FINAL CLEANUP ACTION PLAN

ARDEN'S COUNTRY STORE
MALOTT, WASHINGTON

INTRODUCTION

A draft cleanup action plan (CAP) has been provided to briefly describe the alternatives for final cleanup of the contaminated soil and ground water at the Arden's Country Store site (hereafter referred to as "the site") located in Malott, Washington. This CAP has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW, and addresses the requirements of the MTCA Cleanup Regulation (section 173-340-360(10). The purposes of the CAP are to: (1) briefly describe the alternatives presented in the Feasibility Study (FS); and (2) identify the preferred cleanup alternative. Additional information is also included to provide sufficient background for the site, including a site description and nature and known extent of contamination.

The alternatives and information described in this plan are evaluated in detail in the Feasibility Study and Remedial Investigation (RI) report, which were conducted pursuant to Order No. DE 91-C141. This draft CAP and the associated proposed Scope of Work were issued for public comment from December 4, 1992 to December 31, 1992. No comments were received.

SITE BACKGROUND

The site is located on the southwest corner of Old Highway 97 and Allen Street, in Malott (Figure 1). Arden's Country Store is currently a convenience store, and, prior to July 1991, was also a gas station. The site was first reported to Ecology in March 1988 as an emergency situation due to the presence of explosive levels of gasoline vapors in the store. Immediate site stabilization included removal of two abandoned underground storage tanks (USTs) along with associated contaminated soil. An old abandoned domestic well in the store's basement was also sealed to prevent further migration of vapors. Subsequent analysis of ground water on-site from March 1988 to March 1990 revealed continuously increasing levels of benzene, toluene, ethylbenzene, and xylenes (BTEX, which are constituents of gasoline). The surrounding community of Malott utilizes ground water as the only source of drinking water, so numerous wells in the site vicinity were and are at risk from these contaminants. Throughout this period, letters were repeatedly sent to the site owner/operator informing him of the need for a Remedial Investigation/Feasibility Study (RI/FS).

In May of 1991, an Enforcement Order requiring the RI/FS was issued. The Order was not complied with, so Ecology contracted for the work to be done using funds from the State Toxics Control Account. Field work conducted during the RI encompassed the downtown Malott area surrounding the site, and included domestic well sampling, a soil gas survey, installation of five monitoring wells, and sampling of soil and ground water. The RI

concluded that the sources of contamination originated on-site, and consisted of the three existing USTs (currently in temporary closure status), and residual contamination remaining from the two USTs excavated in 1988. Levels of contamination in the ground water exist at concentrations far exceeding MTCA Method A cleanup levels, and drinking water standards.

During the FS, additional soil and ground water sampling was conducted in an attempt to more closely delineate the plume of contamination. However, due to the presence of numerous above and below ground structures, utilities, and pipelines, it was not possible to install the borings as planned, in locations most likely to reveal contamination. For this reason, the presence of petroleum contaminated soil in the vicinity of the existing USTs has not yet been confirmed. Sufficient evidence does exist, however, to indicate that they have, at a minimum, contributed to the contamination at the site (as concluded by the RI). This evidence consists of a failed tank tightness test in 1988, with no follow-up investigation or repair, and the indication of an ongoing contamination source as demonstrated by increasing levels of ground water contamination since 1988. For these reasons, tank decommissioning and investigation will be included in this cleanup action. For the purpose of cost estimation, the amount of petroleum contaminated soil (PCS) has been estimated to be approximately 750 cubic yards. The actual amount will be determined after the tank decommissioning and removal.

Further, the FS concluded that contamination detected through the soil gas survey in the vicinity of the excavated USTs (during the RI) most likely indicates the residual contamination of the ground water and not residual soil contamination above the water table.

Contaminants of concern at the site include benzene, toluene, ethylbenzene, xylenes (BTEX), total petroleum hydrocarbons (TPH) as gasoline, TPH as diesel, and lead. During laboratory analysis of RI field samples, methylene chloride was also detected both in laboratory blanks and in soil and water samples; it is believed to be a lab contaminant only, but this will need to be verified through an additional analysis.

Soil types in the site vicinity consist predominantly of sands and silts with a thin layer of clay interfingered around most of the east and south side of the site, but not documented as underlying all of the site. The depth of the clay layer varies from 13.5 to 14.5 feet below ground surface (bgs), and its thickness varies from 3 to 4 inches. The depth to ground water was 18.5 feet bgs in July 1992, and 12.5 feet bgs in July 1991.

The contaminated ground water plume is estimated to underlie most of the west half of the site, encompassing the asphalt covered area where the

existing USTs, pump islands, and excavated USTs are/were located. It is also estimated to extend east approximately 25 feet under the store building. Ground water flows slowly to the east, but the plume has not yet migrated off-site.

ALTERNATIVE CLEANUP METHODS EVALUATED

Prior to deciding on the proposed draft cleanup action plan, other appropriate cleanup methods were evaluated. These alternatives were analyzed in detail in the Feasibility Study, and are described very briefly below.

Initial Soil Cleanup Alternatives

Initial alternatives considered for cleanup of the probable soil contamination included soil gas venting/vacuum extraction, in-situ on-site, and off-site bioremediation, on-site and off-site incineration, asphalt blending, landfill disposal, soil flushing, hydraulic barriers, and no action.

When these initial alternatives were evaluated for site specific suitability (as determined by site geology and contaminants of concern), and compliance with WAC 173-340-360 (Selection of Cleanup Action), all but incineration, asphalt blending, and landfill disposal were eliminated from further consideration. The no-action alternative will be reconsidered if no soil contamination is found when the tanks are removed. Detailed information on this evaluation process is included in the Feasibility Study.

Briefly, soil gas venting/vacuum extraction is not effective in soils containing silt and clay, or when diesel contamination is present. Neither off-site nor on-site bioremediation are suitable due to lack of an appropriate treatment site and unacceptable transfer of volatile hydrocarbons from the soil to the air. In situ bioremediation is not suitable due to the soil types and uncertain restoration time frame. Soil flushing would generate unacceptably large quantities of contaminated wastewater, and hydraulic barriers are more suitable for the containment of free petroleum product, which has not been found at the site; nor do hydraulic barriers accomplish soil cleanup. The no-action alternative is reserved in the event that no soil contamination is found. If petroleum contaminated soil is found, WAC 173-340-360 requires that it be addressed through remedial action.

Initial Ground Water Cleanup Alternatives

Initial alternatives evaluated for the cleanup of contaminated ground water at the site included pumping wells, carbon adsorption, air stripping,

trench excavation, vacuum extraction, biorestoration, air sparging, and no action.

When these initial alternatives were evaluated for site specific suitability (as determined by site hydrogeologic characteristics and contaminants of concern), and compliance with WAC 173-340-360 (Selection of Cleanup Action), all but pumping wells, carbon adsorption, and trench excavation were eliminated from further consideration. Detailed information on this evaluation process is included in the Feasibility Study.

Briefly, vacuum extraction is not effective at sites with soils containing silt and clay, or when nonvolatile contaminants (TPH as gas and diesel) are present. Air stripping is not efficient at remediating TPH either, so additional treatment steps would be needed. Biorestoration and air sparging were eliminated because they are both new technologies with a large number of unknowns involved. It is likely that cleanup of the ground water using these technologies would take an unacceptably long period of time to achieve, and that cleanup would be incomplete. Further, air sparging is not effective at remediating less volatile contaminants in soils containing silt and clay. The no-action alternative was eliminated from consideration because the site threatens a drinking water aquifer and cleanup is technically possible and practicable (WAC 173-340-360(5)&(7)).

<u>Summaries of Practicable Alternative Soil Cleanup Methods Suitable to the Arden's Country Store site</u>

METHOD 1: Excavation and Asphalt Blending: Petroleum contaminated soil is excavated and transported to an asphalt blending plant, where it is incorporated into an asphalt matrix to be used for construction purposes. The excavation is backfilled with clean fill. If there is an asphalt blending plant located within an economically practicable distance from the site, and if the levels of contamination and soil type are acceptable to the plant, this method would be in compliance with section 173-340-360 WAC, and is high on the cleanup technology hierarchy (173-340-360(4)WAC), due to the reuse of soil and immobilization of contaminants. This option is the most expensive option, however, relative to the incineration and landfill disposal options.

METHOD 2 & 3: Excavation and On-site or Off-site Thermal Incineration: If the quantity of petroleum contaminated soil is found to be 750 cubic yards or less, then it appears more cost effective to transport the PCS to an incineration facility which heats the soil to a high enough temperature to destroy the contaminants, after which the soil is reused. Any contaminants released to the air are also collected and destroyed prior to atmospheric release. Should the quantity of PCS be found to exceed 750 cubic yards, it may be more cost effective to arrange for a mobile incinerator to come to

the site and treat the PCS there, rather than transporting the soil. In either case, the excavation is backfilled with treated soil. This method is in compliance with section 173-340-360 WAC, and is high on the cleanup technology hierarchy (173-340-360(4)WAC), due to destruction of contaminants and reuse of soil. This option is less expensive than asphalt blending, and more expensive than the landfill disposal option.

METHOD 4: Excavation and Disposal at an Appropriately Licensed and Permitted Landfill: Contaminated soil is excavated and transported to the closest landfill, the East Wenatchee landfill, and disposed of. The excavation is backfilled with clean fill. This method is in compliance with section 173-340-360 WAC, but is lower on the cleanup technology hierarchy (173-340-360(4)WAC) because the PCS is simply disposed of; contaminants are not destroyed and the soil is not reused. However, this option is much more economically practicable than the first and second options, and thus would help to ensure that sufficient funds be devoted to the ground water cleanup, which will be a more long-term operation.

No-Action: In the event that UST decommissioning and investigation indicates the absence of petroleum contaminated soil, no remedial action would be necessary for the soil.

Summaries of Practicable Alternative Ground Water Cleanup Methods Suitable to the Arden's Country Store site

METHOD 1: Extraction Trench and Granular Activated Carbon Adsorption: This option involves excavation of a trench downgradient of the contaminated ground water plume, from which contaminated ground water is pumped and treated by granular activated carbon adsorption. After installation of the pumping system, the trench is backfilled with gravel. While this type of system is efficient at capturing the contaminated ground water, it is not as efficient as an extraction well in areas where the depth to ground water fluctuates, as at this site. When the depth to ground water increases too much, the system has to be shut down. Although no cost estimate for trench extraction was provided in the Feasibility Study, this method is known to be more expensive than the extraction well option, and does not appear to be as suitable to this site as an extraction well. This method has been retained for future consideration, however, in the event that unforseen problems should arise with the preferred option, described below.

METHOD 2: Ground Water Extraction Well and Granular Activated Carbon Adsorption (Pump & Treat): This treatment method was concluded to be the most effective and efficient treatment option for this site, given the site hydrogeology and nature of contaminants. A ground water extraction well is planned to be installed on the downgradient side of the site (southwest of the store building), and the contaminated ground water will be pumped

through granular activated carbon adsorption filter units. Prior to upgradient discharge on-site, the treated ground water will be laboratory analyzed to determine compliance with the MTCA Method A Cleanup Levels, listed below under "CLEANUP STANDARDS".

Once the treated ground water has been found to meet required cleanup levels, it will be routed to the discharge point, which will consist of an infiltration gallery placed in an upgradient on-site location.

CLEANUP STANDARDS

Soil Cleanup Standards: Cleanup levels for soil which apply to this site are listed in WAC 173-340-740(2) 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, which is currently defined as the corner parcel occupied by Arden's Country Store.

Total Petroleum Hydrocarbons (TPH) as:	
Gasoline	100.0 ppm*
Diesel	200.0 ppm
Benzene	0.5 ppm
Toluene	40.0 ppm
Ethylbenzene	20.0 ppm
Xylenes	20.0 ppm
Lead	250.0 ppm

*ppm=parts per million

Ground Water Cleanup Standards: Cleanup levels for ground water which apply to this site are listed in WAC 173-340-720(2) and are summarized below. The MTCA Method A ground water cleanup standards will be achieved at the points of compliance, which will be throughout the site, which is currently defined as the corner parcel occupied by Arden's Country Store.

Total Petroleum Hydrocarbons (TPH) as:	
Gasoline	1000.0 ppb*
Diesel	1000.0 ppb
Benzene	5.0 ppb
Toluene	40.0 ppb
Ethylbenzene	30.0 ppb
Xylenes	20.0 ppb
Lead	5.0 ppb

*ppb=parts per billion

ANALYSIS OF CLEANUP ACTION ALTERNATIVES SUITABLE TO THE SITE

Alternative 1: Tank Decommissioning & Investigation, Excavation & Transport of Petroleum Contaminated Soil (PCS) to East Wenatchee Landfill, and Ground Water Pump & Treat.

Estimated Cost:

Tank Decom. & Investigation	$21,500.00
PCS Excavation, Transport & Backfill*	$43,500.00
PCS Disposal*	$18,000.00
Ground Water Pump & Treat (5 million gal)	$147,000.00
TOTAL COST	**$230,000.00**

24.00/cyd

Alternative 2: Tank Decommissioning & Investigation, Excavation, Transport & Incineration of PCS, and Ground Water Pump & Treat.

Estimated Cost:

Tank Decom. & Investigation	$21,500.00
PCS Excavation & Backfill*	$28,500.00
PCS Transport (if off-site incineration is more cost-effective)*	$15,000.00
Off-site PCS Incineration*	$50,000.00
Ground Water Pump & Treat (5 million gal)	$147,000.00
TOTAL COST	**$262,000.00**

66.66/cyd

Alternative 3: Tank Decommissioning & Investigation, Excavation and Transportation of PCS to Asphalt Blending Facility, and Ground Water Pump & Treat.

Estimated Cost:

Tank Decom. & Investigation	$21,500.00
PCS Excavation, Transport & Backfill*	$43,500.00
Asphalt Blending of PCS*	$75,000.00
Ground Water Pump & Treat (5 million gal)	$147,000.00
TOTAL COST	**$287,000.00**

100/cyd + transp

*** The cost estimated for these tasks is based on an estimated quantity of PCS, which is 750 cubic yards (cyds). The actual quantity of PCS cannot be**

determined until the three USTs are decommissioned and excavated, and the soil conditions investigated.

Alternative 4: Tank Decommissioning & Investigation and Ground Water Pump & Treat (no soil cleanup required).

Estimated Cost:

Tank Decom. & Investigation	$21,500.00
Ground Water Pump & Treat	$147,000.00
TOTAL COST	**$168,500.00**

The methods incorporated in the above four alternatives are described briefly under the previous summaries of alternative cleanup methods, beginning on page 4, and in more detail in the Feasibility Study.

Following is an evaluation of the four cleanup action alternatives using MTCA Cleanup Regulation criteria (WAC 173-340-360):

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

Alternatives 1, 2, and 3 would all involve removal of PCS from the site, and remediation of ground water to concentrations below cleanup levels and drinking water standards. It is expected that the treatment of five million gallons of ground water will remediate the plume of contaminated ground water and accomplish the flushing of contaminants adsorbed onto the soil matrix below the saturated zone where excavation is not practical. Since all of the alternatives accomplish removal of contaminants from the site, they all accomplish protection of human health and the environment in the vicinity of Malott.

The potential threats common to alternatives 1, 2, and 3 involve excavation and transport of the PCS (unless the quantity of PCS determines that on-site incineration is more economically practicable). To minimize the threat posed by excavation (also presented by Alternative 4), access to the excavation area will be restricted, and the open excavation will be fenced off, both in accordance with Washington State Department of Labor and Industries laws. The PCS transport will be conducted in a safe manner in accordance with applicable Washington State Department of Transportation laws. Transport is not expected to pass through neighborhoods or other similarly sensitive areas, other than along Allen Street on the way to Route 97.

An additional potential threat common to all alternatives is presented by decommissioning and excavation of the USTs, which is a potentially dangerous operation due to the explosivity of gasoline vapors under certain conditions. The employment of an appropriately experienced contractor who is licensed to decommission USTs in accordance with the Underground Storage Tank law and regulation is expected to keep this potential threat to a minimum.

The only difference between Alternatives 1, 2, and 3 is the fate of the PCS. While Alternatives 2 and 3 accomplish recycling and destruction or immobilization of contaminants, Alternative 1 accomplishes disposal in a facility designed to minimize future release of the contaminants. Since Alternative 1 does not accomplish complete destruction of the contaminants, it is assumed that there is a small potential that, in the event the disposal facility's containment system is ever compromised, a release of contaminants could present a potential risk to human health and the environment in the vicinity of the East Wenatchee Landfill.

Although Alternative 2 is currently the preferred option, Alternative 1 is retained as a default alternative in the event that: (1) the quantity of PCS is found to be much less than currently estimated; or (2) incineration (Alternative 2) turns out to be technically impracticable from an economic standpoint due to the remote location of the site. Of course, Alternative 4 will be selected in the event that tank decommissioning and investigation indicates no petroleum contaminated soil exceeding cleanup levels.

2. Compliance with Method A Cleanup Standards

All alternatives would enable the site to comply with the MTCA Method A Cleanup Standards within a reasonable restoration time frame, estimated to be 2 years from signing of a cleanup contract. Confirmational monitoring will be conducted after ground water has been remediated to below cleanup levels. It is possible that this monitoring may indicate that the soil matrix below the water table may still contain residual adsorbed contaminants above cleanup levels. Depending on the levels of contamination which may remain, the ground water pump and treat system would either be continued (if the levels are significantly above cleanup levels), or, if levels are only slightly above cleanup levels, the site would continue to be monitored with the remaining low levels of contamination allowed to remediate through naturally occurring microbial degradation. Alternative 1 does not accomplish attainment of cleanup standards for soils, however, the PCS would be disposed of in an appropriately designed facility with the potential for future release minimized.

3. Compliance with State and Federal Laws

All alternatives would be in compliance with the applicable or relevant and appropriate state and federal requirements (ARARs). These would include, but not be limited to the following:

- o compliance with Water Quality technical standards for treated ground water discharge;
- o compliance with Department of Labor and Industries laws regarding worker safety and training and restricted access at hazardous waste sites and in excavations or confined spaces;
- o compliance with the State Environmental Policy Act, including issuance of a Determination of Nonsignificance;
- o compliance with Department of Transportation laws regarding transport of PCS (unless on-site incineration is the chosen alternative);
- o compliance with Air Quality laws if incineration is the chosen alternative.

4. Provision for Compliance Monitoring

A compliance monitoring plan, as required by WAC 173-340-410, will be included in the contractual work plan prior to implementation of the actual cleanup action. This compliance monitoring plan will be subject to Ecology approval.

5. Use of Permanent Solutions to the Maximum Extent Practicable

Regarding cleanup of PCS, Alternative 2 is highest on the technology hierarchy (WAC 173-340-360(4)(a)), utilizing the most preferred technologies. Incineration of PCS accomplishes destruction of contaminants and reuse of soil. Alternative 3, asphalt blending, utilizes the fourth most preferred technology, which is immobilization of contaminants. It also results in reuse of soil, the most preferred technology. Alternative 3 is not a preferred alternative for this site because it has the highest cost; WAC 173-340-360(5) does allow for consideration of cost in the final selection of cleanup technology. Alternative 1, landfill disposal, is the fifth most preferred technology in the hierarchy. It has a higher preference than isolation or containment of contaminants and institutional controls and monitoring. Alternative 1 is proposed as the default alternative in the event that Alternative 2 is found not to be economically practicable due either to remote site location (and lack of availability within an economically feasible distance), or a relatively small quantity of PCS being confirmed.

exceptions: (1) part of the TPH and lead adsorbed in the carbon filters will likely be released to the atmosphere during regeneration, and (2) some BTEX would volatilize from the PCS if it is disposed of in a landfill, depending on how quickly it is covered with other solid waste (Alternative 1). None of the alternatives rely primarily on institutional controls and monitoring since it is technically possible and practicable to implement a higher preference cleanup technology. The alternative utilizing off-site transport and disposal of PCS is not the most preferred option; however, if Alternative 2 (incineration) proves to be unpracticable from an economic standpoint, Alternative 1 (landfill disposal) is proposed as the default preferred alternative.

PROPOSED CLEANUP ACTION

Cleanup at this site is proposed to consist of the following phases and methods:

(1) Investigation and decommissioning of three on-site underground storage tanks (USTs) currently in temporary closure status, will be conducted in accordance with:

- UST Regulation, Chapter 173-360 WAC;
- Guidance for Site Checks and Site Assessments for USTs (rev. October 1992);
- Model Toxics Control Act Cleanup Regulation (MTCA), Chapter 173-340-450 WAC;
- Guidance for Remediation of Releases from Underground Storage Tanks ("LUST guidance" document); and
- Scope of Work contract.

(2) If/when suspected soil contamination is confirmed, remedial activities will be conducted in accordance with the MTCA Cleanup Regulation, WAC 173-340, the LUST guidance document, and the Scope of Work specified in the contract. Petroleum contaminated soil (PCS) is planned to be sampled, excavated, stockpiled, and incinerated in accordance with the last mentioned documents.

(3) Installation of one ground water extraction well downgradient of Monitoring Well A5, located so as to extract contaminated ground water as efficiently as possible. One additional monitoring well will also be installed.

(4) Contaminated ground water will be pumped out of the extraction well and routed through granular activated carbon adsorption filters. After treatment, the water will be laboratory analyzed to ensure that it meets the required Method A cleanup levels (listed on page 6).

After the ground water is confirmed as being in compliance with cleanup levels, it will be routed to a discharge point located upgradient and on-site. The discharge point will consist of an infiltration gallery designed to prevent runoff, with restricted access.

For further detail, please refer to the Scope of Work document.

PROPOSED SCHEDULE & ESTIMATED RESTORATION TIME FRAME

It is expected that a contract for this cleanup action should be in place by March 1993, and implementation of the cleanup should begin by April 1993.

The time frame for restoration of the site is estimated to be approximately two years. The length of time is largely dependent on the amount of petroleum adsorbed in the soil matrix below the water table, and how efficiently the ground water treatment system "flushes" this adsorbed contamination so that it can be recovered. This time period begins with signing of the contract for the cleanup action, and includes the first round of confirmational sampling of selected monitoring wells, and assumes a nearly continuous operation of the treatment system. It is also based on the assumption that five million gallons of ground water will need to be remediated.

Regarding the requirements for ground water restoration (WAC 173-340-360(7)), all alternatives utilize the same technology, and this technology is planned to achieve MTCA Method A cleanup levels throughout the site.

JUSTIFICATION FOR PROPOSING A DEFAULT CLEANUP ACTION WHICH UTILIZES A LESS PREFERRED TECHNOLOGY

In the event that the proposed Alternative 2 is found to be an unavailable or economically impracticable option due either to the remote location of the site or a relatively small quantity of PCS being confirmed, it is proposed that a less preferable technology, landfill disposal, be utilized as default Alternative 1. The reason for this proposal is to help ensure that sufficient funds be reserved to complete the ground water cleanup, which is expected to be a long-term operation, with an estimated restoration time frame of two years.