqualin	105.01	34210	107028	µg/L
Aramite	594.00		140578	µg/L
Arocior 1016	114.00	34671	12674112	µg/L
Arocior 1221	115.00	39488	1104282	µg/L
Arocior 1232	116.00	39492	11141165	µg/L
Arocior 1242	117.00	39496	53469219	µg/L
Arocior 1248	118.00	39500	12672298	µg/L
Arocior 1254	119.00	39504	11097691	µg/L
Arocior 1260	120.00	39508	11096825	µg/L
Arsenic, Dissolved	322.00	01000	7440382	µg/L
Arsenic, Inorganic (dissolved)	121.00	01000	7440382	µg/L
Arsenic, Total	137.00	01002	7440382	µg/L
Arsenic, Total Recoverable	122.00	00978	7440382	µg/L
Asbestos	123.00	34225	1332214	µg/L
Atraton	280.00	82185	1610179	µg/L
Atrazine	281.00	39033	1912249	µg/L
Avadex	532.00	73386	2303164	mg/Kg
Avenge	330.01	78882	43222486	µg/L
Azinphos-Ethyl	282.00	81292	2642719	µg/L
Azinphos-Methyl (Guthion)	359.01	39580	86500	µg/L
Azobenzene	595.00	77625	103333	µg/L
Azodrin	383.01	81890	6923224	µg/L
BFB	459.00			%
BHC	132.00	81283	608731	µg/L
BOD	499.01	00310		mg/L
Balan	283.00	39002	1861401	µg/L
Banvel	284.00	82052	1918009	µg/L
Barium, Dissolved	508.00	01005	7440393	µg/L
Barium, Total	509.00	01007	7440393	µg/L
Barium, Total Recoverable	124.00	01009	7440393	µg/L
Bassgran	286.01	38710	25057890	µg/L
Basalin	354.01	79184	3324539	µg/L
Basanite	337.01	81287	88857	µg/L
Baygon	424.01	38537	114261	µg/L
Baymix	307.02	81293	56724	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Bromochloromethane	533.00	32105	124481	µg/L
Bromodichloromethane	47.00	32101	75274	µg/L
Bromoform	48.00	32104	75252	µg/L
Bromomethane	49.00	34413	74839	µg/L
Bromoxynil (Water, Whole)	556.00	70979	1689845	µg/L
Butachlor, Water/Whole/Recoverable	633.00	30235	23184669	µg/L
Butanone	376.02	81595	78933	µg/L
Butyl benzyl phthalate	136.00	34292	85687	µg/L
Butylate	290.00	81410	2008415	µg/L
Butylbenzenes, Total	292.01	45049		µg/L
C3-Alkylbenzenes, Total	291.00	45048		µg/L
C4-Alkylbenzenes, Total	292.00	45049		µg/L
CEC	161.01	81356		meq/100G
CIPC	305.01	81322	101213	µg/L
COD	492.01	81319		mg/L
Cadmium, Dissolved	406.00	01025	7440439	µg/L
Cadmium, Total	407.00	01027	7440439	µg/L
Cadmium, Total Recoverable	138.00	01113	7440439	µg/L
Calcium	521.00	00910	7440702	mg/L as CaCO3
Calcium, Dissolved	520.00	00915	7440702	mg/L
Calcium, Total	141.00	00916	7440702	mg/L
Camphor (ACN)	287.00	81324	76222	µg/L
Captan	293.00	39640	133062	µg/L
Carbaryl	294.00	77700	63252	µg/L
Carbazole	329.00	77571	86748	µg/L
Carbendazim	295.00	38735	10605217	µg/L
Carbofuran	296.00	81405	1563662	µg/L
Carbon disulfide	50.00	77041	75150	µg/L
Carbon tetrachloride	51.00	32102	56235	µg/L
Carbon, Total Organic	250.00	00680	7440440	µg/L
Carbonate as CO3	142.00	00445	3812326	mg/L
Carbonate as CaCO3	455.00	00430	471341	mg/L
Carbophenothion	297.00	39786	786196	µg/L
Carboxin	139.00	70987	5234684	µg/L
Cation Balance	143.00			
Cation Exchange Capacity	161.00	81356		meq/100G
Chemical Oxygen Demand	492.00	81319		mg/L
Chloramben	276.01	82051	133904	µg/L
Chlordane	144.00	39350	57749	µg/L
Chlordecon	298.00	81281	143500	µg/L
Chlordimeform	299.00	77953	6164983	µg/L
Chloride, Total	145.00	00940	16887006	mg/L
Chlorine, Total Residual	146.00	50060	7782505	mg/L
Chlorobenzene	52.00	34301	108907	µg/L
Chlorobenzilate	300.00	39460	510156	µg/L
Chlorocyclohexane	86.00	77217	542187	µg/L
Chlorodibromomethane	58.01	32105	124481	µg/L
Chloroethane	53.00	34311	75003	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Chloroethane	82.03	39175	75014	µg/L
Chloroethylene	82.02	39175	75014	µg/L
Chloroform	54.00	32106	67663	µg/L
Chloromethane	55.00	34418	74873	µg/L
Chloroneb	301.00	38423	2675776	µg/L
Chloropicrin	303.00	77548	76062	µg/L
Chloropropham	305.00	81322	101213	µg/L
Chloropropylate	302.00	38429	5836102	µg/L
Chlorothalonil	313.01	70314	1897456	µg/L
Chlorpyrifos	304.00	77969	2921882	µg/L
Chlorthal	314.02	39770	1861321	µg/L
Chromium VI	506.01	01032	18540299	µg/L
Chromium, Dissolved	516.00	01030	7440473	µg/L
Chromium, Hexavalent	506.00	01032	18540299	µg/L
Chromium, Total	491.00	01034	7440473	µg/L
Chromium, Total Recoverable	147.00	01118	7440473	µg/L
Chrysene	148.00	34320	218019	µg/L
Cinnamene	74.03	77128	100425	µg/L
Clodrin	306.00	82565	7700176	µg/L
Co-Ral	307.01	81293	56724	µg/L
Cobalt	149.00	01037	7440484	µg/L
Coliform, Fecal	505.01	31616		#/100ml
Coliform, Total	150.00	31628		#/100ml
Color	599.00		00080	std. units
Conductivity	449.02		00094	µmhos/cm
Copper, Dissolved	408.00	01040	7440508	µg/L
Copper, Total	442.00	01042	7440508	µg/L
Copper, Total Recoverable	152.00	01119	7440508	µg/L
Corrosivity	600.00			std. units
Coumaphos	307.00	81293	56724	µg/L
Creosote	308.00	39140	8001589	µg/L
Crotoxyphos	306.01	82565	7700176	µg/L
Cumene	309.00	77223	98828	µg/L
Cyanazine	310.00	81757	21725462	µg/L
Cyanide	153.00	78248	57125	µg/L
Cyanide, Dissolved Std Method	279.00	00723	57125	µg/L
Cycloate	311.00	81892	1134232	µg/L
Cyclohexane	254.00	81570	110827	µg/L
D-D Mix	441.01	81610	96184	µg/L
DBCP	315.00	38761	96128	µg/L
DCNA	316.00	38447	99309	µg/L
DCOD	168.01	80116		mg/L
DCPA	314.01	39770	1861321	µg/L
DDD	208.00	39360	72548	µg/L
DDE	209.00	39365	72559	µg/L
DDT	210.00	39370	50293	µg/L
DDVP	317.00	73071	62737	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
DEF	324.00	81295	78488	µg/L
DMPA	336.00	81285	299854	µg/L
DNBP	337.00	81287	88857	µg/L
DNOC	338.00	34657	534521	µg/L
DO	169.01	00299	7782447	mg/L
Daconil	313.00	70314	1897456	µg/L
Dacthal	314.00	39770	1861321	µg/L
Dalapon	312.00	38432	75990	µg/L
Dasanit	350.01	38684	115902	µg/L
Demeton	325.00	39560	8065483	µg/L
Devrinol	387.01	79195	1529999	µg/L
Di-n-butylphthalate	155.00	39110	84742	µg/L
Di-n-octylphthalate	465.00	34596	117840	µg/L
Diallate	532.01	73386	2303164	mg/Kg
Diazinon	158.00	39570	333415	µg/L
Dibenz(a,h)anthracene	159.01	34556	53703	µg/L
Dibenz(a,h)anthracene-d	14557.00	79040	53703	mg/Kg
Dibenzo(a,h)anthracene	159.00	34556	53703	µg/L
Dibenzofuran	57.00	81302	132649	µg/L
Dibromochloromethane	58.00	32105	124481	µg/L
Dibromochloropropane	315.01	38761	96128	µg/L
Dibromodichloromethane	489.00	77779	594183	µg/L
Dibromomethane	160.00	81522	106934	µg/L
Dicamba	284.01	82052	1918009	µg/L
Dichloran	316.01	38447	99309	µg/L
Dichlorobromomethane	47.01	32101	75274	µg/L
Dichlorodifluoromethane	162.00	34668	75718	µg/L
Dichloromethane	68.02	34423	75092	µg/L
Dichloroprop	244.00	30190	120365	µg/L
Dichlorvos (DDVP)	317.01	73071	62737	µg/L
Dicofol	327.00	39780	115322	µg/L
Dicrotophos	328.00	38454	141662	µg/L
Dicyclopropyl methanone	579.00			µg/L
Dieldrin	164.00	39380	60571	µg/L
Diesel	472.00	78939	68476346	µg/L
Diethyl ether	165.00	81576	60297	µg/L
Diethylphthalate	59.00	34336	84662	µg/L
Diethylphthalate-d4	558.00			
Difenson	397.01	39022	80331	µg/L
Difenzoquat	330.00	78882	43222486	µg/L
Diisopropyl ether	154.00	81577	108203	µg/L
Dimecron	414.01	78881	13171216	µg/L
Dimethoate	331.00	46314	60515	µg/L
Dimethyl ketone	40.02	81552	67641	µg/L
Dimethyldisulfide	166.00	81580	624920	µg/L
Dimethylphthalate	60.00	34341	131113	µg/L
Dimethyltetrachlorophthalate	314.03	39770	1861321	µg/L
Dinitro-o-cresol	338.01	34657	534521	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Dinoseb	337.02	81287	88857	µg/L
Dioxathion	332.00	38783	78342	µg/L
Dioxin	87.01	34675	1746016	µg/L
Diphenamide	333.00	78004	957517	µg/L
Diphenoloxide	167.00	77587	101848	µg/L
Diquat	334.00	78885	85007	µg/L
Direct Black 38	601.00			µg/L
Direct Blue 6	602.00		2602462	µg/L
Direct Brown 95	603.00		16071866	µg/L
Dissolved COD	168.00		80116	mg/L
Dissolved Oxygen	169.00	00299	7782447	mg/L
Dissolved TOC	170.00	00679	7440440	kg/100GAL
Disufoton sulfone	642.00			µg/L
Disulfoton (Di-Syston)	171.00	81888	298044	µg/L
Disulfoton sulfoxide	643.01	81030	2497076	µg/L
Dithane	365.01	38831	8018017	µg/L
Dithiocarbamate	446.01	38917	137304	µg/L
Diuron	335.00	39650	330541	µg/L
Dowpon	312.01	38432	75990	µg/L
Dursban	304.01	77969	2921882	µg/L
Dyfonate	339.00	81294	944229	µg/L
Dylox	340.00	39014	52686	µg/L
EC	449.01	00094		µmhos/cm
EDB	8.01	77651	106934	µg/L
EPN	344.00	81290	2104645	µg/L
EPTC	345.00	81894	759944	µg/L
Endosulfan	341.00	34361	959988	µg/L
Endosulfan I	341.01	34361	959988	µg/L
Endosulfan II	342.00	34356	33213659	µg/L
Endosulfan Sulfate	172.00	34351	1031078	µg/L
Endothall	343.00	38926	145733	µg/L
Endrin	174.00	39390	72208	µg/L
Endrin Aldehyde	173.00	34366	7421934	µg/L
Endrin Ketone	490.00	78008	53494705	µg/L
Enide	333.01	78004	957517	µg/L
Epichlorohydrin	604.00	106898		µg/L
Eptam	345.01	81894	759944	µg/L
Etazine	428.01	38542	26259460	µg/L
Ethanol	346.00	77004	64175	µg/L
Ethenylbenzene	74.04	77128	100425	µg/L
Ethion	175.00	39398	563122	µg/L
Ethoprop	634.00	81758	13194484	µg/L
Ethyl acetate	176.00	81585	141786	µg/L
Ethyl acrylate	606.00		140885	µg/L
Ethyl alcohol	346.01	77004	64175	µg/L
Ethyl isopropyl ketone	95.01	78133	108101	µg/L
Ethylan	411.01	39034	72560	µg/L

APPENDIX D: CHE TIONAR
01/27/93

COMP_NAME		RET_NO	CAS_NO	UNITS
Ethylbenzene		71	100414	µg/L
Ethylen dibromide		51	106934	µg/L
Ethyle e dichloride		31	107062	µg/L
Ethyle a glycol		23	107211	µg/L
Ethylene thiourea		28	96457	µg/L
Ethyli ane thiourea		28	96457	µg/L
Evik		184	834128	µg/L
Fecal Coliform, MF		31816		#/100ml
Fenamiphos		38929	22224926	µg/L
Fenarinol				µg/L
Fensulfothion		38684	115902	µg/L
Fenthion		38685	55389	µg/L
Fenuron		38468	101428	µg/L
Ferba		38806	14484641	µg/L
Ferric 3+)		01045	7439896	µg/L
Ferro 2+)		01045	7439896	µg/L
Fluch ralin		79194	3324539	µg/L
Fluor nthene		34376	206440	µg/L
Fluore ne		34381	86737	µg/L
Fluor sceinSodium			518478	
Fluori le		00950	16984488	mg/L
Fluor neturon		38811	2164172	µg/L
Fluric ne			59756604	µg/L
Foam ng Agents		01288		mg/L
Folex		39019	150505	µg/L
Folpe		46351	133073	µg/L
Fonofos		81294	944229	µg/L
Formalde de		71880	50000	mg/L
Freor 11		77652	76131	µg/L
Freor 12 lon		34668	75718	µg/L
Furadan		81405	1563662	µg/L
Furazolic		67458		µg/L
Furium				µg/L
Furm			60568050	µg/L
Gard		581.01	38877	961115
Gard		433.01	38559	5915413
Gasc		471.00		6842598
Gear		280.01	82185	1610179
Glyp		358.00	79743	1071836
Grain		348.02	77004	64175
Guth		359.00	39580	86500
Hardn tal		248.00	00900	471341
Hepta		181.00	39410	76448
Hepr xoxide		180.00	39420	1024573
Hep		182.00	81589	25339564
Hexa nzene		183.00	39700	118741
Hexa adiene		63.00	34391	87683

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Hexachlorocyclohexane	132.01	81283	608731	µg/L
Hexachlorocyclohexane (alpha)	265.04	39337	319846	µg/L
Hexachlorocyclopentadiene	64.00	34386	77474	µg/L
Hexachloroethane	65.00	34396	67721	µg/L
Hexazinone	360.00	38815	51235042	µg/L
Hydram	394.02	82199	2212671	µg/L
Hydrazine	184.00	81313	302012	mg/L
Hydrocarbons, Total	473.00	81336		mg/L
Hydrocarbons, Total Fuel	462.00			
Hydrocarbons, Total Petroleum	461.00	46116	14280309	mg/L
Hydroxide	185.00	71830	14280309	mg/L
Hydroxide as CaCO3	456.00			
Hyvar	289.01	82198	314409	µg/L
IPC	423.01	39052	122429	µg/L
Imidan	361.00	39800	732116	µg/L
Indeno(1,2,3-cd)pyrene	186.00	34403	193395	µg/L
IntStd: 2,4,6-Tribromophenol	559.00	34719	118796	µg/L
IntStd: Hexabromobenzene	560.00			
Ion Balance	451.00			%
Ioxynil	561.00		16898341	µg/L
Iron, Dissolved	323.00	01046	7439896	µg/L
Iron, Total	188.00	01045	7439896	µg/L
Iron, Total Recoverable	362.00	00980	7439896	µg/L
Isobutylbenzene	552.00	77334	538932	µg/L
Isophorone	66.00	34408	78591	µg/L
Isopropyl carbanilate	423.02	39052	122429	µg/L
Isopropylbenzene (Cumene)	309.01	77223	98828	µg/L
Karmex	335.01	39650	330541	µg/L
Kepone	298.01	81281	143500	µg/L
Kerb	419.01	39080	23950585	mg/Kg
Kerosene	383.00	78878	8008206	µg/L
Kjeldahl-N, Total	249.00	00625	17778880	mg/L as N
Langlier Index	500.00			
Lead, Dissolved	402.00	01049	7439921	µg/L
Lead, Organic	463.00			
Lead, Total	403.00	01051	7439921	µg/L
Lead, Total Recoverable	189.00	01114	7439921	µg/L
Lindane	357.01	39340	58899	µg/L
Linuron	364.00	39530	330552	µg/L
Lithium	466.00	01130	7439932	µg/L
Lorsban	304.02	77969	2921882	µg/L
MBAS	233.01	34790	7429905	mg/L
MCPA	367.00	39151	94746	µg/L
MCPA Dimethylamine Salt	367.01	39151	94746	µg/L
MCPB	368.00	38486	94815	µg/L
MCPP (Water, Total)	562.00	38491	93652	µg/L
MEK	376.01	81595	78933	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
MIBK	34.02	78133	108101	µg/L
MSMA	385.00	38935	2163806	µg/L
Magnesium as CaCO3	519.00	00920	7439954	mg/L
Magnesium, Dissolved	518.00	00925	7439954	mg/L
Magnesium, Total	191.00	00927	7439954	mg/L
Malathion	192.00	39530	121755	µg/L
Mancozeb	365.00	38831	8018017	µg/L
Maneb	366.00	38835	12427382	µg/L
Manganese, Dissolved	404.00	01056	7439965	µg/L
Manganese, Total	193.00	01055	7439965	µg/L
Manganese, Total Recoverable	405.00	01123	7439965	µg/L
Matacil	277.01	38404	2032599	µg/L
Mercury, Dissolved	477.00	71890	7439976	µg/L
Mercury, Total	476.00	71900	7439976	µg/L
Mercury, Total Recoverable	194.00	71901	7439976	µg/L
Merphos	369.00	39019	150505	µg/L
Mesitylene	370.00	77226	108678	µg/L
Metasystox	371.00	39020	8022002	µg/L
Methidathion	374.00	78879	950378	µg/L
Methiocarb	373.00	38500	2032657	µg/L
Methomidophos	372.00	38927	10265926	µg/L
Methomyl	375.00	39051	16752775	µg/L
Methoxychlor	195.00	39480	72435	µg/L
Methyl Phenols, Total	378.00	45058	1319773	µg/L
Methyl Trithion	197.00	39790	953173	µg/L
Methyl Xylenes, Total	444.01	78136	25551137	µg/L
Methyl bromide	49.01	34413	74839	µg/L
Methyl chloride	55.01	34418	74873	µg/L
Methyl ethyl ketone	376.00	81595	78933	µg/L
Methyl isobutyl ketone	34.01	78133	108101	µg/L
Methyl ketone	40.03	81552	67641	µg/L
Methyl n-butyl ketone	25.01	77103	591786	µg/L
Methyl n-propyl ketone	97.01	77060	107879	µg/L
Methyl paraoxon	637.00			µg/L
Methylbenzene	76.01	34010	108883	µg/L
Methylcyclohexane	198.00	77100	108872	µg/L
Methylene Blue Active Substances	493.00	38260	61734	
Methylene bromide	160.01	81522	106934	µg/L
Methylene chloride	68.00	34423	75092	µg/L
Metolachlor	163.00		51218452	µg/L
Metribuzin	379.00	81408	21087649	µg/L
Mevinphos	413.01	39610	7786347	µg/L
Mexacarbate	380.00	38507	315184	µg/L
Mirex	381.00	39755	2385855	µg/L
Modown	382.00	78883	42576023	µg/L
Molinate	394.01	82199	2212671	µg/L

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Molybdenum	467.00	01060	7439987	µg/L
Monitor	372.01	38927	10265926	µg/L
Monochloroethene	82.04	38175	75014	µg/L
Monochloroethylene	82.01	39175	75014	µg/L
Monocrotophos	383.00	81890	6923224	µg/L
Monosodium methyl arsonate	385.01	38935	2163806	µg/L
Monuron	384.00	38511	150685	µg/L
N-Nitroso-N-methylethylamine	613.00	73613	10595956	µg/L
N-Nitroso-di-n-butylamine	614.00	73609	924163	µg/L
N-Nitroso-di-n-propylamine	69.00	34428	621647	µg/L
N-Nitrosodiethanolamine	615.00	73610	1116547	µg/L
N-Nitrosodiethylamine	616.00	73611	55185	µg/L
N-Nitrosodimethylamine	392.00	34438	62759	µg/L
N-Nitrosodiphenylamine	199.00	34433	86306	µg/L
N-Nitrosopyrrolidine	617.00	78206	930552	µg/L
NH3-N, Total	109.01	00610	17778880	mg/L as N
NO3 + NO2-N, Total	321.01	00630	17778880	mg/L as N
Naled	386.00	38855	300765	µg/L
Naphthalene	70.00	34696	91203	µg/L
Napropamide	387.00	79195	1529999	µg/L
Neburon	388.00	38521	555373	µg/L
Nemacure	349.01	38929	22224926	µg/L
Nickel, Dissolved	481.00	01065	7440020	µg/L
Nickel, Total	483.00	01067	7440020	µg/L
Nickel, Total Recoverable	200.00	01074	7440020	µg/L
Nitrate + Nitrite-N, Total	321.00	00630	17778880	mg/L as N
Nitrate-N	452.00	00620	17778880	mg/L as N
Nitrite-N	202.00	00615	17778880	mg/L as N
Nitrobenzene	71.00	34447	98953	µg/L
Nitrofen	389.00	81303	1836755	µg/L
Nitrofurazone	618.00	59870		µg/L
Nitroguanidine	203.00	79753	556887	µg/L
Nonadecane	391.00	77822	629925	µg/L
Norflurazon, in Water	639.00	78064		µg/L
OBPA	206.00	58366		
Octachloronaphthalene	563.00		2234131	µg/L
Odor	619.00			std. units
Oil & Grease	207.00	03582		mg/L
Ordram	394.00	82199	2212671	µg/L
Orthene	395.00	81815	30560191	µg/L
Oryzalin	396.00	78884	19044883	µg/L
Ovex	397.00	39022	80331	µg/L
Oxamyl	398.00	38865	23135220	µg/L
Oxydisulfoton (Disyston Sulphoxide)	643.00	81030	2497076	µg/L
PAH (Polyaromatic hydrocarbons)	620.00			µg/L
PBB (Polybrominated Biphenyls)	621.00		59536851	µg/L
PCB	219.01	78012	1336363	µg/L

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
PCB-1016	114.01	34671	12674112	µg/L
PCB-1221	115.01	39488	1104282	µg/L
PCB-1232	116.01	39492	11141165	µg/L
PCB-1242	117.01	39496	53469219	µg/L
PCB-1248	118.01	39500	12672296	µg/L
PCB-1254	119.01	39504	11097691	µg/L
PCB-1260	120.01	39508	11096825	µg/L
PCE	75.01	34475	127184	µg/L
PCNB	409.00	39029	81316	µg/L
PCP	213.01	39032	87865	µg/L
PID Reading	470.00			
Paraquat	399.00	82416	4685147	µg/L
Parathion	212.00	39540	56382	µg/L
Parathion, Ethyl-	400.00	46315	56382	µg/L
Parathion, Methyl-	401.00	39600	298000	µg/L
Pebulate, Water, Whole	640.00	79192		µg/L
Pendimethalin	222.02	79190	40487421	µg/L
Penoxalin	222.00	82410	40487421	µg/L
Pentachlorobenzene	410.00	77793	608935	µg/L
Pentachlorophenol	213.00	39032	87865	µg/L
Perchlorate	214.00			
Perchloroethene	75.03	34475	127184	µg/L
Perchloroethylene	75.02	34475	127184	µg/L
Persulfate-N, Total	580.00		7727540	µg/L
Perthane	411.00	39034	72560	µg/L
Phenanthrene	216.00	34461	85018	µg/L
Phencapton (Water, Whole)	564.00	81289	2275141	µg/L
Phenol	73.00	34694	108952	µg/L
Phenol, 4-AAP	217.00		108952	
Phenylethylene	74.02	77128	100425	µg/L
Phorate	218.00	46313	298022	µg/L
Phosalone	412.00	81291	2310170	µg/L
Phosdrin	413.00	39610	7786347	µg/L
Phosmet	361.01	39800	732116	µg/L
Phosphamide	331.01	46314	60515	µg/L
Phosphamidon	414.00	78881	13171216	µg/L
Phosphate-P, Diss Ortho	498.00	00671	7723140	mg/L as P
Phosphate-P, Ortho	205.00	00660	14265442	mg/L as PO 4
Phosphorodithioic acid, O,O,S-trim+	573.00	39580	88500	µg/L
Phosphorous-P, Total	251.00	00665	7723140	mg/L as P
Picloram	257.00	39720	1918021	µg/L
Polychlorinated biphenyl	219.00	78012	1336363	µg/L
Potassium, Dissolved	517.00	00935	7440097	mg/L
Potassium, Total	220.00	00937	7440097	mg/L
Princep	430.01	39055	122348	µg/L
Profluralin	415.00	38872	26399360	µg/L

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Prometon	416.00	39056	1610180	µg/L
Prometryn	417.00	39057	7287196	µg/L
Pronamide	419.00	39080	23950585	µg/L
Propachlor	418.00	38533	1918167	µg/L
Propane	420.00	82358	74986	µg/L
Propanone	40.01	81552	67641	µg/L
Propargite	421.00	82085	2312358	mg/L
Propazine	422.00	39024	139402	µg/L
Propham	423.00	39052	122429	µg/L
Propoxur	424.00	38537	114261	µg/L
Propylbenzenes, Total	291.01	45046		µg/L
Propylene oxide	622.00	77011	75569	µg/L
Prowl	222.01	79190	40487421	µg/L
Prowl, Lachate	221.00	79190	40487421	µg/L
Prowl, Soil	223.00	85793	40487421	µg/L
Pyrene	224.00	34469	129000	µg/L
Pyrethrins	425.00	39930	8003347	µg/L
Radium 226	623.00	09501	13982633	pCi/L
Radium 226 & 228	624.00	11503		pCi/L
Retene	457.00	73076	483658	µg/L
Roneet	311.01	81892	1134232	µg/L
Ronnel	427.00	39357	299843	µg/L
Round-up	426.00	39941	1071836	µg/L
SCA	225.00			
Secbumeton	428.00	38542	26259450	µg/L
Selenium, Dissolved	484.00	01145	7782492	µg/L
Selenium, Total	485.00	01147	7782492	µg/L
Selenium, Total Recoverable	226.00	00981	7782492	µg/L
Sencore	379.01	81408	21087649	µg/L
Sevin	294.01	77700	63252	µg/L
Siduron	429.00	38548	1982496	µg/L
Silica (SiO2)	227.00	00992	7631869	µg/L
Silicate	497.00	00958		mg/L
Silver, Dissolved	495.00	01075	7440224	µg/L
Silver, Total	234.00	01077	7440224	µg/L
Silver, Total Recoverable	228.00	01079	7440224	µg/L
Simazine	430.00	39055	122349	µg/L
Simetryn	431.00	39054	1014706	µg/L
Sodium Absorption Ratio	501.00	00931	7440235	SAR
Sodium Chlorate	229.00	00726	7775099	µg/L
Sodium, Total	450.00	00929	7440235	mg/L
Solids, Total Dissolved	247.03	70300		µg/L
Solids, Total Suspended	496.01	74016		mg/L
Specific Conductance (Field)	502.00	00094		µmhos/cm
Specific Conductance @ 25C (LAB)	151.00	00095		µmhos/cm
Specific Conductance(fIELD)	449.00	00094		µmhos/cm

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Stirofos	432.00	38877	961115	µg/L
Strontium-90	625.00	13501	10098972	pCi/L
Styrene	74.00	77128	100425	µg/L
Sulfate, Total	230.00	00945	14808798	mg/L as SO4
Sulfide, Total	231.00	00745	18496258	mg/L
Sulfite, Total	232.00	00740	14265453	mg/L as SO3
Sumitol	428.02	38542	26259450	µg/L
Supracide	374.01	78879	950378	µg/L
Surfactants	233.00	03581		mg/L
Surflan	396.01	78884	19044883	µg/L
Surrog: 1,2-Dichloroethane-d4	460.00			%
Surrog: 1,4-Bromofluorobenzene	187.00			
Surrog: 1-Bromo-2-floroethane	157.00			
Surrog: 2-Chlorophenol-d4 (spike)	565.00	95978		
Surrog: 2-Fluorobiphenyl	479.00			
Surrog: 2-Fluorophenol	480.00			
Surrog: 4-Chloroaniline-d4	566.00			
Surrog: Dibutylchlorendate (spike)	567.00			
Surrog: Fluorene-d10 (spike)	568.00			
Surrog: Nitrobenzene-d5	474.00			
Surrog: Phenol-d5	526.00			
Surrog: Pyrene-d10 (spike)	377.00			
Surrog: Toluene-d8	458.00			%
Surrog: p-Terphenyl-d14	525.00			
Sutan	290.01	81410	2008415	µg/L
Swep	433.00	38555	918189	µg/L
Systox	325.01	39560	8065483	µg/L
T3	236.00	78166		µg/L
T4	237.00	51489		µg/L
TCE	80.01	39180	79016	µg/L
TDS	247.01	70300		µg/L
TEPP	435.00	39620	107493	µg/L
TFH	462.01			
TKN	249.01	00625	17778880	mg/L as N
TOC	250.01	00680	7440440	µg/L
TOS (Calculated)	245.00			
TPH	461.01	46116	14280309	mg/L
TPN, Total Persulfate Nitrogen	580.01		7727540	µg/L
TSS	496.00		74016	mg/L
Tebuthiuron	190.00		34014181	µg/L
Tedion	434.00	39808	116290	µg/L
Temik	274.01.	39053	116063	µg/L
Temperature, 0 C	238.00	00010	0	C
Temperature, 0 F	239.00	00011	0	F
Terbacil	204.00		5902152	µg/L
Terbuthylazine	436.00	38559	5915413	µg/L
Terbutryn	437.00	38887	886500	µg/L

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Tetrachloroethene	75.00	34475	127184	µg/L
Tetrachloroethylene	75.04	34475	127184	µg/L
Tetrachloromethane	51.01	32102	56235	µg/L
Tetrachlorophenol	438.00	81849	25167833	µg/L
Tetrachlorvinphos	581.00	38877	961115	
Tetradifon	434.01	39808	116290	µg/L
Tetraethyldiphosphate	435.01	39620	107493	µg/L
Tetrahydrofuran	241.00	81607	109999	µg/L
Thallium, Dissolved	522.00	01057	7440280	µg/L
Thallium, Total	523.00	01059	7440280	µg/L
Thallium, Total Recoverable	242.00	00982	7440280	µg/L
Thiophanate	439.01	78880	23564069	µg/L
Thiosulfate	243.00			
Tin, Dissolved	513.00	01100	7440315	µg/L
Tin, Total	512.00	01102	7440315	µg/L
Tin, Total Recoverable	468.00	00983	7440315	µg/L
Titanium	469.00	01150	7440326	µg/L
Toluene	76.00	34010	108883	µg/L
Topsin-MR	439.00	78880	23564069	µg/L
Total BTEX	478.00	34103		µg/L
Total BTX	72.00	34103	n/a	µg/L
Total Dissolved Solids (residue)	247.00	70300		µg/L
Total Filterable Residue	247.02	70300		µg/L
Total Organic Halides	503.00	70353		µg/L
Total Organics	486.00	81299		µg/L
Total Solids	253.00	70297		Kg/100Gal
Total Solids	252.00	70318		%
Total Trihalomethanes	494.00	82080		µg/L
Toxaphene	255.00	39400	8001352	µg/L
Trefian	443.01	81284	1582098	µg/L
Triadimefon	440.00	38892	43121433	µg/L
Trichlorobenzoic acid	551.00	50317		
Trichloroethene	80.00	39180	79016	µg/L
Trichloroethylene	80.02	39180	79016	µg/L
Trichlorofluoromethane	83.00	34488	75694	µg/L
Trichloromethane	54.01	32106	67663	µg/L
Trichlorophon	340.01	39014	52686	µg/L
Trichlorotrifluoroethane	3.02	81611	26523648	µg/L
Trichlorotrinitrobenzenes,Total	258.00			
Tricyclazole, Water, Whole	641.00	38902	41814782	µg/L
Trifluralin	443.00	81284	1582098	µg/L
Trimethyl Benzenes, Total	444.00	78136	25551137	µg/L
Trimethyl phosphate	626.00		512561	µg/L
Trinitrobenzenes, Total	259.00			
Triphenyl phosphate (Water, Whole)	569.00	77881	115866	µg/L
Trithion	297.01	39786	786196	µg/L
Tritium	627.00	07000	10028178	pCi/L

APPENDIX D: CHE AL DICTIONARY
01/27/93

COMP_NAME	J		STORET_NO	CAS_NO	UNITS
T dity(Lab)	2		82079		NTU
(MH	2		81314	57147	mg/L
\ adium (Dissol	2		10085	7440622	
\ ar	3		38815	51235042	µg/L
V am	4		82200	1929777	µg/L
\ molate	4		82200	1929777	µg/L
\ acetate	8		77057	108054	µg/L
\ chloride	8		39175	75014	µg/L
\ chloride	4		34511	79005	µg/L
\ anzene	7		77128	100425	µg/L
\ e Dissolve	2				
\ e Organic	ds	4		78733	mg/L
Xy isomers,	ole	5		85795	µg/L
V					
) isomers, C	ole			80353	µg/L
V					
), m-		6	77134	108383	µg/L
Xy , o-		7	77135	95476	µg/L
Xy p-		4	77133	106423	µg/L
X s, Total		2	34020	1330207	µg/L
Zin issolved			01090	7440666	µg/L
Z tal			01092	7440666	µg/L
Z tal Recove			01094	7440666	µg/L
Zin			38912	12122677	µg/L
Zir			38917	137304	µg/L
Z			81291	2310170	µg/L
Z			81285	299854	µg/L
a E			39337	319846	µg/L
a- fan		2	34361	959988	µg/L
a		2	39337	319846	µg/L
alph zene hexa		2	39337	319846	µg/L
alp rdane		5	39348	5103719	µg/L
alph sulfan			34361	959988	µg/L
alph ne			39337	319846	µg/L
b-BH			39338	319857	µg/L
b- fan			34356	33213659	µg/L
beta			39338	319857	µg/L
beta ne hexac			39338	319857	µg/L
beta ulfan-			34356	33213659	µg/L
beta e			39338	319857	µg/L
cis-1 hloroethe			77093	156592	µg/L
cis-1 hloroethy			77093	156592	µg/L
cis- hloroprop			34704	10061015	µg/L
cis-1 hloroprop			34704	10061015	µg/L
d-BH			34259	319868	µg/L
delta			34259	319868	µg/L
delta ne hexac			34259	319868	µg/L

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
delta-Lindane	269.02	34259	319868	ug/L
g-BHC	357.00	39340	58899	ug/L
gamma-BHC (Lindane)	357.04	39340	58899	ug/L
gamma-Benzene hexachloride	357.03	39340	58899	ug/L
gamma-Chlordane	529.00	39065	5103742	ug/L
gamma-Lindane	357.02	39340	58899	ug/L
m-Diethylbenzene	549.01	77348	141935	ug/L
m-Dimethylbenzene	67.04	77134	108383	ug/L
m-Xylene	67.03	77134	108383	ug/L
meta-Xylene	67.02	77134	108383	ug/L
n-Butylbenzene	539.00	78483	104518	ug/Kg
n-Octacosane	390.00	78116	630024	ug/L
n-Propylbenzene	393.00	77224	103651	ug/L
o,p'-DDT	270.00	39305	789026	ug/L
o,p'-TDE	271.00	39315	53190	ug/L
o-Chloronitrobenzene	628.00		88732	ug/L
o-Chlorophenol	24.01	34586	95578	ug/L
o-Diethylbenzene	548.01	77340	135013	ug/L
o-Dimethylbenzene	77.03	77135	95476	ug/L
o-Phenylenediamine	629.00	73628	106503	ug/L
o-Toluidine	630.00	77142	95534	ug/L
o-Xylene	77.01	77135	95476	ug/L
ortho-Xylene	77.04	77135	95476	ug/L
p,a,a,a-Tetrachlorotoluene	632.00			ug/L
p,p'-DDD	208.02	39360	72548	ug/L
p,p'-DDE	209.02	39365	72559	ug/L
p,p'-DDT	210.02	39370	50293	ug/L
p,p'-TDE	272.00	39360	72548	ug/L
p-Chloro-m-cresol	31.02	34452	59507	ug/L
p-Chloronitobenzene	631.00		100005	ug/L
p-Cresol	35.01	77146	106445	ug/L
p-Diethylbenzene	550.01	77345	105055	ug/L
p-Dimethylbenzene	475.04	77133	106423	ug/L
p-Isopropyltoluene	538.00	77356	99876	ug/L
p-Nitroaniline	36.01	73278	100016	ug/Kg
p-Nitrophenol	37.01	34646	100027	ug/L
p-Xylene	475.02	77133	106423	ug/L
pH	448.00	00400		std. units
para-Xylene	475.01	77133	106423	ug/L
propyzamide	419.02	39080	23950585	ug/Kg
sec-Butylbenzene	543.00	78485	135988	ug/Kg
tert-Butylbenzene	537.00	78448	98066	ug/Kg
trans-1,2-Dichloroethene	78.00	34546	156605	ug/L
trans-1,2-Dichloroethylene	78.01	34546	156605	ug/L
trans-1,3-Dichloropropene	79.00	34699	10061026	ug/L
trans-1,3-Dichloropropylene	79.01	34699	10061026	ug/L
269	338.40			

APPENDIX E: LABORATORY QUALIFIERS

LIST OF QUALIFIERS FOR NUMERIC RESULTS

REMARK CODE	DEFINITION
B	Analyte is found in the blank as well as the sample, indicated possible/probable blank contamination.
J	Estimated value; not accurate.
M	Presence of material verified but not quantified
U or K	Compound was analyzed for but not detected. The associated numerical value is the sample quantitation detection limit.
UJ	Compound was analyzed for but not detected. The number is the estimated minimum detection limit.
C	The value is one of, or the sum of both, Benzo (b) Fluoranthene and Benzo (k) Fluoranthene.
X	Many background organisms.
H	Over holding time. Analysis run.
G	Improper container.
Z	Sample low due to interfering substance.
D	Sample high due to interfering substance.
IS	Interfering Substance.
P	Greater than (>).
A	Less than (<).
LMX	Lab Matrix Number.
LBK	Lab Blank Number.

APPENDIX E CONTINUED:

Data Qualifier Definitions

For the purpose of this document the following code letters and associated definitions are provided:

dr	- dry weight
wt	- wet weight
R	- The data are unusable (compound may or may not be present). Resampling and reanalysis is necessary for verification.
N	- Presumptive evidence of presence of material.
NJ	- Presumptive evidence of the presence of the material at an estimated quantity.
UJ	- The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

The reviewer may determine that qualifiers other than those used in this document are necessary to describe or qualify the data. In these instances, it is the responsibility of each reporting entity to thoroughly document/explain the qualifiers used and notify Ecology prior to submition of data packages.

APPENDIX F: COUNTY FIPS CODES

WASHINGTON

001	ADAMS
003	ASOTIN
005	BENTON
007	CHELAN
009	CLALLAM
011	CLARK
013	COLUMBIA
015	COWLITZ
017	DOUGLAS
019	FERRY
021	FRANKLIN
023	GARFIELD
025	GRANT
027	GRAYS HARBOR
029	ISLAND

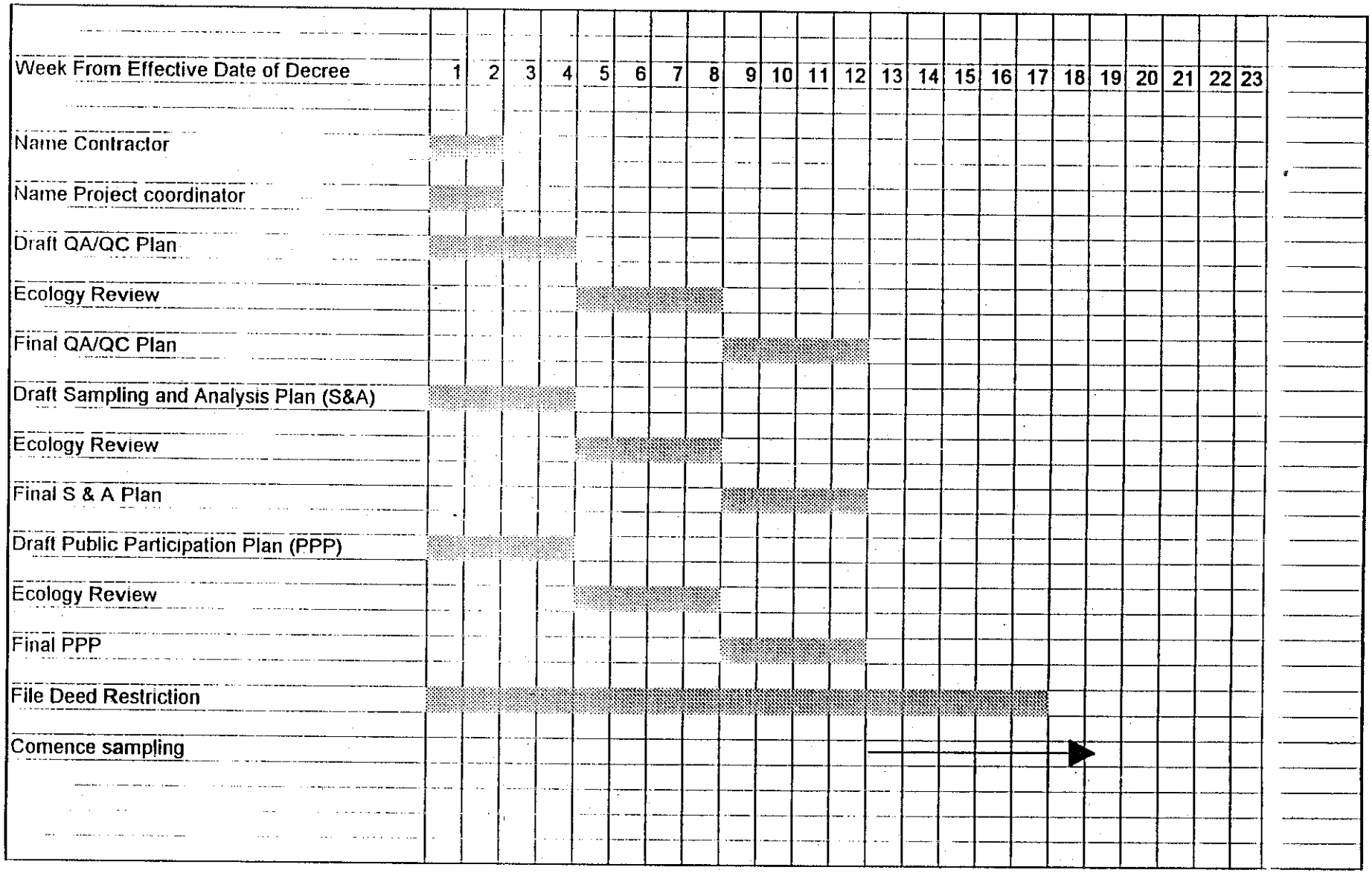
031 JEFFERSON
033 KING
035 KITSAP
037 KITTITAS
039 KLICKITAT
041 LEWIS
043 LINCOLN
045 MASON
047 OKANOGAN
049 PACIFIC
051 PEND OREILLE
053 PIERCE
055 SAN JUAN
057 SKAGIT
059 SKAMANIA
061 SNOHOMISH
063 SPOKANE
065 STEVENS
067 THURSTON
069 WAHKIAKUM
071 WALLA WALLA
073 WHATCOM
075 WHITMAN
077 YAKIMA

EXHIBIT D

IMPLEMENTATION SCHEDULE

Richardsons Airways

EXHIBIT D
IMPLEMENTATION SCHEDULE
RICHARDSON'S AIRWAYS



APPENDIX A

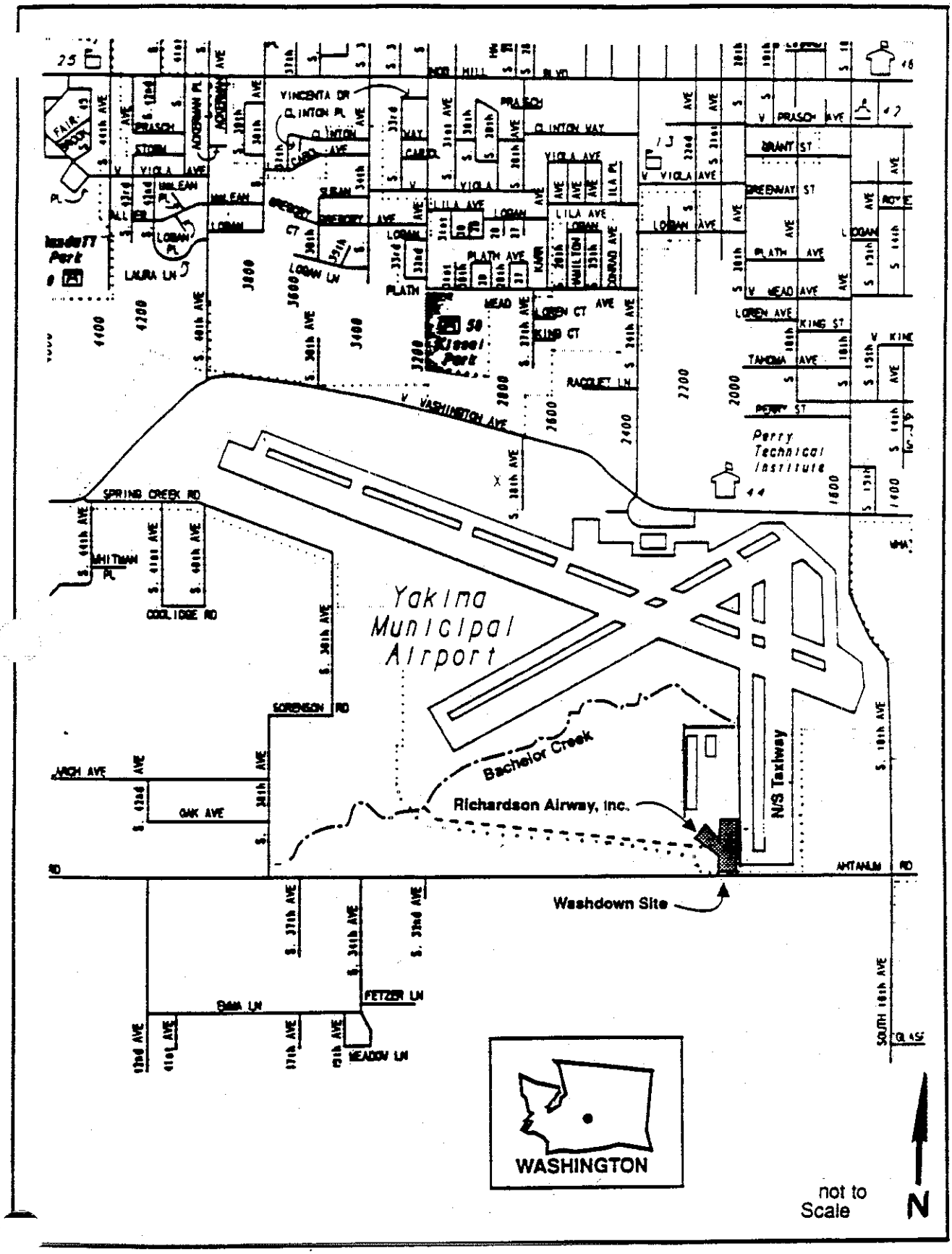
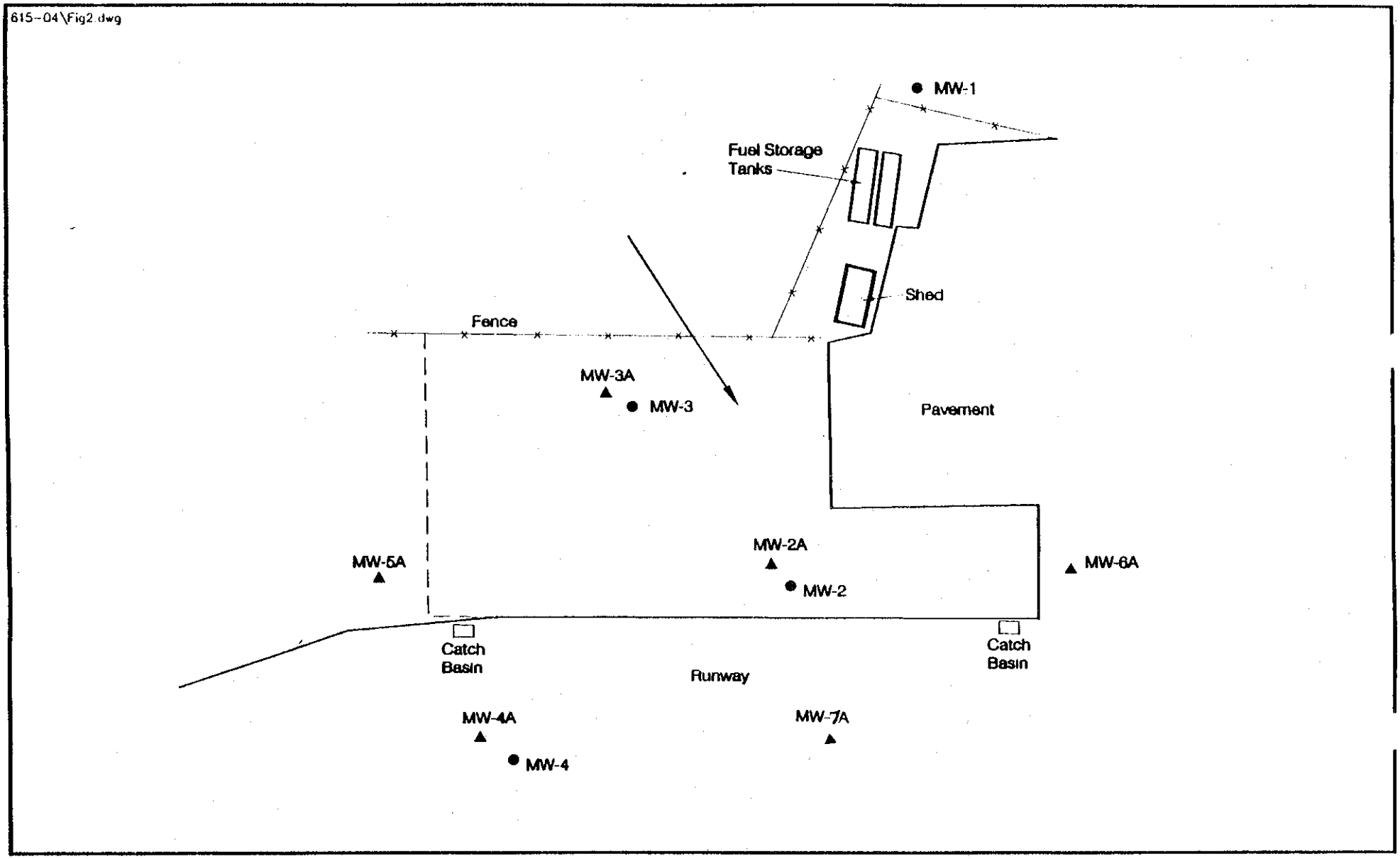


Figure 1

RICHARDSON AIRWAY, INC.
LOCATION - YAKIMA AIR TERMINAL AND RICHARDSON AIR INC.

615-04\Fig2.dwg



N

0 Feet 50

▲ Shallow Monitoring Well
● Deep Monitoring Well
→ Direction of Groundwater Flow

MAXIM 615.04

Site Map
Richardson Airway Inc. Washdown Site
Yakima, Washington
FIGURE 2

Groundwater Flux through Aq 's underlying Richardson Airways

Darcian Flow:

$$Q = KA\frac{dh}{dl}$$

Cross sectional Area (A)

Estimated Length of Cross section from RI/FS Figure 2-1

$L = 171\ ft$

Saturated Thickness of Aquifer (B)

Upper Aquifer 0-10 ft BGS

$B = 10\ ft$

Lower Aquifer

$B = 20\ ft,\ 50\ ft,\ 100\ ft$

$A = LB$

Cross-sectional Area of Upper Aquifer

$A = 171\ ft\ (10\ ft) = 1710\ ft^2$

Cross-sectional Area of Lower Aquifer

$A = 171\ ft\ (20\ ft) = 3420\ ft^2$

$A_2 = 171\ ft\ (50\ ft) = 8550\ ft^2$

$A_3 = 171\ ft\ (100\ ft) = 17100\ ft^2$

Hydraulic Gradient (dh/dl)

dh = Difference in water Levels between MW-1 & MW-4

dl = Distance between MW-1 & MW-4 estimated from Work Plan Figure 2, 9/10-95

$$\frac{dh}{dl} = \frac{1047.52\ ft - 1044.35\ ft}{440\ ft} = 6.07\times10^{-3}$$

$$\frac{dh}{dl} = \frac{1046.17 - 1045.14}{440} = 2.34\times10^{-3}$$

$$\frac{dh}{dl}_{avg} = 4.20\times10^{-3}$$

Hydraulic Gradient of ~~Upper~~ Aquifer is not determined because a datum has not yet been established for the wells completed in this aquifer

MAXIM