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Colbert Landfill, WA

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16. ABSTRACT

The Colbert Landfill, a 40-acre county-owned sanitary landfill is located in Spokane County, Washington. From 1968 through 1986, the landfill received both municipal and commercial wastes. During five years, from 1975 to 1980, a local electronics manufacturing company, Key Tronic Corporation, disposed of several hundred gallons per month of spent organic solvents, mainly methylene chloride and 1,1,1-trichloroethane (TCA) at the landfill. These wastes were typically brought to the landfill in drums and poured down the sides of open trenches to mix with the soil or ordinary municipal refuse already in the trench. During the same period, Fairchild Air Force Base, disposed of various solvent wastes at the site. Pesticides and refinery tar residues were also disposed on site, but to date, these contaminants have not been detected in the ground water. In 1980, nearby residents complained to the Eastern Regional Office of the Washington Department of Ecology about these disposal practices. Investigation of these complaints led to the discovery of nearby private well contamination with TCA. In June 1984, an Initial Remedial Measure (IRM) was developed to extend the public water supply mains to effected residents. The primary contaminants of concern effecting the ground water include: VOCs, TCA,1,1-dichloroethylene, 1,1-dichloroethane, trichloroethylene TCE, tetrachloroethylene, methylchloride.
(See Attached Sheet)

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16. ABSTRACT (continued)

The selected remedial action includes: installation and operation of interception and extraction wells; onsite ground water treatment; and implementation of an alternate water supply. The estimated present worth cost for this remedy is $24,000,000.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 6TH AVENUE
SEATTLE, WASHINGTON

RECORD OF DECISION,
DECISION SUMMARY,
AND
RESPONSIVENESS SUMMARY

FOR

INTERIM FINAL REMEDIAL ACTION
COLBERT LANDFILL SITE
COLBERT, WASHINGTON

SEPTEMBER 1987

DECISION SUMMARY
REMEDIAL ALTERNATIVE SELECTION
INTERIM FINAL REMEDIAL ACTION
COLBERT LANDFILL SITE, COLBERT, WASHINGTON

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RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

SITE

Colbert Landfill Site
Colbert, Spokane County, Washington

PURPOSE

The decision document presents the selected interim final remedial action for this site, developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable the National Contingency Plan (NCP, 40 CFR Part 300). The State of Washington has been consulted and has concurred with the selected remedy.

BASIS

This decision is based upon the administrative record for the site, as obtained from the files of the U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology. This record includes, but is not limited to, the following documents describing the site, the costs and effectiveness of the remedial alternatives, and community concerns:

- Remedial Investigation Report for the Colbert Landfill, Spokane, Washington;
- Feasibility Study Report for the Colbert Landfill, Spokane, Washington (includes the Risk Assessment);

- Decision Summary of Remedial Alternative Selection (attached hereto);
- Responsiveness Summary (Appendix A); and
- Staff summaries and briefing documents.

An index (Appendix D) identifies other items which are included in this administrative record.

DESCRIPTION

This Record of Decision addresses management of the migration of contamination using a groundwater interception system and attempts source control through extraction in the areas of highest contaminant concentrations.

The remedy is designed to:

- prevent further spread of contaminated groundwater in two aquifers by installing and operating interception wells,
- remove contaminated materials which have entered the aquifers and are contributing to the contaminant plume, by installing and operating extraction wells in the area where the plumes originate,
- reduce the toxicity, mobility, and volume of the contaminants by treating all extracted groundwater from both interception and extraction wells, and
- provide an alternate water supply system to any residents deprived of their domestic supply due to demonstrated contamination from the landfill or due to the action of the extraction or interception systems.

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Treatment will be sufficient to reduce contaminant levels in the aquifers and in the wastewater effluent to or below performance standards. These have been set at the Maximum Contaminant Levels (MCLs, 40 CFR 141.61), or a similarly defined health-based level (a 10^{-6} risk level for carcinogenic constituents). Numeric values for these performance standards are presented in Table 1. Treatment should be permanent, and should effectively reduce the toxicity, mobility, and volume of the contaminants. Any treatment system which will produce air emissions will be designed to meet any appropriate state Air Toxics Guidelines and to use Best Available Control Technology (BACT) on the effluent air stream.

In order to implement this remedial action, adequate monitoring will be required in private wells in the area of impact, as well as in monitoring wells as needed to assess progress of the remediation and performance of the containment system. Treated water effluents also will be monitored to assure that they meet the appropriate performance standards (Table 1). Treated water discharge shall at all times be consistent with U.S. and Washington State laws including but not limited to RCW 90.48 (Water Pollution Control) and WAC 173-218 (Underground Injection Control Program). Plume containment will be confirmed by installation and periodic sampling of monitoring wells and residential wells downgradient of the interception zone. Extraction will continue until all wells in contaminated zones show that the contaminants from the landfill have been reduced to and consistently remain below the health protection maximum levels.

Those residents who are deprived of domestic drinking water, either because their well water quality shows demonstrated contamination from the landfill or because the quantity available has been reduced by the action of the extraction and interception systems, will be connected to an adequate supply of safe drinking water for in-home domestic use. The present community water system serving the area, the Colbert Extension of the Whitworth Water District No. 2, may require upgrading to provide these supplies. The system will be designed to meet state public water system standards.

TABLE 1

PERFORMANCE STANDARDS

MAXIMUM ALLOWABLE CONTAMINANT CONCENTRATIONS

Health Protection Levels 1/

Contaminant	Maximum Concentration ($\mu g/l$)	Basis
1,1,1-Trichloroethane (TCA)	200	MCL
1,1-Dichloroethylene (DCE)	7	MCL
1,1-Dichloroethane (DCA)	4,050	MAC
Trichloroethylene (TCE)	5.0	MCL
Tetrachloroethylene (PCE)	0.7	10^{-6} cancer risk
Methylene Chloride (MC)	2.5	10^{-6} cancer risk

1/ Health Protection Levels are not to be exceeded, during operational life of remedial action, in effluents from groundwater treatment systems. Permanent reduction of contaminant concentrations below these levels throughout the site will indicate completion of the remedial action.

Institutional controls will be developed consistent with the final design to assure that the remedial action will continue to protect human health and the environment. Colbert Landfill will be closed to meet state Minimum Functional Standards for Landfill Closure (WAC 173-304-460), including capping, regrading, groundwater and gas monitoring and post-closure maintenance.

This is designed to be the final remedial action to be implemented at the Colbert Landfill site. It is an interim final action because the extraction and interception well systems will be in operation for decades before remediation is complete and changes in the selected action may be required during that period. The design therefore will be reassessed and adjusted periodically, at intervals not to exceed five years. It builds on the Interim Remedial Measure which provided alternate water supply, through the Colbert Extension of the Whitworth Water District No. 2, to residents whose wells had shown contamination from the landfill at levels above public health concern.

The performance standards described above will serve both as minimum treatment levels for effluents and as maximum residual levels for groundwater within the contaminant plumes. Completion of the treatment requirements is conditional upon reaching and maintaining contamination at concentrations below these maximum residual levels. The time required for this remedy is not presently known, but the entire treatment system will be reassessed by the EPA at intervals not to exceed five years.

DECLARATION

Consistent with CERCLA, as amended by SARA, and the NCP, it is determined that the selected remedy as described above is protective of human health and the environment, attains Federal and State requirements which are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference expressed in SARA for treatment that reduces toxicity, mobility or volume, as a principal element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

3-27-87

Date

Robie G. Russell
Regional Administrator
Environmental Protection Agency
U.S. EPA - Region 10

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I. SITE LOCATION AND DESCRIPTION

The Colbert Landfill is a Spokane County-owned sanitary landfill that was operated from 1968 through 1986. The Colbert area is in northeastern Washington, in Spokane County, approximately 15 miles north-northeast of Spokane, Washington. The landfill covers 40-acres and is located about 2.5 miles north of the Town of Colbert and a half mile east of U.S. Highway 2 (Newport Highway) in the northwestern quadrant of the intersection of Elk-Chattaroy, Yale, and Big Meadows Roads. It is situated in the southeast corner of Section 3, Township 27 North, Range 43 East, W.M. (Figure 1). The landfill received both municipal and commercial wastes up to 1986, is now filled to capacity, and is no longer receiving waste.

The remedial action site, the area of potential impact surrounding the landfill, extends north of the landfill about a half mile, west about a mile to the Little Spokane River, east a similar distance, and south approximately five miles to Peone (or Deadman) Creek. The total area is approximately 6800 acres which includes parts of Sections 2, 3, 10, 11, 14, 15, 16, 21, 22, 23, 26, 27, 28, 33, 34, and 35 of the same township and range. The site is entirely within the drainage basin of the Little Spokane River, mainly on a plateau bounded by bluffs down to the river on the west and knobby granite and basalt hills to the east.

The area is semi-rural with an estimated population of about 1,500 people within a 3-mile radius of the landfill. There are residences on all sides of the landfill; however, the closest residences are located north and east. Land use within the remedial action site is predominantly suburban residential, with some agricultural use, mainly truck farming or livestock production. The land immediately surrounding the landfill is planned to remain rural, according to the Spokane County Generalized Comprehensive Plan (Figure 2), a designation which allows a maximum of one house every ten acres. West and south of this zone are found, successively, areas designated semi-rural (one house per two acres), suburban (one house per half acre), and urban (five houses per acre).

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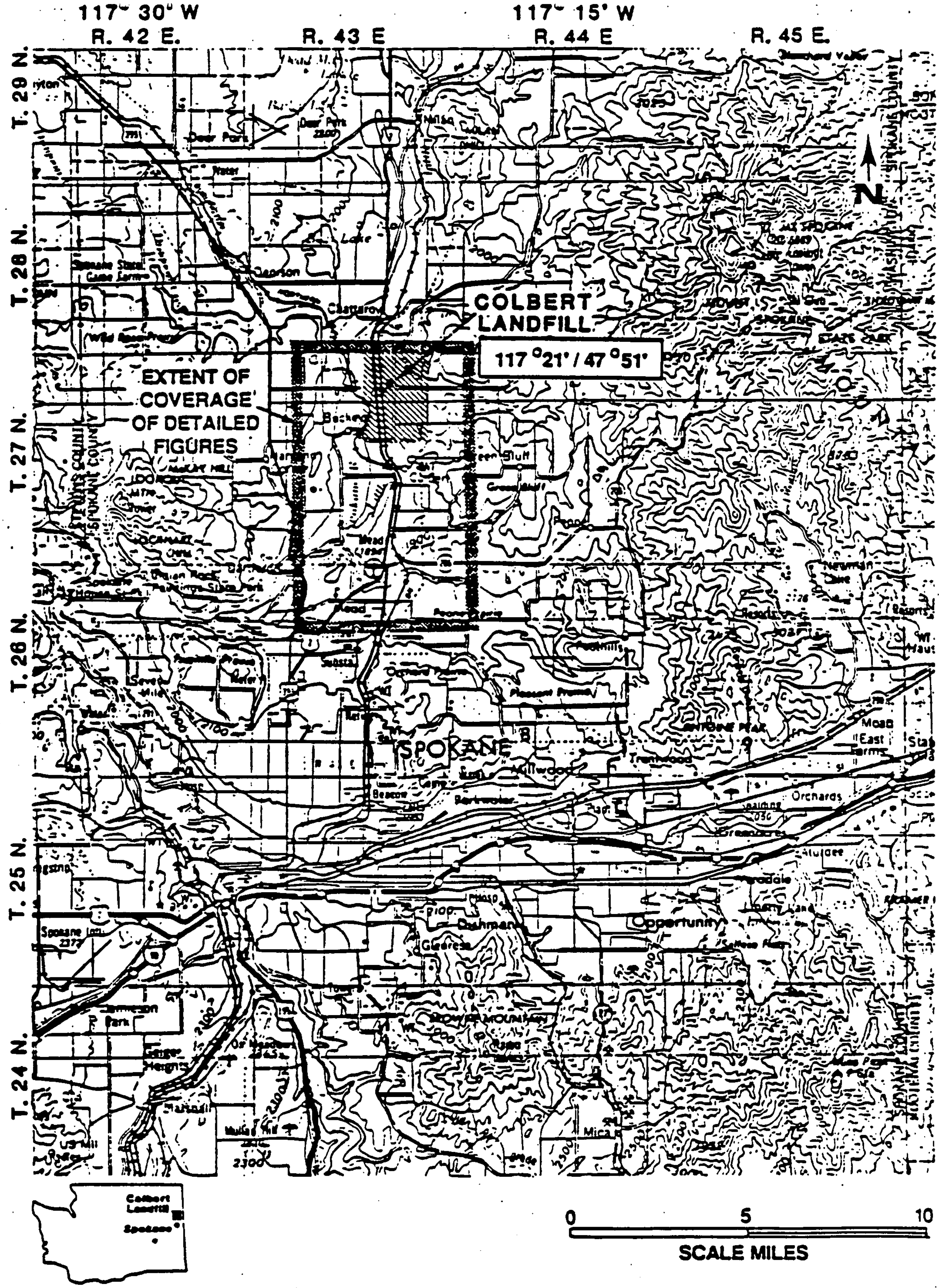
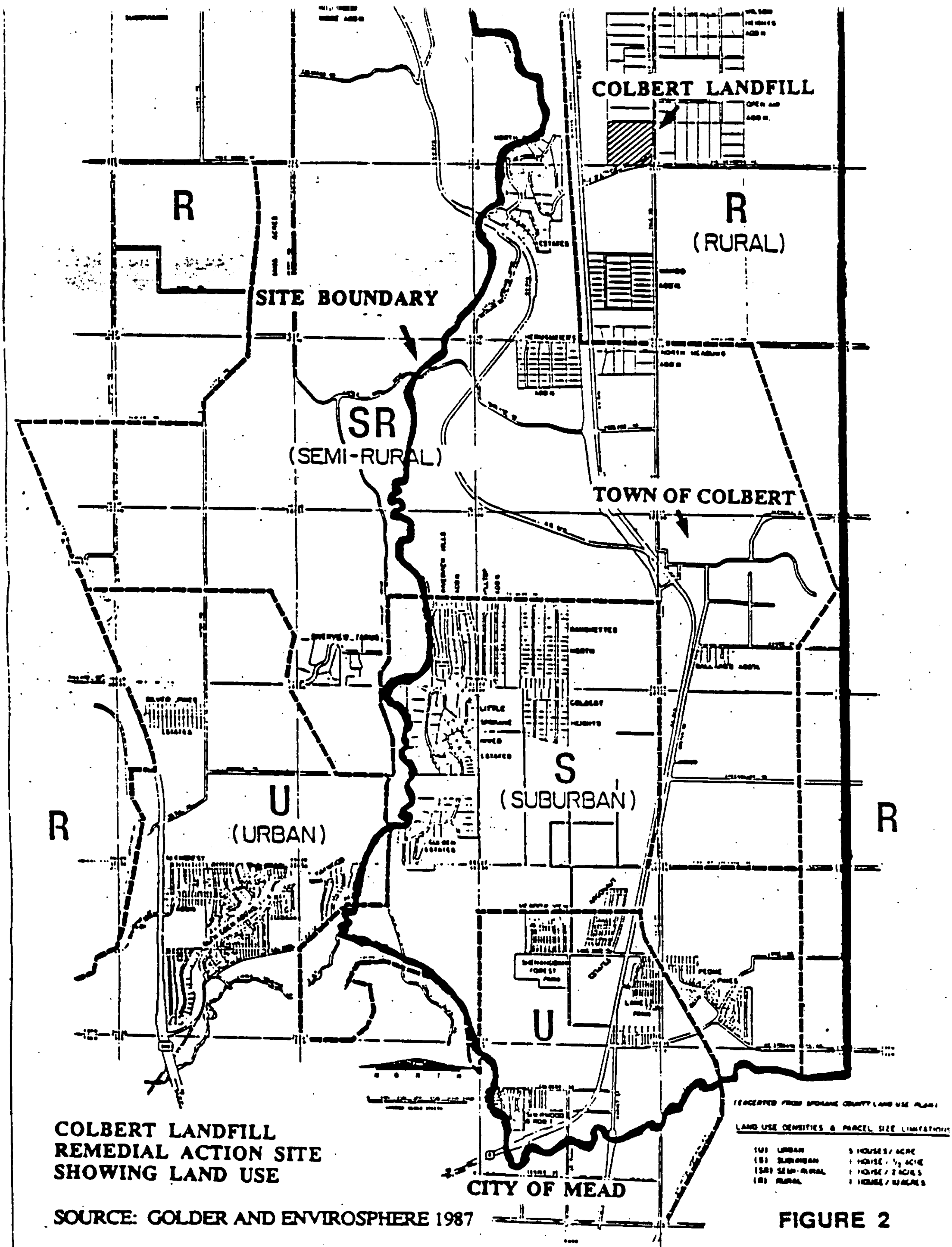


REGIONAL LOCATION MAP OF COLBERT LANDFILL SITE

SOURCE: USGS 1:250,000 MAP OF SPOKANE, WA.

FIGURE 1



COLBERT LANDFILL
REMEDIAL ACTION SITE
SHOWING LAND USE

SOURCE: GOLDER AND ENVIROSPHERE 1987

FIGURE 2

The population density is much lower than permitted because most of the area is vacant or agricultural; 1980 census data indicate approximately 6.5 persons per acre in the areas which include the semi-rural, suburban, and urban portions of the site.

Surface water resources include the Little Spokane River along the western edge of the area, Peone Creek on the southern edge, and Little Deep Creek flowing southwest through the middle of the site. Groundwater in the area is obtained from several aquifers but mainly from the upper and lower sand and gravel aquifers which have become contaminated by releases from the landfill.

The presence of groundwater contamination in the aquifers has had socioeconomic impacts in the area. Many of the nearby homeowners operate their properties as small crop and livestock farms. Water was supplied only by local groundwater resources until 1984 when the Whitworth Water District extended service to the currently impacted area.

II. SITE HISTORY

LANDFILL HISTORY, OPERATIONS, AND REGULATORY ACTIONS

Colbert Landfill had been operated as a sanitary landfill by the Spokane County Utilities Department since it was opened in September 1968 to its cessation of operations in October 1986. During the five years from 1975 to 1980, a local electronics manufacturing company, Key Tronic Corporation, used the Colbert landfill to dispose of spent organic solvents, mainly methylene chloride (MC) and 1,1,1-trichloroethane (TCA), at an average rate of several hundred gallons a month (Table 1). These wastes were typically brought to the landfill in drums, and were poured out down the sides of open trenches to mix with the soil or ordinary municipal refuse already in the trench. During the same period a nearby military facility, Fairchild Air Force Base, also disposed of various solvent wastes at the site. A variety of other chemicals (such as pesticides and refinery tar residues) from other sources were also disposed at the site but have not, to date, been detected in the groundwater at the site.

In 1980 nearby residents complained to the Eastern Regional Office of the Washington Department of Ecology (Ecology) about these disposal practices. State and county officials, under the lead of the Spokane County Utilities Department, initiated an investigation into complaints of groundwater contamination in the area by sampling nearby private wells of which some were found to be contaminated with TCA.

In the following years, a number of studies have been directed toward the contamination problem at the Colbert Landfill. The original investigation, which was initiated in response to citizen complaints, was conducted by George Maddox and Associates. The Phase I study, carried out in 1981 (Maddox 1981), included a review of existing information on the site and some field study, and recommended a groundwater monitoring program. Phase II studies, carried out in 1982

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TABLE 1

REPORTED SOLVENT MATERIALS DISPOSED AT THE COLBERT SITE

Source	Compound	Estimated Quantity (Gallons/Month)
Key Tronic Corporation	Methylene Chloride (20 - 25 percent acrylic resins by weight)	300 - 400
	1,1,1-trichloroethane (20 - 25 percent acrylic resins by weight)	150 - 200
	Mix of above (10 percent acrylic resins by weight)	100 - 150
Fairchild Air Force Base	Methyl Ethyl Ketone	25
	Poly Thinner	12.5
	Enamel Thinner	10
	Toluene	10
	Paint Remover	10
	Primer Wastes	10

Source: CH_2M Hill, 1983, p. 25.

(Maddox 1982), involved monitoring well installation, injection tests, and two rounds of groundwater quality sampling and analysis which also included selected private and purveyor wells.

In August 1983 the U.S. Environmental Protection Agency (EPA) placed the Colbert Landfill Site on its National Priorities List. Subsequently, Spokane County and Key Tronic Corporation, who were both identified as potential responsible parties (PRPs), continued to have George Maddox and Associates sample and analyze well waters around the landfill (Spokane County and Key Tronic 1986). The EPA contracted CH_2M Hill to conduct a Remedial Action Master Plan (CH_2M Hill 1983) which presented a scope of work for an eventual Remedial Investigation / Feasibility Study (RI/FS). Also in 1983, Timothy D. Cook conducted an earth resistivity survey at the landfill site as part of a Masters Thesis (Cook 1985).

Beginning in 1984, bottled water supplies were distributed by Spokane County and Key Tronic Corporation to some of the households with high contamination levels in their wells. Ecology entered into a cooperative agreement with the EPA for conducting a RI/FS at the Colbert Landfill Site in August 1984. A "Focused Feasibility Study for Initial Remedial Measures at the Colbert Landfill" (Ecology 1984a) and a "Community Relations Plan for Remedial Measures at the Colbert Landfill" (Ecology 1984b) were developed in June 1984. The chosen Initial Remedial Measure (IRM) was to supply water to the affected area by constructing a pressurized water system through the Colbert Extension (System 9) of the Whitworth Water District No. 2. The hookup of affected residents to this system was subsidized, again by the PRPs, contingent on three conditions imposed by the PRPs:

- o Contamination of well water of more than the then-proposed MCL values, including a 200 μg/l limit for TCA
- o Proximity (less than 500 ft) to water supply mains
- o Signing of a hold-harmless agreement

Other residents, although not meeting these conditions, have also elected to receive this water supply at their own expense.

Ecology contracted Golder Associates to conduct a data review of the Colbert Landfill Site. They submitted their recommendation report in December 1984 (Golder 1984), and then developed a work plan for the Remedial Investigation (RI) which was submitted in January 1985. Authorization to conduct the RI was received in March 1985. A draft RI report was released for public review in May 1986 and the final RI report was completed in May 1987 (Golder 1987).

In the summer of 1985, the EPA contracted Lockheed-EMSCO to perform soil gas and earth resistivity surveys near the landfill. A subcontractor, Tracer Research Company, performed the soil gas survey for three of the detected chlorinated hydrocarbons while Lockheed conducted the resistivity survey. The County of Spokane and Key Tronic Corporation retained George Maddox and Associates and ABC Laboratory to continue monitoring of private wells in cooperation with the efforts of Ecology and Golder through 1985, 1986, and 1987.

In April 1986, Ecology authorized Golder to prepare a Feasibility Study (FS) based upon the RI. The FS was performed by Golder and their subcontractor, Envirosphere Company, with input from Hall and Associates. The FS Final Report was submitted for public comment in May 1987 (Golder and Envirosphere 1987).

SITE ENVIRONMENT

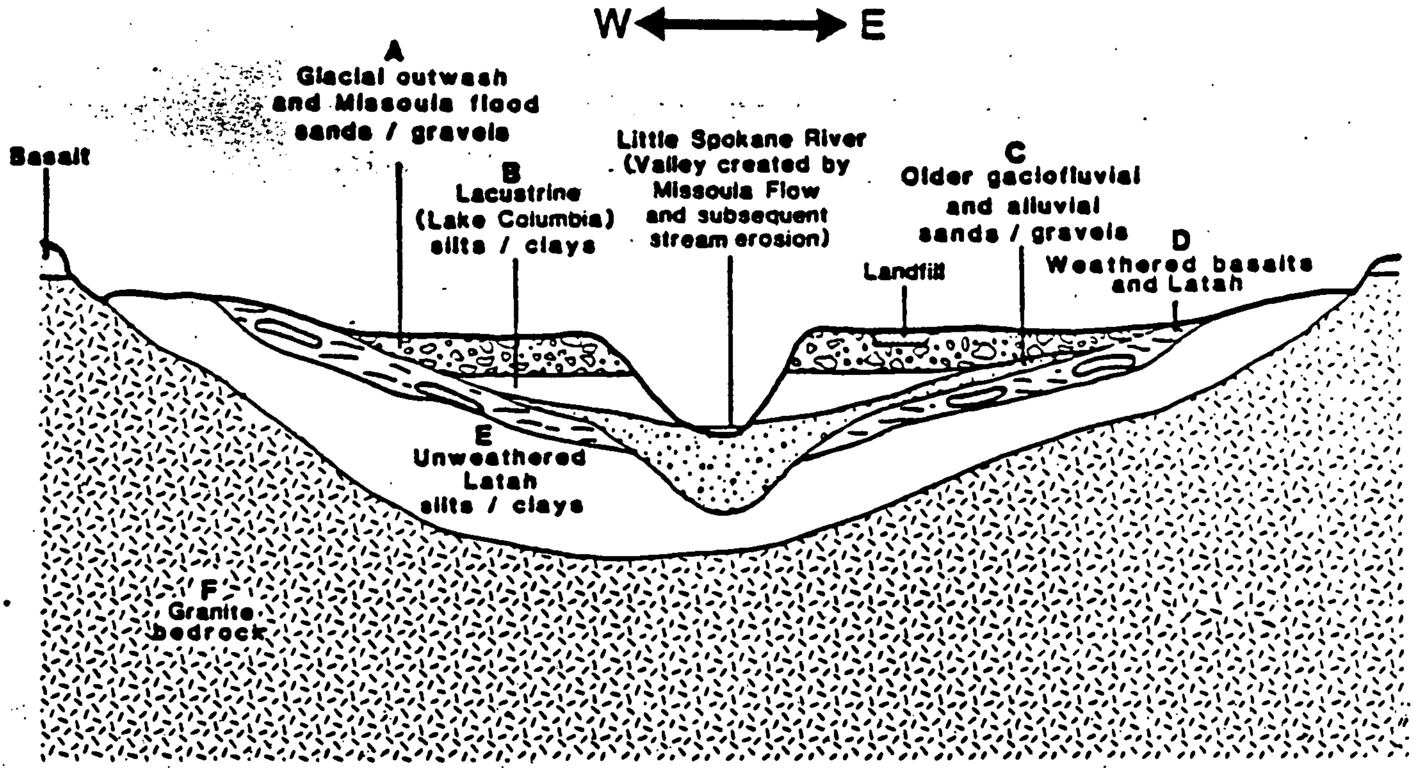
The site is in the drainage basin of the Little Spokane River, on a plateau bounded by bluffs down to the river on the west and knobby granite and basalt hills to the east. The climate is characteristic of eastern Washington with mild temperatures ranging from typical summer highs around 83°F to typical winter lows around 23°F, and a relatively low annual precipitation of approximately 17 inches falling mainly during the winter months of November through February (NOAA 1985).

The geology of the site consists of a series of glacially-derived materials laid down on an eroded landscape of clays, basaltic lava flows, and granitic bedrock. The stratigraphic units (layers) as described in the Remedial Investigation (Golder 1987), from youngest to oldest (i.e., from the top down), are:

A. Glacial outwash/Missoula flood sands/gravels.
B. Glacial Lake Columbia lacustrine silts/clays.
C. Older glaciofluvial and/or alluvial sands/gravels.
D. Weathered basalts and Latah (landslide deposits).
E. Unweathered Latah silts/clays.
F. Granite bedrock.

A schematic view of a cross-section of the Little Spokane River valley at the site of the landfill showing the general configuration of these units is provided in Figure 3.

This specific geological system can be hydrogeologically defined as containing three aquifers and three aquitards. There is an aquifer associated with Unit A - the glacial outwash/Missoula flood deposits which is designated as the upper sand/gravel aquifer. Unit B - The lacustrine silts/clays stratum is a relatively impermeable layer which acts as an aquitard. The second aquifer, located in Unit C - the older glaciofluvial and/or alluvial deposits, is called the lower sand/gravel aquifer. The weathered zone of the basalts and Latah, Unit D, may be considered an extension of the lower aquifer. The unweathered Latah silts/clays, Unit E, serves as the second aquitard. The upper fractured zone of granite, Unit F, is capable of water transmission and, although a poor producer in most areas, it could be considered as an aquifer while the deeper, less fractured portions of the bedrock serve as the confining lower boundary or aquitard to the entire regional flow system.



SCHEMATIC CROSS-SECTION OF
LITTLE SPOKANE RIVER VALLEY THROUGH COLBERT LANDFILL SITE
SHOWING GEOLOGIC STRATIGRAPHY

SOURCE: GOLDER 1987

FIGURE 3

The upper aquifer is unconfined with a water table at an approximate elevation of 1,770 feet, 90 feet below ground surface in the area of the landfill. The thickness of the upper aquifer varies from 8 to 15 feet in the central channel, decreasing as it extends toward the western bluffs and eastern hills. Groundwater is flowing predominately toward the south with velocities ranging from 4 to 13 feet per day (ft/day). The lower aquifer is generally a confined system, with its potentiometric surface at an approximate elevation of 1,680 feet, 180 feet below ground surface in the same area. The thickness of the lower aquifer varies considerably from only a few feet, east of the landfill, to over 150 feet as it approaches the river valley, where the aquifer is hydraulically connected to the Little Spokane River. Groundwater in this lower sand/gravel aquifer flows predominately toward the west at velocities ranging from 2 to 12 ft/day. Northeast of the landfill, the lower aquifer is closer to the surface, and becomes unconfined, interconnecting with the upper aquifer.

Both aquifers would be classified as current sources of drinking water (Class IIA) according to the EPA Groundwater Classification System (EPA 1986).

The vegetation in the vicinity of the landfill is dominated by ponderosa pine, with an undergrowth of grasses that are green in the spring and dry-brown by summer. Along the Little Spokane River the forest is somewhat denser and includes more species of trees. This riparian zone also supports a variety of shrub species and broadleafed herbaceous plants in addition to grasses. Game animals, small birds, and small mammals inhabit the wooded areas, and the river supports a variety of aquatic species, including trout. Bald eagles are seen occasionally along the river, especially in winter. Much of the landfill site itself has been cleared of trees, generally leaving bare soil, with occasional patches of grasses and shrubs in unworked sections. Adjacent to the site are both wooded areas and private residences. Wildlife use of the landfill property is probably limited to birds, insects, and perhaps small reptiles and mammals, similar to species found in surrounding areas.

Most of the nearby residences are multiple-acre homesteads, although a number of residential subdivisions are located within a short distance of the landfill, including Wilson Heights, Open Air, Wahoo, North Meadows, and Hermsmeier Additions, and North Glen Estates (Figure 4). Several other residential subdivisions are located further south but still within the site (the total potential area of impact); these include Riverview Hills Addition, Hilltop Addition, Ranchettes North, Ballards Addition, Colbert Heights, Little Spokane River Estates, Golden Estates, Meadow View, Argonaut Estates, Lane Park, Peone Pines, and Sherwood and Robert. In addition, the site includes the town of Colbert and part of the City of Mead. The area is primarily semi-rural with limited agricultural land use consisting of part-time farming to produce garden vegetables and livestock.

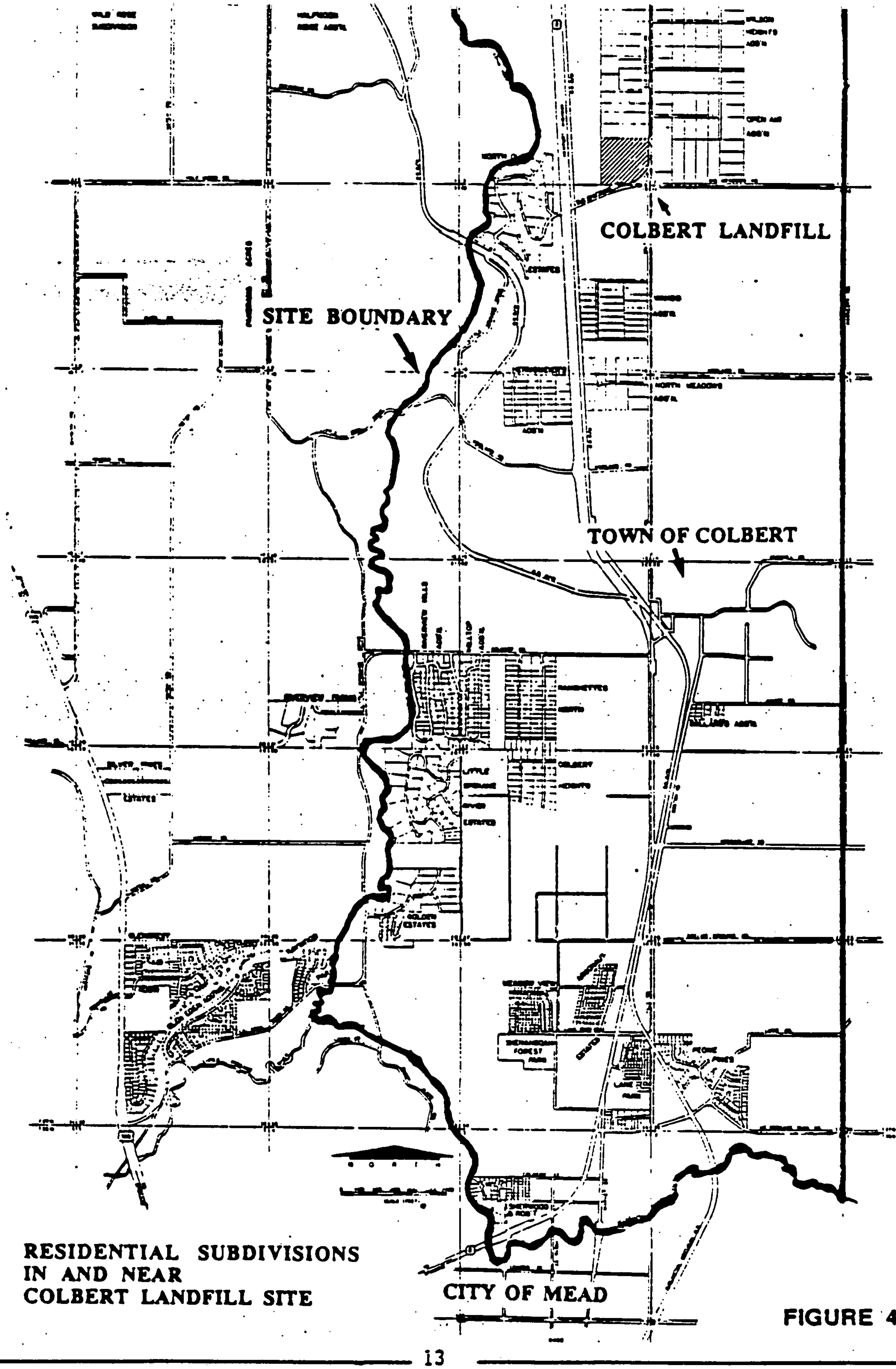
NATURE AND EXTENT OF PROBLEM

Organic Contaminants Detected

Six volatile organic chemicals, all chlorinated aliphatic hydrocarbons, were the main contaminants detected in the groundwater at the Colbert Landfill Site during the Remedial Investigation (Golder 1987) and are listed in Table 2. Several other contaminants were also detected in the RI samples, but occurred at lower concentrations or were less widely distributed (bottom of Table 2). Because they behave similarly to the above contaminants they were not considered separately for remediation. There is no potential for reuse or recycle of any organic contaminants that were detected at this site.

Extent of Soil Contamination

Although the contaminants placed into the landfill traversed a considerable thickness of unsaturated soil to reach the groundwater, the drilling program carried out during the RI found little trace of these chemicals in the soil samples obtained. This may be because



RESIDENTIAL SUBDIVISIONS
IN AND NEAR
COLBERT LANDFILL SITE

FIGURE 4

TABLE 2
ORGANIC CONTAMINANTS FOUND IN COLBERT LANDFILL
SITE GROUNDWATER DURING REMEDIAL INVESTIGATION

Contaminant	Number of Wells	Maximum Concentration (µg/l)1/
Major Contaminants		
1,1,1-Trichloroethane (TCA)	20	5,600
1,1-Dichloroethylene (DCE)	19	190
1,1-Dichloroethane (DCA)	19	600
Trichloroethylene (TCE)	11	230
Tetrachloroethylene (PCE)	9	23
Methylene Chloride (MC) (also called Dichloromethane)	11	2,500
Lesser Contaminants		
Acetone (also called Propanone)	3	445
Chloroform (also called Trichloromethane)	11	6
Methyl Ethyl Ketone (also called 2-Butanone)	2	14
1,2-Dichloroethane (also called Ethylene Dichloride)	2	5
1,2-trans-Dichloroethylene	5	12
Toluene (also called Methyl Benzene)	2	<1

1/ In this report, all organic contaminant concentrations will be presented in the units of micrograms (µg) of chemical per liter (l) of water. This conventional unit of measurement is essentially equivalent to parts per billion (ppb).

borings happened to be placed outside of areas where the solvents were actually disposed, or due to a combination of influences from drilling procedures (volatilization of the compounds by the air circulation of the air rotary drilling) and from natural forces which have had sufficient time to drive off virtually all the contamination which might have originally adsorbed onto the soil particles. The only contaminant of concern which was detected in any of the soil samples from auger or well borings was methylene chloride (MC). It was measured at levels of about 4 milligrams per kilogram (mg/kg) in auger borings from the intermediate cover and garbage within the landfill. This was unexpected since MC had not been detected in the upper aquifer beneath the landfill. Similar concentrations of MC were also detected in well borings of the lower aquifer in the immediate vicinity of the landfill. For these deeper borings, the presence of MC was probably due to its lower volatilization compared to the other contaminants, and the presence of higher MC levels in the lower aquifer. It should also be noted that MC is a common laboratory chemical and when it is found at low concentrations, it is possible that it was introduced accidentally during analysis.

Another form in which contamination exists in the vicinity of the landfill is in the soil atmosphere. Chapter 3 of the RI Report (Golder 1987) describes the soil atmosphere survey carried out in August 1985 by Tracer Research (Marrin 1986). They tested for three of the contaminants known to exist in the groundwater, TCA, TCE, and PCE, at probe depths of 3 to 5 feet. Draft results for TCA were presented in Figure 3-3 of the RI Report, and showed detectable levels of soil gas contamination over much of the area where groundwater contamination has been found, both in the upper and lower aquifers. Maximum soil gas concentrations of TCA were in the 100-200 μg/l level (except for one reading of 940 μg/l) and were generally found in a semicircular pattern around and to the east of the landfill, an area where "secondary sources" of the contaminants are suspected to lie. Secondary sources are points where contaminants migrating from their original disposal site collected and from which contaminants are now migrating.

Much lower levels of TCE and PCE than TCA were detected in the soil atmosphere during this investigation. According to Marrin (1986), the highest quantified soil gas concentration of TCE at 0.09 μg/l was measured southwest of the landfill. However, an area to the northeast of the landfill is identified as having possibly higher concentrations. This is the same area where secondary sources of contamination are suspected. For PCE, the highest measured soil gas concentration was 1 μg/l northwest of the landfill, in the vicinity of the highest levels of PCE groundwater contamination (23 μg/l) found during the RI.

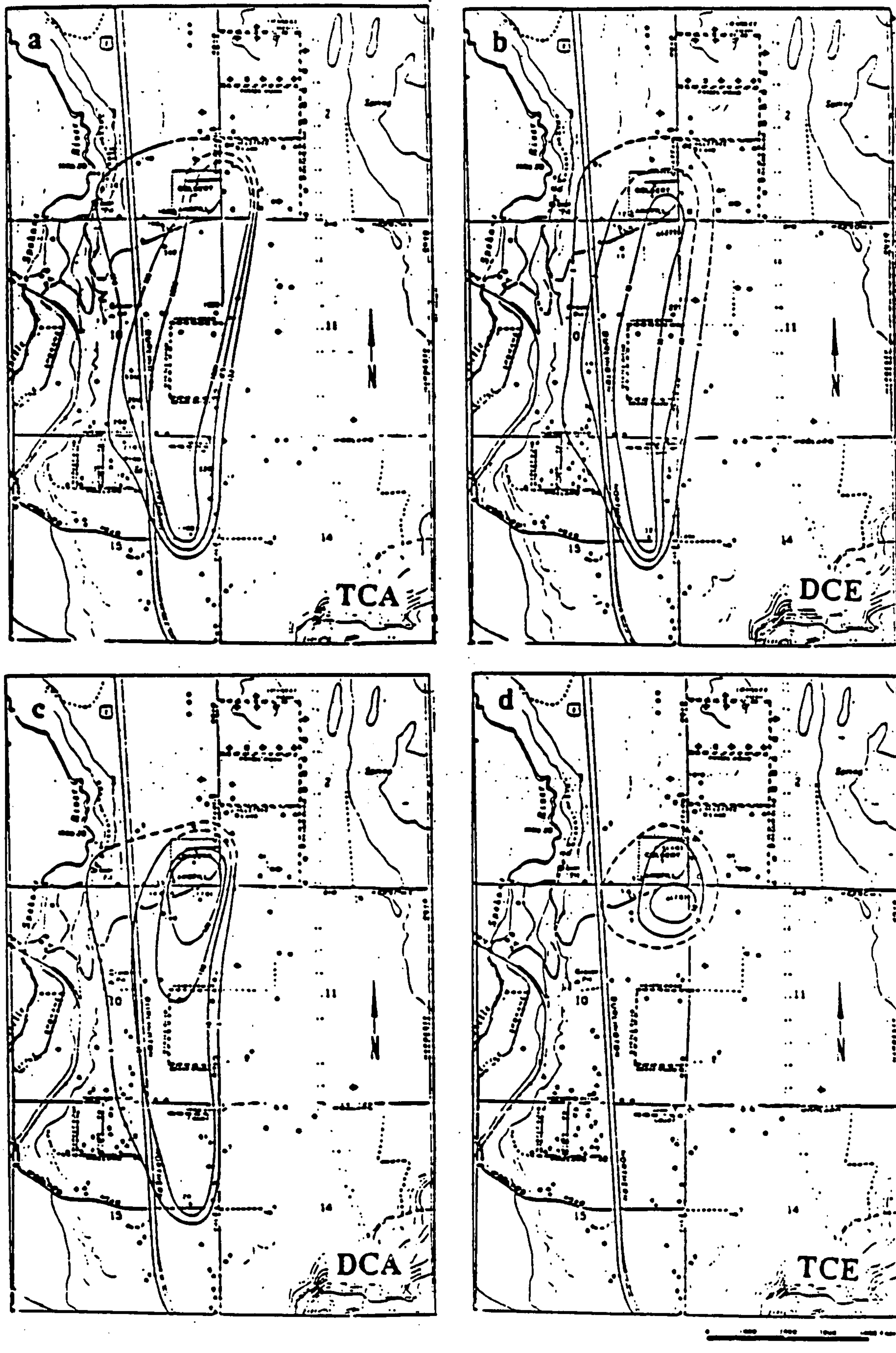
Extent of Groundwater Contamination

Contour maps included in the RI Report (Figures 5-17 through 5-25 of Golder 1987) show the distribution of the contaminants of concern in the two aquifers associated with the Colbert Landfill Site:

a. 1,1,1-Trichloroethane (TCA)
b. 1,1-Dichloroethylene (DCE)
c. 1,1-Dichloroethane (DCA)
d. Trichloroethylene (TCE)
e. Methylene chloride (MC)

These maps are presented here in reduced form as Figures 5 and 6 in order to show the general pattern in which each contaminant has spread in the upper and lower aquifers respectively.

The maximum levels of these contaminants, plus tetrachloroethylene (PCE), which were detected in the 1985 RI groundwater sampling program are summarized in Table 3. These values are rather dynamic and suffer from two limitations for representing the maximum contamination levels in the aquifers. First, they fluctuate due to movement of the plumes, variations in sampling, laboratory inaccuracies, or some combination of these. Second, the wells may not be located at the point of highest concentration in the aquifer. Nevertheless, they indicate the relative magnitude of the problem in the two aquifers.

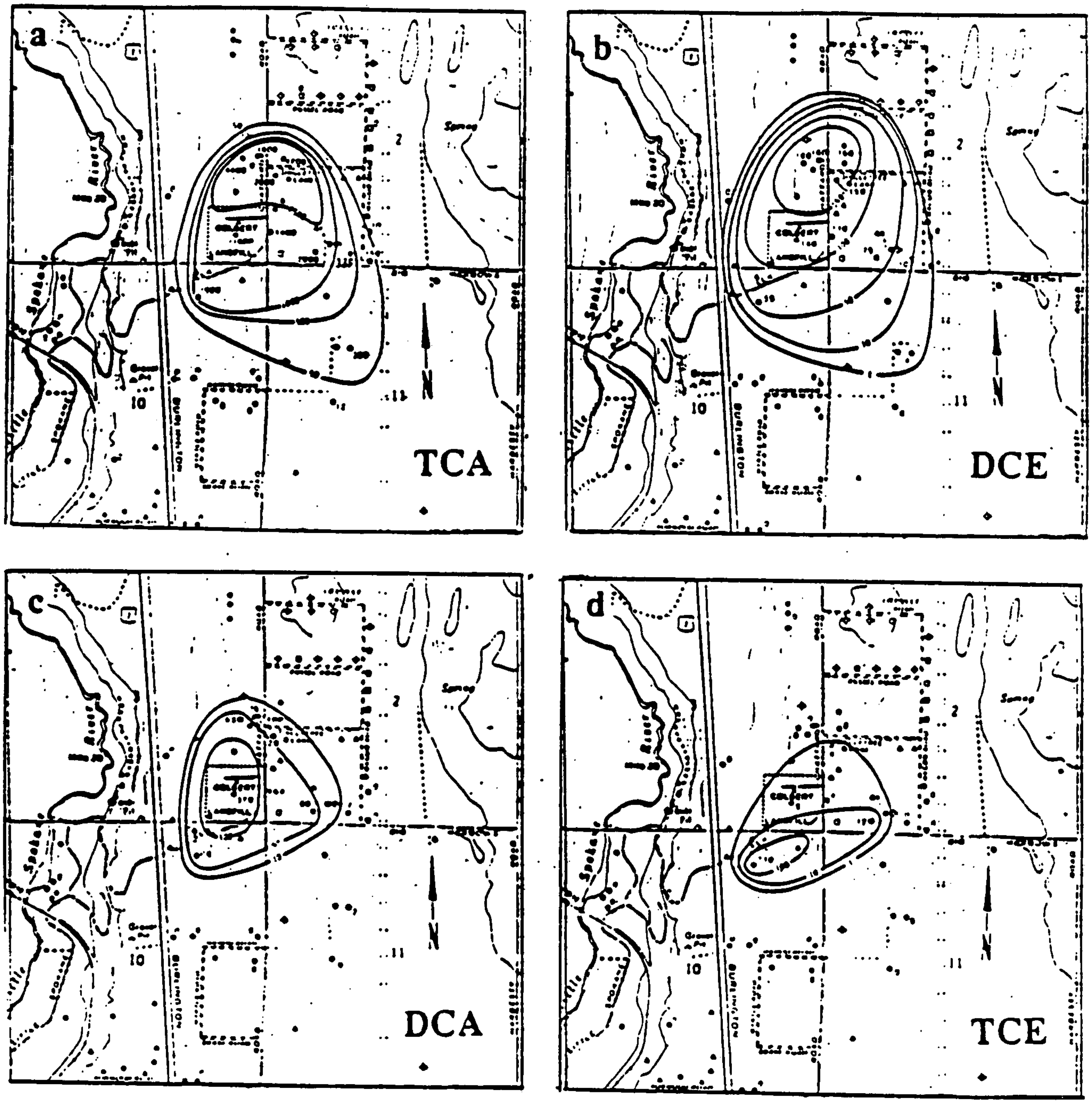


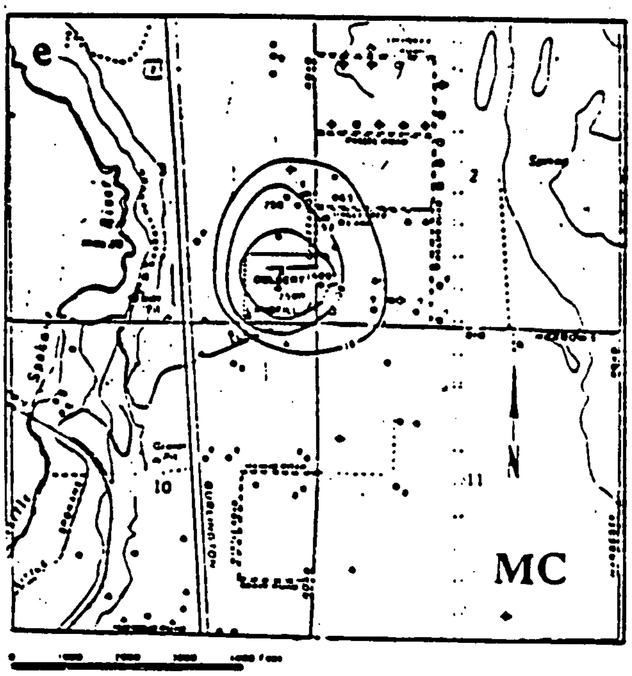
DISTRIBUTION OF CONTAMINANTS IN UPPER AQUIFER

(a) 1,1,1-Trichloroethane (TCA) (b) 1,1- Dichloroethylene (DCE)
(c) 1,1-Dichloroethane (DCA) (d) Trichloroethylene (TCE)

SOURCE: GOLDER AND ENVIROSPHERE 1987

FIGURE 5





DISTRIBUTION OF CONTAMINANTS IN LOWER AQUIFER

(a) 1,1,1-Trichloroethane (TCA)
(b) 1,1-Dichloroethylene (DCE)
(c) 1,1-Dichloroethane (DCA)
(d) Trichloroethylene (TCE)
(e) Methylene Chloride (MC)

SOURCE: GOLDER AND ENVIROSPHERE 1987

FIGURE 6

TABLE 3

MAXIMUM CONTAMINANT CONCENTRATIONS IN GROUNDWATER AT COLBERT LANDFILL SITE

Contaminant	Concentration (μg/l) Upper Aquifer	Lower Aquifer
1,1,1-Trichloroethane (TCA)	1,300	5,600
1,1-Dichloroethylene (DCE)	47	190
1,1-Dichloroethane (DCA)	600 1/	420
Trichloroethylene (TCE)	72 1/	230
Tetrachloroethylene (PCE)	23	1
Methylene Chloride (MC)	ND 2/	2,500

1/ Latest concentrations recorded in 1984 by George Maddox and Associates in Well CS-13 which could not be sampled in 1985 due to low water levels.

2/ ND = not detected to date in any well in aquifer.

Source: Golder 1987. Measurements are from the Fall/Winter 1985 RI samples, except as noted.

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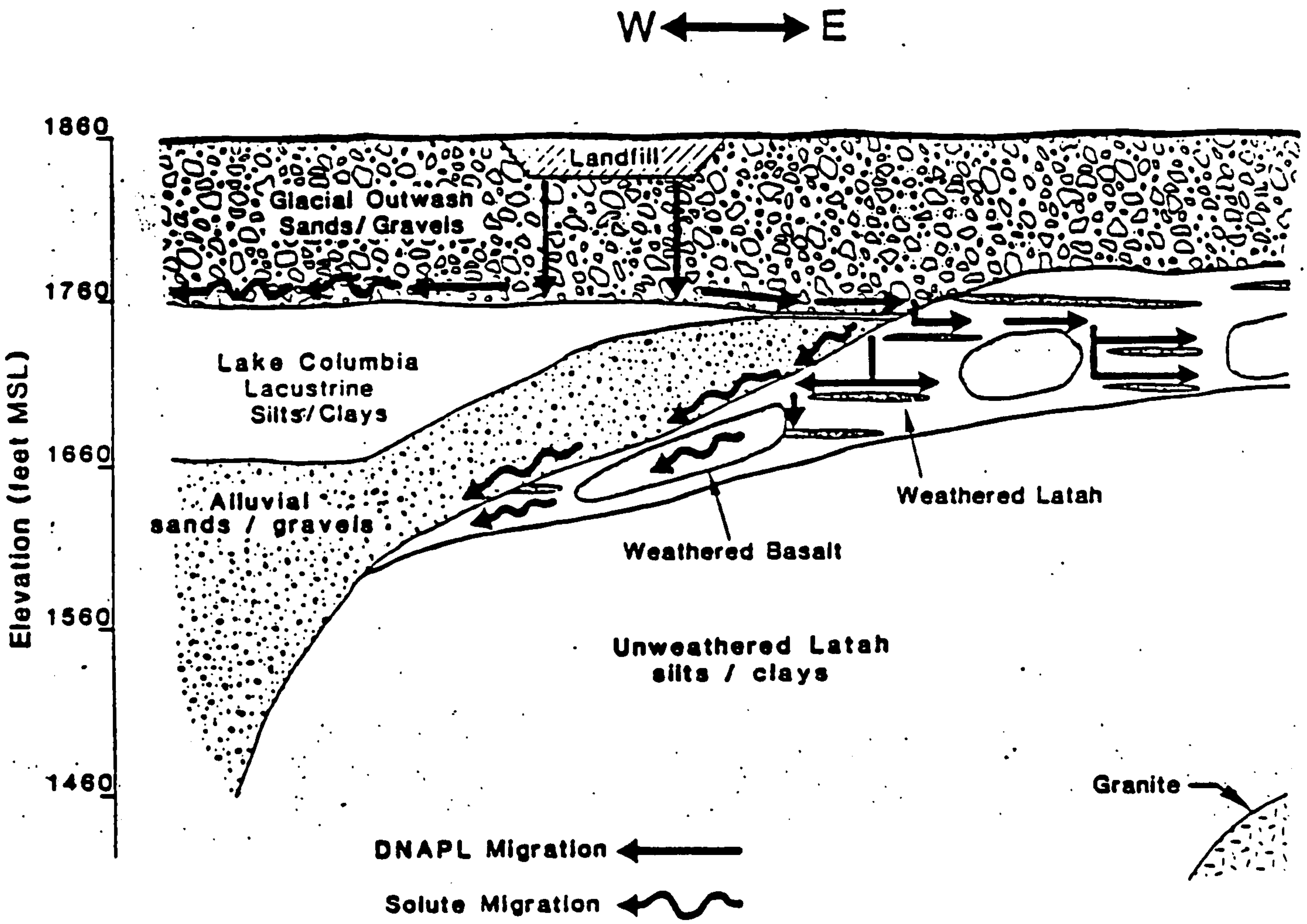
As can be seen in the distribution maps, the contamination has spread much further in the upper aquifer than it has in the lower, with the upper aquifer plume extending south of the landfill toward the town of Colbert. The lower aquifer plume, on the other hand, has proceeded further north and southeast. The highest levels of contamination in the groundwater are divided between the two aquifers, with TCA, DCE, TCE, and MC found at higher concentrations in the lower aquifer, with DCA and PCE more concentrated in the upper aquifer.

Section 5.4.1 of the RI Report (Golder 1987) presents an estimate that only about 10 percent of the TCA documented to have been disposed at Colbert Landfill can be accounted for in solution in the groundwater. It has been proposed that substantial quantities of the contaminants remain at the bottom of the aquifers in the form of dense, nonaqueous phase liquids (DNAPLs), i.e., relatively undiluted chemicals existing as separate liquids rather than in solution in the groundwater. While it is difficult to estimate how much was lost to volatilization at the time of disposal and subsequently during contaminant migration, it appears possible that some portion of the remaining 90 percent of this material could remain in the subsurface in DNAPL form. Since these chemicals have a density greater than water, they are likely to have flowed along the bottom of the upper aquifer under gravitational influence. Contaminant flow would then occur both to the east and to the west since, according to stratigraphic interpretation, the landfill is situated over a ridge formed by the upper surface of the lacustrine silt/clay aquitard, which slopes to both the east and the west. The DNAPL flow would continue along the bottom of the aquifer until it came to a confined low point where it could pond. There it would remain and slowly release its chemical constituents into the groundwater flowing over it. A schematic illustration of this contaminant migration is reproduced from the RI Report as Figure 7.

The quantity of these DNAPL residuals is impossible to determine with any accuracy. Their location is likely to be to the north and east of the landfill, and probably more in the lower aquifer than in the upper



SCHEMATIC OF DENSE, NONAQUEOUS PHASE LIQUID (DNAPL) MIGRATION BENEATH COLBERT LANDFILL

FIGURE 7

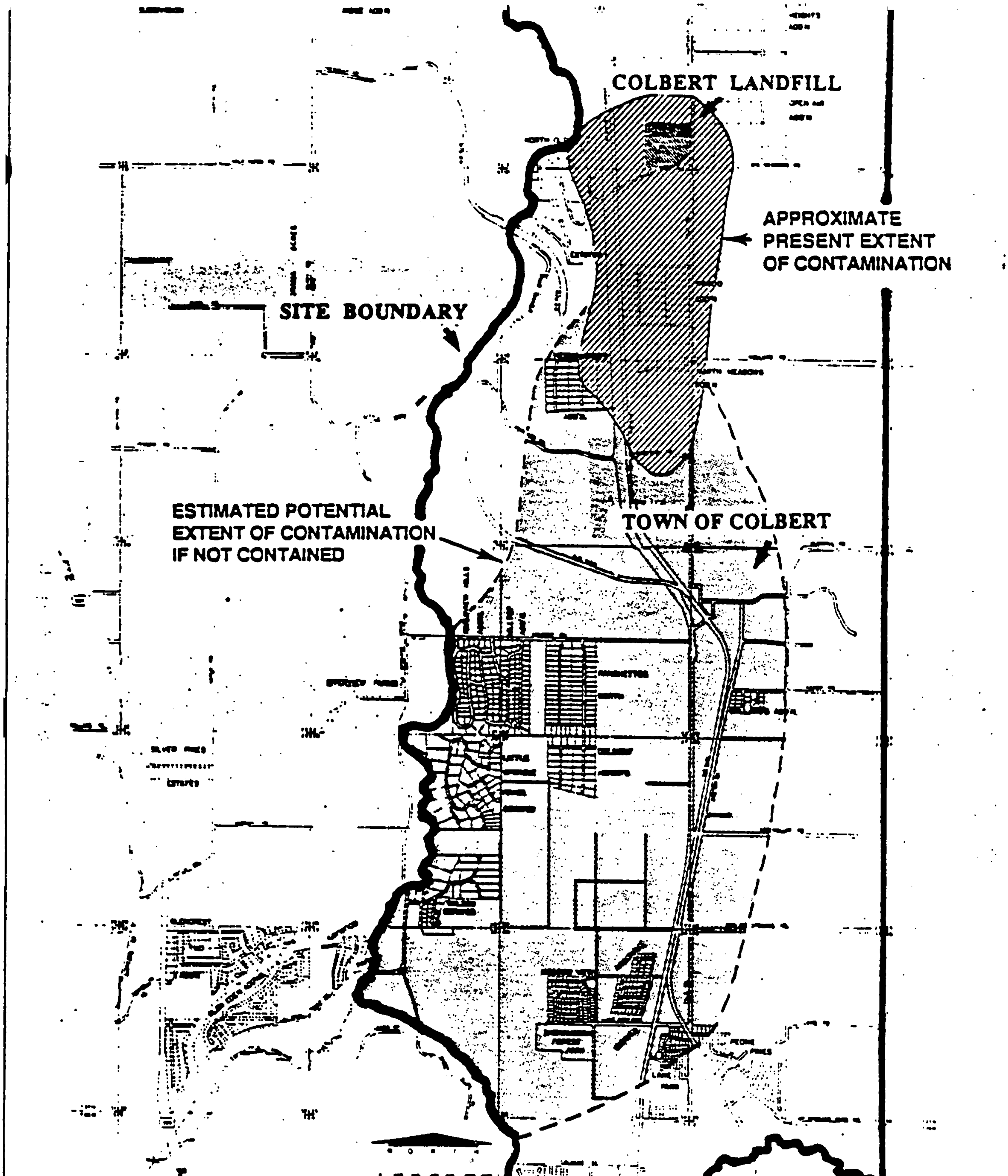
SOURCE: GOLDER 1987

aquifer. The existence of these constituents is further indicated by the centers of contamination in the lower aquifer being shifted toward the northeast (see Figure 6), and by the high levels of contaminants detected in the groundwater at this depth despite the fact that the lower aquifer should be further from the original source. As such, the hypothetical pools of contaminants at the bottom of the aquifer would constitute secondary sources which could cause continuing groundwater contamination for an extended period of time.

Future Migration and Impacts of Contaminants-Upper Aquifer

In the upper aquifer, the fronts of the contamination plumes for TCA, DCE, and DCA have extended over the past 8 to 10 years as far as 9000 feet south of the landfill (see Figure 5). Golder (1987) calculated a solute plume velocity of about 2 to 3 ft/day for the TCA plume by two separate methods. The other contaminants mentioned above appear to have similar velocities. These transport rates are likely to continue for the next several years, although the stratigraphy in the area ahead of the plumes is less well understood and so cannot be used to confirm this. The plumes appear to be migrating toward the town of Colbert. A portion of the groundwater flow in the upper aquifer appears to move toward a granite bedrock outcrop just north of the town, where runoff from the eastern hills and the upper aquifer infiltrate down into the lower aquifer, in which groundwater flows westward to the Little Spokane River Valley. Therefore, contamination in the upper aquifer could also pass into the lower aquifer here and migrate westward.

An estimate was made of the future extent of the upper aquifer contaminant plume if remediation is not undertaken (Figure 8). This was based on an interpretation of the topography of the site and general vicinity as shown on the USGS Mead and Dartford 7.5-Minute Quadrangles, the regional geology as derived by Griggs (1973) and shown in Figure 2-1 of the RI Report, and the stratigraphy and hydrogeology of the site delineated in the course of the Remedial Investigation. The upper aquifer plume seems to be advancing toward the south along a



ESTIMATED POTENTIAL EXTENT OF CONTAMINATION IN UPPER AQUIFER IF PLUME IS NOT CONTAINED

SOURCE: GOLDER AND ENVIROSPHERE 1987

FIGURE 8

trough in the Lake Columbia lacustrine silt/clay aquitard. This is most likely a channel incised in the lake bottom from recessional glacial outwash flows and flooding events following the draining of the ice age lake. The channel follows a paleo-valley bounded by the granitic hills and older glacial outwash materials to the east, and the bluffs down to the Little Spokane River to the west. There are no obvious discharge areas although portions of the flow may discharge as small springs on the western bluff, feed Little Deep Creek where it is perennial south of Green Bluff Road, or drain down through a connection into the lower aquifer. The bulk of the flow, and thus ultimately the plume, however, probably continues south and discharges in the valley sides of Peone (or Deadman) Creek. The overall course of the groundwater flow is interpreted to be approximately parallel to Highway 2. Approaching Peone Creek the flow will probably be diverted slightly by the granitic bedrock high to the south beyond and align with the westerly course of the Little Spokane Valley. Groundwater flows from other areas, such as Peone Prairie to the east, would also tend to divert the plume to the west.

Based on available stratigraphic and hydrogeologic information, this interpretation represents a best estimate rather than worst case. Using the 2- to 3-feet-per-day advance of contaminants calculated to date, it is estimated that the plume will migrate the remaining four miles to Peone Creek in about 20 to 30 years. Actual migration time may be shorter or longer than this due to the width, depth, and hydraulic properties of the aquifer. Clearly, however, it is possible that any wells in the upper aquifer in the area delineated in Figure 8 could become contaminated during the 30-year planning period of the FS.

Various processes could occur that may cause the quantity of contaminants in the plume to be reduced and thereby diminish in concentration during the period of transport. These include:

- o Volatilization into vadose soil gas, and then into the atmosphere;

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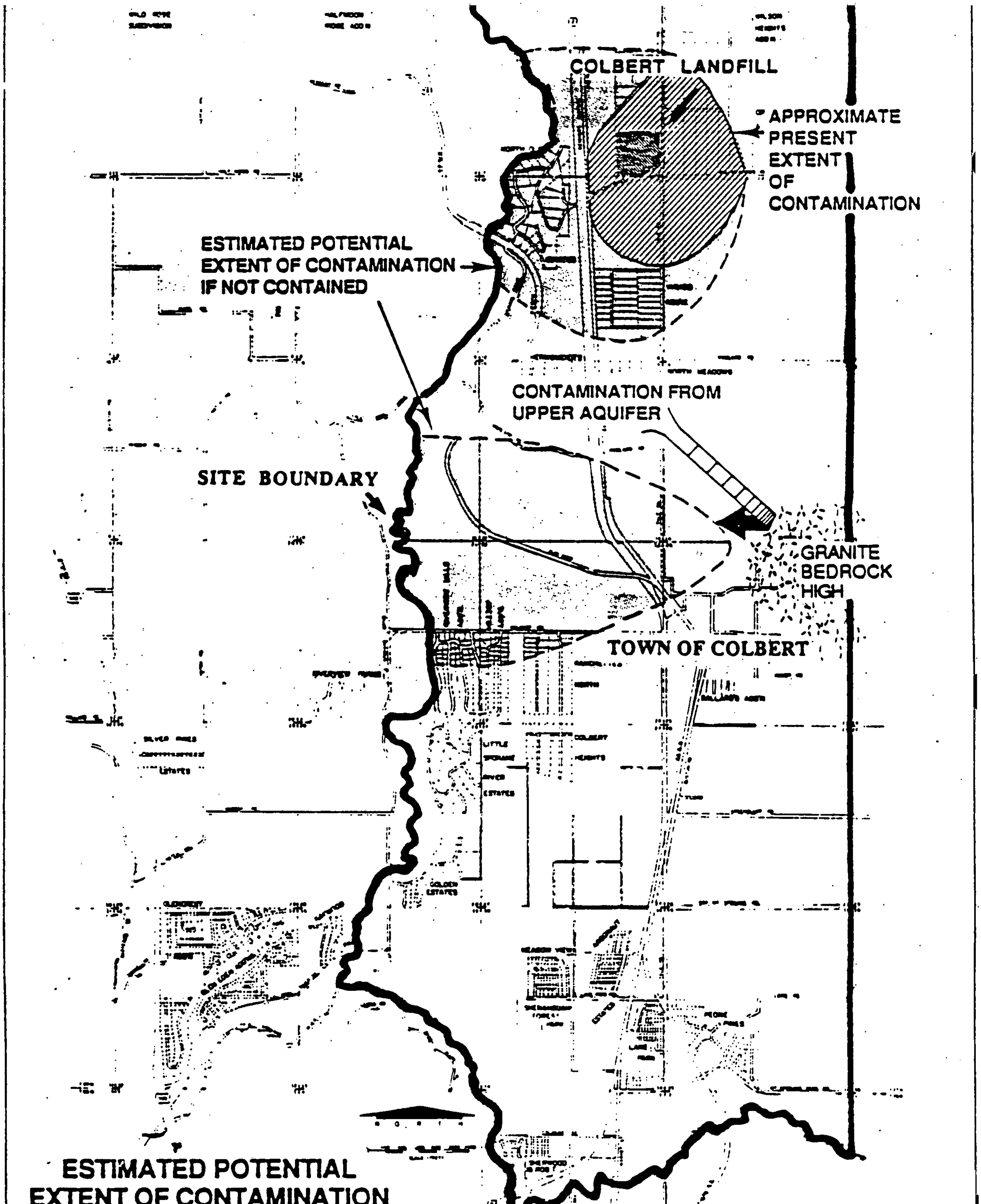
- o Adsorption onto soil particles, particularly organic matter;
- o Microbial degradation; and
- o Hydrolysis, the decomposition of a chemical compound by reaction with water.

Based upon the observation that the concentration levels, at least for the contaminants TCA and DCE, are fairly constant over most of the plume, it appears that the natural degradation is slow. If degradation were occurring, the concentration of contaminants at the front of the plume would have diminished. There has been a trend in the upper aquifer for contamination levels near the source areas to diminish over the time they have been monitored. Chemical concentrations for the upper aquifer will remain elevated for a significant time, certainly longer than the estimated time for migration to Peone Creek.

Future Migration and Impact of Contaminants - Lower Aquifer

The RI Report did not develop a plume velocity for the contaminants in the lower aquifer partially because the plume has not advanced far enough to provide the data required to make any accurate estimates based upon historical data, and also because the hydrogeology of this aquifer is complicated. Migration of the contamination to the west, for example, is expected to slow down considerably over the next several years as the plume moves into thicker saturated zones adjacent to the river (see Figure 3).

Following a similar procedure to that described in the previous section for the upper aquifer, the future extent of the lower aquifer plume is predicted to impact a much smaller area (see Figure 9). It is also suggested that the upper aquifer may be connected with the lower aquifer in areas other than those identified east of the landfill. For example, in the area of the granite bedrock high north of the town of Colbert, groundwater elevations from wells indicate that flow in the upper aquifer is diverted southeasterly (i.e., toward the bedrock high). This appears indicative of a partial sink in the upper aquifer due to connection to the lower aquifer in this area. If this



ESTIMATED POTENTIAL EXTENT OF CONTAMINATION IN LOWER AQUIFER IF PLUME IS NOT CONTAINED

SOURCE:. GOLDER AND ENVIROSPHERE 1987

FIGURE 9

away, apparently due to the contaminants volatilizing into the air. Contamination reaching the Little Spokane River from these springs which are located several hundred feet away from the river will be dissipated to undetectable levels.

The contamination in the lower aquifer has not reached the vicinity of the river. If it does, it will flow into the river below the water surface and not be subjected to the same immediate aeration processes. Future contaminant concentrations in the river were predicted (see Table 4) based on four assumed conditions: the present-day flux of the chemicals in solution in the lower aquifer beneath the landfill; unimpeded transfer from the aquifer to the river; full mixing in the river; and no volatilization from the river surface.

It is expected that the levels attained immediately upon mixing will be diminished through in-stream processes, predominantly aeration, before the Little Spokane reaches the Spokane River some 20 miles downstream, at which point the flow in the larger river will further reduce any remaining contaminant levels.

RISK ASSESSMENT

A Risk Assessment (RA) of the Colbert Landfill Site was conducted to provide a quantitative determination of the potential for harm to the general public as a result of exposure to site contaminants (Appendix A - Golder and Envirosphere 1987). Three primary pathways potentially expose humans to the contaminants, which include both carcinogenic and noncarcinogenic compounds. The pathway of most concern is ingestion, as site groundwaters are presently used as a potable water supply by many residents in the Colbert area. In addition, many residents of the community use their properties for crop production and livestock grazing. Therefore, a potential risk to human health also occurs from the ingestion of crops irrigated by or grown in contaminated water and ingestion of beef or dairy products from livestock grazing in the area. Pathways of less concern, but still evaluated in the RA, are dermal contact from bathing and inhalation of volatile contaminants, and health impacts for livestock drinking contaminated water.

TABLE 4

ESTIMATED CONTAMINANT FLUXES IN LOWER AQUIFER

AND RESULTANT FUTURE CONCENTRATIONS IN LITTLE SPOKANE RIVER

Colbert Landfill

Contaminant	Present-day flux (g/day)	Maximum Future River Concentration (µg/l)	
		Mean river flow conditions q_{avg} = 236 cfs[1/]	Drought flow conditions $q_{7,10}$ = 75 cfs[2/]
1,1,1-Trichloroethane (TCA)	9700	17	53
1,1-Dichloroethylene (DCE)	680	1.2	3.7
1,1-Dichloroethane (DCA)	730	1.3	4.0
Trichloroethylene (TCE)	95	0.2	0.6
Methylene Chloride (MC)	4400	7.6	24

Source: Golder and Envirosphere 1987.

1/ q_{avg} is long-term average flow in the Little Spokane River, calculated for the reach adjacent to the site.

2/ $q_{7,10}$ is the seven-day average flow which is exceeded (on the low side) only once every ten years (on average).

Risk Assessment of Contaminants

For each of the indicator contaminants identified above, Acceptable Doses (AD) were derived. Noncarcinogen ADs were based on available toxicity data that indicate a no adverse effect level. For carcinogens the ADs were based on a one-in-a-million (10^{-6}) or one-in-a-hundred-thousand (10^{-5}) chance of developing cancer from a lifetime exposure, using the EPA Cancer Assessment Group (CAG) evaluation of the cancer potency. The different pathways were analyzed as sequences of steps, with partitioning of contaminants occurring at each specific step. The results of these calculations are presented in Table 5 as Maximum Acceptable Concentrations (MAC) values which should not be exceeded in water used for drinking (ingestion) or bathing (dermal). The Federal Drinking Water Maximum Concentration Levels (MCLs) and the maximum concentration detected in the upper and lower aquifers are also presented for comparison.

Risks to Human Health and the Environment

Based upon the Risk Assessment, the following conclusions were made concerning risks to human health and the environment from contaminants associated with the Colbert Landfill Site.

- Concentrations for the contaminants TCA, DCE, TCE, and MC frequently exceed their human ingestion MAC values for both of the aquifers. Therefore, drinking the water from contaminated wells poses the most significant risk to human health. The subdivisions that are already within the areas of aquifer contamination above the MAC values are: Wilson Heights, Open Air, Wahoo, North Meadows, and Hermsmeier Additions. Other subdivisions which are in the total potential area of impact include: North Glen Estates, Ranchettes North, Hilltop Addition, Riverview Hills Addition, Little Spokane River Estates, Colbert Heights, Golden Estates, Ballards Addition, Meadow View, Argonaut Estates, Lane Park, Peone Pines, and

TABLE 5

RESULTS OF RISK ASSESSMENT FOR INGESTION AND DERMAL EXPOSURE 1/

Detected Contaminant	Indicator Parameter	Carcinogens 2/	Acceptable Dose (µg/day)	Maximum Acceptable Concentration (MAC) Values (µg/l)		EPA Maximum Contaminant Levels (MCLs) (µg/l)	Maximum Concentrations (µg/l) 4/	
				Ingestion Pathway	Dermal Exposure		Upper Aquifer	Lower Aquifer
1,1,1-Trichloro-ethane (TCA)	Yes	No	400	200	97,000	200	1,300	5,600
1,1-Dichloro-ethylene (DCE)	Yes	Possible	14	7	3,050	7	47	190
1,1-Dichloro-ethane (DCA)	No	No	8,100	4,050	NA 3/	None	600	420
Trichloroethylene (TCE)	No	Yes	6.4	3.2	NA	5	72	230
Tetrachloro-ethylene (PCE)	No	Yes	1.4	0.7	NA	None	23	1
Methylene Chloride (MC)	Yes	Yes	5	2.5	1,200	None	ND 5/	2,500

1/ See Risk Assessment document (Appendix A of Feasibility Study Report, Golder and Envirosphere 1987).
2/ Data for carcinogens is given for the 10^{-6} (one-in-a-million) risk level only. MAC values for a 10^{-5} (one-in-a-hundred thousand) risk levels can be computed by multiplying the MAC by 10.
3/ NA = not analyzed as part of Risk Assessment.
4/ From Table 3.
5/ ND = not detected to date in any well.

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Sherwood and Robert. Some of these subdivisions or portions of them are already serviced by Whitworth Water District No. 2. However, the Meadow View and Kellogg Wells, which presently serve System 9, could become contaminated by the advancing plume.

- Exposure from ingestion of crops grown in contaminated waters does not pose a significant health risk due to the volatile nature of the contaminants and the location of the contaminated aquifers below the root zone of local vegetation. Similarly, a human health risk is not expected from the ingestion of beef or dairy products.

- Some contaminant concentrations exceed the dermal MAC values for MC and DCE both as a carcinogen and noncarcinogen; therefore, bathing in contaminated water could pose a risk to human health.

- Although exceedances of the MAC values for MC could occur in the Little Spokane River, the river is not used as a potable supply. Therefore, human health risks are negligible, as only incidental ingestion is expected. Since no exceedances of the dermal MAC values occur for any of the indicators, swimming in the Little Spokane River does not appear to pose a risk to human health.

- The inhalation exposure to volatile organics was calculated using two different models for showering and normal domestic water use, both of which indicated that volatilization of organics does not present a public health risk.

III. ENFORCEMENT

The remedial action is anticipated to be accomplished voluntarily by the Responsible Parties who have been identified to date. These include Spokane County, Key Tronic Corporation, and Fairchild Air Force Base. Other responsible parties may be identified in the future. There have never been any enforcement actions taken by the regulatory agencies (EPA or the Washington Department of Ecology) regarding the Colbert Landfill Site. If the Responsible Parties decline to implement the selected remedy as described in this Record of Decision, however, EPA will seek appropriate enforcement action.

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IV. COMMUNITY RELATIONS HISTORY

Community interest in groundwater contamination at Colbert Landfill has been high since 1980, when local residents complained to Ecology and the Spokane County Utilities Department that hazardous materials were being disposed of at the landfill. At that time, Spokane County hired a consultant to study the extent of the contamination. The County also developed a community relations plan and began a public information program to explain the study to local residents. The County distributed fact sheets and press releases about the situation, notified well owners of their test results, and established an information repository at the Colbert Water District building.

The Utilities Department also held seven public meetings between May 1981 and November 1983, explaining each phase of the study and the test results. Representatives of several agencies, including the Spokane County Health Department and the Tax Assessor's Office, were available to respond to questions. Citizens expressed numerous significant concerns at these meetings. The primary concern was whether or not the well water was safe to use for drinking or for other purposes, and what the potential health impacts could be from drinking the water. Residents were also concerned about how the contamination would affect their property values.

There were three official actions in response to these concerns. In March 1983, Spokane County and Key Tronic Corporation began supplying bottled water to homes whose wells had over 1,000 μg/l of 1,1,1-trichloroethane (TCA). Shortly afterward, the Spokane County Tax Assessor reduced the assessed valuation of homes with wells at this contamination level and of the other homes within 3/4 mile of the landfill.

In response to continued public requests for safe drinking water supplies, the County and Key Tronic constructed an extension to the Whitworth Water District to serve the contaminated area. This Initial Remedial Measure was completed in early 1985. Homes having wells with contamination levels over 200 μg/l TCA were connected to the system.

In the fall of 1985, local residents, not satisfied with County responses to their requests, formed the Colbert Landfill Contaminate Area Committee. The group's purpose was to collect information and make it available to interested people. In December 1985 this group presented seven recommendations to the Spokane County Commissioners. The major requests were: free water hookup for all homes in the contaminated area, with no water payments for twenty years; revaluation of property in the area; and continued well monitoring for twenty years. The County's response continued the policy of hooking up only those homes with specified contamination levels. The citizens saw this as too restrictive, which increased their frustration.

Ecology met frequently with concerned citizens and County and Key Tronic representatives between 1985 and 1987. Ecology held a public meeting in 1986 to explain the Remedial Investigation/Feasibility Study process and the results of the RI and held another meeting in May 1987 when the FS report was released for public comment. The main purpose of this meeting was to explain the cleanup alternatives and the options for treating the contaminated water. Over 200 people, primarily local residents, attended. Twenty-nine people returned the detailed comment forms and six sent letters commenting on the alternatives. Response strongly favored the recommended extraction-treatment-surface water discharge alternative and the air stripping treatment option.

The major citizen concerns regarding the FS recommendations were the shortness of the comment period (which was then extended), the concentration on the County and Key Tronic without searching for other responsible parties, potential air pollution from air stripping, and reduced ground water levels caused by the extraction system. These comments are discussed in detail in the Responsiveness Summary.

V. ALTERNATIVES EVALUATION

ALTERNATIVES

The remedial alternatives which were developed and evaluated in the Feasibility Study included:

1) **No action;**
2) Alternate water supply;
3) Point of entry treatment;

4 - 12) Groundwater extraction, treatment, and discharge (using various technologies for each) plus an expanded water system.

Each of these alternatives was considered separately in three geographic portions of the site:

- The Southern area, where the plume in the upper aquifer is advancing;
- The Western area, where the plume in the lower aquifer is the major concern;
- The Eastern area, where the plumes appear to originate, probably from accumulations of concentrated solvent fluids.

Each of the alternatives is designated by a letter indicating its area (S-, W-, or E-) followed by a number, denoting the technology.

About 90 different technologies were screened and evaluated during the feasibility study. As the result of this detailed analysis, 12 remedial alternatives in the southern area, 7 in the western area and 7 in the eastern area were carried through for detailed evaluation using EPA's 1985 RI/FS guidance factors (EPA 1985).

PERFORMANCE CRITERIA

One remedial alternative will be selected for each of the areas of concern. This Record will not, however, specify a particular technology in order to allow the responsible parties a sufficient degree of latitude in selecting the technology required to achieve the desired performance. This performance is defined as treating the wastewater effluent to or below the Maximum Contaminant Levels (MCLs, 40 CFR 141.61) or a similar health-based level (the 10^{-6} risk level for carcinogens) for contaminants for which MCLs have not been determined. Numeric standards are presented in Table 6 for discharge levels and for termination of the remedial action. Treated water effluents also will be monitored to assure that they meet the appropriate performance standards. Treated water discharge shall at all times be consistent with U.S. and Washington State laws including but not limited to RCW 90.48 (Water Pollution Control) and WAC 173-218 (Underground Injection Control Program). WAC 173-218 states in part that any permit issued in accordance with the provisions of the chapter are designed: "(a) to satisfy the intent and requirements of Part C of the Federal Safe Drinking Water Act (SDWA) 42 U.S.C. Section 300k et seq. as authorized by RCW 43.21A.445 and of the Water Pollution Control Act, chapter 90.48 RCW; and (b) to preserve and protect groundwaters, including underground sources for drinking water, for existing and future beneficial uses (173-218-010 (a)(b))."

WAC 173-218-020 enunciates Washington State policy regarding the carrying out of chapter purposes. Further, WAC 173-218 prohibits certain classes of new wells.

Treatment systems which may result in air emissions will be designed and monitored to meet appropriate state Air Toxics Guidelines and to use Best Available Control Technology (BACT).

TABLE 6

PERFORMANCE STANDARDS

MAXIMUM ALLOWABLE CONTAMINANT CONCENTRATIONS

(HEALTH PROTECTION LEVELS)1/

Contaminant	Maximum Concentration (μg/l)
1,1,1-Trichloroethane (TCA)	200
1,1-Dichloroethylene (DCE)	7
1,1-Dichloroethane (DCA)	4,050
Trichloroethylene (TCE)	5
Tetrachloroethylene (PCE)	0.7
Methylene Chloride (MC)	2.5

1/ Health protection levels are not to be exceeded, during operational life of remedial action, in effluents from groundwater treatment systems. In addition, permanent attainment of these levels in the groundwater throughout the site will indicate completion of the remedial action.

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EVALUATION METHODOLOGY

The detailed evalution in the Feasibility Study discusses the cost-effectiveness of an alternative in terms of technical, environmental and public health, and institutional concerns. According to NCP Section 300.68(h), the detailed analysis of each alternative should include:

- o Refinement and specification of alternatives in detail, with emphasis on use of established technology;
- o Evaluation in terms of engineering implementation, reliability, and constructibility;
- o An assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of public health and welfare and the environment;
- o An analysis of adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation; and
- o Detailed cost estimation, including operation and maintenance costs, and distribution of costs over time.

The detailed aspects of evaluating these alternatives are presented by five major criteria:

- o Technical Feasibility,
- o Institutional Requirements,
- o Public Health Impacts,
- o Environmental Impacts, and
- o Cost Analysis.

This presentation facilitates the comparison of similar components among the alternatives for the same criteria.

The technical evalution addresses the feasibility of the technologies and associated components which make up each alternative. The evaluation of institutional requirements analyzes compliance with current EPA policy on the use of applicable and relevant standards and other criteria, guidance, and advisories at Superfund remedial sites, as well as coordination with other agencies and community concerns. Each alternative is evaluated as to how well it can limit the concentrations of hazardous substances in the environment to avoid unacceptable threats to public health as established by the Risk Assessment. The environmental impacts of each alternative are evaluated by comparing beneficial and adverse effects. The cost for each alternative includes the capital costs for implementation and the operation and maintenance costs spanning the thirty year study period.

The results of the detailed evaluation for each alternative are expressed in a rating system utilizing the terms high, moderate, and low.

A high rating indicates that the alternative promotes the intent of the criteria and/or meets or exceeds the remedial objectives. A moderate rating indicates that the alternative only partially promotes the intent of the criteria, however, the alternative does remediate the problem to an acceptable extent even though it does not meet all the remedial objectives. A low rating indicates that the alternative does not promote the criterion and/or does not meet the remedial objectives.

RESULTS

The detailed evaluation according to 1985 RI/FS Guidance Factors (EPA 1985) is presented on Table 7, and an evaluation of these remedial alternatives according to the Section 121(b)(1)(A-G) factors is shown on Table 8. The rating system for Table 8 is similar to that for Table 7, using ratings of high, moderate, and low to indicate a degree of compliance with each factor.

TABLE 7

SUMMARY OF DETAILED EVALUATION

1985 RI/FS GUIDANCE FACTORS

Remedial Alternatives		Technical Feasibility Rating	Institutional Requirements Rating	Public Health Requirements Rating	Environmental Impacts Rating	Cost Analysis ($ Million) Capital Cost	Present Worth
SOUTHERN AREA [1/]							
S-1:	No action	High	Low	Low	Moderate	.330	0.592
S-2:	Alternate Water Supply/Water Use Restrictions	High	Moderate	Moderate	Moderate	17.09	18.08
S-3:	Point of Entry Treatment	High	Low	Low	Low	2.77	17.90
S-4:	Deep Well Extraction/Carbon Adsorption/Creek Outfall	High	High	Moderate	High	2.4	4.10
S-5:	Deep Well Extraction/Air Stripping/Creek Outfall	Moderate	High	Moderate	High	2.23	2.88
S-6:	Deep Well Extraction/Ozone/UV/Creek Outfall	High	High	Moderate	High	2.66	3.69
	Deep Well Extraction/Hydrogen Peroxide/UV/Creek Outfall	High	High	Moderate	High	2.92	7.02
S-7:	Deep Well Extraction/Carbon Adsorption/Drainfield	High	High	Moderate	High	2.43	4.42
S-8:	Deep Well Extraction/Air Stripping/Drainfield	Moderate	High	Moderate	High	2.28	3.00
S-9:	Deep Well Extraction/Ozone/UV/Drainfield	High	High	Moderate	High	2.86	4.23
	Deep Well Extraction/Hydrogen Peroxide/UV/Drainfield	High	High	Moderate	High	3.15	9.31
S-10:	Deep Well Extraction/Carbon Adsorption/Recharge Wells	High	Moderate	Moderate	High	2.62	4.68
S-11:	Deep Well Extraction/Air Stripping/Recharge Wells	Moderate	Moderate	Moderate	High	2.47	3.26
S-12:	Deep Well Extraction/Ozone/UV/Recharge Wells	High	Moderate	Moderate	High	3.05	4.49
	Deep Well Extraction/Hydrogen Peroxide/UV/Recharge Wells	High	Moderate	Moderate	High	3.34	9.57
WESTERN AREA:							
W-1:	No Action	High	Low	Low	Moderate	0	0.124
W-2:	Alternate Water Supply/Water Use Restrictions	High	Moderate	Moderate	Moderate	2.81	2.99
W-3:	Point of Entry Treatment	High	Low	Low	Low	52.70	571.0
W-4:	Deep Well Extraction/Carbon Adsorption/River Outfall	High	High	Moderate	High	1.53	41.58

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TABLE 7 (Continued)

SUMMARY OF DETAILED EVALUATION

1985 RI/FS GUIDANCE FACTORS

Remedial Alternatives		Technical Feasibility Rating	Institutional Requirements Rating	Public Health Requirements Rating	Environmental Impacts Rating	Cost Analysis ($ Million) Capital Cost	Present Worth
WESTERN AREA (Continued):							
W-5:	Deep Well Extraction/Air Stripping/River Outfall	Moderate	High	Moderate	High	1.02	2.15
W-6:	Deep Well Extraction/Air Stripping a Carbon Adsorption/ River Outfall	Moderate	High	Moderate	High	1.81	22.84
W-7:	Deep Well Extraction/Ozone/UV/River Outfall	Moderate	High	Moderate	High	2.34	6.26
	Deep Well Extraction/Hydrogen Peroxide/UV/River Outfall	Moderate	High	Moderate	High	2.26	15.37
EASTERN AREA							
E-1:	No Action	High	Low	Moderate	Moderate	1.32	1.50
E-2:	Alternate Water Supply/Water Use Restrictions	High	Moderate	High	High	2.54	2.89
E-3:	Point of Entry Treatment	High	Low	Low	Low	2.32	3.06
E-4:	Deep Well Extraction/Carbon Adsorption/River Outfall	High	High	High	High	3.73	22.7
E-5:	Deep Well Extraction/Air Stripping/River Outfall	Moderate	High	High	Moderate	3.39	4.34
E-6:	Deep Well Extraction/Air Stripping a Carbon Adsorption/ River Outfall	Moderate	High	High	Moderate	3.92	14.13
E-7:	Deep Well Extraction/Ozone/UV/River Outfall	Moderate	High	High	High	4.20	6.52
	Deep Well Extraction/Hydrogen Peroxide/UV/River Outfall	Moderate	High	High	High	4.33	13.58

1/ Costs for Southern Area Extraction/Treatment/Discharge Alternatives (S-4 through S-12) include improvements to Whitworth Water District No. 2 water supply system.

T LE 8
EVALUATION OF CERCLA SECTION 121(b)(1)(A-G) FACTORS [1]

	A	B	C	D	F[2]	G
Remedial Alternatives	Land Disposal Uncertainties	Solid Waste Disposal Act Objectives	Persistence, Toxicity, Mobility of Hazardous Substances	Adverse Health Effects	Future Costs if Failure	Threats due to Excavation, Transportation, Containment
<u>SOUTHERN AREA</u>						
S-1: No action	N/A	Low	Low	Low	N/A	Low
S-2: Alternate Water Supply/Water Use Restrictions	N/A	Low	Low	Moderate	Low	Low
S-3: Point of Entry Treatment	N/A	Low	Low	Moderate	Low	Low
S-4: Deep Well Extraction/Carbon Adsorption/Creek Outfall	N/A	High	High	High	High	High
S-5: Deep Well Extraction/Air Stripping/Creek Outfall	N/A	Moderate	Moderate	Moderate	High	High
S-6: Deep Well Extraction/Ozone/UV/Creek Outfall	N/A	High	High	High	High	High
Deep Well Extraction/Hydrogen Peroxide/UV/Creek Outfall		High	High	High	High	High
S-7: Deep Well Extraction/Carbon Adsorption/Drainfield	N/A	High	High	High	Moderate	High
S-8: Deep Well Extraction/Air Stripping/Drainfield	N/A	Moderate	Moderate	Moderate	Moderate	High
S-9: Deep Well Extraction/Ozone/UV/Drainfield	N/A	High	High	High	Moderate	High
Deep Well Extraction/Hydrogen Peroxide/UV/Drainfield		High	High	High	Moderate	High
S-10: Deep Well Extraction/Carbon Adsorption/Recharge Wells	N/A	High	High	High	Moderate	High
S-11: Deep Well Extraction/Air Stripping/Recharge Wells	N/A	Moderate	Moderate	Moderate	Moderate	High
S-12: Deep Well Extraction/Ozone/UV/Recharge Wells	N/A	High	High	High	Moderate	High
Deep Well Extraction/Hydrogen Peroxide/UV/Recharge Wells		High	High	High	Moderate	High
<u>WESTERN AREA:</u>						
W-1: No Action	N/A	Low	Low	Low	N/A	Low
W-2: Alternate Water Supply/Water Use Restrictions	N/A	Low	Low	Moderate	Low	Low

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TABLE 8 (Continued)

EVALUATION OF CERCLA SECTION 121(b)(1)(A-G) FACTORS

Remedial Alternatives	A	B	C	D	F[2/]	G
WESTERN AREA (Cont.)						
W-3: Point of Entry Treatment	N/A	Low	Low	Moderate	Low	Low
W-4: Deep Well Extraction/Carbon Adsorption/River Outfall	N/A	High	High	High	High	High
W-5: Deep Well Extraction/Air Stripping/River Outfall	N/A	Moderate	Moderate	Moderate	High	High
W-6: Deep Well Extraction/Air Stripping a Carbon Adsorption/ River Outfall	N/A	High	High	High	High	High
W-7: Deep Well Extraction/Ozone/UV/River Outfall	N/A	High	High	High	High	High
Deep Well Extraction/Hydrogen Peroxide/UV/River Outfall		High	High	High	High	High
EASTERN AREA						
E-1: No Action	N/A	Low	Low	Low	N/A	Low
E-2: Alternate Water Supply/Water Use Restrictions	N/A	Low	Low	Moderate	Low	Low
E-3: Point of Entry Treatment	N/A	Low	Low	Moderate	Low	Low
E-4: Deep Well Extraction/Carbon Adsorption/River Outfall	N/A	High	High	High	High	High
E-5: Deep Well Extraction/Air Stripping/River Outfall	N/A	Moderate	Moderate	Moderate	High	High
E-6: Deep Well Extraction/Air Stripping a Carbon Adsorption/ River Outfall	N/A	High	High	High	High	High
E-7: Deep Well Extraction/Ozone/UV/River Outfall	N/A	High	High	High	High	High
Deep Well Extraction/Hydrogen Peroxide/UV/River Outfall		High	High	High	High	High

[1/]NOTES:
- A = The long-term uncertainties associated with land disposal
- B = the goals, objectives, and requirements of the Solid Waste Disposal Act
- C = the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents
- D = short- and long-term potential for adverse health effects from human exposure
- E = cost of remediation (see Table 7)
- F = the potential for future remedial action costs if the alternative remedial action in question were to fail
- G = the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment

2/ factor E (cost of remediation) see Table 7

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As shown on these tables, all of the deep well extraction, treatment, and disposal alternatives were evaluated either moderate or high with respect to all of the 1985 RI/FS Guidance Factors and the A-G Factors. Any of these technologies is acceptable, as long as the performance standards in Table 6 are met.

Alternatives that did not employ deep well extraction were rated low with respect to one or more evaluation criteria. As a result, none of these is considered acceptable.

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VI. SELECTED REMEDY

DESCRIPTION

There are contamination problems in the southern, western, and eastern areas of the site. This interim final remedial action addresses management of the migration of contaminants using a groundwater interception system in the south and west areas, and attempts source control in the east area through extraction of groundwater with the highest contaminant concentrations. All extracted water will be treated to specified Performance Standards, monitored to assure compliance, and will be properly discharged. The water supply system in the area will be improved to assure sufficient supplies for all residents who require it.

The remedy is designed to:

- prevent further spread of contaminated groundwater (in the south and west) in two aquifers by installing and operating interception wells and treating the extracted groundwater,

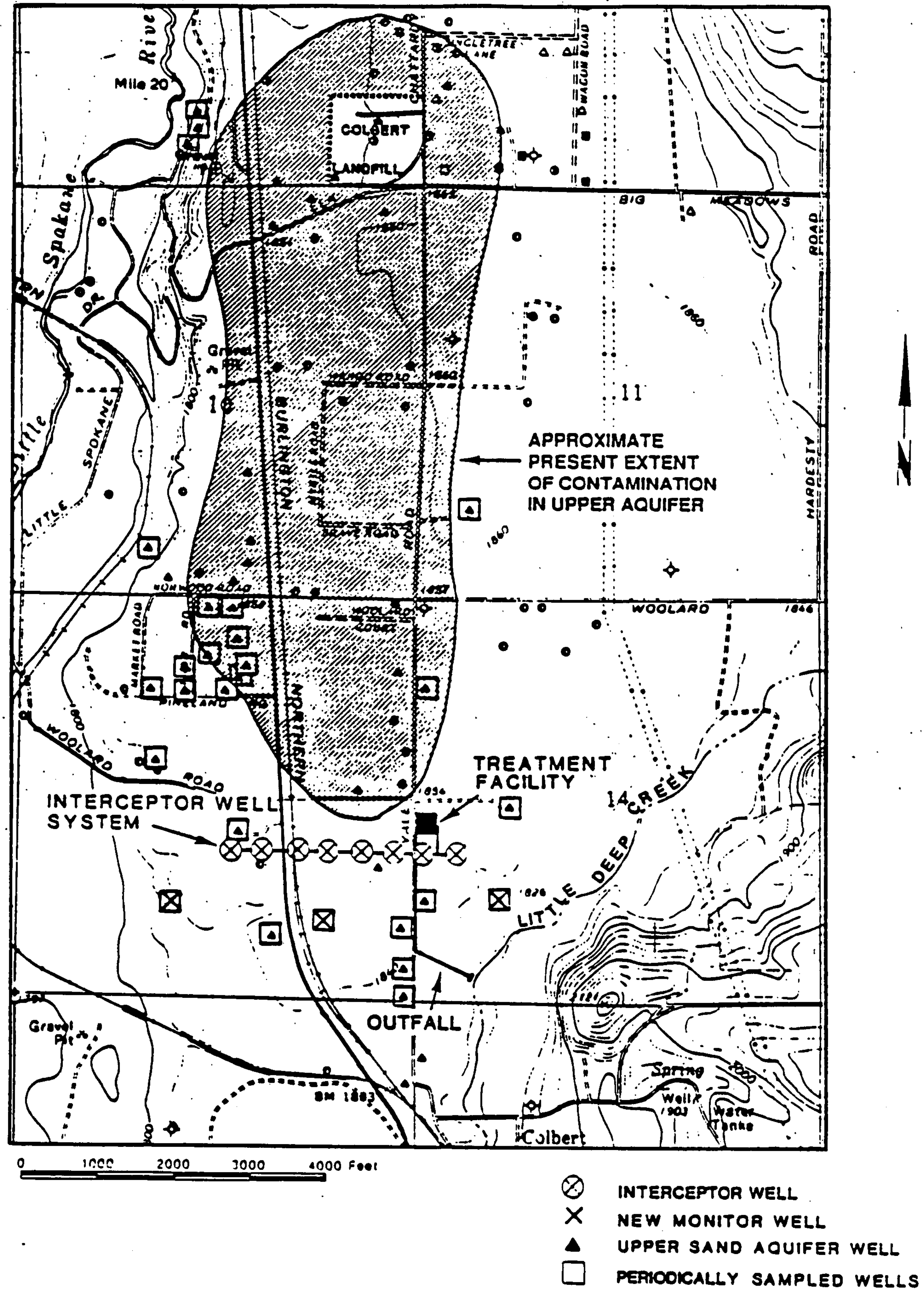
- remove contaminated materials (in the east) which have entered the aquifers and are contributing to the contaminant plume, by installing and operating extraction wells in the area where the plumes originate and treating the effluent, and

- provide an alternate water supply system to any residents who are deprived of their domestic supply by demonstrated contamination from the landfill or due to the action of the extraction systems.

For interception of the contaminant plume in the upper aquifer (southern area), a line of wells will be required downgradient of the plume at the time of implementation. Placement of the wells and extraction rates will be sufficient to prevent any significant amount of the contamination from proceeding beyond this line of wells. One possible configuration, based on the location of the plume as determined at the time of the Remedial Investigation (December 1985) and developed for the evaluated alternatives S-4, S-5, and S-6 of the Feasibility Study, is shown in Figure 10. In this arrangement, about eight wells, each approximately 100 feet deep, would be used, with each pumping 20 to 30 gallons per minute (gpm). To confirm successful interception as well as limiting spreading of the plume, several other wells will be sampled and analyzed, including in this scenario 24 private wells and three new monitoring wells.

In the western area, a configuration similar to that analyzed in the Feasibility Study for alternatives W-4, W-5, W-6, and W-7 will be necessary to prevent future westward migration of this contamination as shown in Figure 11. In this suggested arrangement ten extraction wells may be necessary, each pumping approximately 130 gpm. Monitoring would involve 33 private wells and four new monitoring wells. Note that these extraction/monitoring well field concepts are not required for the selected alternative but are rather merely illustrative suggestions; such details will instead be chosen in the design phase of the remedial action, with EPA and state review to assure conformance with the objectives of the selected remedial alternative.

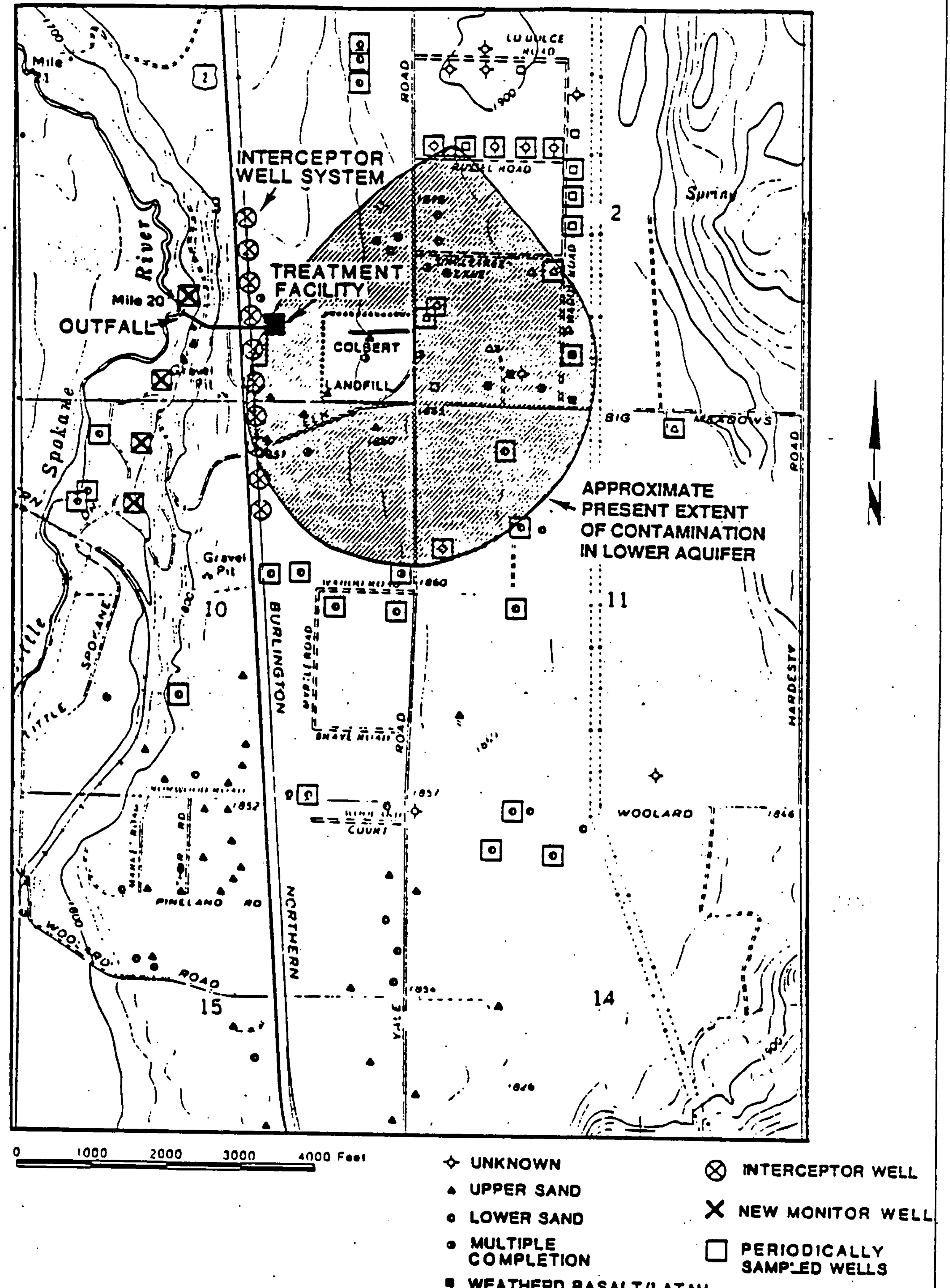
Treatment for both areas will be sufficient to reduce contaminant levels in the aquifers and in the wastewater effluent to or below the Maximum Contaminant Levels (MCLs, 40 CFR 141.61) or similar health-based criteria (a 10^{-6} risk level for carcinogenic constituents). Numeric performance standards have been presented in Table 6. Treatment should be permanent, and should effectively reduce the toxicity, mobility, and volume of the contaminants. Possible methods of treatment which were analyzed in the Feasibility Study include carbon absorption, air stripping, and chemical oxidation using ultraviolet (UV) light and either ozone or hydrogen peroxide. Any treatment system which may result in contaminant air emissions will be designed to meet appropriate state Air Toxics Guidelines and will



POSSIBLE REMEDIAL IMPLEMENTATION FOR SOUTHERN AREA (CONCEPTUAL DESIGN)

SOURCE: GOLDER AND ENVIROSPHERE 1987

FIGURE 10



POSSIBLE REMEDIAL IMPLEMENTATION
FOR WESTERN AREA (CONCEPTUAL DESIGN)

SOURCE: GOLDER AND ENVIROSPHERE 1987

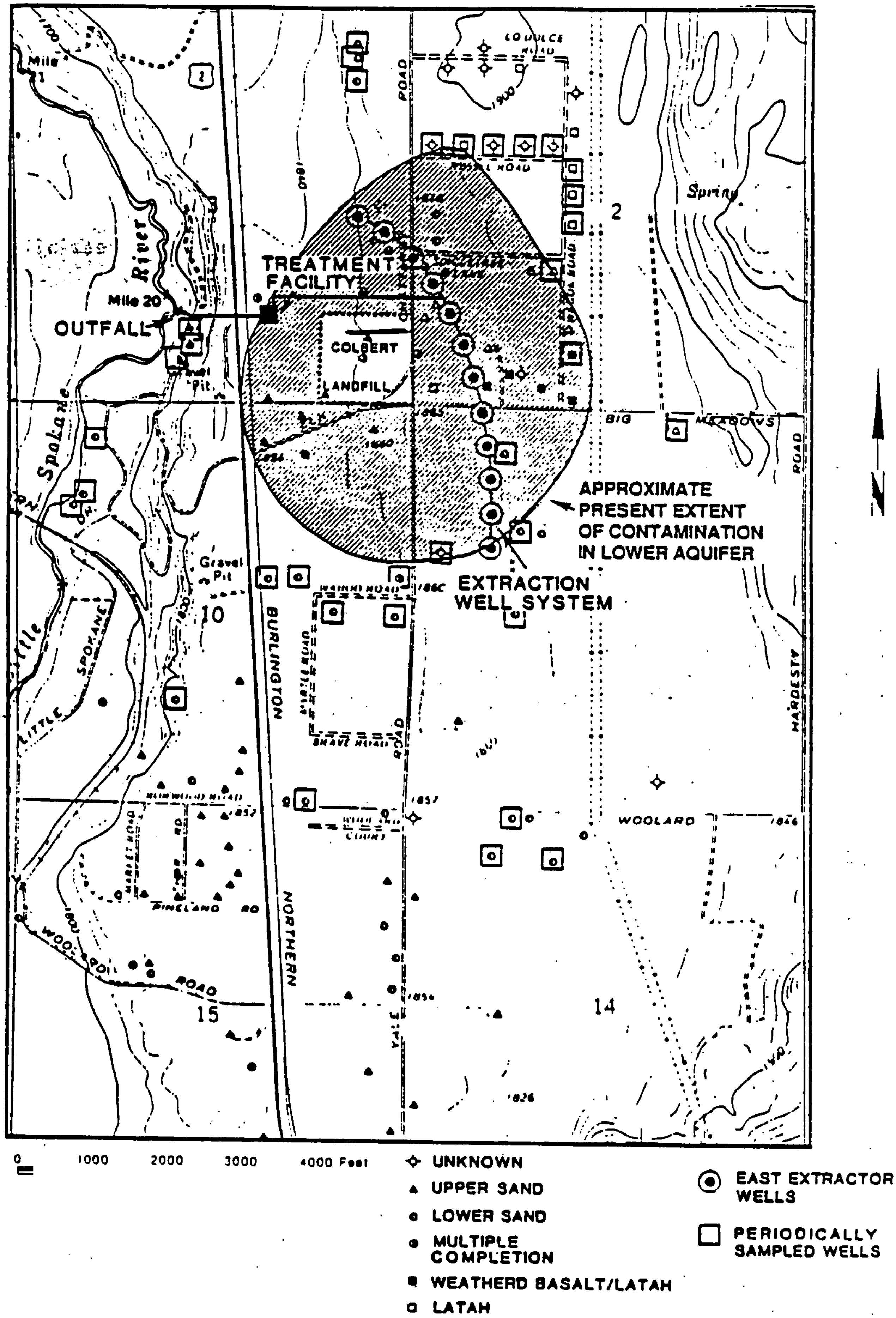
FIGURE 11

incorporate Best Available Control Technology (BACT). Periodic sampling of the effluent water stream will be required to assure adherence to the performance standards, and monitoring of air emissions will verify compliance in that regard.

Discharge of the treated water may be accomplished in any of a number of ways. The treatment alternatives recommended in the Feasibility Study included discharge of clean water to surface water streams, namely Little Deep Creek in the south and the Little Spokane River in the west. Because the treated water is a valuable resource, other options should be considered such as recharge of the aquifers via drainfield which may enhance interception through gradient reversal in the southern area. Release to the public is possible for some other beneficial use, such as irrigation, which would not threaten public health if the treatment system temporarily did not achieve performance standards.

In the plume origin (east) area, extraction will be carried out for the purposes of source control rather than management of migration. A possible configuration of the extraction and monitoring wells is presented in Figure 12 as it was evaluated for Alternatives E-4, E-5, E-6, and E-7 in the Feasibility Study. In this arrangement twelve wells, approximately 180 feet deep and pumping 40 to 50 gpm each, would be used for extraction of the most highly contaminated groundwater in order to reduce the strength of the sources as quickly as possible. In addition, this suggested design shows 32 private wells which would be monitored, most of them already included in the monitoring configuration shown in Figure 11. No new monitoring wells are proposed for the plume origin area in this scenario. Treatment and discharge in this area will be similar and meet the same criteria as described above for the interception systems.

Extraction in the plume origin area will continue until the wells being monitored in that area show that the constituents have been permanently reduced below the health-based performance standard maximum levels. It



POSSIBLE REMEDIAL IMPLEMENTATION FOR EASTERN AREA (CONCEPTUAL DESIGN)

FIGURE 12

SOURCE: GOLDER AND ENVIROSPHERE 1987

is anticipated that this may require decades of pumpage and treatment before the performance standards are reliably attained throughout the area of contamination. The treatment in the other areas, where further migration of the contaminant plume is being controlled, will also be based on the permanent reduction of contamination levels below the same health-based performance standards. This will probably require a longer period to account for the time of transport from the source areas to the downgradient extent of contamination where the extraction systems are located. In any case, the EPA will reevaluate the implemented system every five years to assure that it is working properly and to propose any modifications that could facilitate the remediation.

Those residents who are deprived of water, either because their well water quality shows demonstrated contamination from the landfill or due to the action of the extraction systems, will be connected to the alternate water supply system. Adequate and appropriate monitoring will be performed to demonstrate water quality is maintained. The present community water system serving the area, the Colbert Extension of the Whitworth Water District No. 2, may be upgraded to assure adequate supplies to all residents who may require alternate water. Enhancements will be designed to meet state public water system standards. Institutional controls will be developed consistent with the final design to assure the effectiveness of the remedial action.

Colbert Landfill will be closed in accordance with the State Minimum Functional Standards (WAC 173-304) for landfill closure, including capping, regrading, groundwater and gas monitoring, and post-closure maintenance. The state landfill closure regulations are consistent with EPA Guidelines for the land disposal of solid waste. The closure of the landfill under the State Minimum Functional Standards will need to be evaluated to ensure consistency with RCRA Hazardous Waste Regulations and will be addressed in the final ROD for this site.

STATUTORY DETERMINATIONS

The selected alternative meets all statutory requirements, particularly those of CERCLA, as amended by SARA. The highest priority in this regard is that the selected remedy (extraction, treatment, and discharge) is protective of human health and the environment; this can be demonstrated according to each of the potential threats. The containment of the contaminant migration to the south and west will be designed to reduce the mobility of the contaminants and prevent additional wells from becoming significantly contaminated, exposing residents in those areas to the contaminants through their drinking water. The containment will also prevent significant contamination from reaching surface water, mainly the Little Spokane River, thereby exposing recreational users of the river as well as fish and other aquatic life. Treating the extracted water will be designed to reduce the toxicity and volume of the contaminants and prevent them from returning to the environment.

The selected remedy will also meet all substantive laws and regulations of other Applicable or Relevant and Appropriate Requirements (ARARs). These are listed and their application is briefly described in Appendix B. The laws and regulations of concern include:

- Resource Conservation and Recovery Act (RCRA, 42 USC 6901); RCRA regulations (40 CFR 261 to 280); Washington State Dangerous Waste Regulations (WAC 173-303); Minimum Functional Standards for Solid Waste Handling (WAC 173-304).

  The selected remedy prevents further spread of groundwater contamination and constitutes a Corrective Action Program as specified in 40 CFR 264.100 and WAC 173-303-645(11). Closure of Colbert Landfill to State Minimum Functional Standards will be evaluated to ensure consistency with RCRA landfill closure standards.

- Safe Drinking Water Act (SDWA, 42 USC 300); Primary Drinking Water Standards (40 CFR 141).

  The selected remedy prevents exposing the public to drinking water which exceeds the Maximum Concentration Levels.

- Clean Water Act (CWA, 33 USC 1251); National Pollution Discharge Elimination System (NPDES, 40 CFR 122); NPDES Permit Program (WAC 173-220).

  The selected remedy treats the extracted water before discharge to surface water. Other, mainly procedural, aspects of the NPDES Permit system will be met during the design phase, although no permit is actually required.

- Rules and Regulations of the State Board of Health Regarding Public Water Systems (WAC 248-54).

  Enhancements to the alternate water supply system, in order to supply all residents who may require these supplies, will be in conformance with these regulations.

EPA review of the remedial design will assure that these, and all other requirements, will be met by the design which is ultimately implemented.

Finally, the selected remedy meets the requirements of cost-effectiveness and use of permanent solutions to the maximum extent practicable. The cost-effectiveness can be demonstrated by the fact that extraction treatment and discharge technologies are available that will meet the performance standards and have a lower cost than merely providing alternate water supply (See Table 6). The total (present worth) cost for the alternate water supply (Alternatives S-2, W-2, and E-2) is estimated to be almost $24 million; the cost of ozone/UV oxidation for all three areas (Alternatives S-6a, W-7a, E-7a) is estimated to be approximately $16.5 million, not taking into account any cost savings associated with the treatment of two or more areas at a single facility (estimated to be $1.6 million, see Section 6.2.1 of the Feasibility Study). It is possible that an air stripping treatment system, combined with vapor-phase carbon absorption, would be even more cost effective, as it should meet the performance standards at a present worth cost of approximately $12.8 million (see Section 6.2.4 of the Feasibility Study).

The selected remedy meets the SARA preference to permanent solutions to the maximum extent practicable. Resource recovery is, however, not practicable as there is no market for the off-specification solvent mixture which could be recovered from the groundwater. Nevertheless, treatment technologies are used as a principal element of the remedy and they will effectively reduce the toxicity, mobility, and volume of the contaminants permanently.

VII. REFERENCES

CH_2M Hill. 1983. Remedial Action Master Plan, Colbert Landfill, Colbert, Washington. A report prepared for the U.S. Environmental Protection Agency, Remedial Planning/Field Investigation Team, Zone II (Contract No. 68-01-6692). Washington, D.C. 124 pp.

Cook, T.D. 1985. Applications and Limitations of Earth Resistivity as a Technique for Monitoring Leachate Near the Colbert Landfill, Spokane County, Washington [unpublished masters thesis (Civil Engineering)]. Washington State University, Pullman, Washington.

Ecology (Washington State Department of Ecology). 1984a. Focused Feasibility Study for Initial Remedial Measure at Colbert Landfill. Prepared by C.R. Thompson, Hazardous Waste Remedial Action Section, Remedial Action Division, Olympia, Washington. 26 pp.

Ecology. 1984b. Community Relations Plan for Initial Remedial Measure at Colbert Landfill. Prepared by C.R. Thompson, Hazardous Waste Remedial Action Section, Remedial Action Division, Olympia, Washington. 10 pp.

EPA (U.S. Environmental Protection Agency). 1986. Guidelines for Ground Water Classification Under the EPA Ground Water Protection Strategy. Final Draft. Office of Ground Water Protection. Washington, D.C. December 1986.

EPA. 1985. Guidance on Feasibility Studies Under CERCLA. EPA Hazardous Waste Engineering Research Laboratory, Office of Research and Development. Cincinnati, Ohio. EPA 540/6-85/003. June 1985.

Maddox (George Maddox and Associates, Incorporated). 1981. A Preliminary Report on the Geohydrology of the Colbert Landfill, Spokane County, Washington-Phase I. Prepared for Spokane County Utilities Department, Spokane, Washington. 19 pp.

Maddox. 1982. Geohydrologic Investigations of Colbert Landfill, Phase II. Prepared for Spokane County Utilities Department, Spokane, Washington. 65 pp.

Marrin, D.L. 1986. Shallow Soil Gas Investigation in the Vicinity of the Colbert Landfill, Spokane County, Washington (Draft). Prepared for U.S. EPA Environmental Monitoring Systems Laboratory, Las Vegas, Nevada. December 1986.

Golder (Golder Associates, Inc.). 1984. Data Review and Recommendations for Remedial Investigations at the Colbert Landfill. Prepared for State of Washington, Department of Ecology, Olympia, Washington. 59 pp.

Golder. 1987. Remedial Investigation Report for the Colbert Landfill, Spokane, Washington. Prepared for State of Washington Department of Ecology, Volumes I and II. May 1987.

Golder and Envirosphere. 1987. Feasibility Study Report for the Colbert Landfill, Spokane, Washington. Prepared for State of Washington, Department of Ecology, Olympia, Washington. Volumes I and II. May 1987.

Griggs, A.B. 1973. Geologic Map of the Spokane Quandrangle, Washington, Idaho, and Montana (1:250,000). U.S. Geological Survey Miscellaneous Geologic Investigations, Map I-768.

NOAA (National Oceanic and Atmospheric Administration). 1985. Summary of Day-First Order TD3210, Entire Period of Record Through 1985 for Spokane, Washington. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Environmental Satellite Data and Information Service, National Climatic Data Center, Asheville, North Carolina.

PEC (Pacific Environmental Consultants). 1986. Water System Plan Update Systems 8 and 9 (Preliminary Draft). Prepared for Whitworth Water District No. 2. March 1986.

Spokane County and Key Tronic Corporation. 1986. Results of continued Studies at Colbert Landfill, Colbert, Washington, by George Maddox and Associates. Personal Communications with Bruce Austin (Spokane County and Key Tronic, Incorporated), Spokane, Washington.

Williams, J.R. and H.E. Pearson. 1985. Streamflow Statistics and Drainage Basin Characteristics for the Southwestern and Eastern Regions, Washington: Volume II. Eastern Washington. United States Geologic Survey open file report 84-145-B, Tacoma, Washington.

APPENDIX A
RESPONSIVENESS SUMMARY

COLBERT LANDFILL, SPOKANE, WASHINGTON
RESPONSIVENESS SUMMARY

This community relations responsiveness summary is divided into the following sections:

Section 1.0 Overview. This section discusses the U.S. Environmental Protection Agency's (EPA) preferred alternative for corrective action, and likely public reaction to this alternative.

Section 2.0 Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial planning activities at the Colbert Landfill site.

Section 3.0 Summary of Major Comments Received during the Public Comment Period and EPA's Responses to the Comments. Both written and oral comments are categorized by relevant topics. EPA's responses to these major comments are also provided.

Section 4.0 Remaining Concerns. This section describes remaining community concerns that EPA should take into consideration in conducting the remedial design and remedial action at the Colbert Landfill site.

Community relations activities conducted during remedial response activities at the Colbert Landfill site are listed in an attachment to this appendix.

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1.0 OVERVIEW

The Washington State Department of Ecology (Ecology), as lead agency under a cooperative agreement with the U.S. Environmental Protection Agency (EPA), carried out the Remedial Investigation and Feasibility Study for the Colbert Landfill site north of Spokane. During the 1970s, the landfill had received industrial solvents and disposed of them in a way that allowed the chemicals to penetrate the underlying aquifer. These chemicals began to show up in nearby drinking water wells at levels high enough to cause public health concerns. The cleanup alternative which was recommended by Ecology's consultants, and in turn by Ecology to EPA, was to intercept the advance of the contaminants by extracting the contaminated water, treating it, and discharging the cleaned water. The cleaned water would meet health-based drinking water standards. This alternative is described in more detail in Chapter 4 of the Feasibility Study and in the Record of Decision.

This Responsiveness Summary describes concerns which the community has expressed in regard to the problems at the site, the recommended cleanup alternative, and the study process itself. The most severely impacted individuals, the nearby residents, have long complained that their welfare has not received proper attention from local and state agencies. These residents hope that the cleanup will be as quick and as thorough as possible and not raise additional problems through its implementation. On the other hand, two of the named responsible parties at the site, Spokane County and Key Tronic Corporation, are concerned that there was insufficient time for public review and that the cleanup would be too expensive. They asked Ecology or EPA to search out other potentially responsible parties to share the cleanup costs; EPA is now doing this.

Because of the scarcity of water and the reliance on ground water supplies in this area, clean water is a particularly important concern. Some citizens desire clean drinking water, but do not feel it is necessary to go to the additional time and expense to clean the aquifer.

Other concerns for some people include potential drying up of wells due to pumping, and possible flooding and erosion from river discharge.

2.0 BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Community interest in the Colbert Landfill contamination problem dates from 1980 when local residents complained to Ecology and the Spokane County Utilities Department that hazardous materials were being disposed of at the landfill. Community concern and involvement have remained strong since that time. Three key individuals, Mr. Floyd Wakefield, Ms. Grace Garrison, and Mr. Craig Costello, have been especially active in coordinating community meetings, increasing community awareness, and voicing area residents' concerns to the Utilities Department, Ecology, and EPA. They have been successful in getting attention from these agencies as well as in attracting media attention to the site. The major citizen concerns expressed about the Colbert Landfill contamination problems and how agencies have addressed these concerns are described below:

1) In October 1980, a resident near the landfill complained to Ecology and the Utilities Department that hazardous materials were being disposed of at the landfill.

   Actions: Ecology investigations revealed that Key Tronic Corporation had disposed of solvents at the landfill and that several private wells were contaminated. Spokane County also began studying the extent of groundwater contamination, hiring George Maddox and Associates, Inc., to study the hydrogeology of the landfill site.

2) In the winter of 1981, citizens called the Utilities Department with questions on the Colbert site. The citizens had questions and concerns about: what the project status was; how the study was being conducted; how residents could get their water tested; where the contamination plume was heading; what the results were to date; what the study actions would show; what the County Commissioners were going to do; how contaminated water would effect health, children, and property values; whether the water was safe to drink;

whether it was carcinogenic; why there were fluctuations in the tests; how will it be tested for parts per billion; and what everyone else was doing?

Actions: Spokane County organized and implemented a community relations plan in conjunction with the Maddox Study. As part of the plan, the County maintained a record of citizens who called and developed a mailing list from the tax assessor's records. The Utilities Department held seven public meetings, beginning in May, 1981, to explain the intent of the Maddox study and to discuss study progress and the results of the water quality sampling program. The Utilities Department sent each homeowner in the well sampling program a copy of their test results and also posted water sampling results at the Colbert Water District Office.

3) Citizens' concerns from public meetings held by the Utilities Department in 1982 and 1983 included whether their water was safe to use, what the health impacts could be, and how the contamination would impact their property values. Citizens thought that a new water supply was needed immediately.

Actions: In February 1983, the Spokane County Health District advised residents with significantly contaminated wells to use bottled water. Spokane County and Key Tronic began supplying bottled water to some homes.

In March 1983, the Spokane County Tax Assessor discussed reassessing the homes affected by the ground water contamination. The county tax assessor established a plan for estimating the reduced value on homes within the 3/4-mile study area established by George Maddox and Associates, Inc.

4) Homeowners became frustrated by the absence of an immediate plan for an alternative water system and met with several water districts interested in serving the Colbert Landfill area.

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Actions: In June 1984 Ecology documented the need for an alternative water supply to residents living near Colbert Landfill. The County approved a new water system and began construction in the fall of 1984. The system was completed in the winter of 1985. This new system, funded by Spokane County, Key Tronic, and state referendum money, served as an alternate water supply and as an Initial Remedial Measure for the Colbert Landfill Site.

5) In August 1985, EPA contractors alarmed three area families by telling one family that their well water was probably unsafe to drink. The family was afraid to use their water, contacted an attorney, and appeared on the evening news. They also boarded their 30 thoroughbred horses elsewhere. This incident caused the three area families to question who was in charge and who they should believe.

Actions: Spokane County and Key Tronic felt that the EPA contractor's mistakes had hampered an already fragile community relations effort. They worked with Ecology to encourage the EPA contractors to apologize to the family, to get an expert opinion, to retract their statements, and to admit that their employees had only rendered an opinion. Key Tronic supplied the family unlimited bottled water, and in September 1985 the family was hooked up to the Whitworth Water District.

6) Because of concerns that the public was not getting adequate information about the site, two area residents organized the Colbert Landfill Contaminate Area Committee in the fall of 1985. This committee was to gather information and make it available to everyone. The committee presented seven recommendations to the Spokane County Commissioners in December 1985.

The recommendations were:

a) Free hookup for any household within the proposed area, the known contaminated area, and any future contaminated area regardless of the level of contamination of the household well at the time.

b) Monthly water fees, maintenance, and any other associated fees to be borne by the known source of contamination, including Spokane County and Key Tronic Corporation, for a period of twenty (20) years.

c) Property values in the area to be re-assessed due to the devaluation of property.

d) Existing wells be utilized for outdoor irrigation with the installation of a stationary frost-proof yard hydrant to be installed free of charge to the property owner.

e) Testing of wells in the area should continue at the existing schedule for a period of twenty (20) years at the expense of Spokane County and Key Tronic Corporation or longer if contamination stays at current levels or increases.

f) Contaminant-related health problems may be pursued on a individual basis for an indefinite time, including future generations of the present residents.

g) Any property owner who has previously accepted settlement and/or monies from Spokane County and Key Tronic Corporation were excluded from this proposal.

Actions: The Commissioners drafted a response in January 1986 that included specific conditions under which water would be supplied to the affected residents. Because of the restrictive conditions, citizen frustration increased.

7) EPA and Ecology released the Remedial Investigation/Feasibility Study report in May 1987, and held a public meeting to obtain comments. Citizens and Key Tronic complained that the three-week comment period was too short.

Actions: EPA extended the comment period by three weeks.

8) A newspaper editorial criticized EPA and Ecology for not using their investigatory and enforcement powers more fully, and for the shortness of the comment period. Key Tronic employees purchased a full-page newspaper ad supporting the editorial. They expressed the concern that Key Tronic was being treated unfairly and that other users of Colbert Landfill should share in the cleanup expenses.

Actions: As previously noted in No. 7 above, EPA extended the comment period. Ecology and EPA have notified Fairchild Air Force Base that it is a potentially responsible party. EPA is now searching for additional parties who may share responsibility.

9) During the public comment period, citizens expressed concern about wells drying up and the Little Spokane River flooding due to pumping and treating contaminated water and discharging the cleaned water. They also expressed concerns about emissions from the air stripping towers.

Actions: Ecology held two public meetings on September 9, 1987, to answer these questions.

3.0 SUMMARY OF MAJOR COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES TO THE COMMENTS

Comments from members of the public, primarily Colbert area residents, regarding the feasibility study report are summarized below. Similar comments are grouped under the following headings: general, public participation process, contamination levels, and cleanup alternatives. Each comment is followed by a response from EPA.

The public comment period originally ran from May 15 to June 5, 1987, but was later extended to June 30, 1987, for a total of over six weeks. Ecology held a public meeting in Colbert on May 28, 1987, to explain the study and the alternatives. The consultants' selected alternative (Extraction-Treatment-Discharge-Expanded Water Supply) recommended air stripping for the treatment option and a river outfall for the discharge option. Many comments focused on this alternative and the various treatment and discharge options.

Detailed comment forms were distributed to all meeting attendees. Ecology received 29 completed forms and six letters by the June 30 deadline, primarily from Colbert area residents.

Meeting attendees were asked to rank the four cleanup alternatives on the comment form. The selected alternative (Extraction-Treatment-Discharge-Expanded Water Supply) was preferred by 26 of the 33 who expressed a preference. Six people preferred Alternate Water Supply. One person proposed a fifth alternative consisting of removal and treatment of the landfill waste.

Among the treatment technologies, air stripping received majority support. However, twelve people supported either carbon adsorption or chemical oxidation, primarily because of the potential air pollution from the air stripping process. The recommended option of discharging the treated water into the river also received strong support. However, ten respondents favored recharge wells or drainfields because of fears of lowering the water table or flooding.

GENERAL

1) Identification of additional potentially responsible parties was a major concern, both at the public meeting and in subsequent written comments. Key Tronic and its employees were especially concerned about the equity of the company apparently being held largely responsible for the contamination and cleanup; they pointed out that the company has not been associated with all of the identified contaminants.

   Agency Response: EPA and Ecology have identified three potentially responsible parties: the landfill owner (Spokane County) and two major disposers of hazardous substances, Key Tronic Corporation and Fairchild Air Force Base. EPA is searching to identify other potentially responsible parties.

2) The cost of cleanup concerned several residents. Some felt that the proposed program may be too costly. One resident felt that the health risks had been overstated and that the funds could be better spent elsewhere in the county. Others felt that no expense should be spared to clean the aquifer. The most common response, however, was that the most cost-effective alternative be selected. This was mentioned frequently in support of the air stripping treatment option, which is less expensive than the other treatment technologies studied. The public was also concerned about the source and reliability of the cost estimates and who would pay the cost of the cleanup.

Agency Response: The cost information is based on data from equipment suppliers and costs of similar projects. Present knowledge does not indicate how long the contaminated ground water at the site will have to be treated, so 30 years was selected as a reasonable length of time for planning. Costs were estimated based on current pricing and technologies, then totalled over the 30-year period. The Superfund law stipulates that responsible parties pay the bill for cleanup whenever possible. Following the formal selection of the cleanup alternative at the Colbert Landfill site, EPA and Ecology will direct the responsible party or parties to undertake the cleanup as specified. If the responsible parties fail to comply with the request, EPA or Ecology will do the cleanup and sue to recover the cost. The responsible parties will also be requested to pay operations and maintenance costs for the cleanup measures.

The actual costs may be from 30 percent less than the estimates to 50 percent more. More accurate cost estimates will be made when the detailed project design is done.

Federal regulations specify that a less-effective cleanup action cannot be chosen simply because it is cheaper. However, if several alternatives are considered to be equally effective, EPA may select the least costly.

3) Property values have been a continuing issue with residents since contamination was first detected. Potential impacts of cleanup measures such as noise, odor, appearance, and air pollution on property values were a concern to several residents. A major corporate owner of undeveloped property expressed concern about the reduced value of the property if water were not available for future development.

Agency Response: Noise and air pollution generated by the remedial system will be within local, state, and federal regulatory standards. Similar facilities in other communities have operated successfully without problems or complaints related to noise and air pollution. The issues of future development and property values will be resolved consistent with implementation of the remedial action.

4) Immediate availability of clean, low-cost water has also been a continuing concern since the beginning of the project. The residents' highest priority is having an assured, convenient supply of clean drinking water. The citizens' committee has requested that clean water be supplied to everyone in the contaminated area. One resident suggested that, without this, property owners should not have to pay taxes because their land is unsaleable. At the same time, another person was concerned that expanding the Whitworth Water District supply lines to accommodate the long-term growth needs of the district would be unfair. Key Tronic and Spokane County also see it as unfair to charge them for these costs which would have been encountered even without the contamination problem.

Agency Response: The selected alternative requires that everyone affected by the contamination or the cleanup process be assured of a safe and adequate drinking water supply. Maintaining and improving the Whitworth Water District System will provide adequate domestic water supplies for present and future population in the area.

The Whitworth Water District water system may be adequate for in-home water use only. The risk assessment, Appendix A of the Feasibility Study, indicated that there should be no adverse health consequences from use of the contaminated ground water for outside purposes such as irrigation. It should be possible to continue to use existing wells for these high-consumption purposes as long as these lines are adequately isolated from th domestic supply systems.

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5) The need for continued long-term monitoring of both drinking water and monitoring wells was emphasized.

Agency Response: The recommended cleanup alternative provides continued monitoring of drinking water and monitoring wells. EPA or Ecology will supervise and manage the monitoring to ensure that it is done properly. Two kinds of monitoring would be conducted. The system monitoring program would frequently assess how well the ground water extraction and treatment system is working. The other monitoring program would track the spread of contaminants in the ground water.

PUBLIC PARTICIPATION PROCESS

1) Residents, particularly those who had been most involved in the process, sought assurance that their involvement would continue through the cleanup design process. A large corporate property owner also expressed the desire to be contacted during the design phase. One meeting participant, not a resident of the affected area, questioned the extent of citizen involvement and review up to this point.

Agency Response: EPA and Ecology have appreciated and encouraged the level of public involvement experienced at Colbert Landfill in the process of selecting a cleanup alternative. The agencies will continue to work with the community and local residents to ensure public participation through the design and cleanup phases. Ecology will revise the Community Relations Plan before the design process begins.

2) Residents and one agency representative asked about regulatory controls or permit requirements relating to the treatment and discharge options. Specifically, they wanted to know if air and water discharges would be subject to state or federal law.

Agency Response: Cleanup actions at Colbert Landfill do not require permits because of the Federal Superfund law. However, the actions must comply with the intent and purpose of any regulations that would normally apply. Such applicable regulations would include National Pollution Discharge Elimination System provisions of the Clean Water Act, local air quality standards, and others. Monitoring of air and water discharges will assure compliance with these standards.

CONTAMINATION LEVELS

1) Several questions were asked to clarify the remedial investigation findings. One person asked if the contamination levels in various parts of the aquifers had changed over time in relation to the EPA standards. Another person asked why the report seemed to indicate that 90 percent of the pollutants disposed of in the landfill had not been accounted for in the ground water.

Agency Response: Some wells have shown constant contamination levels. In other wells, the concentrations have been decreasing. In still others, the levels have fluctuated. The wells that are showing fairly constant concentrations appear to be near "pools" of contamination in the aquifers. These pools have remained at high levels for several years. This suggests that these pools are still in place and still releasing contaminants. It is likely that much of the 90 percent referenced above is in these pools and the other 10 percent lost to evaporation at the time of disposal (see the Remedial Investigation Report, Section 5.4.1, pp. 76-77 for more information). In the upper aquifer, contamination appears to be decreasing.

2) A long-time resident of the area asked if capping the landfill in 1980 would have prevented the spread of the contaminants in the ground water.

Agency Response: By 1980 contaminants had already been documented in wells northeast of the landfill, so capping would have been too late and not particularly useful. Colbert Landfill was operated until late 1986; capping a working landfill would be a difficult task, particularly for a landfill as large and as active as this one. Pure solvents travel through the ground easily; they were dumped into the landfill in such large quantities that it is likely that even with capping they would have reached the ground water on their own accord. From the time they reached the ground water, probably well before 1980, the contaminants have continued to migrate away from the landfill area due to the natural flow in the aquifers.

REMEDIAL ALTERNATIVES

Extraction Options

1) There were major concerns about lowering the ground water levels and possibly drying up existing wells through the extraction of large amounts of ground water for treatment. Many wells in the area already have low water levels during the summer. Water is needed for irrigation even if another water supply is available for domestic use. A related concern was that lowering the water table would increase the flow of contaminants, including iron, into the aquifers.

Agency Response: The wells will be designed to intercept the contaminant plume to remove the contaminated water. The water which is extracted is obviously not available for other uses. Clean water is, however, also being carried along around the edges of the plume. Current information on the upper aquifer, which is more likely to be depleted, indicates that the proposed system would only reduce water levels by about two feet near the extraction wells. Over 100 feet away, the reduction would be insignificant. Thus, the extraction systems should not violate the existing water rights in the area. The impacts on people who use more than their water rights allow is not known at this time. The design of the wells will be refined through additional testing during the design phase to ensure that adverse impacts are minimized.

The extraction system would not cause high iron concentrations and other problems associated with the deep aquifer to spread to more shallow aquifers because water will not be drawn from these deeper zones.

2) One person suggested that the existing monitoring wells be incorporated into the extraction well system.

Agency Response: Most existing monitoring wells are two inches in diameter, too small to extract the necessary amount of water. In addition, the monitoring wells, with their known history of contamination levels, will be needed to observe the changes that occur during the cleanup process.

Treatment Options

1) The public questioned the effectiveness of the alternatives studied, wanting assurance that the recommended technologies had been used successfully elsewhere. They also wanted the process to clean both aquifers effectively, completely, and in a reasonable time period.

The alternative which has been selected by the EPA, ground water extraction and treatment, has been employed successfully at many sites around the country, using a variety of treatment technologies. Treatment similar to that proposed for the site has been successfully used at other sites in Washington and sites across the country. EPA fully expects that it will be just as effective at the Colbert Landfill site and will eliminate the hazards posed by the ground water contamination. The spread of contamination will be controlled within two to three months following installation of the system. It may require a longer time to deplete the sources totally. The length of time the complete cleanup will take is still uncertain, but 30 years is being assumed for planning purposes.

2) The consultant-recommended treatment option, air stripping, provoked numerous comments. The greatest concern was about potential air pollution caused by the release of the contaminants taken out of the water. Residents and an agency representative questioned whether any health risk assessment had been done and how consultants knew that the contaminants would present no health risk. There was also concern about its effectiveness, especially in removing methylene chloride. Some respondents suggested that treatment options be combined to take advantage of the strong points of each and minimize the weaknesses. One suggested the use of carbon adsorption as well as air stripping to alleviate the air pollution problem.

Agency Response: EPA has chosen not to specify a treatment technology for its selected cleanup alternative, but rather let the PRPs (or EPA or Ecology, if either does the cleanup) have the widest latitude for designing a treatment system which will meet the cleanup needs of the site. Air pollution issues will be studied throughout in the design process. The option selected will be the best for cleaning the water to drinking water standards and safeguarding air quality. The option eventually selected may be a combination of technologies such as air strippers with carbon filters. In any case, it will meet Air Toxic Guidelines and will use Best Available control Technologies (BACT).

The possibility of combining technologies was evaluated in the Feasibility Study; Alternatives W-6 and E-6 discuss combining carbon adsorption and air stripping. These were found to be less cost-effective in cleaning the water. Using carbon filters in the air stripping towers to clean the air emissions may be considered as a possible design; it is described in Section 6.2.4 of the Feasibility Study. Carbon filters would capture the contaminants so that they can be destroyed as part of their treatment.

Methylene chloride is the most difficult of the contaminants to remove through air stripping. Nevertheless, a treatment system can be specifically designed to remove this and other contaminants to concentrations below drinking water standards.

3) Other concerns were raised that the moisture emitted by air stripping towers could cause ice and heavy fogs on nearby roads.

<u>Agency Response</u>: Similar systems with air strippers have been successfully used throughout the country, including Michigan and Wisconsin which have more severe winter climates than this area. Devices are included in the air strippers to reduce moisture emissions. References do not indicate problems on nearby highways. No matter what treatment system is used, if problems develop, the configuration will be modified to assure that such problems are resolved.

4) Other potential impacts also received comment, including possible noise, odors, and the appearance of air stripping towers.

<u>Agency Response</u>: All of these factors will be considered extensively in designing the project. Noise, odors, and appearance have been considered at other sites and resolved satisfactorily to adjacent residents. Odors, in particular, would not be discernable even directly in the exhaust.

5) Disposal of the contaminated carbon used for the carbon adsorption process was a concern for one person.

Agency Response: The contaminated carbon would be disposed of through incineration at a facility in Yakima. Hazards associated with transporting it there are minor; even in the event of a complete spill of the carbon, few adverse impacts are likely because the contaminants would remain in the carbon itself.

6) One resident asked how bacteria growth in the treatment equipment would be controlled to maintain water quality.

Agency Response: Bacterial growth has been successfully controlled at similar facilities. We are presently envisioning the occasional use of chlorination to control bacterial growth.

Discharge Options

1) One of the concerns expressed most frequently was that discharging large quantities of water into the Little Spokane River would cause flooding and erosion. One resident requested that a contingency plan be discussed in the event that flooding and low well water levels do occur. It was urged that the river outfall be constructed to eliminate hazards to both humans and animals, since the river is heavily used for swimming.

Agency Response: The discharge from the recommended alternative is only about 4 cubic feet per second (cfs), which is 31 gallons per second. This is only about 2 percent of the mean flow in the Little Spokane River which is 236 cfs. Such a small addition is not likely to be discernible in its flooding potential. The ground water extracted, treated, and discharged to the Little Spokane River would have been discharged to it naturally anyway. Thus, the difference in flows in the river will be small over the long run.

Higher flows will occur for a few months when the treated water is first introduced and while the natural recharge is still occurring. Even during this transition time, the impact will be small.

It is possible to safely shut down the treatment system temporarily to avoid increasing the flood flows at all. Both this and the Little Deep Creek outfall will be dealt with in more detail during the design phase of the project.

The river outfall will be constructed to eliminate hazards to people (especially children) and animals. Normally the flows will be relatively constant, so the chance of anyone being caught unaware by a sudden increase in flow is unlikely.

2) The public wanted assurance that the water discharged into surface streams would be effectively treated so it would be safe for humans, fish, and animals. They also requested safeguards to prevent accidental discharge of contaminated water in case of treatment equipment failure.

<u>Agency Response</u>: The discharge water will be analyzed frequently to assure that the water is suitably clean. Detection systems may be included to shut down the equipment in the event of a failure. Even if a failure occurred, the effect would be temporary and would not have environmental or public health effects.

3) Other potential uses for the cleaned water provoked considerable comment. Some residents considered the discharge into the river to be a waste of a resource. They suggested such options as using it for irrigation, for the Whitworth Water District, or for a new recreational reservoir.

Agency Response: No alternate uses of the discharge water were discussed in the Feasibility Study because no other use is likely to be able to absorb all the water that must be discharged, especially during the winter months. Ecology studied the option of the Whitworth Water District using the water. However, the system would produce more than the District could handle. It is possible that alternate uses could be developed when the design is prepared. One important point of contention remaining is who should pay for any additional facilities required.

4) One of the other discharge options studied, discharge into a drainfield, also provoked several comments. One was that it would cause a build-up of water, resulting in swamps, ice, and pests. Another person was concerned that this option would cause water to carry more contaminants down to the aquifer. However, several people favored recharge wells or drainfields to maintain the level of the aquifer and prevent drying up of existing wells.

Agency Response: Given the very permeable soils in the area, it is unlikely that swamps could develop. Instead, the water would seep very readily into the upper aquifer. It is unlikely that these flows could carry contaminants into the aquifers unless the treatment system breaks down. A potential advantage of the drainfield option is that the water would be directly returned to the aquifer and be available for additional use downstream. However, this would involve some of the water being treated again and result in higher treatment costs. These issues will be considered in project design.

5) One resident questioned whether the private ownership of the bed of the Little Spokane River had been considered in the planning phase. She also asked what action would be taken if owners refused to grant easements for discharge facilities.

Agency Response: EPA recognizes the private ownership of the riverbed. The water within the Little Spokane River belongs to the state, but the bedlands of the river are in private ownership. EPA believes that the likelihood of contaminating the river bed is low.

EPA will work with landowners to make arrangements for putting in towers or excavating to put in pipes or river outfalls. However, if arrangements cannot be made, EPA will pursue other means to obtain easements. The government has a responsibility to maintain the public health and safety of its citizens.

4.0 REMAINING CONCERNS

Several issues have been discussed extensively, but have not yet been totally resolved. These issues include:

- Will alternative uses of the cleaned water be identified?
- How will the issue of property values be addressed?
- How will the extent and cost of improvements to the Whitworth District be determined?
- How will Colbert residents who have not declared legal rights to the irrigation water they are currently using be affected by the potentially decreased water levels?

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ATTACHMENT

COMMUNITY RELATIONS ACTIVITIES CONDUCTED AT THE COLBERT LANDFILL SITE

Community relations activities conducted at the Colbert Landfill site to date include:

- o Spokane County developed a community relations plan for the Colbert Landfill site (April 1981).
- o Spokane County held a public meeting to discuss the monitoring and water quality sampling program (May 1981).
- o A press release was issued by Spokane County to announce public meetings scheduled for December 1 and 3 (November 1981).
- o Spokane County held two public meetings to discuss the results of the first phase of the study (December 1981).
- o Spokane County had a public meeting to discuss the intent of the second phase of the study (February 1982).
- o Spokane County held a public meeting to discuss study activity (October 1982).
- o Spokane County established an information repository at the Colbert Water District Building (1982).
- o Spokane County Health District met with residents to discuss further results of the study (February 1983).
- o Fact sheets on the well sample test results were sent to the well owners (1983).

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- Affected residents began receiving bottled water from Key Tronic Corporation and Spokane County (March 1983).

- Spokane County held a public meeting to present the intent of the third phase of the study (March 1983).

- Remedial Action Master Plan (RAMP) was published (August 1983).

- EPA designated Colbert Landfill a National Priorities List (NPL) site (August 1983).

- A press release was issued by Spokane County on the alternative water system selected (November 1983).

- A letter on the chosen water system alternative was sent by Spokane County to concerned citizens (November 1983).

- Public comments on the alternative water supply were addressed by Spokane County at public meetings (May - November 1983).

- Ecology prepared a Focused Feasibility Study for Initial Remedial Measures (June 1984).

- An alternate water supply was constructed as an initial remedial measure (1984-1985).

- EPA authorized soil, gas, and earth resistivity tests (August 1985).

- Ecology met frequently with citizens, County officials, and Key Tronic Corporation representatives (1985-1987).

- Ecology held a public meeting to discuss the results of the Remedial Investigation and plans for the Feasibility Study (May 1986).

- Ecology released the Feasibility Study (FS) for public review and comment and held a public meeting (May 1987).

- Public comments on the FS were accepted (May 18 - June 30, 1987).

- Public meetings were held (September 9, 1987) to discuss citizen concerns.

- Responsiveness Summary finalized (September 1987).

- Record of Decision written (September 1987).

APPENDIX B

APPLICABLE, OR RELEVANT AND APPROPRIATE REQUIREMENTS

APPENDIX B

Applicable, or Relevant and Appropriate Requirements

Federal Laws and Regulations

- Resource Conservation and Recovery Act (RCRA) (42 USC 6901), Subtitle C:
  - protection of groundwater (40 CFR 264, Subpart F)
  - closure and post-closure of landfills (40 CFR 264, Subpart G)

  [Note: These are administered by Ecology under Dangerous Waste Regulations, WAC 173-303.]

- Safe Drinking Water Act (SDWA) (42 USC 300):
  - Drinking Water Standards (40 CFR 141), including both enforceable maximum contaminant levels (MCLs) and recommended maximum contaminant levels (RMCLs).

Contaminant	RMCL (µg/l)	MCL (µg/l)
1,1,1-Trichloroethane (TCA)	200	200
Trichloroethylene (TCE)	0	5
1,1-Dichloroethylene (DCE)	7	7

  - Underground Injection Control (UIC) standards (40 CFR 146)

    [Note: UIC standards are administered by Ecology under WAC 173-218.]

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- Clean Water Act (CWA) (33 USC 1251):
  - National Pollutant Discharge Elimination System (NPDES) (40 CFR 122)

    [Note: NPDES program is administered by Ecology under WAC 173-220.]

- Clean Air Act (CAA) (72 USC 7401):
  - National Emission Standards for Hazardous Air Pollutants (NESHAPS)

    [Note: NESHAPS Program is administered by Ecology and Spokane County Air Pollution Control Agency under WAC 173-403.]

Washington State Laws and Regulations

- Dangerous Waste Regulations, WAC 173-303. Applicable for handling contaminated groundwater which could be considered a dangerous waste.

- Minimum Functional Standards for Solid Waste Handling, WAC 173-304. Requirements for closure of solid waster disposal facilities such as Colbert Landfill.

- Washington Department of Ecology Final Cleanup Policy. Used for guidance in establishing cleanup levels.

- Water Quality Standards for Waters of the State of Washington, WAC 173-201. Applicable in determining acceptable contaminant levels in Little Spokane River or Little Deep Creek if treated water is discharged into them.

- Submission of Plans and Reports for Construction of Wastewater Facilities, WAC 173-240. Applies to the treatment system designed to meet performance standards.

- National Pollutant Discharge Elimination System Permit Program, WAC 173-220. Applicable if treated water is discharged through an outfall into surface waters.

- Underground Injection Control Program, WAC 173-218. Applicable if treated water is reinjected into the ground for contaminant migration control.

- State Waste Discharge Permit Program, WAC 173-216. A permit is required for the disposal of treated water via drainfields.

- Washington Clear Air Act, RCW 70.94. Applicable for discharging pollutants into the atmosphere from a new source.

- General Regulations for Air Pollution Sources, WAC 173-400.

- Implementation of Regulations for Air Contaminant Sources, WAC 173-403.

- Emission Standards and Controls for Sources Emitting Volatile Organic Compounds (VOC), WAC 173-490.

- Water Code, RCW 90.03 and Water Rights, RCW 90.14. Establishes water rights permits necessary for water withdrawals, including groundwater extraction.

- Protection of Withdrawal Facilities associated with Ground Water Rights, WAC 173-150. Restricts activities which would impair senior groundwater rights, including water level lowering and water quality degradation.

- Protection of Upper Aquifer Zones, WAC 173-154. Also restricts activities which would impair senior groundwater rights, including water level lowering and water quality degradation.

- Minimum Standards for Construction and Maintenance of Water Wells, WAC173-160. Governs design of extraction and recharge wells.

- Water Well Construction Act, RCW 18.104.

- State Environmental Policy Act (SEPA), WAC 197-11.

- Water Pollution Control Act, RCW 90.48. Authorizes the use of water quality regulations at hazardous waste sites.

- Washington Water Quality Standards, WAC 173-201.

APPENDIX C

STATE CONCURRENCE WITH REMEDY

7527a

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

SEP 29 1987

Superfund Branch

September 23, 1987

Mr. Robie G. Russell
Regional Administrator
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Russell:

Interim Final Record of Decision (ROD) for
<u>Colbert Landfill Site, Colbert, Washington</u>

The Washington Department of Ecology has reviewed the Interim Final ROD for the Colbert Landfill site and concurs with the selected performance-based remedies as the final remedial action. We agree that in this situation prescribing performance standards for a pump and treat system is better than dictating a specific technology. There are several suitable technologies which will remediate the groundwater contamination associated with the Colbert Landfill. The alternate water supply system is also an important component of the remedial action.

We look forward to the upcoming consent decree negotiation sessions with the potential responsible parties. The outlook for a satisfactory settlement, especially with our unified effort, is very promising.

Sincerely,

Andrea Beatty Riniker
Director

ABR:MB:md

APPENDIX D

INDEX TO THE ADMINISTRATIVE RECORD

NDEX TO ADMINISTRATIVE RECORD OF COLBERT LANDFILL

Doc#	File	Type/Description	Date	# Pages	Author/Organization	Addressee/Organization
00000001.	Preliminary assessment	Potential hazardous waste site-identification and preliminary assessment	4/80	4	Neil Thompson, EPA	Unknown
00000002.	Preliminary assessment	Enforcement review	6/30/80	1	D. Stefani	Unknown
00000003.	Preliminary assessment	Colbert landfill, general description and background info. Time estimates for site cleanup	no date	5	Unknown	Unknown
00000004.	Site investigation report	Enforcement review/potential hazardous waste site - site inspection report/memo re same	6/30/80	11		
00000005.	Site investigation report	Sample and analysis review	5/19/80	1	C. Wilson, EPA	Unknown
00000006.	Site investigation report	Potential hazardous waste site - site inspection report	8/23/82	10	Hussein Aldis, EPA	Unknown
00000007.	State cooperative agreements	Cover letter/cooperative agreements between WDOE and U.S. EPA	2/29/84	39	Donald Moos, WDOE	Ernesta Barnes, EPA
00000008.	State cooperative agreements	Cover letter/EPA assistance agreement - amendment	4/13/84	7	Donald Moos WDOE	Frederick Meadows, EPA
00000009.	State cooperative agreements	Cover letter/IRM cooperative agreement-amendment between Washington WDOE and U.S. EPA	7/24/84	34	Donald Moos, WDOE	Ernesta Barnes, EPA
00000010.	State cooperative agreements	Cover letter/EPA assistance agreement-amendment	8/30/84	5	EPA	WDOE
00000011.	State cooperative agreements	Cover memo/memo re deviation memo for Colbert	9/11/84	2	Cristina Griffin, EPA	Phil Millam, EPA
00000012.	State cooperative agreements	Memo re Amendment of Superfund cooperative agreement No. V-000282-02-1	3/10/85	2	Neil Thompson, EPA	Oddvar Aurdal, EPA
00000013.	State cooperative agreements	Memo/completed cooperative agreement application re RI/FS	12/19/85	12	John Littler, WDOE	Ernesta Barnes, EPA
00000014.	State cooperative agreements Colbert RI/FS	EPA assistance agreement-amendment re	3/13/86	4	Charles Findley, EPA	Phillip Johnson, WDOE

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00000015.	State cooperative agreements	Memo/letter re Extension of cooperative agreement	8/13/86	2	Neil Thompson, EPA	Oddvar Aurdal, EPA
00000016.	State cooperative agreements	Letter re project and budget extension for Colbert	8/15/86	1	Oddvar Aurdal, EPA	John Littler, WDOE
00000017.	State cooperative agreements	Memo re Extension of project and budget periods for Colbert cooperative agreement	12/31/86	1	Neil Thompson, EPA	Oddvar Aurdal, EPA
00000018.	State cooperative agreements	Letter re time extension for feasibility study re Colbert	12/29/86	1	Fred Gardner, WDOE	Kathy Davidson, EPA
00000019.	State cooperative agreements	Letter re project and budget extension for Colbert	2/27/87	1	Oddvar Aurdal, EPA	Phillip Johnson, WDOE
00000020.	State cooperative agreements	Memo re extension of ending date for Colbert cooperative agreement	2/26/87	1	Neil Thompson, EPA	Oddvar Aurdal, EPA
00000021.	State cooperative agreements	Assistance amendment to extend project and budget period for Colbert	1/6/87	1	Oddval Aurdal, EPA	Phillip Johnson, WDOE
00000022.	County-EPA cooperative agreements	Memo re proposed cooperative agreement with Spokane County for Colbert	9/24/81	9	Sam Morekas, EPA	Fred Meadows, EPA
00000023.	County-EPA cooperative agreements	Colbert landfill cooperative agreement-proposal. Attachments: Federal Assistance Application, A-95 Review letter, statement of work, community relations plan	9/15/81	28	William Dobratz, Spokane County	EPA
00000024.	County-EPA cooperative agreements	Notification of assistance award action-nonconstruction re Colbert RI/FS	9/24/81	1	EPA	Spokane County
00000025.	County-EPA cooperative agreements	Letter/assistance agreement-amendment	10/19/81	5	William Dobratz, Spokane County	Neil Thompson, EPA
00000026.	County-EPA cooperative agreements	Commitment notice/grant funding order	9/24/81	2	Barbara Barras, EPA	Spokane County
00000027.	County-EPA cooperative agreements	Letter re extension of project completion date for Colbert grant	2/2/82	1	Neil Thompson, EPA	William Dobratz, Spokane County
00000028.	County-EPA cooperative agreements	Assistance amendment re extension of budget and project	3/29/82	1	Frederick Meadows, EPA	William Dobratz, Spokane County

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00000029.	County-EPA cooperative agreements	Letter re extension of project completion date	5/27/82	1	William Dobratz, Spokane County	Neil Thompson, EPA
00000030.	County-EPA cooperative agreements	Assistance agreement-amendment re Colbert disposal site	9/24/81	4	Frederick Meadows, EPA	Spokane County
00000031.	State cooperative agreements	Letter re extension of date of Colbert cooperative agreement	10/7/86	1	Fred Gardner, WDOE	Kathy Davidson, EPA
00000032.	Work plans	Memo re Colbert landfill transfer agreement; transfer agreement	7/18/84	4	Don Dubois, WDOE	Lynda Brothers
00000033.	Work plans	Site management plan for Colbert landfill	10/1/84	3	Unknown	Unknown
00000034.	Work plans	Memo/attachments re work plan for geophysical bore hole logging, cost estimate, QA/QC plan, statement re conflict of interest	1/9/85	7	Bruce Auld, Geo/Resource Consultants	Douglas Morrell
00000035.	Work plans	Work plans for remedial investigation of Colbert landfill	1/29/85	49	Golder Assoc.	WDOE
00000036.	Work plans	Work plan for feasibility study at Colbert landfill site	2/86	38	Golder Assoc. and Envirosphere	WDOE
00000037.	Work plans	Work plan Colbert landfill site	No date	4	Unknown	Unknown
00000038.	Groundwater investigation and report	Letter/request for proposals re hydrogeological report and monitoring wells for Spokane County operated landfills	2/6/81	8	William Dobratz	WDOE
00000039.	Groundwater investigation and report	Letter/agency response forms re hydrogeological and monitoring wells project	2/26/81	12	Martha, Shannon, Spokane Regional Planning Conf.	Damon Taam, Spokane County
00000040.	Groundwater investigation and report	A description of tasks and subtasks used for estimating the cost of Phase 1	4/10/81	3	Unknown	Tech.Operations Section
00000041.	Groundwater investigation and report	Agreement between owner/client and George Maddox & Associates, for professional services	4/21/81	37	George Maddox & Assoc.	Spokane County
00000042.	Groundwater investigation and report	Letter/attachments re proposed budget for Phase II of Colbert/Mica landfill investigation	8/31/81	11	George Maddox & Assoc.	Damon Taam, Spokane County

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00000043.	Groundwater investigation and report	Resolution No. 81 1046 of Spokane County Board of Commissioners re hydrogeologic report including well installation and monitoring at Colbert and Mica/attachments	9/17/81	3	Spokane County Board of Commissioners	Unknown
00000044.	Groundwater investigation and report	Preliminary report on a geohydrology of the Colbert landfill--Spokane County, WA. Phase I (document located at WDOE)	11/9/81		George Maddox & Assocs, James Montgomery, Consulting Engrs.	Spokane County Utilities Dept.
00000045.	Groundwater investigation and report	Letter/Phase II progress report	2/26/82	5	Damon Taam, Spokane County	Neil Thompson, EPA
00000046.	Groundwater investigation and report	Letter/Phase II progress report re geohydrologic study of Colbert and Mica landfill sites	5/24/82	14	George Maddox, George Maddox & Assocs.	William Dobratz, Spokane County
00000047.	Groundwater investigation and report	Letter/attachments re technical, property, financial status and summary reports re grant CA 809777-01	12/15/82	6	Damon Taam, Spokane County	Betty Gordon, EPA
00000048.	Groundwater investigation and report	Letter/attachments re resistivity data collection, proposed budget, graphs	7/7/83	8	Tim Cook, George Maddox Assocs.	Damon Taam, Spokane County Utilities Dept.
00000049.	Groundwater investigation and report	Cover letter/final report re Colbert landfill groundwater monitoring program	3/23/84	119	George Maddox, George Maddox & Assocs.	William Dobratz, Spokane County
00000050.	Groundwater investigation and report	Report: Geophysical Borehole Logging--Colbert landfill (Document located at WDOE)	2/86		Geo/Resource Consultants	Golder Assocs.
00000051.	Groundwater investigation and report	Colbert landfill background information, progress report Phase I, work plan info and budget for Phase II	Unknown	19	Unknown	Unknown
00000052.	Groundwater investigation and report	Report: Geohydrologic Investigations of Colbert landfill - Phase II	Unknown	205	George Maddox & Assocs., James Montgomery Consulting Engrs.	Spokane County Utilities Dept.
00000053.	Groundwater investigation and report	Request for proposals re hydrogeologic report and monitoring wells for Spokane County operated landfills	2/3/81	7	Unknown	Unknown

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00000054.	Remedial action management plan (RAMP)	Memo re review of Colbert landfill draft RAMP	8/29/83	2	Rene Fuentes, EPA	Neil Thompson, EPA
00000055.	RAMP	Letter re review of Colbert landfill draft RAMP	8/29/83	2	John Anicetti, Spokane County Health Dept.	Neil Thompson, EPA
00000056.	RAMP	Draft RAMP for Colbert landfill	7/29/83	174	Unknown	EPA
00000057.	Initial Remedial Measure (IRM)	Letter/summary report re Colbert landfill water supply and interlocal cooperation agreement between Spokane County and Whitworth Water District No. 2	3/23/84	22	James Legat, Spokane County	Rob Goodman, WDOE
00000058.	IRM	Report: Focused Feasibility Study for IRM at Colbert Landfill	6/84	78	Carol Thompson, WDOE	Unknown
00000059.	IRM	Record of decision re IRM alternative selection for Colbert Landfill/Summary of Interim Remedial Alternatives Selection	8/24/84	18	Ernesta Barnes	Unknown
00000060.	IRM	Decision memo re IRM for Colbert landfill	8/24/84	3	Charles Findley, EPA	Ernesta Barnes, EPA
00000061.	IRM	Memo re Colbert landfill advance match provisions/Assistance Funding Order	8/29/84	2	Russell Wyer, EPA	Chuck Findley, EPA
00000062.	IRM	Briefing for the regional administrator, record of decision, Colbert landfill	Unknown	1	Unknown	Unknown
00000063.	IRM	Report: Responsiveness Summary for IRM at Colbert Landfill	Unknown	15	Carol Thompson, WDOE	Unknown
00000064.	Remedial Investigation (RI) Report	Potential hazardous waste site log	2/26/80	1	J. W. Fey	Unknown
00000065.	RI Report	Report: Evaluation of a Temporary Groundwater Extraction Measure for Colbert Landfill	9/25/85	17	Golder Assoc.	Unknown
00000066.	RI Report	Report: Remedial Investigation Report for the Colbert Landfill, Spokane, WA, Vol. 1	5/87	122	Golder Assoc.	WDOE

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00000067. RI Report	Report: Remedial Investigation Report for the Colbert Landfill, Spokane, WA, Vol. 2	5/87	259	Golder Assoc.	WDOE
00000068. Feasibility Study (FS)	Report: Feasibility Study, Colbert Landfill, Spokane, WA Vol. 1	5/87	360	Golder Assoc.	WDOE
00000069. Feasibility Study (FS)	Report: Feasibility Study, Colbert Landfill, Spokane, WA, Vol. 2	5/87	226	Golder Assoc.	WDOE
00000070. Correspondence, RI/FS	Letter re work plan for County-EPA cooperative agreement	8/26/81	1	Joanne Fujita Asaba, EPA	Damon Taam, Spokane County Utilities
00000071. Correspondence, RI/FS	Memo re summary report of Colbert alternatives	4/5/84	2	Bob Goodman, WDOE	James Legatt, Spokane County Utilities
00000073. Correspondence, RI/FS	Letter re State cooperative agreement for RI/FS at Colbert landfill	6/15/84	1	Charles Findley, EPA	Lynda Brothers, WDOE
00000074. Correspondence RI/FS	Letter with attachment re proposed field investigation at Colbert landfill	4/2/85	5	Jeff Vanke, EPA	Carol Kraege, WDOE
00000075. Correspondence RI/FS	Letter re increased costs of RI/FS	1/14/86	2	Carol Kraege, WDOE	Neil Thompson, EPA
00000076. Correspondence RI/FS	Letter re amendment to State cooperative agreement for performance of RI/FS tasks at Colbert landfill	3/15/86	1	Charles Findley, EPA	John Littler, WDOE
00000077. Correspondence RI/FS	Letter re commencement of RI and requesting deferral of commencement date of RI study phase	4/16/86	2	Spokane County Board of Commissioners	Carol Kraege, WDOE
00000078. Correspondence RI/FS	Letter re review of RI and delay of start of FS	4/17/86	2	Lewis G. Zirkle, Key Tronic	Carol Kraege, WDOE
00000079. Correspondence RI/FS	Letter re request for delay of FS	5/5/86	2	Carol Kraege, WDOE	Spokane County Board of Commissioners
00000080. Correspondence RI/FS	Letter re Key Tronic's wish to assume responsibility for investigation and remedial action at Colbert landfill	7/16/86	2	Gary Haight, Key Tronic	Fred Gardner, WDOE
00000081. Correspondence RI/FS	Letter re response to Haight's letter of 7/16/87	8/27/86	4	Fred Gardner, WDOE	Gary Haight, Key Tronics

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00000082.	Correspondence RI/FS	Letter re projected schedules for Colbert and Northside	8/25/86	1	Neil Thompson, EPA	Fred Gardner, WDOE
00000084.	Correspondence RI/FS	Letter re Pounder's Excavation's availability for services re decontaminate Colbert landfill	2/10/87	2	Bill Mann, Pounder's Excav.	EPA
00000085.	Correspondence RI/FS	Letter re time extension for FS	2/18/87	2	Fred Gardner, WDOE	Kathy Davidson, EPA
00000086.	Correspondence RI/FS	Letter re effects of SARA on Spokane County	3/12/87	4	Fred Gardner, WDOE	Jerry Neal, Lukins & Annis
00000087.	Correspondence RI/FS	Memo re selection of final remedial measure for Colbert landfill	3/16/87	2	Carol Kraege, WDOE	Colbert Landfill file
00000088.	Correspondence RI/FS	Letter re response to letter of 2/10/87 suggesting Pounder's availability of services re decontamination of Colbert landfill	4/20/87	1	Neil Thompson, EPA	Bill Mann, Pounder's Excavation
00000089.	Correspondence RI/FS	Letter re Colbert landfill RI/FS information requests	5/20/87	2	Paul Agid, Dames & Moore	Doug Morell, Golder Assoc.
00000090.	Correspondence RI/FS	Letter re Colbert landfill extraction/ treatment system	5/27/87	2	Leo Hutchins, Whitworth Water District No. 2	Fred Gardner, WDOE
00000091.	Correspondence RI/FS	Letter re response to questions on Colbert landfill RI/FS	6/10/87	7	Anthony Burges, Golder Assoc.	Fred Gardner, WDOE
00000092.	Correspondence RI/FS	Letter re response to questions on Colbert landfill RI/FS	6/17/87	2	Golder Assoc.	Fred Gardner, WDOE
00000093.	Correspondence RI/FS	Letter re extension of public comments for Colbert landfill FS	6/19/87	1	Robie Russell, EPA	A. Pardini, Spokane Office of Sen. Dan Evans
00000094.	Correspondence RI/FS	Letter re Colbert landfill FS and southern area of Whitworth Water District water system	6/25/87	3	Leo Hutchins, Whitworth Water District No. 2	Pat Mumney, John McBride, Keith Shepard
00000095.	Correspondence RI/FS	Letter re Colbert landfill-RI/FS reports and attached resolution of Whitworth Water District No. 2 re drilling of wells	6/26/87	4	Leo Hutchins, Whitworth Water District No. 2	Fred Gardner, WDOE

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00000096.	Memos RI/FS	Memo/attachments re information on Caron Chemical and Colbert Landfill sites	12/29/80	9	Don Dubois, EPA	Michael Cook, EPA
00000097.	Memos RI/FS	Memo re Superfund engineering feasibility design funds	5/22/81	2	Charles Findley, EPA	Michael Cook, EPA
00000098.	Memos RI/FS	Letter re Superfund Cooperative Agreement Guidance	8/26/81	1	Joanne Fujita Asaba, EPA	Tom Cook, WDOE
00000099.	Memos RI/FS	Memo re Superfund Cooperative Agreement for Colbert landfill	8/28/81	1	Joanne Fujita Asaba, EPA	Ed Coate, Alex Smith, Chuck Findley, Ken Feigner, John Barich, Neil Thompson, Lloyd Reed, Clark Gaulding, Gary O'Neal, Cheryl Koshuta
00000100.	Memos RI/FS	Decision memo re Colbert Landfill Cooperative Agreement Proposal	9/18/81	2	John Spencer, EPA	Michael Cook, EPA
00000101.	Memos RI/FS	Memo re Colbert Landfill Cooperative Agreement Fact Sheet	9/25/81	3	Joanne Fujita Asaba, EPA	Mary Neilson, EPA Bob Jacobson, EPA
00000102.	Memos RI/FS	Memo re Colbert Landfill Cooperative Agreement	10/1/81	2	Charles Findley, EPA	John Spencer, EPA
00000103.	Memos RI/FS	Memo re Colbert landfill contamination-substituting for versus cleaning up an unusable aquifer	11/3/83	5	Michael Ruef, WDOE	Linda Brother, WDOE Earl Tower, EPA
00000104.	Memos RI/FS	Memo re Colbert landfill groundwater contamination, review corrective proposals by CH2MHill, Maddox Associates and other alternatives	12/15/83	8	Michael Ruef, WDOE	John Littler, WDOE
00000105.	Correspondence	Letter re additional EPA funding under current RAP	12/29/83	1	John Littler, WDOE	Phil Millam, EPA

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00000106.	Correspondence	Letter re advance match funds at Colbert site	2/15/84	2	Phil Millam, EPA	John Littler, WDOE
00000107.	Quality Assurance Project Plans (QAPP)*	Report: Quality Assurance Project Plan for Remedial Investigations at the Colbert Landfill (document located at Washington WDOE)	1/85	Unknown	Golder Assoc.	WDOE
00000108.	QAPP	Letter review evaluation of final version of Colbert landfill QAPP	5/9/85	1	Barry Towns, EPA	Doug Morell, Golder Assocs.

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00000109.	Public Comment Responsiveness Summary	Letter re: activities at the Colbert Landfill	12/8/86	2	Andrea Beatty Riniker, WDOE	Members of Colbert Landfill Contaminate Area Committee
00000110.	Public Comment Responsiveness Summary	Letter regarding earlier letter dated 4/17/87 to "Concerned Citizens"	4/24/87	3	Grace Garrison, Resident	Andrea B.T. Riniker, WDOE
00000111.	Public Comment Responsiveness Summary	Letters on Colbert Landfill; feasibility study report and comment period	5/21/87	71	Key Tronic employees, Key Tronic supporters, County commissioner, legislator, citizens of Colbert area & other areas	Andrea Beatty Riniker, WDOE
00000112.	Public Comment Responsiveness Summary	Letter re: extension of public comment period	6/17/87	1	Robbie Russell, EPA	Andrea Beatty Riniker, WDOE
00000113.	Public Comment Responsiveness Summary	Letter regarding Colbert Landfill feasibility study comments	6/29/87	3	Key Tronic Corp.	Fred Gardner, WDOE
00000114.	Public Comment Responsiveness Summary	Letter re Colbert Landfill remedial investigation and feasibility study	6/29/87	2	Craig Costello, Colbert Landfill Contaminate Area Committee	Fred Gardner, WDOE
00000115.	Public Comment Responsiveness Summary	Letter regarding Colbert Landfill feasibility study comment	6/29/87	3	Patricia A. Mumney, John R. McBride, Board of Commissioners of Spokane County	Fred Gardner, WDOE
00000116.	Public Comment Responsiveness Summary	Letter re feasibility study	6/29/87	1	Rhys A. Sterling, Spokane County Health District	Fred Gardner, WDOE
00000117.	Public Comment Responsiveness Summary	Letter regarding Spokane County Air Pollution Control Authority review of Colbert Landfill feasibility study	6/30/87	2	Christopher McEnnay, Spokane County Air Pollution Control Authority	Fred Gardner, WDOE

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00000118.	Public Comment Responsiveness Summary	Colbert Landfill remedial investigation/ feasibility study comments for submission to WDOE	6/30/87	22	Dames & Moore, Key Tronic Corp.	WDOE
00000119.	Permits and/or applications-- state/Federal	Industrial/commercial waste discharge permit application form	4/17/78	3	Key Tronic Corp.	WDOE
00000120.	Permit and/or applications- state/Federal	Hazardous waste permit application; Notification of Hazardous Waste activity	6/1/69	7	Lewis G. Zirkle, Key Tronic Corp.	EPA
00000121.	Reference materials or listing of guidance documents used	Guidances for administrative record (Actual guidances located at EPA Regional Office)		2	Neil Thompson, EPA	
00000122.	Community Relations & News Releases	Cover letter with attachments regarding cooperative agreement for EPA grant on Colbert disposal site; revised work statement; community relations plan	11/12/81	28	William R. Dobratz, Damon Taam, Spokane County Office of County Utilities	Neil Thompson, EPA
00000123.	Community Relations & News Releases	News release re Federal grant for groundwater contamination at Colbert	10/21/81	1	EPA	
00000124.	Community Relations & News Releases	Memo regarding immediate news release	11/24/81	1	Unknown	
00000125.	Community Relations & News Releases	Phase II Community Relations scheduling	11/24/81	2	Unknown.	
00000126.	Community Relations & News Releases	Letter re agenda of informal public meeting	11/25/81	1	William R. Dobratz, Spokane County	
00000128.	Community Relations & News Releases	Community relations plan for remedial investigation of feasibility study with appendices	No date	20	Carol Rushin Thompson, WDOE	
00000129.	Community Relations & News Releases	Colbert Landfill Community Meeting Notice with attachments	2/20/85	8	Unknown	
00000130.	Community Relations & News Releases	Colbert Landfill update	7/85	1	WDOE	

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00000131.	Community Relations & News Releases	Colbert Landfill update	8/85	1	WDOE	
00000132.	Community Relations & News Releases	News release re clean water for Spokane families with polluted wells	7/2/85	1	WDOE	
00000133.	Community Relations & News Releases	News release: Colbert Landfill meeting announced	10/23/85	1	WDOE	
00000134.	Community Relations & News Releases	Colbert Landfill update	10/85	1	WDOE	
00000135.	Community Relations & News Releases	Memo & minutes of county commissioners' meeting held January 8, 1986; Colbert Landfill Contaminate Area Citizens Proposals	1/10/86	4	Robin Swanson	
00000136.	Community Relations & News Releases	Notice of public meeting re RI	4/22/86	1	WDOE	
00000137.	Community Relations & News Releases	Memo re progress of Colbert Landfill Contaminate Area Committee	7/27/86	1	Colbert Landfill Contaminate Area Committee	Residents of Colbert
00000138.	Community Relations & News Releases	Letter re: current and future cleanup activities	8/5/86	3	Fred Gardner, WDOE	Residents
00000139.	Community Relations & News Releases	Memo with attached Colbert mailing list	8/26/86	24	Janet Rhodes, DOE	Neil Thompson, EPA
00000140.	Community Relations & News Releases	Newsletter--Colbert property owners' update	8/86	1	Spokane County--Key Tronic Corp.	
00000141.	Community Relations & News Releases	Public meeting notification and affidavit of publication	5/14/87	3	Jerry Jewell, WDOE	
00000142.	Community Relations & News Releases	Fact sheet re: proposed Colbert landfill cleanup	5/14/87	8	WDOE	
00000143.	Community Relations & News Releases	For Immediate Release: Ground-water cleanup views sought (News Release)	5/21/87	2	WDOE	
00000144.	Community Relations & News Releases	Agenda for Colbert Landfill meeting	5/22/87	1	WDOE	

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00000145.	Community Relations & News Releases	Letter re extension of public comment period	5/28/87	1	Andrea Beatty Riniker, WDOE	Robie Russell, EPA
00000146.	Community Relations & News Releases	Colbert Landfill public meeting transcript	6/9/87	118	Jeanne Bullis, Reiter & Assocs.	
00000147.	Community Relations & News Releases	Air water pollution report Around The States	6/15/87	1	Unknown	
00000148.	Community Relations & News Releases	Cleaning up the Colbert Landfill (general information)		4	Unknown	
00000149.	Newspaper articles	Chemical Cleanup money may go to Colbert Landfill	1/09/81	1	Jeff Sher, Spokesman-Review	
00000150.	Newspaper articles	County is expecting report early in '82 on aquifer's quality	12/11/81	1	Kim Crompton, Spokane WA Weekly Chronicle	
00000151.	Newspaper articles	Households near landfill demand end to pollution	11/17/82	1	Kim Crompton, Chronicle	
00000152.	Newspaper articles	13 Waste sites proposed for cleanup priority list	11/18/82	1	Greg Darby, Spokesman-Review	
00000153.	Newspaper articles	2 years later water near landfill troubling	11/18/82	1	Greg Darby, Spokesman-Review	
00000154.	Newspaper articles	Contaminated Colbert Landfill gets second nomination to EPA's cleanup list	11/24/82	1	Tri-County Tribune	
00000155.	Newspaper articles	Water woes need curing	3/3/83	1	Spokane Chronicle	
00000156.	Newspaper articles	County officials get ready for second landfill session	3/19/83	1	John Craig, Spokane Chronicle	
00000157.	Newspaper articles	County, company appeal pollution award	4/8/83	1	Ken Sands, Spokane Chronicle	
00000158.	Newspaper articles	Family of seven quitting polluted water area home	4/23/83	1	Tim Hanson, Spokane Chronicle	
00000159.	Newspaper articles	Incident brings tighter county landfill controls	7/12/83	1	Ken Sands, Spokane Chronicle	
00000160.	Newspaper articles	Hazardous waste barrels buried at landfill	7/13/83	1	Ken Sands, Spokesman Review	

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00000161.	Newspaper articles	Two more residents sue over polluted wells	7/27/83	1	Richard Wagoner, Spokesman Review	
00000162.	Newspaper articles	Colbert water decision promised within two weeks	7/30/83	1	Ken Sands, Spokesman Review	
00000163.	Newspaper articles	Contracts place Colbert closer to water system	1/4/84	1	Ken Sands, Spokane Chronicle	
00000164.	Newspaper articles	Feasibility of cleaning up Colbert Site to be studies	4/27/85	1	Ken Sands, Spokesman Review	
00000165.	Newspaper articles	Pollution spreading in aquifers	11/8/85	1	Jeff Sher, Spokesman-Review	
00000166.	Newspaper articles	Key Tronic adds firms to lawsuit	5/30/86	1	Kim Crompton, Spokane Daily Chronicle	
00000167.	Newspaper articles	Key Tronic wants others to share dumping blame	5/30/86	1	Kim Crompton, Spokesman-Review	
00000168.	Newspaper articles	Colbert area well ban asked	6/25/86	1	Tri-County Tribune	
00000169.	Newspaper articles	Key Tronic, County liable for pollution	6/28/86	1	Kim Crompton, Spokesman-Review	
00000170.	Newspaper articles	Landfill decision left intact	8/8/86	1	Kim Crompton, Spokesman-Review	
00000171.	Newspaper articles	Key Tronic, county still liable for dumping	8/9/86	1	Kim Crompton, Spokesman-Review	
00000172.	Newspaper articles	Well water woes worth $42,360	10/21/86	1	Kim Crompton, Spokesman-Review	
00000173.	Newspaper articles	Key Tronic layoffs 'may backfire'	11/22/86	2	Bill Sallquist, Spokesman-Review	
00000174.	Newspaper articles	Colbert cleanup costs could climb to $17.5 million	1/20/87	1	Jeff Sher, Spokesman-Review	
00000175.	Newspaper articles	Troubles blamed on water district	1/30/87	1	Kim Crompton, Spokesman-Review	
00000176.	Newspaper articles	Developer wins Colbert lawsuit for $1.8 million	2/11/87	1	Kim Crompton, Spokesman-Review	
00000177.	Newspaper articles	Key Tronic reduces its work force	2/13/87	1	Bill Sallquist, Spokesman-Review	
00000178.	Newspaper articles	Work won't lower wells, experts say	6/1/87	1	Jim Camden, Spokesman-Review	

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00000179.	Newspaper articles	More comment time wanted on Colbert plan	5/24/87	1	Jeff Sher, Spokesman-Review Spokane Chronicle	
00000182.	Newspaper articles	Work won't lower wells, experts say	5/29/87	2	Jim Camden, Spokesman-Review	
00000183.	Newspaper articles	Colbert cleanup plan has hasty approach	5/31/87	1	Spokesman-Review	
00000185.	Newspaper articles	The issue is fairness; Colbert cleanup	6/7/87	2	Key Tronic, The Spokesman-Review Spokane Chronicle	
00000186.	Newspaper articles	Around the States - Washington	6/15/87	1	Air/water Pollution Report	
00000188.	Newspaper articles	Colbert residents file suits	3/13/86	1	Kim Crompton, Spokane Daily Chronicle	
00000189.	Newspaper articles	County to run landfill cleanup	No date	1	Jeff Sher, Spokesman-Review	
00000190.	Lab reports/raw data	Memo/attachments re organic analysis of aqueous samples/water well records/ water quality reports	1/14/80	13	Alexandra Smith, EPA	Gary O'Neal, EPA
00000191.	Lab reports/raw data	Table re water quality at selected wells near Colbert Landfill	2/10-11/81	1	EPA	
00000192.	Lab reports/raw data	Memo w/attachments re well water samplings/maps	4/24/81	7	Ben Eusebio, EPA	Chuck Findley, EPA
00000193.	Lab reports/raw data	Letter re Colbert Landfill data analysis	6/19/81	5	James Malm, WDOE	Carolyn Wilson, EPA
00000194.	Lab reports/raw data	Letter w/attachments re water quality tests at Colbert	8/31/81	4	William Dobratz, Spokane County Utilities	Joanne Fujita Asaba, EPA
00000195.	Lab reports/raw data	Well water sampling results	1/28/82	5	Unknown	
00000196.	Lab reports/raw data	Field sample data sheet	8/4/82	1	Tim Cook, George Maddock & Assocs.	R. R. Jones
00000197.	Lab reports/raw data	Metal data-AA-11GA 2100 (Water), Santora well	8/4/82	14	EPA	Roy Jones
00000198.	Lab reports/raw data	Base/neutral compounds	3/25/82	8	Jim Blasethick, EPA	
00000199.	Lab reports/raw data	Inspection report and memo with sample results	6/7/86	8	Schlender, WDOE	Carol Kraege, Fred Gardner, WDOE

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00000200.	Lab reports/raw data	Memo re continued sampling of Colbert monitoring wells	11/19/86	1	Carol Kraege, WDOE	Fred Gardner, WDOE
00000201.	Lab reports/raw data	Sampling results	2/27/87	1	Unknown	
00000202.	Lab reports/raw data	Shallow Soil Gas Investigation in the Vicinity of the Colbert Landfill/Field Data	12/86	50	Don Elmeren, Tracer Research Corp.	EPA
00000203.	Lab reports/raw data	Sample results, Lab No. 2895-87	4/8/87	5	ABC Labs, Inc.	Key Tronic Corp.
00000204.	Lab reports/raw data	Colbert Testing Results (Appendix A updated through April, 1987). (Document located at WDOE file.)	1980-2/87		Key Tronic-Spokane County	
00000205.	Lab reports/raw data	April 27, 1987, testing/sampling results, Lab. No. 2981-87	5/10/87	1	Unknown	
00000206.	Lab reports/raw data	Sampling results, Lab No. 30191-87	5/26/87	1	Unknown	
00000207.	Lab reports/raw data	Table 1 re water well records reviewed to develop conceptual model of the geohydrology	No date	7	Unknown	
00000208.	Correspondence	Letter re proposed sampling plan	2/4/81		James L. Malm, WDOE	Carolyn B. Wilson, EPA
00000209.	Correspondence	Letter regarding WA future solid waste grant #266310104	5/14/81	1	Peter R. Haskins, WDOE	William R. Dobratz, Spokane County Utilities Dept.
00000210.	Correspondence	Letter regarding postponing of drilling at Mica Landfill site	3/30/82	2	George E. Maddox, George E. Maddox & Assocs.	Damon Taam, Spokane County Utilities Dept.
00000211.	Correspondence	Letter re potential health impact of volatile organics	10/23/85	1	Carl Sagerser, Dept. of Social & Health Services	Carol Kraege, WDOE
00000212.	Correspondence	Letter re potential health impact of volatile organics	10/14/85		Carol Kraege, WDOE	Bill Lichte, Dept. of Social & Health Services
00000213.	Correspondence	Letter re announcement of site manager and formation of action committee	3/4/87	2	Lewis G. Kirkle, Key tronic	Fred Gardner, WDOE
00000214.	Correspondence	Letter re extension of public comment period with attached news article	5/29/87	2	A. J. "Bud" Pardini, U.S. Senate	Robbie Russell, EPA
00000215.	Correspondence	Letter regarding Superfund proposal cleanup of Colbert Landfill	6/17/87	2	Jane T. King, resident	Fred Gardner, WDOE

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00000216.	Correspondence	Memo re request for technical assistance	No date	2	Bob Courson, EPA	Jeff VanEe, EMSL
00000217.	Memoranda, Misc.	Memo re revision of work request ESD-82-025	2/25/82	1	Neil Thompson, EPA	Bill Schmidt, EPA
00000218.	Memoranda, Misc.	Memo (handwritten) re observation of electrical resistivity field work	5/1/85	3	Mike Gallagher, WDOE	Carol Kraege, WDOE
00000219.	Notices	Notice re Colbert Landfill comment period	6/2/87	3	WDOE	
00000220.	Notices	Notice of public review period for the focus feasibility study for the initial remedial measure at Colbert Landfill.	7/17/84	1	WDOE	
00000221.	State Cooperative Agreement	Memo re deviation from 40CFR.30.308 for the Colbert Landfill site, Washington (CV000282)	8/29/84	2	Sam Morekas, EPA	Harvey G. Pippin, I[illegible]
00000223.	Maps	Exhibit 12 (Alternatives). (Map at EPA Regional (Site) file.)	No date	1	Unknown	
00000224.	Maps	Exhibit 13 (Gleneden Plan). (Map at EPA Regional (Site) file.)	No date	1	Unknown	
00000225.	Maps	Duplicate of Document # 00000223 (above: Exhibit 12)				
00000226.	Maps	Colbert Landfill, Aquifer	12/86	1	Golder Associates	
00000227.	Maps	Preliminary General Geologic map. (Map at EPA Regional (Site) file)	No date	1	Allen Griggs Map 1-464, USGS, M.M. Maddox Assocs./ Montgomery Engineers	
00000228.	Maps	Preliminary locations map of proposed Phase II drilling and water sampling points. (Map at EPA Regional (Site) file.)	No date	1	Spokane County Utilities Department	
00000229.	Maps	Preliminary cell map. (Map at EPA Regional (Site) file.)	No date	1	Spokane County Utilities Department	
00000230.	Maps	Preliminary relation of hydraulic gradient and width of unit square areas	No date	1	M.M. Maddox Assocs./ Montgomery Engineers	

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00000231.	Maps	Preliminary relations of water level, elevation and unit square areas	No date	1	M.M. Maddox Assocs./ Montgomery Engineers	
00000232.	Maps	Groundwater flow net, middle sand aquifer. (Map located at EPA Regional file.)	No date	1	M.M. Maddox Assocs./ Montgomery Engineers	
00000233.	Maps	Preliminary detailed potentiometric surface map, Middle Sand Aquifer. (Map at EPA Regional (Site) file.)	No date	1	Spokane County Utilities Department	
00000234.	Maps	Preliminary general potentiometric surface map, Middle Sand Aquifer. (Map at EPA Regional (Site) file.)	No date	1	Spokane County Utilities Department	
00000235.	Maps	Preliminary detailed potentiometric surface map, Middle Sand Aquifer. (Map at EPA Regional (Site) file.)	No date	1	Spokane County Utilities Department	
00000236.	Maps	Preliminary detailed Isopach map, Upper Clay Unit. (Map at EPA Regional (site) file.)	No date	1	Spokane County Utilities Department	
00000237.	Maps	Preliminary general potentiometric surface map, Upper Sand Aquifer (map at EPA regional (site) file).	No date	1	Spokane County Utilities Department	
00000238.	Maps	Preliminary general isopach map, Upper Clay Unit. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department	
00000239.	Maps	Preliminary Detailed Structure Contour map, top of Upper Clay. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department	
00000240.	Maps	Preliminary General Structure Contour map, top of Middle Sand. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department	
00000241.	Maps	Preliminary Detailed Structure Contour map, top of Middle Sand. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department	
00000242.	Maps	Preliminary General Structure Contour map, top of Upper Clay Unit. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department	

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243.	Maps	Geologic Cross Section C-C. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department. M. M. Maddox Assocs./Montgomery Engineers	
244.	Maps	Geologic Cross Section B-B. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department. M. M. Maddox Assocs./Montgomery Engineers	
245.	Maps	Geologic Cross Section A-A. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department. M. M. Maddox Assocs./Montgomery Engineers	
246.	Maps	Preliminary Location map, existing water wells. (Map at EPA regional (site) file.)	No date	1	Spokane County Utilities Department.	
247.	Maps	Location map of proposed drilling and water sampling site. (Map at EPA regional (site) file.)	7/30/81	1	George Maddox & Assocs., Inc.	
248.	NPL Listing & Comments	Federal Register, Vol 47., No. 251, pp. 58470-84, NPL proposed rules	12/3/82	9	EPA	
249.	NPL Listing & Comments	Federal Register, Vol. 48, No. 175, pp. 40658-40673. Final Rule, National Priorities List	9/8/83	17	EPA	