DEC 30 1997

SUPERIOR COURT
SPOKANE COUNTY WA

SUPERIOR COURT OF WASHINGTON
FOR SPOKANE COUNTY

STATE OF WASHINGTON,
DEPARTMENT OF ECOLOGY,

Plaintiff,

v.

SPOKANE COUNTY,

Defendant.

No. 97207890-7

JOINT MOTION FOR ENTRY OF CONSENT DECREE

The parties to this action hereby jointly move for entry of the Consent Decree in the above-entitled matter. The Consent Decree has been signed by the parties to this action, and has been the subject of public notice and a public hearing.

SPOKANE COUNTY

~~JAMES P. EMACIO, WSBA #4862~~
~~Deputy~~ Prosecuting Attorney
Attorney for Spokane County

Date Nov 26 1997

CHRISTINE O. GREGOIRE
Attorney General

JOAN M. MARCHIORO, WSBA #19250
Assistant Attorney General
Attorneys for Department of Ecology

Date November 24, 1997

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

environment, and Defendant, after notice, fails to take the necessary action within a reasonable time.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

BY ______________________
MARY E. BURG
Program Manager
Toxics Cleanup Program

DATE 11-24-97

STATE OF WASHINGTON
ATTORNEY GENERAL'S OFFICE

BY ______________________
JOAN M. MARCHIORO
WSBA #19250
Assistant Attorney General

DATE November 24, 1997

SPOKANE COUNTY

BY ______________________
JAMES P. EMACIO
Attorney for Spokane County

DATE Nov 26 1997

BY ______________________
JOHN ROSKELLEY
Chairman of the Board
Spokane County Commissioners

DATE Nov. 25, 1997

BY ______________________
PHIL HARRIS
Spokane County Commissioner

DATE 11-25-97

BY ______________________
KATE McCASLIN
Spokane County Commissioner

DATE 11-25-97

ATTEST Daniela Erickson
Clerk of the Board

DATE 11-25-97

DATED this 30th day of December, 1997.

RICHARD J. SCHROEDER
JUDGE
Spokane County Superior Court

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

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON
FOR SPOKANE COUNTY

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY,	)	
	)	No.____________
v.	)	
	)	CONSENT DECREE
SPOKANE COUNTY, WASHINGTON	)	

Table of Contents

I. INTRODUCTION

A. In entering into this Consent Decree (Decree), the mutual objective of the Washington State Department of Ecology (Ecology), and Spokane County (Defendant) is to provide for remedial action at the Greenacres Landfill Site (Site), a facility where there has been a release or threatened release of hazardous substances. This Decree requires the Defendant to undertake the remedial actions as specified in the Greenacres Landfill Final Cleanup Action Plan.

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 party wishes to resolve the issues raised by Ecology's complaint. In addition, the party agrees 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 Defendant agrees 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.

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 Defendant 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 expeditious cleanup of hazardous substances. RCW 70.105D.040(4)(b) requires that such a settlement be entered as a Consent Decree issued by a court of competent jurisdiction.

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 Defendant, as set forth in chapter 70.105D.020 RCW and 42 U.S.C. 9601 et seq., 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. Defendant has agreed to undertake the actions specified in this Decree and consent to the entry of this Decree under the MTCA.

III. PARTIES BOUND

This Decree shall apply to and be binding upon the signatories to this Decree (parties), their successors and assigns, except as provided by RCW 70.105D.040(4)(e). 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. Defendant agrees 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 Defendant under this Decree. Defendant 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 as specified herein, all definitions in WAC 173-340-200 apply to the terms in this Decree.

A. Site: The Site, referred to as Greenacres Landfill, is located within Section 16, Township 25 North, Range 45 East, W.M., Spokane County, Washington. The Site is identified in Exhibit A of this Decree which is a general Site diagram.

B. Parties: Refers to the Washington State Department of Ecology, Spokane County, and Liberty Lake Land Company, Inc.

C. Defendant: Refers to Spokane County

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

V. STATEMENT OF FACTS

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

1. Greenacres Landfill is located mostly within the southwest quarter of the southwest quarter of Section 16, Township 25 North, Range 45 East, Willamette Meridian in Spokane County, Washington. The Site covers approximately 50 acres and is situated in a former ravine that merges with the Spokane Valley to the north. Underlying the Spokane Valley is the Spokane-Rathdrum Prairie Aquifer which was designated as a "Sole Source Aquifer" in 1978 and provides the drinking water for approximately 350,000 people.

2. The Site was reportedly used for dumping through the late 1940's. In 1951, the Site was deeded to Greenacres Township for use as a municipal dump. The Township owned the Site and contracted for site operators from 1951 through March, 1967. In March, 1967, the Township form of government was dissolved in Spokane County and the Spokane County Health Department was assigned the responsibility for operating the Site. The Health Department contracted for daily operation of the Site.

3. In April, 1968, Spokane County Engineer's Office was assigned responsibility for operations at the Site. Spokane County Engineer's Office continued to operate the Site until 1972 when the Site was filled to capacity and closed.

4. In 1971, Spokane County deeded a portion of the Site to Holiday Hills Recreation Center, Inc. In 1972, Spokane County sold the remaining portion of the landfill Site to Holiday Hills Recreation Center, Inc.

5. In July, 1976, Wells B. McCurdy, Trustee, acquired title to all of Holiday Hills' property. In 1986, Liberty Lake Investments, Inc. acquired all of the beneficial interest under the Wells B. McCurdy Trust.

6. During a ground water quality monitoring survey in 1978, a nearby residential well, located approximately 600 feet downgradient from the Site and owned by Mrs. Ruth Jeffers was found to be contaminated. Additional testing completed in 1980 indicated the presence of volatile organic compounds in Mrs. Jeffers' well. The Spokane County Health District subsequently advised Mrs. Jeffers to procure an alternative water supply.

7. In 1984 the Site was placed on the National Priorities List (NPL). Mrs. Jeffers then filed suit against Spokane County alleging a release of contaminants from the Site. Spokane County arranged for an alternative water supply to the Jeffers residence and the suit was subsequently settled after a monetary payment.

8. In 1985 the U.S. Environmental Protection Agency (EPA) conducted a preliminary investigation of the Site at which time three ground water monitoring wells were installed. EPA and Ecology monitoring data indicated the Site was the source of contamination observed in Mrs. Jeffers' well and the two downgradient monitoring wells. The data further indicated that hazardous substances or contaminants were being released into ground waters of the state. These contaminants include volatile and semi-volatile organic compounds and metals.

9. EPA notified Spokane County and Holiday Hills Development, Inc. of their potential liability under CERCLA in 1985. EPA and Ecology agreed in 1985 that Ecology would assume lead agency status of the Site. A Memorandum of Agreement (1989) between the EPA and Ecology gave Ecology responsibility for all aspects of the remedial investigation, feasibility study, remedial design, remedial action and community relations activities at state lead sites. The agreement specified that all activities at state lead NPL sites would be completed under state authorities.

10 In 1985, Ecology initiated remedial investigation activities at the Site, undertaking and completing a community relations plan, a seismic refraction survey, a hydrologic budget, and a detailed remedial investigation work plan. Ecology notified Spokane County and Holiday Hills Development, Inc., (1987) of their potential liability under state and federal law and requested that each party assume responsibility for the necessary response actions at the Site. In 1993, Ecology notified Liberty Lake Investments, Inc. of their potential liability under chapter 70.105D RCW.

11. In 1988, Spokane County began conducting a Remedial Investigation/ Feasibility Study (RI/FS), under Consent Order 87-0926 at the Site. The purpose of the RI was the following: (A) determine the nature and extent of the release or threatened release of hazardous substances, pollutants and contaminants at the Site; and (B) characterize the Site to provide sufficient information to determine the necessity for and the proposed extent of remedial action. The purpose of the FS was to identify, develop, evaluate, and select remedial action alternatives which are consistent with a permanent remedy to prevent or minimize the release or threatened release of hazardous substances, pollutants and contaminants from the Site.

12. The RI/FS was completed in 1991. The results of the investigation substantiated earlier data that leachate from the landfill is contaminating underlying alluvial and bedrock aquifers with volatile and semi-volatile organic compounds and metals. In addition, low levels of volatile organic gases were detected on-site and off-site during sampling of landfill soil gas.

13. Following a public hearing and additional opportunity for public review and comment, Ecology completed the Final Cleanup Action Plan (FCAP) for the Site on December 21, 1992. The FCAP specified the following requirements for the Site cleanup action:

1. Conduct indoor air sampling at adjacent residences.
2. Construct a Minimum Functional Standards cover for the landfill.
    a) Control landfill gas
    b) Control landfill access
    c) Control stormwater run on/ run off

3. Provide institutional controls for the Site.

4. Monitor Site ground water

14. Ecology and Spokane County entered into formal Consent Decree negotiations on April 14, 1993. Consent Decree negotiations for the implementation of the Cleanup Action Plan failed to reach consensus and were terminated after one year.

15. Ecology issued Enforcement Order No. DE 94TC-E101 to Spokane County and Liberty Lake Investments, Inc. on April 18, 1994. The Enforcement Order required the Defendants to implement the Cleanup Action Plan.

16. The Defendants conducted ground water monitoring in accordance with the Order from the period of May 1994 to January 1997.

17 The Defendant conducted indoor air sampling of a nearby residence in accordance with the Order in September 1994.

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, pollutants and contaminants at, on, or from the Site. This program, which implements the Cleanup Action Plan (Exhibit B) and is referred to as the Scope of Work and Schedule and is set forth in Exhibit C to this Decree. Exhibit C sets forth the work to be performed to accomplish required remedial action at the Site during the duration of this Decree and the schedule for such remedial action.

This Decree requires the Defendant to undertake the following remedial actions as identified in the Cleanup Action Plan, and Scope of Work and Schedule:

(1) Design and construct a landfill cover in accordance with the State of Washington's Minimum Functional Standards (Chapter 173-304 WAC). Stormwater run on/run off and gas collection and control systems shall be included in the cover design.

(2) Implement institutional controls to restrict extraction and use of contaminated groundwater, to restrict development of landfill property, and to insure continued inspection and maintenance of the cover and related systems to maintain the integrity of landfill cover.

(3) Complete a Cleanup Action Report in accordance with WAC 173-340-400 (7)(b).

(4) Conduct long-term ground water monitoring to demonstrate compliance with cleanup standards.

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

Defendant agrees 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 Chapter 173-340 WAC and all other applicable state and federal laws unless otherwise provided herein

VII. DESIGNATED PROJECT COORDINATORS

The project coordinator for Ecology is:

William J. Fees, P.E.
N. 4601 Monroe, Suite 100
Spokane, Washington 99205

The project coordinator for Defendant is:

William J. Wedlake
1026 West Broadway Avenue
Spokane, Washington 99260-0170

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 Defendant 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.

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. Defendant 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.

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 Defendant's 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 Defendant. All parties with access to the Site pursuant to this paragraph shall comply with approved health and safety plans.

Defendant is responsible for obtaining access agreements from third party property owners where property access is required to implement the Cleanup Action Plan.

X. SAMPLING, DATA REPORTING, AND AVAILABILITY

With respect to the implementation of this Decree, Defendant shall make the results of all sampling, laboratory reports, and/or test results generated by them, or on their 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 D: 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, Defendant shall allow split or duplicate samples to be taken by Ecology and/or its authorized representatives of any samples collected by Defendant pursuant to the implementation of this Decree. Defendant 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 Defendant 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 sampling. Without limitation on Ecology's rights under Section IX, Ecology shall endeavor to notify Defendant prior to any sample collection activity.

XI. PROGRESS REPORTS

Defendant shall submit to Ecology written progress reports which describe the actions taken during the reporting period to implement the requirements of this decree. Reporting periods are as follows:

A) Monthly Reports - Progress reports shall be submitted monthly, beginning in the month following the effective date of this decree, and shall continue up to and including the month in which mobilization for construction of the landfill closure cap occurs. These reports shall be submitted by the 10th day of the month in following the subject month. They shall include:

1) a list of on-site activities that have taken place during the month;

2) A detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

3) A description of all deviations from the Schedule (Exhibit C) during the current month, and any projected or planned deviations in the upcoming month;

4) For any deviations in the Schedule, a plan for recovering lost time and maintaining compliance with the Schedule;

5) All relevant data (including laboratory analysis) received by the Defendant during the past month and an identification of the source of the samples. Examples of relevant data include drill logs, test pit logs, air quality monitoring data, and sample analytical data; and

6) A list of deliverables for the upcoming month if different from the Schedule.

B) Weekly Reports- Progress reports shall be submitted weekly during construction of the landfill closure cap, beginning in the week of mobilization for construction, and ending the week following demobilization of the contractor following construction completion. These reports shall detail progress on-site work. These reports shall be submitted the day of the weekly construction meeting between the Defendant and any Contractor retained by the Defendant for purposes of performance of the cleanup action. These reports can be submitted by facsimile transmission.

C) Quarterly Reports- Progress reports shall be submitted quarterly during the post closure period following construction, beginning according to the schedule in 1999. These reports shall be submitted as follows:

First quarter report- Due on the first business day following April 31 of the calendar year

Second quarter report-Due on the first business day following July 31 of the calendar year

Third quarter report-Due on the first business day following October 31 of the calendar year.

Fourth quarter and annual report-Due on the first business day following January 31 of the following calendar year.

These progress reports shall include:

1) a list of on-site activities that have taken place during the quarter;

2) A detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

3) For any such deviations, a plan for recovering lost time and maintaining compliance with the Schedule;

4) All relevant data (including laboratory analysis) received by the Defendant during the past quarter and an identification of the source of the samples. Examples of relevant data include drill logs, test pit logs, air quality monitoring data, and sample analytical data required for post closure monitoring; and

5) A list of deliverables for the upcoming quarter if different from the Schedule.

Unless otherwise specified, progress reports and any other documents submitted pursuant to this decree shall be sent by certified mail, return receipt requested, or by express courier, or by facsimile with a confirmation copy via the U.S. Postal Service to Ecology's project

XII. RETENTION OF RECORDS

Defendant shall preserve, during the duration 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 subcontractors a similar record retention requirement. Upon request of Ecology, Defendant 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, monitoring system installed or implemented pursuant to this Decree. Restrictions specifically identified in the Cleanup Action Plan shall also be included in any conveyance or relinquishment of title.

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, Defendant 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, Defendant 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 Defendant has fourteen (14) days within which to notify Ecology's project coordinator of its 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.

(3) Defendant 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 Defendant's 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 Defendant, Defendant has the right to submit the dispute to the Court for resolution. The Defendant must appeal to the court within 10 days of receiving Ecology's final written decision 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 Defendant presents 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 on 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. If Ecology determines that time is of the essence, Ecology can expedite the dispute resolution process.

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.

Defendant 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. Ecology may seek amendment to the Consent Decree in the same manner as Defendant.

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.

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 Defendant 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 Defendant 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 Defendant; or

(2) Acts of God, including fire, flood, blizzard, extreme temperatures, 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 Defendant.

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 XVI

Ecology shall give Defendant 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 Defendant 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 Defendant 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 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 Defendant determines 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, Defendant may stop implementation of this Decree for such period of time necessary for Ecology to evaluate the situation and determine whether Defendant should proceed with implementation of the Decree or whether the work stoppage should be continued until the danger is abated. Defendant 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 Defendant' determination, it may order Defendant to resume implementation of this Decree. If Ecology concurs with the work stoppage, the Defendant' 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 Defendant fail, after notice, to comply with any requirement of this Decree;

(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 identified 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 Greenacres Landfill.

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

Defendant 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 Defendant, its officers, employees, agents, or contractors in entering into and implementing this Decree. However, the Defendant 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.

XX. COMPLIANCE WITH APPLICABLE LAWS

A. All actions carried out by Defendant(s) 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.

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

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 Defendant 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 Defendant agree to pay costs incurred by Ecology to date and incurred by Ecology pursuant to this Decree. These costs shall include work performed by Ecology or its contractors for investigations, remedial actions, and Decree preparation, negotiations, oversight and administration. Ecology costs shall include costs of direct activities; e,g., employee salary, travel costs, laboratory costs, contractor fees, and employee benefit packages; and Ecology indirect costs of direct activities. The Defendant 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 Defendant have failed without good cause to implement the remedial action, Ecology may, after notice to Defendant, perform any or all portions of the remedial action that remain incomplete.

If Ecology performs all or portions of the remedial action because of the Defendant' failure to comply with its obligations under this Decree, Defendant shall reimburse Ecology for the costs of doing such work in accordance with Section XXI, provided that Defendant 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 every five years the parties shall meet to discuss the status of the Site and the need, if any, for 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, Defendant shall prepare a public participation plan for review and approval by Ecology. In addition, Defendant shall cooperate with Ecology as needed, 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 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 at least 48 hours prior to the distribution of all press releases and fact sheets, and before major meetings with the interested public and local governments. Likewise, Ecology shall notify Defendant at least 48 hours prior to the issuance of all press releases and fact sheets, and before major meetings with the interested public and local governments;

C. Participate in public presentations on the progress of the remedial action at the Site at Ecology's request. 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 Spokane Public Library, Spokane County Public Library and Ecology's Eastern Regional Office at N. 4601 Monroe, Suite 100, Spokane, Washington. At a minimum, copies of the Final Cleanup Action Plan, Consent Decree and Scope of Work, all remedial actions work plans, engineering design reports, and any other documents as specified in the public participation plan shall be promptly placed in these repositories.

XXV. DURATION OF DECREE

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

XXVI. CLAIMS AGAINST THE STATE

Defendant hereby agree that it 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 Defendant will make no claim against the State Toxics Control Account or any Local Toxics Control Account for any costs incurred in implementing this Decree. Except as provided above, however, Defendant 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.

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.

XXIX. COVENANT NOT TO SUE

In consideration of Defendant' compliance with the terms and conditions of this Decree, the State, covenants not to institute legal or administrative actions against Defendant regarding contamination covered by this Decree unless confirmational monitoring indicates that additional remedial actions are necessary at the Site to attain MTCA cleanup standards within the reasonable restoration time frame set forth in the CAP. Until cleanup standards are met at this Site, compliance with this Decree shall satisfy Defendant' cleanup obligations for the release or threatened release of hazardous substances covered by the terms of this Decree, unless, as noted above, confirmational monitoring indicates that additional remedial actions are necessary at the Site to attain MTCA cleanup standards within the reasonable restoration time frame set forth in the FCAP.

The terms and application of this Consent Decree are strictly limited to the Site specifically identified in Exhibit A and to those hazardous substances which Ecology knows to be located at the Site as of the entry of this Decree. This Consent Decree shall not be applicable to any other hazardous substance or area, and the State retains all of its authority relative to such substances and areas.

A. Reopeners: Ecology specifically reserves the right to institute legal or administrative action against Defendant seeking to require it to perform additional response actions at the Site, and to pursue appropriate cost recovery in accordance with provisions set out in RCW 70.105D.050, under the following circumstances:

(1) Upon Defendant' failure to meet the requirements of this Decree, but not limited to, failure of the remedial action to meet the cleanup standards identified in the Final Cleanup Action Plan (Exhibit B);

(2) Upon Ecology's determination that action beyond the terms of this Decree is necessary to abate an imminent and substantial endangerment to public health or welfare or to the environment;

(3) In the event new information becomes available regarding factors previously unknown to Ecology, including the nature or quantity of hazardous substances at the Site, and this new information presents a previously unknown threat to human health or the environment, and Ecology determines, in light of this new information, that further remedial action is necessary at the Site, to protect human health or the environment and Defendant, after notice, fails to take the necessary action within a reasonable time.

FOR STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By______________________________ BY______________________________

MARY E. BURG Date
Program Manager
Toxics Cleanup Program

JOAN M. MARCHIORO Date
Assistant Attorney General

FOR SPOKANE COUNTY

By______________________________ BY______________________________

JAMES P. EMACIO Date
Attorney for Spokane County

JOHN ROSKELLEY Date
Chairman of the Board
Spokane County Commisioners

By______________________________ By______________________________

PHIL HARRIS Date
Spokane County Commissioner

KATE McCASLIN Date
Spokane County Commissioner

ATTEST______________________________
Clerk of the Board Date

FOR LIBERTY LAND COMPANY, LLC
A Washington Limited Liability Company

By______________________________

WILLIAM RADEMAKER Date
President

BY ______________________________

F.J. DULLANTY Date
Attorney for Liberty Lake Land Company

DATED this _______ day of ____________________, 199_

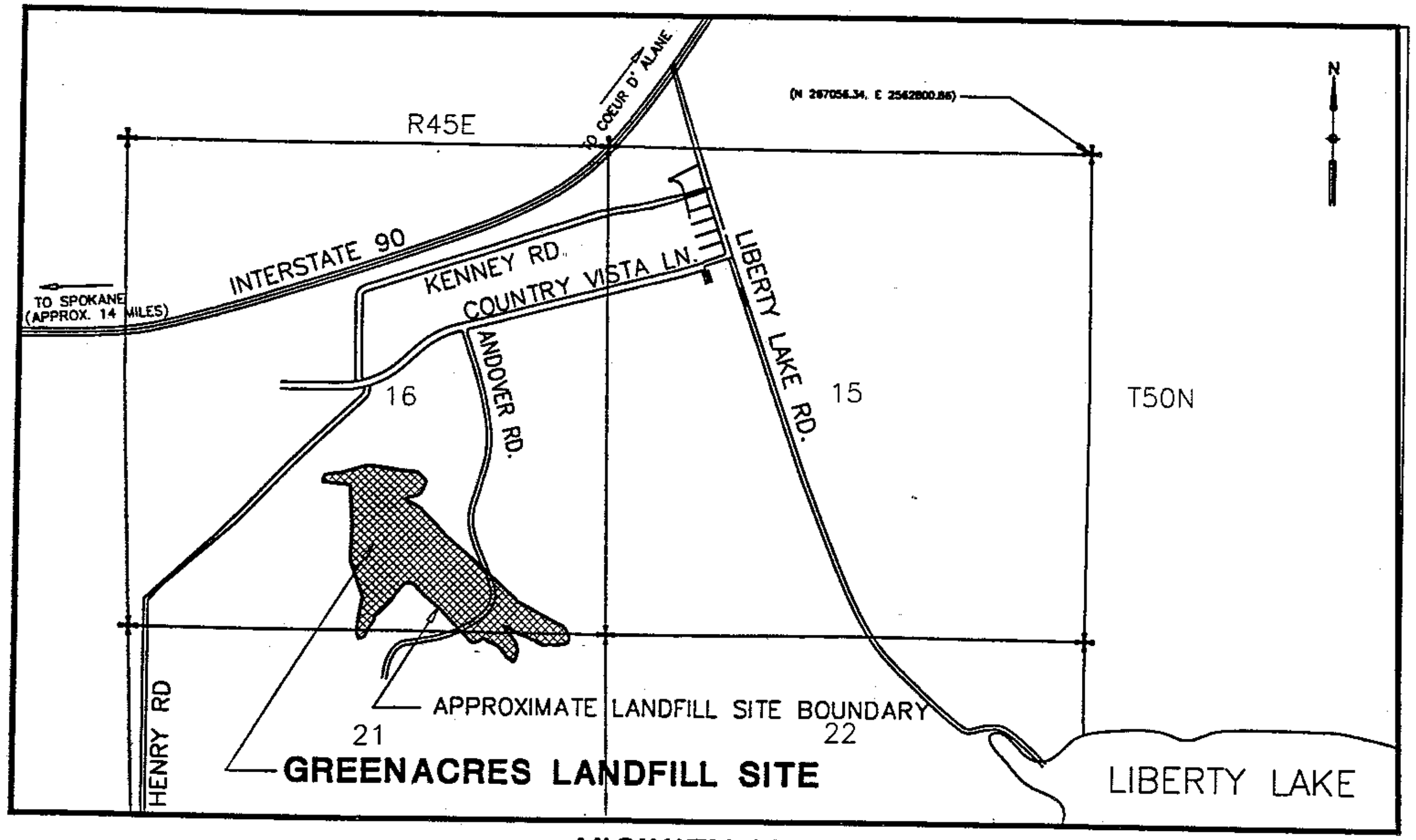
JUDGE
Spokane County Superior Court

EXHIBIT A

Site Diagram

GREENACRES LANDFILL
SPOKANE COUNTY, WASHINGTON

SITE LOCATION MAP
NOT TO SCALE



VICINITY MAP

SCALE 0 1/8 1/4 1/2 MILES

LEGEND

A, 1	DETAIL OR SECTION NUMBER DETAILS REFERENCED WITH NUMBERS SECTIONS REFERENCED WITH LETTERS
	SHEET NUMBER WHERE DETAIL OR SECTION CAN BE FOUND
	SHEET NUMBER WHERE DETAIL OR SECTION IS CUT
1.0%	SLOPE INDICATOR
	FENCE
TP97-1 ⊠	INTERIOR TEST PIT LOCATIONS (WOODWARD-CLYDE 1997)
⊗	ESTIMATED LOCATION OF INTERIOR TEST PITS FROM EDGE OF REFUSE INVESTIGATIONS. (WOODWARD-CLYDE 1997)
⊕	ESTIMATED LOCATION OF EXTERIOR TEST PITS FROM EDGE OF REFUSE INVESTIGATIONS. NO REFUSE ENCOUNTERED IN THESE TEST PITS.
PGP-1 ■	PERIMETER GAS PROBE LOCATION
IGP-1 ●	LOCATION OF INTERIOR GAS PROBE
BTP-1 ▲	BOUNDARY TEST PIT LOCATION FROM LIMITS OF REFUSE INVESTIGATION (WOODWARD-CLYDE 1997)
(1)	NUMBER INDICATES THICKNESS OF SOIL COVER AT LOCATION IN FEET (WOODWARD-CLYDE 1997)
LW-1, MW-3, WCC-8 ●	EXISTING MONITORING WELL LOCATIONS
(TP-3)	FORMER TEST PIT LOCATIONS (WOODWARD-CLYDE 1989)
	SURFACE WATER FLOW DIRECTION
	DRAINAGE BERM
	DRAINAGE DITCH
o	VALVE/LATERAL CONNECTION
	3" HDPE LATERAL
	10" HEADER PIPE
	HORIZONTAL LFG COLLECTION TRENCH
	PHONE LINE
	MAINTENANCE ROAD
	EXISTING ROAD
	SECTION CORNER
	SURVEY CONTROL POINT
	REFUSE
	FOUNDATION SOIL
	COVER SOIL LAYER
	VEGETATED TOPSOIL
	CUSHION GEOTEXTILE
	STRIP DRAIN

ABBREVIATIONS

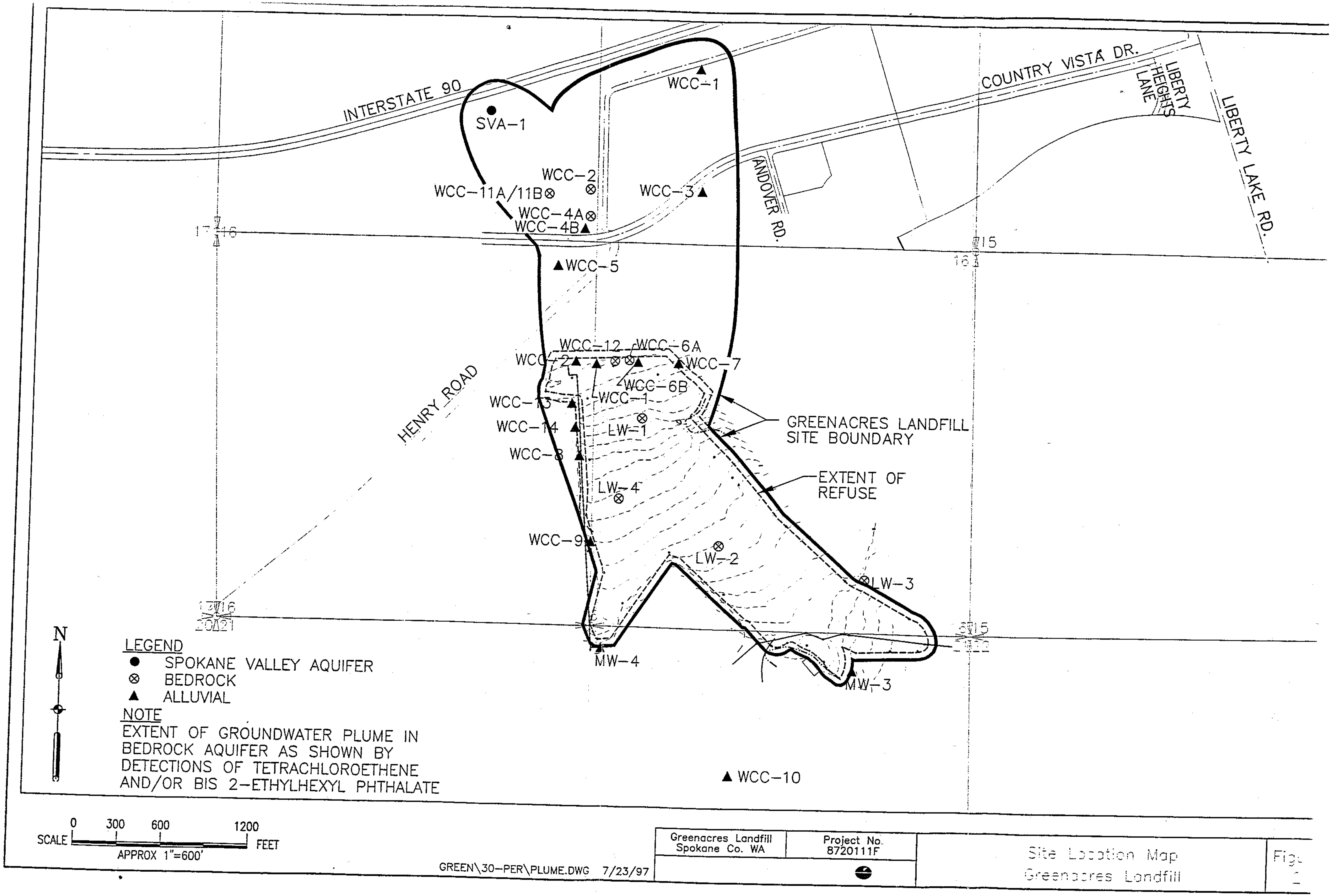
CU FT OR CF	CUBIC FOOT
CU IN	CUBIC INCH
CU YD OR CY	CUBIC YARD
DIA OR ø	DIAMETER
DWG	DRAWING
E	EAST
ELEV	ELEVATION
EX OR EXIST	EXISTING
FT	FOOT/FEET
MI	MILE
MIN	MINIMUM
MSL	MEAN SEA LEVEL
N	NORTH
NO	NUMBER
NTS	NOT TO SCALE
SF	SQUARE FEET/SQUARE FOOT
R	RANGE
STA	STATION
STD	STANDARD
T	TOWNSHIP
TYP	TYPICAL

INDEX OF DRAWINGS

△	DRAFT LANDFILL CLOSURE PLAN		
	DESCRIPTION OF REVISION	BY	DATE

Woodward-Clyde
Engineering & sciences applied to the earth & its environment

DESIGNED WLSO	GREENACRES LANDFILL SPOKANE COUNTY, WASHINGTON		REVISION 0
DRAWN TKS			
CHECKED WLSO	GENERAL SITE PLAN, VICINITY MAP, ABBREVIATIONS, AND LEGEND		PROJECT 974015NA
PEER REVIEWED DJH			FIGURE NO. G-1
PROJECT MANAGER DRH			
DATE 8/21/97			


INTERSTATE 90
COUNTRY VISTA DR.
LIBERTY HEIGHTS LANE
LIBERTY LAKE RD.
ANDOVER RD.
HENRY ROAD
SVA-1
WCC-1
WCC-2
WCC-3
WCC-11A/11B
WCC-4A
WCC-4B
WCC-5
WCC-12
WCC-6A
WCC-7
WCC-6B
WCC-13
WCC-14
WCC-8
WCC-9
WCC-10
LW-1
LW-2
LW-3
LW-4
MW-3
MW-4
GREENACRES LANDFILL SITE BOUNDARY
EXTENT OF REFUSE
N
LEGEND
SPOKANE VALLEY AQUIFER
BEDROCK
ALLUVIAL
NOTE
EXTENT OF GROUNDWATER PLUME IN BEDROCK AQUIFER AS SHOWN BY DETECTIONS OF TETRACHLOROETHENE AND/OR BIS 2-ETHYLHEXYL PHTHALATE
SCALE 0 300 600 1200 FEET
APPROX 1"=600'
GREEN\30-PER\PLUME.DWG 7/23/97
Greenacres Landfill Spokane Co. WA
Project No. 8720111F
Site Location Map
Greenacres Landfill

Four hydrogeologic units have been identified at the Site (Fig. 3): an unsaturated zone; an alluvial aquifer; a weathered bedrock aquitard; and a fractured bedrock aquifer. The unsaturated zone includes landfill refuse, sandy soils directly below the refuse, unsaturated silty sands, and sandy cobbly gravels encountered north of the landfill.

The alluvial aquifer is defined as the saturated alluvial zone located near the north edge of the landfill extending north to the boundary of the Spokane Aquifer. The alluvial aquifer is bound on the east and west by bedrock and on the south by the decreasing total saturated thickness of the aquifer.

Directly below the unsaturated zone and alluvial aquifer is weathered bedrock consisting of silt and clay-size weathering products of the metamorphic bedrock. The weathered bedrock appears to act as a barrier to flow between the overlying alluvium and fractured bedrock below. Ground water flow in the underlying bedrock is fracture controlled. Flow in both the alluvial and bedrock aquifers is generally northward toward the Spokane Aquifer.

NATURE AND EXTENT OF CONTAMINATION

Contamination was discovered at the Site in soil, ground water and unsaturated zone soil gas. Generally, contamination increases with depth and reaches the highest levels in soils and ground water at or near the contact between alluvial sediments and weathered bedrock.

Ground water, from both the alluvial and bedrock aquifers, was sampled from 24 monitoring wells. The remedial investigation sampling program consisted of quarterly sampling for up to five quarters. Many of the wells were only sampled two to three quarters. Contamination of ground water consists of volatile and semi-volatile organic compounds and metals. Tetrachloroethene and 1,2-dichloroethylene were consistently detected and provide the best estimate of the extent of ground-water contamination by volatile organic compounds. Contaminant distribution indicates ground water in the alluvial aquifer flows through a narrow zone at the north edge of the landfill before mixing with the Spokane Aquifer.

Eight semi-volatile organic compounds were detected over the course of quarterly sampling. The herbicides Silvex, 2,4-D, and MCPA were detected in a few of the wells completed in both alluvium and bedrock.

Ecology and Environment, Inc. was contracted by Ecology to conduct a round of ground water sampling in June 1990, in addition to the sampling done for the RI. Samples from selected wells (MW-3, WCC-11A, WCC-2, IW-1B, WCC-4A, WCC-12) were analyzed for volatile organics, metals and two herbicides, MCPA and MCPP. Several volatile organics and high metal concentrations were detected. MCPA and MCPP were not detected in any of the samples.

Soils sampled at the Site were found to be contaminated with volatile and semi-volatile organic compounds and metals. Contamination was generally found at depths from 35 to 120 feet below land surface in the unsaturated zone and in the alluvial aquifer at the weathered bedrock contact. The principal volatile organic compounds detected in alluvial soils underlying landfill refuse were 2-butanone, toluene, ethylbenzene, and xylene. Elevated metal levels including barium, chromium, copper, lead, manganese, nickel, tin, and zinc were detected.

Low levels of volatile organics were detected during sampling of landfill soil gas. The most consistently detected organic compound was tetrachloroethene. Tetrachloroethene concentration maps indicate soil gas contamination in the refuse area trending northeast of the landfill boundary. At depth, significant concentrations of 1,2-dichloroethane, benzene, ethylbenzene, toluene, and xylene were detected in upgradient ground water wells and vinyl chloride was detected in a downgradient ground water well. Methane gas was consistently detected within the landfill boundary. However, concentrations of methane gas outside of the refuse boundary were below natural background levels.

CONTAMINANT TRANSPORT

Contaminant transport at the Site is by two primary mechanisms: emission of gaseous contaminants to the atmosphere by diffusion from the landfill and leaching of organic compounds and metals into the ground water due to rainfall and snowmelt percolating through the refuse and underlying contaminated soil. The spread of contaminants by particulate transport in the atmosphere and by particulates or dissolved species in surface waters are not considered significant pathways.

RISKS TO HUMAN HEALTH AND THE ENVIRONMENT

A baseline risk assessment, conducted as part of the RI Report (WCC, 1989), characterizes current and potential human health risks in the absence of remedial action at the Site. Three potential exposure pathways considered for the Site include contaminant migration to ground water and subsequent migration of contaminated water to a drinking source, emission of contaminated soil gas into the atmosphere and subsequent air transport to nearby residences, and movement of contaminated gas through the soil and entry to structures through cracks or other open spaces in building foundations. Local soils were used to cover the landfill, therefore ingestion or contact with soils was not considered an exposure pathway. Contact or ingestion of contaminated soils at depth is unlikely.

Risk characterization was conducted for both carcinogenic and non-carcinogenic health risks for the ground water and atmospheric air pathways. Risks were determined using both average and worst case scenarios. Ground water ingestion presents a lifetime incremental risk

EXHIBIT B

Cleanup Action Plan

FINAL CLEANUP ACTION PLAN

GREENACRES LANDFILL

SPOKANE, WASHINGTON

by

Washington State
Department of Ecology

December 1992

EXECUTIVE SUMMARY

Greenacres Landfill was used as a municipal dump site under private ownership in the early 1940's. The landfill was operated by the Greenacres Township form 1951 to 1967. Spokane County acquired the landfill after dissolution of the Greenacres Township and operated it from 1967 to final closure in 1972. The land was then sold to Holiday Hills (Liberty Lake Investors), the current landowners.

Ground water contamination at the site was identified in 1978 in a private well located 600 feet from the base of the landfill. Three monitor wells were constructed and confirmed the landfill as the source of contamination. The site was placed on the U.S. Environmental Protection Agency's National Priorities List in 1983.

Greenacres Landfill is located approximately 14 miles east of Spokane, Washington. The landfill is situated in a former ravine bordered by bedrock ridges. The ravine and bedrock ridges merge with the Spokane Valley north of the site. Ground water flow from the site is generally northward into the Spokane Valley/Rathdrum Prairie Aquifer.

Ground water, soil and soil gas are contaminated at the site. Contamination of ground water and soils consist of volatile and semi-volatile organic compounds and metals. Low levels of volatile organics were detected during sampling of landfill soil gas. Concentrations of methane outside of the refuse boundary were below natural background levels.

There is no immediate threat to human health at the site. Spokane County has provided an alternative source of drinking water to the residence affected by ground water contamination. However, the site does represent a low, long-term risk to human health and the environment. The following actions are planned to cleanup the site and mitigate the low, long-term risk:

- Indoor Air Sampling
  Conduct indoor air sampling of occupied and unoccupied residences located north/northeast of the landfill. There is no available data to indicate the effect contaminated soil gas may have on indoor air quality.

- Construct Minimum Functional Standards Cover for Landfill
  Design and construct a landfill cover in accordance with the State of Washington's Minimum Functional Standards for Solid Waste Handling. These standards define the minimum acceptable requirements for a municipal landfill cover. The cover will

act to contain refuse and provide a barrier to reduce infiltration of surface water. Limiting infiltration will reduce leachate generation and migration of contaminants to the underlying aquifers and ultimately the Spokane Valley Aquifer. Stormwater runon/runoff and gas collection and control will be included in the cover design.

- Institutional Control

  Institutional controls include providing alternate water supplies, placing covenants on property deeds restricting ground water use, and deed restrictions on future activities within the landfill boundaries. There is an existing water main and distribution network in place in anticipation of future development in the area. Covenants on property deeds will restrict extraction and use of contaminated ground water. Deed restrictions will be placed on landfill property to prevent future site development and insure continued cover maintenance and monitoring of cleanup measures.

- Ground Water Monitoring

  Ground water monitoring is necessary to demonstrate control and containment of hazardous substances. In addition, long-term ground water monitoring is required until hazardous substance concentrations no longer exceed established cleanup levels.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Appendix A - Ground water contaminants detected at Greenacres Landfill

Appendix B - Estimated cost for closure of Greenacres Landfill

Appendix C - SEPA documents for Greenacres Landfill

Appendix D - Responsiveness summary

LIST OF ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Regulation
CERCLA	Comprehensive Environmental Response, Liability, Compensation, and Liability Act
CFR	Codified Federal Register
cm/sec	centimeters per second
EPA	Environmental Protection Agency
DCAP	Draft Cleanup Action Plan
FCAP	Final Cleanup Action Plan
LW	Landfill Well
MCL	Maximum Concentration Limit
MFS	Minimum Functional Standards (WAC 173-304)
MTCA	Model Toxics Control Act
MW	Monitor Well
NCP	National Contingency Plan
NPL	National Priorities List
POTW	Publicly Owned Treatment Works
PQL	Practical Quantification Limit
ppb	Parts per Billion
ppm	Parts per Million
RCW	Revised Code of Washington
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Acts
SEPA	State Environmental Policy Act
USC	United States Code
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code
WCC	Woodward-Clyde Consultants

INTRODUCTION

PURPOSE AND OBJECTIVES

This document is the Draft Cleanup Action Plan (DCAP) for the Greenacres Landfill Site (Site) located near Spokane, Washington. A DCAP is required as part of the site cleanup process established by the Washington State Department of Ecology (Ecology) under Chapter 173-340 WAC, "Model Toxics Control Act Cleanup Regulation" (MTCA). The purpose of the DCAP is to identify the proposed cleanup action for the site and provide an explanatory document for public review. The specific objectives of the DCAP are identified in WAC 173-340-360(10), "Draft Cleanup Action Plan".

The objectives of the DCAP are to:

- Summarize the alternative cleanup actions evaluated in the Site Remedial Investigation/ Feasibility Study reports
- Describe the cleanup action selected by Ecology and the selection rationale
- Present Site cleanup levels and points of compliance for hazardous substances
- Develop implementation schedule for cleanup action plan
- Specify any required institutional controls and site use restrictions
- Justify selection of cleanup action that uses lower preferences cleanup technology than the higher representative cleanup technologies listed in WAC 173-340-360(4)(a)
- Identify applicable state and federal laws for the proposed cleanup action
- Demonstrate compliance with MTCA cleanup action requirements (WAC 173-340-360(2) and (3))
- Specify the types, levels and amounts of hazardous substances remaining on-site and the measures that will be utilized to prevent migration of those substances

PREVIOUS WORK

The DCAP presents a brief description and history of Greenacres Landfill. Results from applicable studies and reports are summarized to provide background information pertinent to the DCAP. These studies and reports include the "Remedial Investigation Report, Greenacres Landfill Site" (Woodward-Clyde Consultants, November 1989), the "Remedial Investigation Report--Air Modeling and Risk Assessment Report" (Woodward-Clyde Consultants, February 1991), and the "Feasibility Study Report, Greenacres Landfill Site" (Woodward-Clyde Consultants, March 1991). Portions of the DCAP text are taken directly from these documents.

APPLICABILITY OF CERCLA AND MTCA

Greenacres Landfill was placed on the National Priorities List (NPL) by U.S. Environmental Protection Agency (EPA) in 1983. EPA and Ecology agreed Ecology would assume lead agency status of the site in 1985. A Memorandum of Agreement (1989) between EPA and Ecology gives Ecology responsibility for all aspects of the remedial investigation, feasibility study, remedial design, remedial action and community relations activities at state lead sites. The memorandum also states that "...work on state lead NPL sites will be done using only state authorities, under schedules set by the state, using no federal funding, and having no EPA involvement." In addition, it is stated that "all remedial action at NPL sites must comply with promulgated federal and more stringent state standards, requirements and limitations that are legally applicable or relevant and appropriate to the circumstances of the site."

The Remedial Investigation and Feasibility Study (RI/FS) reports were submitted in 1989 and 1991, respectively. The RI/FS was completed in accordance with EPA guidance documents for conducting an RI/FS under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (EPA, 1985; EPA, 1988).

Section 121(d) of the Superfund Amendments and Reauthorization Act of 1986 (SARA) requires remedial actions at Superfund sites attain the "applicable or relevant and appropriate requirements" (ARAR's) of federal and state environmental laws. The Model Toxics Control Act was passed as Initiative 97 in November 1988 and became law in March 1989. Chapter 173-340 WAC, "Model Toxics Control Act Regulation" was promulgated in two parts, May 1990 and February 1991. Through the agreement between Washington State and EPA, the cleanup action of Greenacres Landfill is done under MTCA authority. The cleanup action will meet EPA's mandate that remedial actions at NPL sites comply with promulgated federal and more stringent state standards.

THE DCAP AND THE CLEANUP PROCESS

The DCAP is one in a series of documents used by Ecology to monitor progress of site investigation and cleanup. Figure 1 identifies documents required by the Model Toxics Control Act site cleanup process.

The Remedial Investigation/Feasibility Study (RI/FS) reports present results of investigations into the nature and extent of contamination at a site, assess the risk posed by that contamination, and evaluate the feasibility of alternative methods of remediating the site. The investigations, assessments, and evaluations were performed according to an Ecology approved work plan which was incorporated into a Consent

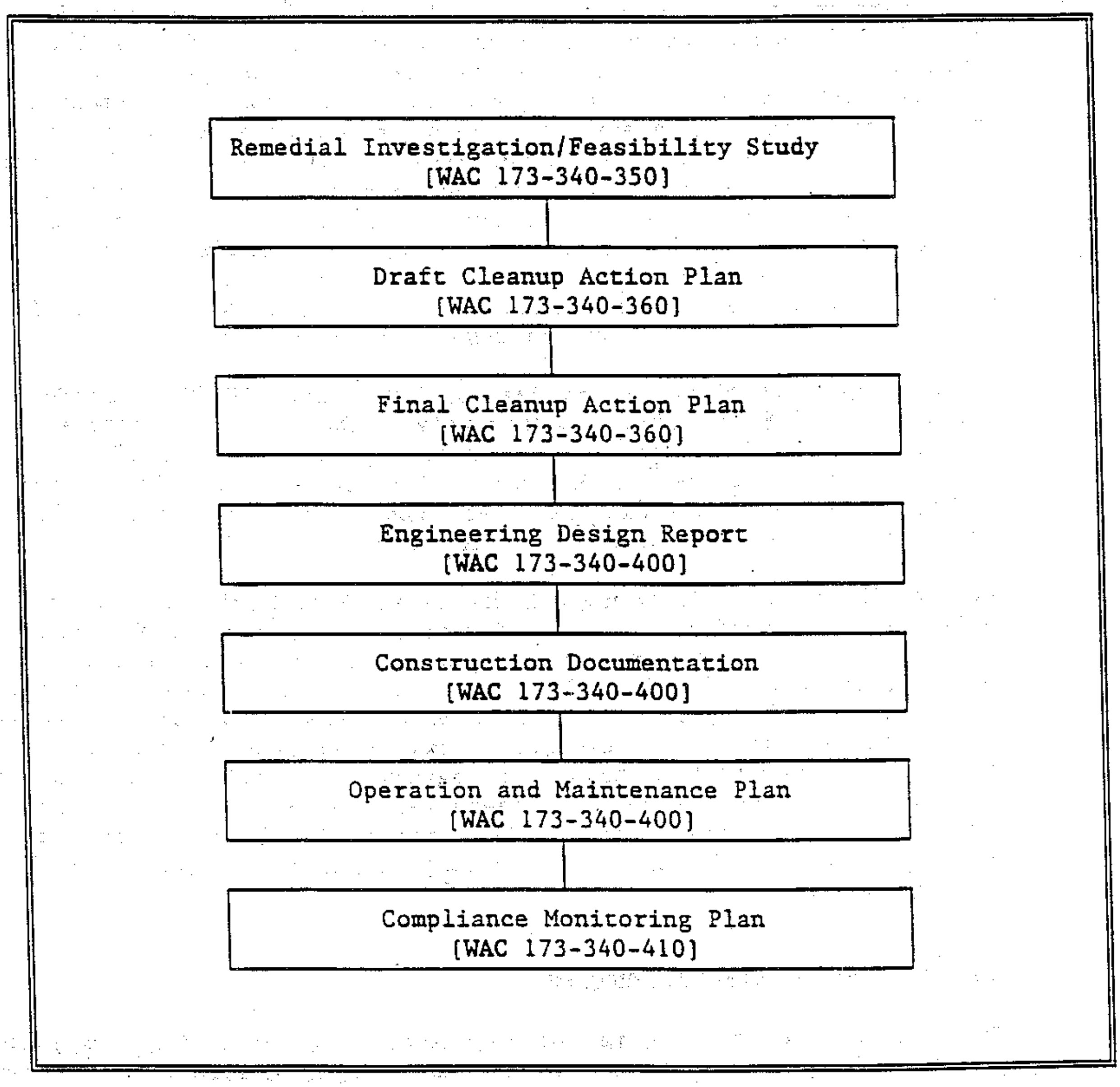


Figure 1. Documents required under Model Toxics Control Act (Chapter 173-304 WAC).

Order dated October 1987. The Consent Order was entered in Spokane County Superior Court after a public review and comment period.

Spokane County completed the RI/FS investigations, assessments and evaluations. The RI/FS reports were submitted to Ecology for review and comment. Spokane County's responses to Ecology's comments have been incorporated into the final versions of these reports. Both documents were available for public review and comment as required by WAC 173-340-600. The documents are currently available for review at state repository locations.

The DCAP sets forth functional requirements which the cleanup must meet. These include specification of cleanup levels for affected environmental media (soil, ground water, surface water, and air) and indicate remedial actions planned for media containing contamination above those levels.

A Final Cleanup Action Plan (FCAP) will be prepared after consideration of public comment on the DCAP. The FCAP is then incorporated into a Consent Decree. The Consent Decree is an agreement between Spokane County and Ecology for implementing the remedial actions outlined in the FCAP and is entered in Superior Court under Chapter 70.105D RCW.

An Engineering Design Report and Construction Plans and Specifications provide the necessary technical drawings and specifications to allow contractors to implement the methods described in the FCAP for remediating the site.

Construction documentation includes as-built drawings and documentation of any changes or modifications that were necessary during the course of implementing the remedial actions.

An Operation and Maintenance Plan presents technical guidance and regulatory requirements to assure effective operations and maintenance under both normal and emergency conditions.

Compliance Monitoring Plans include: protection monitoring, to confirm that human health and the environment are adequately protected during construction and operation and maintenance periods of the cleanup action; performance monitoring, to confirm that cleanup actions have attained cleanup standards and other performance standards; and confirmational monitoring, to confirm the long-term effectiveness of the cleanup action.

SITE DESCRIPTION AND HISTORY

SITE DESCRIPTION

The Site comprises about 45 acres of land located approximately 14 miles east of Spokane, Washington within Section 16, Township 25 North, Range 45 East (Fig. 2). The landfill is situated in a former ravine along the north slope of Carlson Hill. Bedrock ridges of metamorphic rock form the east and west borders of the ravine. The ravine was partially filled by alluvial deposits from outpourings of glacial Lake Missoula and by natural valley fill in the localized drainage area. Refuse was placed on the alluvial surface nearly filling the ravine. The topography flattens as the bedrock ridges merge with the Spokane Valley, a large east - west trending valley, directly north of the landfill. The Spokane Valley contains the Spokane Valley-Rathdrum Prairie Aquifer (Spokane Aquifer), a sole source aquifer that provides water for municipal, industrial, and agricultural purposes, serving approximately 350,000 people.

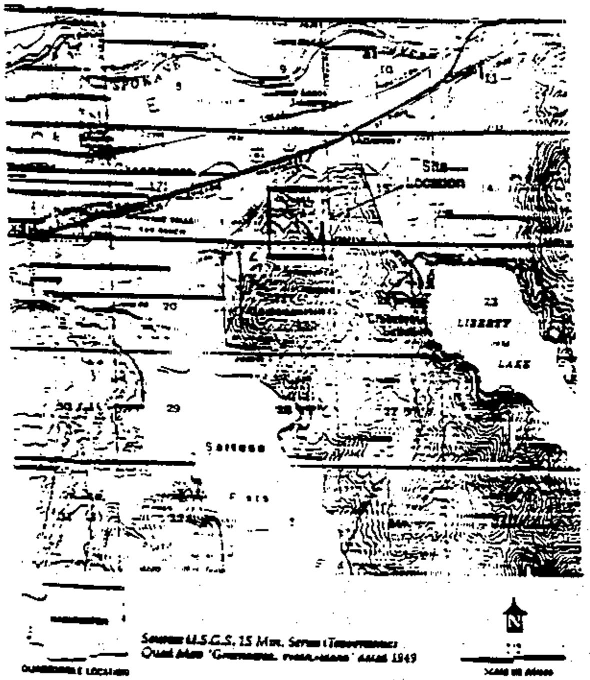
SITE HISTORY

Greenacres Landfill was used as a municipal dump site under private ownership in the early 1940's. Greenacres Township was responsible for operating and regulating the site from 1951 to 1967. Spokane County acquired the landfill after dissolution of the Greenacres Township and operated it from 1967 to final closure in 1972. The land was then sold to Holiday Hills Development, Inc. (Liberty Lake Investments, Inc.), the current landowners

Ground water contamination at the site was identified in 1978 during a ground water monitoring survey. Water from a private well, located 600 feet from the base of the landfill, was found to be contaminated with chlorinated volatile organic compounds (VOC's). Spokane County provided an alternative source of drinking water to the affected residence. Other area residents obtain drinking water from private wells, Consolidated Irrigation District or Liberty Lake Sewer District. None of the other private wells in the vicinity of the landfill show evidence of contamination.

The site was placed on the National Priorities List in 1983. Installation of three monitoring wells in 1985 confirmed the landfill as the source of contamination. Through an agreement with EPA, Ecology assumed lead agency status.

Under Consent Order No. 87-0926, Spokane County began conducting the Remedial Investigation/Feasibility Study (RI/FS) of the Site in 1988. The RI report was completed in November 1989 by Woodward-Clyde Consultants (WCC) for Spokane County. Amendments to the Remedial Investigation and the Feasibility Study Report were completed in February, 1991 and March, 1991 respectively, by Woodward-Clyde Consultants for Spokane County.



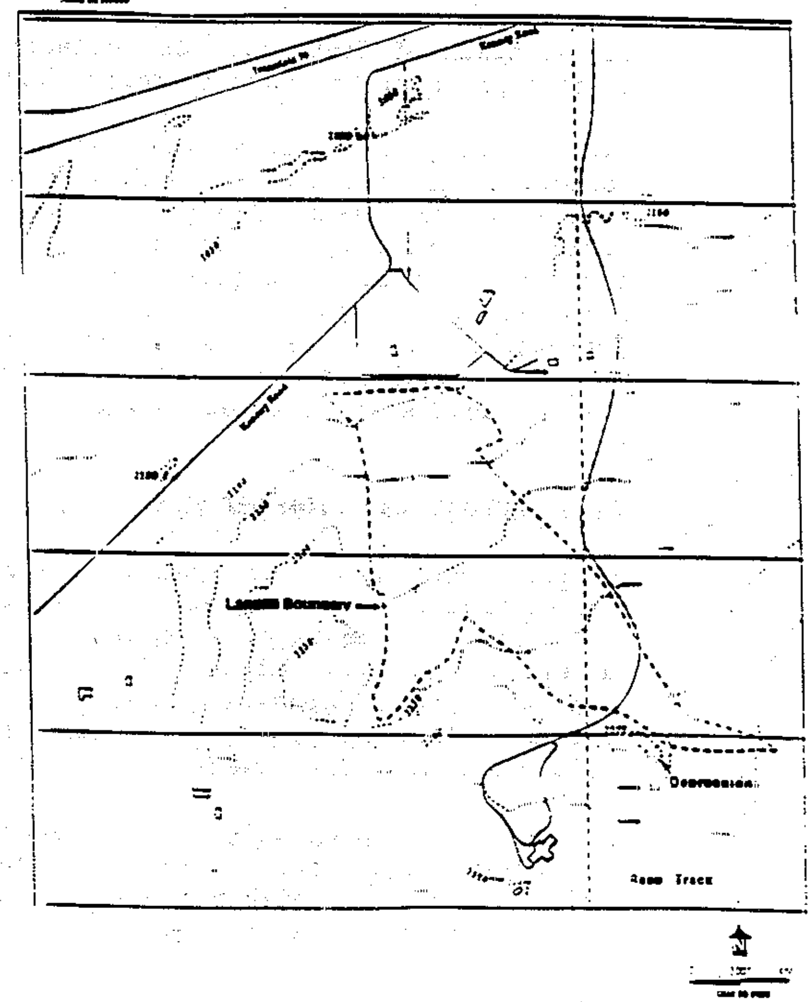


Figure _ Greenacres Landfill location map (_CC, 1991).

SUMMARY OF ENVIRONMENTAL ISSUES

METHODS OF INVESTIGATION

Geophysical surveys were performed at the site in January, 1988. Surveys included terrain conductivity, electrical resistivity soundings, and seismic refraction. The purpose of the surveys was to define the extent of the refuse boundaries, gain information regarding site geology, and help determine the best location for additional monitor wells and test pits.

A soil gas survey was conducted to provide information on unsaturated zone contamination by volatile organic compounds. A total of 88 soil gas measurements were taken at the site.

Geologic investigations at the site included: 1) excavation of 17 test pits to define the landfill perimeter; 2) 15 shallow borings to define the landfill perimeter and estimate cover thickness; 3) installation of 22 monitoring wells, five of which are constructed through refuse; 4) installation of four soil gas collection wells on the landfill; and 5) three exploratory borings to define bedrock depth.

Water levels were measured and water samples were collected for analysis following installation of monitoring wells. Water samples were collected quarterly from March 1988 to May 1989. Washington State Department of Ecology contracted with Ecology and Environment, Inc. to conduct sampling for specific volatile organic compounds (VOC's), herbicides and metals in June 1990. Additional sampling was conducted by Woodward-Clyde Consultants in October 1990 and May 1991. Slug tests were performed on two wells completed in the alluvial aquifer and ten wells completed in the bedrock aquifer to estimate hydraulic conductivity (WCC, 1989).

SITE GEOLOGY AND HYDROGEOLOGY

Bedrock underlying the landfill site is highly fractured Precambrian metamorphic schist and gneiss. A weathered bedrock zone is located above the fractured bedrock. Alluvium overlies the weathered bedrock and underlies landfill refuse. The alluvial material is composed of silt, sand and gravel deposited during the Missoula Flood and localized flood events. Alluvium merges with thick Missoula Flood deposits of the Spokane Valley north of the landfill (Fig. 3).

The regional hydrogeology in the Spokane area is dominated by the Spokane Valley-Rathdrum Prairie Aquifer (Spokane Valley Aquifer). Saturated thickness of this highly productive alluvial aquifer varies from a few feet to greater than 500 feet.

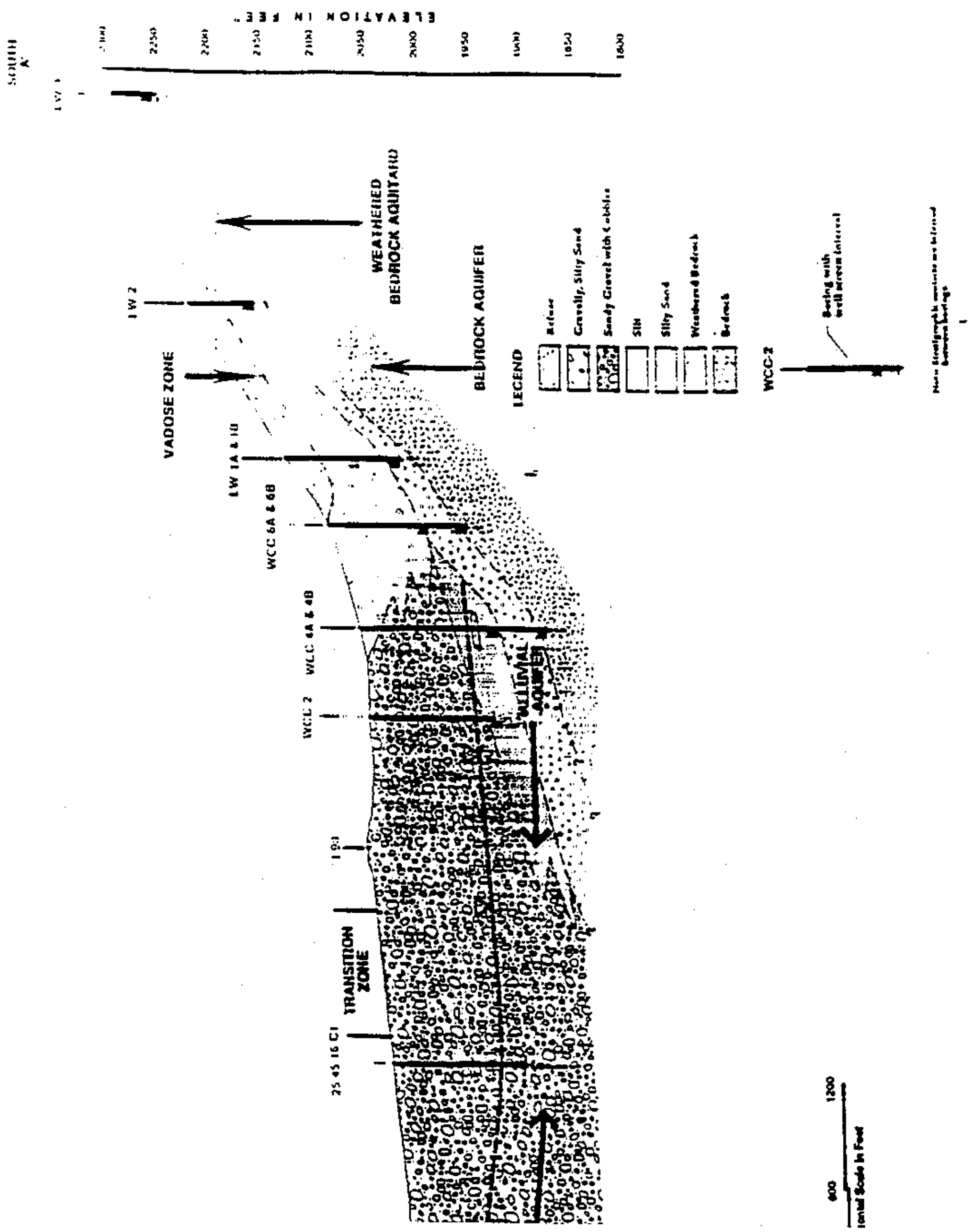


Figure 3. Cross section A-A', Greenacres Landfill (WCC, 1991)

above generally acceptable limits for the worst case scenarios and the majority of the average case scenarios evaluated.

The atmospheric air pathway does not appear to present a significant risk to residents in the area of the landfill. However, movement of gas through soil was not fully evaluated as a pathway of concern and may present a risk if there are high concentrations of gas within nearby residences.

GROUND WATER CLEANUP STANDARDS

OVERVIEW OF MTCA CLEANUP STANDARDS

Cleanup standards include cleanup levels and points of compliance. Cleanup levels mean the concentration of a hazardous substance that is determined to be protective of human health and the environment. Points of compliance mean the location where cleanup levels must be attained.

Chapter 173-340 WAC provides three methods for establishing cleanup levels: Method A; Method B; and Method C. Method A applies to routine clean up actions at sites involving a limited number of contaminants. Method B is the standard method and applies to sites demonstrating complex contamination scenarios with several contaminants of concern. Method C applies to sites where compliance with cleanup levels developed under either Method A or Method B may be impossible to achieve or may cause greater environmental harm.

Greenacres Landfill is not eligible for Method A cleanup standards. It is not considered a routine site due to contamination of more than one media (ground water and soil) and the numerous contaminants of concern. Generally, Method A is not selected for sites exhibiting ground water contamination. Method C is not applicable because compliance with Method B cleanup levels are achievable and will not cause greater environmental harm than good. Therefore, Method B was selected as the basis for establishing final cleanup levels for the Site.

The highest beneficial use of Site ground water is as a current or future drinking water source. Ecology has determined that exposure to hazardous substances through ingestion of drinking water and other domestic uses represents the reasonable maximum exposure expected [WAC 173-340-720(1)(a)]

Method B cleanup levels for individual hazardous substances in ground water are established using applicable state and federal laws and/or risk equations specified in WAC 173-340-720(3)(a). Cleanup levels for individual carcinogens are based on the upper bound of the estimated excess lifetime cancer risk of one in a million ($1x10^{-6}$). Cleanup levels for individual noncarcinogenic substances are set at concentrations which are not anticipated to result in acute or chronic toxic effects on human health and the environment.

The point of compliance is generally the entire site or a location as close as possible to the area of contamination. WAC 173-340-720(6) states "ground water cleanup levels shall be attained in all ground water from the point of compliance to the outer boundary of the hazardous waste plume." Compliance with ground water cleanup levels is determined for each ground water monitoring well [WAC 173-340-720(8)]. Data analysis and evaluation procedures will be defined in a compliance monitoring plan.

The compliance monitoring plan will identify statistical procedures proposed to determine compliance with cleanup levels. The compliance monitoring plan is reviewed and approved by Ecology.

GENERAL CLEANUP LEVEL DEVELOPMENT PROCESS

The cleanup level development process is used to identify indicator parameters for a site with multiple contaminants and set cleanup levels for the selected parameters. The first step in cleanup level development is to determine levels for individual site contaminants. These individual levels are then adjusted to reflect the risks and hazards resulting from the presence of multiple hazardous substances and routes of exposure. A substance should be considered for regulation under MTCA if the maximum concentration of that substance is greater than its cleanup level. However, not all substances in violation of cleanup levels should be included in the second step of standard development. Issues to consider in determining whether or not to retain a substance as an indicator parameter in the analysis of overall hazard or risk include:

1. The concentration of the substance. Substances with concentrations marginally above their cleanup levels may not be important in considerations of overall hazard and risk.

2. The frequency of detection of the substance. It may be appropriate to eliminate compounds which are detected with a frequency of less than five percent.

3. The toxicity of the substance. It may be suitable to delete substances of low toxicity.

4. Environmental fate. Substances which readily degrade in the environment may not be of importance to overall hazard or risk. Conversely, those with highly toxic degradation products should be included in an analysis of overall hazard and risk.

5. The substance is present at high natural background concentrations. MTCA regulates risks due to substances found at contaminated waste sites. Risks caused by substances at background concentrations are not addressed by MTCA.

6. The mobility and potential for exposure to the substance. Substances may be eliminated if these parameters are low.

Limitations of analytical chemistry are also considered. The practical quantitation limit (PQL) for a substance may be greater than its risk based cleanup level. The risk based cleanup level is used in analysis of overall site hazard and risk, in such cases. However, the regulatory limit for such substances will be the PQL. Improvements in analytical technology will result in readjustment of the regulatory limit to match new, lower PQL's, during any subsequent evaluation of the Site.

Once a list of substances to be assessed for cumulative risks and hazards has been developed, the total cancer risk for a site may not exceed $1x10^{-5}$. Additionally, the hazard index may not exceed one for chemicals with similar non-carcinogenic toxicological endpoints.

GROUND WATER CLEANUP LEVELS FOR GREENACRES LANDFILL

Sampling results from the RI Report (1989) are used to establish appropriate cleanup levels at Greenacres Landfill. Several contaminants are eliminated from evaluation as indicator parameters due to maximum contaminant concentrations below MTCA cleanup levels and/or low detection frequencies.

A review of chemicals at Greenacres Landfill indicate the maximum concentration for 32 chemicals violate Method B cleanup standards. Thirteen chemicals were dropped from analysis due to a detection frequency of less than five percent (Appendix A). An additional contaminant, 2-methylnapthalene, was eliminated as an indicator parameter as no toxicological data is available. It is difficult to set a cleanup level when there is a no ARAR's or quantitative measure of the health risk associated with the chemical.

Barium, cadmium, and nickel exceed a 5% frequency of detection and MTCA cleanup levels. Barium concentrations exceeded the Method B cleanup level of 8 ppm in Wells WCC-11A and WCC-12. All samples collected were below the Maximum Contaminant Level (MCL) of 2 ppm. Ecology and Environment, Inc sampled Well WCC-11A in June 1990. Barium was detected below the Method B cleanup level in a filtered sample and marginally above the Method B level in an unfiltered sample. Cadmium was only detected once above the MCL of 0.005 ppm and the Method B cleanup level of 0.008 ppm. The sample was collected from Well 11-A at a concentration of 0.021 ppm. Other samples collected at this well, including a filtered and duplicate sample collected in June, 1990 by Ecology and Environment, Inc., indicated concentrations below the MCL. Nickel was detected below the Method B cleanup level of 0.32 ppm in all wells except Well WCC-4B (0.6 ppm) and Well WCC-11A (0.33 ppm). Ecology and Environment, Inc. sampled Well WCC-11A in June, 1990 and obtained low nickel levels from both filtered and unfiltered samples.

It is probable that spikes in barium, cadmium and nickel concentration levels are related to suspended material within samples and not dissolved constituents. Barium, cadmium and nickel are not analyzed for overall risk and no cleanup level is established.

1,1-dichloroethane concentrations exceed Method B cleanup levels ($5x10^{-4}$ ppm) in samples collected from Wells WCC-4A and MW-2. The Method B cleanup level is calculated from the oral slope factor established by the EPA. EPA has not established an oral slope factor or reference dose (RfD) for 1,1-dichloroethane. EPA's weight-of-evidence classification is C, possible human carcinogen. The health assessment conducted by Washington Department of Health in a cooperative agreement with the Agency for Toxic Substances and Disease Registry concludes that 1,1-dichloroethane is not a contaminant of concern at the site. 1,1-Dichloroethane is eliminated as an indicator hazardous substance for the Greenacres Landfill Site.

Ground water Eh-pH conditions dictate whether chromium exists in the trivalent (Cr III) or hexavalent (Cr VI) state. There is evidence indicating Cr III or Cr VI may change oxidation states within the body (IRIS, 1992). Therefore the risk assessment and cleanup levels at the site are based on the most conservative state, chromium VI.

Arsenic is present in water at a natural background level of 0.005 ppm. The ground water cleanup level for arsenic is set at the natural background level. Arsenic is not included in the overall risk analysis for the Site.

The PQL for 1,2-dichloroethane and vinyl chloride exceed the Method B cleanup levels. The regulatory limit for both contaminants is set at the PQL, however the risk analysis is based on the Method B cleanup level. If the PQLs are lowered during cleanup of the site, the regulatory limit will be adjusted downward to reflect the lowest achievable PQL.

Indicator parameters and final cleanup levels for Greenacres Landfill are presented in Table 1. The total cancer risk calculated for the Site is within the acceptable risk of $1x10^{-5}$. The total hazard index for the Site exceeds one. WAC 173-340-708(5)(c) allows noncarcinogenic hazardous substances to be grouped by similar toxic responses or endpoints. The hazard index for each toxicity group must be less than or equal to one. If the hazard index for a toxicity group is greater than one, individual substance cleanup levels will need to be adjusted downward until the hazard index for that toxicity group is less than or equal to one. Table 2 presents the hazard index for each toxicity endpoint. The 1,2-dichloroethylene cleanup level was adjusted downward to achieve a hazard index less than one for the applicable toxicological group.

INDICATOR HAZARDOUS PARAMETER	MAXIMUM GROUND WATER CONCENTRATION (ppm)	CLEANUP LEVEL (ppm)	BASIS
Antimony	0.011	0.005	BNON
Arsenic	0.0355	0.005	BKGR
Bis(2-ethylhexyl) phthalate	0.078	1.004	MCL
Chromium VI	1.27	0.08	BNON
1,2-dichloroethane	0.03	0.005 0.0005	PQL BCAR
1,2-dichloroethylene (total)	0.22	0.05	MCL (adj)
Lead	0.34	0.05	MCL
Manganese	8.17	0.05	MCL
Pentachlorophenol	0.14	0.001	MCL
Tetrachloroethene	0.017	0.005	MCL
Trichloroethene	0.0076	0.005	MCL
Vinyl Chloride	0.012	0.001 0.00002	PQL BCAR

BKGR: Background Concentration
MCL : Maximum Contaminant Level
BNON: MTCA Cleanup Method B, Noncarcinogen
BCAR: MTCA Cleanup Method B, Carcinogen
PQL : Practical Quantitation Limit

Table 1. Ground water indicator parameters and cleanup levels.

ORAL TOXICITY ENDPOINT	INDICATOR HAZARDOUS PARAMETER	CLEANUP LEVEL (ppm)	HAZARD INDEX
ADRENAL	Pentachlorophenol	0.001	2.08E-03
BLOOD	Antimony 1,2-dichloroethylene	0.005 0.05	7.81E-01 6.25E-01
CENTRAL NERVOUS SYSTEM	Manganese	0.05	9.47E-02
CIRCULATORY SYSTEM	Pentachlorophenol	0.001	2.08E-03
KIDNEY	Pentachlorophenol	0.001	2.08E-03
LIVER	Chromium VI Pentachlorophenol Tetrachloroethene Bis(2-ethylhexyl) phthalate	0.05 0.001 0.005 0.004	1.00 2.08E-03 6.25E-02 1.25E-2

Table 2 Hazard index for affected toxicity groups

GREENACRES LANDFILL CLEANUP ACTION

SUMMARY OF FEASIBILITY STUDY CLEANUP ACTION ALTERNATIVES

Introduction

Five primary remedial action alternatives were selected for detailed evaluation in the Feasibility Study. The first two alternatives do not require active remediation of the Site. The other three alternatives consist of extraction of contaminated ground water with on-site treatment or discharge to a Publicly Owned Treatment Works (POTW). Four landfill closure/ground water extraction options are proposed to be used in conjunction with the three treatment alternatives. The proposed ground water extraction options are for the alluvial aquifer only and do not address ground water contamination in the bedrock aquifer.

Landfill Closure/ Ground Water Extraction Options

The Feasibility Study identified four optional landfill closure/ground water extraction combinations. One of these options would be used in conjunction with the ground water treatment alternatives outlined in the remedial action alternatives 3, 4, and 5.

A) Construction of a Minimum Functional Standards (MFS) cover over the landfill to limit infiltration and contaminant migration. Construction of a slurry wall along the northern edge of the landfill with extraction wells located upgradient and downgradient of the slurry wall.

B) Construction of a slurry wall along the northern edge of the landfill with ground water extraction wells located upgradient and downgradient of the slurry wall. An MFS cap is not included.

C) Construction of a MFS cap over the landfill to limit infiltration and contaminant migration. Ground water extraction wells located downgradient of the landfill. A slurry wall is not included.

D) Downgradient ground water extraction wells only.

Remedial Action Alternatives

The remedial action alternatives presented in the Feasibility Study are summarized below.

Alternative 1 - No Action

The No Action Alternative does not require any remedial activities. Ground water monitoring is the only activity that would continue at the site.

Alternative 2 - Institutional Controls, Use Restrictions, Alternate Water Supply

Alternative 2 consists of utilizing institutional controls to restrict ground water use within the contaminated ground water plume. Institutional controls include deed restrictions on property titles and provisions for an alternate water supply. Consolidated Water Sewer District (CWSD) has an existing water main and distribution network located near the site and can supply an alternate water source for future development. Additional monitoring wells would be installed to further define the contaminant plume and track movement to the Spokane Valley Aquifer.

Alternative 3 - Extraction + Metals Removal + GAC + Surface Discharge

Alternative 3 outlines site remediation by extracting ground water, according to one of the landfill closure/extraction options previously presented, and on-site treatment of ground water. The proposed treatment process is a combination of a metal removal, filtration, and granular activated carbon (GAC) adsorption.

Extracted ground water is treated by an electrochemical unit proceeded by alum addition and oxidation with hydrogen peroxide. This step removes heavy metals to a wet sludge which is filtered to produce a sludge cake with high heavy metal concentrations. Effluent from the electrochemical step is pumped through GAC beds to reduce organic concentrations to nondetectable levels. Water flows to a storage tank for compliance sampling and ultimate surface discharge. It is anticipated that disposal of sludge cake from the metal removal process and carbon from the GAC process will require handling and disposal as a hazardous waste.

Alternative 4 - Extraction + Metals Removal + UV/Oxidation + Surface Discharge

Alternative 4 provides a second alternative for on-site ground water treatment in conjunction with one of the optional landfill closure/extraction combinations. The alternate treatment process combines metals removal, filtration, and UV/oxidation.

The initial metal removal and filtration process is similar to Alternative 3. Ground water is treated by alum addition, oxidation by hydrogen peroxide and electrochemical precipitation. Filtration of the wet sludge produces a waste sludge cake. Organic contamination is reduced by a UV/oxidation process. Effluent from the metals removal step is pumped to a UV/oxidation chamber in which ozone is generated and diffused to a UV apparatus. Treated ground water will be sampled for compliance with discharge permit requirements and discharged to the surface. Sludge cake from the metal removal process will probably require handling and disposal as a hazardous waste.

Alternative 5 - Extraction + Discharge to City of Spokane POTW

Alternative 5 consists of ground water extraction, by one of the previously described landfill closure/extraction options, and discharge to City of Spokane POTW facility. Metal and organic ground water concentrations sampled at Greenacres Landfill do not exceed the City of Spokane's Total Toxic Organics limit or pre-treatment requirements. However, the discharger must be able show that toxic contaminants are not passing through the treatment system (WAC 173-216). A literature review indicates Spokane POTW should effectively remove contaminants of concern.

Extracted ground water is stored in an on-site holding tank for sampling and discharge directly to an sewer intercept line which runs to the City of Spokane waste water treatment plant. A tie-in line approximately 1/4-mile long would be required to access the existing intercept line which is maintained by Spokane County.

CLEANUP ACTION CRITERIA

Model Toxics Control Act [WAC 173-340-360] describes the requirements for selecting cleanup actions. Included in these requirements are criteria for approving cleanup actions, policies for permanent solutions and the order of preference for cleanup technologies. Cleanup actions must meet the following four threshold requirements and three other requirements.

Threshold Requirements

- protect human health and the environment
- comply with cleanup standards
- comply with applicable state and federal laws
- provide for compliance monitoring

Other Requirements

- use permanent solutions to the maximum extent practicable
- provide for a reasonable restoration time frame
- consider public concerns raised during public comment on the draft cleanup action plan

Preference is given to permanent solutions to the maximum extent practicable. Criteria are developed to determine whether a cleanup action meets this objective. These criteria include:

- overall protection of human health and the environment
- long-term effectiveness including a degree of certainty the alternative will be successful
- short-term effectiveness including protection of human health and the environment during implementation
- permanent reduction of toxicity, mobility and volume
- implementability
- cleanup costs when selecting between two alternatives which have an equivalent level of preference

Cleanup technologies are prioritized to minimize the amount of untreated hazardous substances remaining at a site. MTCA cleanup priorities are listed in order of descending preference:

(i) Reuse or recycling;

(ii) Destruction detoxication;

(iii) Separation or volume reduction followed by reuse, recycling, destruction, or detoxification of the residual hazardous substance;

(iv) Immobilization of hazardous substances

(v) On-site or off-site disposal at an engineered facility designed to minimize the future release of hazardous substances and in accordance with applicable state and federal laws

(vi) Isolation or containment with attendant engineering controls; and

(vii) Institutional controls and monitoring

EVALUATION OF PROPOSED REMEDIAL ACTION ALTERNATIVES

The Feasibility Study provides a detailed analysis of the presented alternatives using guidance developed by EPA for conducting feasibility studies under CERCLA (U.S.EPA, 1988). MTCA incorporates CERCLA requirements into Chapter 173-340 WAC. Cleanup actions at Greenacres Landfill are subject to MTCA regulations, therefore, the alternatives presented in the FS are evaluated in the Cleanup Action Plan according to requirements and criteria of WAC 173-340-360.

Alternative 1 (No-Action) and Alternative 2 (Institutional Controls and Monitoring) do not meet MTCA cleanup action criteria. The proposed alternatives are not protective of the environment, do not comply with applicable state and federal laws, and do not use permanent solutions to the maximum extent possible. Therefore, these alternatives are not acceptable cleanup actions.

Four landfill closure/ground water extraction options have been identified in conjunction with Alternative 3, 4, and 5: an MFS cover with downgradient slurry wall; a slurry wall only; an MFS cover and extraction wells only with no slurry wall; or extraction wells only. WAC 173-340-710(6) lists selected applications of specific applicable state and federal laws to cleanup actions. It identifies "Solid waste landfill closure requirements. For solid waste landfills, the closure requirements in chapter 173-304 WAC shall be minimum requirements for cleanup actions conducted under this chapter". Therefore, cleanup action alternatives that do not include an MFS cover are not acceptable.

The remaining cleanup actions proposed in the Feasibility Study include ground water extraction and treatment alternatives in conjunction with an MFS landfill cover and optional slurry wall. Each of these alternatives meet MTCA cleanup action requirements.

PROPOSED CLEANUP ACTION PLAN

The selected cleanup action utilizes a phased approach. The initial phase of the cleanup action for the Site consists of the following elements:

- Conduct indoor air sampling at adjacent residences
- Construct MFS cover for landfill
    - Control landfill gas
    - Control landfill access
    - Control stormwater run on/run off
- Provide institutional controls
- Monitor ground water

The final phase will be selected at a later date (five years) based on the effectiveness of the initial phase in reducing leachate migration and ground water contamination. The effectiveness of the initial phase will be evaluated by determining whether there has been an enlargement of the contaminant plume or a statistically significant increase in any of the indicator parameter concentrations. Ground water sampling results will be used to evaluate cap effectiveness over time. If there is evidence of increased plume migration or contaminant concentrations, a final phase including ground water extraction and treatment technologies, as outlined in the FS, may be necessary. Design and construction of any additional remedial action will be submitted for public comment and approved by Ecology. Ecology has made the determination that the cleanup action meets the requirements of WAC 173-340-360.

An explanation of the key elements of the cleanup action plan are described in detail.

- Indoor Air Sampling

  Conduct indoor air sampling of all structures in the immediate vicinity of the landfill. This includes the occupied and unoccupied residences located north/northeast of the landfill. The need for indoor air sampling is due to the detection of volatile organics in soil gas over a large areal extent. There is no available data to indicate the effect of contaminated soil gas on the concentration of indoor air quality in structures in the immediate vicinity of the landfill. The need for additional sampling or remediation should be evaluated based on results from the initial sampling effort.

- MFS Landfill Cover

  A landfill cover functions to contain refuse and provide a barrier to reduce infiltration into waste. Limiting infiltration will reduce leachate generation and migration to the alluvial and bedrock aquifers and ultimately the Spokane Aquifer.

  Design and construction of the landfill cover will be in accordance with the State of Washington Minimum Functional Standards for Solid Waste Handling (MFS) (WAC 173-304-460) which defines minimum requirements for a municipal landfill cover. MFS requires a cover of either 50-mil synthetic geomembrane liner or two feet of low permeability soil ($1x10^{-5}$ cm/sec or lower). Stormwater runon/runoff and gas collection and control will be included in the cover design. Property access shall be controlled to limit entry by the public and animals.

  Final cap design will be determined during the remedial design phase with Ecology oversight and review. Proper design, along with appropriate construction quality assurance and control and regular maintenance will provide long-term protection and effective containment of the landfill.

- Institutional Controls

  Institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of a cleanup action or result in exposure to hazardous substances at a site [WAC 173-340-440]. A site or facility is defined as "any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, vessel, or aircraft; or any site or area where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located." [WAC 173-340-200].

Institutional controls include physical measures and legal and administrative mechanisms to ensure the measures are maintained over time. Institutional controls are described in restrictive covenants on the property that are executed by the property owner and recorded with the appropriate county. Restrictive covenants run with the land and are binding on the owners successors and assignees. A declaration of specific restrictive covenants shall be included with the consent decree.

The Greenacres Landfill site or facility is defined as the refuse area, and other areas required for necessary components to the cleanup action including the landfill cover, access roads, gas collection and monitoring systems, and stormwater collection and detention systems. In addition, the facility will include all compliance monitoring wells, contaminated aquifers and the area within the volatile organic soil gas plume, north of the landfill, as identified in the Remedial Investigation Report (Woodward-Clyde Consultants, 1989).
Institutional controls required as part of the cleanup action are:

1. Restrictions on extraction and use of ground water from the contaminated bedrock and alluvial aquifers.

2. Restrictions limiting access and development of areas covered by the low-permeability landfill cover and associated components including gas collection, monitoring and stormwater collection and detention systems, and access roads.

3. Restriction of activities at the Facility that may interfere with the cleanup action, including ongoing operation, maintenance and monitoring.

4. Restrictions within the area of the soil gas plume identified in the Remedial Investigation Report (WWC, 1989) Any development or activities within the plume area will require sampling and testing of soil prior to excavation and construction. Locations where soil gas concentrations are high enough to pose a threat to human health, mitigative measures shall be included in the design and construction of structures. Sampling data, analysis, and design and construction mitigation measures shall be submitted to Ecology for approval.

5. Access requirements giving Ecology and its designated representatives the right to enter the property at reasonable times for the purpose of evaluating compliance with the cleanup action plan, including the right to take samples, inspect the operation of cleanup actions, and inspect cleanup records.

6. Restrictions on adjacent properties limiting any activities that may result in the release of hazardous substances which were contained as a part of the cleanup action.

7. Requirements for permanent physical measures, such as fences and signs, to limit activities that may interfere with the cleanup action

8. Covenant requiring the grantor to give written notice to Ecology of conveyance of any real property interest in any portion of the Property at least 30 days prior to such contemplated conveyance.

9. Any conveyance of any real property interest in any portion of the Property is subject to the provision of the CAP, including any provisions for continued operation and maintenance, monitoring, containment, or other measures necessary to assure the integrity of the cleanup action. A copy of the Consent Decree, RI/FS, and CAP shall be furnished to any transferee of any real property interest in any portion of the Facility prior to conveyance to such transferee.

- Ground Water Monitoring

Long-term ground water monitoring is required by MTCA for cleanup actions at sites involving on-site disposal, isolation or containment [WAC 173-340-360]. Monitoring must be continued until residual hazardous substance concentrations no longer exceed cleanup levels. Ground water monitoring must also be done to demonstrate control and containment of hazardous substances.

Ground water monitoring at Greenacres Landfill will include sampling all monitor wells and wells known as RW-1 and RW-2 on a quarterly basis for the selected indicator parameters identified in the cleanup standards section. All sampling and laboratory analysis should achieve detection limits which meet or exceed established health-based standards or PQL's.

A sampling and analysis plan meeting the requirements of WAC 173-340-820 will be written by Spokane County and approved by Ecology. The plan will identify data analysis and evaluation procedures that are used to demonstrate and confirm compliance with cleanup standards. This includes a description of all proposed statistical methods used to determine significant increases or decreases of contaminant levels over time. Ecology will be notified of statistically significant increases of any indicator parameters.

Changes may be made to the monitoring program as data is collected and analyzed. These changes may include increasing or decreasing the sampling frequency, adding or deleting monitoring parameters and adding or eliminating monitor wells. Any changes to the monitoring plan proposed by Spokane County or Ecology will require Ecology approval. Changes may also be required due to amendments to Chapter 173-340 WAC. Substantial changes require public participation in accordance with WAC 173-340-600(14)(a). Ecology will determine when public participation is required.

The proposed strategy is consistent with Ecology's recognition for "... the need to use engineering controls, such as containment, for sites or portions of sites that contain large volumes of materials with relatively low levels of hazardous substances where treatment is impracticable" [WAC 173-340-360(9)(c)]. This is consistent with EPA's expectations that appropriate Superfund remedial actions are a combination of containment of low concentrations of materials and immobile wastes dispersed over large areas, with institutional controls acting as supplements to long-term engineering controls.

It is not possible to specify the types, levels and amounts of hazardous substances that are deposited at a solid waste landfill. Typically, multiple types of household hazardous waste and other wastes deposited prior to regulatory restrictions contribute to site contamination. A landfill cap is effective in reducing leachate generation and preventing contact with wastes as required by WAC 173-340-360(10)(a).

Protection of human health and the environment is assured by implementing a long-term monitoring program and institutional controls which "remain in effect until residual hazardous substance concentrations no longer exceed site cleanup levels established ..." [WAC 173-340-360(8)(b)]. Institutional controls, in the form of deed restrictions and alternate water supplies, insure that site ground water is not used and site cleanup and monitoring responsibilities are clearly defined.

Selection of a remedial action requires consideration of whether ground water extraction and treatment is appropriate. The objectives of ground water extraction are to control a contaminant plume to prevent further contamination and to lower the concentration of contaminants. Recently, the effectiveness of extraction systems in achieving ground water cleanup level goals has been evaluated based on actual field data (Haley and others, 1991; Doty and Travis, 1991).

Ground water extraction technologies typically are successful at reducing contaminant mobility and concentration. However, studies conducted by Haley and others (1991) and Doty and Travis (1991) conclude that extraction methods are generally ineffective at restoring water quality to health based standards. Modeling efforts estimate aquifer restoration time frames may require 100 - 1000 years (Doty and Travis, 1991).

The overall effectiveness of ground water extraction in aquifer remediation is dependent on various physical and chemical properties. Typically, extraction systems are most successful in highly permeable, homogeneous aquifers. Contaminant sorption characteristics, contaminant concentration levels and contaminant solubility of non-aqueous phase liquids greatly influence the success of extraction systems.

Aquifer and chemical properties at Greenacres Landfill may not be conducive to effective remediation by extraction techniques. Additional aquifer tests need to be performed to better define the bedrock and alluvial aquifer response to pumping. Low contaminant concentrations and contaminants resistant to desorption may also limit the success of an extraction system.

Capping and controlling the primary source of contamination at the landfill is anticipated to be as effective at lowering contaminant concentrations as ground water extraction and treatment, at this time. The contaminant plume at the Site has probably reached the maximum areal extent as leakage from the landfill has been occurring for a several years. A five year review of ground water data from the Site will be used to evaluate whether the cap is controlling downgradient contaminant concentrations and plume migration. A statistically significant increase in the concentration of an indicator parameter or evidence that the size of the plume is enlarging may require additional remedial action, such as ground water extraction and treatment.

The estimated capital cost of implementing an extraction and treatment system ranges from $270,000 to $1,700,000 (WCC, 1991), depending on the system design. Annual operating costs are estimated to range from $51,000 to $124,000. It is anticipated that construction of a low permeability cover will effectively reduce ground water contamination concentrations and control or reduce the size of contaminant plumes. Therefore, additional benefits that could be achieved by an extraction system are not sufficient to justify the increased incremental cost of construction and operation of the system at this stage of remediation. However, if ground water data collected during the five year monitoring period conducted after completion of the cap indicates increased contaminant levels or plume migration, the benefits of ground water extraction and treatment may outweigh the additional costs. A requirement of WAC 173-340-360(7)(b)(vi) is that "the practicability of achieving ground water cleanup levels by treating the ground water affected by the release shall be reevaluated during the periodic review under WAC 173-340-420."

EVALUATION OF CLEANUP ACTION WITH RESPECT TO MTCA CRITERIA

Protection of Human Health and the Environment

The major exposure route of Site contamination is through ingestion of contaminated ground water, with minor secondary routes through air and direct contact. Institutional controls restricting use of contaminated ground water will provide short-term protection of human health. A landfill cap minimizing infiltration and reducing the amount of leachate generated and released to ground water will be protective of long-term human health and the environment. Additionally, direct contact with the waste and contaminated soils will be prevented by a landfill cap. Gas collection and control will be incorporated into the cap design limiting potential off-site gas migration. Maintenance of the cap to insure the long-term integrity of the cap is an important factor in long-term protection of human health and the environment.

Compliance with Cleanup Standards

All refuse and underlying contaminated soil will be contained by construction of a landfill cap. WAC 173-340-700(2)(c) specifies that a cleanup action involving the containment of hazardous substances "may be determined to comply with cleanup standards, provided the compliance monitoring program is designed to ensure the long-term integrity of the containment system. " The cleanup action plan requires provisions for long-term maintenance of the landfill cap in the compliance monitoring plan. In addition, institutional controls are incorporated into the cleanup action plan as required when on-site containment is the selected cleanup action [WAC 173-340-360(8)(b)].

Compliance with Applicable State and Federal Laws

The cleanup action at Greenacres Landfill complies with applicable federal and state laws. Federal and state laws applicable to the implementation of the proposed cleanup action are identified in Table 3. Local laws which are more stringent than specified federal and state laws will govern when applicable.

Compliance Monitoring

Compliance monitoring consists of three categories; protection, performance, and confirmational monitoring [WAC 173-340-410]. Protection monitoring confirms that human health and the environment are adequately protected during construction and operations and maintenance of the cleanup action. Performance monitoring confirms the cleanup action has attained cleanup standards and other performance standards. Confirmational monitoring confirms the long-term effectiveness of the cleanup action once cleanup standards are attained.

Spokane County will prepare and submit compliance monitoring plans for Ecology review and approval. The plans will describe how data is to be interpreted, the conditions in which additional remedial actions may be required, methods for data confirmation, and reporting of monitoring results. An inspection plan will be developed to insure the structural integrity of the MFS cap is maintained. A worker's safety and health plan [WAC 173-340-810] and a sampling and analysis plan [WAC 173-340-820] will also be included as part of the compliance monitoring plans. All cleanup actions and long-term monitoring will be performed in accordance with these plans.

ACTION	CITATION	COMMENT
Cleanup Action Construction	29 CFR 1910 Chapter 173-340 WAC 43.21 RCW; Chapter 197-11 WAC Chapter 296-155 WAC Chapter 296-62 WAC	Occupational Safety and Health Act Model Toxics Control Act: Defines administrative process for cleanup actions and requirements for selecting cleanup action State Environmental Policy Act Rules Safety Standards for Construction Work Occupational Health Standards--Safety Standards for Carcinogens, Part P, Hazardous Waste Operations and Emergency Response
Cleanup Standards	42 USC 300 33 USC 1251 WAC 173-340-700 to 760	Safe Drinking Water Act Clean Water Act Model Toxics Control Act: Requirements for establishing cleanup standards
Landfill Cap	WAC 173-304-460 40 CFR Part 258	Minimum Functional Standards: Closure Requirements Criteria for Municipal Solid Waste Landfills
Gas Collection and Control	72 USC 7401 Chapter 173-304 WAC 70.94 RCW Chapter 173-400 WAC Chapter 173-403 WAC Chapter 173-460 WAC Chapter 173-490 WAC SCAPCA Regulation I 40 CFR Part 28	Clean Air Act Minimum Functional Standards; Closure Requirements Clean Air Act General Regulations for Air Pollution Sources Implementation of Regulations for Air Contaminant Sources Controls for New Sources of Toxic Air Pollutants Emission Standards and Controls for Sources Emitting Volatile Organics Emission Standards and Controls for Sources Prevention of Fugitive Emissions Criteria for Municipal Solid Waste Landfills
Stormwater Runon/Runoff	Chapter 173-304 WAC Chapter 173-201 WAC Chapter 173-220 WAC 90 48 RCW 90 52 RCW 90 54 RCW Chapter 173-216 WAC 40 CFR Part 258	Minimum Functional Standards for Solid Waste Handling; Closure Requirements Water Quality Standards for Surface Waters of the State of Washington National Pollutant Discharge Elimination System Permit Program State Water Pollution Control Act Pollution Disclosure Act of 1971 Water Resources Act of 1971 State Waste Discharge Permit Program Criteria for Municipal Solid Waste Landfills
Compliance Monitoring	Chapter 173-340 WAC 40 CFR Part 258	Model Toxics Control Act Criteria for Municipal Solid Waste Landfills

Table 3. Federal, state, and local laws and regulations applicable or relevant and appropriate to the proposed cleanup action.

Use of Permanent Solutions to the Maximum Extent Practicable

Containment of hazardous substances and institutional controls alone are not considered permanent solutions under MTCA. However, it is recognized that permanent solutions may not be practicable for all sites. The cleanup action must satisfy the criteria outlined in WAC 173-340-360(5)(d) used to determine whether the cleanup is permanent to the maximum extent practicable.

Protection of Human Health and Environment

Capping the landfill will provide overall protection of human health and the environment as previously discussed. Containment of refuse is expected to significantly reduce the migration of leachate to ground water. Attainment of ground water cleanup standards resulting from the proposed cleanup action will be assessed as part of a five year review required under Chapter 173-340 WAC. If ground water standards have been attained at that time, no additional cleanup actions will be required. If, in Ecology's opinion, ground water concentrations are approaching cleanup levels, an additional monitoring period may be allowed to determine if ground water standards can be met without further remedial action. If there is no trend indicating a reduction in contamination concentrations, additional remedial action may be required.

Long-term Effectiveness

Long-term effectiveness should be achieved by limiting leachate generation and migration. However, if contaminant levels show no decrease in concentration over time, ground water treatment may be required. Long-term effectiveness depends on regular maintenance of the cap, stormwater collection and gas collection systems. Performance monitoring is required to confirm the cleanup action has attained cleanup standards. Confirmational monitoring is necessary to confirm the long-term effectiveness of the cleanup action once cleanup standards are attained.

Short-term Effectiveness

Risks associated with implementation of the cleanup action involve potential exposure of workers to dust and soil during construction activities. Mitigation techniques to be used on-site to reduce risks associated with implementation of this alternative will be defined as part of remedial design. Protection monitoring to confirm that human health is adequately protected during the construction and operation and maintenance of the cleanup action will be required.

Permanent reduction of toxicity, mobility and volume

A properly constructed and maintained landfill cap is anticipated to reduce the volume and mobility of leachate from the landfill.

Implementation

Implementation of the proposed cleanup action will be straight forward as capping a landfill is a proven and routine technology. Capping involves use of conventional construction equipment. Institutional controls will prohibit any land uses which may damage the cap.

Cost

Based on a 1992 cost estimated provided by Spokane County, the approximate cost for constructing an MFS landfill cover over Greenacres Landfill is $6,000,000 (Appendix B). Annual maintenance and compliance monitoring cost are estimated in the FS (WCC, 1991) at $34,000 (Appendix B).

Provide Reasonable Restoration Time Frame

The proposed cleanup action will help limit continued discharge and migration of leachate. The time frame necessary for the achievement of cleanup levels with the proposed phased cleanup action cannot be clearly determined. A phased approach will allow evaluation of additional remedial actions if capping does not effectively reduce contaminant concentrations. Due to the potential ineffectiveness of ground water extraction and treatment at the Site and the indefinite time frame required to remediate ground water, the phased cleanup approach is considered to best meet the overall goals of MTCA.

Public Participation and Community Acceptance

MTCA regulations require public concerns regarding the proposed cleanup alternative be addressed. A public comment period for this document will allow the public and parties affected by the cleanup action a chance to comment on the proposed action. Public comments and concerns will be evaluated in developing the final cleanup action plan. A responsiveness summary will also be submitted as part of the final cleanup action plan to specifically respond to all public comments associated with this plan.

IMPLEMENTATION SCHEDULE

Spokane County is to submit the following documents to Ecology within six months of the date of signing the Consent Decree implementing this Cleanup Action Plan:

- Institutional control plan
- Sampling and analysis plan
- Compliance Monitoring Report

No work will be performed until Ecology has approved those portions of the Engineering Design Report and the Compliance Monitoring Report governing that work.

Spokane County will implement the following within nine months of signing the Consent Decree:

- Completion of sampling and data analysis for indoor air quality
- Engineering Design Report with relevant plans and specifications

The following items will be completed within two years of the date of signing the Consent Decree:

- Construction of approved MFS cover
- Completion of approved operations and maintenance plan

REFERENCES

Ecology and Environment, Inc., 1986, "Greenacres Landfill, Spokane County, Washington" ," Prepared for U.S. Environmental Protection Agency, Region X by Ecology and Environment, Inc., Seattle, Washington.

Ecology and Environment, Inc., 1990, "Groundwater monitoring data Greenacres Landfill," Prepared for Department of Ecology by Ecology and Environment, Inc., Seattle, Washington.

Haley, J., Hanson, B., Enfield, C., Glass, J., 1991, "Evaluating the effectiveness of ground water extraction systems," Ground Water Monitoring Review, v Winter 1991.

Lum II, W.E., Turney, G.L, and Alvord, R.C., 1986, "A preliminary evaluation of the geohydrology and water quality of the Greenacres Landfill area, Spokane County, Washington," U.S.G.S. Open-File Report 85-496.

U.S. EPA, 1985, "Guidance on feasibility studies under CERCLA, EPA, OSWER, OWPE," EPA Report #540/6-85/002, NTIS Ref#PB-85-268616, OSWER Directive 9355.0-06B, U.S. EPA, Cincinnati, Ohio.

U.S. EPA, 1988a, "Guidance for conducting remedial investigations and feasibility studies under CERCLA," EPA/540/G-89/004, OSWER Directive 9355.3-01.

U.S. EPA, 1988b, "National oil and hazardous substances contingency plan," 40 CFR Part 300.

U.S. EPA, 1988c, "CERCLA compliance with other laws manual." OSWER Directive 9234.1-01.

U.S. EPA, 1990, "Health effects assessment summary tables," First/Second Quarters FY - 1990, OERR 9200.6-303(90-1/2).

U.S. EPA, 1991, Integrated Risk Information System.

Woodward-Clyde Consultants, 1989, "Greenacres Landfill remedial investigation report," Prepared for Spokane County by Woodward-Clyde Consultants, Seattle, Washington.

Woodward-Clyde Consultants, 1990, "Greenacres Landfill RI/FS Technical Memorandum: Ground water contamination investigation," Prepared for Spokane County by Woodward-Clyde Consultants, Seattle, Washington.

Woodward-Clyde Consultants, 1991, "Greenacres Landfill remedial investigation report, Amendment 1; Air quality modeling and risk assessment," Prepared for Spokane County by Woodward-Clyde Consultants, Seattle, Washington.

Woodward-Clyde Consultants, 1991, "Greenacres Landfill feasibility study report," Prepared for Spokane County by Woodward-Clyde Consultants, Seattle, Washington.

Woodward-Clyde Consultants, 1991, Written communication between Dean Fowler, Spokane County and William J. Deutsch, Woodward-Clyde Consultants Regarding Greenacres Landfill RI/FS May 1991 Supplemental Sampling Round (Revised Report).

APPENDIX A

Contaminants detected at Greenacres Landfill.

GREEN ACRES LANDFILL
CONTAMINANTS EXCEEDING MTCA CLEANUP STANDARDS

CHEMICAL NAME	FREQUENCY OF DETECTION	MAXIMUM CONCENTRATION (ppm)
2-Hexanone	1.4%	.0056
Benzo[a]anthracene	2.1%	.002
Benzo[a]pyrene	2.1%	.003
Benzo[ghi]perylene	2.1%	.004
Benzo[k]fluoranthene	2.1%	.007
Bis(2-chloroethyl)ether	2.1%	.002
4-Chloro-3-methylphenol	2.1%	.007
Dibenz[ah]anthracene	2.1%	.003
Indeno[1,2,3-cd]pyrene	2.1%	.003
Isophorone	2.1%	.03
Dalapon	2.1%	.08
Dichlorpropane	2.1%	.002
Chloroform	4.1%	.002
1,1-Dichloroethane	8.1%	.0025
Pentachlorophenol	10.6%	.14
1,2-Dichloroethene(trans)	12.2%	.22
2-Methylnapththalene	12.8%	.019
Benzene	18.9%	.04
1,2-Dichloroethane	28.4%	.03
1,2-Dichloroethene(cis)	28.4%	.18
Vinyl Chloride	28.4%	.012
Antimony	28.9%	.011
Cadmium	31.1 %	.021

CHEMICAL NAME	FREQUENCY OF DETECTION	MAXIMUM CONCENTRATION (ppm)
Trichloroethene	36.5%	.0076
Bis (2-ethylhexyl)phthalate	42.6%	.078
Arsenic	51.1%	.0355
Tetrachloroethene	56.8%	.017
Chromium	62.2%	1.27
Nickel	66.7%	.6
Lead	74.3%	.34
Barium	100%	4.84
Manganese	100%	8.17

APPENDIX B

Estimated cost for Greenacres Landfill closure.

Revised Cost for Cap Described in Greenacres Landfill Feasibility Study Report:Final, dated March 1991.

ITEM	UNIT COST	UNIT	QUANTITY	COST
I. Direct Costs (Installed)				
Materials				
Subgrade Fill Material	$7.20	cubic yard	15,165	$109,188
0.5-ft Underlying Sand Layer	$7.80	cubic yard	37,913	$295,721
50-mil HDPE	$0.40	square foot	2,047,320	$818,928
1-ft Soil cover	$7.80	cubic yard	75,827	$591,451
0.5-ft Depth of Topsoil	$16.00	cubic yard	37,913	$606,608
Gas Vents (installed)	$700.00	vent	10	$7,000
Construction				
Soil Material Placement	$2.50	cubic yard	166,818	$417,045
Grading	$1.75	cubic yard	75,827	$132,697
Site Clear and Grub	$1,575.00	acre	47	$74,025
Geomembrane Placement	$0.35	square foot	2,047,320	$716,562
Vegetation	$1,500.00	acre	47	$70,500
Total Direct Costs				$3,839,725
II. Indirect Field Costs				
Construction Expenses (10% DFC)				$383,973
Total Indirect Field Costs				$383,973
III. Indirect Costs				
Contractor Profit (10% DFC)				$383,973
Sales Tax (8.2% DFC)				$314,857
Eng'r'g Design & Construction (15%DFC)				$575,959
Total Indirect Costs				$959,931
Captital Subtotal				$5,183,629
Contingency (20%)				$1,036,726
Total Capital Requirement				$6,220,355

Notes:

1. Additional subgrade material was assumed 1 foot depth over 20 percent of 47 acres.
2. Unit costs based on 1991 Means Site Work and past similar projects.
3. The typical landfill gas generation rate is expected to decay exponentially with a half-life of 20-years (Lofy, 1981). Since Greenaceres landfill has not received refuse for 20 years, gas generation is assumed negligible, and only gas vents were included in the design.

References:

Lofy, R.J., 1981. Feasiblity of Direct On-Site Conversion of Landfill Gas to Electric Energy at Scholl Canyon Landfill, Glendale, California. Prepared for the U.S. Department of Energy.

wo/gan/sccr.a

APPENDIX C

SEPA documents for Greenacres Landfill.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
N 4601 Monroe, Suite 100 • Spokane Washington 99205-1295 • (509) 456-2926

DETERMINATION OF NONSIGNIFICANCE

Description of Proposal: Remediation of a closed landfill consisting of constructing a low permeability cover over the refuse area and installing a landfill gas collection and control system, and stormwater run-on/run-off collection and handling system.

Proponent: Spokane County Utilities Department

Location of proposal, including street address, if any: Greenacres Landfill, located within the SW¼SW¼ of Section 16, Township 25 North, Range 45 E.W.M., Spokane County, Washington.

Lead Agency: State of Washington, Department of Ecology.

The lead agency for this proposal has determined that it does not have a probable significant adverse impact on the environment. An Environmental Impact Statement (EIS) is not required under RCW 43.21C.030(2)(c). This decision was made after review of a completed Environmental Checklist and other information on file with the lead agency. This information is available to the public on request.

This Determination of Nonsignificance is issued under 197-11-340(2); the lead agency will not act on this proposal for fifteen (15) days from the date below. Comments must be submitted by August 1, 1992.

Responsible Official: Flora J. Goldstein

Position/Title: Section Manager
Toxics Cleanup Section

Telephone: 456-7693

Address: N. 4601 Monroe, Suite 100
Spokane, WA 99205-1295

Date: July 17, 1992

Signature: Flora J. Goldstein

GREENACRES LANDFILL REMEDIAL ACTION
ENVIRONMENTAL CHECKLIST

A. BACKGROUND

1. Name of proposed project, if applicable:

   Greenacres Remedial Action, Spokane, Washington

2. Name of applicant:

   Spokane County

3. Address and phone number of applicant and contact person:

   Spokane County
   Public Utilities Division
   N. 811 Jefferson Street
   Spokane, Washington 99260
   Attn. Dean Fowler

4. Date checklist prepared:

   April 30, 1992

5. Agency requesting checklist:

   Washington State Department of Ecology

6. Proposed timing or schedule (including phasing, if applicable):

   It is anticipated that remediation work in accordance with the Remedial Action Consent Decree will commence in 1993.

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   No

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   Woodward-Clyde Consultants, 1989, Greenacres Landfill Remedial Investigation Report; Prepared for Spokane County, November, 1989.

   _, 1991, Remedial Investigation Report (Amendment I): Air Quality Modelling and Risk Assessment; Prepared for Spokane County, February, 1991.

   _, 1991, Greenacres Landfill Feasibility Study Report; Prepared for Spokane County, March 1991.

_, 1991, Correspondence to Mr. Dean Fowler (Spokane County) Re: Greenacres Landfill RI/FS May 1991 Supplemental Sampling Rounds (Revised Report), August 1991.

_, 1992, Correspondence to Mr. Dean Fowler (Spokane County) Re: Groundwater Cleanup Standards for Greenacres Landfill, Spokane, WA, January 1992.

_, 1992, Correspondence to Mr. Dean Fowler (Spokane County) Re: Greenacres Landfill RI/FS - Workplan Amendment #5 Supplemental Risk Assessment, January 1992.

_, 1992, Supplemental Risk Assessment Greenacres Landfill; Prepared for Spokane County, March 1992.

Washington State Department of Health, 1992, Draft Health Assessment for Greenacres Landfill, Spokane, Washington, CERCLIS Number WAD980514608, March 1992

Draft Cleanup Action Plan (in progress)

Design Engineering Report (to be prepared)

Construction Plans and Specifications (to be prepared)

9. **Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.**

   No, the cleanup action plan will require institutional controls at the site limiting any development.

10. **List any government approvals or permits that will be needed for your proposal, if known.**

    Approved Cleanup Action Plan and Consent Decree for remedial action (Department of Ecology)

    Air quality permits and surface water discharge permits may be required in conjunction with capping the landfill.

11. **Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.**

    Capping refuse area with an impermeable cover and monitoring ground water on-site and off-site.

12. **Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

SW1/4 SW1/4, Section 16, Township 25 North, Range 45 East; Spokane County, Washington.
See vicinity map attached.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. **General description of the site:**

Filled ravine sloping to the north, bounded by bedrock ridges to the east and west.

b. **What is the steepest slope on the site (approximate percent slope)?**

eight percent

c. **What general types of soils are found on the site (for example, clay, sand, gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.**

Bedrock ridges lie east and west of the property. Refuse is covered by one to five feet of silty gravelly sand. Natural soils at the site are predominantly sands and gravels.

d. **Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.**

There is evidence of localized subsidence within the refuse area.

e. **Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.**

Grading may be required to achieve necessary elevations for cap construction. The landfill cap will consist of a minimum of two feet of low permeability soil or a geomembrane. The cap will be covered with a drainage layer and vegetation layer.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

Yes, to a minimum extent. However, a requirement of the construction plans will be to control erosion to the maximum extent possible to prevent any off-site migration of contaminated soils.

Stormwater run on/ run controls for the landfill will be required as part of the cap design.

g. About what percent of the site will be covered with impervious surfaces after project constructions (for example, asphalt or buildings)?

The entire refuse area will be covered with an impervious cap.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

Erosion controls will be included in construction plans and final design.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities if known.

Dust generation during construction activities will be minimized by applying good construction practices. There may be some vehicle emissions from construction equipment. Air monitoring will be required during construction in compliance with the Health and Safety Plan.

A gas control system will be designed in conjunction with the cap design in accordance with all air quality regulations. Odors are not expected to be a problem due to the age of the landfill.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No

c. Proposed measures to reduce or control emissions or other impact to air, if any:

Good construction practices should reduce dust generation during construction. A landfill gas collection and control system will be designed with the final cover.

3. Water

a. Surface:

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

No

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

Not applicable

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No

b. **Ground:**

1) Will ground water be withdrawn, or will water be discharge to ground water? Give general description, purpose, and approximate quantities if known.

An infiltration pond will probably be designed to control stormwater runoff.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemical...: agricultural, etc.) Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

Not applicable

c. **Water Runoff (including storm water):**

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

Runoff water will be collected from areas upgradient of the final cover and from drainage off the surface of the final cover. The water will be collected by ditches, drainage layers, drainage nets culverts, and/or storm sewers. The water will probably flow to an infiltration pond adjacent to the cover landfill.

2) Could waste materials enter ground or surface waters? If so, generally describe.

The purpose of the proposed action is to reduce migration of contaminants into ground water. It is possible that surface water runoff could become contaminated through contact with contaminated soils, however, this will be controlled by requirements stated in the Cleanup Action Plan.

d. **Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:**

These measures, which will be included in the Design Engineering Report, could include testing, sedimentation ponds, and berms.

4. Plants

a. Check or circle types of vegetation found on the site:

___ deciduous tree: alder

___ evergreen tree: (limited landscaping)

_X_ shrubs (limited landscaping)

_X_ grass (limited landscaping)

___ pasture

___ crop or grain

___ wet soil plants: cattail (in drainage ditches)

___ water plants: water lily, eelgrass, milfoil, other

___ other types of vegetation

b. What kind and amount of vegetation will be removed or altered?

Existing vegetation will be removed for cap construction, however a native grasses will be replanted over the final cover.

c. List threatened or endangered species known to be on or near the site.

None

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Native grasses will be reseeded over impermeable cap.

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other:

mammals: deer, bear, elk, beaver, other:

fish: bass, salmon, trout, herring, shellfish, other:

b. List any threatened or endangered species known to be on or near the site.

None

c. Is the site part of a migration route? If so, explain.

No

d. Proposed measures to preserve or enhance wildlife, if any:

None

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed projects's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Not applicable

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

Not applicable

7 Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk or fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.

The purpose of the proposed action is to reduce or eliminate the risk of environmental health hazards associated with site contamination. During the course of remedial action work workers on-site could be exposed to hazardous materials, if work is done without proper safeguards. Potential exposures will be limited by measures to be implemented under the Cleanup Action Plan.

1) Describe special emergency services that might be required.

Emergency medical services might be required in the event of a construction accident.

2) **Proposed measures to reduce or control environmental health hazards, if any:**

All work will be done in accordance with an approved Cleanup Action Plan, including a site health and safety plan.

B. Noise

1) **What types of noise exist in the area which may affect your project (for example: traffic, equipment, operation, other)?**

Not applicable.

2) **What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.**

Noise from construction equipment and truck traffic will occur. Noise associated with these activities would occur between 7:00 a.m. and 10:00 p.m.

3) **Proposed measures to reduce or control noise impacts, if any:**

Limit hours of construction activity and hauling. Haul routes will not be through any residential neighborhoods.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The site is a closed landfill that has been covered with one to five feet of soil and vegetated with native grasses. A roadway, leading to an adjacent hay barn and vacant recreational lodge,dissects a portion of the site. A single family residence is located directly northeast of the property.

b. **Has the site been used for agriculture? If so, describe.**

No

c. Describe any structures on the site.

None

d. Will any structures be demolished? If so, what?

No

e. What is the current zoning classification of the site?

SR1: Suburban Residential-1

f. What is the current comprehensive plan designation of the site?

Suburban

g. If applicable, what is the current shoreline master program designation of the site?

Not applicable

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

No

i. Approximately how many people would reside or work in the completed project?

None

j. Approximately how may people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not applicable

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Not applicable

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.

Not applicable

b. Approximately how many units, if any, would be eliminated? Indicate whether high-, middle-, or low- income housing.

Not applicable

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable

10. Aesthetics

a. **What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?**

No structures are proposed.

b. **What views in the immediate vicinity would be altered or obstructed?**

Not applicable

c. Proposed measures to reduce or control aesthetic impacts, if any:

None during construction. Native grasses will be planted over the final cover.

11. Light and Glare

a. **What type of light or glare will the proposal produce? What time of day would it mainly occur?**

None, except for headlights of vehicles during on-site and off-site hauling activity and temporary construction lights required by OSHA.

b. **Could light or glare from the finished project be a safety hazard or interfere with views?**

No

c. **What existing off-site sources of light or glare may affect your proposal?**

None

d. Proposed measures to reduce or control light or glare impacts, if any:

None

12. Recreation

a. **What designated and informal recreation opportunities are in the immediate vicinity?**

A vacant recreational lodge is located directly south of the property. A small racetrack is adjacent to the lodge. Neither of the facilities are operational.

b. **Would the proposed project displace any existing recreational uses? If so, describe.**

The access road to the lodge will need to be relocated or constructed over the final landfill cover.

c. **Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any:**

Roadway will be incorporated into the design of the final cover, either relocated adjacent to the landfill or on the landfill cover.

13. Historic and Cultural Preservation

a. **Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known t be on or next to the site? If so, generally describe.**

No

b. **Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.**

None

c. **Proposed measures to reduce or control impacts, if any:**

Not applicable

14. Transportation

a. **Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.**

An interstate freeway is located directly north of the property. The interstate freeway frontage road provides access to the site. See attached site plan.

b. **Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?**

Not applicable

c. **How many parking spaces would the completed project have? How many would the project eliminate?**

Not applicable

d. **Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).**

No new roads or streets will be required for access to the site. The existing road that dissects the site will replaced in order to construct a final cap.

e. **Will the project use (or occur) in the immediate vicinity of water, rail, or air transportation? If so, generally describe.**

No

f. **How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.**

None

g. Proposed measures to reduce or control transportation impacts, if any:

Not applicable

15. Public Services

a. **Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.**

No

b. Proposed measures to reduce or control direct impacts on public services, if any.

Not applicable

16. Utilities

a. Circle utilities currently available at the site:

<u>electricity</u>
natural gas
<u>water</u>
refuse service
telephone
sanitary sewer
septic system
other

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities which might be needed.

None

C. **SIGNATURE**

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: Ryan Broadhead

Date Submitted: May 5, 1992

APPENDIX D

Responsiveness Summary

SPOKANE COU
UTILITIES DEPARTMENT
William R. Dobratz, P.E., Director
A DIVISION OF THE PUBLIC WORKS DEPARTMENT
Dennis M. Scott, P.E., Director

Roxanne Broadhead
Greenacres Project Mgr.
Department of Ecology
N. 4601 Monroe St.
Spokane, WA. 99205-1295

August 18, 1992

Dear Ms. Broadhead:

Attached you will find our comments to the Greenacres Draft Cleanup Action Plan. The comments summarize past technical memorandums and correspondence to Ecology, and should be considered collectively as comments to Ecology's Draft Document.

Spokane County has received a petition for a joint public meeting, which was then forwarded to Ecology.

Please notify us of some proposed dates for this meeting, along with a Draft Agenda. The petition requested a meeting from Ecology and Spokane County. It would be in the publics best interest if a public meeting offered both points of view.

Thank you.

Sincerely,

Dean S. Fowler, P.E.
Project Manager

Enc.

DSF/kes

N 811 Jefferson Spokane WA 99260-0180 509) 456-3604 FAX (509) 456-4715

ATTACHMENT NO. 1

Woodward-Clyde Consultants has completed its review of the July 16, 1992 Greenacres Landfill Draft Cleanup Action Plan (DCAP) prepared by the Washington State Department of Ecology (Ecology). The proposed actions include installing a low-permeability cap on the landfill in accordance with Minimal Functional Standards (MFS; 173-304 WAC). The estimated cost of design and construction of the cap is $6,000,000. As a matter of formal record, Woodward-Clyde has prepared the following response to the DCAP.

Woodward-Clyde Consultants does not believe a cap is technically justified nor cost-effective at this time for the following reasons:

1. **The cap is not required to protect public health or the environment.**

Current residents are supplied by public water imported from surface water sources; public water will be available to future residents; institutional controls proposed in
1 the DCAP will prevent future use of affected groundwater; the DCAP does not identify protection of public health as a function of the cap (DCAP, p. 24 ¶ 4). Plants, animals, and habitats are not impacted by the contaminated groundwater.

2. **The upper confidence limits of the mean concentration of organic compounds measured at the monitoring wells screened in the alluvial aquifer beneath the landfill (LW-1) are close to the DCAP cleanup levels and are expected to decrease below cleanup levels without the placement of an MFS cap (see Table 1).**

2 Time and travel estimates conducted by Woodward-Clyde indicate that the chemicals currently being measured at the landfill at LW-1 represent contamination from leachate that was generated 20 years ago. Based on the landfill closure date (1972), groundwater concentrations measured at LW-1 probably represent the release of constituents from the last waste materials placed in the landfill. Therefore, expected future groundwater concentrations measured at the alluvial aquifer from leachate presently being generated at the landfill are likely to be less than the concentration of the chemicals currently measured in LW-1.

3. **The Spokane Valley Aquifer is not affected presently nor is it likely to be affected in the future.**

3 Discharge from the alluvial aquifer to the Spokane Valley Aquifer is approximately 4 gallons per minute (gpm), and the water flux of the Spokane Valley Aquifer in the vicinity of the Greenacres Landfill is approximately 260,000 gpm. The flux from the alluvial aquifer is 0.002% of the flux from the Spokane Valley Aquifer, which

represents a dilution factor of 60,000:1 (assuming complete mixing). Clearly, the potential for degradation of quality of the Spokane Valley Aquifer from the Greenacres Landfill is inconsequential. There has been no contamination of the Spokane Valley Aquifer (Remedial Investigation Report, Greenacres Landfill, WCC November 1989); the contaminant plume has probably reached its maximum areal extent (DCAP, p. 27 ¶ 2); concentrations of chemicals of concern measured at monitoring well LW-1, which is located within the landfill has lower concentrations of organic contaminants than does groundwater in downgradient wells at the toe of the landfill (WCC-12) and off-site (WCC-2 and WCC-4A). Therefore, contaminant concentrations in the plume are expected to decline.

4. **The functions of the cap identified in the DCAP are either unnecessary or will not necessarily help achieve cleanup goals:**

4 <u>Function 1. Reduce leachate generation</u>: The ability of the cap to produce a meaningful reduction in leachate generation is highly uncertain. Leachate concentrations appear to be declining due to normal decay and flushing. The concentration of chemicals of concern measured at the core of the groundwater plume (WCC-4A and WCC-2) are statistically significantly greater than the concentrations measured at LW-1 (Correspondence to Mr. Dean Fowler (Spokane County), Re: Greenacres Landfill RI/FS May 1991 Supplemental Sampling Rounds (Revised Report), Woodward-Clyde Consultants, August 1991). The travel time between LW-1 and WCC-4A and WCC-2 is estimated at approximately 10 years (considering only advection). This decrease in leachate concentration is generally observed in municipal landfills where substantial declines in leachate concentration are typically observed within 10 years after closure, after which gradual declines are observed (Leachate from Municipal Landfills: Production and Management, J.C.S. Lu, B. Eichenberger, and R.J. Stearns, Noyes Publications, Park Ridge, New Jersey, 1985). The relationship in landfill age and municipal waste leachate composition has been described as a first order rate equation (Lu and Others, 1985).

A first order rate constant was estimated by using the mean concentration of chemicals of concern at the downgradient wells detected at the core of the plume (WCC-2 and WCC-4A; concentration produced 30 years ago from the landfill) and the mean concentration detected at the well located at the landfill (LW-1; representing contamination from leachate generated 20 years ago). Dispersion and diffusion were not taken into account in developing the decay constant. Therefore, the resulting estimated decay constant represents a conservative estimate. Assuming this first order decay relationship, the time required to achieve the target cleanup goals at monitoring well LW-1 was estimated, and the results are shown in Table 3. These results indicate that the target cleanup goals at LW-1, on the average, should be attained within five years for the organic compounds and antimony, and approximately 40 years for manganese. The concentration for manganese is probably overconservative since the analytical results are from samples which were not field filtered. The Model Toxics Control Act states that, "Ecology expects that filtering will generally be allowed for hazardous substances such as . . . manganese (WAC 173-340-720 (8)(iv))". Based on this analysis, leachate concentrations are expected to decrease within a few years to below target cleanup levels and a cap probably will not have a beneficial effect upon leachate concentrations.

In addition, while the cap will reduce the volume of infiltration, and therefore, volume of leachate generation, the concentration of the chemicals in the leachate will not necessarily be reduced. Higher rates of infiltration to a landfill will produce a more dilute leachate than lower rates of infiltration. Other sources of leachate generation, such as drum rupturing, will not be reduced by the cap. In addition, the benefits of biodegradation have been shown to be reduced with reduced moisture content (Lu and Others, 1985). Therefore, a cap will likely lengthen the time that contaminants are present in the refuse.

<u>Function 2. Contain refuse:</u> Refuse is already contained by bedrock sidewalls and
5 a 2-foot thick layer of vegetated soil; therefore the cap is not needed to contain
refuse.

<u>Function 3. Control gas emissions by providing a vent system:</u> Landfill gas
emissions do not pose a threat to public health (Air Quality Modeling and Risk
6 Assessment, Remedial Investigation Report Amendment 1, Woodward-Clyde
Consultants, February 1991); therefore, gas emissions controls are not needed to
protect public health.

<u>Function 4. Control storm runon and runoff:</u> A cap is not needed to control storm
runon or runoff. Drainage swales already partially control storm runon; if further
7 control is demonstrated to be needed, this can be accomplished without capping.
Control of storm runoff is not required because surface soils are not contaminated.

Other factors should also be considered in evaluating the capping alternative:

1. Cost: Capping is expensive and, as outlined above, its impact on achieving cleanup goals is highly uncertain. The Model Toxics Control Act (MTCA) states:

> 8 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 clean up action. (WAC 173-340-360(5)(d)(vi).

2. MFS (173-304 WAC) should be a requirement only if capping is identified as the
preferred remedial action to protect human health and the environment; MFS
9 should not dictate the remedy selection. As stated in the Feasibility Study Report,
Greenacres Landfill, Woodward-Clyde Consultants March 1991:

> It is the County's position that Chapter 173-304 WAC (MFS) is an action-specific ARAR [applicable, relevant or appropriate requirement] and that the requirements of MFS must be met only if the remedial alternative includes an activity (such as installation of a cap) that is addressed by MFS . . . [A]ction-specific ARARs are technology- or activity-based restrictions placed on actions taken during remediation and affect how a selected alternative is achieved. A particular action-specific ARAR becomes a part of the cleanup when the selected remedial activity includes the relevant action.

MFS is identified by Ecology as an action-specific ARAR: "MFS requirements (capping, gas emission control, and inhibition of public use) are considered to address an action" (Edward Fisher, Dept. of Ecology Toxics Cleanup Program to Dean Fowler, Spokane County Public Utilities, January 2, 1991).

10

3. **Discretionary authority:** Greenacres Landfill can be considered exempt from MFS because it ceased operation in 1972, prior to the effective date of the rule (173-304-400 WAC). However, if this exemption is not allowed by Ecology, variances from MFS are permitted under Chapter 173-304-700, which states that the jurisdictional health department may grant a variance if the site does not endanger public health, safety or the environment and if compliance with the regulation would produce hardship without equal or greater benefits to the public.

11

The upper confidence limit of the mean concentration of each well which had a detection greater than the target cleanup level was evaluated to determine compliance with the target cleanup levels presented in the DCAP. The upper confidence limits were evaluated using a one-tailed test of the null hypothesis that the true ground water concentration exceeds the groundwater cleanup level at a Type I error level of 0.05 (WAC 173-720(e)). As indicated in Table 1, the chemical impact of organic compounds on the alluvial aquifer is greater than the chemical impact on the bedrock aquifer. Therefore, the analysis conducted by Woodward-Clyde to date, which focuses on the alluvial aquifer, is conservative. Only three monitoring wells in the bedrock aquifer have been impacted by organic compounds which exceed the upper confidence limits. At these wells the upper confidence limits are exceeded by a factor of 2 or less, with the exception of pentachlorophenol. Pentachlorophenol (PCP) and benzene appear to be outliers; PCP has been detected in only two wells at the site (WCC-12 and WCC-8) and benzene has been detected in only one well (MW-3)

12

The comparison of the upper confidence limits to groundwater target cleanup levels for trace metals is provided in Table 2. Most of the trace metals data includes only two rounds of sampling; therefore, the statistical based confidence limits are relatively high as compared to their mean value. Overall, the concentrations of the trace metals detected in the Alluvial Aquifer are higher than the concentrations detected in the bedrock aquifer. With the exception of manganese, the mean concentrations are within one order of magnitude of the target cleanup levels. These results may be high compared to the true groundwater concentration since they were not field-filtered samples. For compliance monitoring, MTCA allows for field filtering of groundwater samples (173-340-720(8)).

13 The DCAP identifies continued monitoring for a five-year period as the preferred alternative for the off-site groundwater plume to confirm that there is no increase in plume extent or contaminant concentrations (DCAP p. 23 ¶ 5). After five years, the need for further action is to be evaluated. As indicated above, leachate concentrations measured at LW-1 probably represent the release of constituents from the last waste materials placed in the landfill. The groundwater monitoring conducted to date is not sufficient to assess the effectiveness of the closure. Considering the high cost and uncertain benefits of capping, continued monitoring and a five-year review period would also seem to be appropriate for the entire site.

Woodward-Clyde Consultants

TABLE 1
COMPARISON OF MEAN CONCENTRATIONS TO GROUNDWATER TARGET CLEANUP LEVELS FOR ORGANIC COMPOUNDS(μg/L)

	WELL NO.	ORGANIC COMPOUNDS	Mean	No. of Samples	Upper Confidence Limit	Target Cleanup Level
Alluvial Wells	WCC-1	Tetrachloroethene	8.3	4	12.6	5
	WCC-2	1,2- Dichloroethene (Total)	68	7	84	50
		Tetrachloroethene	5.7	7	6.9	5
		Trichloroethene	4.3	7	4.7	5
	WCC-4A	1,2-Dichloroethene (Total)	133	7	164	50
		Tetrachloroethene	14	7	15	5
		Trichloroethene	5.3	7	6.3	5
	WCC-7(a)	Tetrachloroethene	11	4	12	5
	WCC-11A	Tetrachloroethene	9	2	22	5
	WCC-11B	Tetrachloroethene	8.8	5	12	5
	WCC-12(a)	1,2-Dichloroethane	16	5	23	5
		1,2-Dichloroethene (Total)	150	5	177	50
		Vinyl Chloride	7	5	9	1
		Pentachlorophenol	71	2	378	1
	LW-1(a)	1,2-Dichloroethane	4.9	7	8.4	5
		1,2-Dichloroethene (Total)	82	7	96	50
		Vinyl Chloride	1.6	7	2.3	1
	MW-3(a)	Benzene	22	2	103	5
Bedrock Wells	WCC-8(a)	Pentachlorophenol	97	4	138	1
	WCC-9(a)	Tetrachloroethene	7.7	4	10	5
	MW-2(a)	1,2-Dichloroethene (Total)	57	4	82	50
		Tetrachloroethene	7.9	4	11	5
		Vinyl Chloride	1.1	4	1.5	1

: Concentration is below target cleanup level.
a: Well located adjacent to or in landfill area.
Analysis excluded wells where all individual detections were below the target cleanup levels.

Woodward-Clyde Consultants

TABLE 3
ESTIMATED TIME TO ACHIEVE TARGET CLEANUP LEVELS AT LW-1

LW-1	Chemical	Target Cleanup Level	Mean Concentration/ Upper Confidence Limit (3/88 to 11/91)	Time Attained Based on Data Avail. to Date (yrs)	Mean Concentration (10/90 to11/91)	Time Attained Based on Most Recent Data (yrs)	Year Attained
Organic (µg/L)	1,2-Dichloroethane	5	4.9/8.4	-- to 6	1.8	--	Already Attained to1997
	1,2-Dichloroethenene (total)	50	82/96	5 to 7	65	3	1994 to 1998
	Vinyl Chloride	1	1.6/2.3	5 to 9	1.1	1	1992 to 2000
			(3/88 to10/88)				
Inorganic (mg/L)	Antimony	0.05	0.008/0.02	44 to 45	--		1993 to 2006
	Manganese (a)	0.005	2.98/3.09	5	--		2032 to 2033

Notes:
--. Not applicable or data not available.
a: Samples were not field-filtered prior to analysis. The Model Toxics Control Act (MTCA) states that, "Ecology expects that filtering will generally be allowed for hazardous substances such as ...manganese (WAC 173-340-720(8)(iv))".

TABLE 2
COMPARISON OF MEAN CONCENTRATIONS TO GROUNDWATER TARGET CLEANUP LEVELS FOR TRACE METALS(mg/L)

	WELL NO.	TRACE METAL	Mean	No. of Samples	Upper Confidence Limit	Target Cleanup Level
Alluvial Wells	WCC-2	Manganese	4.87	4	5.60	0.05
	WCC-4A	Antimony	0.004	2	0.014	0.005
		Manganese	0.146	4	0.289	0.05
	WCC-11A	Arsenic	0.0043	2	0.013	0.005
		Chromium	0.761	2	1.45	0.05
		Lead	0.33	2	0.37	0.05
		Manganese	6.40	2	14.3	0.05
	WCC-12(a)	Arsenic	0.027	2	0.053	0.005
		Chromium	0.045	2	0.15	0.05
		Lead	0.028	2	0.10	0.05
		Manganese	4.7	2	6.0	0.05
	LW-1(a)	Antimony	0.008	2	0.02	0.005
		Manganese	2.98	4	3.09	0.05
Bedrock Wells	WCC-4B	Antimony	0.006	2	0.02	0.005
		Chromium	0.6	2	3.5	0.05
		Manganese	0.664	4	1.15	0.05
	WCC-5	Manganese	0.10	3	0.13	0.05
	WCC-6B(a)	Manganese	0.047	4	0.062	0.05
	WCC-9(a)	Manganese	0.10	4	0.16	0.05
	WCC-13(a)	Chromium	0.42	2	0.15	0.05
		Lead	0.093	2	0.21	0.05
		Manganese	0.649	2	2.03	0.05
	WCC-14(a)	Arsenic	0.02	2	0.08	0.005
		Chromium	0.09	2	0.2	0.05
		Lead	0.10	2	0.4	0.05
		Manganese	0.78	2	3.15	0.05
	MW-1(a)	Chromium	0.065	2	0.32	0.05
		Lead	0.02	4	0.04	0.05
		Manganese	0.09	4	0.1	0.05

: Concentration is below target cleanup level.
a: Well located adjacent to or in landfill area.
Analysis excluded wells where all individual detections were below the target cleanup levels.

RESPONSE TO LETTER NO. 1: SPOKANE COUNTY UTILITIES DEPARTMENT

1. The policy of the Department of Ecology is to protect all of the states ground water, whether it is currently in use or not [WAC 173-340-720]. We agree there is no immediate threat to human health at the Greenacres Landfill site. However, the Model Toxics Control Act Regulation [chapter 173-340 WAC] requires cleanup of sites that constitute a threat to human health and the environment, not only sites that pose an immediate threat to human health. A low-permeability cover is an effective method to achieve this goal.

   A site where there is an immediate threat to human health would require an emergency or interim action to eliminate that threat. The cleanup process would then continue with actions that achieve cleanup standards that are protective of human health and the environment. The environment is defined by Chapter 173-340 WAC as "any plant, animal, natural resource, surface water (including underlying sediments), ground water, drinking water supply, land surface (including tidelands and shorelands) or subsurface strata, or ambient air within the state of Washington or under the jurisdiction of the state of Washington."

   Institutional controls and monitoring are not acceptable cleanup actions. WAC 173-340-360(5)(e)(iv) states "A cleanup action relying primarily on institutional controls and monitoring shall not be used where it is technically possible to implement a cleanup action alternative that utilizes a higher preference cleanup technology for all or a portion of the site." Containment of the landfill by a low-permeability cover is a higher preference technology and is technically possible at Greenacres Landfill.

2. <u>Natural decrease of contaminant concentrations without landfill cover:</u>
   A decease in contaminant concentration without active remediation is expected due to natural leaching and degradation of the contaminant source given sufficient time. Evidence from studies of landfills indicate natural flushing of all hazardous substances may require decades. This natural flushing process is done by contaminants migrating from the waste into ground water. This is not an acceptable remediation under the Model Toxics Control Act.

   The conclusions of the Remedial Investigation (Woodward-Clyde Consultants, 1989) directly conflict with the comments presented. The Greenacres Landfill Remedial Investigation Report (Woodward-Clyde Consultants, 1989) results are summarized in the Greenacres Landfill Feasibility Study Report (Woodward-Clyde Consultants, 1991, page 1-13) stating "a review of the physical and chemical processes that affect the environmental fate of contaminants in ground water and soil gas suggest the future release and transport of these compounds will not change substantially from current conditions. The existing low levels of contamination will probably persist as the sources continue to leach and volatilize and the compounds move slowly to the aquifer and soil gas." The Feasibility Study (Woodward-Clyde Consultants, 1991, page 3-11) concludes, in the evaluation of pump and treat scenarios without a landfill cover, that "because a cap is not used to limit infiltration, contamination still present in the landfill refuse zone will continue to be released for an indefinite period of time."

In addition, the Greenacres Landfill RI/FS May 1991 Supplemental Sampling Round (Revised Report) (Woodward-Clyde Consultants) reports the results of a statistical analyses used to determine whether the landfill is contributing contaminants at a decreasing rate. The results of the comparison between selected volatile organic compound data collected from 1988 to 1990 and 1991 at well LW-1 were:

1. Except for 1,2 dichloroethene at 80% and 90% confidence limits, there is no statistical evidence that indicates a source reduction of the compounds of concern (COCs) from 1988 to 1990 and 1991.

2. If there is a reduction of COCs contributing from the source, it is at a very slow rate.

Ground water samples collected at well LW-1 from 1988 to 1991 show an increase in tetrachloroethene levels. This is another indication that the landfill is continuing to degrade and generate contaminants.

<u>Concentration of ground water at LW-1:</u>
Ground water data collected at well LW-1, from 1988 - 1991, was evaluated to determine if contaminant levels were in compliance with regulatory cleanup levels (WAC 173-340-720(8)). It is difficult to statistically evaluate compliance with cleanup levels for some of the indicator parameters due to the sporadic data collected over the past four years. However, based on criteria established in WAC 173-340-720(8), ground water cleanup levels are exceeded at Monitor Well LW-1 for eight of the eleven indicator hazardous substances.

Contaminant concentrations measured at Monitor Well LW-1 are not clearly representative of all contaminant releases from the landfill. Pentachlorophenol is detected in an adjacent bedrock and alluvial monitoring well at concentrations exceeding federal drinking water standards and cleanup levels by 100% but is not detected in Well LW-1. Lead levels exceeding federal drinking water standards are detected in bedrock and alluvial monitoring wells but not in LW-1. Evidence suggests that contaminants from the landfill may be released directly into the bedrock aquifer. The expected uncertainty in characterizing site hydrogeology contamination from landfills is one of the reasons MTCA requires compliance with cleanup levels in all site monitor wells as opposed to one or two selected site wells.

<u>Contaminant time and travel estimates:</u>
The travel time estimates by Woodward-Clyde Consultants for landfill leachate to reach the Spokane Aquifer appear to be based on the estimated velocity of ground water in the alluvial aquifer between wells WCC-4 and WCC-2. The Remedial Investigation (Woodward-Clyde Consultants, 1989, page 3-36) estimates the velocity at 0.35 feet/day. However, an estimate of ground water velocity in an upper portion of the alluvial aquifer between wells WCC-1 and WCC-4 is 43 feet/day (Remedial Investigation, Woodward-Clyde Consultants, 1989, page 5-11). Travel time estimates for contaminants to impact the Spokane Aquifer, based on a velocity of 43 feet/day in the upper portion of the aquifer, is less than 3 years.

Ground water velocity estimates, based on aquifer characteristics at a specific point, includes site specific data averaged over a large area and many generalized assumptions. These calculated values provide a range of potential velocities for ground water in the alluvial aquifer which results in large variations in conclusions regarding the travel time. Complex hydrogeologic testing and models would be necessary to better define the hydraulic properties of the alluvial and bedrock aquifers. The available data is sufficient to provide only very rough estimates for contaminant travel time.

3. <u>Contamination of the Spokane Valley Aquifer:</u>
Ground water contaminated by leachate from Greenacres Landfill discharges to the Spokane Valley Aquifer. The volume of water within the Spokane Valley Aquifer is great enough that contaminants from the site have not been detected within the regional aquifer due to dilution and dispersion of contaminants The Remedial Investigation (Woodward-Clyde Consultants, 1989, p. 5-17) states "Assuming that volatilization of organic contaminants from ground water is minimal and that biodegradation processes are slow relative to transport, then the majority of the contaminated ground water is released to the Spokane Aquifer." The Remedial Investigation Report continues with "the continuing release of chlorinated volatile organics to the Spokane Aquifer is expected to continue at the current rate for an extended period of time."

WAC 173-340-360(5)(e) states "The cleanup action shall not rely primarily on dilution and dispersion of the hazardous substance if active remedial measures are technically possible." This regulation helps insure that the combined effects of numerous small contaminant sources do not jeopardize a drinking water source such as the Spokane Valley Aquifer. Currently, ground water contaminant concentrations exceed National Drinking Water Regulations established under the Safe Drinking Water Act and Model Toxics Control Act ground water cleanup levels. A cover over the landfill will prevent or minimize future contaminant releases from the landfill to the alluvial and bedrock aquifers and ultimately the Spokane Valley Aquifer.

Contaminant Plume:
The extent of the 1,2-DCE plume is a function of site geology and the dilution zone boundary caused by the Spokane Valley Aquifer. It is likely the size of the detectable contaminant plume is at the maximum areal extent. The area of the plume is likely to stay in the existing configuration with no size decrease for several decades without containment of the source.

Contaminant concentrations at LW-1:

Overall downward trends in contaminant concentrations have not been observed at the Greenacres Landfill site. For example, tetrachloroethene (PCE) concentrations are increasing at LW-1 and are relatively constant at downgradient well WCC-4A. PCE concentrations are higher in LW-1 than in wells WCC-12 and WCC-2. Pentachlorophenol levels in bedrock wells indicate no overall downward trend.

Contaminant releases from a landfill are not characterized by a single slug of contamination or a one time release. Landfill leachate generation and concentration fluctuate over time. In addition, multiple contaminants are typically identified in leachate due to the physical, chemical, and biological degradation processes of the waste. The lack of clear trends in contaminant releases, as seen at in the existing data, is indicative of a typical landfill.

4. Function of a low-permeability cover:
Leachate is defined as water or other liquid that has been contaminated by dissolved or suspended materials due to contact with solid waste. The objective of a low permeability landfill cover is to contain the source by acting as a barrier between surface precipitation and the refuse. This reduces the volume of water available to dissolve and transport contaminants from the refuse to ground water. A finding of the Remedial Investigation (Woodward-Clyde Consultants, 1989) was "infiltration of surface water is the principal transport mechanism for contaminants from unsaturated refuse and sands and gravels to the ground water."

A water balance model (Army Corp of Engineers, HELP) was conducted to compare the percent reduction in leachate generation between existing landfill conditions and the landfill with the proposed cover. Results of the modeling indicate, under current conditions, approximately 30% of annual precipitation contributes to leachate generation. If the landfill is covered with an low permeability cover, less than 7% of the annual precipitation will contribute to leachate generation.

Continued unrestricted flushing of the refuse will eventually result in a decrease of contaminants migrating from the landfill. However, it may require several decades before natural processes reduce contaminant levels below federal drinking water standards and Washington State health based standards.

Ground water concentration downgradient of landfill:
Please see response to Comment 2.

Travel time of contaminants:
Please see response to Comment 2.

First order rate equation:
The first order rate equation developed by Lu and others (1985) defines the slope of a line based on landfill age and changes in measured concentrations. The equation is very sensitive to minor changes in estimated existing and past leachate concentrations and landfill age. Based on the estimated date of leachate generation of Woodward-Clyde Consultants and the combinations of leachate concentrations (for example, the upper confidence limit, the 1990 - 1991 mean, and the 1988 - 1991 mean) the potential time frame to achieve target cleanup levels at LW-1 range from .5 - 150 years for the three organic compounds evaluated.

Leachate age estimates are very rough approximations at best. Estimated leachate generation dates are critical to deriving reasonable estimates between the relationship of landfill age and leachate concentrations. Finally, it should be understood that the equation developed by Lu and others (1985) is an attempt to relate landfill age with leachate concentrations. However, Lu and others (1985) state that "...landfill age, in itself, does not govern leachate compositional changes, rather it is the rates of solid waste stabilization and the rate and volume of water infiltration to the landfill."

Experimentation by Lu and others (1985) concluded the first order rate equation does not describe the observed behavior of heavy metal constituents. Heavy metal constituents do not generally exhibit consistent trends similar to those exhibited by organic constituents.

Filtered versus non-filtered metal concentrations:
The Model Toxics Control Act does allow for filtering of manganese. Ecology and Environment, Inc. (Groundwater Monitoring Data Greenacres Landfill, June 1990) collected filtered and

unfiltered samples in July 1990. The following table presents manganese results of filtered and unfiltered samples.

Well Identification	Unfiltered Manganese Concentration (ppb)	Filtered Manganese Concentration (ppb)
MW-3	2.0	2.0
LW-1	1300	1720
WCC-2	5450	5500
WCC-4A	48.2	38.5
WCC-11A	31.5	2.3
WCC-12	2650	2680

These sampling results of Ecology and Environment, Inc. were evaluated in the Greenacres Feasibility Study (Woodward-Clyde Consultants, 1991, p. 1-11) with the conclusion that "filtering did not produce a large effect on the concentrations of barium, calcium, magnesium, or manganese."

5. Containment is defined by the Model Toxics Control Act Regulations as "a container, vessel, barrier, or structure, whether natural or constructed, which confines a hazardous substance within a defined boundary and prevents or minimizes its release into the environment." The permeability of the existing soil cover does not adequately prevent or minimize the leachate migration to ground water. The surrounding fractured bedrock act as a direct conduit, not as containment, for leachate from the landfill to the bedrock aquifer (Greenacres Landfill Remedial Investigation Report, Woodward-Clyde Consultants, 1989).

6. A landfill gas control system is an integral part of a low permeability cover. The gas control system prevents off-site gas migration and potential subsurface gas pressure that could damage the cover. Gas control systems are standard engineering practice with any low permeability landfill cover and are required by chapter 173-304 WAC (Minimum Functional Standards for Solid Waste Handling) and chapter 173-400 WAC (General Regulation for Air Pollution).

7. Storm water runon/runoff controls are required in conjunction with a low permeability cover to reduce the amount of water flowing onto and over the landfill. This reduces the volume of water available for infiltration and

leachate generation. Control of storm water runon/runoff is also necessary to maintain the integrity of the low permeability cover by reducing erosion.

8. Capping is a standard proven technology to contain a widespread low level contaminant source such as a landfill. The low permeability cover acts to reduce infiltration from precipitation and thereby reduce leachate generation. The Feasibility Study Report (Woodward-Clyde Consultants, 1991 p. 1-12) states "Two mechanisms have been identified that may transport contaminants at the Greenacres Landfill. These are the emission of gaseous contaminants to the atmosphere by diffusion from the landfill and the leaching of organic compounds and metals into the ground-water system due to rainfall and snowmelt percolating through the refuse and underlying contaminated soil." The impact of a low-permeability cover at Greenacres Landfill to reduce leaching of contaminants into the ground water system caused by infiltration of precipitation through the waste is not uncertain.

The regulation cited [WAC 173-340-360(5)(d)(vi)] is in reference to regulatory criteria used to determine whether a cleanup action is "permanent to the maximum extent practicable." Permanent solutions include reusing, recycling, destroying, or detoxifying the hazardous substance. However, additional requirements are established that must be met to ensure a bias toward permanent solutions in the selection of cleanup actions [WAC 173-340-360(5)(e)]. These requirements include:

(i) The cleanup action shall prevent or minimize present and future releases and migration of hazardous substances in the environment;

(ii) The cleanup action shall provide for a net reduction in the amount of a hazardous substance being released from the source area;

(iii) The cleanup action shall not rely primarily on dilution and dispersion of the hazardous substance if active remedial measures are technically possible;

(iv) A cleanup action relying primarily on institutional controls and monitoring shall not be used where it is technically possible to implement a cleanup action alternative that utilizes a higher preference cleanup technology for all or a portion of the site.

The cost of a cleanup action requiring reusing, recycling, destroying, or detoxifying the refuse was considered substantial and disportionate to the degree of protection it would achieve over a lower preference cleanup action such as containment. A low-permeability landfill cover is the minimum cleanup action alternative for Greenacres Landfill that meets the regulatory requirements of WAC 173-340-360(5)(e) and other criteria of WAC 173-340-360.

9. Action-specific ARARs are defined in the Federal CERCLA regulations. However, Model Toxics Control Act incorporates action-specific ARARs as part a more stringent regulation which includes all applicable, and relevant or appropriate laws and regulations in the definition of "applicable federal and state laws and regulations." Applicable regulations are state and federal laws that address purposes or problems that are similar to those at the site.

   WAC 173-340-710(6) identifies selected applications of specific applicable state and federal laws to cleanup actions. Subsection (6)(c) specifically addresses solid waste landfill closure requirements stating "For solid waste landfills, the solid waste closure requirements in chapter 173-304 WAC shall be minimum requirements for cleanup actions conducted under this chapter." Chapter 173-304 WAC (Minimum Functional Standards for Solid Waste Handling (MFS)) addresses closures of solid waste landfills. Closure requirements in chapter 173-304 WAC include a low permeability cover.

10. RCW 70.95 and Chapter 173-340 WAC (MTCA) do not provide provisions for waiving compliance with applicable state and federal law. The variance provision of WAC 173-304-700 address variances from permit requirements for landfills regulated under the jurisdiction of the local health department. Greenacres Landfill ceased operation prior to the promulgation of chapter 173-304 WAC, therefore, a permit was not required and the landfill closure was not under the jurisdiction of the local health department. Landfill closure is required by chapter 173-340 WAC as an applicable law and regulation and is not subject to the waiver provision cited.

11. <u>Statistical analysis of ground water data:</u>
    WAC 173-340-720(8) establishes criteria for evaluating compliance with cleanup levels. The criteria are:

    - the upper confidence limit on the true ground water concentration shall be less than the ground water cleanup level

    - no single sample concentration shall be greater than two times the ground water cleanup level

- less than ten percent of the sample concentration shall exceed ground water cleanup levels during a representative sampling period

Ground water concentration at several site monitor wells do not meet these criteria. Data from well LW-1 indicates that eight of the eleven indicator hazardous constituents do not meet the compliance criteria for cleanup levels.

Bedrock monitor wells:
Well logs included in the Remedial Investigation Report (Woodward-Clyde Consultants, 1989) show that wells WCC-1 and WCC-7 are screened in the fractured bedrock aquifer, as opposed to the alluvial aquifer, as shown on Table 1 of the comment letter. Organic compounds exceeding cleanup levels have been detected in five bedrock monitor wells.

Pentachlorophenol and benzene concentrations:
Pentachlorophenol (PCP) is not considered an outlier. There are no provision in MTCA for excluding outlier that are not demonstrated to be in error. PCP has been consistently detected in well WCC-8 over four sampling periods (Remedial Investigation Report, Woodward-Clyde Consultants, 1989). PCP was detected once out of two sampling periods in well WCC-12. There is no evidence to suggest the detection of PCP is in error.

Benzene was detected above cleanup levels during one sampling period in only one well, MW-3, a monitor well located upgradient of the landfill. Therefore, benzene was not selected as an indicator parameter for the site.

12. Ground water at the site does not comply with heavy metal cleanup levels in several alluvial and bedrock monitor wells (Table 2). Heavy metals were only sampled for two quarters in many of the site monitor wells. Any conclusions drawn from a statistical analysis of only two samples are questionable.

As discussed in an earlier response, manganese concentrations do not appear to be influenced by filtering. The Feasibility Study (Woodward-Clyde Consultants, 1991) in summarizing the nature and extent of the contamination at Greenacres Landfill states:

> "Supplemental sampling of selected monitoring wells was conducted by Ecology (June 1990) to evaluate the effect of filtering the water samples on metals concentrations and test for the presence of ethylene dibromide, MCPP and MCPA. The results of this sampling and analysis (Ecology and Environment 1990) show that field filtering of the water samples has a

large effect on reducing the measured concentrations of aluminum, chromium, iron and zinc. This suggests that these metals are at least partially present in particulate form in the water samples. Filtering did not produce a large effect on the concentrations of barium, calcium, magnesium, or manganese."

Based on the sampling data, unfiltered manganese concentrations detected during previous sampling periods are considered representative of site ground water.

Additional information is provide in the response to Comment 4.

13. The benefits of capping a landfill with a low permeability cover are not uncertain. Capping landfills is a standard technology and has proven successful nationwide at significantly reducing leachate production and resulting contaminant releases from landfills.

WAC 173-340-420(1) states "If the department selects or approves a cleanup action that results in hazardous substances remaining at a site at concentrations which exceed method A or method B cleanup levels established under WAC 173-340-700 through 173-340-760 or if conditional points of compliance have been established, the department shall review the cleanup action no less frequently than every five years after the initiation of such cleanup action to assure that human health and the environment are being protected." A five year review of the cleanup action is mandated if hazardous substances remain at the site after the cleanup action.

Ground water contamination was detected in site ground water in 1978. The site was listed as a National Priority Site by the U.S. Environmental Protection Agency in 1983. Woodward-Clyde Consultants determined that sufficient information was available to assess cleanup action alternatives at the site with the completion of the Remedial Investigation in 1989. An evaluation of cleanup alternatives for the site was presented in a Feasibility Study (Woodward-Clyde Consultants) in early 1991. Woodward-Clyde Consultants and Spokane County have submitted additional studies and evaluations of the site since 1991. The site has been studied for over 10 years. It is now time to implement a cleanup action and begin to actively abate the release of contaminants to ground water.

COMMENT LETTER NO. 2

KRISTINE GEBBIE
Secretary

RECEIVED
SEP - 4 1992
DEPARTMENT OF ECOLOGY
...RN REGIONAL OFFICE

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
OFFICE OF TOXIC SUBSTANCES
Airdustrial Center, Building 4 • P.O. Box 47825 • Olympia, Washington 98504-7825

September 1, 1992

Roxane Broadhead
Department of Ecology
Toxics Cleanup Program
North 4601 Monroe, Suite 100
Spokane, Washington 99205-1295

Dear Roxane:

Re: Comments on the Draft Cleanup Action Plan for Greenacres landfill Superfund Site

Enclosed please find comments on the draft Cleanup Action Plan for Greenacres Landfill Superfund site. Overall, the proposed plan adequately addresses most of the recommendations made in the Agency for Toxic Substances and Disease Registry (ATSDR) Health Assessment for Greenacres Landfill Superfund site.

In review of the proposed plan, I noticed that two health assessment recommendations associated with soil-gas contamination have not been included. Please take into consideration the following recommendations:

1 1. Implement institutional controls to prevent residential and commercial development over the soil-gas on and off-site, until additional soil-gas and indoor air data indicate the contaminant concentrations are below levels of health concern.

2 2. Conduct soil-gas monitoring prior to construction or remedial activities involving excavations over the existing soil-gas plume. Based on soil-gas results, appropriate personal protective equipment and safe work techniques be applied.

An explanation would be appreciated, should Ecology conclude that these recommendations are not applicable to the cleanup action plan.

3 I am glad Ecology is addressing the potential for indoor air contamination in the initial phase of the proposed plan. However, I strongly recommend that Ecology proceed with indoor air sampling as soon as possible and not wait for the finalization of the plan. To be protective of human health, it is important to ensure that local residents

are not currently being exposed to contaminants of health concern. I would appreciate the opportunity to review the indoor air sampling plan, as well as sampling data, as it becomes available.

I will be looking forward to Ecology's response to the soil-gas recommendations as well as the comments. Should you have any questions, please feel free to contact me at (206) 753-1940.

Sincerely,

Anne Duffy

Anne Duffy
Health Assessor
Hazardous Waste Section

Enclosure

mj C:\wp51\anne\cleanup.com

COMMENTS ON
DRAFT CLEANUP ACTION PLAN FOR GREENACRES LANDFILL SUPERFUND SITE

Page 10, Risks to Human Health and the Environment, Paragraph 1
4 Ingestion or contact with soils was not considered an exposure pathway because contamination is not detected in the surface soils.

Surface soil sampling was not conducted during the soil investigation for the site; therefore contamination of surface soils was never determined. However, the assumption was made that surface soils were unlikely to be contaminated on the basis that local soils were used to cover the landfill.

Page 15, Ground Water Cleanup Levels for Greenacres Landfill, Paragraph 1
Bis(2-ethylhexyl)phthalate

Re-evaluate bis(2-ethylhexyl)phthalate (BEHP) as an indicator parameter. Elevated concentrations of BEHP may have resulted from suspended sediments in the groundwater samples; however, this assumption should not be the factor to eliminate BEHP as an indicator parameter until analytically confirmed, particularly in regard to the high detection frequency of BEHP.

Though BEHP is known to strongly adsorb onto soils and sediments, the compound can percolate through soils into groundwater during times of rapid infiltration. Also, in hazardous waste sites, the presences of common organic solvents can increase the solubility of BEHP, therefore increasing mobility of the compound through soils into
5 groundwater. This is consistent with reports of BEHP in landfill leachate at concentrations in excess of the compound's usual water solubility. (Toxicological Profile for Di(2-ethylhexyl)phthalate, Draft October 1991).

Due to the many synonyms of BEHP, confusion on the health-based guidelines and regulator standards may have occurred in evaluating this compound as an indicator parameter. BEHP has several commonly used synonyms such as, di(2-ethylhexyl)phthalate, diethylhexyl phthalate, 2-ethylhexyl phthalate, and ethylhexyl phthalate. EPA Drinking Water Regulations and Health Advisories has information on

BEHP under the synonym diethylhexyl phthalate, while ATSDR information is under the synonym di(2-ethylhexyl)phthalate. Please check if these health-based and regulator values correspond to those used in evaluating BEHP: EPA MCLG of zero, proposed MCL of 4 ug/L, chronic oral RfD of 0.02 mg/kg/day, oral cancer slope factor of 0.014 (mg/kg/day)-1, and B2 cancer classification.

Page 15, Ground Water Cleanup Levels for Greenacres Landfill, Paragraph 2
<u>1,1-Dichloroethane</u>

According to Integrated Risk Information System (IRIS), EPA has not established an oral cancer slope factor for 1,1-dichloroethane. In reviewing Ecology's Toxicology Database for Use in Washington Ranking Method Scoring, January 1992, I noticed that the oral cancer slope factor for 1,2-dichloroethane of 0.091 (mg/kg/day)-1 was mistakenly specified for 1,1-dichloroethane. It appears that this slope factor was used in calculating the Method B cleanup level for 1,1-dichloroethane of 5E-4 ppm, as well.

A RfD for 1,1-dichloroethane of 0.1 mg/kg/day is listed in Ecology's toxicology database document, however currently IRIS list the chronic oral RfD as pending. In this situation, I was wondering what is the procedure for developing a MTCA cleanup level where a RfD is under review by EPA.

6

In the third sentence, the term, slope factor, has been misused. EPA categorizes the carcinogenicity of a chemical based on the weight-of-evidence from human and animal studies, referred as the weight-of-evidence classification. As you indicated, EPA's weight-of-evidence classification for 1,1-dichloroethane is C, possible human carcinogen. A cancer slope factor is a toxicity value for carcinogenic effects based on this weight-of-evidence assessment, as well as the dose-response assessment. Should you want more information on either the weight-of-evidence or dose-response assessments, please feel free to contact me.

Washington Department of Health (WDOH) has a cooperative agreement with ATSDR to prepare health assessments for Superfund sites in the state. In the preparation of the health assessment for Greenacres Landfill Superfund site, 1-1-dichloroethane was evaluated for potential health effects. Based on the maximum concentration of 2.5 ug/L in off-site groundwater, ATSDR does not consider 1,1-dichloroethane as a contaminant of health concern at the Greenacres Landfill site. Please change WDOH to ATSDR indicates that 1,1-dichloroethane is not a contaminant of health concern.

Page 15, Ground Water Cleanup Levels for Greenacres Landfill, Paragraph 4
<u>Arsenic is not included in the overall risk analysis for the Site.</u>

Arsenic concentrations exceed the natural background levels. Did you mean to
7 include arsenic in the overall risk analysis for the site? It is listed as an indicator
parameter in Table 1.

Page 15, Ground Water Cleanup Levels for Greenacres Landfill

8 Please summarize your conclusions on mercury as an indicator parameter; mercury has a maximum concentration of 2.2 ug/L, which slightly exceeds the proposed MCL of 2.0 ug/L.

Page 15, Ground Water Cleanup Levels for Greenacres Landfill, Paragraph 6
Total cancer risk

9 For easy reference, I suggest that the compounds used in calculating the total cancer risk be presented in a table. For the total cancer risk, arsenic, bis(2-ethylhexyl)phthalate, 1,2-dichloroethane, pentachlorophenol, and vinyl chloride should be evaluated. The carcinogenicity of tetrachloroethylene and trichloroethylene is currently under review by EPA. However, a conservative approach would be to include these two compounds in determining total cancer risk, as well.

Page 16, Ground Water Cleanup Levels for Greenacres Landfill, Paragraph 1
Total hazard index

10 Keep in mind when determining the total hazard index, though a compound may not have a quantitative toxicity value to calculate a cleanup level, it may have similar toxic responses or endpoints as compounds with toxicity values. For example, lead has the oral toxicity endpoints of blood, kidney, and central nervous system; 1,2-dichloroethane has endpoints of blood, kidney, and liver; trichloroethylene has endpoints of central nervous system; and vinyl chloride has endpoints of blood, circulatory system, and liver. Acknowledging the noncarcinogenic effects of such compounds, will provide for a more complete characterization of health concerns. In turn, aid in the final development of site remediation.

Page 17, Table 1, "Ground water indicator parameters and cleanup levels"

11 Trans 1,2-dichloroethylene was not included in the table as an indicator parameter. Cis 1,2-dichloroethylene with a maximum concentration of 180 ug/L and trans 1,2-dichloroethylene with a maximum concentration of 220 ug/L should be handled separately, particularly since the two compounds have different toxicity values.

Page 24, Proposed Cleanup Action Plan, Paragraphs 3 and 7
Indoor Air Sampling

12 Good! I am glad to see Ecology is including indoor air sampling as an element of the initial phase of the cleanup action plan. Because of uncertainties associated with

accumulation of soil-gas contaminants in nearby buildings and effect on indoor air quality, the safe alternative to ensure protection of human health is to conduct appropriate indoor air sampling. Without indoor air data, we cannot determine if nearby residences are currently being affected, or if future residential and commercial development over the soil-gas plume will result in a public health hazard.

I strongly recommend that Ecology proceed with the sampling of nearby residences as soon as possible to ensure that residents are not currently being exposed to indoor air contaminants of health concern. Also, I would like an opportunity to review the indoor air sampling plan, when it becomes available.

Institutional Controls

13 Consider implementing institutional controls to prevent residential and commercial development over the soil-gas on and off-site, until additional soil-gas and indoor air data indicated the contaminant concentrations are below levels of health concern.

Page 25, Proposed Cleanup Action Plan, Paragraph 4
Groundwater Monitoring

I understand that the groundwater analysis to confirm the effectiveness of the initial phase includes only the selected indicator parameters. Prior to final phase, a more comprehensive analysis including the low frequency contaminants would be
14 worthwhile to positively confirm effectiveness. This would help assure the reduction of contaminant concentrations is not resulting in increases of different contaminants due to natural biodegradation or other factors, and low frequency contaminants are actual below regulator standards.

Page 30, Use of Permanent Solutions to the Maximum Extent Practicable, Paragraph
Short-term Effectiveness

Risks associated with remediation should include the potential exposure to soil-gas by workers during construction activities. During construction or excavation operations, soil-gas released from newly exposed subsurface soils can reach high concentrations
15 within trenches or pits due to the lack of air flow. In this situation, workers can be exposed to dangerous concentrations if they fail to wear proper safety equipment during their work activities. Monitoring of soil-gas should be required prior to construction or remedial activities and appropriate personal protective equipment and safe work techniques be applied.

RESPONSE TO LETTER NO. 2: WASHINGTON STATE DEPARTMENT OF HEALTH
OFFICE OF TOXIC SUBSTANCES

1. Implementation of the Cleanup Action Plan is negotiated with the Potentially Liable Persons (PLP) as part of the Consent Decree. Indoor air sampling is included as part of the Cleanup Action Plan. At this time there is insufficient data to require institutional controls restricting development over detected soil gas area. However, a restrictive covenant will be included requiring testing and sampling of soil gas within the identified plume area prior to excavation and construction. If soil gas concentrations are high enough to pose a threat to human health, mitigative measures must be included in design and construction of structures.

2. WAC 173-340-810 requires "Protection monitoring to confirm that human health is adequately protected during construction and operation and maintenance of the cleanup action..." A worker safety and health plan will be included as part of the Cleanup Action specifying the necessary protective measures that must be implemented during excavation and construction.

3. The Department of Ecology is anxious to negotiate a Consent Decree implementing the Cleanup Action Plan with Spokane County so the elements of the plan can be performed in a timely manner.

4. Comment noted. The sentence will be changed to read "Local soils were used to cover the landfill, therefore ingestion or contact with soils was not considered an exposure pathway."

5. Bis(2-ethylhexyl) phthalate (BEHP) was eliminated as an indicator hazardous constituent based on low detection frequencies at levels above the Method B formula value of 6.25 ug/L, the low water solubility, and the high octanol/water partitioning coefficient. A reevaluation of BEHP was done based on this comment regarding synonyms of BEHP and the proposed maximum contaminant level (MCL) of 4 ug/L. In addition to the two wells in which detection of BEHP exceeded the Method B cleanup level, BEHP was detected marginally above the MCL in one well and at the MCL in two other wells. BEHP is added as an indicator hazardous substance for Greenacres Landfill due to the increase in detection frequency above the MCL.

6. WAC 173-340-708 identifies a procedure for establishing a reference dose when a reference dose is not available through the

"integrated risk information system" (IRIS). Based on the low concentrations of 1,1-dichloroethane detected at the site and the conclusions of ASTDR, 1,1-dichloroethane was not selected as an indicator parameter for the site. The database will be checked and appropriate corrections will be made. 1,2-dichloroethane is an indicator hazardous substance at the site and the correct oral slope factor of 0.091 (mg/kg/day)-1 was used to calculate the cleanup level.

Paragraph 2 will be changed to read: "EPA has not established an oral cancer slope factor or an RfD for 1,1-dichloroethane. EPA's weight-of-evidence classification is C, possible human carcinogen. The health assessment conducted by Washington Department of Health (WDOH) in a cooperative agreement with ASTDR concludes that 1,1-dichloroethane is not a contaminant of concern at the site. 1,1-dichloroethane was eliminated as an indicator hazardous substance."

7. MTCA regulates risks due to substances caused by hazardous waste sites and activities not risks from other sources. The cleanup level for arsenic is set at the natural background level, therefore, no overall risk is attributed to the background concentration.

8. Mercury was detected at a concentration above 2.0 ug/L in one sample. The other samples were at concentrations well below 2.0 ug/L, therefore, mercury was eliminated as an indicator hazardous substance.

9. The substances used to calculate the total site cancer risk include 1,2 dichloroethane, pentachlorophenol, trichloroethylene, tetrachloroethylene, and vinyl chloride. The cleanup levels for these substances are based on federal drinking water standards and MTCA Method B risk-based equations [WAC 173-340-720].

10. Without a quantitative toxicity value it is not possible to apportion risk to a toxic response or endpoint. It is through a quantitative risk evaluation that cleanup levels are established for noncarcinogenic effects [WAC 173-340-700].

11. 1,2-dichloroethylene consists of a mixture of two isomers, cis and trans. The cleanup level is based on the total mixture. The table will be changed to reflect total 1,2-dichloroethylene.

12. Please see response to Comment 3.

13. Please see response to Comment 1.

14. The definition of indicator hazardous parameter is "the subset of hazardous substances present at a site selected under WAC 173-340-708 for monitoring and analysis during any phase of remedial action for the purpose of characterizing the site or establishing cleanup requirements for that site." The subset of hazardous substances is selected by eliminating hazardous substances that contribute a small percentage of the overall threat to human health and the environment. The established indicator hazardous substances are then used for evaluating compliance with regulatory cleanup levels.

15. Please see response to Comment 2.

COMMENT LETTER NO. 3

CLEAR the AIR
SPOKANE

RECEIVED
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

SPOKANE COUNTY AIR POLLUTION CONTROL AUTHORITY

July 30, 1992

Flora J. Goldstein
Section Manager
Toxics Cleanup Section
Washington Department of Ecology
N. 4601 Monroe, Suite 100
Spokane, WA 99205-1295

Dear Ms Goldstein:

We have reviewed the DNS and Draft Cleanup Action Plan for the
Greenacres Landfill and have only one comment. Both documents
refer to a gas control system to be installed in conjunction with
the MFS cover. There is no information on what type of control
1 system this might be. The Draft Cleanup Action Plan is correct in
assuming that the gas control system is subject to our Regulation
I which includes our Notice of Construction and Application for
Approval requirements. The application should be submitted to us
as soon as details of the control system are known so that our
review procedure will not cause delays in the cleanup process.

Thank you for the opportunity to review and comment on these documents.

Sincerely,

SPOKANE COUNTY AIR POLLUTION
CONTROL AUTHORITY

Fred O. Gray

Fred O. Gray
Environmental Engineer

fgtox2.ltr

RESPONSE TO LETTER NO. 3: SPOKANE COUNTY AIR POLLUTION CONTROL AUTHORITY

1. A preliminary design of the gas control system will be included in the engineering design report. Sufficient information should be available at that time, for Spokane County to submit the appropriate application to SCAPCA.

December 15, 1992

COMMENT LETTER NO. 4

LIBERTY LAKE SEWER DISTRICT
PEOPLE ENVIRONMENT

P.O. Box 184 • Liberty Lake, WA 99019 • (509) 922-5443 District Office • (509) 928-6123 Treatment Facility

OCT 1992

October 16, 1992

Roxanne Broadhead
Washington Department of Ecology
North 4601 Monroe, Suite 100
Spokane, Washington 99205

Re: Comments on Draft Cleanup Action Plan
Greenacres Landfill Site

Dear Ms. Broadhead,

Liberty Lake Sewer District No. 1 has reviewed the above plan and would like to present the following comments for your consideration.

The District presented comments on the Greenacres Landfill Feasibility Study in an earlier letter dated May 2, 1991, addressed to Mr. Dean Fowler of the Spokane County Utilities Department. In this correspondence the District reviewed the five alternatives presented for cleanup of the site. Alternative No. 5 as outlined in Section 3.3.5 of the Feasibility Study was considered by the District as the most appropriate. This option was for the extraction and discharge of contaminated ground water to the City of Spokane's Wastewater Treatment Facility for treatment. Alternatives No. 3 and 4 as outlined in Sections 3.3.3 and 3.3.4 were considered equally reliable, but less attractive due to uncertain treatment methods. Alternative No. 1 and 2 were considered ineffective since further degradation of the aquifer would not be curtailed under these options.

1 The paramount concern of the District is to prevent potential contamination of two local domestic-use groundwater wells supplying drinking water to more than 500 residences. In addition, it is critically important to protect the Spokane Sole Source Aquifer from potential degradation.

The Remedial Investigation and Draft Cleanup Action Plan (the Plan) have both shown contaminated ground water at and adjacent to the subject property. A down gradient residence has been affected and has been provided an alternative drinking water source.

2 In fact, the Plan states that contamination increases with depth and reaches the highest levels in soils and ground water at or near the contact between local weathered bedrock and alluvial sediments. The report also states that contaminant distribution in the ground water of the alluvial sediments flows through a narrow zone at the north edge of the landfill before mixing with the Spokane Aquifer. The 32 indicated contaminants include

metals, volatiles, and semi-volatile organic compounds, and detection of chlorinated herbicides like 2,4-D, Silvex, and MCPA. However, the fate and transport of the contamination was not based on actual ground water data, but was predicted by computer modeling. The plan calls for collection and evaluation of more data to fully evaluate the risks, and the District would recommend assessing the actual dangers to the public health prior to selection of a cleanup action.

The health risk assessment indicates that site ground waters are unacceptable for human health and the environment. Despite the contaminant and health risk data, the Plan recommends a minimum plan for mitigative and monitoring actions. The proposed Plan is not one of the primary alternatives presented by the Feasibility Study. The four elements of the Plan are basic preventive methods rather than treatment and corrective actions. We do not believe that the proposed Plan has selected a cleanup action that meets the requirements of the State's Model Toxics Control Act (MTCA Chapter 172-340 WAC).

The proposed preventive and monitoring actions do not promote
compliance with MTCA cleanup standards and threshold
requirements. The elected action is considered the last choice
by the MTCA in implementing cleanup technologies and does not
3 address specific hazardous substances and pathways. There is no
guarantee of immobilization of contaminants from a landfill cap.
The contaminants have been shown to be concentrated beyond the
landfill's active cell areas. While the capping of the landfill
may be a choice to help mitigate contaminant transport, it is not
a corrective action used to solve existing contamination of both
soil and ground water.

The proposed Plan cannot be considered a permanent solution where cleanup standards can be met. A careful explanation of why the original cleanup alternatives have not been used is not included in the documentation. An overriding public concern exists concerning the Spokane Aquifer and potentially affected down gradient water sources. The Plan essentially relies on dilution and dispersion of the contaminants, which does not comply with MTCA standards.

Institutional controls and compliance monitoring are used despite
it being technically possible to implement a cleanup action
alternative. These planned methods may be appropriate for
4 subject site contamination, but ground water has been
contaminated beyond the point of compliance. Off-site transport
should require implementation of an appropriate treatment
technology or method to attain cleanup standards.

A time frame has been established for mitigative and monitoring methods, however there has not been a proposed schedule for the restoration time frame. A monitoring program may only extend the restoration time frame and should not be used as a substitute for

active cleanup actions, if there are environmental or health
risks to the public. Ground water treatment should be
implemented to achieve the levels set by the MTCA and ground
water regulations (Chapter 173-200 WAC) because of the impacts
5 beyond the point of compliance. In fact, if the State Department
of Ecology (WDOE) considers that ground water treatment and
restoration is impractical, then other measures should be taken.
The measures in addition to those proposed should include some
minimum treatment to reduce the levels to the maximum extent
possible and control ground water contaminants.

The WDOE expects that cleanup actions will return useable ground
waters to their beneficial use wherever practical and within a
reasonable time frame. There are definitive, practical, and
6 sensible methods available as outlined in the Feasibility Study.
A comparison of costs for treatment technologies was not included
with the proposed Plan to confirm or evaluate the options.
Adequate information was not presented which supports the
decision.

We appreciate the opportunity to comment on the Draft Cleanup Action Plan. In summary, we believe the Plan is not consistent with the principles and processes required for this level of environmental and public health risk and recommend the following issues be addressed prior to the final selection of the cleanup action:

1. Collect additional offsite ground water data to better
characterize the contaminant plume, its impact on the
7 Spokane Aquifer, and actual risk to the environment and
public health.

2. Prepare a more definitive evaluation of which cleanup alternatives would correct and mitigate the risks to the environment and public health. Specifically, this would consider the actual health risks and cost impacts to the public.

Sincerely,

Corrine Mountjoy

Corrine Mountjoy
Manager

cc: Jeff Leppo, Century West Engineering
Dean Fowler, Spokane County Utilities

RESPONSE TO LETTER NO. 4: LIBERTY LAKE SEWER DISTRICT

1. The Department recognizes your concern and the importance of protecting the Spokane Valley Aquifer. The consequence of degradation of the Spokane Valley Aquifer was considered in the evaluation of this site and the selection of a cleanup action.

2. The HELP computer model referenced in the Remedial Investigation Report (Woodward-Clyde Consultants, 1989) is a water budget model used to predict the runoff and percolation resulting from precipitation on the landfill. Conclusions regarding the fate and transport of ground water contamination downgradient of the landfill were based on actual ground water data.

   Sufficient data is available to evaluate and select a cleanup action for the site. The plan requires continued ground water monitoring to demonstrate the effectiveness of the landfill cover and to evaluate whether additional remedial measures, such as pump and treat, are warranted. The additional data collection is not for the purpose of obtaining further health risk information. A health risk assessment was conducted as part of the Remedial Investigation (Woodward-Clyde Consultants, 1989) and the established cleanup levels are health risk based standards.

3. The cap will serve to prevent future contaminant releases from the landfill. It is generally recognized that containment is the only practical method to mitigate sites with large areas of low levels of hazardous substances, such as landfills [WAC 173-340-360(9)(c)]. Reuse, recycling, destroying or detoxifying the refuse is not a reasonable alternative at this site. Landfill covers have proven to be effective at significantly reducing leachate generation and migration.

   You are correct that the cover will not remediate existing ground water contamination. The Cleanup Action Plan proposes a phased or staged approach to site cleanup. Ground water contamination will be monitored following cover construction to confirm the effectiveness of the cover at preventing additional aquifer contamination. Data collected over a five year period will be evaluated to determine whether additional remedial actions, such as ground water pump and treat is necessary. Based on the questionable ability of ground water pump and treat systems to achieve cleanup standards in aquifers with physical and chemical characteristics similar to this site, and the high cost of additional design tests, construction and operation of a pump and treat system, a staged cleanup is a reasonable approach. This action does not rely primarily on dilution and dispersion for remediation of the site.

The Department may select one of the alternatives identified in the Feasibility Study Report (Woodward-Clyde Consultants, 1991), a combination of two or more of the alternatives, or a portion of one or more of the alternatives. An evaluation of the proposed cleanup action with respect to Model Toxics Control Act cleanup criteria and threshold requirements [WAC 173-340-360 (1) and (2)] is presented in the Cleanup Action Plan. The cleanup action alternative selected is determined to be in compliance with the Model Toxic Control Act.

4. Institutional controls and compliance monitoring are required in conjunction with a landfill cover, the selected cleanup action. Institutional controls are required where a cleanup action results in hazardous substances remaining on-site and to assure the continued protection of human health [WAC 173-340-440]. Compliance monitoring is required by WAC 173-340-460.

5. The restoration time frame is addressed in the Cleanup Action Plan by the following:

"The proposed cleanup action will help limit continued discharge and migration of leachate. The time frame necessary for the achievement of cleanup levels with the proposed phased cleanup action cannot be clearly determined. A phased approach will allow evaluation of additional remedial actions if capping does not effectively reduce contaminant concentrations. Due to the potential ineffectiveness of ground water extraction and treatment at the Site and the indefinite time frame required to remediate ground water, the phased cleanup approach is considered to best meet the overall goals of MTCA."

6. The Feasibility Study (Woodward-Clyde Consultants, 1991) provides estimates for the cost of the cleanup action alternatives evaluated. The estimated present worth cost of Alternative 5, without a low-permeability cover, based on various discount and inflation rates, ranges from $2.5 million to $5 million. The estimated present worth cost of Alternative 5, with a low-permeability cover, ranges from $4 million to $6 million.

Spokane County (Woodward-Clyde Consultants, 1992) submitted a new cost estimate for a landfill cover at $6 million. Updated estimates of the other alternatives were not given. A present worth analysis, based on the updated landfill cover estimate of $6 million and 1991 Feasibilty Study (Woodward-Clyde Consultants, 1991) operation and maintenance cost estimates, ranges from $6.5 million to $7 million.

7. Data collected during the remedial investigation study (Woodward-Clyde Consultants, 1989) showed aquifer contamination in monitor wells downgradient of the landfill. These aquifers discharge to the Spokane Valley Aquifer, however, due to the dilution effects of the Spokane Valley Aquifer, contaminants from the landfill were not detected in existing wells in the Spokane Valley Aquifer.

The Feasibility Study Report (Woodward-Clyde Consultants, 1991) presents and evaluates potential cleanup alternatives. The Feasibility Study Report was written prior to the final effective date of the Model Toxics Control Act Regulations. Therefore, the alternatives were evaluated according to Federal cleanup criteria not the more stringent Washington state cleanup criteria. The alternatives are evaluated for compliance with WAC 173-340-360 in the cleanup action plan. A health risk assessment was conducted as part of the Remedial Investigation Report (Woodward-Clyde Consultants, 1989). Cleanup levels for the site are risk based standards developed by the Model Toxics Control Act Regulations [WAC 173-340-700].

this site should be sufficient to ensure that the low levels of contamination at the site do not pose a threat to human health in the future.

Very truly yours,

LIBERTY LAKE INVESTMENTS, INC.

William Rademaker, Jr.

Enclosures

INTRODUCTION

PURPOSE AND OBJECTIVES

This document is the Draft Cleanup Action Plan (DCAP) for the Greenacres Landfill Site (Site) located near Spokane, Washington. A DCAP is required as part of the site cleanup process established by the Washington State Department of Ecology (Ecology) under Chapter 173-340 WAC, "Model Toxics Control Act Cleanup Regulation" (MTCA). The purpose of the DCAP is to identify the proposed cleanup action for the site and provide an explanatory document for public review. The specific objectives of the DCAP are identified in WAC 173-340-360(10), "Draft Cleanup Action Plan".

The objectives of the DCAP are to:

- Summarize the alternative cleanup actions evaluated in the Site Remedial Investigation/ Feasibility Study reports
- Describe the cleanup action selected by Ecology and the selection rationale
- Present Site cleanup levels and points of compliance for hazardous substances
- Develop implementation schedule for cleanup action plan
- Specify any required institutional controls and site use restrictions
- Justify selection of cleanup action that uses lower preferences cleanup technology than the higher representative cleanup technologies listed in WAC 173-340-360(4)(a)
- Identify applicable state and federal laws for the proposed cleanup action
- Demonstrate compliance with MTCA cleanup action requirements (WAC 173-340-360(2) and (3)
- Specify the types, levels and amounts of hazardous substances remaining on-site and the measures that will be utilized to prevent migration of those substances

PREVIOUS WORK

The DCAP presents a brief description and history of Greenacres Landfill. Results from applicable studies and reports are summarized to provide background information pertinent to the DCAP. These studies and reports include the "Remedial Investigation Report, Greenacres Landfill Site" (Woodward-Clyde Consultants, November 1989), the "Remedial Investigation Report--Air Modeling and Risk Assessment Report" (Woodward-Clyde Consultants, February 1991), and the "Feasibility Study Report, Greenacres Landfill Site" (Woodward-Clyde Consultants, March 1991). Portions of the DCAP text are taken directly from these documents.

COMMENT LETTER NO. 5

LIBERTY LAKE INVESTMENTS, INC.

1325 FOURTH AVENUE, SUITE 1940
SEATTLE, WASHINGTON 98101-2510
(206) 624-4494
FAX:(206) 624-5014

October 20, 1992

RECEIVED
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Department of Ecology
N. 4601 Monroe Street
Spokane, WA 99205-1295

RE: Greenacres Landfill

Dear Sir or Madam:

I submit this letter in my capacity as President of Liberty Lake Investments, Inc., a Washington corporation, presently the owner of the property commonly referred to as the Greenacres Landfill. Liberty Lake Investments, Inc.'s predecessors acquired the property from Spokane County in the 1970's.

The Greenacres Landfill was operated as a municipal dump site under a private ownership in the 1940's. Thereafter, the Greenacres township became responsible for operating and regulating the landfill from 1951 to 1967. Spokane County, after the dissolution of the townships, operated the landfill until its final closure in 1972 at which time the land was sold to Holiday Hills a predecessor of Liberty Lake Investments, Inc.

Despite the fact that the landfill had been closed for 20 years and that Spokane County had been conducting water quality sampling under the "208 program" since 1978, which has not shown any impact to the Spokane aquifer or to any other public drinking water supplies, the landfill was placed on the national priorities list in 1984. An examination of the Hazardous Ranking System sheet shows that the Greenacres Landfill received a very high ranking particularly in category one and five where it received the highest possible scores despite the lack of any evidence then or now of contamination of public water supply systems emanating from the landfill.

1 To this day only one well, the Jeffers' well, has been impacted by the landfill. Spokane County moved quickly to provide the Jeffers with an alternate water supply system. There is no other evidence that any other private or public water supply system has been or will be affected by the Greenacres Landfill. I submit

that a more balanced and better reasoned ranking of the site would not and should not have resulted in the site being placed on the NPL list. The reasons for and process by which such ranking occurred remains highly questionable and very suspicious.

Even now, nearly 50 years after the landfill was first opened and 20 years after it was closed, the Department of Ecology (DOE) has admitted that: "There is no immediate threat to human health at the site." Draft Cleanup Action Plan, Greenacres Landfill, conducted by the Washington State Department of Ecology, May 1992, page 1.

The DOE further admits that no other wells in the general area show any evidence of contamination resulting from the Greenacres
2 Landfill. Draft Cleanup Action Plan at page 5.

To require Spokane County to spend as much as $6 Million to place a cap on a landfill that has been closed for 20 years is a tremendous waste of taxpayers money. Especially, given the fact that the DOE concedes that there is no immediate threat to public health emanating from the site. There is no evidence to show that any contamination from the landfill is reaching the Spokane aquifer in amounts above safe drinking-water levels.

While I strongly endorse the cleanup of sites that pose a threat to human health or the environment the Greenacres Landfill does not in my view meet the criteria to require the expenditure of millions of dollars at this site. The Model Toxics Control Act, Chapter 70.105D RCW, was intended to focus on hazardous waste sites which ... "present serious threats to human health and environment." RCW 70.105 D.010. Not only does this site not present a serious threat to human health and the environment, the DOE has conceded that there is no immediate threat to human health at all at the site which sharply focuses on the DOE's wasteful
3 position to require the expenditure of $6 Million to place a cap on the landfill that poses no threat to human health.

In summary, the DOE's cleanup action plan is a foolish expenditure of scarce public resources. Twenty years is a sufficient length of time to demonstrate whether the landfill will pose any threat to public health. DOE has conceded that the landfill does not pose such a threat and continued monitoring of

EPA REGION X

Facility name: Greenacres Landfill (aka Liberty Lake Landfill)

Location: Spokane Co. Wa Sec 16 T25N R45E

EPA Region: 10

Person(s) in charge of the facility: Spokane County Utilities
William R. Dobraty, Utilities Director
N811 Jefferson
Spokane, WA. 99260
(509) 456-3604

Name of Reviewer: H. Alder Date: 6/28/83

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Landfill formerly receiving up to 50000 cu/yds/year of domestic commercial and industrial waste from Spokane. Well immediately downslope from landfill (closed 1972) shows low but increasing levels of trans-dichloroethylene, trichloroethylene & perchloroethylene. Sole source aquifer serves large population and is major irrigation source.

Scores: S_M = ~~35.27~~ 28.90 (S_{gw} = ~~61.54~~ 50.00 S_{sw} = 0 S_a = 0)

S_{FE} = 0

S_{DC} = 0

FIGURE 1
HRS COVER SHEET

EPA REGION X

Facility name: Greenacres Landfill (aka Liberty Lake Landfill)

Location: Spokane Co. Wa Sec 16 T25N R45E

EPA Region: 10

Person(s) in charge of the facility: Spokane County

Name of Reviewer: H. Alder

Date: 6/2?/83

General description of the facility:

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Scores: S_M = ~~[illegible]~~ 28.90 (S_{gw} = ~~[illegible]~~ 50.00 S_{sw} = 0 S_a = 0)

S_{FE} = 0

S_{DC} = 0

FIGURE 1
HRS COVER SHEET

SITE DESCRIPTION AND HISTORY

SITE DESCRIPTION

The Site comprises about 45 acres of land located approximately 14 miles east of Spokane, Washington within Section 16, Township 25 North, Range 45 East (Fig. 2). The landfill is situated in a former ravine along the north slope of Carlson Hill. Bedrock ridges of metamorphic rock form the east and west borders of the ravine. The ravine was partially filled by alluvial deposits from outpourings of glacial Lake Missoula and by natural valley fill in the localized drainage area. Refuse was placed on the alluvial surface nearly filling the ravine. The topography flattens as the bedrock ridges merge with the Spokane Valley, a large east - west trending valley, directly north of the landfill. The Spokane Valley contains the Spokane Valley-Rathdrum Prairie Aquifer (Spokane Aquifer), a sole source aquifer that provides water for municipal, industrial, and agricultural purposes, serving approximately 350,000 people.

SITE HISTORY

Greenacres Landfill was used as a municipal dump site under private ownership in the early 1940's. Greenacres Township was responsible for operating and regulating the site from 1951 to 1967. Spokane County acquired the landfill after dissolution of the Greenacres Township and operated it from 1967 to final closure in 1972. The land was then sold to Holiday Hills (Liberty Lake Investors), the current landowners.

Ground water contamination at the site was identified in 1978 during a ground water monitoring survey. Water from a private well, located 600 feet from the base of the landfill, was found to be contaminated with chlorinated volatile organic compounds (VOC's). Spokane County provided an alternative source of drinking water to the affected residence. Other area residents obtain drinking water from private wells, Consolidated Irrigation District or Liberty Lake Sewer District. None of the other private wells in the vicinity of the landfill show evidence of contamination.

The site was placed on the National Priorities List in 1984. Installation of 3 monitoring wells in 1985 confirmed the landfill as the source of contamination. Through an agreement with EPA, Ecology assumed lead agency status.

Under Consent Order No. 87-0926, Spokane County began conducting the Remedial Investigation/Feasibility Study (RI/FS) of the Site in 1988. The RI report was completed in November 1989 by Woodward-Clyde Consultants (WCC) for Spokane County. Amendments to the Remedial Investigation and

APPENDIX IV

CHAPTER 70.105D RCW

HAZARDOUS WASTE CLEANUP — MODEL TOXICS CONTROL ACT

RCW 70.105D.010 Declaration of policy. (1) Each person has a fundamental and inalienable right to a healthful environment, and each person has a responsibility to preserve and enhance that right. The beneficial stewardship of the land, air, and waters of the state is a solemn obligation of the present generation for the benefit of future generations.

(2) A healthful environment is now threatened by the irresponsible use and disposal of hazardous substances. There are hundreds of hazardous waste sites in this state, and more will be created if current waste practices continue. Hazardous waste sites threaten the state's water resources, including those used for public drinking water. Many of our municipal landfills are current or potential hazardous waste sites and present serious threats to human health and environment. The costs of eliminating these threats in many cases are beyond the financial means of our local governments and ratepayers. The main purpose of *this act is to raise sufficient funds to clean up all hazardous waste sites and to prevent the creation of future hazards due to improper disposal of toxic wastes into the state's land and waters.

(3) Many farmers and small business owners who have followed the law with respect to their uses of pesticides and other chemicals nonetheless may face devastating economic consequences because their uses have contaminated the environment or the water supplies of their neighbors. With a source of funds, the state may assist these farmers and business owners, as well as those persons who sustain damages, such as the loss of their drinking water supplies, as a result of the contamination.

(4) Because it is often difficult or impossible to allocate responsibility among

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score		—	15	
3 Containment	0 1 2 3	1	—	3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	12	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	1	8	
	Total Waste Characteristics Score		13	26	
5 Targets					3.5
Ground Water Use	0 1 2 3	3	9	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	40	40	
	Total Targets Score		49	49	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			28665	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 50.00		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multi-plier**	**Score**	**Max. Score**	**Ref. (Section)**
[1] Observed Release	0 45	1		45	4.1
If observed release is given a value of 45, proceed to line [4]. If observed release is given a value of 0, proceed to line [2].					
[2] Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
	Total Route Characteristics Score			15	
[3] Containment	0 1 2 3	1		3	4.3
[4] Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1		18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			26	
[5] Targets					4.5
Surface Water Use	0 1 2 3	3		9	
Distance to a Sensitive Environment	0 1 2 3	2		6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1		40	
	Total Targets Score			55	
[6] If line [1] is 45, multiply [1] x [4] x [5] If line [1] is 0, multiply [2] x [3] x [4] x [5]				64,350	
[7] Divide line [6] by 64,350 and multiply by 100		S_{sw} = 0			

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

CAB

Air Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
[1] Observed Release	0 45	1		45	5.1
Date and Location:					
Sampling Protocol:					
If line [1] is 0, the S_a = 0. Enter on line [5]. If line [1] is 45, then proceed to line [2].					
[2] Waste Characteristics					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
[3] Targets					5.3
Population Within 4-Mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
	Total Targets Score			39	
[4] Multiply [1] x [2] x [3]				35,100	
[5] Divide line [4] by 35,100 and multiply by 100	S_a = 0				

FIGURE 9
AIR ROUTE WORK SHEET

0 NR

	S	S^2
Groundwater Route Score (S_{gw})	50.00	2500.00
Surface Water Route Score (S_{sw})		
Air Route Score (S_a)		
$S_{gw}^2 + S_{sw}^2 + S_a^2$		2500.00
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		50.00
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}\,/\,1.73 = S_M =$		28.90

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Fire and Explosion Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Containment	1 3	1		3	7.1
2 Waste Characteristics					7.2
Direct Evidence	0 3	1		3	
Ignitability	0 1 2 3	1		3	
Reactivity	0 1 2 3	1		3	
Incompatibility	0 1 2 3	1		3	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
	Total Waste Characteristics Score			20	
3 Targets					7.3
Distance to Nearest Population	0 1 2 3 4 5	1		5	
Distance to Nearest Building	0 1 2 3	1		3	
Distance to Sensitive Environment	0 1 2 3	1		3	
Land Use	0 1 2 3	1		3	
Population Within 2-Mile Radius	0 1 2 3 4 5	1		5	
Buildings Within 2-Mile Radius	0 1 2 3 4 5	1		5	
	Total Targets Score			24	
4 Multiply 1 x 2 x 3				1,440	
5 Divide line 4 by 1,440 and multiply by 100		S_{FE} =			

FIGURE 11
FIRE AND EXPLOSION WORK SHEET

Direct Contact Work Sheet					
Rating Factor	**Assigned Value (Circle One)**	**Multi-plier**	**Score**	**Max. Score**	**Ref. (Section)**
[1] Observed Incident	0 45	1		45	8.1
If line [1] is 45, proceed to line [4] If line [1] is 0, proceed to line [2]					
[2] Accessibility	0 1 2 3	1		3	8.2
[3] Containment	0 15	1		15	8.3
[4] Waste Characteristics Toxicity	0 1 2 3	5		15	8.4
[5] Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4		20	
Distance to a Critical Habitat	0 1 2 3	4		12	
Total Targets Score				32	
[6] If line [1] is 45, multiply [1] x [4] x [5] If line [1] is 0, multiply [2] x [3] x [4] x [5]				21,600	
[7] Divide line [6] by 21,600 and multiply by 100	S_{DC} =				

FIGURE 12
DIRECT CONTACT WORK SHEET

EPA REGION X

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

<u>INSTRUCTIONS</u>: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: Greenacres Landfill

LOCATION: Spokane Co. Washington

1 OBSERVED RELEASE

Contaminants detected (5 maximum): JEFFERS WELL (see attachment)

trans - dichloroethylene — DOE files
trichloroethylene — Spokane Co Health District
Tetrachloroethylene — EPA Laboratory
Spokane Aquifer Monitoring Program

Rationale for attributing the contaminants to the facility:

Found in well immediately downhill & downgradient from Landfill

(SPOKANE CO. HEALTH DISTRICT INTER-***OFFICE COMMUNICATION, 6/7/83 - SAMPLES COLLECTED 9/15/80 TO 1/26/83 - 12 SAMPLES)

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern — NOT APPLICABLE DUE TO OBSERVED RELEASE

Name/description of aquifers(s) of concern:

Spokane Valley aquifer

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

84 - 126 - municipal well logs on file (from DOE files)

Depth from the ground surface to the lowest point of waste disposal/ storage:

Uncertain

rNB

NOT APPLICABLE DUE TO OBSERVED RELEASE

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

Annual - 24" (Climatic Atlas of United States)
Nov-April 10.5"

Mean annual lake or seasonal evaporation (list months for seasonal):

Annual 57" (CA of U.S.)
NOV-April 6.66" (18%).

Net precipitation (subtract the above figures):

Annual - 13"
Seasonal ~~-~~ 3.84"

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

Sand and gravel

Permeability associated with soil type:

High $>10^{-3}$ cm/sec

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Liquid

* * *

Containment

Method(s) of waste or leachate containment evaluated: — NOT APPLICABLE DUE TO OBSERVED RELEASE —

N/A

Method with highest score:

N/A

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

	TOXICITY	PERSISTENCE
Tetrachloroethylene	2	2
trichloroethylene	2	2
trans - dichloroethylene	2	2

Compound with highest score:

All moderate toxicity except via i.v. ~~route~~

~~All persistent~~ (~~[illegible]~~)

ALL ABOVE COMPOUNDS = 12

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Unknown.

Basis of estimating and/or computing waste quantity:

* * *

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

① Drinking, domestic & municipal
② Irrigation

(WATER RIGHTS FILES, SPOKANE CO. HEALTH DISTRICT, SPOKANE CO. - CONDENSED COMPUTER REPORT pp. 315-321)

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Jeffers well contaminated

Distance to above well or building:

0 WELL LOCATED WITHIN EXTENDED SITE BOUNDRIES

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from aquifer(s) of concern within a 3-mile radius and populations served by each:

Ⓐ Liberty Lake Sewer District 400 houses x 3.8 persons/house = 1520 - HOUSE COUNT FROM USGS, QUAD MAP, LIBERTY LAKE, WASH. - IDAHO, 1973

Ⓑ Consolidated Irrigation District (4000 people) ~~1000-2000 acres irrigated~~ (includes U.S. Bureau of Reclamation) (509-924-3655)

Computation of land area irrigated by supply well(s) drawing from aquifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

Ⓐ Not less than 1000 acres - Consolidated Irrigation District
Ⓑ at least 2000 acres in addition T25N R45E Sections 9,10,11,14,15 (Water rights in DOE file).

$4500 \text{ people} = 3000 \text{ ACRES} \times 1.5 \frac{\text{PEOPLE}}{\text{ACRE}}$

(Water rights FILES, SPOKANE CO. HEALTH DISTRICT, SPOKANE, WA.) - CONDENSED COMPUTER REPORT, pp. 315-32

Total population served by ground water within a 3-mile radius:

~~10,000 people equivalent~~.

TOTAL FROM ABOVE:

1520
4000
+ 4500
10,020 PEOPLE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

NONE

Rationale for attributing the contaminants to the facility:

* * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

N/A

Name/description of nearest downslope surface water:

Average slope of terrain between facility and above-cited surface water body in percent:

Is the facility located either totally or partially in surface water?

Is the facility completely surrounded by areas of higher elevation?

1-Year 24-Hour Rainfall in Inches

Distance to Nearest Downslope Surface Water

Physical State of Waste

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Method with highest score:

Distance to critical habitat of an endangered species, if 1 mile or less:

Land Use

Distance to commercial/industrial area, if 1 mile or less:

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Distance to residential area, if 2 miles or less:

Distance to agricultural land in production within past 5 years, if 1 mile or less:

Distance to prime agricultural land in production within past 5 years, if 2 miles or less:

Is a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

4 WASTE CHARACTERISTI

Toxicity and Persistence

Compound(s) evaluated

Compound with highest score:

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

Basis of estimating and/or computing waste quantity:

* * *

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Is there tidal influence?

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

Computation of land ar[illegible] irrigated by above-cited in[illegible]e(s) and conversion to population (1.5 people per acre):

Total population served:

Name/description of nearest of above water bodies:

Distance to above-cited intakes, measured in stream miles.

1 OBSERVED RELEASE

Contaminants detected:

NONE

Date and location of detection of contaminants

Methods used to detect the contaminants:

Rationale for attributing the contaminants to the site:

* * *

2 WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Most incompatible pair of compounds:

Toxicity

Most toxic compound:

Hazardous Waste Quantity

Total quantity of hazardous waste:

Basis of estimating and/or computing waste quantity:

* * *

3 TARGETS

Population Within 4-Mile Radius

Circle radius used, give population, and indicate how determined:

0 to 4 mi 0 to 1 mi 0 to 1/2 mi 0 to 1/4 mi

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

REPSONSE TO LETTER NO. 5: LIBERTY LAKE INVESTMENTS, INC.

1. Greenacres Landfill site was placed on the Environmental Protection Agency's (EPA) National Priorities List (NPL) in 1983. At that time, the site met the criteria necessary for nomination to NPL status. The site was ranked against the other sites that were also under consideration and ranked high enough to be place on the NPL as a Superfund Site.

2. Please see response to Letter 10, Comments 8 and 9.

3. Please see response to Letter 10, Comment 13.

COMMENT LETTER NO. 6

April Taylor
Sec. Micaview Landowners Association
19921 E. Sixth Ave.
Greenacres, Wa. 99016-9663
(509) 922-4105

Roxane Broadhead
Dept. of Ecology
Toxics Cleanup Program
4601 N. Monroe, Suite 100
Spokane, Wa. 99205-1295

RE: Greenacres Landfill

Dear Ms. Broadhead, Oct. 26, 1992

1 As a representative of the Micaview Landowners Association I would like addidional studies done on the Greenacres Landfill. Particularly for the people in the Micaview Second Addition to Greenacres Subdivision. I would like to have the Southwest edge of the landfill monitored, as well as the ridge and downhill slope immediately West of that edge. See attached map.

2 Mr. Bill Deutsch, Hydrogeochemist at Woodward-Clyde, showed a chart of some of the contaminants and their concentrations. The level of manganese was very high. I asked him about that and he said the test done on manganese was not filtered, and would be lower of it was filtered. He explained that if people drank the water it would be in a filtered state. I would like manganese to be tested as it would appear in drinking water, for the previous reasons and because it is at a high level and detected in 100% of the wells. Some of the other heavy metals are at high concentrations and detected in a majority of wells; ere they tested unfiltered? If they were I would like them tested as they would appear in drinking water.

I appreciate the opportunity to submit this letter to the record.

Thank You,

April Taylor

April Taylor

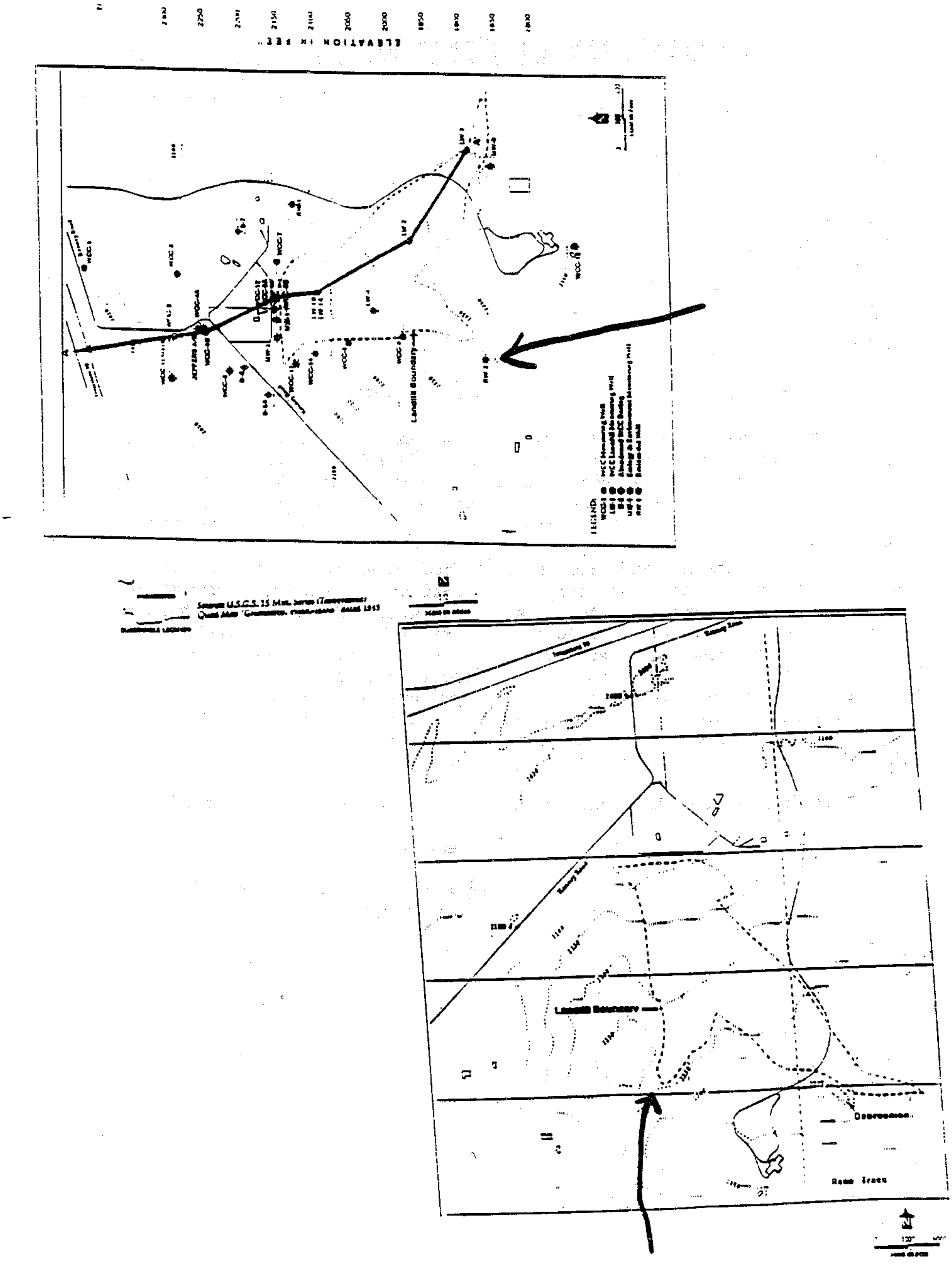


Figure 2   Greenacres Landfill location map (WCC, 1991)

RESPONSE TO LETTER NO. 6: MICAVIEW LANDOWNERS ASSOCIATION

1. A residential well, identified as RW-2, is located in the area southwest of the landfill. Compliance monitoring of the site will include continued monitoring of RW-2 or installation of a new monitor well in a nearby location for monitoring purposes. Bedrock monitor wells are located along the western edge of the landfill and will continue to be monitored.

2. Please see response to Letter 1, Comment 4.

COMMENT LETTER NO. 7

October 20, 1992

RECEIVED

Ms. Roxane Broadhead
Department of Ecology
Toxics Cleanup Program
N.4601 Monroe, Suite 100
Spokane, WA 99205-1295

RE:Greenacres Landfill Draft Cleanup Action Plan

I have many concerns regarding this issue after reading the RI/FS and Draft Cleanup Action Plan for the Greenacres Landfill. I also attended the public meeting held earlier this evening where presentations by DOE, Spokane County and their consultants, as well as public testimony was given. Some of my many concerns are detailed below:

1 1. The close proximity of the contaminant plume to the Spokane Valley Aquifer-a sole source aquifer-for approximately 350,000 persons. It is unknown at this time whether the plume has indeed reached that aquifer,due to the leading edge of the plume (north) travelling beyond the last monitoring well.

The potential for contamination of that aquifer concerns me.If that aquifer is impacted by the Greenacres Landfill or any other sources in the future, it will definitely cost much more than the $6 million dollars now proposed for the landfill cap.

2 2. At the public meeting I believe it was stated by Woodward/Clyde Consultants that water/leachate from the landfill takes 10-20 years to reach the Spokane Aquifer approximately one- third of a mile north of the site. Yet the WDOH Health Assessment(WAD980514608)pg.2 para 5- states that groundwater flow/velocity in the bedrock aquifer estimated averages of 8 feet per day. At the rate of 8 feet per day groundwater from the site takes less than 1 year to reach the Spokane Valley Aquifer. Which is it ?

3 3. At the public meeting this evening I did not hear a reference to the drought situation(lack of precipitation) the Spokane area has experienced in the last 5-7 years. What effect will rainfall and snow have on the contaminant plume during "normal" years? Will levels of contaminants increase or potentially increase in the monitoring wells, etc.?

4. According to area residents, irrigation and water district wells located within one-half mile of the site have not been contaminated.The protection of those wells (Spokane Aquifer also)thru the placing of the cap on the landfill with continued air and water monitoring will insure that human health effects and environmental degradation to the Spokane Aquifer does not occur.

occur.

5. Costs of the landfill cap have risen from 2.5 million to over 6 million dollars in a year and a half. Spokane County is eligible for a 50% cost share with the state at this time.If the county waits for 5 more years before capping the landfill the costs to the citizens will undoubtedly increase.Also it is unknown if state funding will be available for capping at
4 that time.Page 27 para 3,DCAP-states "the estimated capital cost of implementing an extraction and treatment system ranges from $270,000 to $1,700,000 depending on the system design...annual operating costs range from $51,000 to $124,000." Have these costs also more than doubled? How many years would this system be operating? If operations last for approximately 20 years $4.5-$6 million would be spent with inflation nearly the current cost of the cap with its 20-30 year lifespan.

6. I would like to see the indoor air sampling of residences located north/northeast of the landfill as stated in the draft cleanup plan to protect human health. If gases are not found
5 this action can always be reevaluated in the future.Due to the potential accumulative long term health effects of the chemicals(thru air, gas and water pathways), found at the landfill on the livers and kidneys ~~of~~ humans, I believe this is a prudent action.

7. I do not live near the Greenacres Landfill,but I am concerned, due to the proximity of the contaminant plume to the Spokane aquifer -water that we all drink-and the protection of that aquifer for future generations.I understand that Spokane County is against capping the landfill at this time and has proposed 5 more years of monitoring? **Can we as citizens afford the risk of contamination of our aquifer or afford the costs that seem to be escalating rapidly of either state or federal mandated capping and cleanup**?The costs of litigation regarding this issue I believe could better be spent by cleaning up the site as soon as feasible, rather than court costs for several years-I really hope a compromise can be worked out between Spokane County and Ecology that is beneficial to the citizens of this county and state,while protecting human health and our environment.

Thank you for the opportunity to comment on this important issue as a private citizen, an issue that will ultimately effect every citizen in this county.

Sincerely,

Beverley L. Keating

RESPONSE TO LETTER NO. 7: BEVERLEY L. KEATING

1. The alluvial aquifer underlying the Greenacres Landfill discharges to the Spokane Valley Aquifer. The leading edge of the plume, as represented by Mr. Deutsch figure in the public meeting, appears to end at the boundary of the aquifer due to the dilution effects of the regional aquifer. However there are no monitoring wells at the edge of the plume boundary to determine the exact location or extent of the plume. The Remedial Investigation Report (Woodward-Clyde Consultants, 1989, p. 5-17) states "The large disparity between the volume of the ground water of the Spokane Aquifer and the volume of the ground water recharge from the Greenacres Landfill prohibits practical tracing or detection of the contaminant plume from the Greenacres Landfill into the Spokane Aquifer. Nevertheless, the continuing release of chlorinated volatile organics to the Spokane Aquifer is expected to continue at the current rate for an extended period of time."

2. The travel time estimates by Woodward-Clyde Consultants for landfill leachate to reach the Spokane Aquifer appears to be based on the estimated velocity of ground water in the alluvial aquifer between wells WCC-4 and WCC-2. The Remedial Investigation Report (Woodward-Clyde Consultants, 1989) estimates the velocity in the alluvial aquifer at 0.35 feet/day. However, ground water velocity in the of the alluvial aquifer between wells WCC-1 and WCC-4 is estimated at 43 feet/day (Remedial Investigation Report, Woodward-Clyde Consultants, 1989). Travel time for contaminants to impact the Spokane Aquifer, based on a velocity of 43 feet/day in the upper portion of the aquifer, is less than 3 years. No travel times have been estimated for the ground water or contaminant movement in the bedrock aquifer.

   Ground water velocity estimates are based on aquifer characteristics at a specific point averaged over a larger area. These calculated values provide a range of potential velocities for ground water in the alluvial aquifer. Complex hydrogeologic testing and models would be necessary to better define the hydraulic properties of the alluvial and bedrock aquifers. The data available is only sufficient to provide very rough estimates for contaminant travel time.

3. Regional precipitation data averaged over a number of years is one of the parameters used to estimate leachate production. Leachate production and concentration directly impact ground water contaminant levels. Yearly changes in precipitation will affect the volume of leachate generated and the ground water contaminant concentration. This is one of the reasons it is difficult to accurately predict the behavior of a landfill over time.

4 The cost of the cover was estimated in the Feasibility Study (Woodward-Clyde, 1991) at approximately $2 million. Spokane County submitted a revised landfill cover cost estimate at $6 million (Woodward-Clyde Consultants, February 3, 1992). The increase in costs were due to design changes, increased construction costs, and increased contractor's profits and a decrease in the contingency percentage. These estimates are general and are not based on specific site design or actual regional costs. Final project cost will probably vary from these estimates.

The costs of an extraction and treatment system have not been revised from those presented in the Feasibility Study (Woodward-Clyde Consultants, 1991). Estimated operational time frames for the extraction and treatment systems ranged from 13 years if the landfill is covered to 40 years for extraction only with no landfill cover or slurry wall. The Feasibility Study (Woodward-Clyde Consultants, 1991, page 3-13) states "Because a cap is not used to limit infiltration, contaminants still present in the refuse zone will continue to be released for an indefinite time period. For the purpose of the Feasibility Study, it is assumed that remediation time of the downgradient extraction scenario without a cap will be twice as long as downgradient extraction with a cap, resulting in a remediation time of 40 years."

Please see response to Letter 4, Comment 6.

5. Please see response to Letter 2, Comment 1.

COMMENT LETTER NO. 8

East 18618 Augusta Ave.
Greenacres, WA 99016
Oct. 21, 1992

Ms Roxane Broadhead
Dept. of Ecology Toxics Clean Up Program
N 4601 Monroe, Suite 100
Spokane, WA 99205-1295

DEPT. OF ECOLOGY
REGIONAL OFFICE

Re: Greenacres, Landfill

Dear Ms Broadhead:

In spite of the extremely poor communication system I did learn of last night's meeting and got there. It was certainly a learning experience.

Based on my background in Geology (Geology Major, Smith College) and archaeology (Univ. of PA) I am totally against the costly cap on the Greenaces Landfill. It is obvious that landfills closed years ago, present a reducing risk. With no impact on our water supply now there will be none. The costly boondoggle is simply a waste of Spokane taxpayers' money.

Since when is 1,000 times 0 more than 0? Ms Broadhead says since there is no detectable amount of contaminents in the main aquifer the cap must be done because several scurces of taxins that have no detectable impact will add up to our water killing us. All these tiny undetectable contributors of diffused toxins (undetectable often means NOT thare at all)will add up to a big problem. Unless the new math means that 1,000 time 0 is more than 0 that argument is utter, cynical non-sense.

1 No one said anything about amount of water going into the closed landfill from above. This area at best get 20 inches of ~~XXXXX~~ precipatation a year. Much of that evapprates back into the air. What actually penetrates into the landfill to leach out toxic materials,is low level compared to placing the same landfill on the Olympic peninsula where rainfall exceeds outs by at least 100 inches a year. We were given no evidence that any really dreadful threatening material in large amounts was ever put into the landfill. Radioactive waste? PCBs? Vast drums? Any evidence at all of such? Doubtful.

2 Mr. Deutsch made it clear that the threat has been diminishing and will continue to do so. IF the cap is forced on the taxpayers and does nothing at all of value the already existing diminuation of the leachates will make it look justified.

The only real justification of the cap being forced on Spokane County wage earners is"the law says it has to be done". Phooey. IF the law says this then William Shakespear was right to say "The law is a Jack-ass". IF the law is this way it went through behind the public back. If the law is this way it needs to be changed. We have a right to require that it be changed to face reality, real limits of money spent for value obtained. The sick bureaucratic line "If one life is saved" said with tears and emotion, just does not justify this cost. A lot more than one life CAN be saved just by enforcing drunk driving laws. We need reality here - real under-standing of the fact taxes are monies taken from hard working ordinary people who work for the money with sweat and hard labor. It is time bureacrates understood tax money comes from the sweat, blood and hard labor of many. Those workers HAVE rights. And a big right is not to be ripped off.

3 I am in favor of no action except continued monitoring of the ground water in the area. I am totally against the idiot plan to ruin the Spokane economy further by a needless waste of hard earned money. I have to wonder about the 6 million $ price. Is half of that profit for the firm getting the work?

I'd like to comment on proceedure last night. The "Ground Rules" were gratuitous and insulting. Clearly we were supposed to feel chastized and ordered not to put on offensive displays we were clearly accused of planning. Repeitivness insulted our inteligence.An outline of proceedure could have been given more briefly with the explanation that a recording was being made, in far less time and in a form far lass insulting to the public. I learned a lot of bureacratic jargon.

Ms. Broadhead's presentation was especially boring, insulting and childish. Loaded with idiot jargon to boost the egos of bureacrates and over said ad naseum, it was a prime example of bureacratic double talk that translates "we will do as we damn please and we do not give a damn what the people think".

I would remind you bureacrates at DOE you are employed by "We the People". You are our servants. WE are NOT your slaves to be bossed around. Nor are we children who can't understand and who must be coddled for our own good. You were so patronising, so childish yourselves you shot yourselves in the feet. Back off and let the people here deal with reality and decide as is our RIGHT under the Constitution. Let Mr. Deutsch tell the truth. Let local government decide. Do not force a cos law suit. That wastes money for REAL toxic threats to our water.

4 Clearly the Greenacres, Landfill was placed on the Federal hit list solely becasse NO one knew if it was a problem or not. Now that we know such leaching as does occur is being abated by tincture of time, it needs to be removed from the list of Priority Sites and we need to go on to more threatening issues.

As an anthropologist looking at a culture to be studied I learned a lot. I learned that bureaucra spend enormous amounts of time writing out lines, making writen outlines to throw on the screen and then reading those outlines to the illiterate masses. I learned how MY tax dollars are wastec in Olympia! DOE's tactic was to make the puclic crawl - naughty ignorant children who DOE has a God given mandate to control and demean. Instead DOE personel came across as childish, greedy for power and incompetent - unable to think beyond a kindergarten level. I came away appalled and disgusted at the waste of money WA government bureacrates are.

Spokane County is fully able to get the job done, done right and at lowest cost, with TRUE respect for ALL of the people's rights.

I protest the arrogant, greedy plan to cap the Greenacres, Landfill and I protest the incompeten bureacrates who jump through hoops to force unnessessary medicine down our throats.

Thank you,

Jane R. Porter

Why ask for public input when you have already made up your minds(?) to do it?
Why even bother to go thru the farce of asking the public to comment?

The play last night was not about water quality. It was about greed for power on the part of state bureacrates, using general public lack of understanding of geology to do a snow job.

RESPONSE TO LETTER NO. 8: JANE R. PORTER

1. The Remedial Investigation (Woodward-Clyde Consultants, 1989, page 4-2) states "Although no physical records were kept as to chemicals or products disposed, there is oral history to indicate that a wide variety of potentially hazardous substances were disposed. These materials included agricultural wastes, paints, thinners, solvents, and probable industrial wastes from local wood products industries. If only household wastes were disposed, the variety of chemical present in household wastes alone could account for compounds detected during the course of this study (USEPA, Report to Congress, 1988)."

2. Please see response to Letter 1, Comment 2.

3. Please see response to Letter 7, Comment 4.

4. Please see response to Letter 1, Comment 3.

December 15, 1992

COMMENT LETTER NO. 9

GA SIF S11.2

LUKE G. WILLIAMS

2 1992

October 30, 1992

Mr. Dave Powell
DEPARTMENT OF ECOLOGY
Eastern Regional Office
N. 4601 Monroe, Suite 100
Spokane, WA 99205-1295

Dear Mr. Powell:

Thank you for providing me with an opportunity to express my opinion on the Department's recommendations relative to the Greenacres Landfill.

After listening to a considerable amount of testimony at the hearing, I asked the following question.

1 "If there is no immediate danger to health, and if the pollution has not reached a well or the aquifer, Why do anything about the landfill until there is some danger to public health that can be substantiated?"

2 The response was "even though there is no danger to health now, many other unforeseen pollution situations "could" develop. If the Greenacres Landfill was one of many landfills polluting our aquifer, a crisis "could" develop, so to avoid this potential calamity from happening, the Greenacres Landfill should be capped at a cost of $6 million dollars of taxpayers money to keep, as Chicken Little said, "The sky from falling."

In my judgment, this is an extreme case of government regulations being used to create more government spending to create a spreading bureaucracy. Six million dollars is a tremendous amount of money to spend to solve a "potential" threat to the public health. What rationale exists for rejecting the alternative for continued monitoring to see if a threat is even possible? As it exists now the Department is only speculating that a problem might ever exists.

1119 Washington Mutual Building • Spokane, WA 99201 • 509/456-0465 • FAX 509/838-2182

LUKE G. WILLIAMS

3 Taxpayers, through the Department of Ecology are probably spending $100,000 per year plus for a Site Manager, staff and support facilities for a landfill that has been closed for 22 years. It seemeded to me that the Site Manager was securing her own job by advocating a very expensive solution to a non-existing problem.
In addition to the prospect of spending $6 million dollars, how much money does the Department of Ecology estimate it will spend on this site?

In the meantime, this non-problem, through bureaucratic maneuvering, has kept millions of dollars and hundreds of jobs from materializing in the development of the land. This has been going on for four years, and in my judgment, it is ridiculous.

It is obvious that Spokane County is going to lose the battle with the Site Manager so let's get it out of the bureaucrats hands and into the courts where the public can expect some objectivity and concern for jobs, economic development and tax payers dollars.

Again, I want to thank you for this opportunity to comment.

Sincerely,

Luke Williams

Luke G. Williams

1119 Washington Mutual Building • Spokane, WA 99201 • 509/456-0465 • FAX 509/838-2182

RESPONSE TO LETTER NO. 9: LUKE G. WILLIAMS

1. The Department is required to accomplish cleanups in a manner that protects both human health and the environment [WAC 173-340-100]. Please see response 10, Comment 8.

2. The local alluvial and bedrock aquifers are contaminated above federal drinking water standards. These aquifers were a source of drinking water until contaminant concentrations at levels unsafe for human consumption were detected. The aquifers are a potential future source of domestic water when they no longer exceed safe drinking water limits. It is the policy of the Department, to protect all of the state's ground water, whether currently in use or not.

   The contaminated aquifers discharge to the Spokane Valley Aquifer. The contaminants are not detected in wells tested in the Spokane Valley Aquifer due to the effects of dilution. WAC 173-340-360(5)(e)(iii) states that "The cleanup action shall not rely primarily on dilution and dispersion of the hazardous substance if active remedial measures are technically possible." Therefore, the Department is required to select an action that reduces or prevents continued releases of hazardous substances into the environment. The Model Toxics Control Act requires action to be taken on cleanup sites that pose a threat to human health or the environment. Although, sites are given priority status if there is an immediate threat to human health, the Department attempts to remediate a site before it presents an immediate health threat to human health.

3. There are hundreds of sites on the hazardous sites list in Washington State requiring cleanup. Ecology project managers do not need to "make work" as active cleanup is underway on only a limited number of these sites.

   The law requires oversight costs incurred by the Department of Ecology to be recovered from each person who is liable under chapter 70.105D RCW. The total cost for investigating and remediating the site will be distributed among the liable persons. At this time, Spokane County and Holiday Hills Development, Inc. are named Potentially Liable Person (PLP) under chapter 70.105D RCW. Other PLP's may be named at the site if credible evidence is available.

   Grant funding is currently available through the Remedial Action Grant program. Spokane County is eligible for 50 percent funding under this program. The total amount of money spent on this project will depend on the amount of time that it takes to negotiate the final agreement with Spokane County, the final cost of the cleanup action, and the efficiency that Spokane County implements the cleanup action.

GREENACRES LANDFILL DRAFT CLEANUP ACTION PLAN
PUBLIC MEETING - OCTOBER 20, 1992
MEETING TRANSCRIPTS

MR. POWELL: Good evening ladies and gentlemen my name is Dave Powell with the Department of Ecology and I'll be your meeting facilitator for tonight's public meeting. I want to reiterate the purpose of this meeting, it's to receive your comments concerning our Draft Cleanup Action Plan for the Greenacres Landfill. Tonight's meeting will have three main parts. First of all we'll have a series of presentations to give you the background of the site and the proposed cleanup action. First of all these -- this will consist of a presentation by Mr. Mark Fuchs here on my right, who's a hydrogeologist with the Department of Ecology, and he's also our Cleanup Unit Supervisor. He will give you a brief overview of the Model Toxic's Control Act as well as a history of the site for the Greenacres Landfill. Following Mr. Fuchs will be Mr. Bill Deutsch to his right, he's from Woodward-Clyde Consultants, Mr. Deutsch is representing Spokane County as their contractor and he will present to you a summation of the Remedial Investigation and Feasibility Study. Following him to his right Ms. Roxane Broadhead also of the Department of Ecology, she's an environmental engineer for us, she's also the site manager for the Greenacres Landfill, and she will be giving you a summary of our proposed Draft Cleanup Action Plan. And to Ms. Broadhead's right is Ms. Flora Goldstein, she will be not -- will not be giving you a presentation, but she's our Section Manager for the Toxic Cleanup Program here in the regional office in Spokane, and she'll be here to answer any questions that the rest of us can't.

Okay, following these presentations we'll open this up for questions from you all about the materials that have just been presented to you. We'll take about fifteen minutes to do that. I want to caution ya, this will not be the time when we'll be receiving formal public comment, this is just an opportunity for you to ask specific questions about any of the materials that have been presented thus far. The formal comment period will come later on in the -- in the meeting. Okay, finally, the final part of our -- of our segment this evening will be as I indicated the formal segment where you get the opportunity to tell us about your thoughts for Draft Cleanup Action Plan. Now I want to emphasize your comments and inputs are very important to us, we take these things very seriously. When we receive your comment, Ecology will formally respond to your comments in a document, a formal document that we call a Responsiveness Summary. That will be published along with our Final Cleanup Action Plan and everyone in this room, if you filled out a card, and I'm sure everyone has, you will -- you will get a copy of that Responsiveness Summary for this meeting and any other comments that we receive during the public comment period.

Okay, I need to authenticate the meeting for the record. Let the record show that it's 7:10 p.m., on the 20th of October, 1992, and this meeting is being held in the Liberty Lake Room of the Hewlett-Packard Company Spokane Division Office located on East 24001 Mission Avenue, in Liberty Lake, Washington. Public notifications about this meeting were published in Ecology's Site Register on September 15, September 29, and October the 13th of this year. A display ad was also published in the Spokesman Review on Sunday for October of this year. In addition, notices of this meeting were mailed to over a hundred and fifteen interested people, many of you here tonight were on that mailing list for -- for that notice.

Okay, now I'd like to tell you about my role as your meeting facilitator. Basically my job is to conduct this meeting, and I have two main responsibilities; first, I need to make sure that everyone who wants to has the opportunity to come up and comment about our Draft Cleanup Action Plan. And second, I need to make sure that the Department obtains a clear record of this meeting and that's what these recorders are for. This is being recorded now from -- from the opening until the closing of this meeting.

But to do my job I need your help. I have a few ground rules designed to support common courtesy and to keep order during the conduct of the meeting. The first ground rule is about speaking in order. I will call you by your name when we get to that segment of the program in the order by which you've registered for the meeting tonight as you come into the lobby down below. After I've given everyone the opportunity who has signed up by the cards I'll open it up to anyone that wants to make a comment that hasn't signed -- you know indicated on the card. So if you didn't have the -- if you -- when you registered if you didn't feel you wanted to comment and you change your mind you will still have the opportunity to come up here and present comments -- comment to us.

I ask you that when I call your name that you come up here to this podium so that everyone in the audience plus everyone up here at the front tables can hear you. Your comments will be recorded and you'll need to state your name, your address, you can just -- you don't have to give the street address, but whether its Liberty Lake, Spokane, or whatever, and if you're representing some organization if you would just indicate who that organization is. If you're just representing yourself that's fine.

I want to emphasize that one person speaks at a time and you will have the floor until you're done making comment about the cleanup proposal.

Okay, the second rule is about the length of comments. I want to make sure everyone that wants to comment has the opportunity to do so and -- and many of you here have indicated you want to do that and so we want to -- we want to make sure everyone, your neighbors, your colleagues, whatever, have that opportunity. And we also want to make sure that because it is an evening meeting that everybody gets out of here at a reasonable -- a reasonable hour. Okay, so what I'd like to do is I'd like to limit if you're gonna speak for a group or an organization, I'd like to limit your comments to about ten minutes. If -- if you're just speaking for yourself as a, as a citizen I'd like to try to limit that to about five minutes. Does that sound fair to everyone? Okay, thank you.

If you've got really lengthy comments, if you tried to summarize them and try to avoid any repetitive comments, that would certainly help. Or if -- if you'd like to we'll accept written comments. The comment period officially closes today. But if you're here tonight and after this meeting you want to submit written comments just because you're here I'd like for you to see Ms. Broadhead after this meeting is over and alert her that you will be sending in written comments so that we can be looking for those.

Okay, the third rule is concerning questions and this is -- this is mainly about the question and answer period following our presentation. As I said before we want to take about fifteen minutes to do that following our presentations and but again I want to caution ya, this is -- this will not be the time for you to present formal public comment, alright? That will come later because that, like I said that's a that's a very important segment of this program. Now during the formal comment period if you want to ask a question that's certainly appropriate but we won't - none of the folks up here in this -- on these front tables will be responding to that question during the formal comment period. We'll respond to that question during the Responsiveness Summary. Okay, did I make that clear to everyone? The fifteen minutes right after the presentations they'll be question and answer. But during the formal comment period if you want to ask a question, we will not be providing you an answer tonight for that question, that will be done in writing. Okay, does everybody understand that, any questions? Okay.

I certainly want to extend the invitation that after the meeting is over you're welcome to come up and speak with anyone from Spokane County, Spokane County's consultants, or anybody from the

Department of Ecology. We certainly welcome those opportunities to discuss anything with you about this proposed cleanup action.

And again I want to reiterate if -- if you haven't filled out one of these cards please do so because we're gonna put you on a mailing list for information about the site and again if you -- if you -- if you want to change your mind about speaking you'll certainly have that opportunity to do so.

UNIDENTIFIED MAN: Do you have extra cards?

MR. POWELL: Yes, we do have extra cards, yes and we'll get -- we'll get you one.

Okay, my final ground rule about the meeting involves noise from the audience. Basically extra noise won't be appropriate. We want to you know render courtesy to the person doing the speaking and also because it's very important that we get these recordings for the official record for this site so if you could refrain from any extra side comments or whatever there will be opportunities either during the meeting for that, for you to speak, or for -- during our question and answer session about the materials presented or you can discuss anything about the site with -- with the staff and Spokane County following the meeting.

Okay, let me summarize: One person speaks at a time down here at the podium, please speak loud enough for everyone to hear you so that we can also record it, try to keep your comments to about ten minutes for groups, five minutes for individuals, questions can be asked for the record but we will answer those during the formal Responsiveness Summary, and also please keep the noise down while someone else is speaking. Does that sound -- do these rules sound reasonable to everyone?

AUDIENCE: Their fine.

MR. POWELL: Okay, thank you very much. Okay, as I indicated earlier the agenda is very simple; we'll have a series of presentations you all have given -- been given an agenda for the meeting, you can follow that once the presentations are done we'll have a fifteen minute question and answer period from you about the materials that have been presented, following that we'll have a short ten minute break and then we'll reconvene for the formal public comment period. Okay, I would like to get this going and introduce the gentleman to my right, Mr. Mark Fuchs, he will as I indicated earlier will give you a presentation about the Model Toxics Control Act which is the governing state statute which we use to cleanup hazardous waste sites and he will also give you a brief history about the Greenacres Landfill. Mr. Fuchs.

MR. FUCHS: Thank you Dave. Dave's got a real powerful voice, and I got to tell you I spent Saturday down at the Coug game yelling and raisin heck so I don't know if you folks can hear me in the back if you can't, you're welcome to come forward, otherwise raise your hand and I'll try to raise the volume a little bit. Dave, if you could get the light on the side there.

As Dave said, I'm a hydrogeologist and unit supervisor for the Department of Ecology, our office is here in Spokane, the Eastern Regional Office. Tonight I will give a brief site introduction and an overview of the cleanup law and regulations.

The landfill is located -- the Greenacres Landfill is located about here, here's Spokane, I-90 running east, we are located at H.P. here tonight, Hewlett-Packard, approximately in this area. So the landfill is located about a mile and a half southwest of us where we are tonight. The landfill is located on an upland that is -- is it okay, is that bothering anybody? Is located on an upland facing northwest, Carlson Hill is located about down here in this portion of the site, Liberty Lake would be further to the -- to the south -- a couple of things; the area of the landfill is encompassed by this dashed line and consists of about forty-five acres of surface area. A couple of additional points I'd like to make, notice the Jeffers well, we'll be talking about that in a minute here, and the Interstate. The Interstate is the approximate boundary of the Spokane Valley Rathdrum Prairie Aquifer runs near the Interstate. It just happens to run about -- about at that location. This is the sole source drinking water supply aquifer for much of the Spokane area.

The landfill operated as a municipal dump and a landfill from 1940 to about 1972. The -- Spokane County operated the landfill for about the last five years of the site operation. Now typical kinds of waste were disposed. Now I would like you to all kind of think back twenty or thirty years ago, when you went to the dump what did you see? That's what was when -- that's what went into this, this landfill, is a typical kind of waste that were -- were deposited for that area. We didn't do source separation at that time, there was very little recycling, so the typical kinds of municipal and industrial waste went out there. These included household refuse, paints and solvents, and pesticides and pesticide containers, and most other kinds of waste.

In 1978 there was a 208-Water Quality Survey for the Spokane Valley Rathdrum Prairie Aquifer. The Jeffers well which was the well about here on the last slide, was sampled during that study. It was found to be contaminated with solvents. Based on this finding E.P.A. established the site as a National Priorities List Site, that is a Superfund Site, in 1983.

In 1987 Department of Ecology and Spokane County signed a Consent Order which was an agreement to complete this portion of the work; the Remedial Investigation and the Feasibility Study. The Remedial Investigation is the field study to evaluate the extent of contamination in soils, ground water, etc. The Feasibility Study is a evaluation of alternatives for site cleanup. We're at this point in the process right now, we're at the Draft Cleanup Action Plan. The Department of Ecology has drafted the Cleanup Action Plan, we will finalize that as Dave said based on public input that we've received through the comment period and this evening. These three items, or these three steps form a portion of the process that's outlined in the cleanup law which is the Model Toxics Control Act for the State of Washington. This law was passed as Initiative Measure 97 by voters in the state in November of 1988. It establishes the framework to conduct cleanups of hazardous waste sites. The law became effective in March of 1989, it mandates site cleanup to protect human health and the environment. The law has several provisions within it; it directs Department of Ecology to adopt rules that flush out the framework of the law, and to establish cleanup standards. It encourages public participation by directly requiring public notice that steps within the process and it establishes a tax on hazardous substances which is used as -- a portion of that tax is used as a funding mechanism to assist local governments in site cleanups.

The law provided the broad parameters and directed Ecology to adopt rules to fill in that framework. The first of three phases of rule adoption were begun in early 1989. The public input was sought during each phase. Numerous meetings were held across the state, meetings were held in Spokane, at various locations on the other side of the state, and an external work group, that is a group that was formed to assist the Department of Ecology in drafting and review of the rule to fill out that framework of that law was established. The people on that work group consisted of concerned citizens, representatives from business and industry and local government, and representatives from environmental groups. In addition the Science Advisory Board was established by the law. This board additionally provides input to the Department on the sound science behind the regulations. Based on this rule development process, rules were adopted that provide site cleanup requirements. Briefly that cleanup process can be shown pictorially in this overhead, and while there's -- there's some things that are

-- that are going on up here on this portion of the slide, I'd like to focus -- focus attention down here, this is where the action is as far as Greenacres tonight. The Remedial Investigation and Feasibility Study is the portion that Mr. Deutsch will discuss. Selection of a Cleanup Action Plan, we've got a Draft Cleanup Action Plan and Roxane Broadhead will -- will discuss that. Once the Cleanup Action Plan becomes final then we will be negotiations with Spokane County on final cleanup of the site.

So with that, we'll go to Mr. Deutsch.

MR. POWELL: Thank you Mr. Fuchs. Mr. Bill Deutsch from Woodward-Clyde Consultants representing Spokane County.

MR. DEUTSCH: Thank you. Good evening, I'm glad none of you have broken any of the rules yet because I'd hate to see what happens if you do.

My name is Bill Deutsch and I'm a geochemist, the ground water geochemist, from Woodward-Clyde Consultants which is a nationwide environmental engineering and sciences consulting firm and Woodward--Clyde has been working for Spokane County for the -- since 1987 on the Greenacres Landfill and our role has been to conduct this Remedial Investigation and the Feasibility Study for Spokane County. And what I'd like to do this evening is spend the next twenty-five minutes or so describing to you what sort of investigation we conducted, what sort of results we found and kind of where -- some of the alternatives that were recommended in the Feasibility Study for dealing with the contamination site.

I'd like to start with the Remedial Investigation. The objectives of this were to first estimate the nature and extent of chemicals that might have been released to the environment from the landfill. I'd like to provide a technical basis to understand the fate and transport of these chemicals released to the environment. In other words, compounds in the landfill that may pose a threat to human health or the environment have to be mobile, have to move out of the landfill into the environment either through the air or through the soil, through leachate, ground water moving through the landfill and into the ground water and then migrate. So this -- this portion looks at the mobility of those chemicals that may pose a threat to human health or the environment. Once we know which chemicals we're talking about, what sort of concentration levels we're at, we can do what's called a baseline risk assessment. What this involves is considering the concentrations of chemicals and the different ways that people might -- might say ingest ground water or breathe air that has contamination in it, what sort of risk does doing those natural things pose to human health? That's the base line risk assessment. And then to characterize the site sufficiently to describe the necessity for remedial action and the degree of action required. So if the baseline risk assessment shows that -- that there is a potential problem or risk to human health, what can we do to minimize that risk?

The scope of the Remedial Investigation consisted of two phases. The initial phase involved what's called a geophysical survey, soil gas investigation, primarily to look at just what is the extent of the landfill. This -- the landfill stopped accepting waste twenty years ago or about fifteen years after the start of phase one. And if any of you have seen the landfill you'd probably agree its pretty hard to figure out just where it is. It's on the side of the hill there but what are the boundaries of it? So our first task was to identify using some of these methods just where are the edges of the landfill to help focus the investigation. That involved more in-depth sampling of the soil and the ground water. So the first phase went through these investigations. We did a water well survey to find out who was using the ground water in the area, looked through the files to find water users and prepared a topographic map. Now the heart of the Remedial Investigation however is collecting samples of soil, air, soil gas, ground water to evaluate whether it has been affected by the landfill or not. So the phase two program involved digging a number of test pits in shallow borings around what we believe was the perimeter of the landfill to better define that perimeter and also through the -- what is now the soil cover on the landfill, cause the refuse we found is covered by -- by soil that was excavated from the area and it's covered by a -- on average about two feet of soil. So this -- this program was primarily designed to determine just how thick that cover is and it varies across the landfill but on average it's about two feet.

We also installed a number of monitoring wells to sample the ground water and we'll get into some of those details in a minute. We installed some soil gas wells also in the landfill to -- to extract the -- the air in the soil to see if it contains volatile contaminants that come from the evaporation of solvents or other volatile compounds. And we did some exploratory borings into the bedrock beneath the landfill to look at its characteristics. From each of these programs of digging into the ground, taking ground water samples, gas samples, we did a variety of chemical and physical analyses to look at what is the composition of this water or gas or soil that we collected and does it contain any of the potential contaminants that might form that might be evaluated looking at these groups of compounds. We looked at volatile organic compounds, typically the sorts of things that are present in paints and solvents, we looked at semi-volatile organic compounds that are present in plasticizers, rubber goods, also in wood treating chemicals, that sort of thing. We looked at pesticides, herbicides, and PCB's, metals and a couple of other compounds.

Okay, so what did we find? Well let's look a little bit more at each of those investigation phases and I'll talk a little bit about what we found in that investigation. Here again is the landfill border, it's shown by these dash lines here, and this shows the test pits and test borings that were done on the landfill, most of these were done around in 1988. So you can see that we have quite a few sampling points here along the landfill perimeter and also within the landfill proper itself. And these were partially to define that edge and also to look at the thickness of the landfill cover. And we also sampled the soil beneath the landfill to see if the soil contained appreciable contaminant levels. And what we found in general is the contamination is pretty low in the soil. And there is a fairly small number of contaminants detected in those soil samples, and this is the list -- these are primarily -- these are all organic compounds that are present in solvents and paints in wood treating compounds, petroleum compounds, gasoline, that sort of thing, and some metals that were also found in the soil samples. But generally this is a fairly small number of compounds and they were -- the levels they were found were fairly low concentrations. And this is in the soil beneath the landfill.

The other part of the investigation was to look at soil gas because some of these organic compounds do evaporate, they give off gases, their compounds, so we did a very extensive soil gas survey and what this figure shows is the locations where -- where we -- where we stuck a probe into the ground and we basically put a pump on it and pulled out the soil gas. And then we analyzed the composition of that gas to see if there were volatile compounds in the soil that might represent the extent of contamination to soil gases. And this is for methane, a gas compound that's typically produced when vegetation decays, it's the natural decay product of rotting organic matter. It's very common in swampy material and in landfills. And this is the pattern we got for methane, these are five thousand parts per million in the soil gas and what you can see here is that it's pretty well localized beneath the landfill, the high levels anyway, and there's perhaps a little expression of -- of elevated methane in this direction of the landfill. One thing this shows is though that a landfill that's -- that's fairly young, in other words where it has pretty fresh material in it, will typically have very high methane values. Instead of five thousand we might see a hundred thousand or two hundred thousand levels because the fresh material is in the process of decomposing and it produces a lot of methane. So what this showed to us is that -- that a lot of decomposition has gone on in the waste and that -- that the landfill is not producing a lot of -- of soil gases at this time, which makes sense because it's been a long time since organic matter, fresh organic matter, has been added to this landfill. And also there are indications when the landfill was operating that a lot of the combustible material was burned when it was placed in the landfill to make -- to make room for other materials. So there's probably at least, over certain parts of the history of the landfill, there wasn't a lot of organic, fresh organic matter added to it.

Okay. So the results of the Remedial Investigation for landfill and soil gas showed that given the concentration levels measured of methane and carbon dioxide indicate that the landfill is not an anaerobic system. This means that there's probably oxygen in the landfill which means that it's a pretty mature landfill, it's gone through a lot of decomposition and it's starting to look more and more like the natural material rather than -- than a system, an anaerobic system that has low levels of oxygen in the soil. The concentrations of volatile organic compounds were extremely low in the shallow subsurface meaning that volatilization has probably been going on for a long time and concentrations are decreasing, are very low. We did find concentrations of this one compound, 1,2-DCE and these gasoline compounds, in one of the upgradient landfill gas wells of fairly high levels and we believe that this was due to the fact that where this landfill gas well was located was where some of the freshest material had been deposited. It was the last area of the landfill and one of the last areas to have material added to it.

And the soil gas beyond the landfill perimeter contains pretty low levels of landfill derived gases. The gases don't migrate very far from underneath the landfill.

Now the primary investigation in the Remedial Investigation was looking at ground water. Because the first indication that the landfill is a potential problem was a detection of some of these volatile organic compounds in the Jeffers well, so we focused quite a bit on installing monitoring wells in the ground water or beneath the landfill, and this simply shows the pattern of the monitoring wells that were installed as part of the Remedial Investigation and the difference in the symbols are there are two what are called aquifers beneath the landfill, let me use this other screen here to show what I mean by that. This is a cross-section through the landfill, so what we've done here is we've taken a slice pretty much along this path and we've cut into the earth and we're looking at it from the side, it's a cross-sectional view of the earth, and what it shows is the different geologic units that are beneath the landfill and the key here is this pattern represents the refuse, the landfill material, that -- this thickness was determined by drilling through the landfill at a number of locations. What we found is that beneath that there is what's called alluvial material that's derived from stream channels, a mass wasting off of hillsides, that sort of thing, beneath the landfill that is not saturated. It doesn't contain water in it that you could put a well in and extract water to use, for whatever purpose you want. There's a zone of under -- unsaturated conditions. However beneath that when you get to a certain place in the landfill, typically down in this area of the landfill, we do encounter ground water, saturated conditions, where you could put a well in and extract the water and that's exactly what we did and we measured the levels of compounds in that water. So we defined, or found, this is what we call the alluvial aquifer, the first aquifer beneath the landfill, and beneath that we found some material that doesn't transmit water very well. Okay it's kind of a barrier to the flow of water from this aquifer, this alluvial aquifer, to the next aquifer below this barrier. And we've called that the bedrock aquifer. Okay. So the two aquifers adjacent to the landfill are this alluvial aquifer and the bedrock aquifer and what we've done is -- is put wells in both of those aquifers, the squares here represent the alluvial aquifer wells and the circles are the bedrock aquifer wells. So what did we find in those wells? Well as you might guess the -- the highest levels of compounds that may have been derived from the landfill are found in this alluvial aquifer, the first aquifer beneath the landfill. However, this aquifer is not very extensive, it doesn't exist very far up the hill because there's just not enough water coming through the landfill or from farther up the hill to -- to produce a water table, a saturated zone, in this alluvial aquifer. Where we did sample it we found that the principle contaminants are what are called chlorinated volatile organic compounds. And the best way to look at the extent of the contamination was to follow this one compound, 1,2-DCE, and I'll show you the distribution of that on this next figure. This compound 1,2-DCE was found at this well which was located through the refuse and in the alluvial aquifer. It was also found in a couple of downgradient wells in the alluvial aquifer. It was not found in some adjacent wells next to here so we feel that this plume is fairly well contained in the alluvial aquifer. It's not extend to great distances to the side here and if this compound is probably a pretty good indicator of the majority of the organic compounds that are present in that alluvial aquifer because it was found in the most number of wells and seems to be the most extensive organic compound found in the alluvial aquifer.

We also found elevated concentrations of some trace metals that are potential threats to human health. There's some question about some of the metals data because unfiltered water samples were taken and that can sometimes result in higher measured concentrations then you would typically drink in a water sample because there's a lot of silt in the water.

Another point I would like to make about the distribution of these compounds, what I've shown on this plot is the concentration of this compound 1,2-DCE at a number of wells along the flow path, along the direction in which ground water would flow from the landfill downgradient in this direction. And so this plot shows the concentrations in this well LW-1, well number 12, which is right next to well number 6, and then number 4 and number 2, which are also further downgradient. And the trend I'd like to show here is that the highest concentrations for this compound are actually not beneath the landfill, but their downgradient of the landfill. And what's coming -- what's beneath the landfill now and most representative of what is leaching out of the landfill is lower then the concentrations that we see downgradient of the landfill. And I'm gonna come back to this later on during the comment period.

Okay, that's the alluvial aquifer, what about the bedrock aquifer. Well, as I mentioned, the con-- the levels are not as high in the bedrock aquifer, this aquifer is somewhat shielded from the landfill because it has this -- this barrier zone to it. However, we did find organic compounds in some of the wells but it appears to be pretty localized. I mean it -- in only four of the monitoring well locations and they're shown on this map. The majority of the compounds were found along -- the organic compounds were found along this western border of the landfill, typically they're not the same compound in the different wells and what this suggests is that -- that these compounds are due to some local anomalies. Perhaps material that was dumped along the edge of the landfill that isn't very mobile. Because if it was mobile we'd see these compounds not only down here but also further out here downgradient of the landfill as we saw the 1,2-DCE in the alluvial aquifer. Okay. So that's one point to make that the elevated concentrations of organic compounds are localized in this deeper aquifer and also the concentrations of trace metals and organic compounds in general are generally lower then those detected in the alluvium.

Okay. So now we have completed the investigation part, the characterization part, to decide what is in the soil, what is in the ground water, what is in the gas phase, the next step was to do this risk assessment. You know, are these levels a problem? Okay. There are -- we identified two potential exposure pathways of these contaminants to -- to human beings. One is contaminant migration to ground water and then movement to a water supply well. So leaching of the contaminants from the landfill and into the ground water below the landfill and then along the ground water flow path to somebody's well. Secondly, emission of contaminated soil gas into the atmosphere and subsequent transport to nearby residences. So we know there are some soil gases, they get up in the air, they're gonna go somewhere, is that gonna cause problems to someone living downwind to the thing?

What we did for the risk assessment, we take the concentration levels say in the ground water, and we look at if someone drank that water for some period of time, say usually thirty years, would that ca-- would that increase their chance of cancer if they drank the water that long and how much would it increase it and is that considered a threat to human health? What we found for ground water ingestion did present an unacceptable, potential life-long incremental risk above the generally accepted limits for what's called the worst case scenario and the average scenario. In other words, in some cases we use very high concentrations, more -- close to the highest levels ever measured in the ground water, and other cases for the risk assessment we used an average concentration. But in both cases it was found that drinking the ground water would not be very good for you. However, the soil gas levels were so low that doing a similar type of assessment we found that the -- the air exposure pathway does not appear to present a significant risk to nearby residents.

So given the fact that we've identified a potential threat to human health, I should mention here that no one is using this contaminated ground water now, all of the residents downgradient of the landfill have been supplied with public water. But, given the potential threat, the next thing to do is to evaluate ways of minimizing that threat to human health and the environment. And that process is called the Feasibility Study, where we look at alternatives for dealing with this contamination. So, the objectives of the Feasibility Study are to identify, develop, and evaluate potential remedial action alternatives. Ways of -- of cleaning up the ground water or keeping people from using the contaminated water. The scope of the Feasibility Study was to identify remedial action objective, what levels might you need to clean this water up to to protect human health, and what are the general response actions for doing that. Do you institute institutional controls to keep people from using the water, give them alternative water supply, or do you go further and pump the contaminated water out and treat it and that sort of thing. And then we identify specific technologies for doing that. How do you clean the water up? How do you keep people from using the contaminated water? That sort of thing. And then we develop and evaluate the remedial action alternatives. And the alternatives that were developed are listed in what's called the Feasibility Study Report and there are five of them, these remedial alternatives. One, is no action plus ground water monitoring. That means you don't do anything with it, you just monitor the system and -- and monitor the levels of contamination in the ground water. This is primarily done, this alternative is always selected in a Feasibility Study in order to provide a comparison between the no action alternative and the other one that includes some type of action. The second alternative was -- is institutional control and use restriction plus alternative water supply with ground water monitoring. So in this situation institutional controls provide for minimizing the possibility that anybody will use this contaminated ground water and also providing them with alternative water supply. And also continue to monitor the system to see what happens over the long-term.

The next three alternatives are more active alternatives that all involve extraction of the contaminated water and either treating it or disposing of it. These two options ...

(TAPE ENDED, PART OF THE DISCUSSION NOT RECORDED)

... the organic compounds. Both of these methods will work where you pump the water through the system and it -- it either removes the organic compounds onto the carbon or this one, or this one actually oxidizes the organic compounds into carbon dioxide, basically destroying them in the water.

The final alternative here is extracting the water and discharging it to the city sewage treatment plant through the sewer line and that -- given the low levels of contamination found in the aquifer the sewage treatment plant would accept, at least a few years ago, would accept that -- that discharge to a sewer treatment plant and it would be treated in the sewage treatment plant.

Now the other option with these alternatives is whether or not a landfill cap is installed over the -- the surface or not. And the purpose of the landfill cap would be to minimize the amount of infiltration, new water that moves into the landfill, and this was evaluated along with the other alternatives and it was found that whether or not you put a cap on it you can still clean up the water, it may take longer because of this increased infiltration, but using the extraction scenarios that we looked at you could still clean up the ground water by pumping it and treating it or discharging it to the sewer line.

You might ask well what's the difference in cost for these things? Of course the no-action alternative is pretty cheap except for the ground water monitoring. These two we estimate are about similar in cost on the order of a hundred to a hundred and fifty thousand dollars. These three are also pretty similar with and without the cap. Without the cap they're all about two and a half to three million dollars to clean up the water. The cap itself would cost about six million dollars to add on top of those two and half to three million dollar cost.

Okay. Let me just summarize then the Remedial Investigation/ Feasibility Study. We did -- we sampled the soils, the gas in the soil and ground water. We sampled and analyzed for landfill derived contamination. The ground water was identified as a principle transport mechanism of the contaminants. And then the risk assessment showed a potential threat to people who might use the contaminated ground water. Based on that, the remedial alternatives were the (inaudible) and evaluate for insuring that human health and the environment are not impacted by the landfill. Okay. I'll turn it over to Roxane and we will discuss the Draft Cleanup Action Plan.

MR. POWELL: Thank you Mr. Deutsch. I just want to remind everyone we're about two-thirds of the way through this, I know this is a lot of dry material, this is not something that you get real excited about, but we feel it's important for you to know the complete background for this site and I -- if I can give you one bit of encouragement, we do have some refreshments at the break, coffee and some ice water, thanks to our host the Hewlett-Packard company. So there is something to look forward to. On that note, I'd like to introduce Ms. Roxane Broadhead, she's our site manager with the Department of Ecology, and she'll give you a summary about our proposed cleanup action for the site.

MS. BROADHEAD: Unfortunately we're competing with the World Series tonight. (inaudible)

My name's Roxane Broadhead, I'm an environmental engineer for the State Department of Ecology. I'm also the site manager for this -- for the Greenacre -- the Greenacres Landfill site. The remedial action, or cleanup process, is the process of setting cleanup standards that protect human health and the environment, and then selecting a cleanup action that will achieve those standards. The Draft Cleanup Action Plan is a description of Ecology's proposed cleanup action. The cleanup action is selected after thorough, technical and regulatory review of the information presented in the Remedial Investigation and Feasibility Study as presented by Mr. Deutsch.

First, I'd like to go to the end of the presentation and show you what cleanup -- proposed cleanup action is. Then I'll go back to the beginning and I will describe how the site is assessed based on the hazardous substances detected at the site and then I will explain the regulatory criteria for selecting a cleanup action and give a brief description of the cleanup action alternatives considered for this site.

Basically, so you can kind of keep in mind while I give this presentation I'll give a quick cut-away, this is a similar cut-away to what Mr. Deutsch showed of the landfill, alluvial aquifer, bedrock aquifer and the Spokane Valley Aquifer.

The proposed Cleanup Action Plan for the Greenacres Landfill sites includes construction of a low-permeability cover over the landfill. The cover will consist of two feet of compacted clay or synthetic plastic membrane. The cover will be designed and constructed in accordance with the Washington State Regulations for permanently closing landfills for solid waste municipal landfills.

The landfill site, ground water contamination occurs by water moving or migrating through the waste, dissolving contaminated substances in the waste, and transporting these contaminants to ground water. A low-permeability cover will act like a barrier to reduce or prevent infiltration of rain water and snow melt into the landfill and through the waste. Landfill covers are a standard technology and accepted statewide and nationwide as the best method to close landfills and help prevent additional ground water contamination at landfills. Several landfills in this area have been or will be covered by similar types of covers and this would include the Southside, Northside, Colbert, Marshall and Mica.

The component of the landfill system is for a landfill gas system. The landfill gas system is used to control and vent any gas that's generated -- continues to be generated from the refuse and could possibly damage the cover or migrate off-site. The second component of the landfill cover is a system to control the stormwater. The stormwater system is used to help prevent erosion of that cover, it's for storm water moving on to or off of the cover.

A second element of the cleanup action plan is for institutional controls. Institutional controls are measures that are used to either prohibit activities that would interfere with the cleanup action or result in exposure to hazardous substances at that site. The institutional controls proposed for the Greenacres Landfill site including zoning restrictions that would prohibit landfill access and would also help assure that the cover would not be damaged or removed in the future. And in addition there will be institutional controls that will be required to prohibit the use of ground water at the site and also provide alternative water sources to any new residents in the area. At this time Spokane County has provided alternative water supplies to the residents that were affected by that contaminated aquifer.

A third element of the plan is for ground water monitoring. Ground water monitoring is required to one, confirm the landfill of the cover is accomplishing what it's intended to do or any cleanup action that was selected, secondly, to evaluate the short-term and long-term performance of the landfill cover, and three, to determine when the site ground water has achieved safe drinking water levels.

And the final element of the cleanup action plan is for sampling indoor air quality in the residences located directly north or northeast of the landfill. This requirement is only a precautionary measure and it's based on a recommendation from the Washington State Department of Health to make sure that any of the gases that have migrated from the landfill are not impacting -- or not -- these adjacent residences.

Now that you know what the proposed cleanup action plan for the Greenacres Landfill site is, I will explain how we decide when the site needs to be cleaned up and how we determine when it is cleaned up.

Cleanup levels are set for hazardous substances or contaminated, contaminants that are detected at the site. The contaminant level for hazardous substances is that concentration of the substance that does not pose a threat to our health or our environment. These cleanup levels are compared with the concentration of the hazardous substances measured at that site to see if the soil, water and air are considered safe. Cleanup levels for ground water are based on federal drinking water standards that were established by the United State Environmental Protection Agency. In addition to these standards, there are standards established by Washington State based on cancerous and other toxic effects that are associated with contact or consumption of these hazard substances. Thirty-two hazardous substances were detected in ground water at the Greenacres Landfill site. At this time there is evidence of existing contamination from the landfill and there's nothing -- no existing evidence that shows that -- that is declining and that there's not going to be future contamination from the landfill. Ground water data that's been collected over the course of the investigation shows hazardous substance concentrations above the acceptable federal and state cleanup levels in both the alluvial and the bedrock aquifers throughout the site. Some of these levels are a hundred times what are considered acceptable drinking water standards. So in other words, the concentration of these hazardous substances in the ground water at this site are higher then levels that are considered safe for our health or our environment.

The data collected over the past four years has shown decreasing levels in some of the contaminants, also some increase in levels in some of the contaminants and some of the contaminants have just shown basically a steady concentration over the past four years, virtually no change. Again, this has occurred in both the bedrock wells and the alluvial wells. This is typical of most old landfills. The long-term behavior of a landfill is very difficult to predict since the contamination is not released in a very steady or constant manner. Unfortunately there is no evidence that the hazardous substances have stopped migrating or moving from the refuse to ground water or that this is going to stop in the immediate future. So based on the concentration of the hazardous substances in ground water at the Greenacres Landfill site and the indication at this time that the landfill is continuing to release these hazardous substances a cleanup action was determined to be necessary at the Greenacres Landfill.

Once cleanup levels are established and a need for a cleanup action is confirmed, cleanup alternatives presented in the Feasibility Study are reviewed and evaluated both on technical and regulatory criteria. The -- there are seven regulatory criteria in the Model Toxics Control Act that must be met when selecting an appropriate cleanup action. These criteria help insure that the cleanup action meets the environmental goals of the State of Washington. These criteria are: That all cleanup action shall protect human health and the environment. The environment includes any plant, natural resource, surface water, ground water, drinking water supply, land surface or air, within the State of Washington. Cleanup action shall comply with the cleanup standards. This means the action needs to adhere to the cleanup levels established for the hazardous substances detected at the site so the site is eventually safe for our health and our environment as I have just discussed. Cleanup action must comply with the applicable state and federal laws. This means the action should adhere to state and federal laws that address purposes or problems that are similar to those at the site. This would include federal drinking water standards and landfill closure laws and regulations. Cleanup actions should provide for compliance monitoring. Compliance monitoring means the sampling of ground water to measure the concentration of the hazardous substances in that water. This is done to confirm that the action is working and performing as expected. In addition compliance monitoring is used to help determine when ground water has reached the established cleanup level. A cleanup action shall provide for a reasonable restoration time frame. This means that an action must be taken if it will result in a clean site more quickly then doing nothing. The cleanup action shall consider public concerns raised during the public comment period. This means that all the comments received during the public comment period and this meeting are reviewed and considered prior to making a final determination.

Finally, the cleanup action shall use permanent solutions to the maximum extent possible. Permanent solutions would include reuse, recycling, destroy or detoxifying a substance. This is generally not possible at most landfill sites when you see large areas of low levels of contamination. Therefore, the next highest priority to a permanent solution is either off-site disposal and the next is isolation or containment of the waste. It is generally recognized that isolation or containment of the refuse is the most practical solution at most landfills. Containment confines the waste to prevent direct contact with the refuse and it also helps prevent the future release of hazardous substances into ground water.

In addition to the seven primary criteria, there are some additional regulations that are required to help ensure that a permanent or the next best option is selected. And these regulations are: That the cleanup action shall prevent or minimize present and future releases and migration of hazardous substances into the environment. This means an action must be taken to stop the problem. The cleanup action shall provide for a net reduction in the amount of hazardous substances being released from the source area. In this case the source area is the landfill refuse. This requirement means we must be working towards an overall reduction in the hazardous substances moving from the waste to ground water. The cleanup action should not rely primarily on dilution and dispersion of the hazardous substances if it is technically possible to prevent the release of these hazardous substances. An example of dilution and dispersion is when a small amount of high concentration dye is mixed with a large volume of water. The concentration of the dye is reduced but it's still in the water and this is what occurs when the upper alluvial aquifer and the lower bedrock aquifer with hazardous substances above the drinking water standards discharges into the Spokane Valley Aquifer. The hazardous substances still exist, they're just diluted by a much larger aquifer. This regulatory requirement was established to help prevent the combined effects of several small sources of contaminant - contaminant sources from ultimately jeopardizing the Spokane Valley Aquifer, a sole source aquifer, our only drinking supply in this area. And finally, the cleanup action shall not rely primarily on institutional controls and monitoring where it is technically possible to actively cleanup or contain the contaminated site.

As I explained earlier, institutional controls are measures such as zoning restrictions or any other type of restriction that would prohibit activities at the site and prevent exposure to those substances. Basically this requirement means that action must be taken to stop or cleanup a site if it is technically possible. It's not acceptable to put a fence around the problem or to just provide another source of water and walk away.

These regulatory criteria provide the framework that the cleanup alternatives, presented in the - by Mr. Deutsch in the Feasibility Study, are assessed. However the process of selecting a cleanup action from the alternatives requires both technical and regulatory review. The technical evaluation must consider whether the action will work and if it will be effective at cleaning up the problem. The regulatory evaluation must consider the regulatory -- excuse me, the regulatory criteria and requirements just described to ensure that the remedial action meets the environmental requirements of this state as defined in the Model Toxics Control Act.

The cleanup action alternatives evaluated were, no action, institutional controls and long-term monitoring, a low permeability landfill cover, and ground water pump and treat systems. The no action and industrial -- institutional controls and long-term monitoring alternatives were not selected as acceptable cleanup actions for this site. Neither alternative reduces or prevents continued contaminant releases to ground water or eliminates the source of the problem. Therefore, they do not meet the regulatory criteria for a cleanup action.

As previously stated, a low permeability landfill cover acts like a barrier to prevent rainfall and snow melt from moving through the waste, dissolving the contaminants and transporting these hazardous substances from the landfill to ground water. A cover would significantly reduce continued releases of hazardous substances from the refuse to ground water in both the bedrock and the alluvial aquifers and eventually the regional Spokane Valley Aquifer. Landfill covers are technically recognized as the best method to permanently close landfills to prevent future contamination. A landfill cover meets the seven regulatory criteria and the other additional criteria for a cleanup action. Washington State Law requires that when existing landfills permanently close, a low permeability landfill cover including two feet of clay or a synthetic plastic liner go over the top of that. So any landfills that are in existence today when they close are required by law to be closed in that manner.

Now they -- the fourth alternative looked at was ground water pump and treat systems. This is again, extracting already contaminated ground water and treating that water. The overall purpose is to treat water that has been contaminated. Without a low permeability landfill cover, precipitation will continue to move through the refuse, contaminants will be dissolved, move to ground water in both the alluvial and the bedrock aquifer. This basically is a case where the symptom would be treated but the source of the problem would be overlooked. Landfill covers stops the contamination at the source making it an important component to the success of a pump and treat system. Therefore a landfill cover would be necessary at the Greenacres Landfill with or without a pump and treat system.

Pump and treat systems have limited effectiveness in lowering ground water concentrations to acceptable drinking water levels in aquifers that have physical and chemical properties similar to the Greenacres Landfill. They're not always successful at bringing the levels down to drinking water levels. They may reduce it somewhat but they don't always reduce it all the way and it often takes much longer then was originally thought when this technology first started. The pump and treat system would only treat half the problem, it would only address contaminants in the alluvial aquifer, it would not address contaminants that have migrated through into the bedrock aquifer. And pump and treat systems are fairly costly to construct and to operate. Therefore the question must be asked, once there is a low-permeability cover in place to significantly reduce future contamination in the upper and the lower aquifers, should an -- should an attempt be made to restore the existing contaminated water in the upper alluvial aquifer. Due to the doubts as to whether the pump and treat system would be effective at lowering contaminant concentrations to acceptable drinking water standards and the fact that only one of the two aquifers would be affected it was decided that the limited benefits that may be provided by constructing and operating a pump and treat system did not justify the substantial cost. Therefore a pump and treat system was not proposed as a cleanup requirement for this site.

The technical and regulatory evaluation of the cleanup alternatives for the Greenacres Landfill site led to the selection of the proposed cleanup action. It was determined that the source of the hazardous substances was the most important aspect at the landfill to treat and that a low-permeability cover would most effectively treat that source.

Ground water in both the upper and the lower aquifers will be monitored in the future to assess the performance of that cover.

In summary, the process for the selecting an appropriate cleanup action at the Greenacres Landfill site requires one, establishing cleanup levels for ground water based on federal drinking water and state health based guidelines, or standards. The proposed cleanup alternatives are then evaluated both technically and regulatorily to assure that the best alternative is selected.

Once again the proposed cleanup action for the Greenacres Landfill site is one, a low-permeability cover to act as a barrier to prevent precipitation and snow melt from infiltrating through the waste and future contamination of the ground water aquifers. Two, restrict use to prohibit consumption of contaminated ground water and access to the landfill. Three, ground water monitoring to evaluate the short-term and the long-term effectiveness of the cleanup action and four, as a precautionary measure, indoor air sampling of adjacent residences for indoor air gas.

Spokane County has estimated the cost of the landfill cover at Greenacres Landfill from two million dollars in 1991 to six million dollars in 1992. Ecology recognizes that this action will be a large expense to the county. Unfortunately the cost of cleaning up most contaminated sites is very high. State funding is available to assist municipalities in the cleanup of these kind of contaminated sites. It's through a tax that is on oil and hazardous substances. Spokane County is eligible for a fifty percent matching fund -- grant from this fund and although the money from this fund is decreasing due to the increasing demand from other projects throughout the state, there is currently money in this fund available to assist the county in this financial endeavor.

The bottom line is the cost of the action may seem high, the risk of allowing Greenacres Landfill and other contaminated sites to continue to release hazardous to our only drinking water supply may in the long run be actually higher. Thank you very much.

MR. POWELL: Thank you Ms. Broadhead. I apologize I know we've overwhelmed you with a lot of information but from these presentations now I hope you have garnered a -- an understanding of the problem and what the Department of Ecology proposes. Now what I'd like to do is if you have any specific questions about any of the materials that have been presented thus far we'll give you that opportunity to do that. What I'd like to do is -- and I want to remind you this is your public meeting. We're here for you to you know to gain information and then to give us feedback. So if you will raise your hand if you want to direct your question to any anyone particular please do that. If, if -- if you don't want to do that then I will try to find someone up here to answer your question.

Yes sir?

MR. NEAL: Jerry Neal, I'd like to address the question to Ms. Broadhead. What evidence do you have to support your contention that contamination from the landfill is reaching the sole source aquifer in levels that would pose a threat to human health?

MS. BROADHEAD: Basically the evidence presented in the Remedial Investigation.

MR. NEAL: Could you be more specific, is - do you have any specific evidence that any contaminant from the landfill is reaching the sole source aquifer in levels in excess of any drinking water supply?

MS. BROADHEAD: Yes, the levels that are discharging into the Spokane County Aquifer,

MR. NEAL: No. The sole source aquifer.

MS. BROADHEAD: The sole source aquifer, the Spokane Valley Aquifer?

MR. NEAL: Yes.

MS. BROADHEAD: is the sole source aquifer?

MR. NEAL: Yes.

MS. BROADHEAD: And that contaminants from this land -- the ground water from this landfill discharges to that aquifer.

MR. NEAL: In what amounts?

MS. BROADHEAD: In in basically everything in that aquifer discharges to the Spokane Valley Aquifer. Now as I explained, the levels in the local aquifer are above drinking water concentrations but due to a dilution effect, yes the Spokane Aquifer is a very large aquifer and due to dilutions effects no it is not being detected in the Spokane Valley Aquifer. That doesn't mean the contaminants are not still present in that aquifer.

MR. NEAL: I'll address some comments to that type of statement later. Thank you.

MR. POWELL: Okay. Yes sir?

MR. HIGGINS: My name is Pete Higgins and I'll also direct my comments to her. I called the local water district this morning and I did ask the local water board or director, what -- what has been their history on this landfill. Other then the well that was originally tested and had contaminants in it the local water district until up and through their last testing has not in any of their wells in any direction from this site picked up any contaminant what -- in any amount that could be contributed to a landfill percolation. They have nothing and they do have a well what a quarter to a half a mile away?

MS. BROADHEAD: You're absolutely right.

MR. HIGGINS: They have not until this date have found any type of any pollutant that could possibly be in that would normally be in a landfill run-off from the landfill. Also I believe that the local director stated that there is a clay layer extending out from the hill they have no definition of it but that this clay laver -- layer is fairly impregnable and they are not they -- they personally don't see any (inaudible) many contaminants coming through it. But they said there is a clay layer that wasn't on your that I could see on your cutaway anywhere.

MS. BROADHEAD: I'm sorry I didn't point that out and I believe Mr. Deutsch did it in his, it's called a weathered bedrock or clay layer and you're absolutely right. As -- as I said there's the Spokane Aquifer is a very large aquifer and there haven't been contaminants in that aquifer. That's what

MR. HIGGINS: I understand it's a large aquifer but we're talking about the nearest well for it to Consolidated Irrigation District's west of a quarter or about less than a half mile and it is also in the direct flow from that what -- what normally be from that aquifer -- or from that location.

MS. BROADHEAD: Ya, and you're absolutely right those wells have not shown any contaminants luckily cause contamination of the Spokane Aquifer would be a problem far greater then this to have to ever address and hopefully we'll never have to. What's happening is you're right, there's a -- a layer here that's a clay layer that it looks like a fairly difficult for those contaminants directly to go through. However the bedrock ridges also sit on both sides of that hill and contaminants from that landfill are directly going into this bedrock aquifer from the side hills and that's why we've detected contamination in both of the aquifers. and basically it comes back to the whole dilution and dispersion effects that aren't allowed. The State of Washington looked at that and said if you allow dilution and dispersion since you can't pick up the contaminants here we'll just say well it's no problem. There's dilution, it's we're not seeing it.

MR. HIGGINS: They also stated that -- that in the history of -- of reading the testing over -- over the many years what seventy-eight that the that the level of contaminants had gone down in the testing and not gone up.

MS. BROADHEAD: That's unfortunately not completely true. There's been some contaminants that we've shown significant -- we've shown some decreases we're showing increases in some of the contaminants. They're showing a lot of contaminants just not changing over time that their levels have stayed consistently high. That typically is what we're seeing in the bedrock aquifer is really high levels and not changing over time. But back to the dilution you're absolutely right we're not picking up those contaminants are not at high enough levels in the Spokane Valley Aquifer at this time to detect.

MR. POWELL: Okay sir did -- did is did that satisfy your question, comment?

MR. HIGGINS: Um hum.

MR. POWELL: Okay. Again I just want to caution everyone this is a question and answer session about the materials and this is not your formal opportunity to make public comment, that'll come after the break so if you want to save those for later on please feel free to do that. And I'm -- I'm gonna I'm gonna take people as I saw then. Sir you had your hand up earlier would you like to as a question?

UNIDENTIFIED MAN: Sure I'd like to ask Ms. Broadhead the alternatives you considered in your recommendation here are they only the alternatives presented by Mr. Deutsch?

MS. BROADHEAD: Bas--basically what happens is in the development of the Remedial Investigation/Feasibility process....

UNIDENTIFIED MAN: Would you speak a little louder please?

MS. BROADHEAD: Sure. Did everyone hear the question? The question was, and if I restate it wrong please tell me, were the alternatives we considered only those alternatives presented in the Remedial and the Feasibility Study that was put together by Woodward-Clyde Consultants? Basically the process is what the Remedial Investigation and Feasibility Study are originally written. Ecology looks those over and basically approves those documents, says yes we agree with you that these are the alternatives that may make sense at this site. Actually as Mr. Deutsch presented the selection we chose was not a clear one of the five alternatives. We basically looked and said in total all of the cleanup action alternatives for this site are probably included in this Feasibility Study but we just selected one component of that.

UNIDENTIFIED MAN: Given today's technology do you feel like your pretty complete on this?

MS. BROADHEAD: Fortunately ya. There's not a lot that can be done once there is a contaminated ground water aquifer, but.

MR. POWELL: Okay one other thing I'd thought I'd ask of ya if you would please stand so that that's an excellent point, we need to make sure everyone in the audience here hears the question and sometimes we may not repeat it exactly as you stated so if you'd please stand. Yes mam, yes mam.

UNIDENTIFIED WOMAN: Yes, I have a question for Mr. Deutsch there. How far is your closest monitoring well to the Spokane County Aquifer that's currently being tested? You showed one with the D - 1,2-DCE?

MR. DEUTSCH: Right the Plume?

UNIDENTIFIED WOMAN: Uh huh.

MR. DEUTSCH: It's not -- this is the -- the plume that I showed, these are the wells where this 1,2-DCE has been detected. The actual definition of where the Spokane Aquifer begins is not well defined. It's this the valley that contains the landfill pretty much merges out here with the Spokane Valley and we're talking about this alluvial aquifer merging at some point in here with the larger Spokane Valley Aquifer but this is not a distinct zone or position where you go from one aquifer to the other.

UNIDENTIFIED WOMAN: So you really couldn't say then whether that there's a certain distance between the Spokane Valley Aquifer that you've tested so there's no point in the Valley Aquifer, I'm trying to figure out in my own mind whether that the potential for the Spokane Valley Aquifer to be contaminated or not? Or if that's not been checked.

MR. DEUTSCH: The wells that are here which correspond to these downgradient of the landfill would probably not be considered in the Spokane Valley Aquifer. They're they are not very productive ground water wells they don't make a lot of water when you pump them whereas the Spokane Valley Aquifer is known for very high production rates and so we're far enough away from you know that zone up the side up this valley to -- to be in the zone that's -- that's not very productive.

MR. POWELL: Did that answer your question?

UNIDENTIFIED WOMAN: I guess. I'm still sort of confused how far you know so if I went down to point up there at the top where your plume is that's not the valley aqui -- the valley?

MR. DEUTSCH: It's gonna merge out here somewhere but the exact definition is not well.

UNIDENTIFIED WOMAN: Okay so you haven't tested right there where it merges?

DEUTSCH: No we have not tested beyond there. Beyond here well there is a well here we've tested that is not contaminated with this 1,2-DCE but we have not tested you know the very tip of that.

UNIDENTIFIED WOMAN: Thank you very much.

MR. POWELL: Okay I'll take this gentleman and then you're next sir.

UNIDENTIFIED MAN: A very simple question you people talk in big words. How far down when they test this water how far down do they go to test it to get the water? In other words, this aquifer is a hundred and twenty feet deep I use the deal as a layman's

MR. POWELL; Yes sir.

UNIDENTIFIED MAN: (inaudible) I can spit in a glass of water and take a straw and go down to the bottom and everything's gonna be fine, but what's on top of the water, where is the sample of water taken from the top, or from the bottom? I've already fought with your guys with that well where they have there and in my estimation and tested it before it even goes underneath the landfill.

MR. POWELL: Mr. Deutsch would you respond to that please?

MR. DEUTSCH: Sure. All of the samples from the alluvial aquifer this shows a sample at the very top of the aquifer the -- the top of what's called the water table where you get a saturated zone so that's the top of the water in your glass. Some of these others,

UNIDENTIFIED MAN: No, no that well is the one that goes the highway that goes around the landfill. Somebody that was there told me that's the well and all the water goes out and then it goes someplace where there's no houses there's no nothing and is this well tested after it rains? You can test that thing forever if it's been five weeks since it's rained and you probably will get nothing. But after it's cooked up there for awhile then it rains, does anybody test the well then? Nobody says when they test it.

MR. DEUTSCH: Well in the Remedial Investigation Report I believe there's a copy on the table over there and it shows exactly when each of these wells was tested and this

UNIDENTIFIED MAN: Does it say in there after it rained or before or what have ya? This is big words over there I don't understand three quarters of um. I could if I studied the thing. All I know is I won't drink my own water.

MR. DEUTSCH: I think the point to be made on is there a relationship between what's in a well at any given day and when it rains is an important one. Based on our calculations it takes a long time, years, perhaps decades, for water to get from the top of the landfill down -- if water to go percolate through the landfill down through this zone and down into these wells as much as ten to twenty years water to move that far.

UNIDENTIFIED MAN: It sounds like Hanford, something like Hanford. The only thing is it goes down. If they bring the water from a hundred and twenty feet down and test it -- it should be spiffy clean. What I'm talkin' about is the stuff that's on top. Of course that goes into Spokane and they pollute their water not pollute it but chlorinate it, and then I guess everything's all better. What I'm trying to get at is the test of the water after it rains or when there's a lot of snow on it and it's seeping through.

MR. DEUTSCH: Okay.

UNIDENTIFIED MAN: Then make your test but nobody says anything. You can make a test like I say if it hasn't rained for five weeks you make your test it's all sittin' their dormant it isn't gonna do anything.

MR. DEUTSCH: That's a good point also. When it rains here yes, water moves through here but there isn't enough water to fill all the pores of the rock to take a sample from that water. It isn't -- what we have to look at is when -- when you've got a glass of water that you could take water out of when the water is percolating through the landfill and into this zone where there's not much water you just can't sample it by standard ground water sampling methods.

UNIDENTIFIED MAN: Ya because you don't -- like I say you don't say how far down you're going to get the water. You can have all kinds of pollution on the top of the water but if it's down a hundred and twenty feet you're gonna have spiffy clean water. But eventually it's all gonna blend.

MR. DEUTSCH: Basically the investigation was designed to look at specifically the top of the water at that water table. What is the composition of that water and not some deeper zone that and you're right it's probably clean.

UNIDENTIFIED MAN: Where are the wells at that you're testing? You say Alpha three and Beta two and somethin' else where is the exact locations of the well? I know three of um are by a highway that runs around the perimeter of the closest to the freeway there's three wells there.

MR. DEUTSCH: Let me

UNIDENTIFIED MAN: To me they're testing the water before it even goes into them, the landfill.

MR. DEUTSCH: This was the diagram that showed the location of all of those monitoring wells and this is Interstate 90 and this is Kenney Road that goes around the landfill, this is the location.

UNIDENTIFIED MAN: Okay (inaudible) three of the ones that they told me were the wells right?

MR. DEUTSCH: These three?

UNIDENTIFIED MAN: Right by the road, those three there.

MR. DEUTSCH: Here?

UNIDENTIFIED MAN: I'm a lay person but in my opinion that's testing somethin before it even went -- goes in through the landfill. Why don't they test it over at Henry after it comes out of the landfill?

SEVERAL PEOPLE TALKING AT THE SAME TIME: The other way around. (inaudible) It's the other way around.

UNIDENTIFIED MAN: What do you mean it's the other way around?

MR. DEUTSCH: The water runs up from the bottom of the (inaudible) to the front of the hillside.

SEVERAL PEOPLE TALKING AT THE SAME TIME: (inaudible)

MR. DEUTSCH: The water runs through the landfill and then down to the location of these three wells. So that this is actually water it went -- it ran through the landfill probably twenty years ago, the water that we're sampling down here today.

UNIDENTIFIED MAN: Do you know if they tested any water on Henry? That's this -- this is not a forbidden zone this is on the west side of the landfill but nobody seems to care about the west side. All they're talkin about is the east side before it even goes through the landfill.

MS. BROADHEAD: No.

UNIDENTIFIED MAN: That's the industrial zone.

MANY PEOPLE TALKING AT THE SAME TIME: (inaudible)

UNIDENTIFIED MAN: It's on the other side, the west side.

MANY PEOPLE TALKING AT THE SAME TIME: Is it after it moves through the landfill?

UNIDENTIFIED MAN: It would be on the right according to that.

MR. FUCHS: Let's -- let's see if we can resolve this gentleman's question and then after -- after the break if we can't get it done now then after the break we'll talk with you a little more specifically about these issues and maybe we can go to the Remedial Investigation Report itself and get a couple of additional figures to show you what what's goin' on. Bill will go ahead and try to explain it off of these figures and then if we still haven't got your question answered let's follow-up with you specifically at the break.

MR. DEUTSCH: The -- What's shown here is a topographic map the elevations, and so we're looking at the top of the hill here, the bottom of the hill here and what the landfill was put -- the refuse was put in the valley okay, Carlson Valley here and filled in there so in -- in affect you know the refuse is contained within the valley and also any rain that falls on the refuse or any snow melt that goes through the refuse is pretty much contained in that old valley which is now partially filled with the refuse. So what goes on over here on this side of the hill and what goes on over here on this side of the hill probably has little affect on what's beneath the landfill or what's in directly north of the landfill because of those physical boundaries between where the landfill is in this valley and things to the east and the west.

UNIDENTIFIED MAN: I was taught or told what you're talking about is like a coffee percolator in there it couldn't have been a worse place to put a landfill because its rock barrier all the way around it and when it rains or it snows it just sits there and pukes it right down into the aquifer and off it goes. That's what I was told, I mean it made some sense

MR. DEUTSCH: Well maybe we should talk about it during the break.

MR. POWELL: Okay lots of hands lots of questions but I'll try to keep these order. Yes sir, you were next.

UNIDENTIFIED MAN: A question for Mr. Deutsch. You stated that the landfill was no longer anaerobic is that correct?

MR. DEUTSCH: That's right.

UNIDENTIFIED MAN: How come its generating methane?

MR. DEUTSCH: Well there are probably parts of it that are still anaerobic it's gotta be to be generating methane but compared to a typical landfill where -- where the amount of methane gas is usually fifty percent or can be fifty percent of the soil gas it's -- it's nowhere near a typical anaerobic system.

UNIDENTIFIED MAN: Is then there may be still generating leaching is that correct?

MR. DEUTSCH: Oh there's still - yes there's still leaching cause we see it.

UNIDENTIFIED MAN: Oh you do see it?

MR. DEUTSCH: In the monitoring wells beneath the landfill.

UNIDENTIFIED MAN: Okay now with regard to the DCE underneath the landfill you showed a nice figure that showed how it's at low concentration underneath the landfill and a high concentration at the upgradient?

MR. DEUTSCH: Um hum.

UNIDENTIFIED MAN: Is DCE a -- was it probably put in the landfill as a liquid?

MR. DEUTSCH: It was probably a component of a solvent.

UNIDENTIFIED MAN: A component of a solvent?

MR. DEUTSCH: Ya.

UNIDENTIFIED MAN: Or maybe a degradation product of the solvent?

MR. DEUTSCH: Possibly.

UNIDENTIFIED MAN: Also,

MR. DEUTSCH: They bear a variety,

UNIDENTIFIED MAN: If it was a degradation product of the solvent would you expect it in low or high concentrations below the landfill relative to this (inaudible)?

MR. DEUTSCH: It depends on the mobility of the source the -- the -- the source of the degradation product and typically the source the degreda -- the source of DCE is trichloroethylene or ferachloroethylene and they have relative mobilities that aren't as great as the 1,2-DCE.

UNIDENTIFIED MAN: Do you see that coming from the landfill?

MR. DEUTSCH: Yes we do see those. They aren't as -- as good an indicator apparently as of the extent of the plume because they aren't seen in as many monitoring levels.

UNIDENTIFIED MAN: Okay. Is your contention then still that the landfills stopped degrading?

MR. DEUTSCH: The contention is that degrading?

UNIDENTIFIED MAN: Ya. I think stabilized is the word you used.

MR. DEUTSCH: No I don't think I said stabilized what I meant was that the -- the leachate concentrations that appear to be coming from the landfill now are lower then they were in the past.

MR. POWELL: Is that satisfied?

UNIDENTIFIED MAN: That's fine thank you.

MR. POWELL: Mam, I believe you had your hand up I'm trying to get everybody in order.

UNIDENTIFIED WOMAN: Ya just with that topo map out there it's hard to believe that there's no run off down to the west side there. I mean from what I can see I mean it doesn't have it in real low increments is what?

MR. DEUTSCH: This is a -- this is a ridge that runs down to this is a -- this is a high point.

UNIDENTIFIED WOMAN: So even that little gap right there that is a little bit higher elevation?

MR. DEUTSCH: Which little gap?

UNIDENTIFIED WOMAN: Just -- just south of that hill that little hill.

MR. DEUTSCH: Yes this is -- this is all running up this is twenty-three, twenty-two fifty, this is a high point here of twenty-two fifty.

UNIDENTIFIED WOMAN: Ya.

MR. DEUTSCH: and it runs down this way.

UNIDENTIFIED WOMAN: But I'm just sayin' between that little hill there and the next line over there's no way for anything to get through there? Ya right there.

MR. DEUTSCH: Right here?

UNIDENTIFIED WOMAN: There's no way to get for anything to get through there?

MR. DEUTSCH: (inaudible).

UNIDENTIFIED MAN: Do you know the specifics of that?

MS. BROADHEAD: At this point there's no wells there so it's really kind of (inaudible)

UNIDENTIFIED WOMAN: (inaudible) cause there are quite a few homes just down hill from that are just being put in. They were just built within the last year or two.

MR. POWELL: Okay. Is that

UNIDENTIFIED WOMAN: Well I'd like to know I mean you know is that

MR. POWELL: That's something we can pursue either at the break or after the meeting with some of our studies.

MS. BROADHEAD: It might be an appropriate comment to

UNIDENTIFIED WOMAN: Ya it'd be nice to know Cause that's just from the higher concentrations.

MR. POWELL: Sir, sir. Other folks that had their hands up? Yes sir?

UNIDENTIFIED MAN: Yes on restrictive zoning to what degree is restrictive zoning that you're talking about and how far does it extend away from the dump on the hill itself?

(TAPE ENDED, PART OF THE DISCUSSION NOT RECORDED)

MS. BROADHEAD: ... to tap that cover on the landfill, so -- the refuse area. The restrictive zoning on the ground water would be in place for both this bedrock and the alluvial aquifer in any of the areas that we've (inaudible) to assure that no one moved into the area, drilled a well and started drinking that water until we said.

UNIDENTIFIED MAN: Could that water be used for irrigation?

MS. BROADHEAD: No. At this point it's high enough levels that it's not considered safe for plants, animals, basically any type of human or other types of consumption. It's above federal drinking water levels so I don't think they'd want to have contact with that water.

MR. POWELL: Does that help you sir? Yes, sir?

UNIDENTIFIED MAN: I'd appreciate it if Ms. Broadhead, MR. POWELL: If you could stand up please sir.

UNIDENTIFIED MAN: Yes sir. If she would explain all of what is proposed by the Department is proposed then it's a matter of subject of negotiation between the responsible parties and it would perhaps be more beneficial that she would explain that what her proposal has not been adopted or agreed to, and it's a matter of negotiation, and whether there's going to be restrictive zonings, a matter of negotiation yet to be -- yet to be determined.

MS. BROADHEAD: Let me describe the process and so you kind of understand how this all works. What happens is after the Remedial Investigation and the Feasibility Study have been written, everyone's approved that the information in there is accurate, the Department again goes through, as I discussed, a technical and regulatory evaluation of those alternatives to select an action. We propose the action, we make it in a draft form so we can have meetings such as this and public comment periods to see if there's anything we've missed, to see if there is major issues we've missed, to see if there's public concern that we've missed, all of that will go into developing that final cleanup action. But let me make clear, the cleanup action is a selection and a determination by the Department of Ecology. It's our role and our function to make these tough decisions. And to understand the technical issues that go into them as well as the regulatory issues that go into them. Once the final cleanup action plan is issued, we invite Spokane County into a process called negotiation Consent Decree. The Consent Decree is the legal document that implements this cleanup action to happen. There's two methods that this can happen by: one is we go through negotiations and ask the county how are we gonna get this done. We negotiate time frames, legal language, and get it in a document that's submitted to the courts. The other option is an enforcement action. The Department has enforcement capabilities that they can go to the responsible parties with these cleanup actions, file it in court, and enforce the responsible parties to implement these cleanup actions. Those are the courses by law that we are able to follow. Does that answer your question?

MR. POWELL: Answer your question?

UNIDENTIFIED MAN: It's still a matter of negotiation. In other words, the Department doesn't have the ultimate authority, it has to seek redress in the courts in which all the responsible parties have the right to present their views and it will be a decision by the court, not by the Department. That's the point I'm trying to make.

BROADHEAD: Yes. I'm -- if, well and I think that again if -- if the negotiations break down, as in any process, it can go to the courts. It delays cleanup actions and there's always redress in the courts and that -- that's where things when they finally break down go to. But it would delay this substantially.

MR. POWELL: I saw a hand. Yes sir.

UNIDENTIFIED MAN: My question sir is for Roxane as well, I'm a little confused when you put this cap on these projects like this what then happens to the -- to all the decaying matter underneath it ? Do we get gases or I mean it's gotta go someplace where it hasn't decayed and it's been sitting there for two hundred years -- for two hundred and three hundred years.

MS. BROADHEAD: Sir, the material continues to decay. It probably decays at a slower process. However, it stays contained and the majority of it then stays contained within the refuse. I've heard an analogy to a sponge. How the sponge, that if you've run enough water through it absorbs some and eventually it starts running out the bottom.

UNIDENTIFIED MAN: So what you're saying is it produces a little less gas over a longer period of time or it produces a little less contamination for a longer period of time?

MS. BROADHEAD: Eventually ya. The problem is -- is once it's there unless we remove it -- it will continue to decay. It should stay within the confines of the landfill because there's nothing driving it through, there's no water pushing it on through the system. It will leak out slowly, but at much -- much lower levels.

MR. POWELL: Any other questions? We want everyone to -- if I could get this gentleman back here and then I'll come up to you again sir. Yes sir.

UNIDENTIFIED MAN: Ya I had a question for Mr. Deutsch. It's a little unclear how familiar the map that shows the plume it looks like the plume is pretty well (inaudible) in size and shape and everything and that plume is pretty well developed but how well known is the size and shape of that plume?

MR. DEUTSCH: There are monitoring wells, let's see maybe I can just put this over this -- these are other monitoring wells adjacent to it that did not show the 1,2-DCE so that's how we get this horizontal extent. The -- here it's pretty well defined because the -- the bedrock comes together at the base of the valley and it appears that -- that everything that leaches through the landfill has to come out through a pretty narrow gap here. It can't start broadening out until it gets through that gap. So we feel pretty confident that it's about this area here and it expands somewhat here, but not a great amount, and like I mentioned before, we don't have any wells at the very front of the thing so we don't -- that's -- that extent is not very well known.

MS. BROADHEAD: May I add one piece to that?

MR. DEUTSCH: Ya, go ahead.

MS. BROADHEAD: Please keep in mind this is one contaminant of thirty-two. The other contaminants are found, but this was the most easily traceable well, it was a good indicator, it's helpful for illustrative purposes. However, contaminants have been found in these wells, in these wells, contaminants have been found in these wells. So -- so contamination has been seen and detected throughout the site, it's just that this is one contaminant that's been detected in this well.

MR. POWELL: Does that answer your question sir? Yes sir?

UNIDENTIFIED MAN: On the dump itself I've talked to some people that said that the military out at the old industrial park, before it was decommissioned...

MR. POWELL: Sir, excuse me, could you stand up, I don't believe the folks in back can hear you.

UNIDENTIFIED MAN: I've talked to some people that -- the prior use of this, before it was an industrial park was the military was decommissioned at the industrial park that there was dumping here from certain toxins and I was just wondering if you've found anything from that period in fifty or fifty-six, one of those decommissions?

MS. BROADHEAD: What happens is when the -- I don't know Mr. Deutsch you might answer this better than I, but the chemicals that are -- we look at a break-down of all chemicals, we don't look at whole substances, and so if those breakdown and as those breakdown into their individual chemical components, that's what's detected. So it becomes very hard to trace one chemical component back to a certain industry. Basically we have to go through old records to try to find out what kind of actual contaminants or hazardous waste or municipal waste or industrial waste or whatever was put there.

FLORA GOLDSTEIN: If someone does have that kind of information in terms of what kinds of substances, materials were dumped from the decommissioning and we've got credible evidence, that's certainly useful in terms of getting a better handle on what was disposed of at the site and who did the disposal.

MR. POWELL: Okay, yes sir.

UNIDENTIFIED MAN: I understand that there's a plume from certain contaminants somewhere in this water and it was found in wells down below. But now that those wells have been decommissioned and county water provides drinking water to people in those areas and if there's no real contaminants have been found in the aquifer --aquifer, then as you said if they did get it there the aquifer is so big that it -- it would dilute it. If whether it would be meaningless, why do anything?

MR. POWELL: Roxane.

UNIDENTIFIED MAN: I mean ...

MS. BROADHEAD: That's a good question.

UNIDENTIFIED MAN: why do anything?

MS. BROADHEAD: I'll start at the first of your question and move on. First of all these wells are still very active, there is sampling still going on at these wells and will continue to go on indefinitely at this point. And the question of why do anything, you're right, they're not being detected here. Spokane Aquifer is a very large aquifer. Probably one event will not be -- will not contaminate the entire aquifer. What we'll see if we ever have a concern to our drinking water source is the combined effect of several small contaminant sources that these non-detectable hazardous substances that are still out there start adding up and so the cumulative effect of all these sites that contribute only a small fraction, they still contribute to that aquifer, will ultimately cause a -- an overall degradation of that water supply. And that's basically why the -- the -- the regulations says we can't allow dilution and dispersion. Is -- basically you could say well hey all of these sources are small why clean up any of them and wait until we have such a catastrophic event or until all of these were so combined together that you no longer had a drinking water source in the Spokane Valley Aquifer but it was too late because we had so many sources contributing to them. Does that answer your question?

UNIDENTIFIED MAN: Sort of.

MR. POWELL: Yes sir.

UNIDENTIFIED MAN: I assume that this is sliding down the hill, the water is running -- water is running down into the valley and this is running downhill, is that correct? Why would you put a cover over it, trap it forever and ever and ever, why don't you put a pervious dam across the bottom to keep it from going anyplace?

MS. BROADHEAD: And that was one of the solutions.

UNIDENTIFIED MAN: Let the nature take its course, or trap it so it can't run any place.

MS. BROADHEAD: And actually that was one of the alternatives although we don't put a great detail on it that Woodward-Clyde had looked at in their study and again that was in conjunction with a landfill cover, in conjunction with a pump and treat. And that would have been, correct me if I'm wrong, right along this area. That sits right along this area. Again it only addresses half of the problem, it would -- if it were effective and again sometimes that might be questionable, but if it were effective it would only answer half of the problem, the alluvial aquifer, we're still seeing contamination of the bedrock aquifer, and therefore we are trying to look at a solution that -- that prevents contamination of both aquifers.

MR. POWELL: Okay. We're way beyond time here for our fifteen minutes, we've doubled it and close to tripling it. I'd like to break now cause we've been here for a long time. If -- I saw two other hands and -- and please we want to make sure if you would come up here you know we'd answer your questions face to face. Let me just --a couple of things to point out before I give you a ten minute break. Rest rooms are on both sides of this conference room, down here if you just look to the water fountains and there's a small hallway, right beside each one there's men and women's rest rooms on both ends. Also I'd like to ask that you please not roam around this building for security reasons. Please stay in the vicinity of this conference room, this is a -- we want to be kind to our host Hewlett-Packard and they've asked that you please don't roam for security purposes. Also, I'd like to invite you to come up here and get some coffee, ice water, whatever, and again thanks to Marty Gilchrist in the back who's our gracious host from Hewlett-Packard and they allowed us to use this wonderful facility. So please break for about ten minutes.

If anybody didn't fill out a card, I have cards up here if you'd like to come up. I believe you asked about that sir.

BREAK

JBLIC MEETING COMMENTS NO. 10

GREENACRES LANDFILL DRAFT CLEANUP ACTION PLAN
PUBLIC MEETING - OCTOBER 20, 1992
FORMAL COMMENTS

MR. POWELL: Okay, I'd like to reconvene the meeting please. Now we want to give you all the opportunity to come up and make formal public comment about our proposed action for the Greenacres Landfill. Again I want to reiterate you may ask questions for the record and those will be responded to in our formal written Responsiveness Summary but we will not be answering those questions here tonight, those will be done formally in writing. I will call your name in the order that I have received it when you registered with our receptionist down below. I ask you again to please keep the noise down, to be considerate of the person doing the speaking, everyone relax, you know this is a -- this is your meeting, don't be intimidated by anyone up here or anyone else in the audience, we -- we are truly seeking your input to this process. And please try to limit your comments for organizations to about ten minutes and for individuals to about five minutes. I'm not gonna embarrass you if you go over that just try to you know be considerate. I've got about ten or so cards here so there will be quite a few people commenting on our proposal.

Okay. I'd like to call Mr. Dean Fowler please. If you'd please identify yourself and state the organization or if you're a private citizen, where you live. Thank you.

MR. FOWLER: My name is Dean Fowler and I'm with the Spokane County Utilities Department and I'm here representing Spokane County at this time. Basically what I'd like to do is make a brief comment to oppose Department of Ecology's proposal and I would introduce again Bill Deutsch who is our consultant with Spokane County and Jerry Neal with Preston Thorgrimson Firm, he will be presenting legal arguments as to why we oppose Department of Ecology's proposal.

1 Briefly, Spokane County inherited this landfill from the dissolved Townships in 1967 and we operated the site for approximately four years 'til it ended operation in 1972. Since then Spokane County has gone through a very costly process of this

investigation as you heard Bill Deutsch describe to you. So far we've spent about a million and a half for this investigation. Ecology has proposed a cleanup action that will cost the tax payers in the Spokane County and the State of Washington about over six and a half million dollars. Ecology has presented extensive regulatory arguments to support their proposal but have yet to describe the cost effectiveness of their proposal and at no point have they applied a reasonableness factor to what their solution is -- is here on.

Spokane County maintains that continued monitoring will show decreasing levels of contamination from the landfill and that there are other alternatives that exist to remediate the problem out there. At this time I will just introduce Bill Deutsch and he'll make a quick presentation and then Jerry Neal.

MR. POWELL: Thank you Mr. Fowler.

MR. DEUTSCH: It will be pretty brief bear with me for a few minutes. Once again my name is Bill Deutsch, I'm a consultant with Woodward-Clyde in Seattle. My comment focuses on the need fora cap on the landfill and whether or not the cost of this cap is justified by the benefits received. The need for a cap is justified in the cleanup action plan because it is stated that the landfill is a continuing source of contamination at an unacceptable level and what I'd like to do with a few view graphs is present to you some data that shows that this level is declining and may reach the target cleanup levels defined in the cleanup action plan in a relatively short period of time making the cap an unnecessary expense to the tax payer.

2

I showed this plot earlier that showed concentration levels in a series of monitoring wells that are along the flow path from beneath the landfill to downgradient of the landfill and what I showed here was that - that the concentrations of at least this compound are much higher in these -- in this level -- in this area - downgradient of the landfill then they are from this well which is immediately beneath the landfill. And the reason we believe this is so is that the amount of contamination coming from the landfill is decreasing over time. And that's a very likely thing to happen because of the degradation, the natural degradation of the organic matter in the landfill.

I'd also like to show you a chart here of the concentrations of the same compound, 1,2-DCE, in ground water over the time period in which we have sampled these monitoring wells from 1988 to the most recent sample this last month. And what you can see is the general trend in the concentration of this compound for a large number of monitoring wells, five monitoring wells, and a general trend in decreasing concentration.

3 Now in the cleanup action plan it's -- it's stated that the monitoring of the ground water isn't acceptable to evaluate the zone of contamination that is down in this area of the landfill because it's expected that concentrations will decrease over time and that nothing will be done with this ground water until after five years in which a decision will be made as to whether clean up of this ground water will be done or not. And the point we would like to make is that if we can monitor that area of the contamination for another five years perhaps monitoring of the other ground -- the other monitoring wells is also a good idea to see if the cap is necessary or not.

4 We have done some calculations to estimate the time to achieve the target cleanup levels in the well immediately beneath the landfill, this well here, and what we've done is taken the concentration levels measured in that well, LW-1, for over a long period of time and we've compared it to the target cleanup level in the Draft Cleanup Action Plan. And based on -- on the natural degradation and some of the patterns we've seen, we predicted or estimated a year at which we would attain this cleanup level just due to natural degradation. And for the organic compound and most of the metals we've found that -- we anticipate that cleanup may be achieved in as few as -- a few years to eight or nine years from now, just due to the natural lowering of concentrations due to

degradation.

5

Now metals are another factor, they're not going to degrade by the -- by bio-degradation and decay of the organic matter but this antimony compound is already not detected below the cleanup level. Manganese is -- is a bit of a problem, it is much higher than the target cleanup level but this -- this concentration is possibly due to the fact that unfiltered water samples were collected.

6

Let me give just a perspective on the cost of the cap. We looked at the aquifer area here that could be potentially used for ground water extraction. We looked at how much water you could extract from that ground water and supply people. And assuming that each person needs about sixty gallons of water per day, that zone of the aquifer could supply about two hundred and forty people. Now the cost of the cap is estimated at six million dollars. What that means is that it's gonna cost twenty-five thousand dollars per person to install this cap. So that's what you're gaining by installing the cap to be able to provide those people water. Twenty-five thousand dollars a person. Okay.

Let me just summarize here some of the current and future conditions. The landfill stopped operating twenty years ago, it's undergone several flush cycles which have likely removed many of the mobile contaminants and it's also biodegradation has probably reduced other contaminants. The current detected concentrations of organic compounds in the well immediately beneath the landfill are close to the target cleanup levels and are anticipated to decrease to cleanup levels without the need for a cap. The current public water supply is available to present users and future users in the zone of contamination and institutional controls will protect future users.

7

Our recommendation is this: to establish the institutional controls and to provide alternative water supply to those people above the aquifer that's contaminated, to evaluate the concentration of trace metals in ground water samples which have been field filtered to look at this affect of perhaps elevated levels because of silt in the water sample. Monitor the ground water periodically for chemicals which exceed the target cleanup level. And finally, re-evaluate the need for a cap after some period of time, say five years, of ground water monitoring. Similar to the decision to re-evaluate for cleaning up the contaminating ground water after an additional period of monitoring.

MR. POWELL: Thank you Mr. Deutsch. If I could just interrupt just for a second before Mr. Neal. We'd like to sometime after this meeting get copies of your overheads for the official record.

MR. DEUTSCH: Sure.

MR. POWELL: Mr. Jerry Neal.

MR. NEAL: Thank you very much. My name is Jerry Neal, I'm with Preston Thorgrimson, and I'm here representing Spokane County. I first of all want to thank the Department and its staff and in particular Mr. Sappington, I saw Claude here earlier but I see he's left -- has left, and if you would convey my appreciation to Mr. Sappington for the time that the Department has taken here tonight to provide the public and in particular Spokane County, the opportunity to speak to you.

8

The Department's role in these matters are governed by the Model Toxics Control Act, MTCA in its abbreviated form. And I think we would all agree that the purpose of MTCA is to protect public health. What we do and how we enforce MTCA should be governed by that standard. Are we -- what are we doing and does it protect the public health.

9

The Department in its Cleanup Action Plan, the Draft Cleanup Action Plan that is available, has conceded that, and I'll quote from page 1 of the Draft Cleanup Action Plan, quote "There is no immediate threat to human health at the site." Later on in page five, "...the Department recognizes ...that this site does not pose a threat to human health." We were told that the site has been closed for twenty years. The county has conducted the 208 water quality sampling program since 1978. There is no evidence from that program to suggest that any contaminants from the landfill are affecting any drinking water supply. The only well that was ever impacted was Mrs. Jeffers' well that was nearly adjacent to the site and at that time the county moved quickly to provide an alternate water supply system. At a cost I might say that is a bare fraction of the proposed six million dollars plus that the Department wants to spend of the tax payers' money to remedy what the Department concedes is not a threat to public health.

10 The landfill was operated by the citizens, by private citizens in the 1940's. When the township form of government came into effect the township operated this landfill and did so for a number of years. The legislature of the State of Washington decided to do away with landfills, excuse me -- do away with townships, and they dissolved all of the townships. So the county inherited -- the county inherited this landfill that it had operated it for approximately four years. I say this because now the Department wants the county to be responsible entirely for all of the cost to cleanup for a facility that the county operated for nearly four years of nearly thirty years of its operation. The county had no knowledge at all when it inherited the site from the townships what had been disposed of and what was there at the site. The county thinks that its status as an owner is not the traditional owner that one finds when one normally purchased property. The county was given this site by virtue of operation of law and really had no choice. And we think that the statutes that transferred the liability to the county that the ownership did not transfer the liability for the entire operation of the site. Nevertheless, despite that, at the time that this site was placed on the N.P.L. list the county stepped forward in an effort to try to reach a cooperative agreement with the Department of Ecology to try to do what the county believed was protecting the public health and yes we entered into a consent decree to try to study it. But it's a far different matter to try at this point to urge the county to assume the entire responsibility for an action of the cost that the Department is proposing here today. And for the record I would state that the county does not believe that its liability is -- is that extensive and its liability is limited under RCW 70.105.040.

Now to address the cleanup action plan. This site has been closed for twenty years and I think its disingenuous to suggest that when there has been no evidence to demonstrate that this site has been an endangerment to public health over twenty years that in
11 the future it's going to pose a threat to public health. When simply asked the question if it hasn't shown a threat to public health in the past twenty years what evidence is there that it's going to pose a threat to public health in the future?

Spokane County objects to the Department of Ecology's interpretation that 173-304 should apply to a cleanup of a landfill that has been closed for twenty years. What I'm saying here, is that it's the Department's interpretation of the regulations that the Minimum Functional Standards which apply to the closure of a landfill, a landfill that is being closed contemporaneous with the
12 operation of law today, should apply to a landfill that was closed twenty years ago. And that's a legal interpretation and for the record Spokane County objects to that legal interpretation. Spokane County believes that based upon federal guidance that is similar to the RCRA requirements that the Department has discretion to determine what are relevant and appropriate standards for cleanup of landfills. And I would submit that this site that has been closed for twenty years is not well suited for those regulations and we disagree with the Department's interpretation.

And I submit that under the evidence that's in this record that to require the county to expend six million dollars is a tremendous waste of taxpayer's money and it does not meet one of
13 the criteria of the very law under which you are operating, which was not mentioned here tonight. And that is 173-340-360(5)(d)(vi) which provides that 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. And I would ask all of you to focus on that provision of the law that was not mentioned heretofore. That means that we have to look to the cost effectiveness of any particular type of action before we proceed to select the remedy and I would submit to you that the proposed remedy, the six million dollar cap, is a substantial cost and disproportionate to the incremental degree of protection that it would provide over a lower preference cleanup action, especially when the Department concedes that there is no immediate threat to public health posed by the landfill.

I appreciate the opportunity to clear up this notion that there is direct evidence that any contaminant from the landfill is reaching any public water supply system. And I would only suggest to you that if there were a threat to public drinking water supply system we would be hearing from those public agencies here tonight who have a responsibility equal to the Department's responsibility to insure that their public water supply systems are protected. And to the best of my knowledge there is no evidence that any contaminant from the landfill is -- is in the aquifer at levels that are not safe to drink. I also disagree with Ms. Broadhead's interpretation that test results don't show declining levels in the landfill. And I appreciate the fact that the Department is entitled to its interpretation. I hope you can also understand that reasonable minds can differ and we just simply differ with you and we reach different conclusions than the Department reaches.

There are many remedies that satisfy the standards of MTCA and protect public health. I urge the Department to re-think its analysis here and to provide a remedy that continues to protect public health but doesn't soak the taxpayers for a cost that is far disproportionate to any benefit.

Thank you very much for the opportunity to come.

MR. POWELL: Thank you Mr. Neal. Mr. William Rademaker please.

14

MR. RADEMAKER: I'm William Rademaker, Jr., President of Liberty Lake Investments, Inc., which is owner of the subject property, including the still site and several, several hundreds of acres around that. My address is 1325 4th Avenue, Seattle. I hope we don't have a tempest tea pot here fueled by bureaucratic zealotry. Many of us have been startled that this was on a super fund site in the first place looking at the studies as they appear to be evolving. There seems to be considerable doubt that this is the if and the possibly and the maybe that we've heard so much about from some of the state officials. Having been a deputy state security's commissioner for several years I know how projects have a nature of taking on their own -- their own life and they seem to grow beyond what they really are. I think six million plus the other millions that have been spent already is an enormous sum of proceeds in the finite world of the taxpayer, particularly in this economy, to be doing what appears to be way beyond what's needed based on expert testimony. Also, as a landowner, we'd like to have a resolution of this we sit dangling in the winds of study after study, this has been going since our ownership and we took over in 1987 and it would seem fair that we get this bottom line and get started.

I think also the surrounding of somebody's property with the Berlin Wall and monitoring for gases, which don't seem to be there, seems to be a horrible intrusion on the right of ownership and the right of use. But I would strongly recommend that dollars are finite today, solutions seem to be available beyond the extremes we've heard from your Department and I would ask you to please keep the taxpayers in mind and at least keep the property owners in mind. Thank you.

MR. POWELL: Thank you Mr. Rademaker. Mr. Frank Boyle.

15

MR. BOYLE: My name's Frank Boyle, I'm a commissioner of the Liberty Lake Sewer District, I'm a resident of Liberty Lake, Washington, and you do have a letter from us that we sent into your file and I just am here tonight to reiterate our concerns along with the concerns of the preceding people of overspending to cure a problem that could be taken care of with much less expense. Our original recommendation was for option number 5, which I believe is wells and pump the water and put it into the pipe and send it down to the sewer treatment plant. It's much less expensive then six million dollars and make sure that putting a land cap over the top - - a cap over the top of the landfill if that contaminant is moving down through there it's still gonna get in the aquifer while pumping would make it a rather you know any chance of it getting (inaudible).

MR. POWELL: Thank you Mr. Boyle. Ms. April Taylor

MS. TAYLOR: Hello, I'm April Taylor, I live at 19921 East Sixth Avenue, Greenacres, and I'm a secretary of the Mica View Landowners Association and,

MR. POWELL: We can't hear you.

MS. TAYLOR: Sorry, I'm the secretary of the Mica View Landowners Association, and as I represent some of the residents
16 west of this landfill I feel there needs to be a study done on the west side of the landfill so those people will be protected and know if there are any contaminants coming down the hill. This action may cause an increase in the area that needs to be monitored and restricted. Personally, I support the DOE proposal because of the risk of small multiple contaminants to the sole source aquifer. What is our aquifer worth? What if it was contaminated? How much would it cost us to clean up the big aquifer? If Spokane doesn't
17 chose the DOE study is there money available for us also? What does cleaning up just the water do like option 5 or 6?

And here was a question about the magnesium, you
18 mentioned that it wasn't tested as it would be filtered. Is it possible to test it now that it's filtered?

Thank you very much.

MR. POWELL: Thank you Ms. Taylor. Lynn Goyne. That person had a question mark so - Lynn Goyne. Apparently that person has departed.

Mr. Al Rueter. Did I pronounce your name correctly?

MR. RUETER: Yes, you did good. On this sketch I scratched out some notes here as people were talking so this isn't very organized. But I'm a landowner in the area and I'm also a Spokane County tax payer, and I kind of believe we need to do all we can to clean up after ourselves. I thank you people for the efforts you put forward, I appreciate the chance to talk on this, and I also
19 support the recommendations of the Department of Ecology. My concerns here though are is it enough, could we do more? I believe in addition to a cap the strict zoning is important. I know years ago there was a major development plan for the area and I'd be concerned, like this bedrock wall or that you said kind of funnels everything to the north. What if that got disturbed, would this stuff leach in other directions? So I'd like to see the cap, I'd like to see a strict zoning put around that to make sure that the cap does not get disturbed.

I'm also worried about special interest groups and litigation and this whole process getting delayed. I believe you
20 said Mr. Deutsch, Doicht, or -- said -- stated something about the cap a few years ago where it would have been a couple million dollars and six million now or whatever, maybe I misinterpreted what you said.

But the bottom line is the prices are gonna escalate. If we don't act now it's gonna be a lot more expensive in the future. I was really concerned that Spokane County spoke up against this. I was wondering to myself who is Spokane County? I mean we are Spokane County, the people that live in Spokane County, nobody asked me if we were for it or not, the first I really heard about it is tonight. I think it's a great idea. I'm kind of upset that Spokane County is against this. I believe they're thinking about dollars and not the people that live in Spokane County. And what's it gonna take, are we gonna have to incorporate to get this thing done you know I mean it's a - I was never for it before but I'm beginning to wonder. How do you put a dollar value on the quality of life? I have children here, we're trying to raise a family here, you know I wasn't here twenty years ago when this mess was made but I feel being a landowner in the area, I feel responsible for it and I'm willing to pay my share of the taxes to do whatever it takes to take care of this problem.

So I guess my big concern is that I'd like to see us not delay this cleanup any longer. I'd hope there wouldn't be litigation, I'd hope Spokane County would listen to its tax payers and do what we want.

21

I think it was stated in the presentation that it could take twenty years for this stuff to leach down through to where it would get to the aquifer and I guess the question I would have is if it takes twenty years for that to leach down and if the things been closed like basically for twenty years, are we seeing just the beginning of it now, could this get much worse? And in five years if this does get worse and if we decide oh we better put a cap on this thing now, what's it gonna cost in five years to put a cap on this?

So I guess what I'd say is thanks for the job you did I haven't read through everything yet but just from what I've heard tonight I'd support your recommendations and I hope the county doesn't delay this. Thank you.

MR. POWELL: Thank you Mr. Ruder. That's the last of the cards that I have for folks that have indicated in writing that they'd like to speak. As I promised, if there's anyone else here who would like to come up and make formal comment please now is the time to do it. Yes sir if you would come up and introduce yourself.

22

JOHN: John is my name, I am a taxpayer out here and have land just like the fellow before me, I'm -- one of the things that a lot of people don't realize I think and this is it isn't shoes and garbage cans, it's in the dump. The perpetrators in this deal, we're in the building of one of the perpetrators that dump their crap in there. Hewlett-Packard, Key Tronics, don't shake your head no. My son-in-law was the one that dumped those fifty-five gallon barrels of that crap over in the dump for twenty bucks.

So I know instances where it went over and this stuff does not decay in five years. It's got a shelf life of a hundred -- a hundred and twenty thousand years. There's no way you're gonna fight it unless you cover it. Just like Chenobol, they left -- they left the place. There's nothin' you can do. This isn't garbage 23 cans and nails, and a little engines, this is all kinds of different things in there. Where's the trees at? Look up on the hill. We all drink the stupid water, we all drink it don't we? Either drink milk, you drink water, all the pop that's bottled here they use the water of the aquifer to do it with. Where's the trees up on the hill? You look over on the other side, the east side where there's not a dump, there's all kinds of trees. You look over there, there's no trees. If trees don't grow there there's gotta be something bad in my estimation, underneath the ground. And like I say it's just a -- the perpetrators that -- everybody did it, the Key Tronics, ISC, Hewlett-Packard, they all dump their stuff, they did in Colbert. Same thing, they dump there. There isn't as many people in Colbert as there is here. And this deal of we're gonna monitor it, five hundred thousand dollars a year. Great, ten years. That's the same thing as putting the cap on it. Am I right? Five hundred thousand dollars a year, ten years, that's five million bucks. You can put the cap on for the same damn thing. Excuse the language.

Okay, I guess I spoke my peace.

MR. POWELL: Sir could I ask you just to repeat your name again? I don't think we got it.

JOHN: I don't know if I want to repeat my last name I'm libel to get bumped off. I'm not kiddin'. There's a lot of money in this.

MR. POWELL: Alright sir, that's fine.

JOHN: There's a lot of money in this deal on the thing.

MR. POWELL: Alright, alright. Thank you for your comments.

JOHN: Cause I don't think Hewlett-Packard and the rest of would want to help cleanup that deal in there when there's money in it.

MR. POWELL: Alright John, thank you sir. Is there anyone else? Mr. Neal I want to make sure everyone else who hasn't had the opportunity to speak does so. Yes sir, if you would please come up. And I'll give you a second opportunity Mr. Neal.

24

MR. HIGGINS: My name is Pete Higgins, I live at East 20221 8th Avenue, I am also a taxpayer and I am all in favor of taxing for those where the public derives the greatest benefit. I've lived in this area for a little over fifteen years. As a kid I spent a lot of time at Liberty Lake, I can remember the activity or the dump being there in the 40's, it wasn't of great use in those days. It wasn't something that unless you were a local resident you really didn't even know it was there. I have heard the comments about capping and I understand that -- that is just the first step. We'll cap it, but we'll still monitor it, we'll still test it and then in the future, if it's deemed necessary, we will do more as the next step.

I have talked to the local water district they have detected nothing at all within a half mile, they have one well within a half mile, they have many wells in all directions, and they have detected no, nothing, zero, of any type of pollutant that could have come from this or would have been ascertained and have come from this -- this landfill. I'm in favor of capping and protecting the environment and the public but I don't think in this case that we have a place where this type of activity needs to be done. We can spend our money in better places -- to get a better job. This one is not going to cause the people in the City of Spokane or in the County of Spokane any problem in the future. That's my opinion.

MR. POWELL: Thank you Mr. Higgins. Is there anyone else. Mr. Neal what I don't want to do is I don't want to turn this into a format where you were gonna rebut any of the previous comment, we're here to receive public comment, so if you have something additional that you'd like to make in behalf of the county that's certainly appropriate. But I really don't -- the format is for us to receive comment and I -- I really don't want to be giving you or to turn this into a public debate. Is there...

MR. NEAL: I appreciate that but you must understand that if this thing goes up it goes up on the record and I don't want the record to reflect that Hewlett-Packard or ISC or Key Tronics ever dumped anything in this landfill. There is no evidence at all to that.

MR. POWELL: We will respond to every comment that's been received here tonight and we will respond with everything that's in the official public record up to this point in time.

MR. NEAL: Alright, thank you very much.

MR. POWELL: Alright sir. Sir, same response.

MR. RADEMAKER: I'm not gonna say a word other then to mention that I handed in a written response and I'd ask that to be a part of the public record.

MR. POWELL: Yes sir, most definitely. In fact, again

MR. RADEMAKER: I'm Mr. Rademaker, thank you.

MR. POWELL: Yes sir, thank you. I will reiterate that for everyone. If you are here tonight and you want to respond to us formally in writing even though the comment period, which we have extended since it was originally set to terminate on August the 19th, if you're here tonight we will take your written comments. Please make this known to Ms. Broadhead right after we adjourn so that we'll know to expect your comments in a few days. We will take anybody here tonight, your comments, if you get to us you know in a reasonable amount of time. Okay, I saw one other hand. Yes sir.

UNIDENTIFIED MAN: I was gonna say I'd like to provide a comment.

MR. POWELL: Yes sir, you certainly may and we will accept them and it will be part of the official record for this meeting.

MS. BROADHEAD: And even if you don't get in touch with me tonight, please -- either give me a call and let me know it's gonna take you a few days or drop it by our office this week or the beginning of next and of course I will include those.

MR. POWELL: On the agenda we've given out names, telephone numbers and addresses you know so please communicate with us whatever means you -- you would desire. So you know you're important to us and we really do appreciate this -- this great turn out.

MR. NEAL: Why don't you give me one last minute. I'd like to have the opportunity.

MR. POWELL: Would you introduce yourself for the record?

25

MR. NEAL: Yes, I'm sorry. Jerry Neal with the county. I'd like to have the opportunity to -- to make sure there's an agreement on what is the official record, it's always important to know what this record consists of and before any determination is made by the Department as to what it -- what it is going to include on the record. I'd appreciate it if you could give us an opportunity to review that so that we can ensure from the county stand point that the record was complete. Thank you very much.

MR. POWELL: Certainly Mr. Neal. I want to reiterate to everyone under the State Public Disclosure Act the entire record for this for this site is available to the public. I will say there are some exemptions to public disclosure and I'd be more then happy to discuss those with you if you -- if you have a need for that information. But generally speaking everything in the -- in the record for this site is open to the public with only very few exceptions.

26

UNIDENTIFIED MAN: How would the people have an opportunity to read the comments that are presented and the questions here this evening?

MR. POWELL: Thank you, and I'll -- I mentioned this earlier and I'll reiterate, in fact it's in my closing remarks, everyone that's here tonight, and please I hope everyone has filled out a card so that we have your name and mailing addresses, Ms. Dee Weber, the lady in the back, she was down there, if you haven't done so please fill one out before you leave. Everyone on -- that has registered a card with us will receive a copy of this formal written Responsiveness Summary where we will respond to everything that was said here tonight and everything that we have received in writing up til this date and for everybody here that wants to respond after this in writing. So you will get a copy of this Responsiveness Summary. It's a very important document to us and so you will be able to -- to read how the Department responds to every comment that's been made. Yes sir?

UNIDENTIFIED MAN: I have a question. What possible exemptions would there be that would not be part of public record?

MR. POWELL: I'd be more then happy to explain that to you. These are exemptions that are required by state law. It's not something Ecology determines but as far as the Public Disclosure Act under -- in the RCW, Revised Code of Washington, that's something that's laid out by law and I'd be more then happy to explain those to you.

MR. GUILLETT: Well my name is Jim Gillett and I'm a resident of Liberty Lake.

MR. POWELL: Yes sir.

MR. GUILLETT: And I'm concerned about this very much. But could those exemptions be stated in the material that we receive?

MR. POWELL: Yes sir, we will be more then happy to do it, it's being recorded as we speak.

27 MR. GUILLETT: Well give us some examples perhaps?

MR. POWELL: Yes, we can do that.

MR. GUILLETT: I'm -- I just don't understand what would not be part of the public record.

MR. POWELL: Nothing about this meeting yes is exempt from public disclosure. What -- there are things in the record that are exempt by state law. I mean the record that we have in our office, these banks of files, the formal administrative record for this site. There are some documents in there that are exempt from public disclosure and we will tell you in the Responsiveness Summary what those -- those categories are and give you some examples.

UNIDENTIFIED MAN: And why?

MR. POWELL: Yes sir, yes sir, we can do that.

UNIDENTIFIED MAN: It sounds ominous.

MR. POWELL: It's really not, it's not ominous, it's really not. Yes mam, we have a question here. Would you please stand. Would you like to comment?

MS. KEATING: Yes sir, I would. My name is Bev Keating. I'm a resident of Spokane and I've got some questions with listening, with reading material and listening to this presentation
28 tonight. It really doesn't - I really didn't hear from the cost per year of the pumping and treating would be, and for how many years would this go on, versus the cost of the cap?

It seems to be that it's unknown what - whether or not, at this point, at this time, due to either a lack of monitoring wells or monitoring wells closer to the Spokane Aquifer, whether that aquifer -- the main Spokane County Aquifer has been
29 contaminated or what's the potential for it to be contaminated? That looked pretty -- I'm no scientist, but that looked pretty close to me. The cap area, that plume seems to be -- be beyond the area and it's migrated off the site down towards the freeway beyond that cap area.

By placing the cap up there that and reducing the levels
30 underneath that cap is that gonna reduce it down below there where it goes down by the freeway?

There just seems to be a lot of unknown and a lot of, you know, what's the cost of this litigation gonna be, or potential
31 litigation, is it gonna end up being more than the six million -- than the six million dollars we're gonna spend on the cap?

Can't we resolve this as -- as people? It seems like all I'm hearing tonight it's gone on five or six years and the costs just keep rising. Pretty soon we're gonna be beyond that. And I think it's great, I keep hearing no wells - are have been contaminated. I live out by Marshall and we've got a real sad situation out there. We do have some wells that are just starting to be contaminated. I don't want to see that happen here. I think something should be done now before we end up with a bad situation. Thank you.

MR. POWELL: Mam, if we could ask you just one more time for the record to repeat your name and address I'm not sure we got that.

MS. KEATING: My name's Bev Keating and my address is Route 14, Box 962, Spokane, 99204.

MR. POWELL: Thank you Ms. Keating. Okay. Is there anyone else that would like to provide comment?

UNIDENTIFIED MAN: One last thing.

MR. POWELL: Yes sir if you'd please -- please stand

JOHN: How many wells are in the immediate vicinity? Most of -- everybody's on consolidated water so they're really not on a well to get contaminated.

MR. POWELL: Okay I'd just like to for the record, this is Mr. John who spoke previously and we'll get you an answer to that question in the Responsiveness Summary.

JOHN: Thank you.

MR. POWELL: Thank you sir. Yes sir.

MR. WILLIAMS: I just have a question.

MR. POWELL: Ya please -- please stay under

MR. WILLIAMS: My name is Mark Williams and it's not a comment really, I just want to know when we can expect a decision, is there a time limit or anything like that?

MR. POWELL: Ms. Broadhead could you respond to that please.

MS. BROADHEAD: Basically what we all have to do is take all these comments, possibly re-look at the data in some cases and so it's basically how long it takes us to accumulate your comments, take them into consideration, look at our decision in light of that and get a Responsiveness Summary answering the concerns that are addressed here tonight. So hopefully, two weeks to two months. I know that's a broad frame but there's been a lot of good comments here tonight so it may take us up to two months.

MS. GOLDSTEIN: If there is a change in the proposed draft, a substantial change to the selection that selection of remedy, we are required to go through another public comment period. So once again all of these steps require a lot of public participation but also prolong actually going -- going the next step further which hopefully will be negotiations with Spokane County on a Consent Decree to implement those Cleanup Action Plans.

MR. POWELL: Thank you Ms. Goldstein. Okay one more thing I want to pass on to you. Everyone here tonight will also be on the mailing list for this site. So you will be receiving future public notices about any developments or any milestone about the cleanup for this site. You're -- you will be in the loop, in the loop. Yes sir.

MR. MYERS: My name is Joe Myers I just bought in over here at Meadowood, the Village, so I don't know too much of what's going on but.

MR. POWELL: Sir do you want to make a comment?

MR. MYERS: Ya.

MR. POWELL: Could I ask you to come up here please so that everyone can hear you. Thank you. And if you would restate your name again, I'm sorry.

MR. MYERS: Joe Myers. The county has hired ample study to go into this I'm told that a cap will take care of the problem, which we don't know. We know that it is abating and I can't see why another four or five years of monitoring, what does it cost to monitor?

32 **UNIDENTIFIED MAN:** Five hundred thousand dollars a year.

MR. MYERS: A year?

UNIDENTIFIED MAN: No it was estimated at a hundred to fifteen thousand a year.

MR. MYERS: Okay. Five hundred thousand against and who knows what the caps gonna do. Maybe the cap will make it worse. Maybe the cap with the water will gorge down there and carry it close to the Spokane. So I'm with the county, they've got ample study going into it. I've never seen the county too worried about the tax payer when it comes to protecting the people. So I would go with the county.

MR. POWELL: Thank you Mr. Myers. Now is there anybody else before we adjourn that would like to make a formal comment for the record? Okay, just a reminder, Ms. Broadhead is the site manager, you've got information to how to get in contact with her. There'll be a Responsiveness Summary forthcoming and if you want to submit written comments of you know as part of this public meeting tonight please do so, make those desires known to her and on that note I'd like to thank, really thank, everyone for coming. We appreciate the great turn out. Again I want to thank Mr. Marty Gilchrist from Hewlett-Packard for making these facilities available to us and being a gracious host and on behalf of the Department of Ecology thank you very much for coming tonight we appreciate your help, appreciate your good courtesy and on that note I'd like to adjourn this meeting at Ten P.M. exactly.

Thank you and good night.

Woodward-Clyde Consultants

Engineering & sciences applied to the earth & its environment

DECEIVE

DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

October 21, 1992
8720111E

Ms. Roxane Broadhead
Department of Ecology
Toxics Cleanup Program
N. 4601 Monroe, Suite 100
Spokane, WA 99205-1295

Subject: Copies of Visual Aides Used in the Formal Comment Made at the Greenacres Landfill Public Meeting Held on October 20, 1992

Dear Ms. Broadhead,

Enclosed are the materials I used to make a formal comment at the public meeting.

If you have any questions, please call.

Sincerely,

WOODWARD-CLYDE CONSULTANTS

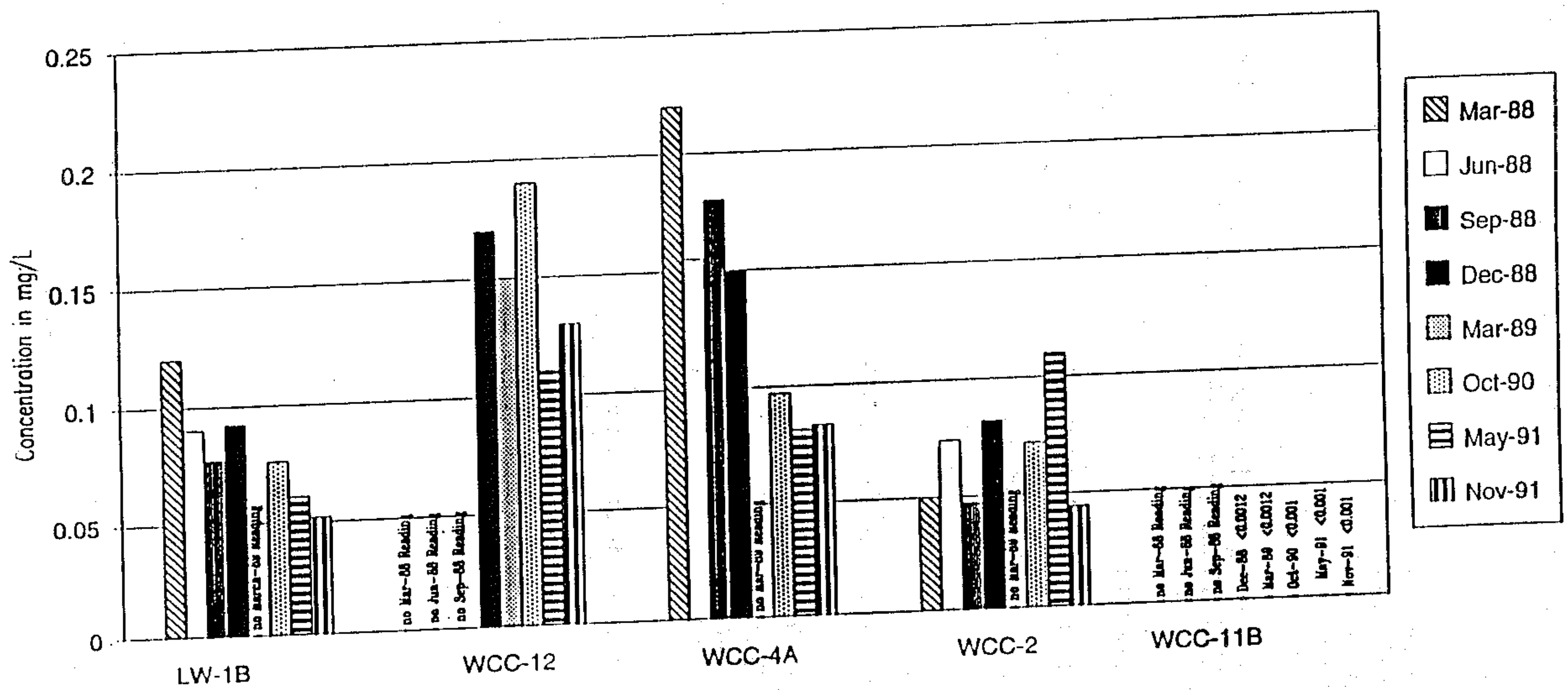
William J. Deutsch
Greenacres Landfill
Project Manager

cc: Dean Fowler (Spokane County)

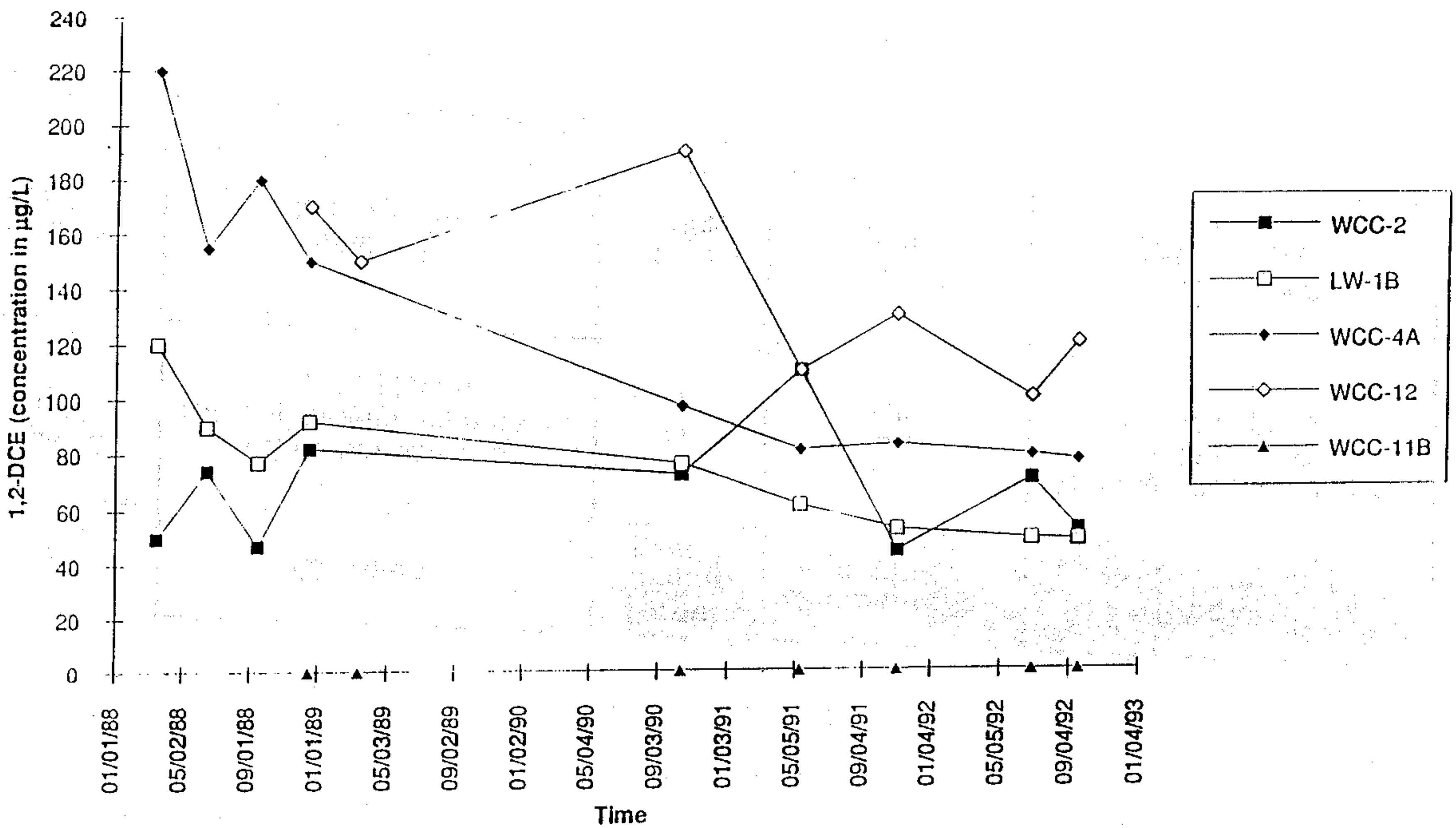
enclosures

3440 Bank of California Center • 900 Fourth Avenue • Seattle, WA 98164 • (206) 343 7333 • Fax (206) 343 0513

1,2-Dichloroethene (DCE), total



Concentrations of 1,2-DCE in Groundwater



Woodward-Clyde Consultants

Estimated Time to Achieve Target Cleanup Levels at LW-1

LW-1	Chemical	Target Cleanup Level	Concentration (9-23-92)	Predicted Year Attained [a]
Organic (µg/L)	1,2-Dichloroethane	5	ND	Already Attained to 1997
	1,2-Dichloroethenene (total)	50	48	1994 to 1998
	Vinyl Chloride	1	ND	1992 to 2000
Inorganic (mg/L)	Antimony	0.05	ND	1993 to 2006
	Manganese	0.005	0.59	2032 to 2033

a Based on groundwater samples which were not field-filtered.

Woodward-Clyde Consultants

A Perspective on the Cost of the Cap

- Assuming an average domestic water consumption of 60 gallons / day / person the alluvial aquifer can supply 240 people

- The cost of the cap is $6,000,000

- The cost of the cap is $25,000 for each of the 240 people supplied by the alluvial aquifer

Current and Future Conditions

- ❑ The landfill has undergone several flush cycles which have likely already flushed out the most mobile contaminants
- ❑ Current detected concentrations of organic compounds at LW-1 are close to the target cleanup levels and are anticipated to decrease to cleanup levels without construction of a cap
- ❑ Current public water supply is available to current and future users
- ❑ Institutional controls will protect future users

Woodward-Clyde's Recommendations

- ❑ Establish institutional controls
- ❑ Evaluate the concentration of trace metals in groundwater samples which have been field-filtered
- ❑ Monitor groundwater periodically for chemicals which exceed the target cleanup levels
- ❑ Re-evaluate the need for a cap after 5-years of groundwater monitoring

RESPONSE TO NO. 10: OCTOBER 20, 1992 PUBLIC MEETING TRANSCRIPT - LIBERTY LAKE, WASHINGTON

1. The selected remedial action is widely accepted as reasonable and cost effective for closure of existing landfills throughout the United States whether the landfill has had a demonstrated release of hazardous substances or not. Therefore, a cap over a landfill that has confirmed releases of hazardous substances in excess of drinking water standards over an extended period of time, would pass the same test for a reasonable and cost effective solution.

   Please see response to Comment 13 of this letter.

2. The graph shows levels of 1,2-DCE decreasing over time. This contaminant is only one of eleven contaminants that have been identified as an indicator hazardous substance for Greenacres Landfill. Similar graphs of other indicator hazardous substances, such as tetrachloroethene, show increases in concentrations over time in wells located immediately beneath the landfill and relatively constant in wells downgradient from the landfill.

   Please see response to Letter 1, Comment 2.

3. The Cleanup Action Plan states that monitoring of ground water is not an acceptable remediation alternative. It also states that ground water concentrations are expected to decrease due to the effect of the cover at limiting infiltration, the mechanism for leachate production and migrations.

   WAC 173-340-420 requires an evaluation of the cleanup action no less frequently than every five years. The purpose of the evaluation is to consider: a.) the effectiveness of the cleanup action, b.) new scientific information for hazardous substances present, c.) new applicable state and federal laws for hazardous substances, d.) the availability e.) the practicability of higher preference technologies and f.) other factors as stated in the regulation.

   Ground water data does not indicate that acceptable cleanup levels will be achieved in the alluvial or bedrock wells in five years if no action is taken. The landfill was in operation since the 1940's and has been closed for 20 years. Ground water contamination is still above acceptable drinking water standards. Furthermore, the landfill continues to actively degrade, as evidenced by methane levels, leachate concentrations, and subsidence. The Remedial Investigation (Woodward-Clyde Consultants, 1989, p. vii) states "Contaminant levels have not changed significantly since the initiation of ground water monitoring under the Section 208 program (1978). The conclusion is that sources will continue to contribute contaminants to ground water for years to come."

4. Please see response to Letter 1, Comments 2 and 4.

5. Antimony was detected above health based cleanup levels in three monitor wells - two bedrock wells and an alluvial well beneath the landfill. The effects of filtering on antimony concentrations were not tested.

The federal drinking water standard for manganese is 50 ug/L. Manganese was detected in several monitor wells. The maximum detected concentration exceeds 5000 ug/L. Manganese concentrations of filtered samples were compared with unfiltered samples at the site. No significant differences were detected between the filtered and unfiltered samples.

Please see response to Letter 1, Comment 4.

6. WAC 173-340-360(9)(e) states "Ecology expects that cleanup actions will return useable ground water to their beneficial uses whenever practicable, within a reasonable time frame. When restoration of ground water to beneficial uses is not practicable, ecology expects to require measures to minimize/prevent future migration, minimize ongoing releases, prevent exposure to contaminated water and other appropriate measures..." No action is not an acceptable alternative for remediation of a current and potential future source of drinking water.

7. Institutional controls and alternative water sources supplied to residences affected by the contaminated aquifer are not acceptable final cleanup actions under the Model Toxics Control Act Regulations [chapter 173-340 WAC].

Comparison of filtered versus unfiltered samples on metal concentrations in ground water has been done and results indicate no concentration difference.

Monitoring ground water to postpone a cleanup action is not similar to monitoring ground water to evaluate the effectiveness of a cleanup action.

Please see response to Letter 1, Comments 1 and 4.

8. The purpose of MTCA is to protect both <u>human health and the environment.</u> RCW 70.105D.010 (Model Toxics Control Act) in the Declaration of Policy states "Each person has a fundamental and inalienable right to a healthful environment, and each person has a responsibility to preserve and enhance that right. The beneficial stewardship of the land, air, and waters of the state is a solemn obligation of the present generation for the benefit of future

generations." WAC 173-340-100 states "The goal of this chapter is to implement the policy declared by chapter 70.105D RCW. This chapter provides a workable process to accomplish effective and expeditious cleanups in a manner that protects human health and the environment."

Environment is defined in chapter 173-340 WAC as "any plant, animal, natural resource, surface water (including underlying sediments), ground water, drinking water supply, land surface (including tidelands and shorelands) or subsurface strata, or ambient air within the state of Washington or under the jurisdiction of the state of Washington."

9. An immediate threat to human health at any contaminated site would justify an emergency action to mitigate that threat. After alleviating any immediate threats to human health, studies to investigate and remedy potential long-term threats to human health and the environment are conducted.

The alluvial and bedrock aquifers contaminated by the landfill were a source of drinking water prior to contamination and are a potential future source of drinking water. WAC 173-340-720(1)(a) states "Ground water cleanup levels shall be based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site use conditions. The Department has determined that for most sites drinking water is the beneficial use requiring the highest quality of ground water and that exposure to hazardous substances via ingestion of drinking water and other domestic uses represents the reasonable maximum exposure. In the event of a release of hazardous substance, treatment, removal, or containment measures shall be conducted to reduce the concentration of the hazardous substance in ground water to concentration consistent with this use ..."

10. Spokane County and Holiday Hills Development, Inc. were named as Potentially Responsible Parties (PRP) by the United States Environmental Protection Agency (EPA) in 1985. Both parties were then notified that EPA entered into an agreement with the Washington State Department of Ecology to assume lead role in the investigation and remediation of the site.

RCW 70.105D.040(1) sets forth the standards of liability under MTCA as "Except as provided in subsection (3) of this section, the following persons are liable with respect to a facility:
(a) The owner or operator of the facility;
(b) Any person who owned or operated the facility at the time of disposal or release of the hazardous substances;
RCW 70.105D.040(2) further states "Each person who is liable under this section is strictly liable, jointly and severally, for all

remedial action costs and for all natural resource damages resulting from the releases or threatened releases of hazardous substances."

Spokane County and Holiday Hills Development, Inc. may submit the names of other persons whom there is reason to believe may be potentially liable persons (PLP) at the facility. If there is credible evidence of their potential liability under RCW 70.105D.040, they will be notified and will incur the same liability as other PLP's.

11. Please see response to Comments 8 and 9 of this letter.

12. The Department of Ecology and Spokane County have had numerous discussions and correspondence regarding the issue of whether Chapter 173-304 WAC, The Minimum Functional Standards for Solid Waste Handling (MFS) is applicable to the cleanup of Greenacres Landfill. The Department maintains the position that the cleanup of Greenacres Landfill must comply with applicable state and federal law as defined under the Model Toxics Control Act Regulations [Chapter 173-340 WAC].

WAC 173-340-710(6) identifies "selected applications of specific applicable state and federal laws to cleanup actions." Subsection (c) states: "Solid waste landfill closure requirements. For solid waste landfills, the solid waste closure requirements in chapter 173-340 WAC shall be minimum requirements for cleanup actions conducted under this chapter."

13. WAC 173-340-360(5) is the section of the regulation describing permanent solutions. WAC 173-340-360(5)(d)(vi) is one of seven criteria used to determine whether a cleanup action is "permanent to the maximum extent practicable". WAC 173-340-360(5)(d)(vi) states " Cleanup costs. 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. When selecting from among two or more cleanup action alternatives which have an equivalent level of preference under subsection (4) of this section, preference may be given to the least cost alternative. In performing this evaluation, the top three preferences in subsection (4) of this section shall be considered equivalent unless there are overriding public concerns or technical uncertainties."

WAC 173-340-700(5) states "Threshold criteria for all cleanup actions. WAC 173-340-360 specifies that all cleanup actions conducted under this chapter shall protect human health and the environment, comply with cleanup standards and applicable state and federal laws, and provide for compliance monitoring. These are the threshold criteria and all cleanup actions must meet these criteria regardless of other factors such as cost or technical limitations." A low-permeability landfill cover meets the specified threshold criteria.

14 We agree that twelve years is a sufficient length of time for study and investigation and it is now time to actively cleanup the site and remedy the problem. The Cleanup Action Plan is the phase of the process in which a cleanup action is selected for a contaminated site. The Department of Ecology is working toward swift and successful negotiations with Spokane County for a Consent Decree that will implement the design and construction of the selected cleanup action plan.

15. Ground water pump and treat systems have had limited effectiveness at sites where the source of the contamination has not been contained. Substantial increases in remediation time have also been noted in cases where there is no source containment. In addition, the pump and treat systems alternatives proposed (Feasibility Study, Woodward Clyde Consultants, 1991) only address contamination in the alluvial aquifer not the contaminated bedrock aquifer. A landfill cover will reduce or prevent future contamination of both of the aquifers.

For a more detailed response, please see response to Comment 17 of this letter and Letter 4, Comment 3.

16. Please see response to Letter 6, Comment 1.

17 Ecology has determined that option 5, without source containment, is not an effective alternative for remediating the contaminated alluvial and bedrock aquifers. However, the cost of option 5 - Pump and Treat with discharge to the City of Spokane's Publicly-Owned Treatment Works (POTW) without source controls - is estimated in the Feasibility Study (Woodward-Clyde Consultants, 1991). The present worth estimated cost, based on a time frame of 40 years and depending on the assumed discount and inflation rate ranges, from $2.5 million to $5 million.

18. Please see response to Letter 1, Comment 4.

19. Specific restrictive covenant language was included in the Final Cleanup Action Plan. Activities on properties adjacent to the facility that will result in the release of hazardous substances which are contained as part of the cleanup action are restricted.

20. Please see response to Letter 7, Comment 4.

21. We do not anticipate the problem getting worse, however, there is no clear evidence the problem is abating at this time. As state in the Remedial Investigation (Woodward-Clyde Consultants, 1989) "Physical/chemical processes affecting the environmental fate of contaminants in soil, ground water, and soil gas indicate that the future release rate and fate will not change substantially from current existing conditions."

Please see response to Letter 1, Comment 2 and Letter 7, Comment 2.

22. There is no evidence that Hewlett-Packard or Key Tronics disposed of wastes at Greenacres Landfill. However, if you are aware of materials or substances dumped at the landfill, and there is credible evidence of the dumping, the information would be beneficial to the understanding of this site and identifying other potentially liable persons.

23. There is no evidence that ISC disposed of anything at the Greenacres Landfill. The potentially liable parties at the Colbert Landfill are a matter of public record for that site.

24. Compliance monitoring is required for all cleanup actions performed under MTCA [WAC 173-340-410]. The purpose of compliance monitoring is to a) confirm that human health and the environment are adequately protected during construction and operation and maintenance period of the cleanup action; b) confirm the cleanup action has attained cleanup standards; and c) confirm the long-term effectiveness of the cleanup action. WAC 173-340-420 requires the Department to review the cleanup action no less frequently than every five years if hazardous substances are left on-site. The only way periodic reviews of the cleanup action would not be necessary is if the refuse were destroyed or removed from the site and ground water achieves established cleanup levels.

25. A recording of this entire public meeting has been transcribed and is part of the official record. These tapes and/or transcripts are located at the office of the Washington State Department of Ecology, N. 4601 Monroe, Suite 200, Spokane, Washington, and are available for review by any interested member of the public. Comments made during the formal comment period and meeting transcripts are included in the Responsiveness Summary as part of the Final Cleanup Action Plan. A copy of the responsiveness summary will be sent to every person who submitted written comments or attended this meeting and filled out an address card.

26. Please see response to Comment 25 of this letter.

27. For clarification, the entire public meeting, including presentations, questions and answers, and formal comments are all part of the public record. The Public Disclosure Law, RCW 42.17, governs the public disclosure of government records. All public records or documents must be available for inspection by the public except for documents that are specified in RCW 42.17.310, RCW 42.17.315 and RCW 42.17.260. Following is a list of documents specifically exempt from the public record:

   1. Specific intelligence information: This would include evidence that was pertinent to an investigation during the course of the investigation.

   2. Information revealing the identity of persons who file complaints.

   3. Valuable formulae, designs, and drawings: This exemption is used for trade secrets related to work done by contractors.

   4. Preliminary drafts, notes, and intra-agency recommendations.

   5. Records which are relevant to a controversy: An example of this exemption would be attorney-client privileged materials.

28. Please see response to Comment 17 of this letter and Letter 7, Comment 4

29. Ground water contaminated by the landfill discharges to the Spokane Valley Aquifer. The 1,2-DCE contaminant plume appears to end at the Spokane Valley Aquifer due to the inability to technically detect the contaminant in the much larger aquifer, not because the plume has not migrated beyond the boundary shown. The Remedial Investigation (Woodward-Clyde Consultant, 1989, page 5-17) states "The large disparity between the volume of the ground water of the Spokane Aquifer and the volume of the ground water recharge from the Greenacres Landfill prohibits practical tracing or detection of the contaminant plume from the Greenacres Landfill into the Spokane Aquifer. Nevertheless, the continuing release of chlorinated volatile organics to the Spokane Aquifer is expected to continue at the current rate for an extended period of time."

30. The landfill cover will prevent future contaminant migration from the landfill. It does not restore the existing contaminated aquifers. Pump and treat technologies were evaluated to determine

whether they should be required as part of the cleanup action plan. However, due to the physical and chemical properties of the alluvial and bedrock aquifers, it is questionable as to whether pump and treat would be effect at restoring ground water to safe drinking water levels. Therefore, a pump and treat system was not included in the cleanup action plan. The site will be monitored to assure the effectiveness of the landfill cover. Pump and treat technologies may be reevaluated during the five year mandatory review of the site.

31. Please see response to Letter 7, Comment 4.

32. The 1991 Feasibility Study (Woodward-Clyde Consultants) estimated the cost of ground water monitoring at $13,100 annually. Mr. Deutsch, Woodward-Clyde Consultants, estimated the cost of ground water monitoring at $100,000 to $150,000 annually during his presentation (Greenacres Landfill Public Meeting Transcript, 1992).

Please see response to Letter 1, Comment 4

EXHIBIT C

Scope of Work and Schedule

EXHIBIT C

Scope of Work and Schedule

The Scope of Work is to be used by the Potentially Liable Parties (PLPs) or their consultants to develop Work Plans for implementation of Consent Decree No. _______ for closure of the Greenacres Landfill. The PLPs will furnish the personnel, materials, and services necessary for, or incidental to, preparing plans and reports and the implementation of the cleanup action.

The tasks and schedule for completing this Scope of Work for cleanup of Greenacres Landfill is provided in Table 1. A description of these tasks is provided in the following paragraphs.

Task 1.0 Project Management Plan

The Project Management Plan describes the management strategy for the site. In accordance with the terms of the Enforcement Order (DE 94TC-E101), the draft version of this document has been submitted to Ecology and is currently under review.

Deliverables: *Project Management Plan (Draft) submitted March 1, 1997*
Project Management Plan (Final)

Task 2.0 Landfill Closure Alternatives Evaluation

The landfill closure alternatives evaluation presents the conceptual design and estimated costs for the landfill cover system for the Greenacres Landfill closure.

In accordance with the terms of the Enforcement Order (DE 94TC-E101), the draft Landfill Closure Alternatives Evaluation Report has been submitted to Ecology and is currently under review.

Deliverables: *Landfill Closure Alternatives Evaluation Report (Draft) submitted May 15, 1997*

Landfill Closure Alternatives Evaluation Report (Final)

Task 3.0 Project Plans

3.1 Work Plan

The Work Plan is a general document that is used for completing the closure of the Greenacres Landfill. The Work Plan includes specific tasks and schedules for closure activities.

In accordance with the terms of the Enforcement Order (DE 94TC-E101), the draft Work Plan has been submitted to Ecology and is currently under review.

Deliverables: *Work Plan (Draft) submitted April 1, 1997*
Work Plan (Final)

3.2 Public Participation Plan

A Public Participation Plan will be developed to provide the public with timely information and an opportunity to participate in accordance with Chapter 173-340-600(8) WAC. A model Public Participation Plan, dated October 24, 1991, is available for use as the format of the final Public Participation Plan.

Deliverables: *Public Participation Plan (Draft)*
Public Participation Plan (Final)

3.3 Safety and Health Plan

The contractor is required to prepare a Safety and Health Plan prior to conducting construction activities for closure of the Greenacres Landfill, as required under Chapter 173-340-WAC. The plan will comply with the requirements of the Occupational Safety and Health Act of 1970 [29 U.S.C. Sec 65 et seq.] and the Washington Industrial Safety and Health Act (Chapter 49.17 RCW]. The Safety and Health Plan will include the following:

- Level of protection
- Hazard evaluation
- Waste characterization
- Special site considerations
- Emergency plan information

A comprehensive description of the requirements for the Safety and Health Plan will be provided as a section to the specifications in the construction documents.

Deliverables: The Safety and Health specification will be submitted as part of the Construction Plans and Specifications (Task 6).

3.4 Interim Groundwater Sampling and Analysis Plan

The Interim Groundwater Sampling and Analysis Plan presents the interim plan for groundwater monitoring that will be in place until the Compliance Monitoring Plan is completed. The wells and analytes to be monitored are included in the June 2, 1997 letter from William Fees at Ecology to David Haddock at Woodward-Clyde Consultants. The plan will provide additional details regarding sampling approach, sampling, methods, and QA/QC methods.

Deliverables: Interim Groundwater Sampling and Analysis Plan (Draft)
Interim Groundwater Sampling and Analysis Plan (Final)

Task 4.0 Engineering Design/Landfill Closure Report

The conceptual design of the cap has been accepted by Ecology. The Engineering Design/Landfill Closure Report will be prepared in sufficient detail that the 30 percent construction plans and specifications are not necessary. The Engineering Design/Landfill Closure Report will be the basis of the design analysis memorandum and the plans prepared for the detailed design.

This report will include engineering design concepts, design criteria, and assumptions and critical calculations used for all the significant components of the closure design. The Engineering Design/Landfill Closure Report will comply with the closure requirements of Chapter 173-304 WAC and report requirements specified in Chapter 173-340-400(4) WAC. Results of the pre-design field investigation will be incorporated into this report. The report will include the following information:

- Brief Introduction, including site name and location, site background, regulatory status, cleanup goals, and general design and construction schedule
- Engineering Justification, including engineering criteria, assumptions, and calculations
- Title Sheet, including Vicinity Map, Abbreviations, and Legend
- General Site Plan
- Geomembrane Grading Plan
- Survey Control Plan
- Site Cross Sections
- Cover Sections
- Stormwater Control System Plan
- Landfill Gas Control Design

Deliverables: *Engineering Design/Landfill Closure Report (Draft)*
Engineering Design/Landfill Closure Report (Final)

Task 5.0 Permit Application Submittals

Application requirements for all federal, state, and local permits for construction and operations of the landfill closure will be identified and submitted. All permit applications will be submitted in a timely fashion soil such that progress on landfill closure is not delayed. It is anticipated that permitting may be required for stormwater discharge and air emissions.

Task 6.0 Construction Documents

6.1 Design Analysis Memorandum, Construction Plans, and Specifications

The landfill closure design will build on the preliminary design presented in the Engineering Design/Landfill Closure Report. The construction plans and specifications will be prepared in sufficient detail for submittal for public competitive bidding and construction. The design will include 60 percent complete and final construction document submittals. The following construction documents will be prepared:

- Design Analysis Memorandum
- Plans
- Specifications

The Design Analysis Memorandum will include brief descriptions of the following information and supporting engineering calculations:

- Brief introduction, including project background, purpose, and scope
- A description of the basis of design, including design issues and approach
- Construction considerations
- Regulatory requirements

Deliverables: *Design Analysis Memorandum, Construction Plans, and Specifications (60 percent complete)*
Design Analysis Memorandum, Construction Plans and Specifications (Final)

6.2 Post-Closure I&M and Compliance Monitoring Plan

A Post-Closure Inspection and Maintenance (I&M) Plan is required to ensure the long-term integrity of the landfill cover and associated systems. This plan will comply with the requirements of MTCA (WAC 173-340-400). The Post Closure I&M Plan will include the following:

- Name and phone number of the responsible individuals
- Process description of the landfill gas control system
- General operation procedures, including startup, normal operations, shutdown, and emergency or contingency procedures
- Spare parts inventory, addresses of suppliers or spare parts, equipment warranties, and appropriate equipment catalogs
- Equipment maintenance schedules incorporating manufacturers' recommendations
- Contingency plan procedures for spills, releases, and personnel accidents
- Procedures that assure the safety and health requirements of WAC 173-340-810 are met, including specification of contaminant action levels and contingency plans
- Procedures for maintenance of the cap and landfill gas collections system
- Procedures for periodic inspections
- Repair of stormwater system, access roads, fencing and re-seeding

This plan will also contain a general post-closure monitoring plan for landfill gas and groundwater. This plan will specify monitoring wells and probes to be monitored during post-closure monitoring, the frequency of monitoring, and will identify the likely analytes to measured. This general plan will be superseded by the Post-Closure Compliance Monitoring Plan when it is completed in late 1998.

Deliverables: *Post-Closure I&M and Compliance Monitoring Plan (Draft)*
Post-Closure I&M and Compliance Monitoring Plan (Final)

6.3 Construction QA/QC Plan

The Construction QA/QC Plan will be prepared upon completion of the Final Design. This plan will specify the QA/QC that will be conducted during landfill closure. The QA/QC plan will address the following requirements: reporting and formats; inspection requirements; construction observation and documentation; and testing.

Deliverables: *Construction QA/QC Plan (Draft)*
Construction QA/QC Plan (Final)

Task 7.0 Post-Closure Compliance Monitoring Plan

7.1 Post-Closure Compliance Monitoring Plan

Compliance monitoring is require for all cleanup actions. Compliance monitoring for post-closure construction activities consists of performance monitoring and confirmational monitoring. Performance monitoring confirms the cleanup action has attained cleanup standards and any other required performance standard. Confirmational monitoring confirms the long-term effectiveness of the clean action after the cleanup standards are attained. This task includes preparing Post-Closure Monitoring Plan for monitoring landfill gas and groundwater. This plan will comply with the requirements of MTCA (WAC 173-340-410).

A procedure for groundwater data analysis and evaluation will be established to demonstrate compliance with cleanup levels. Acceptable statistical analytical methods and compliance criteria are established in Chapter 173-340-720 WAC. The plan will include the following: summary of indicator parameters and cleanup levels; procedure for measurements below the detection limit or practical quantitation limit; data reduction, review, and reporting; statistical parameters and methods; schedule for formal data review; and electronic format for data submittal.

Deliverables: *Post-Closure Compliance Monitoring Plan (Draft)*
Post-Closure Compliance Monitoring Plan (Final)

Task 8.0 Implementation of Cleanup Action

Construction will be conducted in accordance with the plans and specifications, and other plans prepared under this Scope of Work. Detailed construction records will be prepared and maintained for all aspects of the work performed during construction including the following: construction techniques and materials used; items installed; and tests and measurements performed. Construction schedules and status reports will be prepared and maintained that reflect the ongoing status of construction activities.

Written progress reports which describe the actions taken during the reporting period will be submitted to Ecology as follows:

Monthly Reports - Progress reports shall be submitted monthly, beginning in the month following the effective date of this decree, and shall continue up to and including the month in which mobilization for construction of the landfill closure cap occurs. These reports shall be submitted by the 10th day of the month following the subject month. They shall include:

1. A list of on-site activities that have taken place during the month;
2. A detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;

3. A description of all deviations from the Schedule (Exhibit C) during the current month, and any projected or planned deviations in the upcoming month;

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

5. All relevant data (including laboratory analysis) received by the Defendant during the past month and an identification of the source of the samples. Examples of relevant data include drill logs, test pit logs, air quality monitoring data, and sample anlaytical data; and

6. A list of deliverables for the upcoming month if different from the Schedule.

Weekly Reports - Progress reports shall be submitted weekly during construction of the landfill closure cap, beginning in the week of mobilization for construction, and ending the week following demobilization of the contractor following construction completion. These reports shall detail progress on site work. These reports shall be submitted the day of the weekly construction meeting between the Defendant and any Contractor retained by the Defendant for purposes of performance of the cleanup action. These reports can be submitted by facsimile transmission.

Quarterly Reports - Progress reports shall be submitted quarterly during the post closure period following construction, beginning according to the schedule in 1999. These reports shall be submitted as follows:

- First quarter report - Due on the first business day following April 31 of the calendar year
- Second quarter report - Due on the first business day following July 31 of the calendar year
- Third quarter report - Due on the first business day following October 31 of the calendar year
- Fourth quarter and annual report - Due on the first business day following January 31 of the following calendar year

These progress reports shall include:

1. A list of on-site activities that have taken place during the quarter;
2. A detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests;
3. For any such deviations, a plan for recovering lost time and maintaining compliance with the Schedule;
4. All relevant data (including laboratory analysis) received by the Defendant during the past quarter and an identification of the source of the samples. Examples of relevant data include drill logs, test pit logs, air quality monitoring data, and sample analytical data required for post closure monitoring; and
5. A list of deliverables for the upcoming quarter if different from the Schedule.

Unless otherwise specified, progress reports and any other documents submitted pursuant to this decree shall be sent by certified mail, return receipt requested, or by express courier, or by facsimile with a confirmation copy via the U.S. Postal Service to Ecology's project coordinator.

The Cleanup Action Report will include a summary of data presented in the Landfill Closure Plan and Design Analysis Memoranda that shows that the design and construction of the Greenacres Landfill attained the requirements of the Consent Decree. Information will be summarized from the Landfill Closure Plan, the Design Analysis Memoranda, contractor's closure report, and the construction QA/QC data. The report will include the following information:

- Summary of data from design documents that demonstrates that the closure design met appropriate cleanup action requirements
- Summary of construction QA/QC data that shows the physical and any chemical testing results as well as sample locations
- As built drawings prepared by the contractor, including:; the landfill cover, the landfill gas collection system, final topography, and existing and abandoned landfill gas and groundwater monitoring wells

Deliverables: *Cleanup Action Report (Draft)*
Cleanup Action Report (Final)
Construction Schedule
Construction Status Report and Progress Reports

TABLE 1
IMPLEMENTATION AND CONSTRUCTION TASKS (1997 and 1998)

DELIVERABLE	DATE DUE
TASK 1.0 PROJECT MANAGEMENT PLAN	
Project Management Plan (Draft)	March 1, 1997 (submitted)
Project Management Plan (Final)	15 days after receipt of Ecology's comments
TASK 2.0 LANDFILL COVER ALTERNATIVES EVALUATIONS	
Landfill Cover Alternatives Evaluation Report (Draft)	May 15, 1997 (submitted)
Landfill Cover Alternatives Evaluation Report (Final)	30 days after receipt of Ecology's comments

TASK 3.0 PROJECT PLANS

Work Plan (Draft) Work Plan (Final)	April 1, 1997 (submitted) 30 days after receipt of Ecology's comments
Public Participation Plan (Draft) Public Participation Plan (Final)	August 27, 1997 15 days after receipt of Ecology's comments
Safety and Health Plan (Draft)	October 14, 1997 (to be submitted with 60% Design submittal)
Interim Groundwater Sampling and Analysis Plan (Draft) Interim Groundwater Sampling and Analysis Plan (Final)	August 27, 1997 15 days after receipt of Ecology's comments

TASK 4.0 ENGINEERING DESIGN/LANDFILL CLOSURE REPORT

Engineering Design/Landfill Closure Report (Draft)	August 25, 1997
Engineering Design/Landfill Closure Report (Final)	15 days after receipt of Ecology's comments

TASK 5.0 PERMIT APPLICATION SUBMITTALS

Submit Permit Application's to Appropriate Agencies	15 days after receipt of Ecology's comments on 60% Design package

TASK 6.0 CONSTRUCTION DOCUMENTS

Design Analysis Memorandum, Construction Plans, and Specifications (60% Complete)	15 days after receipt of Ecology's comments on Landfill Closure Report
Post-Closure Inspection, Maintenance, and Compliance Monitoring Plan (Draft-60% Complete)	15 days after receipt of Ecology's comments on Landfill Closure Report
Design Analysis Memorandum, Construction Plans, and Specifications (Final)	103 days after receipt of Ecology's comments on 60% Design package

Post-Closure Inspection, Maintenance, and Compliance Monitoring Plan (Final)	103 days after receipt of Ecology's comments on 60% Design package
Construction QA/QC Plan (Draft)	42 days after submittal of Final package
Construction QA/QC Plan (Final)	15 days after receipt of Ecology's comments

TASK 7.0 POST-CLOSURE COMPLIANCE MONITORING PLAN

Post-Closure Compliance Monitoring Plan (Draft)	November 23, 1998
Post-Closure Compliance Monitoring Plan (Final)	30 days after receipt of Ecology's comments

TASK 8.0 IMPLEMENTATION OF CLEANUP ACTION

Construction Schedule	May through October 1998
Progress Reports	Monthly before October 1998 Quarterly after October 1998 Weekly during construction
Cleanup Action Report (Draft)	January 31, 1999
Cleanup Action Report (Final)	30 days after receipt of Ecology's comments

EXHIBIT D

Ground Water Data Submittal Requirements

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. County Fips Codes

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

H. Hydrologic Unit Map

I. Model Letter RE: Toxics Cleanup Program Database Material

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 DEFINITIONS FOR
FIELD 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.
X_LOCATION Y_LOCATION	C C	12 12	Surveyed coordinates reported in the State Plane Coordinates (to the nearest foot).
STPLNZONE	C	1	N = North; S = South.
LO_DAT_U	C	5	Year of Reference datum either 1929 or 1983 and which system L Lat Long or S for State Plane Coordinate System.
LOC_DATUM	C	48	Reference datum from Map or survey e.g., 1983 North American Datum (see Appendix F, RCW 58.20)
DEPT_WATER	N	8	Depth to water (in 0.01 ft) at time of sampling.
UP_DEPTH	N	7	Depth (nearest 0.01 ft) to the top of the interval sampled (e.g. Top of well screen or core interval).
LOW_DEPTH	N	7	Depth (nearest 0.01 ft) to the bottom of the interval sampled (e.g. Bottom of well screen or core interval).
WTR_ELEV	N	8	Water level elevation (in 0.01 ft) at the time of sampling.
AGENCY	C	8	Agency requesting sampling data.
SAMPLE_DAT	D	8	Date of well sampling (mm/dd/yyyy).
SAMP_TIME	C	4	Time of well sampling in military time.
SAMPLE_ID	C	8	Sample ID code or no.

FIELD SAMPLE FILE CONTINUED:

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 ("<") orasterisks, 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-Methylnapthalene	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
2,3,4,5-Tetrachloropheno	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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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	77166	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	95978	μg/L
3,3'-Dichlorobenzidine	98.00	34631	91941	μg/L
3,3-Dimethoxybenzidine	588.00		199904	μg/L
3,3-Dimethylbenzidine	589.00	73560	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		51365	μg/L
3-Chloro octane	528.00			

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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			
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)	246.00	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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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
Aquatin	105.01	34210	107028	µg/L
Aramite	594.00		140578	µg/L
Aroclor 1016	114.00	34671	12674112	µg/L
Aroclor 1221	115.00	39488	1104282	µg/L
Aroclor 1232	116.00	39492	11141165	µg/L
Aroclor 1242	117.00	39496	53469219	µg/L
Aroclor 1248	118.00	39500	12672296	µg/L
Aroclor 1254	119.00	39504	11097691	µg/L
Aroclor 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
Basagran	286.01	38710	25057890	µg/L
Basalin	354.01	79194	3324539	µg/L
Basanite	337.01	81287	88857	µg/L
Baygon	424.01	38537	114261	µg/L
Baymix	307.02	81293	56724	µg/L

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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, 1-chloro-4-(methylsulfony +	572.00			
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)perylene	128.00	34521	191242	µg/L
Benzo(ghi)perylene	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 hexanedioi +	577.00	103321		
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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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	45046		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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Chloroethene	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
Ciodrin	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	8801589	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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-86-0).

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	26259450	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	605.00		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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Ethylbenzene	61.00	34371	100414	μg/L
Ethylene dibromide	8.02	77651	106934	μg/L
Ethylene dichloride	10.01	34531	107062	μg/L
Ethylene glycol	347.00	77023	107211	μg/L
Ethylene thiourea	348.01	38928	96457	μg/L
Ethylidene thiourea	348.00	38928	96457	μg/L
Evik	275.01	82184	834128	μg/L
Fecal Coliform, MFM-FCBR	505.00	31616		#/100ml
Fenamiphos	349.00	38929	22224926	μg/L
Fenarimol	635.00			μg/L
Fensulfothion	350.00	38684	115902	μg/L
Fenthion	351.00	38685	55389	μg/L
Fenuron	352.00	38468	101428	μg/L
Ferbam	353.00	38806	14484641	μg/L
Ferric(3+)	188.01	01045	7439896	μg/L
Ferrous(2+)	188.02	01045	7439896	μg/L
Fluchloralin	354.00	79194	3324539	μg/L
Fluoranthene	177.00	34376	206440	μg/L
Fluorene	62.00	34381	86737	μg/L
Fluorescein(Sodium)	178.00		518478	
Fluoride	179.00	00950	16984488	mg/L
Fluormeturon	355.00	38811	2164172	μg/L
Fluridone	636.00		59756604	μg/L
Foaming Agents	606.00	01288		mg/L
Folex	369.01	39019	150505	μg/L
Folpet	607.00	46351	133073	μg/L
Fonofos	339.01	81294	944229	μg/L
Formaldehyde	356.00	71880	50000	mg/L
Freon 113	3.01	77652	76131	μg/L
Freon 12, Halon	162.01	34668	75718	μg/L
Furadan	296.01	81405	1563662	μg/L
Furazolidone	608.00	67458		μg/L
Furium	609.00			μg/L
Furmecyclox	610.00		60568050	μg/L
Gardona	581.01	38877	961115	
Gardoprim	436.01	38559	5915413	μg/L
Gasoline	471.00		6842596	
Gesatamin	280.01	82185	1610179	μg/L
Glyphosate	358.00	79743	1071836	μg/L
Grain alcohol	346.02	77004	64175	μg/L
Guthion	359.00	39580	86500	μg/L
Hardness, Total	248.00	00900	471341	mg/L CaCO3
Heptachlor	181.00	39410	76448	μg/L
Heptachlor Epoxide	180.00	39420	1024573	μg/L
Heptene	182.00	81589	25339564	μg/L
Hexachlorobenzene	183.00	39700	118741	μg/L
Hexachlorobutadiene	63.00	34391	87683	μg/L

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-86-0).

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	363.00	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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-86-0).

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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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
Monsodium 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		59536651	µg/L
PCB	219.01	76012	1336363	µg/L

CAS NO should be read as follows.. From Right: 1 digit, dash, 2 digits, dash (ie 1774-86-0).

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
Phosorin	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	86500	µg/L
Phosphorous-P, Total	251.00	00665	7723140	mg/L as P
Picloram	257.00	39720	1918021	µg/L
Polychlorinated biphenyl	219.00	76012	1336363	µg/L
Potassium, Dissolved	517.00	00935	7440097	mg/L
Potassium, Total	220.00	00937	7440097	mg/L
Princep	430.01	39055	122349	µg/L
Profluralin	415.00	38872	26399360	µg/L

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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	82065	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, Lechate	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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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

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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
Treflan	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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-86-0).

APPENDIX D: CHEMICAL DICTIONARY
01/27/93

COMP_NAME	JHK_NO	STORET_NO	CAS_NO	UNITS
Turbidity(Lab)	260.00	82079		NTU
UDMH	261.00	81314	57147	mg/L
Vanadium (Dissolved)	262.00	10085	7440622	
Velpar	360.01	38815	51235042	µg/L
Vernam	445.01	82200	1929777	µg/L
Vernolate	445.00	82200	1929777	µg/L
Vinyl acetate	81.00	77057	108054	µg/L
Vinyl chloride	82.00	39175	75014	µg/L
Vinyl trichloride	4.01	34511	79005	µg/L
Vinylbenzene	74.01	77128	100425	µg/L
Volatile Dissolved Solids	263.00			
Volatile Organic Compounds	487.00		78733	mg/L
Xylene Isomers, M+P, Whole Water	578.00		85795	µg/L
Xylene Isomers, O+P, Whole Water	32.00		80353	µg/L
Xylene, m-	67.00	77134	108383	µg/L
Xylene, o-	77.00	77135	95476	µg/L
Xylene, p-	475.00	77133	106423	µg/L
Xylenes, Total	201.00	34020	1330207	µg/L
Zinc, Dissolved	504.00	01090	7440666	µg/L
Zinc, Total	507.00	01092	7440666	µg/L
Zinc, Total Recoverable	264.00	01094	7440666	µg/L
Zineb	447.00	38912	12122677	µg/L
Ziram	446.00	38917	137304	µg/L
Zolone	412.01	81291	2310170	µg/L
Zytron	336.01	81285	299854	µg/L
a-BHC	265.00	39337	319846	µg/L
a-Endosulfan	266.01	34361	959988	µg/L
alpha-BHC	265.03	39337	319846	µg/L
alpha-Benzene hexachloride	265.01	39337	319846	µg/L
alpha-Chlordane	530.00	39348	5103719	µg/L
alpha-Endosulfan	266.00	34361	959988	µg/L
alpha-Lindane	265.02	39337	319846	µg/L
b-BHC	267.00	39338	319857	µg/L
b-Endosulfan	268.00	34356	33213659	µg/L
beta-BHC	267.03	39338	319857	µg/L
beta-Benzene hexachloride	267.01	39338	319857	µg/L
beta-Endosulfan	268.01	34356	33213659	µg/L
beta-Lindane	267.02	39338	319857	µg/L
cis-1,2-Dichloroethene	326.00	77093	156592	µg/L
cis-1,2-Dichloroethylene	326.01	77093	156592	µg/L
cis-1,3-Dichloropropene	56.00	34704	10061015	µg/L
cis-1,3-Dichloropropylene	56.01	34704	10061015	µg/L
d-BHC	269.00	34259	319868	µg/L
delta-BHC	269.03	34259	319868	µg/L
delta-Benzene hexachloride	269.01	34259	319868	µg/L

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-85-0).

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

CAS NO should be read as follows. From Right: 1 digit, dash, 2 digits, dash (ie 1774-86-0).

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

CHAPTER 58.20

WASHINGTON COORDINATE SYSTEM

WESTLAW Electronic Research

See WESTLAW Electronic Research Guide following the Preface.

58.20.010. United States plane coordinate adopted—Zones

The system of plane coordinates which has been established by the United States coast and geodetic survey for defining and stating the positions or locations of points on the surface of the earth within the state of Washington is hereafter to be known and designated as the "Washington coordinate system of 1927".

For the purpose of the use of this system the state is di[illegible] into a "north zone" and a "south zone".

The area now included in the following counties shall constitute the north zone: Chelan, Clallam, Douglas, Ferry, Island, Jefferson, King, Kitsap, Lincoln, Okanogan, Pend Oreille, San Juan, Skagit, Snohomish, Spokane, Stevens, Whatcom, and that part of Grant lying north of parallel 47° 30' north latitude.

The area now included in the following counties shall constitute the south zone: Adams, Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Garfield, that part of Grant lying south of parallel 47° 30' north latitude, Grays Harbor, Kittitas, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Walla Walla, Whitman and Yakima.

Enacted by Laws 1945, ch. 168, § 1. Amended by Laws 1989, ch. 54, § 1.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.130.

Historical and Statutory Notes

Laws 1989, ch. 54, § 1, in the first paragraph, inserted the date of the coordinate system.

Source:
RRS § 10726a.

Cross References

Recording co-ordinates, see § 58.20.060.
United States survey to prevail, see § 58.20.080.

Library References

Boundaries ⇐1.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 1 et seq.

58.20.020. Designation of system by zones

As established for use in the north zone, the Washington coordinate system of 1927 shall be named, and in any land description in which it is used it shall be designated, the "Washington coordinate system of 1927, north zone".

As established for use in the south zone, the Washington coordinate system of 1927 shall be named, and in any land description in which it is used it shall be designated, the "Washington coordinate system of 1927, south zone".

Enacted by Laws 1945, ch. 168, § 20. Amended by Laws 1989, ch. 54, § 2.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.140.

Historical and Statutory Notes

Laws 1989, ch. 54, § 2, throughout the section, inserted the date of the coordinate system.

Source:
RRS § 10726b.

Cross References

Definition of zones, see § 58.20.050.
Washington co-ordinate system defined, see § 58.20.070.

Library References

Boundaries ⟹1, 2.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 1 et seq.

58.20.030. X and Y coordinates

The plane coordinates of a point on the earth's surface, to be used in expressing the position or location of such point in the appropriate zone of this system, shall consist of two distances, expressed in feet and decimals of a foot. One of these distances, to be known as the "x-coordinate", shall give the position in an east-and-west direction; the other, to be known as the "y-coordinate", shall give the position in a north-and-south direction. These coordinates shall be made to depend upon and conform to the coordinates, on the Washington coordinate system of 1927, of the triangulation and traverse stations of the United States coast and geodetic survey within the state of Washington, as those coordinates have been determined by the said survey.

Enacted by Laws 1945, ch. 168, § 3. Amended by Laws 1989, ch. 54, § 3.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.150.

Historical and Statutory Notes

Laws 1989, ch. 54, § 3, inserted the date of the coordinate system.

Source:
RRS § 10726c.

Library References

Boundaries ⟹1, 2.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 1 et seq.

58.20.040. Tract in both zones, how described

When any tract of land to be defined by a single description extends from one into the other of the above coordinate zones, the positions of all points on its boundaries may be referred to either of said zones, the zone which is used being specifically named in the description.

Enacted by Laws 1945, ch. 168, § 4.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.160.

Historical and Statutory Notes

Source:
RRS § 10726d.

Library References

Boundaries ⟹1, 10.
WESTLAW Topic No. 59
C.J.S. Boundaries §§ 1 et seq., 24.

58.20.050. Zones defined

For purposes of more precisely defining the Washington coordinate system of 1927, the following definition by the United States coast and geodetic survey is adopted:

The Washington coordinate system of 1927, north zone, is a Lambert conformal projection of the Clarke spheroid of 1866, having standard parallels at north latitudes 47° 30' and 48° 44', along which parallels the scale shall be exact. The origin of coordinates is at the intersection of the meridian 120° 50' west of Greenwich and the parallel 47° 00' north latitude. This origin is given the coordinates: x = 2,000,000 feet and y = 0 feet.

The Washington coordinate system of 1927, south zone, is a Lambert conformal projection of the Clarke spheroid of 1866, having standard parallels at north latitudes 45° 50' and 47° 20', along which parallels the scale shall be exact. The origin of coordinates is at the intersection of the meridian 120° 30' west of Greenwich and the parallel 45° 20' north latitude. This origin is given the coordinates: x = 2,000,000 feet and y = 0 feet.

The position of the Washington coordinate system of 1927 shall be as marked on the ground by triangulation or traverse stations established in conformity with the standards adopted by the United States coast and geodetic survey for first-order and second-order work, whose geodetic positions have been rigidly adjusted on the North American datum of 1927, and whose coordinates have been computed on the system herein defined. Any such station may be used to establish a survey connection with the Washington coordinate system of 1927.

Enacted by Laws 1945, ch. 168, § 5. Amended by Laws 1989, ch. 54, § 4.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, §§ 58.20.170, 58.20.180.

Historical and Statutory Notes

Laws 1989, ch. 54, § 4, throughout the section, inserted the date of the coordinate system; and, in the second paragraph, in the second sentence, substituted "parallel" for "meridian".

Source:
RRS § 10726e.

Library References

Boundaries ⇐25.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 61.

58.20.060. Recording coordinates—Conditions

No coordinates based on the Washington coordinate system of 1927, purporting to define the position of a point on a land boundary, shall be presented to be recorded in any public land records or deed records unless such point is within one-half mile of a triangulation or traverse station established in conformity with the standards prescribed in RCW 58.20.050: *Provided,* That said one-half mile limitation may be modified by a duly authorized state agency to meet local conditions.

Enacted by Laws 1945, ch. 168, § 6. Amended by Laws 1989, ch. 54, § 5.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.180.

Historical and Statutory Notes

Laws 1989, ch. 54, § 5, inserted the date of the coordinate system.

Source:
RRS § 10726f.

Library References

Boundaries ⇐25.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 61.

58.20.070. Use of term limited

The use of the term "Washington coordinate system of 1927" on any map, report of survey, or other document, shall be limited to coordinates based on the Washington coordinate system of 1927 as defined in this chapter.

Enacted by Laws 1945, ch. 168, § 7. Amended by Laws 1989, ch. 54, § 6.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.200.

Historical and Statutory Notes

Laws 1989, ch. 54, § 6, inserted the date of the coordinate system in two places.

Source:
RRS § 10726g.

Library References

Boundaries ⇐2.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 4.

58.20.080. United States survey to prevail

Whenever coordinates based on the Washington coordinate system of 1927 are used to describe any tract of land which in the same document is also described by reference to any subdivision, line or corner of the United States public land surveys, the description by coordinates shall be construed as supplemental to the basic description of such subdivision, line, or corner contained in the official plats and field notes filed of record, and in the event of any conflict the description by reference to the subdivision, line, or corner of the United States public land surveys shall prevail over the description by coordinates.

Enacted by Laws 1945, ch. 168, § 8. Amended by Laws 1989, ch. 54, § 7.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.210.

Historical and Statutory Notes

Laws 1989, ch. 54, § 7, inserted the date of the coordinate system.

Source:
RRS § 10726h.

Library References

Boundaries ⇐25.
WESTLAW Topic No. 59.
C.J.S. Boundaries § 61.

58.20.090. Construction of chapter

Nothing contained in this chapter shall require any purchaser or mortgagee to rely on a description, any part of which depends exclusively upon the Washington coordinate system of 1927.

Enacted by Laws 1945, ch. 168, § 9. Amended by Laws 1989, ch. 54, § 8.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.220.

Historical and Statutory Notes

Laws 1989, ch. 54, § 8, inserted the date of the coordinate system.

Source:
RRS § 10726I.

Library References

Boundaries ⚿1, 25.
WESTLAW Topic No. 59.
C.J.S. Boundaries §§ 1 et seq., 61.

58.20.110. Definitions

Unless the context clearly requires otherwise, the definitions in this section apply throughout RCW 58.20.110 through 58.20.220 and 58.20.901:

(1) "Committee" means the interagency federal geodetic control committee or its successor;

(2) "GRS 80" means the geodetic reference system of 1980 as adopted in 1979 by the international union of geodesy and geophysics defined on an equipotential ellipsoid;

(3) "National geodetic survey" means the national ocean service's national geodetic survey of the national oceanic and atmospheric administration, United States department of commerce, or its successor;

(4) "Washington coordinate system of 1927" means the system of plane coordinates in effect under this chapter until July 1, 1990, which is based on the North American datum of 1927 as determined by the national geodetic survey of the United States department of commerce;

(5) "Washington coordinate system of 1983" means the system of plane coordinates under this chapter based on the North American datum of 1983 as determined by the national geodetic survey of the United States department of commerce.

Enacted by Laws 1989, ch. 54, § 9.

58.20.120. System designation—Permitted uses

Until July 1, 1990, the Washington coordinate system of 1927, or its successor, the Washington coordinate system of 1983, may be used in Washington for expressing positions or locations of points on the surface of the earth. On and after that date, the Washington coordinate system of 1983 shall be the designated coordinate system in Washington. The Washington coordinate system of 1927 may be used only for purposes of reference after June 30, 1990.

Enacted by Laws 1989, ch. 54, § 10.

58.20.130. Plane coordinates adopted—Zones

The system of plane coordinates which has been established by the national geodetic survey for defining and stating the positions or locations of points on the surface of the earth within the state of Washington is designated as the "Washington coordinate system of 1983."

For the purposes of this system the state is divided into a "north zone" and a "south zone."

The area now included in the following counties shall constitute the north zone: Chelan, Clallam, Douglas, Ferry, Island, Jefferson, King, Kitsap, Lincoln, Okanogan, Pend Oreille, San Juan, Skagit, Snohomish, Spokane, Stevens, Whatcom, and that part of Grant lying north of parallel 47° 30' north latitude.

The area now included in the following counties shall constitute the south zone: Adams, Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Garfield, that part of Grant lying south of parallel 47° 30' north latitude, Grays Harbor, Kittitas, Klickitat, Lewis, Mason, Pacific, Pierce, Skamania, Thurston, Wahkiakum, Walla Walla, Whitman and Yakima.

Enacted by Laws 1989, ch. 54, § 11.

Historical and Statutory Notes

Source:
Former § 58.20.010.

58.20.140. Designation of system—Zones

As established for use in the north zone, the Washington coordinate system of 1983 shall be named, and in any land description in which it is used it shall be designated, the "Washington coordinate system of 1983, north zone."

As established for use in the south zone, the Washington coordinate system of 1983 shall be named, and in any land description in which it is used it shall be designated, the "Washington coordinate system of 1983, south zone."

Enacted by Laws 1989, ch. 54, § 12.

Historical and Statutory Notes

Source:
Former § 58.20.020.

58.20.150. Designation of coordinates—"N" and "E"

"N" and "E" shall be used in labeling coordinates of a point on the earth's surface and in expressing the position or location of such

point relative to the origin of the appropriate zone of this system, expressed in meters and decimals of a meter. These coordinates shall be made to depend upon and conform to the coordinates, on the Washington coordinate system of 1983, of the horizontal control stations of the national geodetic survey within the state of Washington, as those coordinates have been determined, accepted, or adjusted by the survey.
Enacted by Laws 1989, ch. 54, § 13.

Historical and Statutory Notes

Source:
Former § 58.20.030.

58.20.160. Tract in both zones—Description

When any tract of land to be defined by a single description extends from one into the other of the coordinate zones under RCW 58.20.130, the positions of all points on its boundaries may be referred to either of the zones, the zone which is used being specifically named in the description.
Enacted by Laws 1989, ch. 54, § 14.

Historical and Statutory Notes

Source:
Former § 58.20.040.

58.20.170. Zones—Technical definitions

For purposes of more precisely defining the Washington coordinate system of 1983, the following definition by the national geodetic survey is adopted:

The Washington coordinate system of 1983, north zone, is a Lambert conformal conic projection of the GRS 80 spheroid, having standard parallels at north latitudes 47° 30' and 48° 44', along which parallels the scale shall be exact. The origin of coordinates is at the intersection of the meridian 120° 50' west of Greenwich and the parallel 47° 00' north latitude. This origin is given the coordinates: E = 500,000 meters and N = 0 meters.

The Washington coordinate system of 1983, south zone, is a Lambert conformal conic projection of the GRS 80 spheroid, having standard parallels at north latitudes 45° 50' and 47° 20', along which parallels the scale shall be exact. The origin of coordinates is at the intersection of the meridian 120° 30' west of Greenwich and the parallel 45° 20' north latitude. This origin is given the coordinates: E = 500,000 meters and N = 0 meters.
Enacted by Laws 1989, ch. 54, § 15.

Historical and Statutory Notes

Source:
Former § 58.20.050.

58.20.180. Recording coordinates—Control stations

Coordinates based on the Washington coordinate system of 1983, purporting to define the position of a point on a land boundary, may be presented to be recorded in any public land records or deed records if the survey method used for the determination of these coordinates is established in conformity with standards and specifications prescribed by the interagency federal geodetic control committee, or its successor. These surveys shall be connected to monumented control stations that are adjusted to and published in the national network of geodetic control by the national geodetic survey and such connected horizontal control stations shall be described in the land or deed record. Standards and specifications of the committee in force on the date of the survey shall apply. In all instances where reference has been made to such coordinates in land surveys or deeds, the scale and sea level factors shall be stated for the survey lines used in computing ground distances and areas.

The position of the Washington coordinate system of 1983 shall be marked on the ground by horizontal geodetic control stations which have been established in conformity with the survey standards adopted by the committee and whose geodetic positions have been rigorously adjusted on the North American datum of 1983, and whose coordinates have been computed and published on the system defined in RCW 58.20.110 through 58.20.220 and 58.20.901. Any such control station may be used to establish a survey connection with the Washington coordinate system of 1983.
Enacted by Laws 1989, ch. 54, § 16.

Historical and Statutory Notes

Source:
Former §§ 58.20.050, 58.20.060.

58.20.190. Conversion of coordinates—Metric

Any conversion of coordinates between the meter and the United States survey foot shall be based upon the length of the meter being equal to exactly 39.37 inches.
Enacted by Laws 1989, ch. 54, § 17.

58.20.200. Term—Limited use

The use of the term "Washington coordinate system of 1983" on any map, report of survey, or other document, shall be limited to

coordinates based on the Washington coordinate system of 1983 as defined in this chapter.
Enacted by Laws 1989, ch. 54, § 18.

Historical and Statutory Notes

Source:
Former § 58.20.070.

58.20.210. United States survey prevails—Conflict

Whenever coordinates based on the Washington coordinate system of 1983 are used to describe any tract of land which in the same document is also described by reference to any subdivision, line or corner of the United States public land surveys, the description by coordinates shall be construed as supplemental to the basic description of such subdivision, line, or corner contained in the official plats and field notes filed of record, and in the event of any conflict the description by reference to the subdivision, line, or corner of the United States public land surveys shall prevail over the description by coordinates.
Enacted by Laws 1989, ch. 54, § 19.

Historical and Statutory Notes

Source:
Former § 58.20.080.

58.20.220. Real estate transactions—Exemption

Nothing contained in this chapter shall require any purchaser or mortgagee to rely on a description, any part of which depends exclusively upon the Washington coordinate system of 1927 or 1983.
Enacted by Laws 1989, ch. 54, § 20.

Historical and Statutory Notes

Source:
Former § 58.20.090.

58.20.900. Severability—1945 c 168

If any provision of this chapter shall be declared invalid, such invalidity shall not affect any other portion of this chapter which can be given effect without the invalid provision, and to this end the provisions of this chapter are declared to be severable.
Enacted by Laws 1945, ch. 168, § 10.

Repeal

This section is repealed July 1, 1990, by Laws 1989, ch. 54, § 22. See, then, § 58.20.901.

Library References

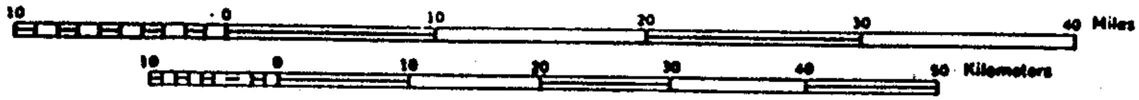
Statutes ⇐64(2).
WESTLAW Topic No. 361.
C.J.S. Statutes § 94 et seq.

58.20.901. Severability—1989 c 54

If any provision of this act or its application to any person or circumstance is held invalid, the remainder of the act or the application of the provision to other persons or circumstances is not affected.
Enacted by Laws 1989, ch. 54, § 21.

HYDROLOGIC UNIT MAP—1974
STATE OF WASHINGTON

Scale 1:500,000
1 inch equals approximately 8 miles



Datum is mean sea level

Compiled, edited, and published by the Geological Survey. 1927 North American datum
Lambert conformal conic projection based on standard parallels 33° and 45°

LEGEND

d

or village

oundary shown for towns over 5,000 population

SOURCE DATA

U. S. Dept. of the Interior—Geological Survey topographic maps
U. S. Dept. of the Army—A. M. S. 1:250,000 scale maps

BASE MAP
Drainage modified 1974

POPULATION KEY

SEATTLE..................more than 100,000
YAKIMA..................25,000 to 100,000
Olympia..................5,000 to 25,000
Ritzville..................1,000 to 5,000
Concrete..................less than 1,000
Population indicated by size of letters

COMPILED IN 1961
EDITION OF 1962

AVAILABLE UPON REQUEST FROM TOXICS CLEANUP PROGRAM

118°

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1974

W/

For sale by U.S. Geological Survey
Denver, Colo. 80225 and Reston, Va. 22092, price $1.25

APPENDIX I

February 17, 1993

Addressee's Name
Address
City, State Zip

Dear Addressee:

Re: Toxics Cleanup Program Database Material

Thank you for implementing our format for your digital data submittals. By adopting some common formats, we can more easily and quickly review your data and so enhance the cleanup process for all of us.

I have enclosed a diskette which contains all the files you'll need to adopt our format. The environmental data storage files are designed for water, soil, and sediment data. These files are in a dBase format and have a DBF extension. You will also find a WordPerfect file on your diskette with a TCP extension. The table below describes the function of each of the files contained on the diskette.

FILE NAME	EXPLANATION
SITE_DES.DBF	The *Site Description File* contains location, construction, and other descriptive information about the sampling site.
FIELD_SA.DBF	The *Field Sample File* contains site-specific field sampling information. It is sample and site specific. Each sampling event is recorded individually.
LAB_SAMP.DBF	The *Laboratory Sample File* contains laboratory analysis information for all analytes.
DATAHDR.TCP	The *Data Header File* contains a narrative explanation of the Site Description File, Field Sample and the Laboratory Sample File.
CHEMDIC.DBF	The *Chemical Dictionary File* contains a alphabetical listing of chemicals with CAS numbers and Toxics Cleanup Program coding.

Please submit Quality Assurance/Quality Control (QA/QC) data, such as method blank and trip blank results, as part of your QA report rather than as part of this data set.

Good luck on your project. If you need help don't hesitate to call or write. My phone number is [Your Telephone Number SCAN and off-SCAN]

Sincerely,

[Your Name, Title]
Toxics Cleanup Program

[INITIALS:secretary's initials]
Enclosure