Hungry whale

6014 FS 1127

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

In the Matter of Remedial Action by:

Port of Grays Harbor
Post Office Box 660
Aberdeen, Washington 98520

AGREED ORDER

No. DE 94-S388

TO: Port of Grays Harbor
Post Office Box 660
Aberdeen, Washington 98520

I.

Jurisdiction

This Agreed Order ("Order") is issued pursuant to the authority of RCW 70.105D.050(1).

II.

Findings of Fact

The Department of Ecology (Ecology) makes the following Findings of Fact, without admission of such facts by Port of Grays Harbor (Port).

1. In October 1990, soil samples collected from areas surrounding two underground storage tanks (USTs) revealed contamination in excess of MTCA Method A cleanup standards for Total Petroleum Hydrocarbons as gasoline (TPH-G) and benzene, ethylbenzene, toluene, and xylene (BTEX).

2. In March 1991, the two USTs were properly closed and a preliminary site assessment was conducted in

accordance with Chapter 173-360 WAC. One 2,000 gallon tank was removed and a second tank, approximately 6,000 gallons capacity, was closed in place. During the tank removal, a thin layer of free product was found floating on the water table in one of the excavations. Soil samples collected during the site activities revealed contamination in excess of MTCA Method A cleanup standards.

3. In November 1991, Ecology contracted Science Applications International Corporation (SAIC) to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the site. A total of six monitoring wells were installed to determine the extent of the contamination. Ground water samples collected confirmed contamination in excess of MTCA Method A cleanup standards for TPH-G and BTEX.

4. In May 1992, SAIC installed three additional monitoring wells to further characterize the site and aid in the design of a remediation system. During this phase of investigation, the presence of floating petroleum product on the water table was discovered.

5. In August 1993, Ecology approached the Port to request that they take over responsibility for site cleanup. Ecology informed the Port that financial assistance in the form of Local Toxics Account funding was available if the Port entered into an Agreed Order with Ecology. The Port

obtained proposals from consultants to explore other options for site cleanup other than what was evaluated by SAIC in the RI/FS.

III.

Ecology Determinations

1. The Port is an "owner or operator" as defined at RCW 70.105D.020(6) of a "facility" as defined in RCW 70.105D.020(3).

2. The facility is known as the Hungry Whale and is located at 1680 N. Montesano, in Westport, Washington.

3. The substances found at the facility as described above are "hazardous substances" as defined at RCW 70.105D.020(5).

4. Based on the presence of these hazardous substances at the facility and all factors known to Ecology, there is a release or threatened release of hazardous substances from the facility, as defined at RCW 70.105D.020(10).

5. By letter dated December 17, 1993, Ecology notified the Port of its status as a "potentially liable person" under RCW 70.105D.040 after notice and opportunity for comment.

6. Pursuant to RCW 70.105D.030(1) and 70.105D.050, Ecology may require potentially liable persons to

investigate or conduct other remedial actions with respect to the release or threatened release of hazardous substances, whenever it believes such action to be in the public interest.

7. Based on the foregoing facts, Ecology believes the remedial action required by this Order is in the public interest.

IV.

Work to be Performed

Based on the foregoing Facts and Determinations, it is hereby ordered that the Port take the following remedial actions and that these actions be conducted in accordance with Chapter 173-340 WAC unless otherwise specifically provided for herein.

1. Locate and sample all monitoring wells. Wells shall be sampled for TPH-G and BTEX using Ecology approved methods. HCID analyses shall also be conducted on samples collected from each well to determine whether hydraulic oil is present. If the presence of hydraulic oil is confirmed, then samples shall be analyzed for WTPH-D extended. Water level measurements shall also be collected for each well. This task shall be completed within two(2) weeks following the effective date of this Order. The results of these analyses can be included in the Engineering and Design Report or submitted separately.

2. Submit Draft Engineering and Design Report, Construction Plans and Specifications, and Operation and Maintenance (O & M) Plan to implement the Selected Alternative described in the Cleanup Action Plan (Exhibit A) for Ecology Review and Comment (hereinafter referred to as "Design Documents"). The O & M Plan shall address the operational aspects as well as the closure of the site once remediation is complete. These elements may be contained in a single report to be prepared in accordance with Chapter 173-340-400 WAC and shall be submitted within five (5) weeks following the effective date of this Order.

3. Submit revised Design Documents. Revised reports shall be submitted to Ecology within three (3) weeks following receipt of Ecology's comments on the draft version of the Design Documents.

4. Perform construction as outlined in approved Engineering and Design Report according to the schedule contained in the report. Following completion of the construction, as-built reports and other construction documentation as described in WAC 173-340-400 (7) shall be submitted to Ecology.

V.

Terms and Conditions of Order

1. Definitions. Unless otherwise specified, the definitions set forth in ch. 70.105D RCW and ch. 173-340 WAC shall control the meanings of the terms used in this Order.

2. Public Notices. RCW 70.105D.030(2)(a) requires that, at a minimum, this Order be subject to concurrent public notice. Ecology shall be responsible for providing such public notice and reserves the right to modify or withdraw any provisions of this Order should public comment disclose facts or considerations which indicate to Ecology that the Order is inadequate or improper in any respect.

3. Remedial Action Costs. The Port shall pay to Ecology costs incurred by Ecology pursuant to this Order. These costs shall include work performed by Ecology or its contractors for investigations, remedial actions, and Order preparation, oversight, and administration. Ecology costs shall include costs of direct activities as defined in WAC 173-340-550(2). The Port shall pay the required amount within 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 description of work performed will be provided upon request. Itemized statements shall be

prepared quarterly. Failure to pay Ecology's costs within 90 days of receipt of an itemized statement of costs will result in interest charges.

4. Designated Project Coordinators. The project coordinator for Ecology is:

Tammy Hall
Department of Ecology Southwest Regional Office
Post Office Box 4775
Olympia, Washington 98504-7775

The project coordinator for the Port is:

Dan Barnette
Port of Grays Harbor
Post Office Box 660
Aberdeen, Washington 98520-0141

The project coordinator(s) shall be responsible for overseeing the implementation of this Order. To the maximum extent possible, communications between Ecology and the Port, and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the project coordinator(s). Should Ecology or the Port change project coordinator(s), written notification shall be provided to Ecology or the Port at least ten (10) calendar days prior to the change.

5. Performance. All work performed pursuant to this Order shall be under the direction and supervision, as necessary, of a professional engineer or hydrogeologist, or similar expert, with appropriate training, experience, and expertise in hazardous waste site investigation and cleanup. The Port shall notify Ecology as to the identity of such engineer(s) or hydrogeologist(s), and of any contractors and subcontractors to be used in carrying out the terms of this Order, in advance of their involvement at the Site. The Port shall provide a copy of this Order to all agents, contractors and subcontractors retained to perform work required by this Order and shall ensure that all work undertaken by such agents, contractors, and subcontractors will be in compliance with this Order.

Except where necessary to abate an emergency situation, the Port shall not perform any remedial actions at the Hungry Whale outside that required by this Order unless Ecology concurs, in writing, with such additional remedial actions.

6. Access. Ecology or any Ecology authorized representative shall have the authority to enter and freely move about 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 Order; reviewing the progress in carrying out the terms

of this Order; conducting such tests or collecting samples as Ecology or the project coordinator may deem necessary; using a camera, sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by the Port. By signing this Agreed Order, the Port agrees that this Order constitutes reasonable notice of access, and agrees to allow access to the Site at all reasonable times for purposes of overseeing work performed under this Order. Ecology shall allow split or replicate samples to be taken by the Port during an inspection unless doing so interferes with Ecology's sampling. The Port shall allow split or replicate samples to be taken by Ecology and shall provide seven (7) days notice before any sampling activity.

7. Public Participation The Port shall prepare and/or update a public participation plan for the site. Ecology shall maintain the responsibility for public participation at the site. The Port shall help coordinate and implement public participation for the site.

8. Retention of Records. The Port shall preserve in a readily retrievable fashion, during the pendency of this Order and for ten (10) years from the date of completion of the work performed pursuant to this Order, all records, reports, documents, and underlying data in its possession relevant to this Order. Should any portion of the work

performed hereunder be undertaken through contractors or agents of the Port, then the Port agrees to include in their contract with such contractors or agents a record retention requirement meeting the terms of this paragraph.

9. Dispute Resolution. The Port may request Ecology to resolve disputes which may arise during the implementation of this Order. Such request shall be in writing and directed to the signatory, or his/her successor(s), to this Order. Ecology resolution of the dispute shall be binding and final. The Port is not relieved of any requirement of this Order during the pendency of the dispute and remains responsible for timely compliance with the terms of the Order unless otherwise provided by Ecology in writing.

10. Reservation of Rights/No Settlement. This Agreed Order is not a settlement under ch. 70.105D RCW. Ecology's signature on this Order in no way constitutes a covenant not to sue or a compromise of any Ecology rights or authority. Ecology will not, however, bring an action against the Port to recover remedial action costs paid to and received by Ecology under this Agreed Order. In addition, Ecology will not take additional enforcement actions against the Port to require those remedial actions required by this Agreed Order, provided the Port complies with this Agreed Order.

Ecology reserves the right, however, to require additional remedial actions at the Site should it deem such actions necessary.

Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the releases or threatened releases of hazardous substances from the Hungry Whale.

In the event Ecology determines that conditions at the Site are creating or have the potential to create a danger to the health or welfare of the people on the Site or in the surrounding area or to the environment, Ecology may order the Port to stop further implementation of this Order for such period of time as needed to abate the danger.

11. Transference of Property. No voluntary or involuntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by the Port without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to transfer of any legal or equitable interest the Port may have in the site or any portions thereof, the Port shall serve a copy of this Order upon any prospective purchaser, lessee, transferee, assignee, or other successor in such interest. At least thirty (30) days prior to

finalization of any transfer, the Port shall notify Ecology of the contemplated transfer.

12. Compliance With Applicable Laws

A. All actions carried out by the Port pursuant to this Order 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 Order that are known to be applicable at the time of issuance of the Order have been included in Section IV/ Exhibit A and are binding and enforceable requirements of the Order.

The Port 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 Order. In the event the Port determines that additional permits or approvals addressed in RCW 70.105D.090(1) would otherwise be required for the remedial action under this Order, it shall promptly notify Ecology of this determination. Ecology shall determine whether Ecology or the Port shall be responsible to contact the appropriate

state and/or local agencies. If Ecology so requires, the Port 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 the Port and on how the Port must meet those requirements. Ecology shall inform the Port in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Order. The Port 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 Port 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.

VI.

Satisfaction of this Order

The provisions of this Order shall be deemed satisfied upon the Port's receipt of written notification from Ecology that the Port has completed the remedial activity required by this Order, as amended by any modifications, and that all other provisions of this Agreed Order have been complied with.

VII.

Enforcement

1. Pursuant to RCW 70.105D.050, this Order may be enforced as follows:

   A. The Attorney General may bring an action to enforce this Order in a state or federal court.

   B. The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Site.

   C. In the event the Port refuses, without sufficient cause, to comply with any term of this Order, the Port will be liable for:

(1) up to three times the amount of any costs incurred by the state of Washington as a result of its refusal to comply; and

(2) civil penalties of up to $25,000 per day for each day it refuses to comply.

D. This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under Section 6 of ch. 70.105D RCW.

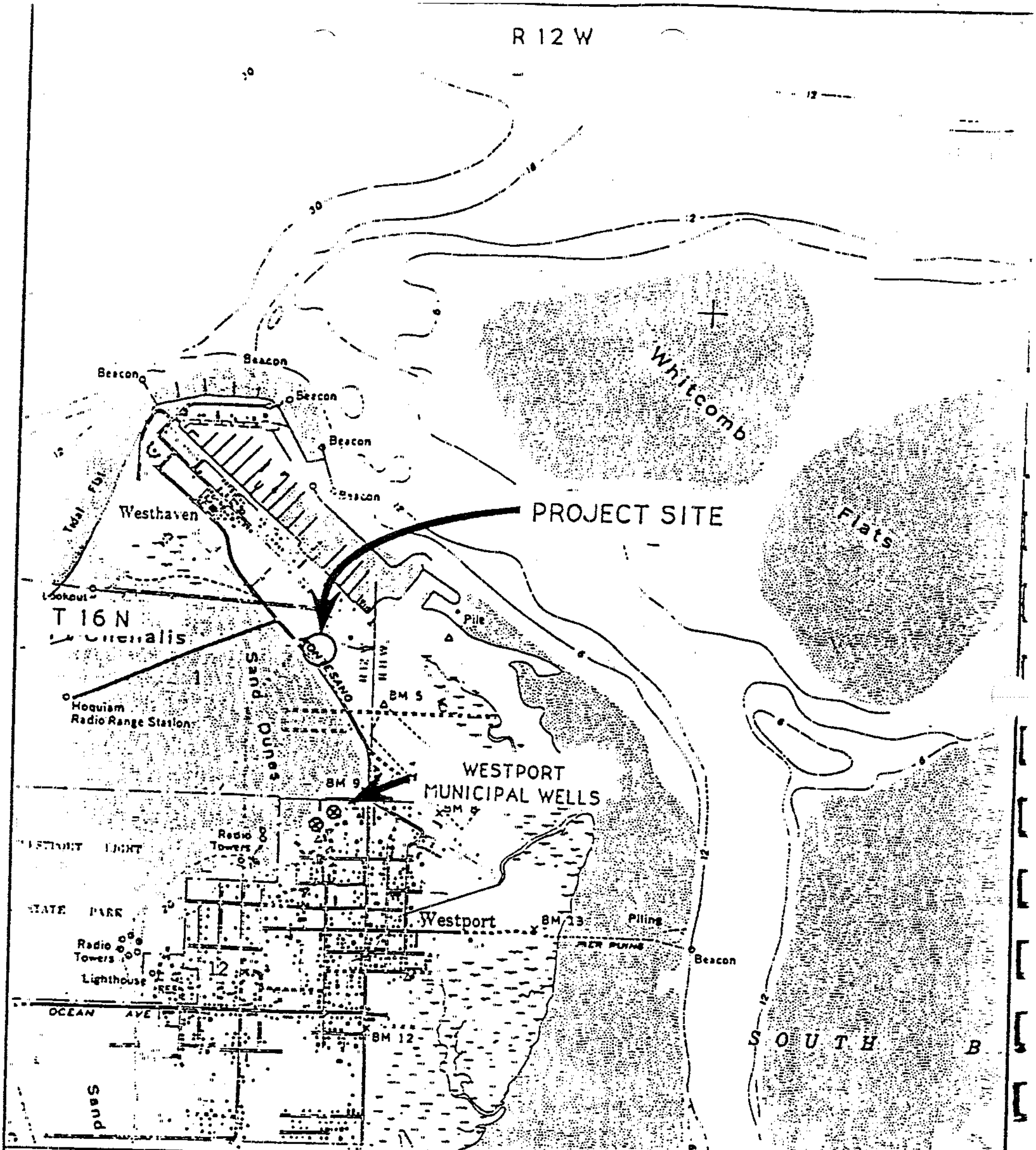
Effective date of this Order: March 29, 1995

Port of Grays Harbor

By _____

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

By _____



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WASHINGTON

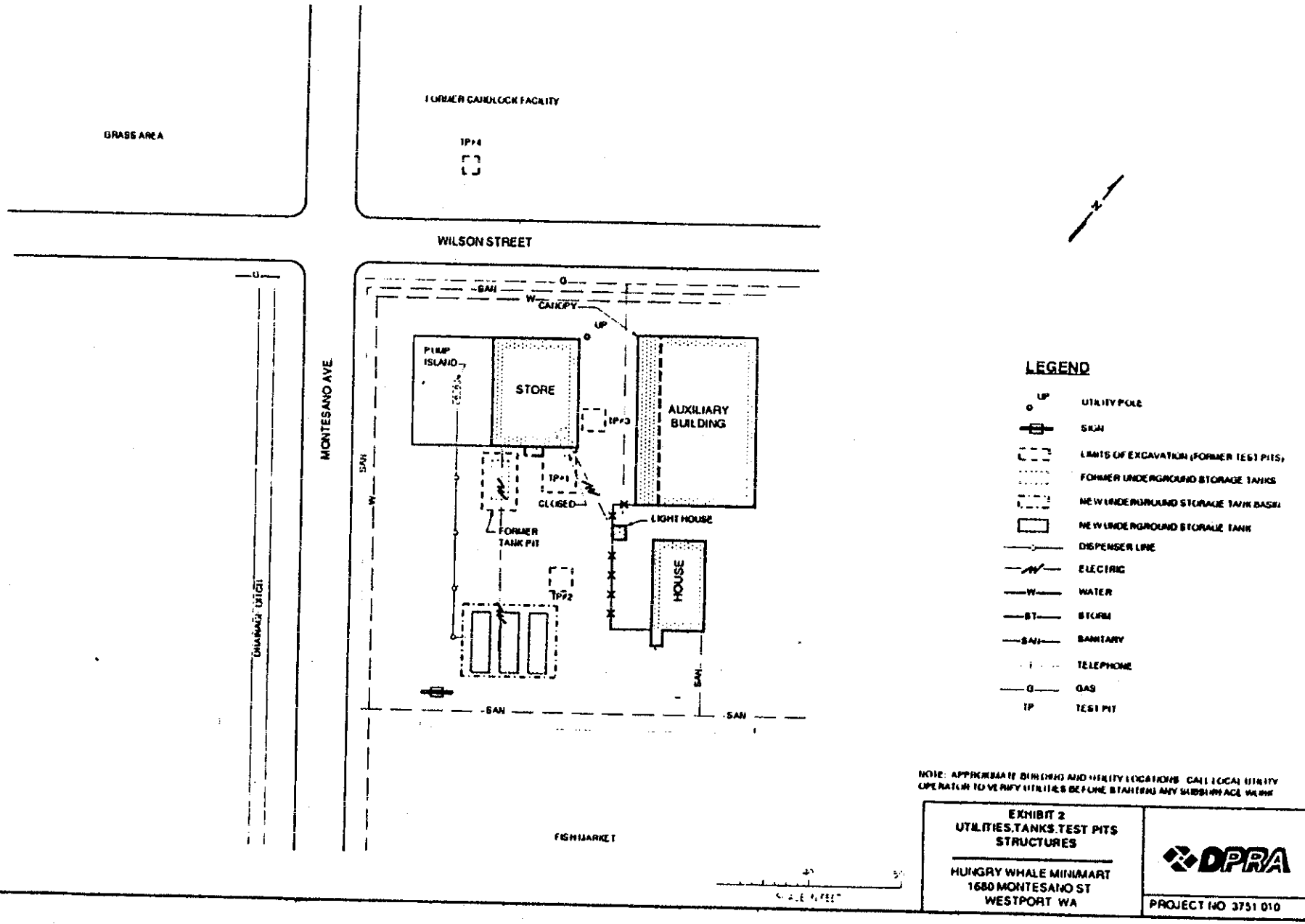
QUADRANGLE LOCATION
WESTPORT, WA

EXHIBIT 1
SITE LOCATION MAP

HUNGRY WHALE MINI/MART
1680 MONTESANO ST.
WESTPORT, WA

DPRA

PROJECT NO. 3751 010



NOTE: APPROXIMATE BUILDING AND UTILITY LOCATIONS. CALL LOCAL UTILITY OPERATOR TO VERIFY UTILITIES BEFORE STARTING ANY SUBSURFACE WORK

EXHIBIT 2
UTILITIES, TANKS, TEST PITS STRUCTURES

HUNGRY WHALE MINIMART
1680 MONTESANO ST
WESTPORT WA

DPRA

PROJECT NO 3751 010

EXHIBIT A

CLEANUP ACTION PLAN
HUNGRY WHALE GROCERY
WESTPORT, WASHINGTON

INTRODUCTION

This cleanup action plan (CAP) has been provided to describe the alternatives for remediation at the Hungry Whale Grocery (hereafter referred to as "the site") located in Westport, Washington and to identify the preferred alternative. This CAP has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA)(Ch 70.105D RCW). The purposes of this CAP are to: (1) briefly describe site history and extent of contamination, (2) identify site cleanup standards, and (3) identify the remedial actions evaluated.

The alternatives and information described in this plan are evaluated in detail in the RI/FS for the site and a separate proposal from Hollis Environmental Remediations. The RI/FS, a Bio-Sparge Proposal for the Hungry Whale by Hollis Environmental Remediations, Inc., and this CAP will be issued for public comment from March 29 to May 1, 1995.

SITE BACKGROUND

The Hungry Whale Grocery is a service station/convenience store located at the intersection of Montesano Avenue and Wilson Street in Westport, Washington (figure 1). Gasoline contamination was confirmed in October 1990 when soil samples were collected from areas surrounding two underground storage tanks (USTs) no longer in use. The samples revealed concentrations as high as 58,000 mg/kg total petroleum hydrocarbons as gasoline (TPH-G). In March 1991, Ecology contracted Olympus Environmental, Inc. to perform a tank closure at the site. One UST was closed in place by cleaning and filling it with sand and a concrete slurry and a second UST was removed. At the time of the tank closure, a thin layer of free petroleum product was found on the surface of the water that had collected in one of the tank excavations.

In November 1991, Ecology contracted Science Applications International Corporation (SAIC) to perform an RI/FS at the site. A total of six monitoring wells were installed to determine the nature and extent of contamination. Samples collected confirmed contamination in excess of MTCA Method A Cleanup Standards for TPH-G, benzene, toluene, ethylbenzene, and xylene (BTEX) for both soil and ground water. Contaminant levels for lead (Pb) exceeded MTCA Method A standards for ground water. The presence of hydraulic oil was also confirmed.

In May 1992, three additional monitoring wells were installed to further characterize the site and aid in the design of a remediation system. During this phase of investigation, the presence of floating petroleum product on the water table was discovered in MW 6. Figure 2 shows locations of the monitoring wells that were installed as part of the RI/FS.

MTCA CLEANUP STANDARDS

Soil Cleanup Standards

Soil cleanup standards which apply to this site are given in Chapter 173-340-740(2) WAC and are summarized below. The MTCA Method A Soil Cleanup Standards

will be achieved at the points of compliance. The points of compliance shall be throughout the site. The site shall be defined as the parcel of property where the Hungry Whale Grocery is located.

Total Petroleum Hydrocarbons (gasoline)	100.0 mg/kg
Benzene	0.5 mg/kg
Toluene	40.0 mg/kg
Ethylbenzene	20.0 mg/kg
Xylenes	20.0 mg/kg

Ground Water Cleanup Standards

Ground water cleanup standards which apply to this site are given in Chapter 173-340-720(2) WAC and are summarized below. The MTCA Method A Ground Water Cleanup Standards will be achieved at the points of compliance. The points of compliance shall be throughout the site.

Total Petroleum Hydrocarbons (gasoline)	1.0 mg/L
Benzene	0.005 mg/L
Toluene	0.040 mg/L
Ethylbenzene	0.030 mg/L
Xylenes	0.020 mg/L
Lead	0.005 mg/L

SITE CONDITIONS

Subsurface Soils

The site lithology generally consists of poorly graded silty sand with some fine sand and silt lenses. The silty sand unit appears to be fairly uniform and is likely eolian in origin. The finer grained sands and silts are most likely fill or marsh deposits. A silty clay spoils or fill layer was present in some of the borings at a depth of approximately five feet below the ground surface. This material is believed to have originated as marsh deposits which were dredged and used as fill.

Ground Water

At the time of the field investigation, depth to ground water ranged from approximately 6 to 7 feet below the surface. The general direction of ground water flow appeared to be to the southeast. Areas of enhanced ground water flow were found near underground utility conduits. Tidal influences appeared to be minimal. Hydraulic conductivity tests conducted on three monitoring wells at the site show fairly uniform aquifer characteristics.

Dwellings and businesses in the area are served primarily by municipal water wells. Three City of Westport wells are located within a one-mile radius of the site. Boring logs show a total depth of approximately 105 feet for each well, with the last five feet of depth being screened. The lithologies present within the upper portion consist of a gray brown green sand to a depth of 36 feet underlain by coarse grained sand and gravel to the total depth of the wells. Distinct shell horizons occurred at 36 and 40 feet, 85 to 88 feet, and at 98 feet. The static water level was observed at a depth of 5 feet below the ground surface. Routine ground water sampling from the wells has not detected contamination. Because of the well construction details and distance from the site, these wells are not considered at risk.

NATURE AND EXTENT OF CONTAMINATION

Free Phase Petroleum Product

Free phase petroleum product was detected in monitoring MW-6 at a thickness of 1.5 feet on both March 17, 1992 and July 31, 1992. A product scan identified the primary components to be gasoline and hydraulic oil. The extent of free product is unknown but appears to be limited to the immediate vicinity of MW-6 since it was not found in any other wells.

Soil Contamination

Results of the RI/FS indicate that soil contamination exists primarily in the southwestern half of the site. The highest contaminant concentrations encountered during the installation of the monitoring wells were in MW-6, MW-7, and MW-9. The contaminated zone appeared to extend approximately 10 to 15 feet in thickness. The total volume of contaminated soil is approximately 10,000 cubic yards. Soil samples collected during the installation of the monitoring wells did not show evidence of off-site soil contamination.

Ground Water Contamination

The most severely impacted ground water at the site is located near the former UST locations and the pump island. MTCA Method A Cleanup Standards were exceeded for TPH-G and BTEX at MW-2, MW-6, MW-7, and MW-9. TPH-G concentrations at these wells ranged from 81,000 to 1,500,000 ug/l. BTEX levels were as high as 47,000, 3,000, 41,000, and 18,000 ug/l, respectively. These high contaminant levels most likely are influenced by the presence of free product. The MTCA Method A Cleanup Standard for lead was exceeded at all wells except MW-8.

POTENTIAL CLEANUP OPTIONS

Unsaturated Zone

A wide range of technologies were considered in the selection of a remedy for the site. Most treatment options can be separated into in-situ and ex-situ technologies. All ex-situ technologies would involve excavation of all contaminated soil, and surface treatment using a variety of methods or disposal at a landfill. Because much of the contaminated soil is located where excavation is not feasible (i.e., under the store, near the pump islands, and areas surrounding USTs that are in use), this method of soil remediation was eliminated from consideration.

In-situ soil treatment technologies are considered the most practical for remediation of this site. Treatment options considered for this site consist of soil vapor extraction, and in-situ bioremediation.

Saturated Zone

The alternatives considered for remediation of the saturated zone all included pump and treat technologies. The treatment alternatives evaluated consisted of air stripping, spray aeration, and bioremediation. All three options involve the extraction of contaminated ground water and reintroduction of the pumped ground water following treatment. These methods were selected because they represent readily available technologies and can result in the attainment of cleanup standards.

CLEANUP ACTION ALTERNATIVES

Based on the previous discussion of technologies which are suited for site conditions, following are three cleanup alternatives which have been considered. These alternatives all have comparable cost and rely largely on "off-the-shelf" models and parts.

1) Vapor extraction of contaminated soils; pump and treat of ground water using air stripper.

2) Vapor extraction of contaminated soils; pump and treat of ground water using spray aeration (Spray Aeration\Vapor Extraction, S.A.V.E.)

3) Enhanced bioremediation of contaminated soils; pump and treat of contaminated ground water using enhanced bioremediation (BIO-SPARGE").

Alternative 1 — Vapor extraction of contaminated soils; pump and treat of ground water using air stripper.

Description

Contaminated soil would be remediated by vapor extraction. Vapor extraction involves the withdrawal of volatile soil vapors from the contaminated soil using a network of vapor extraction wells. These soil vapors are vented to the atmosphere following treatment. A secondary treatment system for the vapor stream would most likely be required before releasing the emissions to the atmosphere.

Ground water would be remediated by pump and treat using an air stripper. After the contaminated ground water is withdrawn by an extraction well, air is introduced to the contaminated water, removing the volatile components and venting them to the atmosphere. As with soil vapor extraction, secondary treatment of the vapor stream will most likely be required before the emissions are released. Additional ground water treatment, such as granular activated carbon, will most likely be necessary to completely remove the hydraulic oil and lead, compounds which are difficult to strip.

Discharge permits for air and the treated ground water would most likely be necessary.

The restoration time frame is estimated at approximately 3 years.

Alternative 2 — Vapor extraction of contaminated soils; pump and treat of ground water using spray aeration (S.A.V.E.)

Description

The S.A.V.E. option is a single treatment system that remediates ground water by pump and treat using spray aeration and soil using vapor extraction. Contaminated ground water would be extracted from the subsurface and circulated through a spray aeration chamber where it is heated, volatilizing the gasoline range contaminants. Soil gas vapors would be withdrawn from

vapor extraction wells and piped into the same system. Gas vapors from both processes are directed to an internal combustion engine where they would be burned. The internal combustion engine is fitted with a three-way catalytic converter which is used to complete combustion and control hydrocarbon emissions to the atmosphere. An external source of fuel, such as propane, and a heavy metals pre-treatment step to remove lead would be necessary.

As with Alternative 1, discharge permits for air and the treated water would most likely be necessary.

The estimated restoration time frame for Alternative 2 is approximately 3 years.

Alternative 3 **Enhanced bioremediation of contaminated soils; enhanced bioremediation of ground water (BIO-SPARGE").**

Description

Bioremediation usually consists of modifying the environment of an aquifer by the addition of oxygen and other inorganic nutrients in order to enhance the activity of native microbial populations and encourage them to degrade contaminants. Other than the hydrogeology, the primary limiting factor of successful bioremediation is the availability of oxygen. If sufficient oxygen is not present naturally, then oxygen must be provided by circulating oxygenated water through the contaminated area until degradation is complete.

The BIO-SPARGE system utilizes an enhanced bioremediation process. This is a closed-loop technology that continually circulates soil vapors and ground water from peripheral wells through a pressurized bioreactor before returning the newly-cleansed vapor and ground water to the center of contamination. The treated soil vapors and ground water are heated and biosurfactants and nutrients are added before reintroduction. The movement of soil vapors and ground water is directed toward the peripheral extraction wells wherein off-site gases and ground water are also withdrawn and mixed with the contaminated vapors and ground water for return to the bioreactor. Free product can be removed either through volatilization and circulation within this loop or if large amounts of free product are present and would justify recovery, then a free product recovery system could be integrated into the basic system structuring.

As with the other alternatives evaluated, an extra treatment step will be necessary to address the dissolved lead present in the ground water. The extracted ground water will be circulated through an ion-exchange filter to remove the dissolved lead present.

The anticipated restoration time frame for this system is approximately 18 months.

ANALYSIS OF CLEANUP ACTION ALTERNATIVES

Following is an evaluation of the three cleanup action alternatives using MTCA criteria:

1. **Protection of Human Health and the Environment**

   Although all alternatives are protective of human health and the environment, Alternative 3 is slightly more protective since it has a shorter restoration time frame and results in the generation of less waste material than alternatives 1 or 2.

2. **Compliance with Cleanup Standards**

   All alternatives would fully comply with the appropriate Method A soil and ground water cleanup standards.

3. **Compliance with Applicable or Relevant and Appropriate Requirements**

   All alternatives would comply with the applicable or relevant and appropriate state and federal requirements (ARARs). Alternatives 1 and 2 would require compliance with discharge limits for ground water and compliance with Olympic Air Pollution Control Authority (OAPCA) for air emissions. Alternative 3 will require compliance with discharge limits.

4. **Restoration Time Frame**

   The restoration time frames for Alternatives 1 and 2 would be approximately 3 years. For Alternative 3, restoration time frame is estimated to be 18 months.

5. **Short Term Effectiveness**

   Alternatives 1 and 2 are equally effective in the short term since each reduce the amount of contaminant present in the subsurface. Alternative 3 is slightly more effective in the short term since cleanup standards will be achieved more quickly.

6. **Long Term Effectiveness**

   All methods are anticipated to be equally effective in the long term (5 to 10 years). The long term effectiveness of Alternative 3 will be documented by drilling confirmatory soil borings in areas where the most severe contamination was present and performing confirmational ground water monitoring to confirm compliance with MTCA Method A cleanup standards.

7. **Reduction of Toxicity, Mobility, and Volume**

   All proposed alternatives involve utilizing a treatment technology that ultimately destroys the contaminants in all contaminated media. Alternatives 1 and 2 involve transfer of contamination from one media to another and either disposing or burning the waste generated. Alternative 3 relies largely on naturally occurring microorganisms to digest the contamination which, in turn, produces less waste material.

8. **Implementability**

   All alternatives are equally executable.

9. Cleanup Cost

Although the cost for the cleanup action cannot be considered when determining the cleanup standard, it may be considered when choosing a cleanup option (WAC 173-340-700(7)(f). All alternatives evaluated have comparable cost.

9. Community Concerns

Community comments will be solicited during a 30-day public review period.

SELECTED ALTERNATIVE

The selected alternative for the remedial action for the site is described below. This selected alternative is the same as Alternative 3, as detailed below:

- In-situ enhanced bioremediation of soil and ground water will be performed using a closed loop process. This technology continually circulates soil vapors and ground water from peripheral wells through a pressurized bioreactor before returning the newly cleansed vapor and ground water to the center of the contamination using a sparge well.

- Bio surfactants and nutrients will be added to the vapors and ground water that is injected into the ground. Bio surfactants will aid in the desorbtion of the hydrocarbons and nutrients will help speed the rate of biodegradation.

- Circulated soil vapors and ground water will be reintroduced in the center of the contaminant plume using a sparge well. These vapors will be heated and have a high moisture content. The high moisture will prevent the soil from drying out. The heated air will also stimulate the bioorganisms to digest the contamination more quickly.

JUSTIFICATION FOR CHOOSING SELECTED ALTERNATIVE

The cleanup action, as selected is designed to accomplish the following requirements:

1. Protect human health and the environment.
2. Comply with cleanup standards per WAC 173-340-700 through 760.
3. Comply with applicable state and federal laws per WAC 173-430-710.
4. Provide compliance monitoring per WAC 173-340-410.
5. Use permanent solutions to the maximum extent practicable per WAC 173-340-360(4), (5), (7), and (8).
6. Provide a reasonable time frame per WAC 173-340-360(6).
7. A comment period from March 29 to May 1, 1995 will solicit public comment on the draft cleanup action plan (WAC 173-340-360(10 through (13)).

The selected alternative, like the other alternatives evaluated, is protective of human health and the environment and remediates contaminated soil and ground water present at the site. The primary difference between the selected alternative and all other alternatives evaluated is that the selected alternative utilizes bioremediation. Bioremediation is a process in which naturally occurring organisms digest the contamination.