DRAFT FEASIBILITY STUDY REPORT

CITY PARCEL SITE

SPOKANE, WA

EASTERN REGIONAL OFFICE

TOXICS CLEANUP PROGRAM

FEBRUARY 2004

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LIST OF ACRONYMS

ARARs	Applicable, Relevant and Appropriate Requirements
CFR	Code of Federal Register
EPA	Environmental Protection Agency
FS	Feasibility Study
MTCA	Model Toxics Control Act
PCBs	Polychlorinated Biphenyls
PLPs	Potentially Liable Persons
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
RI	Remedial Investigation
SAIC	Science Applications International Corporation
TPH – D	Diesel Range Total Petroleum Hydrocarbons
TSCA	Toxics Substance Control Act
VOCs	Volatile Organic Compounds
WAC	Washington Administrative Code

1.0 INTRODUCTION

This Feasibility Study (FS) Report is prepared by the Toxics Cleanup Program of the Washington State Department of Ecology for the City Parcel Site (the Site) in Spokane, WA. Remedial action at the Site is being conducted under the requirements of the Model Toxics Control Act (MTCA), Chapter 173-340 WAC. The Site is not under the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA or "Superfund").

This report presents the development and evaluation of cleanup action technologies and alternatives for the City Parcel Site based on the nature and extent of the contamination determined during field investigations. The field data gathered are presented in the Remedial Investigation (RI) and post-RI groundwater investigation reports (SAIC 2002, 2003). Public comment will be solicited for this draft FS Report prior to the preparation of the Draft Cleanup Action Plan that will specify the selected remedy for the Site.

WAC 173-340-350(8)(c)(i) describes the general requirements of a Feasibility Study report. The report shall include cleanup action alternatives that protect human health and the environment. The alternatives may consist of one or more cleanup action components or technologies. An initial screening of alternatives is conducted to reduce the number of alternatives for the final detailed evaluation. Each alternative retained for final screening shall be evaluated on the basis of the requirements and criteria specified in WAC 173-340-360.

2.0 BACKGROUND INFORMATION

2.1 Site Description

The City Parcel Site is located at 708 N. Cook St. in Spokane, Washington (See Figure 1). This property was occupied from 1961 through 1979 by Spokane Transformer, Inc., a transformer repair and recycling facility. A package delivery service has been operated at this Site since 1979.

The City Parcel property measures approximately 28,400 square feet (0.65 acres). The existing building, which is a square shaped combination masonry block and steel-sided structure, is roughly 19,000 square feet and covers 67% of the property. Figure 2 shows aerial views of the City Parcel Building additions including a building schematic. A fenced gravel covered parking area (9,372 square feet or about 0.2 acres) located north of the building serves as an outdoor storage area for vehicles and other equipment.

The City Parcel property is bounded to the west by Cook Street, to the south by Springfield Avenue, to the north by a private commercial property, and to the east by an alleyway that separates the City Parcel property from an adjoining property (formerly the John Barrier Trust Property), purchased by the City of Spokane in 2003. The alleyway is a deeded City of Spokane right-of-way.

2.2 Site History

The Site is located in an area zoned as M1 Light Industrial. It is located on flat terrain and is predominantly surrounded by commercial light industrial use. Few residences proximate to the Site appear to be associated with the surrounding commercial activities. The Environmental Protection Agency (EPA) conducted investigations at the Site in 1976, 1986 and 1987. High concentrations of polychlorinated biphenyls (PCBs) were found in soils in the parking lot and in the alleyway, in drain sediments inside the building, and in storm drains adjacent to the property. Studies done in 1997 by the current owner of the property detected PCBs in soil and in groundwater. Figure 3 compiles all historic soil and sediment sample locations and results. The presence of PCBs in ground water was inconclusive in the 1997 study. The initial sampling event reported PCB detection above regulatory level, but a subsequent sampling event had no reported detection.

City Parcel and its owners, Paul and Mary Ann Gisselberg, filed a lawsuit as a private right of action under MTCA against Spokane Transformer's past owners/operators Richard E. and Mary K. Boyce, and Jerry E. and Jane Doe Overton in December 1994. This lawsuit was tried in Spokane County Superior Court from July 19-22, 1999. On September 28, 1999, Judge Linda Thompkins issued Findings of Fact and Conclusions of Law imposing liability of 37.5% for Mr. Boyce, 37.5% for Mr. Overton, and 25% for Mr. Gisselberg as contribution for remedial action costs under MTCA.

In 1998, the Spokane Regional Health District completed a site hazard assessment (SHA) of the property, as required under MTCA. The Site was ranked a "2", on a scale of 1 (highest risk) to 5 (lowest risk).

In December 2000, the owner of the adjacent "John Barrier Trust Property" conducted a limited investigation along the western boundary of the property adjacent to the alleyway. PCBs were detected in soils ranging from 2.0 to 9.0 parts per million (ppm) PCBs.

In certified correspondence dated March 21, 2001, Ecology notified Mr. Gisselberg, Mr. Boyce, and Mr. Overton of the preliminary finding of potential liability and requested comment on those findings. On April 12, 2001, Ecology notified Mr. Gisselberg, Mr. Boyce, and Mr. Overton of their status as "potentially liable persons" under RCW 70.105D.040 for the release of hazardous substances at the City Parcel Site.

In 2002, Ecology opened negotiations with the Potentially Liable Persons (PLPs) to complete a Remedial Investigation (RI)/Feasibility Study (FS) as required under MTCA. The RI is to determine the nature and extent of contamination and the FS is to evaluate cleanup alternatives for the Site. These negotiations were not successful and Ecology hired Science Applications International Corporation (SAIC) as its contractor to complete a Remedial Investigation (RI) at the Site under the requirements of WAC 173-340-350. The Remedial Investigation involved field studies of the following: (a) drainage features, underground utilities, and other subsurface structures; (b) soil; and, (c) ground water. These investigations were conducted between April 2002 and July 2002. Additional ground water studies were conducted in 2003 to verify the 2002 ground water results. This 2003 ground water study confirmed that PCB is not of concern in ground water. Results of these studies are found in the following reports:

- SAIC, Final Remedial Investigation Report for the City Parcel Site, November 27, 2002.

- SAIC, City Parcel Site, Post-RI Groundwater Sampling Technical Memorandum, June 30, 2003.

The RI Report was made available for public review and comment from January 16 through February 28, 2003.

2.3 Site Physical Characteristics

2.3.1 Drainage Features and Utilities

The Remedial Investigation included the study of drainage features, and underground structures and utilities on Site. The following are the relevant findings of these investigations (see Figure 4):

- Sewer service for the City Parcel building is provided through a 6-inch sewer line approaching from the north and traveling south located under Cook Street, about five feet west of the building. The sewer line elbows to the east at Springfield Avenue and runs parallel to the building approximately four feet south of the building.

- Storm water from the roof of the building flows down a series of drain lines on the south wall of the building, discharging into a sewer line that runs along the south side of the building. Storm water from the east side of the alley infiltrates into the soil or flows into the dry well on the southeast corner of the property. Storm water in the gravel parking area to the north of the building infiltrate into the soils.

- Drainage features inside the building were documented through drain tracing video and electronic detection methods. In general, liquid releases to the floor inside the building connect into one of nine floor drains. One floor drain serves a dual role as a floor drain and a dry well. One drain appears to discharge towards the sewer line area but could not be confirmed due to blockage.

- Natural gas is supplied to the City Parcel building through a supply line that is located under the alleyway on the east side of the building. The gas line tees and approaches the building at a right angle to the main line near the electrical power pole in the alleyway. The main line is located in the alleyway.

- An underground storage tank is still present beneath the concrete floor near the southeast corner of the building. Although the underground extent of the tank is unknown, a cap is located approximately 26 feet north of the southern wall of the building. Video tracing showed that the tank is connected to a 4-inch diameter standpipe located outside of the building just one foot south of the southern wall. At the time of the investigation, the tank contained about two inches of an unknown liquid.

- A 4-foot by 7-foot concrete footprint of an abandoned vault is visible on the west inside the building,

2.3.2 Site Geology

Geologic units on the Site are generally characterized by poorly graded gravels and cobbles with up to 20% fine to coarse sands. Geological materials generally increase in size from fine to medium gravels with sand at the surface to cobbles and gravels with little sand at approximately 55 feet below ground surface. Water table conditions were encountered at approximately 50 feet below ground surface at the time of drilling operations.

Borelogs indicate the presence of the following four lithologic units:

- The surface consists of poorly-graded, medium to coarse sub-rounded gravel with some fine to coarse sub-rounded sand. This unit extends to a depth of 20 feet below ground surface in the western portion of the site and approximately 30 feet below ground surface at the eastern side of the building.

- A well-graded medium gravel containing a little sand is found from 20 feet to approximately 30 feet below ground surface across the western portion of the site.

- A coarse gravel and cobble is encountered at 30 feet below ground surface across the site.

- A saturated gravel with a few cobbles was encountered at approximately 55 feet below ground surface across the Site.

Figure 5 shows on a Site map the geologic cross-sections illustrated in Figures 6 through 8.

2.3.3 Site Hydrogeology

Ground water was encountered at approximately 50 to 51 feet below ground surface (bgs) or 1,875 to 1,876 feet above mean sea level (msl) at the time of well installations. The flow of ground water is generally from southeast to northwest across the Site, with a slight east to west component of flow at the southern end of the Site (see Figure 9). A data logger installed in one of the monitoring wells (MW5) recorded water levels every four hours. For the 10-month period of monitoring (April 2002 through May 2003), a maximum of 11 feet fluctuation was recorded. The highest elevations occurred in the spring of 2002; the lowest water table elevation occurred in the fall and early winter of 2002.

3.0 NATURE AND EXTENT OF CONTAMINATION

3.1 Surface Soils

Analytical results of the shallow soil samples analyzed indicate the presence of PCBs in soils in the north parking area and exposed soils in the alleyway east of the City Parcel building. Figure 10 shows the PCB concentrations for each shallow soil sample location from the April 2002 soil investigation. The highest concentrations of PCBs (up to 11,500 mg/Kg) were found in the 0 to 6-inch samples, however, substantial PCB concentrations (up to 1,740 mg/Kg) were detected in samples from 6 to 12 inches below ground surface.

Diesel range and lube oil range hydrocarbons were detected in several shallow soil samples, but mostly at levels below the MTCA Method A cleanup level of 2,000 mg/Kg for unrestricted land use. One shallow soil sample contained Diesel Range Total Petroleum Hydrocarbons (TPH-D) at a level of 2,040 mg/Kg which is just slightly above the Method A cleanup level. Some volatile hydrocarbons and volatile organic compounds (VOCs) were also detected below MTCA Method A levels in a limited number of shallow soil samples.

Table 1 is a summary of the soil analytical results.

3.2 Subsurface Soils

Subsurface soil investigation during the RI included an evaluation of soils to a maximum of 60 feet below ground surface from four exploratory borings and five monitoring well borings. One monitoring well boring and four exploratory borings were located inside the building. Subsurface soil analytical results indicate little PCB contamination with depth at the Site. Of the 26 subsurface soil samples analyzed for PCBs, only four had detectable concentrations of PCBs. Analytical results for TPH and PCBs detected in subsurface soil samples are also shown in Table 1.

3.3 Ground Water

Five monitoring wells (MW-2 through MW-6 as shown in Figure 9) were installed by Ecology during the 2002 remedial investigations. MW-2 is a background well; MW-3, MW-4, and MW-5 are down gradient wells. MW-1, installed in 1997 by City Parcel, is on the south end of the alleyway. MW-6 is located inside the building near a dry well. Results of four events of ground water investigations from April 2002 through May 2003 are shown in Table 2 for MW-1, MW-4, MW-5, and MW-6. No PCBs were detected in ground water samples from MW-2 and MW-3 for all four sampling events. PCBs were found in MW-1 at a concentration of 1.88 micrograms per liter (ug/L) in April 2002 but were not detected in the three subsequent sampling events. PCBs were not detected in ground water from the rest of the wells for all sampling events.

3.4 Contaminants and Media of Concern

The results that are summarized in Tables 1 and 2 illustrate that **PCB-1260** mixture is the only contaminant of concern and **shallow soil** is the only medium to consider.

PCB-1260 is also referred to as Aroclor 1260. PCBs are a group of chemicals that contain 209 individual compounds called congeners. PCBs made in the United States were marketed under the trade name Aroclor and are identified by a four digit numbering code in which the first two digits indicate that the parent molecule is a biphenyl and for the 1200 series aroclors, the last two digits indicate the chlorine content by weight. Aroclor 1260 has 60 percent chlorine. The persistence of PCBs increases with an increase in the degree of chlorination. PCBs are probable carcinogens in humans.

Total PCB analysis has been reported as total aroclor equivalents. However, since the aroclor patterns in environmental samples are often degraded, quantification of individual PCB congeners are obtained. Results of the congener analysis provide background information on the distribution of congeners present. For the City Parcel Site, the congener analysis results show that PCB contamination consists primarily of congeners with high degrees of chlorination. This confirms the finding that the PCB contamination is characterized as Arochlor 1260, a mixture of highly chlorinated PCBs.

3.5 Current and Potential Pathways of Exposure

- A current exposure pathway for the shallow soils is ingestion, dermal contact, or inhalation. Disturbances to the temporary gravel cover and the shallow soils may cause ingestion or dermal contact with soils and inhalation of dust emissions.

- PCBs have very low vapor pressures. The rate of volatilization of PCBs from the soil is very low. Therefore, the inhalation of vapor pathway is not a current or potential pathway of exposure.

- Another pathway that relates to soil is the potential for future migration of soil chemicals to ground water. Although current conditions show that the soil chemicals are not migrating to the ground water, a change in Site conditions may have a bearing on the potential of PCBs to migrate. For example, in the presence of organic solvents, PCBs may leach quite rapidly through soil.

- Significant terrestial ecological receptor exposure is not expected at this Site. The Site is in an industrial area that is not frequented by wildlife.

4.0 CLEANUP STANDARDS

Cleanup standards consist of the following:

(a) Cleanup levels for hazardous substances present at the Site;
(b) The location where these cleanup levels must be met (point of compliance); and,
(c) Other regulatory requirements that apply to the site because of the type of action and/or location of the site ("applicable state and federal laws").

A cleanup level is the concentration of a hazardous substance in soil, water, air, or sediment that is determined to be protective of human health and the environment under specified exposure conditions. Cleanup levels, in combination with points of compliance, typically define the area or volume of soil, water, air, or sediment at a site that must be addressed by the cleanup action.

The first step in setting cleanup levels is to identify the nature of the contamination and the potentially contaminated media, the current and potential pathways of exposure and receptors, and the current and potential land and resource uses.

Based on discussions presented in Section 3, cleanup standards for PCBs in soils are developed in this section for the City Parcel Site. The only hazardous substance of concern is PCB-1260 and the only medium of interest is soil.

4.1 Soil Cleanup Levels

Soil cleanup levels are based on the reasonable maximum exposure expected to occur under both current and future site use conditions. MTCA allows for the establishment of soil cleanup levels based on two types of land use – **unrestricted land use** and **industrial land use**. The site use requiring the most protective cleanup levels is residential land use.

For **unrestricted land use**, the soil cleanup level is based on the reasonable maximum exposure expected to occur under residential land use conditions or child exposure scenario. Restrictions on the future use of the land are not required where these soil cleanup levels are met at the point of compliance.

For **industrial land use**, the soil cleanup level is based on an exposure expected to occur under industrial use conditions or on an adult worker exposure scenario. Restrictions on the future use of the land are required if industrial soil cleanup levels are established, even if the cleanup levels are met to ensure the exposure scenario is met.

Various methods are available to establish cleanup levels under MTCA for either land use. MTCA provides for three approaches for establishing soil cleanup levels – **Method A, Method B, or Method C**. **Method A and Method B** are two options used for establishing soil cleanup levels for **unrestricted land use**. **Method A and Method C** are the two options used for establishing soil cleanup levels for **industrial land use**.

Method A is used for routine sites or sites that involve relatively few hazardous substances. MTCA provides for the establishment of Method A cleanup levels for either unrestricted land use or industrial land use. Method A soil cleanup levels are set at concentrations at least as stringent as the following concentrations:

- The numerical values provided for in the appropriate MTCA Method A table;
- Concentrations established under applicable state and federal laws; and,
- Concentrations that protect the environment or concentrations that result in no significant adverse effects on the protection and propagation of terrestial ecological receptors (plants and animals).

The natural background or the practical quantitation limit (PQL), whichever is higher, may be used as the Method A level if numerical values under MTCA or under applicable state and federal laws are not available.

Method B may be used to establish soil cleanup levels at any site. Method B cleanup levels are used for residential land use conditions. Standard Method B method uses default formulas, assumptions, and procedures to develop cleanup levels. Under modified Method B, chemical-specific or site-specific information may be used to change certain assumptions to calculate the cleanup levels. Method B soil cleanup levels are developed under WAC 173-340-740(3).

Method C is the standard method for establishing soil cleanup levels at industrial sites and its use is conditioned upon the continued use of the site for industrial purposes. Under Method C, cleanup levels are established the same as under Method B with different exposure scenarios. Method C soil cleanup levels are developed under WAC 173-340-745(5).

4.2 Land Use of the Site

The City of Spokane does Comprehensive Planning that is in compliance with Chapter 36.70 RCW (Growth Management Act). The Site is zoned M1 – Light Industrial - which is intended for those light industrial users which produce little noise, odor and smoke and for industrial parks. The City Parcel property and the City of Spokane property meet the definition of "Industrial Properties" in WAC 174-340-200.

The City Parcel property is currently occupied by three businesses. City Parcel operates package-sorting and truck-loading businesses each morning and afternoon at the Site. Two other small businesses lease space on the north side of the building as a small engine repair shop and a small storage and truck parking space.

The City of Spokane property (former John Barrier Trust property) is being planned for development in 2004. The City intends to develop this property as a washing and storage facility to support the City's Operations Maintenance Facility located north across the street. The entire area will be paved and wastewater will be directed to a treatment system off-property. Public access to this City property will be restricted.

The alleyway east of the building has unrestricted public access. This alleyway separates the City Parcel Property from the former John Barrier Trust Property which was purchased by the City of Spokane in 2003. In the interim, to prevent current exposure to PCB-contaminated surface soils in the alleyway, the City had covered the alleyway with gravel at the request of Ecology.

Under MTCA [WAC 173-340-745 (1)(a)(i)], the following characteristics shall be considered to determine if the alleyway is "zoned for industrial use":

(A) People do not normally live on industrial property. The primary potential exposure is to adult employees of businesses located on the industrial property;
(B) Access to industrial property by the general public is generally not allowed. If access is allowed, it is highly limited and controlled due to safety or security considerations;
(C) Food is not normally grown/raised on industrial property. (However, food processing operations are commonly considered industrial facilities);
(D) Operations at industrial properties are often (but not always) characterized by use and storage of chemicals, noise, odors and truck traffic;
(E) The surface of the land at industrial properties is often (but not always) mostly covered by buildings or other structures, paved parking lots, paved access roads, and material storage areas – minimizing potential exposure to the soil; and
(F) Industrial properties may have support facilities consisting of offices, restaurants, and other facilities that are commercial in nature but are primarily devoted to administrative functions necessary for the industrial use and/or are primarily intended to serve the industrial facility.

The alleyway cannot be considered to be "zoned industrial" since it does not restrict access to the general public.

4.3 Site Cleanup Standards

4.3.1 Site Cleanup Levels

The department has determined that **industrial land use** represents the reasonable maximum exposure for the **City Parcel** property and the **City of Spokane** property. **Residential land use** conditions represent the reasonable maximum exposure in the alleyway.

To use industrial soil cleanup levels, the following criteria must also be met [WAC 173-340-745 (1)(a)(ii)(iii)]:

- The cleanup action provides for appropriate institutional controls to limit potential exposure to residual hazardous substances. This shall include, at a minimum, placement of a covenant on the property restricting use of the area of the site where industrial soil cleanup levels are proposed to industrial property uses; and
- Hazardous substances remaining at the property after remedial action would not pose a threat to human health or the environment at the site or in adjacent nonindustrial areas.

Method A is used to establish soil cleanup levels because PCB-1260 is the only hazardous substance of concern and numerical standards are available in MTCA for PCBs. The Method A cleanup level for PCB mixtures is 1 mg/Kg (Table 740-1, Unrestricted land use) or 10 mg/Kg (Table 745-1, Industrial Properties). These levels are based on an applicable federal law, 40 C.F.R. 761.61, The Toxics Substances Control Act (TSCA).

It is not necessary to establish a soil concentration that results in no significant adverse effects on the protection and propagation of terrestial ecological receptors for this site. The criteria under WAC 173-340-7491 (1), exclusion from a terrestrial ecological evaluation, will be met at this Site. Upon implementation of the cleanup action, all soils contaminated with PCBs will be covered by buildings, paved, covered with physical barriers, or removed from the Site. The cleanup action will prevent plants or wildlife from being exposed to any PCB contamination remaining on site.

The following are the Site cleanup levels for PCBs in soils:

Property	PCBs Cleanup Level, mg/kg	Notes
City Parcel Property	10	Method A Industrial – cleanup level based on applicable federal law (40.C.F.R. 761.61). This value may be used only if the PCB contaminated soils are capped and the cap maintained by 40 C.F.R. 761.61.
City of Spokane Property (former Barrier Property)	10	
Alleyway	1	Method A Residential – cleanup level based on applicable federal law (40 C.F.R.761.61)

4.3.2 Points of Compliance

The PCB soil cleanup levels for this Site are based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway. The point of compliance as required under WAC 173-340-740(6)(d) and WAC 173-340-745(7) shall be in the soils throughout the Site from the ground surface to fifteen feet below the ground surface. This represents a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of site development activities.

5.0 MTCA'S SELECTION OF CLEANUP ACTIONS PROCESS

5.1 Minimum Requirements for Cleanup

WAC 173-340-360 describes the minimum requirements and procedures for selecting cleanup actions. The minimum requirements, specified under WAC 173-340-360(2), include the following:

(a) Threshold requirements. The cleanup action shall:
- (i) Protect human health and the environment;
- (ii) Comply with cleanup standards;
- (iii) Comply with applicable state and federal laws; and,
- (iv) Provide for compliance monitoring.

(b) Other requirements. When selecting a cleanup action alternative that fulfills the threshold requirements, the selected action shall:
- (i) Use permanent solutions to the maximum extent practicable;
- (ii) Provide for reasonable restoration time frame; and,
- (iii) Consider public comments.

When selecting a cleanup action, preference shall be given to permanent solutions to the maximum extent practicable. A "permanent solution", under WAC 173-340-200, means a cleanup action in which cleanup standards of WAC 173-340-700 through WAC 173-340-760 can be met without further action being required at the site being cleaned up or any other site involved with the cleanup action, other than the approved disposal of any residue from the treatment of hazardous substances. To determine whether a cleanup action uses permanent solutions to the maximum extent practicable, the disproportionate cost analysis shall be used.

5.2 Disproportionate Cost Analysis [WAC 173-340-360 (3)(e)]

Costs are disproportionate to benefits if the incremental costs of the alternative over that of the lower cost alternative exceed the incremental degree of benefits achieved by the alternative over that of the lower cost alternative. The following criteria are used to evaluate and compare each cleanup action alternative when conducting a disproportionate cost analysis to determine whether a cleanup action is permanent to the maximum extent practicable:

- (i) Protectiveness. This involves overall protectiveness of human health and the environment including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing the alternative, and improvement of the overall environmental quality.
- (ii) Permanence. This is the degree to which the alternative permanently reduces the toxicity, mobility, or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment

process, and the characteristics and quantity of treatment residuals generated.

(iii) Cost. This is the cost to implement the alternative, including the cost of construction, the net present value of any long-term costs, and agency oversight costs that are cost recoverable.

(iv) Effectiveness over the long term. This includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. The following types of cleanup action components may be used as a guide, in descending order, when assessing the relative degree of long-term effectiveness: Reuse or recycling; destruction or detoxification; immobilization or solidification; on-site or off-site disposal in an engineered, lined and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring.

(v) Management of short-term risks. This includes the risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.

(vi) Technical and administrative implementability. This is the ability to implement the alternative including whether the alternative is technically possible, availability of necessary off-site facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.

(vii) Consideration of public concerns. This is to address the concerns of the community regarding the alternative.

5.3 Reasonable Restoration Time Frame [WAC 173-340-360(4)(b)]

To determine whether a cleanup action provides for a reasonable restoration time frame, the factors to be considered include the following:

(i) Potential risks posed by the site to human health and the environment;

(ii) Practicability of achieving a shorter restoration time frame;

(iii) Current use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site;

(iv) Potential future use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site;

(v) Availability of alternative water supplies;

(vi) Likely effectiveness and reliability of institutional controls;

(vii) Ability to control and monitor migration of hazardous substances from the site;

(viii) Toxicity of the hazardous substances at the site; and,

(ix) Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the site or under similar site conditions.

A longer period of time may be used for the restoration time frame for a site to achieve cleanup levels at the point of compliance if the cleanup action selected has a greater degree of long-term effectiveness than on-site or off-site disposal, isolation, or containment options. Extending the restoration time frames shall not be used as a substitute for active remedial measures, when such actions are practicable.

5.4 Screening of Alternatives

WAC 173-340-350 (8)(b) states that an **initial screening of alternatives** to reduce the number of alternatives for the final detailed evaluation may be appropriate. The following cleanup action alternatives or components may be eliminated from the detailed evaluation required in feasibility study:

(i) Alternatives that, based on a preliminary analysis, do not meet the minimum requirements specified in WAC 173-340-360. This includes alternatives for which costs are clearly disproportionate under WAC 173-340-360(3)(e);
(ii) Alternatives or components that are not technically possible at the site.

A reasonable number and type of alternatives shall be evaluated after the initial screening. Each alternative may consist of one or more cleanup action components. Each alternative shall be evaluated on the basis of the requirements and the criteria specified in WAC 173-340-360. The feasibility study shall include at least one permanent cleanup action alternative to serve as a baseline against which other alternatives shall be evaluated for the purpose of determining whether the cleanup action is permanent to the maximum extent practicable except under the following conditions:

(i) Where a model remedy is the selected cleanup action;
(ii) Where a permanent cleanup action alternative is not technically possible; and,
(iii) Where the cost of the most practicable permanent cleanup action alternative is so clearly disproportionate that a more detailed analysis is not necessary.

5.5 Expectations for cleanup action alternatives [WAC 173-340-370]

WAC 173-340-370 lists the expectations for the development of cleanup action alternatives and the selection of cleanup actions. These expectations include:

(1) The department expects that treatment technologies will be emphasized at sites containing liquid wastes, areas contaminated with high concentrations of hazardous substances, highly mobile materials, and/or discrete areas of hazardous substances that lend themselves to treatment.
(2) To minimize the need for long-term management of contaminated materials, the department expects that all hazardous substances will be destroyed, detoxified,

and/or removed to concentrations below cleanup levels throughout sites containing small volumes of hazardous substances.

(3) The department recognizes 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.

(4) To minimize the potential for migration of hazardous substances, the department expects that active measures will be taken to prevent precipitation and subsequent runoff from coming into contact with contaminated soils and waste materials.

(5) When hazardous substances remain on-site at concentrations which exceed cleanup levels, those hazardous substances will be consolidated to the maximum extent practicable where needed to minimize the potential for direct contact and migration of hazardous substances.

(6) For facilities adjacent to a surface water body, active measures will be taken to prevent/minimize releases to surface water via surface runoff and ground water discharges in excess of cleanup levels.

(7) Natural attenuation may be appropriate if: source control has been conducted; leaving contaminants on-site during the restoration time frame does not pose a threat to human health and the environment; there is evidence that natural biodegradation of chemical degradation is occurring and will continue to occur at a reasonable rate; and, appropriate monitoring requirements are conducted to ensure that natural attenuation is occurring.

(8) Cleanup actions will not result in a significantly greater overall threat to human health and the environment.

6.0 IDENTIFICATION AND INITIAL SCREENING OF TECHNOLOGIES

6.1 Cleanup Action Objectives

The primary cleanup action objective for the City Parcel Site is to prevent dermal contact with or ingestion of PCB contaminated soils.

A secondary cleanup objective is to reduce any future potential for the migration of PCBs from soil to ground water.

6.2 Federal Regulations Governing Site PCB Remediation

The Toxic Substance Control Act (TSCA) is the major federal law pertinent to the City Parcel Site. TSCA as codified in 40 CFR Part 761 establishes prohibitions of and requirements for the manufacture, processing and distribution in commerce, use, disposal, storage, and markings of PCBs and PCB items in the United States after January 1, 1978. TSCA regulations of importance to this Site are found in 40 CFR Section 761.60 through 761.79, Subpart C: Storage and Disposal. These sections specify treatment, storage, and disposal requirements based on their form and concentration.

The provisions of TSCA apply only to materials containing PCBs at concentrations of 50 ppm and above. PCBs that have been released into the environment after February 17, 1978 are regulated based on the original concentration of the released materials per 40 CFR 761.1(b), generally known as the "anti-dilution" provision of the PCB regulations. However, PCBs at Superfund sites are regulated based on concentrations "as found" at the Site, disposing of the contaminated medium according to the requirements of 40 CFR 761.60(a)(2) to 761.60(a)(5). Consequently, cleanup levels and remedial technologies at Superfund sites are not selected based on the form and concentration of the original PCB material spilled or disposed of at the site prior to initiation of remedial action.

Under TSCA, liquid PCBs at concentrations greater than 500 ppm must be disposed of in an incinerator which complies with 40 CFR 761.70 or by an alternative disposal method that achieves a level of performance equivalent to incineration as provided under 40 CFR 761.60(e). This has been interpreted to imply that treatment residuals must contain less than 2 ppm PCBs. Liquid PCBs at concentrations between 50 ppm and 500 ppm, can be disposed of in an incinerator or high efficiency boiler, or in a facility that provides an alternative method of destroying PCBs that achieves a level of performance equivalent to incineration.

Under TSCA, there are three primary options for non-liquid PCBs in the form of soil, rags, or other debris, that contain PCBs in concentrations of 50 ppm or greater:

1. Incineration meeting the requirements of 40 CFR 761.70.
2. Disposal in a chemical waste landfill meeting the requirements of 40 CFR 761.75.

3. Treatment equivalent to incineration under the performance standards provided in 40 CFR 761.70(b)(1).

TSCA does not specify concentration limits for disposal of PCB-containing non-liquids (e.g., soils), but specifies that industrial sludges or dredged materials with PCB concentrations greater than 500 mg/Kg may not be landfilled. The determination of whether contaminated materials should be considered a soil or an industrial sludge should be made site specifically consistent with the current process for classifying material subject to the land disposal restrictions as either a pure waste or a soil and debris contaminated with a waste.

Disposal of soils, sediments, or treatment residuals contaminated with PCBs in concentrations equal to or greater than 50 ppm must comply with TSCA generator requirements: notification to EPA of PCB-generating activities, shipment of regulated wastes using the Uniform Hazardous Waste Manifest, and disposal at a TSCA-approved disposal facility.

The TSCA regulations for storage requirements, 40 CFR 761.65, specify that materials with PCB concentrations of 50 ppm or greater must be destroyed or disposed of within one year after being placed in storage.

PCBs are not regulated as a hazardous waste under the Resource Conservation and Recovery Act (RCRA). However, if PCBs are mixed with hazardous wastes listed under RCRA, the mixture is subject to the RCRA waste regulations. RCRA is not applicable to the Site because the site soil is not a RCRA hazardous waste.

The State of Washington Dangerous Waste Regulations, Chapter 173-303 WAC, implements Chapter 70.105D RCW, the Hazardous Waste Management Act of 1976 as amended, and Subtitle C of RCRA. PCBs are regulated as a hazardous waste under this regulation.

6.3 Estimated Volumes of PCBs Contaminated Soils

Table 3 shows the soil volume calculations for the Site. Volumes are estimated for soils above 10 mg/Kg PCBs for the parking lot, the alleyway, the south side of the building, and underneath the building. Approximate volumes of contaminated soil as a result of the removal of dry wells DW1 and DW2, and the underground storage tank are included. The volume of surface soil above 10 mg/Kg PCB concentration underneath the building is based on the assumption that the contaminated soils underneath the building are located in the Northern and Eastern addition areas (aerial photographs show that transformers were placed in these areas before the building expansions). Soils in the City of Spokane property do not exceed the PCB industrial cleanup level.

6.4 Treatment of PCBs in Soils

Treatment of PCBs in soils involves the use of a technology that destroys, removes or immobilizes PCBs. Treatment of PCBs in soils can be performed in place (in-situ) with little or no disturbance to the contaminated soils. Ex-situ treatment of soils requires excavation of contaminated soils to be followed by on-site or off-site treatment.

Treatment technologies for PCBs are classified as established, demonstrated or emerging technologies. Established technologies are those that have been employed at the full-scale level to successfully meet cleanup goals at multiple sites; they are commercially available. Demonstrated technologies have been conducted at pilot- or full-scale at a limited number of sites. They have generated performance and cost data on the treatment of the PCBs. Emerging technologies have not yet been shown to effectively or consistently treat PCB soils at the pilot-scale level. They are in bench-scale studies or in pilot-scale level.

6.5 Remedial Technologies or Process Options

The following General Response Actions and appropriate remedial technologies/process options are considered for the contaminated soils at the City Parcel Site:

1. Institutional Controls
   - Deed Restrictions
2. Containment
   - Capping
   - Surface Controls
3. In-situ Treatment
   - Solidification/stabilization
   - Bioremediation
   - Vitrification
4. Excavation/Ex-situ treatment
   - On-site Treatment
     - Incineration
     - Thermal Desorption
     - Chemical Dehalogenation
     - Solvent Extraction
     - Soil Washing
     - Solidification/Stabilization
   - Off-site Treatment
     - Incineration
5. Excavation/Off-site disposal

6.6 Initial Screening

For the initial screening, the remedial technologies/process options in Section 6.5 are screened against the "threshold criteria"; those meeting these criteria will then be screened against the "other requirements" which include cost and implementability.

Technologies/process options that could meet these criteria are retained for the detailed evaluation.

6.6.1 Institutional Controls

Per WAC 173-340-440, institutional controls are measures undertaken to limit or prohibit activities that may interfere with the integrity of an interim action or cleanup action or that may result in exposure to hazardous substances at the Site. Institutional controls may include:

(a) Physical measures such as fences;
(b) Use restrictions such as limitations on the use of property or resources; or requirements that cleanup action occur if existing structures or pavement are disturbed or removed;
(c) Maintenance requirements for engineered controls such as the inspection and repair of monitoring wells, treatment systems, caps or ground water barrier systems;
(d) Educational programs such as signs, postings, public notices, health advisories, mailings, and similar measures that educate the public and/or employees about site contamination and ways to limit exposure; and
(e) Financial assurances.

Institutional controls alone will not attain cleanup standards and thus will not meet the threshold requirements. However, institutional controls are required when a cleanup action results in residual concentrations of hazardous substances exceed Method A or B cleanup levels; when Method C cleanup levels are used; when industrial soil cleanup levels are used; or when a conditional point of compliance is used. **Institutional controls will be retained as a potential component of the cleanup.**

6.6.2 Containment

The purpose of containment is to isolate the PCB-contaminated soils from potential receptors by the use of a physical barrier. The barrier mitigates the exposure hazard by preventing direct contact with the PCBs in soil, eliminating fugitive dust emissions, preventing soil erosion, and reducing the potential for chemical migration into ground water. **Capping** and **surface controls** are two potential options for containment.

Capping involves the construction of an impermeable or permeable barrier over areas of PCB-contaminated soils. A permeable or impermeable barrier would prevent direct contact and ingestion exposures; an impermeable barrier will isolate surface water runoff from the PCB contamination and prevent infiltration of storm water into contaminated soils. Capping would also prevent migration of PCBs in dusts or in soils caused by water erosion. Capping is a reliable technology and can be readily implemented. Caps require periodic monitoring and maintenance to ensure their structural integrity; these can be easily implemented. Capping, when combined with other alternatives, could meet the threshold as well as the other requirements. **Capping is retained as an alternative**.

Surface controls involve soil grading, revegetation, construction of dikes or berms, or other means of controls to divert runoff and minimize erosion. Surface controls would reduce chemical migration but would not eliminate direct contact with chemicals in surface soils. Surface controls would not meet the minimum threshold requirements. **Surface controls will not be retained for further evaluation.**

6.6.3 In-Situ Treatment Technologies

In-situ treatment destroys, removes, or immobilizes hazardous compounds in place. In-situ treatment does not trigger TSCA requirements since the PCBs were deposited in the environment before February 17, 1978 (see Section 6.2 on applicability of TSCA); thus, the primary consideration is the attainment of cleanup levels.

The breakdown of organic compounds by microorganisms is referred to as **bioremediation**. Bioremediation can occur at a higher rate in the presence of oxygen (aerobically) or more slowly under near oxygen-free conditions (anaerobically). **In-situ bioremediation** encourage contaminant biodegradation by enhancing site conditions (e.g., nutrient concentrations, pH, etc.) without substantially disturbing the impacted media.

Historically, PCBs have been considered resistant to biodegradation. However, results of laboratory studies have shown that PCBs do biodegrade in the environment but at a very slow rate. PCB compounds with fewer chlorine atoms have been shown to aerobically degrade whereas the more highly chlorinated are resistant to aerobic degradation. PCBs at this Site represent the more highly chlorinated PCBs. More research on PCBs biodegradation is being conducted but there is no process that is commercially viable at this time. Bioremediation does not meet the threshold requirements. **In-situ bioremediation will not be retained**.

Solidification involves the addition of a binding agent, such as Portland cement or asphalt, to the waste encapsulating the contaminants in solid material. **Stabilization** involves the addition of a binder, such as Portland cement, cement kiln dust, or fly ash to the soil to convert PCBs into a less soluble, mobile, or toxic form. **Solidification/Stabilization (S/S)** processes utilize one or both of these techniques. This treatment method reduces the mobility of PCBs but does not concentrate or destroy PCBs. **In-situ S/S**, the solidification agents are injected into the soils and mixed with the soils using backhoes for surface mixing or augers for deep mixing.

This technology could meet the threshold requirements if combined with institutional controls. PCBs will still be present in the waste but its potential migration is reduced. The long term reliability of the treatment process is uncertain and long-term management controls are required. This technology is easily implemented and the cost for implementation range from $50 to $310 per ton. **In-situ S/S will be retained for detailed evaluation.**

Vitrification can be used to treat soil and sediment containing organic, inorganic, and radioactive contaminants. Heat is used to melt the contaminated soil which forms a rigid, glassy product when it cools. The volume of the vitrified product is typically 20 to 45 percent less than the volume of the untreated soil. PCBs are destroyed by the high temperatures used during vitrification. The destruction mechanism is either pyrolysis (in an oxygen-poor environment) or oxidation (in an oxygen-rich environment). **In-situ vitrification (ISV)** typically uses a square array of four electrodes up to 18 feet apart. The electrodes are inserted or gravity fed into the ground to the desired treatment depth. The electric current flows through the electrodes and generates heat, melting the soils. ISV of PCBs had been demonstrated in some Superfund sites at a cost of $100 to $1000 per ton. There is only one vendor of commercially available ISV systems.

ISV would meet the threshold requirements. However, implementation of the ISV is not possible at the Site since the Site area (at less than 1 acre) is not adequate to accommodate the mobile system with all the ancillary equipment. ISV systems include the ISV equipment, setup areas, and worker's quarters. The surrounding properties are not available for use since the City of Spokane is planning to develop its property adjacent to the alleyway, and the other properties surrounding the Site are commercial establishments. **ISV is not retained for detailed evaluation.**

6.6.4 Excavation/Ex-situ Treatment Technologies

Ex-situ treatment will require soil excavation and either **on-site** or **off-site** treatment. Off-site treatment facilities must be permitted under TSCA.

Compliance with TSCA ARARs requires PCBs, at greater than 50 ppm, be incinerated, treated by an equivalent method, or disposed of in a chemical waste landfill. Equivalence to incineration is demonstrated when treatment residues contain <2 ppm PCB. If treatment is not equivalent to incineration, compliance with TSCA ARARs must be achieved by implementing long-term management controls consistent with a chemical waste landfill.

6.6.4.1 On-Site Treatment Technologies

Incineration is an established remedial ex-situ technology for PCBs and has been the most commonly recommended solution for soils containing PCBs. Incineration is required under 40CFR61.70 to achieve the equivalent of six 9's (99.9999%) destruction removal efficiency. This process treats PCBs in excavated soils by subjecting the soils to very high temperatures (typically > 1000_F) in the presence of oxygen, which causes volatilization, combustion, and destruction of these compounds. Off-gases from the incinerator will have to be treated. On-site incineration costs run from $280-$1000/ton.

Thermal desorption is a demonstrated PCB-treatment technology. It is an ex-situ means to physically separate the PCBs from the soil by heating the soil to temperatures high enough to volatilize the contaminant. Air, combustion gases, or an inert gas is used to strip vaporized contaminants from the soils. The primary stages of a thermal desorption system include excavation, desorption, particulate removal, and off-gas treatment.

Thermal desorption technologies had been selected as the remedial action for several PCB contaminated Sites. Thermal desorption will meet the threshold requirements and will rank high in terms of long-term effectiveness and permanence. The cost of thermal desorption is $90 - $380/ton. Thermal desorption units are available for on-site treatment.

Chemical Dehalogenation technologies, a demonstrated technology, employ chemical reactions to remove halogen atoms (chlorine atoms for PCB) from organic molecules. The BCD or based-catalyzed decomposition process is an efficient, relatively inexpensive process for PCBs. The process can be employed by using sodium hydroxide, sodium bicarbonate, or aliphatic hydrocarbons as hydrogen donors. This process had been demonstrated to be capable of treating PCBs at costs of $225 - $580/ton.

Solvent extraction does not destroy wastes but is a physical means of separating hazardous contaminants from soil, thereby reducing the volume of the hazardous waste that must be treated. The primary stages of the solvent extraction technology are excavation, handling of the soils, contaminant extraction, solvent/media separation, contaminant collection, and solvent recycling. Solvent extraction costs can run from $110 - $540/ton.

Soil washing is an ex-situ water-based remedial technology that mechanically mixes, washes, and rinses soil to remove contaminants. The process removes contaminants from soil by dissolving or suspending soils in the wash solution, or by concentrating the soil into smaller volume through simple, practical separation techniques. The primary stages in the soil washing process are soil preparation (excavation and moving soils to the process) washing, soil and water separation, wastewater treatment, and vapor treatment, if necessary. Mobile soil washing systems may be located on-site but will need space to store the soils, to hold tanks or ponds for wash water preparation and wastewater treatment. Soil washing is a demonstrated technology. On-site soil washing costs run from $60-$230/ton.

Ex-situ Solidification/Stabilization, S/S processes involve (1) soil excavation, (2) classification to remove oversized debris, (3) mixing and pouring and (4) off gas treatment, if necessary. Costs for an ex-situ S/S can range from $50 - $310/ton.

All the above on-site treatment technologies could meet the threshold requirements. However, on-site treatment systems will require the use of mobile treatment systems with all the ancillary equipment including off-gas or other residuals treatment systems. The Site area of less than 1 acre is not adequate for any of these on-site treatment systems which would include the necessary space to store and manage the excavated soils. Areas surrounding the Site are not accessible for use in the cleanup. Because the implementability of these systems is not possible, all the above **ex-situ on-site treatment technologies are not retained.**

6.6.4.2 Off-Site Treatment Technologies

Incineration is performed at an off-site facility. There are a number of commercial incineration facilities capable of accepting PCB-containing soils. Off-site incineration can cost up to $2300 per ton. Off-site incineration would meet the threshold requirements. This is a technology that rates very high in terms of protectiveness, permanence, and long-term effectiveness. Cost can be a concern for incineration. **Off-site incineration will be retained for further analysis.**

6.7 Excavation/Off-site Disposal

Off-site disposal consists of transporting excavated soils containing PCBs to a TSCA-permitted facility. The TSCA permitted landfill closest to Spokane is located in Arlington, Oregon approximately 215 miles from Spokane. Estimated costs for disposal in an off-site landfill are $150-$200 per ton, including transportation. **Excavation/Off-site disposal will be retained for further evaluation.**

Table 4 shows a summary of the initial screening conducted under this section.

7.0 DEVELOPMENT AND DESCRIPTION OF CLEANUP ALTERNATIVES

The remedial technologies that were retained in the initial screening are assembled into cleanup alternatives. These alternatives are developed to present several options to sufficiently compare alternatives against one another.

Alternative 1: Building Demolition, Capping, and Institutional Controls

Alternative 2: Building Demolition, In-situ Solidification/Stabilization, and Institutional Controls

Alternative 3: Deferred Building Demolition, Excavation, Off-site Disposal, and Institutional Controls

Alternative 4: Building Demolition, Excavation, Off-Site Disposal, and Institutional Controls

Alternative 5: Building Demolition, Excavation, Off-Site Incineration, and Institutional Controls

These alternatives are described at a conceptual level. Actual quantities, dimensions, and engineering parameters will be determined in the remedial design phase. Cost figures are preliminary, order-of-magnitude estimates, which are developed primarily for the purpose of comparing remedial alternatives during the remedy selection.

PCB concentrations in the City of Spokane property are below the industrial cleanup level of 10 mg/Kg.; thus, no cleanup action is necessary for this property. However, because industrial cleanup levels are used, the soils will have to be capped and maintained. The City's plan to pave the property will meet this requirement. Deed restrictions limiting site use are also required.

All the alternatives will also include the removal of drywells DW1 and DW2, the underground storage tank, and the drain lines.

7.1 Alternative 1: Building Demolition, Capping, and Institutional Controls

This alternative combines containment measures and institutional controls to reduce the risk of exposure to PCBs. Under this alternative, the building would be demolished, the underground storage tank, DW1, DW2, and the drain lines would all be removed. The contaminated soils would remain in place and would be covered with gravel. This alternative would include the following major elements:

- Building Demolition;
- Removal of the underground storage tank, drywells DW1 and DW2, and drain lines;
- Incineration of PCB liquid and sediments;

- 12" gravel cap for City Parcel property and the alleyway;
- Deed restrictions for the following properties:
  - City Parcel and City of Spokane properties limiting the use to industrial; and,
  - Alleyway to protect integrity of the gravel cap.
- Inspection and maintenance of the gravel cap to assure the long-term integrity of the cap.

The parking lot area of the City Parcel Property and the alleyway are already covered with gravel. Additional gravel may have to be added to make a 12" gravel cap on these areas.

7.2 Alternative 2: Building Demolition, In-situ Solidification/Stabilization, and Institutional Controls

This alternative makes use of solidification/stabilization, an emerging technology, to treat the PCBs in soil. Solidification agents would be mixed with the surface soils to 2 feet deep using a backhoe. The major elements of Alternative 2 are:

- Building demolition;
- Removal of the underground storage tank, dry wells DW1 and DW2, and drain lines;
- Incineration of liquid PCB and sediments;
- In-situ solidification/stabilization of soils in PCB-contaminated areas;
- Soil cover over solidified soils; and,
- Deed restrictions for the following properties;
  - City Parcel and City of Spokane properties limiting use to industrial; and,
  - Alleyway to protect integrity of the soil cap and the solidified soils; and,
- Inspection and maintenance of the cap to assure the long-term integrity of the cap.

7.3 Alternative 3: Deferred Building Demolition, Excavation, Off-Site Disposal, and Institutional Controls

The major element of this alternative is the excavation of shallow soil with PCB concentrations greater than 10 mg/Kg. The soils will be disposed off-site at a TSCA permitted landfill; the closest disposal facility is located in Arlington, Oregon approximately 215 miles from Spokane. Industrial cleanup levels would be met in the City Parcel property; the residential cleanup levels of 1 mg/Kg would not be met in the alleyway. Restrictive covenants would be required for the City Parcel property because industrial cleanup levels are used, the alleyway because residential cleanup levels would not be attained, and the City of Spokane property because industrial levels are used.

Under this alternative, the building would remain in place and would be assumed to be removed sometime in the future. The removal of DW2 , the underground storage tank, and the drain lines would take place prior to the building demolition. For purposes of cost calculations, the building would be assumed to be removed ten (10) years after the initiation of this alternative. Additional cleanup of contaminated soils that were underneath the building would take place after the building is removed. This alternative will consist of the following elements:

- Removal of the underground storage tank, drywells DW1 and DW2, and drain lines;
- Incineration of liquid PCB and sediments;
- Excavation of shallow soil above 10 mg/Kg PCB in the north parking lot area and in the alleyway;
- Off-site disposal of soil in a TSCA-permitted landfill;
- Backfilling with clean soil;
- Deed restrictions for the following properties:
  - City Parcel property limiting the use to industrial, maintaining integrity of the soil cap, and requiring the excavation and off-site disposal of contaminated soils underneath the building when the building is removed;
  - City of Spokane Property limiting site use to industrial; and,
  - Alleyway to protect integrity of the soil cap; and
- Building removal with additional soil cleanup in year 10.

7.4 Alternative 4. Building Demolition, Excavation, Off-Site Disposal and Institutional Controls

The major elements of this alternative are the following:

- Building demolition;
- Limited soil sampling;
- Removal of the underground storage tank, drywells DW1 and DW2, and drain lines;
- Incineration of liquid PCB and sediments;
- Excavation of shallow soil above 10 mg/Kg PCB in the City Parcel property and in the alleyway;
- Off-site disposal of soil in a TSCA-permitted landfill;
- Backfilling with clean soil; and,
- Deed restriction for the following properties:
  - City Parcel and City of Spokane properties limiting the site to industrial use.
  - Alleyway to maintain integrity of the soil cover.

7.5 Alternative 5: Building Demolition, Excavation, Off-Site Incineration, and Institutional Controls

This alternative will consist of the following:

- Building demolition;
- Limited soil sampling;
- Removal of the underground storage tank, drywells DW1 and DW2, and drain lines;

- Incineration of liquid PCBs and sediments;
- Excavation of shallow soil above 10 mg/Kg PCB in the City Parcel property, and in the alleyway;
- Off-site incineration of soil;
- Backfilling with clean soil;
- Deed restriction for the following properties:
  - City Parcel and City of Spokane properties limiting the site to industrial use.
  - Alleyway to maintain integrity of the soil cover.

8.0 DETAILED ANALYSIS OF ALTERNATIVES

The five alternatives proposed in Section 7 are evaluated on the basis of the criteria presented in Section 5.

8.1 Alternative 1: Building Demolition, Capping, and Institutional Controls

Threshold Requirements

Protect Human Health and the Environment

The cap would prevent direct contact with and ingestion of PCB-contaminated soils. Together with institutional controls to prevent unmanaged ground intrusive activities and to limit the use of the site to industrial, this alternative would protect human health and the environment. However, since soils with high PCB concentration would still remain on site, potential future health risks and the potential for future migration of chemical to the ground water would not be eliminated.

Comply with Cleanup Standards

Cleanup levels would not be met at the point of compliance from the ground surface to fifteen feet below the ground surface. However, under WAC 173-340-740(6)(f), for cleanup actions that involve containment, the cleanup action may be determined to comply with cleanup standards, provided:

- The selected remedy is permanent to the maximum extent practicable;
- The cleanup action is protective of human health and the environment;
- The cleanup action is demonstrated to be protective of terrestrial ecological receptors;
- Institutional controls are put in place;
- Compliance monitoring and periodic reviews are designed to ensure the long-term integrity of the containment system;
- The types, levels, and amount of hazardous substances remaining on-site and the measures that will be used to prevent migration and contact with those substances are specified in the draft cleanup action plan.

Therefore cleanup standards would be complied with if this alternative is determined to be permanent to the maximum extent practicable. All the other above criteria would be met for this alternative.

Comply with Applicable State and Federal Law

All other ARARs listed in Table 5 could be complied with.

Provide for Compliance Monitoring

This alternative would provide for periodic inspection and maintenance of the gravel cap. This would ensure that the long-term integrity of the cap for the cleanup action is effective over time.

Other Requirements

Use Permanent Solutions to the Maximum Extent Practicable

(i) Protectiveness: This alternative would be protective of human health and the environment.
(ii) Permanence: No reduction of toxicity, mobility, or volume of PCBs would be achieved under this alternative.
(iii) Cost: The capital cost and annual operation and maintenance costs for this alternative are given in Table 6. All costs are calculated on a present worth basis. The present value of Alternative 1 is $209,731.
(iii) Effectiveness over the long term: This alternative would rank very low in effectiveness over the long term because this involves no treatment that would reduce the toxicity, mobility, or volume of PCBs. Containment with attendant engineering controls rank very low when assessing the relative degree of long-term effectiveness under WAC 173-340-360(3)(e)(iv).
(iv) Management of short-term risks: There would be minimal risk to human health and the environment associated with this alternative during implementation of this alternative. Maintenance workers could be reliably protected through the use of standard safety equipment.
(v) Technical and administrative implementability: This alternative could be easily accomplished.
(vi) Consideration of public concerns: The public would have an opportunity to comment on this alternative.

Provide for Reasonable Restoration Time Frame

Under this alternative, the PCBs would not be removed or destroyed but would be contained with attendant engineering controls. The PCBs are not expected to undergo natural or chemical degradation at a reasonable rate. This alternative would rank very low in terms of providing for a reasonable restoration time frame.

Consider public concerns

Public concerns would be addressed during the public review and comment period for the draft Feasibility Study Report.

Expectations for cleanup action alternatives

Alternative 1 would not meet Ecology's expectation that for sites containing small volumes of hazardous substances, all hazardous substances will be destroyed, detoxified, and/or removed to concentrations below cleanup levels in order to minimize the need for long-term management of contaminated materials.

8.2 Alternative 2: Building Demolition, In-situ Solidification/Stabilization, and Institutional Controls

Threshold Requirements

Protect Human Health and the Environment

This alternative would solidify impacted on-site soil and would be covered with clean soil, therefore eliminating direct contact with and ingestion of the soils. The treated soils would remain on-site, but would no longer pose a threat to human health or the environment. Institutional controls would be needed to prevent unmanaged disturbance of the solidified soil.

Comply with Cleanup Standards

Cleanup standards would not be attained at the point of compliance. PCBs are not completely destroyed by this technology. Because PCBs would still be present in the stabilized soils, long-term management controls in the form of institutional controls are required. Like Alternative 1, this alternative would comply with cleanup standards under WAC 173-340-740(6)(f) if it is determined that this alternative is permanent to the maximum extent practicable.

Comply with Applicable State and Federal Laws

Incineration of the liquid PCBs and the sediments will meet TSCA requirements. All other ARARs listed in Table 5 could be complied with.

Provide for Compliance Monitoring

This alternative would provide for periodic inspection of the soil cover and the solidified soil to ensure its integrity. Deed restrictions on the property to limit site use and to protect the integrity of the soil cover would be required.

Other Requirements

Use permanent solutions to the maximum extent practicable

(i) Protectiveness: This alternative would be protective of human health and the environment.
(ii) Permanence: The PCBs would not be destroyed but its mobility would be greatly reduced. This alternative offers less permanence when compared with alternatives that permanently destroys PCBs.

(iii) Cost: The capital cost and operation and maintenance costs are given in Table 7. All costs are calculated on a present worth basis. The total present value of Alternative 2 is $385,222.

(iii) Effectiveness over the long term: This alternative affords less long-term effectiveness than alternatives that permanently destroy PCBs although this has higher effectiveness over the long term than Alternative 1 because the mobility of PCBs would be reduced. Immobilization or solidification ranks third in assessing the relative degree of long-term monitoring effectiveness under WAC 173-340-360(3)(e)(iv).

(iv) Management of short-term risks: This alternative would have some exposure risk during implementation like exposure to dusts and volatilized PCBs during heating and mixing with the agents. These exposure risks could easily be controlled and mitigated.

(v) Technical and administrative implementability: In-situ solidification/stabilization had already been demonstrated in other Sites. The size of the site area (less than an acre) could pose a challenge as far as accommodation of an in-situ system.

(vi) Consideration of public concerns: The public would have an opportunity to comment on this alternative.

Provide for reasonable restoration time frame

This alternative would stay protective of human health and the environment as long as long-term management controls are maintained. PCBs would still remain with the solidified soils and are not expected to degrade by natural processes. This alternative would also rank low in terms of providing for a reasonable restoration time frame but would rank a little higher than Alternative 1 since the PCBs are demobilized.

Consider public concerns

Public concerns would be addressed during the public review and comment period for the draft Feasibility Study Report.

Expectations for cleanup action alternatives

Alternative 2 would not meet Ecology's expectation for sites containing small volumes to have hazardous substances destroyed, detoxified, and/or removed to concentrations below cleanup levels in order to minimize the need for long-term management of contaminated materials.

8.3 Alternative 3: Deferred Building Demolition, Excavation, Off-site Disposal, and Institutional Controls

Threshold Requirements

Protect human health and the environment

Under this alternative, soils containing PCBs above industrial cleanup levels of 10 mg/Kg would be removed and backfilled with clean soils. The building would not be removed during initial implementation of cleanup; it is assumed that the building would be demolished sometime in the future. However, the dry wells, the underground storage tank, and the drain lines would be removed during the initial stages of the cleanup. There would no longer be any potential for direct contact with PCBs at the Site and the potential for future migration of PCBs to ground water is mostly eliminated. Contaminated soils would be disposed of in a TSCA-permitted landfill; the PCBs would thus be contained and monitored off-site. There would be little or no risk of degrading the environment surrounding the disposal facility since the TSCA-permitted facility is securely isolated and monitored.

Comply with cleanup standards

Industrial cleanup levels would be attained at the point of compliance under this alternative for the City Parcel and the City of Spokane properties, except for the contamination underneath the building. Unrestricted soil cleanup level of 1 mg/Kg would not be met at the point of compliance for the alleyway; however, cleanup standards could be complied with under WAC 173-340-740(6)(f).

Comply with applicable state and federal law

Off-site disposal of PCB-contaminated soils in a permitted landfill, and the incineration of the PCB liquid and sediments would meet the TSCA action ARARs. Other ARARs that could be complied with for this alternative are listed in Table 5.

Provide for compliance monitoring

Protection monitoring would be conducted during excavation and loading to confirm that human health and the environment are adequately protected. Confirmation soil sampling would be conducted to verify that soil cleanup levels are met.

Other Requirements

Use Permanent Solutions to the Maximum Extent Practicable

(i) Protectiveness: This alternative would be protective of human health and the environment.
(ii) Permanence: This alternative would be a permanent remedy.
(iii) Cost: The capital cost and operation and maintenance costs are shown in Table 8. The total present value of Alternative 3 is $748,216 which includes the cost of building demolition and associated soil cleanup (see Table 11) in year 10.
(iv) Effectiveness over the long term: Off-site disposal in an engineered, lined and monitored facility is third in the descending order in the assessment of

the relative degree of long-term effectiveness under WAC 173-340-360(3)(e)(iv).

(v) Management of short-term risks: Risks during excavation, loading, and transporting of PCB-contaminated soils could be controlled. During the excavation and loading activities, dust could impact the surrounding community. Dust control methods could be easily implemented. Air monitoring could be conducted to ensure that fugitive dust would not pose a threat to the community. Risks incurred by offsite transport due to potential for spills or accidental loss of materials could be easily mitigated.

(vi) Technical and administrative implementability: Excavation, hauling, and backfilling operations of soils can be easily implemented. Off-site disposal would occur at an existing permitted off-site facility. However, removal of the DW2 and the underground storage tank would be difficult due to space constraints inside the building; special equipment would be required or portion of the building would have to be destroyed and replaced.

(vii) Consideration of public concerns. The public would have an opportunity to comment on this alternative.

Provide for reasonable restoration time frame

Cleanup levels would be achieved after excavation and backfilling with clean soils in the north parking lot. However, there may still be additional soils that are contaminated under the building that would have to be addressed when the building is demolished.

Consider public concerns

Public concerns would be addressed during the public review and comment period for the draft Feasibility Study Report.

Expectations for cleanup action alternatives

Alternative 3 would partially meet Ecology's expectation that for sites containing small volumes of hazardous substances, all hazardous substances will be destroyed, detoxified, and/or removed to concentrations below cleanup levels in order to minimize the need for long-term management of contaminated materials.

8.4 Alternative 4: Building Demolition, Excavation, Off-Site Disposal, and Institutional Controls

Threshold Requirements

Protect human health and the environment

All PCB-contaminated soils with concentrations above the industrial cleanup level in the Site would be excavated and disposed off-site in a TCSA permitted landfill. This would provide a high level of protection of human health and the environment. Remedial action objectives would be met with a high degree.

Comply with cleanup standards

Cleanup levels would be attained at the point of compliance in the City Parcel property.

Comply with applicable state and federal law

Off-site disposal of PCB-contaminated soils in a permitted landfill and the incineration of liquid PCBs and sediments would meet the TSCA action ARARs. Other ARARs that are listed in Table 5 could be complied with.

Provide for compliance monitoring

Protection monitoring would be conducted during building demolition, excavation and loading to confirm that human health and the environment are adequately protected. Confirmation soil sampling would be conducted to verify that soil cleanup levels are met.

Other Requirements

Use permanent solutions to the maximum extent practicable

- (i) Protectiveness: This alternative would provide a very high degree of protection of human health and the environment.
- (ii) Permanence: This alternative would be a permanent remedy.
- (iii) Cost: The capital cost, and operation and maintenance costs are given in Table 9. The total present value of Alternative 4 is $649,465.
- (iv) Effectiveness over the long-term. Off-site disposal in an engineered, lined and monitored facility is third in the descending order in the assessment of the relative degree of long-term effectiveness under WAC 173-340-360(3)(e)(iv). This alternative would rate a little higher than Alternative 3 because the building and any additional contaminated soil underneath it would be removed.
- (v) Management of short-term risks. Short-term risks for this alternative are similar to those under Alternative 3, with the addition of risks posed during building demolition. All short-term risks could be easily controlled during the construction period.
- (vi) Technical and administrative implementability: Like Alternative 3, excavation, hauling, and backfilling operations of soils could be easily implemented. Off-site disposal would occur at an existing permitted off-site facility.
- (vii) Consider public concerns: The public would have an opportunity to comment on this alternative.

Provide for reasonable restoration time frame

Cleanup levels at the Site would be achieved after excavation and backfilling with clean soils.

Consider public concerns

Public concerns would be addressed during the public review and comment period for the draft Feasibility Study Report.

Expectations for cleanup action alternatives

Alternative 4 would meet Ecology's expectation that for sites containing small volumes of hazardous substances, all hazardous substances will be destroyed, detoxified, and/or removed to concentrations below cleanup levels in order to minimize the need for long-term management of contaminated materials.

8.5 Alternative 5: Building Demolition, Excavation, Off-site Incineration, and Institutional Controls

Threshold Requirements

Protect human health and the environment

All contaminated soils in the Site with PCB concentration higher then 10 mg/Kg would be excavated. The PCB contaminated soils would be sent to an off-site incinerator. This would provide a very high level of protection of human health and the environment. Remedial action objectives would be met with a high degree.

Comply with cleanup standards

Cleanup levels would be attained at the point of compliance for the City Parcel Property. For the alleyway, cleanup levels would not be attained at the point of compliance; however, cleanup standards could be complied with under WAC 173-340-740(6)(f).

Comply with applicable state and federal law

Off-site incineration in a TSCA-permitted facility would meet the TSCA action ARARs. Other ARARs that could be complied with for this alternative are listed in Table 5.

Provide for compliance monitoring

Protection monitoring would be conducted during building demolition, excavation and loading to confirm that human health and the environment are adequately protected. Confirmation soil sampling would be conducted to verify that soil cleanup levels are met.

Other Requirements

Use permanent solutions to the maximum extent practicable

(i) Protectiveness: This alternative would provide a very high degree of protection of human health and the environment.
(ii) Permanence: This alternative would be a permanent remedy.
(iii) Cost: The capital cost, and operation and maintenance costs are given in Table 10. The total present value of the alternative is $5,044,372.
(iv) Effectiveness over the long-term. Incineration would destroy the PCBs and thus ranks second (after reuse and recycling) in the descending order in the assessment of the relative degree of long-term effectiveness under WAC 173-340-360(3)(e)(iv). This alternative would rank the highest in terms of effectiveness over the long-term.
(v) Management of short-term risks. Short-term risks for this alternative are similar to those under Alternative 4. All short-term risks could be easily controlled during the construction period.
(vi) Technical and administrative implementability: Like Alternative 3, excavation, hauling, and backfilling operations of soils can be easily implemented. Off-site disposal would occur at an existing permitted off-site incinerator
(vii) Consider public concerns: The public would have an opportunity to comment on this alternative.

Provide for reasonable restoration time frame

Cleanup standards would be complied with at the Site after excavation and backfilling with clean soil and deed restrictions are in place.

Consider public concerns

Public concerns would be addressed during the public review and comment period for the draft Feasibility Study Report.

Expectations for cleanup action alternatives

Alternative 5 would meet Ecology's expectation that treatment technologies will be emphasized and that for sites containing small volumes of hazardous substances, all hazardous substances will be destroyed, detoxified, and/or removed to concentrations below cleanup levels in order to minimize the need for long-term management of contaminated materials.

9.0 COMPARISON OF ALTERNATIVES

Table 12 shows a summary of the comparison of the five proposed alternatives.

9.1 Threshold requirements

All five alternatives could meet the four threshold requirements. However, for Alternatives 1 or 2, compliance with cleanup standards would be met only if the alternative is determined to be permanent to the maximum extent practicable.

9.2 Other requirements

Use permanent solutions to the maximum extent practicable

Protectiveness: Alternative 1 ranks the lowest in protectiveness since no PCBs would be removed from the soil and would just be contained on Site. Alternative 2, where PCBs would be immobilized and contained on Site, ranks higher than Alternative 1. Alternatives 4 and 5 would rank the highest because all PCBs would be removed from the Site and cleanup levels would be attained at the point of compliance for the City Parcel property. Alternative 3 would rank lower than Alternative 4 since the building would not be demolished immediately and contaminated soils underneath the building would still exist.

Permanence: Alternative 1 ranks the lowest in permanence as this alternative would not reduce the toxicity, mobility or volume of the PCBs in soils. Since the mobility of PCBs would be reduced by Alternative 2, this alternative would rank higher than Alternative 1. Alternative 3 ranks much higher than Alternative 2 since PCB-contaminated soils that are above cleanup levels would be removed and disposed off-site in a TSCA permitted landfill; PCBs in soils underneath the building would still remain until removal is completed upon building demolition. Alternative 4 ranks higher than alternative 3; all soils with PCB concentrations above cleanup level in the City Parcel property would be excavated and disposed off-site. The alternative that ranks the highest in terms of permanence is Alternative 5 since the PCBs in soils that are excavated would be permanently destroyed by the incineration process.

Cost: Table 13 is a summary of the costs of the five alternatives. The cost items considered for each of the alternatives are given in Tables 6 through 10. The cost for removing the DW2 and the underground storage tank would be higher for Alternative 3 since the work would have to be conducted inside the building and would require the use of special equipment. In addition, the floors and walls that would be destroyed during the removal would have to be replaced. Alternative 5 is the most costly of the alternatives because of the incineration. Alternative 1 is the least costly; Alternative 2 costs more than Alternative 1. Alternative 4, which would involve upfront building demolition prior to soil excavation and off-site disposal, costs less than Alternative 3 which would defer the removal of the building and additional soil cleanup to a later time (assumed to be after 10 years). Building demolition would also make the removal of DW2 and the underground storage tank easier, thus reducing the cost, and the cost of replacing the floors/walls would be eliminated.

Long-term Effectiveness: Following the guidance under WAC 173-340-360(3)(e)(iv), Alternative 5, which involves destruction of PCBs, ranks the highest in terms of long-term effectiveness . Alternative 4 that involves off-site disposal in an engineered, lined, and monitored facility ranks next to Alternative 5. Alternative 3, which is Alternative 4 without immediate building removal, ranks a little less than Alternative 4. Alternative 1 which is on-site isolation of containment ranks the lowest. Alternative 2, though this involves immobilization of PCBs but is more of on-site containment with attendant engineering controls, ranks higher than Alternative 1 but less than Alternative 3.

Management of short-term risks: Alternatives 4 and 5 rank the lowest in terms of short-term risks because of building demolition, soil excavation, and the soil transport to the landfill or to the incinerator. Alternative 3 scores a little higher since no immediate building demolition would be involved. Alternative 2, which involves short-term risks associated with the soil mixing, would be higher than Alternative 3. Alternative 1 ranks the highest in terms of management of short-term risk since no soil excavation and transportation are involved.

Implementability: Alternative 1 is the easiest to implement. Alternative 2 ranks next, followed by Alternatives 4 and 5. Implementation of Alternative 3 which, like Alternatives 4 and 5, requires soil excavation and off-site disposal is the hardest to implement since removal of a drywell and underground storage tank would be conducted inside the building.

Public concerns consideration: The public will have an opportunity to comment on these alternatives during the public comment period for the draft FS report as required under MTCA.

<u>Provide for reasonable restoration time frame</u>

Alternatives 4 and 5 rank the highest in terms of providing for reasonable restoration time frame. Alternative 3 ranks a little lower since contaminated soils would be left underneath the building until it is demolished. Alternative 2 scores lower since the PCBs in soils are immobilized and contained but are not removed. Alternative 1 scores the lowest.

<u>Consider public comments</u>

As required under MTCA, the draft FS report would be made available for public review and comment. The public would have the opportunity to comment on the proposed alternatives in the FS Report.

Based on the comparisons of the alternatives, Alternative 4 is the remedy that is most permanent to the maximum extent practicable.

9.3 Ecology Expectations

Alternatives 1 and 2 would not meet Ecology's expectation that for sites containing small volumes of hazardous substances, the hazardous substances will be destroyed, detoxified, and/or removed to concentrations below cleanup levels in order to minimize the need for long-term management of contaminated materials. Alternatives 3, 4, and 5 would be consistent with this expectation.

10.0 REFERENCES

EPA, A Guide to Developing and Documenting Cost Estimates During the Feasibility Study.

EPA, A Guide on Remedial Actions at Superfund Sites with PCB Contamination, August 1990

EPA Engineering Issue, Technology Alternatives for the Remediation of PCB-Contaminated Soil and Sediment, October 1993.

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SAIC, Final Remedial Investigation Report for the City Parcel Site, November 27, 2002.

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