DRAFT FEASIBILITY REVIEW AND
DRAFT CLEANUP ACTION PLAN
7-11 STORE NO 25821
1824 GEORGE WASHINGTON WAY
RICHLAND, WASHINGTON

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1.0 INTRODUCTION

The purpose of this combined Feasibility Review and Cleanup Action Plan (CAP) is to evaluate cleanup action alternatives and recommend a cleanup action for the subject site. The site is located at 1824 George Washington Way in Richland, Washington, and the property building is currently used as the location of a sandwich shop. The site was the former location of an operating 7-Eleven convenience store (Southland Corporation, Store Number 25821). The 7-Eleven store had underground gasoline storage tanks for their gasoline sales. Petroleum contaminated soil and ground water, resulting from the use of the underground storage tanks, have been identified at the site.

Southland intends to allow the sandwich shop to continue to operate and, therefore, requires a cleanup action that will minimize impacts to the business. Also, because much of the contaminated soil has been previously excavated and the site has been resurfaced with asphalt pavement, the use of soil excavation as a cleanup action is limited.

Currently, Southland is performing this site cleanup as an independent remedial action, without Ecology's assistance or approval. However, this action is not intended to preclude Southland from later entering into a cooperative agreement with Ecology for the site cleanup.

The combined Feasibility Review and CAP have been prepared to satisfy the requirements of the Washington State Model Toxics Control Act (MTCA, commonly pronounced MOT'ca). MTCA regulations require that a Remedial Investigation and Feasibility Study (RI/FS) be conducted. The remedial investigation work has been performed, and the results of this work are summarized in Sections 2.0 and 3.0 of this document. The Feasibility Study requirements are presented in Section 4.0 of this document.

The CAP requirements are presented in Section 5.0 of this document. The CAP identifies the selected cleanup alternative, site cleanup levels, and the points where compliance with the cleanup levels are intended to be met. A proposed schedule for implementation, showing an estimated restoration time frame, also is included in Section 5.0.

2.0 SITE BACKGROUND

The site was the former location of 7-Eleven Store Number 25821 and is located at the corner of McMurray Street and George Washington Way in the Richland, Washington. The property building is currently used as the location of a sandwich shop.

The site is situated at an approximate elevation of 36 feet, city of Richland Datum. The area is zoned for commercial use, with residential surrounding areas. The subject property currently is occupied by the store building and an asphalt paved parking area. Plate 1 identifies the site location.

Kleinfelder, Tank Closure Report, June 1989

Southland Corporation requested that Kleinfelder observe and document the removal of the three underground gasoline tanks (single-wall fiberglass) at the subject site (Plates 1 and 2). The results of this work were presented in Kleinfelder Report 60-1049-01, dated June 13, 1989.

The tank removal contractor reported the tanks were approximately two to two and one half years old, each tank had an approximate 10,000-gallon capacity, and the tank vault was approximately 12 feet deep. The contractor also stated the property had previously been a Mobil Oil Station, prior to it being used for the 7-Eleven Store. The contractor reported that the old Mobil Oil tanks had been removed when Southland Corporation purchased the property and that the fiberglass tanks were installed at this time.

The contractor reported that the fiberglass supply lines, connecting the tanks to the pump island, had been broken during the tank excavation and approximately five gallons of gasoline had been spilled (from the broken lines) into the northwest corner of the tank vault.

A Kleinfelder technician used a photoionization detector (PID) to screen the soils in the northwest corner of the excavation for volatile hydrocarbon compounds. Volatile organic compounds were detected in the area of the reported spill. No soil staining or positive PID readings were noted in other areas of the excavation, located away from the area of the reported spill.

The Kleinfelder technician installed several hand auger exploratory borings throughout the open excavation and recovered soils were field screened with the PID. Volatile hydrocarbons were only detected in the area where the supply lines to the pump island had been broken and product reportedly spilled. Also in this area hydrocarbon odor was detectable and the soil was stained blue gray.

The contractor excavated soils in the area of the broken lines (northwest side of the excavation) to clean up the stained soil. At about 11 feet below the ground surface (bottom of the tank vault) the staining increased, as did the hydrocarbon odor. Ground water was also encountered at approximately 12.5 feet below the ground surface. At 13 feet, the maximum reach of the backhoe, the soil was still obviously contaminated with hydrocarbons.

A small pit was excavated along the south edge of the open excavation, to a depth of 13 feet, to explore if the deeper zone of obvious contamination was wide spread. The soil in this southern excavation area, at a depth of approximately 11 feet, also appeared stained and had a hydrocarbon odor. Ground water was also encountered at 12.5 feet below the ground surface.

After about 41 yards of stained soil was removed from the excavation, a soil sample was collected from the bottom of the excavation (SS0105129A from a depth of 13.5 feet). The sample was analyzed by EPA Method 602 for benzene, ethylbenzene, toluene, and xylenes (BETX), by EPA Method 8015 (modified) for total petroleum hydrocarbons (TPH), and for lead. Chemical analysis results for SS0105129A are as follows (units are mg/kg): benzene, <0.05; ethylbenzene, 59; toluene, 48; xylenes, 1000; fuel hydrocarbons as gasoline, 12,000; fuel hydrocarbons as diesel, <100; and lead, <0.10.

Kleinfelder, Site Exploration Report, September 1989

Southland Corporation requested Kleinfelder to explore the extent of released gasoline in on-site soils and ground water. This work included a limited subsurface exploration of the site and a review of Washington Department of Ecology files to identify water supply wells within a one-half mile radius of the site. The subsurface exploration of the site included the installation and sampling of five ground water monitoring wells (MW01, MW02, MW03, MW04, and MW05).

Physical evidence of hydrocarbon in the soil was found only in well MW05 where stained soil with a hydrocarbon odor was recovered from a depth of about 16 feet.

A ground water sample from each well was analyzed by EPA Method 602 for BETX and by EPA Method 8015 (Modified) for fuel hydrocarbons. BETX was detected in ground water recovered from MW03 and MW05. The ground water sample from MW03 contained 0.7 mg/L meta and para xylene. The ground water sample from MW05 contained 0.8 mg/L ethylbenzene, 2.2 mg/L meta and para xylene, and 2.0 mg/L ortho xylene.

Ground water elevation contours, calculated from ground water depths measured on July 1, 1989, indicate a flow gradient to the southeast of 0.0015 foot.

A review of Washington Department of Ecology files, to identify water supply wells within a one-half mile radius of the site, discovered six wells. All of the identified wells were located up-gradient from the site.

Kleinfelder, Well Sampling Report, December 1989

On November 19, 1989, Kleinfelder conducted sampling of the five ground-water monitoring wells at the site (Kleinfelder Report 60-1075-01, dated December 20, 1989).

One sample of ground water was collected from each well and analyzed for benzene, ethylbenzene, toluene, and xylene (BETX), by EPA method 602, and for fuel hydrocarbons (FH), by EPA method 8015, Modified.

The laboratory results for BETX indicate that concentrations were below the detection limits of 0.5 ug/L for samples collected from MW01, MW02, MW03, and MW04. The sample from MW05 contained 6.4, 4.7, 41, and 220 ug/L of benzene, ethylbenzene, toluene, and xylene, respectively.

Fuel hydrocarbons, quantified as gasoline and diesel, were below the detection limit of 0.5 mg/L in the samples collected from wells MW01, MW02, MW03, MW04, and MW05.

Kleinfelder, Well Sampling Report, March 1990

On February 20, 1990, Kleinfelder conducted sampling of the five ground-water monitoring wells at the site (Kleinfelder Report 60-1075-01, dated March 13, 1990).

One sample of ground water was collected from each well and analyzed for benzene, ethylbenzene, toluene, and xylene (BETX), by EPA method 602, and for fuel hydrocarbons (FH), by EPA method 8015, Modified.

The laboratory results for BETX indicate that concentrations were below the detection limits of 0.5 ug/L for samples collected from MW01, MW02, MW03, and MW04. The sample from MW05 contained 0.9, 6.1, and 38 ug/L of benzene, ethylbenzene, and xylene, respectively. Toluene was not detected in the sample from MW05.

Fuel hydrocarbons, quantified as gasoline and diesel, were below the detection limit of 1.0 mg/L in the samples collected from wells MW01, MW02, MW03, MW04, and MW05.

Kleinfelder, Well Sampling Report, August 1990

On May 23, 1990, Kleinfelder conducted quarterly sampling of the five ground-water monitoring wells at the site (Kleinfelder Report 60-1075-01, dated August 6, 1990). At the request of Southland, a sixth ground-water monitoring well (MW06) was installed. This well was located in the area of the former underground storage tanks. Ground water samples were collected from MW06 on May 24. Plate 3 shows the locations of all monitoring wells on the site.

The elevation of monitoring well MW06 was surveyed to the City of Richland Datum by a licensed land surveyor. The static water level was measured in each of the six wells. From these measurements, ground water contours were interpreted and plotted on the site map in feet above mean sea level (Plate 3).

One sample of ground water was collected from each well and analyzed for benzene, ethylbenzene, toluene, and xylene (BETX), by EPA method 602, and for fuel hydrocarbons (FH), by EPA method 8015, Modified. Due to laboratory error, it was necessary to resample wells MW05 and MW06 on May 30, 1990.

The results for BETX indicate that concentrations were below the detection limits for samples collected from MW01, MW03, and MW04. The sample from MW02 contained concentrations of 1.5 ug/L ethylbenzene and 5.6 ug/L xylene. Benzene and toluene were not detected. The sample from MW05 contained 1.1 ug/L ethylbenzene, 0.5 ug/L toluene, and 7.5 ug/L xylene; benzene was not detected. The sample from the new well, MW06, contained 1300 ug/L ethylbenzene, 8500 ug/L toluene, and 14,000 ug/L xylene. The benzene concentration of <500 ug/L was not accurately measured due to the high dilution factor of 1000.

Fuel hydrocarbons quantified separately as gasoline or diesel were below detection limits in the samples collected from wells MW01, MW02, MW03, MW04, and MW05. Results for the sample from MW06 indicated 470 mg/L quantified as gasoline; diesel was not detected.

Kleinfelder, Well Sampling Report, February, 1991

On January 8 and 9, 1991, Kleinfelder conducted sampling of the six ground-water monitoring wells at the site (Kleinfelder Report 60-1075-02, dated February 5, 1991). Plate 3 shows the locations of all monitoring wells on the site.

One sample of ground water was collected from each well and analyzed for benzene, ethylbenzene, toluene, and xylene (BETX), by EPA method 602, and for fuel hydrocarbons (FH), by EPA method 8015, Modified.

The laboratory results for BETX indicate that concentrations were below the detection limits of 0.5 ug/L for samples collected from MW01, MW02, MW03, and MW04. The sample from MW05 contained 6.4, 4.7, 53, 52, and 330 ug/L of benzene, ethylbenzene, toluene, and xylene, respectively. The sample from MW06 contained 760, 4900, and 8500 ug/L of ethylbenzene, toluene, and xylene, respectively. The benzene concentration of <500 ug/L was not accurately measured due to the high dilution factor of 1000.

Fuel hydrocarbons, quantified as gasoline and diesel, were below the detection limit of 0.5 mg/L in the samples collected from wells MW01, MW02, MW03, and MW04. The sample from well MW05 indicated a fuel hydrocarbon quantified as gasoline at a concentration of 2 mg/L. The sample from well MW06 indicated a fuel hydrocarbon quantified as gasoline at a concentration of 52 mg/L and a fuel hydrocarbon quantified as diesel at a concentration of 7 mg/L.

Kleinfelder, Vapor Extraction Test, September, 1991

Kleinfelder performed a field flow test on the monitoring wells to evaluate the possibility of using soil vapor extraction as a site cleanup alternative. Preliminary tests indicate that moderate subsurface air-flow rates could be achieved and that the expected radius of influence for vapor extraction wells would be approximately 15 to 30 feet, if a vapor extraction system were installed at the site. However, volatile organic compounds were not detected (by an explosimeter) in the vacuum exhaust during the vapor extraction test.

3.0 DESCRIPTION OF CONTAMINATION SOURCES AND LOCATIONS

The sources of the contamination on the subject property are fuel hydrocarbons from former petroleum storage/dispensation activities located on the property. Fuel hydrocarbons have been identified in the soil and ground water. Based on the explorations performed to date, the remaining contaminated soils below a depth of 12 to 14 feet appear to be the current source of gasoline compounds leaching into ground water.

3.1 Soil

Information obtained from analytical results of soil samples from hollow-stem auger borings, split-spoon samples, and samples from the tank vault were used to characterize the nature and extent of soil contamination.

Soil contamination appears to be located beneath the area of the former underground storage tanks (the former tank vault location is shown on Plates 2 and 3). The amount of affected soils is believed to be less than 500 cubic yards. Compounds identified were fuel hydrocarbons as gasoline at concentrations up to 12,000 mg/kg. In addition, laboratory analysis identified the volatile organic compounds ethylbenzene, toluene and xylenes (BETX) in the soil samples. High concentrations for these compounds were as follows: ethylbenzene 59 mg/kg, toluene 48 mg/kg, and xylenes 1000 mg/kg.

3.2 Ground Water

Static water levels were measured on several dates and contour maps of water table elevations were developed during the remedial investigations. Plotted contours suggest a ground-water flow direction toward the southeast (Plate 3). Depth to ground water ranges from 13 to 14 feet.

Contamination in ground water appears to consist of the volatile organic compounds benzene, ethylbenzene, toluene, and xylenes (BETX), and to be in the area of the former tank vault. Elevated concentrations of benzene, ethylbenzene, toluene, and xylenes have been found in monitoring wells MW05 and MW06. Fuel hydrocarbons quantified s gasoline or diesel were not detected in the ground-water samples.

4.0 CLEANUP ACTION ALTERNATIVES

The major limitation of cleanup of the site is the current and planned site use. The site is currently an operating sandwich shop. Southland intends to allow the store to continue to operate and therefore interruption of operations for an extended period would not be feasible. Also, much of the contaminated soil has been previously excavated down to the ground-water table and the site has been resurfaced with asphalt pavement. Therefore, extensive excavation of contaminated soil or insitu vapor extraction are not preferred cleanup action options.

4.1 Review of Soil Cleanup Alternatives

Kleinfelder has reviewed several soil remediation technologies for the subject property. During this feasibility review, the following information was considered: the site's geographic location and surrounding land use; the identified contaminants, their concentrations, and detected locations; the current understanding of the site's geology, hydrogeology, and contaminant migration pathways (as identified in the remedial investigation studies); and current federal, state, and local regulations.

Kleinfelder considered several of the reviewed remediation technologies as potentially applicable for this site. These technologies, and our assessment of the alternatives, are presented below and on Table 2.

<u>Soil Cleanup Alternatives</u>

No action	In-situ soil vapor extraction
Soil washing	Aeration of excavated soil
Off-site landfill disposal	Incineration
Bioremediation	Surface capping
Asphalt Encapsulation	Thermal desorption

Soil Feasibility Worksheets for several technologies have been completed and are attached as Appendix A. These worksheets are from EPA Document 600/2-90/011, ***Assessing UST Corrective Action Technologies, Site Assessment and Selection of Unsaturated Zone Treatment Technologies***, dated March 1990.

Other technologies were screened as a part of the feasibility review, but were not included in Table 2. The following technologies were not included due to their expense, their lack of a performance record, or because their application is more suitable to other contaminant compounds and/or dissimilar site conditions.

Stabilization and solidification
In-situ radio frequency heating
On-site disposal

Of the ten soil remediation methods presented on Table 2, only <u>Surface Capping</u> appears to be the more feasible alternatives. Surface Capping represents a proven technology, does not require excavation and off-site transport of the contaminated soils (thereby resulting in fewer impacts to the store's business), involves lower relative costs, and has regulatory-agency acceptance (based on the use of Surface Capping on similar sites with similar contaminants).

Possible Remediation Costs

Possible remediation costs, which include system installation and two years of maintenance, are presented below.

Surface capping	$10,000	to	$15,000 *

* THIS WORK HAS BEEN PERFORMED

Relative capital costs and operation and maintenance (O&M) costs are used rather than detailed cost estimates. The presented costs are based on our professional opinion.

Selection Of Soil Remediation Technology

Based on this preliminary feasibility review, surface capping appears to be the most feasible, to the extent practicable, soil remediation technology for the site.

4.2 Review of Ground-water Cleanup Alternatives

Kleinfelder has reviewed several ground-water remediation technologies for the subject property. During this feasibility review, the following information was considered: the site's geographic location and surrounding land use; the identified contaminants, their concentrations, and detected locations; the current understanding of the site's geology, hydrogeology, and contaminant migration pathways (as identified in the remedial investigation studies); and current federal, state, and local regulations.

Kleinfelder considers several of the reviewed remediation technologies to be potentially applicable for this site. These technologies, and our assessment of the alternatives, are presented below and on Table 3.

Ground Water Cleanup Alternatives

No action
Air stripping
UV/ozone oxidation
Ozonation
Continued monitoring
Carbon adsorption
Bioremediation

Other technologies were screened as a part of the feasibility review, but were not included in Table 3. The following technologies were not included due to their expense, their lack of a performance record, or because their application is more suitable to other contaminant compounds and/or dissimilar site conditions.

Reverse osmosis
Distillation
Chemical oxidation and reduction
Ion exchange
UV/radiation photolysis
Off-site treatment
Hydraulic barriers
Electrolytic recovery

Of the seven ground-water remediation methods presented on Table 3, the following two appear to be the more feasible alternatives.

Continued monitoring
Carbon adsorption

These methods represent proven technologies, involve lower relative costs, and have regulatory-agency acceptance (based on their use on similar sites with similar contaminants).

Possible Remediation Costs

Possible remediation costs, which include system installation and two years of maintenance, are presented below.

Continued monitoring	$ 4,000	to	$ 8,000
Carbon adsorption	$18,000	to	$30,000

Relative capital costs and operation and maintenance (O&M) costs are used rather than detailed cost estimates. The presented costs are based on our professional opinion. These costs include typical expenses for permitting, equipment procurement, and required monitoring.

Selection Of Ground-water Remediation Technology

Based on this preliminary feasibility review, continued monitoring and carbon adsorption appear to be the most feasible, to the extent practicable, ground-water remediation technologies for the site. Ground-water monitoring will provide periodic information regarding the progress of the ground-water remediation.

5.0 IDENTIFICATION OF CLEANUP REQUIREMENTS

A two-step process is defined in the MTCA regulations for establishing site-specific cleanup requirements. The two steps are described below.

STEP ONE: IDENTIFY CLEANUP STANDARDS

Cleanup standards are intended to provide for a uniform, statewide approach to site cleanups. Two primary components of the standards must be established for each individual site. These components are cleanup levels and points of compliance.

Cleanup levels are established as the concentration at which a particular hazardous substance found at a site does not threaten human health and the environment. The regulations identify three options (Methods A, B, and C) for establishing site-specific cleanup levels. Points of compliance are locations on the site where the site-established cleanup levels must be met.

5.1 Soil Cleanup Standards

The following two sections present the two components of the soil cleanup standards: cleanup levels and points of compliance.

5.1.1 Soil Cleanup Levels

Soil cleanup levels are the MTCA Method A Cleanup Levels for residential soils [(WAC 173-340-740 (1)(c) & (2)(a)(i)]. MTCA states that for commercial sites, the presumption is that soil cleanup levels will be as stringent as those for residential soils unless certain specified conditions are met (e.g., surrounded by industrial properties). Those conditions are not met at this site; therefore, the most stringent requirements apply. The soil cleanup levels proposed for the cleanup action are presented in Table 1.

5.1.2 Soil Points of Compliance

The points of compliance for soil cleanup standards are defined in the MTCA regulations. Soil points of compliance will be evaluated by samples collected throughout the site and on adjacent affected properties. The analytical results will be evaluated using statistical methods defined in MTCA.

5.2 Ground-water Cleanup Standards

The following two sections present the two components of the ground-water cleanup standards; cleanup levels and points of compliance.

5.2.1 Ground-water Cleanup Levels

MTCA states that the highest current or potential beneficial use is assumed to be drinking water, unless the hydrogeology meets MTCA specified conditions. Due to the site's location within the city limits of Richland and the shallow depth of the ground water, it is considered to be unlikely that the ground water will ever be a source of drinking water. However, given the site's proximity to the Columbia River, it is possible that the site ground water ultimately discharges to waters that are a possible source of drinking water. Therefore, ground-water cleanup levels will be based on potential use as drinking water.

The cleanup levels for ground water are listed in Table 1 and are the MTCA Method A Cleanup Levels, as identified in WAC 173-340-720 (2)(a)(i).

5.2.2 Ground-water Points of Compliance

The points of compliance for ground-water cleanup standards are defined in the MTCA regulations. All wells located on the property (six currently) will be monitored during the cleanup action. The analytical results will be evaluated using statistical methods defined in MTCA.

STEP TWO: SELECT CLEANUP ACTIONS

Selecting cleanup actions (remediation technologies that could be used on a site) is the second step in determining site-specific cleanup requirements. Alternative cleanup actions need to be evaluated to identify which action would best achieve the cleanup standards. All cleanup actions shall meet the following threshold and other requirements.

- Protect human health and the environment
- Comply with identified cleanup standards
- Comply with applicable state and federal laws

- Provide for compliance monitoring.
- Use permanent solutions to the maximum extent possible.
- Provide for a reasonable restoration time frame.
- Consider public concerns raised during public comment on the draft CAP.

Cleanup of hazardous sites are required to be conducted using technologies that minimize the amount of untreated hazardous substances remaining at the site. In addition, when selecting a cleanup action, MTCA regulations state that priority shall be given to MTCA-preferred cleanup technologies. MTCA-preferred cleanup technologies, in order of decreasing preference, are presented below.

- "Reuse or recycling"
- "Destruction or detoxification"
- "Separation or volume reduction followed by reuse, recycling, destruction or detoxification of the residual hazardous substance"
- "Immobilization of hazardous substances"
- "On-site or off-site disposal at an engineered facility designed to minimize the future release of hazardous substances and in accordance with applicable state and federal laws"
- "Isolation or containment with attendant engineering controls"
- "Institutional controls and monitoring"

Based on the feasibility review findings presented in Section 4.0 of this document, and the above listed requirements, ground-water extraction and carbon adsorption, surface repaving or sealing (the site was resurfaced after the tanks were removed), and continued ground-water monitoring are the remedial action alternatives that are proposed for use. Southland may chose to supplement this remedial action with soil vapor extraction (VES) if monitoring data indicate ground-water cleanup levels are not being achieved.

The following CAP Sections present evaluations of the selected cleanup alternative, with respect to threshold and other requirements.

5.3 Protection of Human Health and the Environment

The identified risks associated with the site contamination are: 1) Human health impacts from inhalation of vapors or ingestion of soils, 2) Human health impacts from ingestion of impacted ground water, and 3) Water quality impacts to the Columbia River.

The proposed alternative should decrease these risks associated with the site as follows:

- Surface capping (repaving or sealing) will abate accidental soil ingestion and inhalation of soil vapors.

- Surface repaving or sealing (the site was resurfaced after the tanks were removed) will decrease infiltration of surface water. Abating infiltration of surface water will reduce the transmission of contaminants from soils into the ground water.

- Ground-water extraction is intended to reduce the potential for additional down-gradient migration of the contaminated ground water.

- Ground-water extraction and carbon adsorption is intended to abate contaminated saturated zone soils. Abating soil contamination will reduce the transmission of contaminants from soils into the ground water.

- Continued ground-water monitoring, of on- and off-site monitoring wells, will allow for a timely response to possible changes in migration patterns and the prevention of accidental contaminated ground-water ingestion.

5.4 Compliance with Cleanup Standards

The proposed cleanup action is intended to comply with the Cleanup Levels identified on Table 1 of this CAP.

5.5 Applicable State and Federal Laws

This requirement evaluates how the proposed cleanup alternative complies with federal and state ARARs. Descriptions of ARARs which may apply to the site are listed below.

Federal Laws and Regulations

1. CERCLA
2. RCRA
3. Occupational Safety and Health Act (OSHA).
4. Federal Water Pollution Control Act of 1972 (Clean Water Act).
5. Water Quality Act of 1987:
   a. Section 308. Establishes water quality criteria for toxic pollutants.
   b. Section 402. Establishes the NPDES permit process for discharges to surface water bodies.
6. Safe Drinking Water Act of 1974. Establishes the development of national primary drinking water regulations. Includes maximum contaminant level standards that drinking water quality cannot exceed.

State Laws and Regulations

1. NPDES Permit Program (WAC 173-220). Controls the discharge of pollutants and other wastes to state surface waters.

2. Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201). Sets water quality standards for surface waters, for the protection of fish, shellfish, and wildlife, in addition to public health. Standards categorize various waterways and set quantitative limits for several toxic substances.

3. Minimum Functional Standards for Solid Waste Handling (WAC 173-304). Outlines minimum functional standards for the proper handling of all solid waste materials.

4. Dangerous Waste Regulations (WAC 173-303). Implements requirements outlined under the federal RCRA and the state Hazardous Waste Management Act. Designates those wastes that are dangerous or hazardous to public health and the environment, and provides for the monitoring of wastes from creation to final disposition.

5. General Regulations for Air Pollution Sources (WAC 173-400). Describes minimum emission standards for sources emitting hazardous air pollutants, including volatile compounds.

The proposed cleanup action is intended to comply with all of the identified ARARs.

5.6 Compliance Monitoring

The following compliance monitoring will be provided as part of the proposed cleanup action.

1. Protection monitoring will be conducted to confirm that human health and the environment are adequately protected during construction and during the operation/maintenance period. The protection monitoring to be performed will be identified in a site health and safety plan.

2. Performance monitoring will be conducted to confirm that the cleanup action has attained the identified cleanup standards.

3. Confirmational monitoring will be conducted to confirm the long-term effectiveness of the cleanup action, once cleanup standards have been attained.

Compliance monitoring plans will be prepared for the site in accordance with the requirements of MTCA (173-340-410 (3)). Treated ground-water discharged from the carbon unit would be monitored and a waste water discharge permit will be obtained.

5.7 Permanent Solution Preference

To ensure a bias toward permanent solutions, the MTCA regulations require that cleanup actions comply with all of the following.

- "The cleanup action shall prevent or minimize present and future releases and migration of hazardous substances in the environment."

- "The cleanup action shall provide for a net reduction in the amount of a hazardous substance being released from the source area."

- "The cleanup action shall not rely primarily on dilution and dispersion of the hazardous substance if active remedial measures are technically possible."

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

- "A cleanup action involving off-site transport and disposal of hazardous substances without treatment shall not be used if a treatment technology or method exists which will attain cleanup standards and is practicable."

The proposed cleanup alternative is intended to meet these criteria to the extent practicable.

5.7.1. Overall Protectiveness

The proposed cleanup action would require minimal disturbance of the contaminated materials to implement. The proposed cleanup action also is intended to reduce the levels of contaminants in soil and ground water to the listed cleanup levels that are protective of human health and the environment.

5.7.2 Long-Term Effectiveness

The proposed cleanup action appears to be capable of meeting most of the cleanup levels identified for petroleum hydrocarbons. It should therefore be technologically feasible to reach the cleanup levels proposed given enough time.

The proposed cleanup action is intended to remain in operation as warranted by the results of the compliance monitoring. Southland may chose to supplement this remedial action with soil vapor extraction if monitoring data indicate ground-water cleanup levels are not being achieved.

5.7.3 Short-Term Effectiveness

The proposed alternative should be effective in deceasing the following site risks prior to the attainment of the site cleanup standards:

- Surface capping (repaving of the site has been performed) will abate accidental soil ingestion and inhalation of soil vapors.

- Surface repaving or sealing will decrease infiltration of surface water. Abating infiltration of surface water also will reduce the potential for additional leaching of contamination from soils into the ground water.

- Surface repaving or sealing will provide for dryer vadose soils, which will allow for better VES performance (if the VES is installed later). Surface capping also will reduce short circuiting (surface bypassing) of subsurface air flow.

- Ground-water extraction is intended to reduce the potential for additional down-gradient migration of the contaminated ground water.

- Continued ground-water monitoring, of on- and off-site monitoring wells, will allow for prevention of accidental contaminated ground-water ingestion.

5.7.4 Permanent Reduction

The proposed alternative is intended to provide for a permanent reduction in the toxicity, mobility, and volume of the hazardous substances as follows:

- Ground-water extraction and carbon adsorption is intended to abate contaminated saturated zone soils. Abating soil contamination will reduce the transmission of contaminants from soils into the ground water.

- Ground-water extraction and carbon adsorption will be utilized to abate contaminated saturated zone soils. The more soluble (and toxic) gasoline compounds (BETX) are expected to be removed earlier than less mobile (and less toxic) gasoline compounds.

- Abating soil contamination will reduce the transmission of contaminants from soils into the ground water.

- Surface repaving or sealing will decrease infiltration of surface water which will reduce the potential for additional leaching of contamination from soils into the ground water.

- Compliance monitoring will be used to document reduced toxicity, mobility, and volume of the hazardous substances.

5.7.5 Implementation Ability

The proposed cleanup action consists of proven technologies which are easily implemented. Treated ground-water discharged from the carbon unit would be monitored and a waste water discharge permit will be obtained.

5.7.6 Cleanup Costs

The cost of the proposed cleanup action is dependant upon the duration of ground-water extraction and treatment operation. This is due to the cost of operation and maintenance of the pump and treatment system and the related compliance monitoring. The expected costs are presented on Figure 1 and reflect a two-year time frame.

Application of surface capping, ground-water extraction and carbon adsorption treatment, and continued ground-water monitoring are proposed as the cleanup actions for both soil and ground water. Given current knowledge regarding site conditions, other reviewed cleanup alternatives which were found to be technologically feasible, were not considered practicable. These other alternatives were not considered practicable due to the opinion that their incremental cost would be substantial and disproportionate to the incremental degree of protection they would achieve over the proposed cleanup alternative.

5.7.7 Community Concerns

Community acceptance will be evaluated based on the comments received during the public comment period. Based on the information gathered from the public, the proposed cleanup alternative may be modified or another alternative may be selected. The public is encouraged to review and comment on this Draft CAP.

5.8 Cleanup Action Schedules

The MTCA regulations require that this CAP identify the schedule for implementation of the CAP, and if known, the site restoration time frame.

5.8.1 Implementation of the Cleanup Action Plan

This Draft CAP will be finalized after the minimum 30-day public comment period. The proposed time frames for the components of the site cleanup are presented on Figure 1.

5.8.2 Restoration Time Frame

The time frame for completion of this cleanup action is considered to be two years, however actual site restoration and termination of the cleanup action will be determined by the compliance monitoring results. The proposed time frames for the components of the site cleanup are presented on Figure 1.

5.9 Consideration of Public Concerns

This Draft CAP will be submitted to Ecology. Ecology will inform the public, by notification in the Site Register, that this Draft CAP is available for review. The public is encouraged to review and comment on this CAP.

5.10 Ground-water Restoration

Southland may chose to supplement this remedial action with additional cleanup actions if compliance monitoring data indicate ground-water cleanup levels are not being achieved or is not practicable.

5.11 Threshold and Other Requirements

All cleanup actions, as characterized in the MTCA regulations, are required to meet the following provisions of MTCA.

- o Protect human health and the environment.
- o Comply with identified cleanup standards.
- o Comply with applicable state and federal laws.
- o Provide for compliance monitoring.
- o Use permanent solutions to the maximum extent practicable.
- o Provide for a reasonable restoration time frame.

- o Consider public concerns raised during public comment on the draft cleanup action plan.

The proposed cleanup action, as presented in this CAP, is designed to accomplish these requirements. Application of surface capping, ground-water extraction and carbon adsorption treatment, and continued ground-water monitoring are proposed as the cleanup actions for both soil and ground water. By focusing on removal of the contaminants from the saturated zone soils, the source and pathway for ground-water contamination is addressed. Reduction of surface water infiltration and removing of the more soluble and toxic compounds by carbon treatment also are expected to decrease ground-water contamination concentrations.

6.0 LIMITATIONS

Kleinfelder has performed this work in accordance with the generally accepted standards of care that exist in the state of Washington at the time of this study. Judgements leading to conclusions and recommendations are generally made with an incomplete knowledge of the subsurface and historical conditions applicable to the study area. More extensive studies including additional site exploration, soil and ground-water sampling, and chemical analyses may be used to supplement the information presented in this CAP. Kleinfelder should be notified for additional consultation if the Southland Corporation wishes to reduce uncertainties beyond the level associated with this CAP. Our understanding of the property may also change as new data become available during additional site exploration, remediation, or development.

Since site activities and regulations beyond our control could change at any time after the completion of this CAP, our observations, findings and opinions can be considered valid only as of the date of the CAP.

The cost estimates presented in this CAP have been prepared for guidance in project evaluation and implementation from the information available. The actual costs of cleanup depend on many variables, including quantity of contaminated material, regulation interpretation, changes to the regulations, labor and equipment costs, and the ultimate project scope. As a result, the final project costs will vary from the estimates presented in this CAP. The capital cost estimates include design of the selected cleanup action, construction oversight, and the implementation of the cleanup alternative. The estimates for capital costs do not include costs for negotiating the selection of the cleanup alternative or community relations. The costs presented on Figure 1 do not include costs for changed administrative procedures.

This CAP may be used only by Southland and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use by executing the "Application for Authorization to Use" which follows this document. Based on the intended use of the CAP, Kleinfelder may require that additional work be performed and that updated information be issued. Non-compliance with any of these requirements by Southland or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

No warranty, express or implied, is made.

TABLE 1
CLEANUP LEVELS FOR SOIL AND GROUND WATER
7–11 STORE NO. 25821
RICHLAND, WASHINGTON

SOIL CLEANUP LEVELS:

Compound	*Concentration in mg/kg*
BENZENE	0.5
ETHYLBENZENE	20.0
TOLUENE	40.0
XYLENES	20.0
TOTAL PETROLEUM HYDROCARBONS:	
GASOLINE	100.0
DIESEL	200.0

GROUND–WATER CLEANUP LEVELS:

Compound	*Concentration in ug/L*
BENZENE	5.0
ETHYLBENZENE	30.0
TOLUENE	40.0
XYLENES	20.0
TOTAL PETROLEUM HYDROCARBONS	1000.0

Note: All concentrations based on WAC 173–340, MTCA Method A Cleanup Levels.

TABLE 2
ALTERNATIVE SOIL REMEDIATION TECHNOLOGIES
7–11 STORE NO. 25821
RICHLAND, WASHINGTON

TECHNOLOGY	TECHNOLOGY DESCRIPTION	PHYSICAL LIMITATIONS	RELATIVE TIME REQUIREMENTS	RELATIVE COST	ESTIMATED OPTIMUM PROJECT SIZE	POSSIBLE RISK	PERMITS REQUIRED	ADDITIONAL STUDIES THAT MAY BE PRUDENT
*Assumes extent of soil contamination has been identified **								
No action.	Perform no remedial action under the presumption that environmental impairment is low, health risks are low and/or natural processes will mitigate the contamination.	Populations or sensitive receptors are not exposed. Acceptance by regu latory agencies.	Variable, depending on monitoring required.	Low to Moder–ate (variable depending on monitoring required).	Open	Health risks are not low and/or natural processes will not mitigate the contamination. Possible changes in the regulations.	Possibly	Risk assessments, which may include exposure and toxicity assessment, and risk characterization.
Surface capping.	Capping the contaminated soil with a low permeability cover. (asphalt, clay, etc.).	Acceptance by regu–latory agencies.	1 to 3 months.	Low.	>100 cubic yards	Capping may not stop contamination migration. Possible changes in the regulations. Property resale and develop–ment restrictions.	Possibly	Risk assessments, which may include exposure and toxicity assessment, and risk characterization.
Sanitary landfill disposal.	Disposing of soil at a permitted landfill.	Limited by ability to excavate, transport and dispose.	1 to 3 months.	Low to Moderate.	<5000 cubic yards	Landfill may leak and require future remediation. PLP liability.	Yes	Verify contamination concentrations and quantity of soil involved. Identify landfill acceptance. (1)
*The following additionally assume physical soil characterization has been completed ***								
Soil washing or flushing.	Excavated soil is flushed with water or other solvent to leach out contaminants.	Area to perform the washing. Disposal or recovery of water or solvent. Shallow excavation depths.	6 months to 1 year, longer if performed in batches.	Moderate to High.	>3,000 cubic yards for petroleum	Clay rich soils require additional pretreatment. Extraction solvent may pose own environmental risk.	Yes	Soil amount calculation. Bench–scale test. (1)
In situ soil vapor extraction.	Subsurface air flow is induced by reducing the air pressure inside one or more vapor extraction wells. The air flow removes volatilized contaminants.	Permeability of soils, depth to ground water, amount of free product, and volatility of contaminants.	1 to 5+ years, longer if contaminate source is not removed.	Low to Moderate.	>1/4 acre	Free or dissolved product may not readily volatilize.	Yes	Soil amount calculation. Air emission study. Soil permeability and transmissivity study.
Aeration of excavated soil.	Contaminated soils are excavated for surface aeration. Aeration performed by tilling the soil or by forced air ventilation through installed perforated tubing.	Area to perform the aeration, dry weather for tilling aeration, bottom liner to prevent downward percolation, and volatilization of contaminant. Shallow excavation depths.	2 months to 2+ years, depending on the aeration technique used, soil type and moisture content, and volatility of the contaminants.	Low (moderate if using forced air ventalation or if the tilling area is another property).	>500 cubic yards for gasoline	Weather, rocky or clay rich soil, discharge of contaminates to the surrounding air.	Yes	Soil amount calculation. Air emission study. Bench–scale test. (1)

TABLE 2
ALTERNATIVE SOIL REMEDIATION TECHNOLOGIES
7–11 STORE NO. 25821
RICHLAND, WASHINGTON

TECHNOLOGY	TECHNOLOGY DESCRIPTION	PHYSICAL LIMITATIONS	RELATIVE TIME REQUIREMENTS	RELATIVE COST	ESTIMATED OPTIMUM PROJECT SIZE	POSSIBLE RISK	PERMITS REQUIRED	ADDITIONAL STUDIES THAT MAY BE PRUDENT
Lower Temperature Incineration.	Excavate and feed soil into a municipal waste incinerator.	Requires excavation and transportation. Facility may not be capable of incinerating soils.	2 to 6 months.	Moderate.	<2000 cubic yards	Hazardous compounds may remain in the ash. Ash may require disposal at a hazardous waste landfill. PLP liability.	Possibly	Possible pilot study and ash evaluation. (1)
Thermal desorption.	Soil is heated to 200 to 800 degrees F to drive off volatile and semi–volatile compounds. Vapors are recovered and directed to a vapor treatment system.	Requires excavation and transportation to permitted facility or mobilization of portable unit.	3 to 6 months.	Low to Moderate.	>500 cubic yards	Hazardous compounds may remain in the soil. Soil may require secondary treatment.	Yes	Soil amount calculation. Pilot study or bench–scale test, "ash" evaluation. (1)
Bioremediation. (In situ and excavated)	Contaminants are degraded, transformed, or immobilized by biological processes. This natural process is enhanced by adding water, oxygen, and/or other nutrients.	Can be land intensive. Requires much design, operation, and maintenance. Potential for adverse environmental impacts if not properly designed and managed.	1 to 10+ years.	Moderate to High.	>500 cubic yards for petroleum	Treatment may not be as effective as predicted. Air emissions may be present. Potential for adverse environmental impacts and other remediation.	Yes	Soil amount calculation. Bench–scale test and pilot study. (1)
Encapsulation with asphalt.	Excavate and feed soil into asphalt batch plant. Resulting material used as paving subgrade material.	Limited by size of the site, soil type, and batch plant acceptance.	2 to 4 months.	Low.	>100 cubic yards. Site dependant	Quantity of generated subgrade may exceed needs.	Possibly	Bench–scale test and pilot study. (1)

** More extensive studies may be necessary, including additional site exploration, soil sampling, and chemical analyses to identify extent of soil contamination. Risk assessments may be performed to determine whether there is a sufficient risk at a site to require remediation or to establish site specific cleanup standards.*

*** Typical information needs are natural soil chemistry, permeability, porosity, engineering properties, organic content, and moisture. This information can be collected from soil sampling and analysis, physical soil testing, and/or contaminant transport computer modeling.*

(1) A geotechnical review should be performed for remediation activities which include soil excavation.

107503T2.WK1

TABLE 3
ALTERNATIVE GROUND–WATER REMEDIATION TECHNOLOGIES
7–11 STORE NO. 25821
RICHLAND, WASHINGTON

TECHNOLOGY	TECHNOLOGY DESCRIPTION	PHYSICAL LIMITATIONS	RELATIVE TIME REQUIREMENTS	RELATIVE COST	TYPICAL PROJECT SIZE	RISK	PERMITS REQUIRED	ADDITIONAL STUDIES THAT MAY BE RECOMMENDED
*Assumes extent of ground water contamination has been identified **								
No action	Perform no remedial action under the presumption that environmental impairment is low, health–risks are low and/or natural processes will mitigate the contamination.	Populations or sensitive receptors are not exposed. Acceptance by regu–latory agencies.	Variable, depending on monitoring required.	Low, however variable depending on monitoring required.	No restriction.	Health risks are not low and/or natural processes will not mitigate the contamination. Possible changes in the regulations.	Possibly	Risk assessments, which may include exposure and toxicity assessment, and risk characterization.
Continued monitoring	Monitor the concentration of contaminants in the ground water. Record the findings and review for trends over time.	Populations or sensitive receptors are not exposed. Acceptance by regu–latory agencies.	Does not apply.	Low, depending monitoring requirements and schedule.	No restriction.	Health risks are not low and/or natural processes will not mitigate the contamination.	Possibly	Risk assessments, which may include exposure and toxicity assessment, and risk characterization.
*The following additionally assume the hydro–geologic characterization of the aquifer/s has been completed ***								
Air stripping	Ground water is recovered and air is mechanically added as the ground water is passed through a packed air tower or chamber.	Water hardness and turbidity. Air treat–ment may be required.	6 mo. to 5+ years, depending upon the extent the contam–inate source/free product is removed.	Moderate	>10 gpm.	Air discharge permit requirements may change. High concentrations of some compounds could cause explosion risk.	Yes	Water flow calculation. Air emission study. Water chemistry study for pre–treatment requirements.
Carbon adsorption	Recovered ground water is passed through activated carbon, which adsorbs the organic contaminant compounds.	Water hardness and turbidity. Cost effective only at low concentrations.	6 mo. to 5+ years, depending upon the extent the contam–inate source/free product is removed.	Moderate.	<100 gpm.	Carbon requires regeneration or disposal. Suspended solids,or biological growth could cause fouling of the influent screen. Carbon could saturate sooner than planned.	Yes	Water flow calculation. Bench scale test and pilot study.

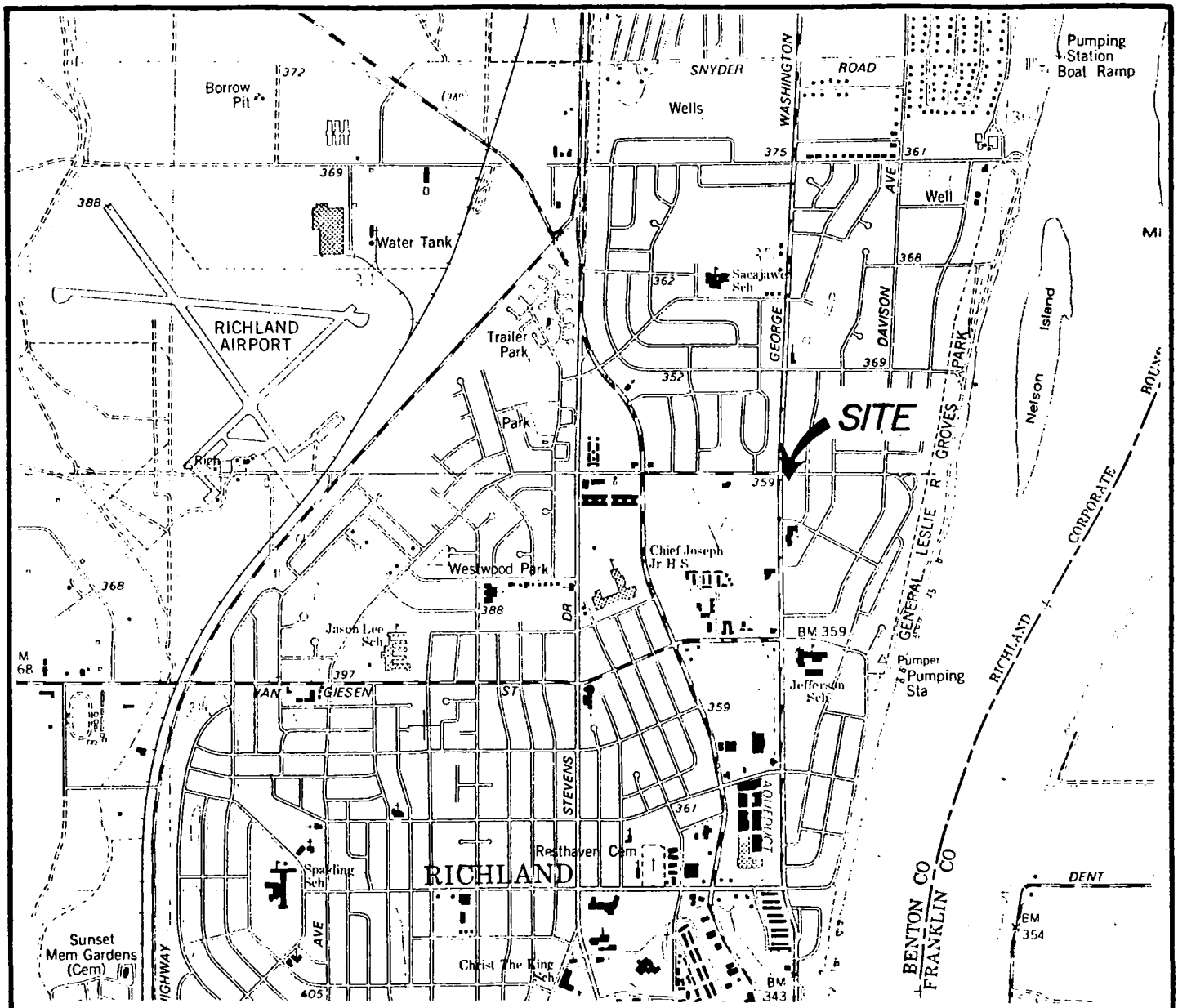
TABLE 3
ALTERNATIVE GROUND–WATER REMEDIATION TECHNOLOGIES
7–11 STORE NO. 25821
RICHLAND, WASHINGTON

TECHNOLOGY	TECHNOLOGY DESCRIPTION	PHYSICAL LIMITATIONS	RELATIVE TIME REQUIREMENTS	RELATIVE COST	TYPICAL PROJECT SIZE	RISK	PERMITS REQUIRED	ADDITIONAL STUDIES THAT MAY BE RECOMMENDED
Ozonation	Ozone is mechanically added to the recovered ground water stream to oxidize contaminant compounds.	Water hardness and turbidity. Will not degrade low molecular weight chlorinated organics.	6 mo. to 5+ years, depending upon the extent the contam–inate source/free product is removed.	Moderate.	<100 gpm.	May require a second technology to degrade low molecular weight chlorinated organics.	Yes	Water flow calculation. Bench–scale test and pilot study. Air emission study.
UV/Ozone	Ozone is mechanically added to the recovered ground water stream which is passed over a UV light source to oxidize contaminate compounds.	Water hardness and turbidity.	6 mo. to 5+ years, depending upon the extent the contam–inate source/free product is removed.	Moderate to High.	<1000 gpm.	Process only applied to ground water treatment within the last five years.	Yes	Water flow calculation. Bench–scale test and pilot study.
Bioremediation (In–situ and recovered)	Contaminants are degraded, transformed, or immobilized by biological processes. This natural process is enhanced by adding water, oxygen, and/or other nutrients.	Requires much design, operation, and maintenance. Potential for adverse environ–mental impacts if not properly designed and managed.	2 to 10+ years.	Moderate to High.	<1000 gpm.	Treatment may not be as effective as predicted. Air emissions may be present. Potential for adverse environmental impacts.	Yes	Water flow calculation. Pilot study and bench scale test.

** More extensive studies may be necessary, including additional site exploration, ground water sampling, and chemical analyses to identify extent of ground water contamination. Risk assessments may be performed to determine whether there is a sufficient risk at a site to require remediation or to establish site specific cleanup standards.*

*** Typical information needs are natural ground water chemistry, ground water velocity, aquifer storitivity, aquifer transmissivity, and aquifer boundaries. This information can be collected from ground water sampling and analysis, aquifer pump testing, and ground water and/or contaminant transport computer modeling.*

107503T3.WK1



SCALE

0' 1000' 2000'

N

REFERENCE:

U.S.G.S. TOPOGRAPHIC MAP; RICHLAND WASHINGTON QUAD. 1978.

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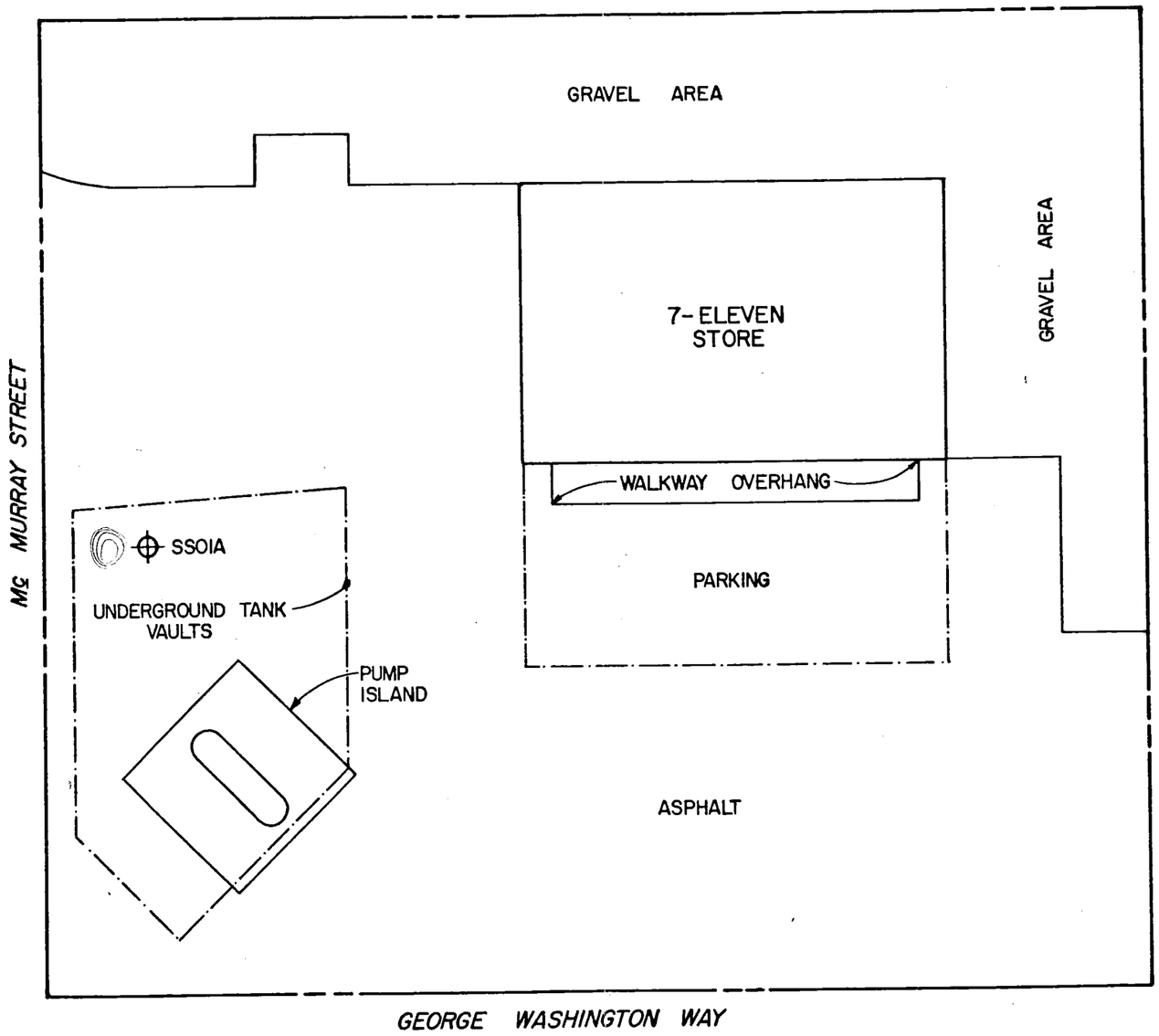
PROJECT NO. 60-1049-01

SITE LOCATION MAP
7-ELEVEN STORE NO. 25821
1824 GEORGE WASHINGTON WAY
RICHLAND, WASHINGTON

PLATE 1



LEGEND

SSOIA — GRAB SOIL SAMPLE LOCATION

—·—·— CONCRETE PAD

SCALE

0' 5' 10' 20'

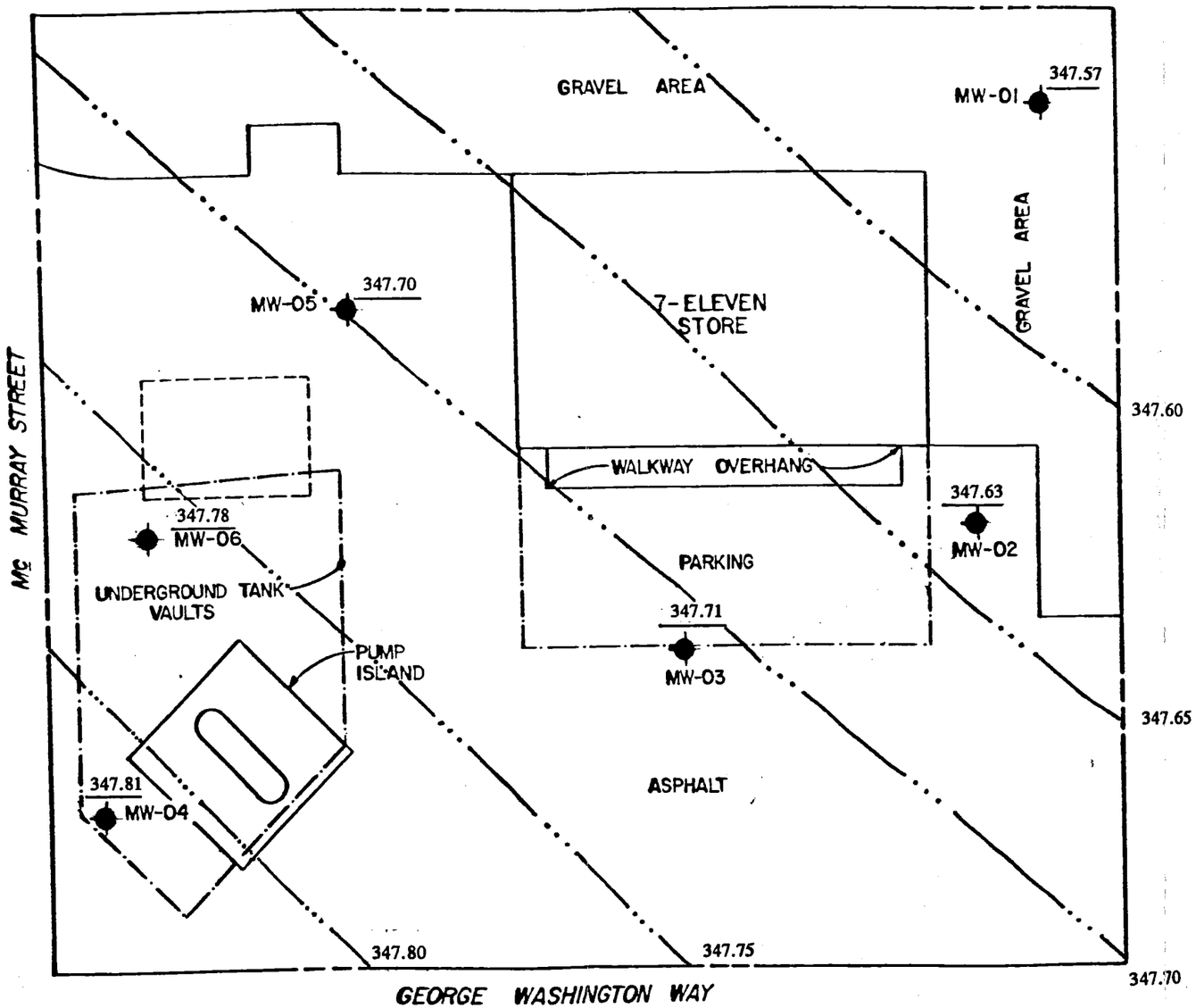
N

KLEINFELDER

PROJECT NO. 60-1049-01

SCHEMATIC SITE PLAN
7-ELEVEN STORE NO. 25821
1824 GEORGE WASHINGTON WAY
RICHLAND, WASHINGTON

PLATE 2



LEGEND

- GROUNDWATER CONTOUR
- APPRX. LOCATION OF HISTORIC TANK VAULT
- CONCRETE PAD
- 348.10 MW-01 Monitoring Well & Ground Water Elevation

SCALE

0' 5' 10' 20'

N

NOTE: Contours are an interpretation of the data presented. Contours may change with additional data points, weather changes, tidal action, construction activities, etc.

KLEINFELDER

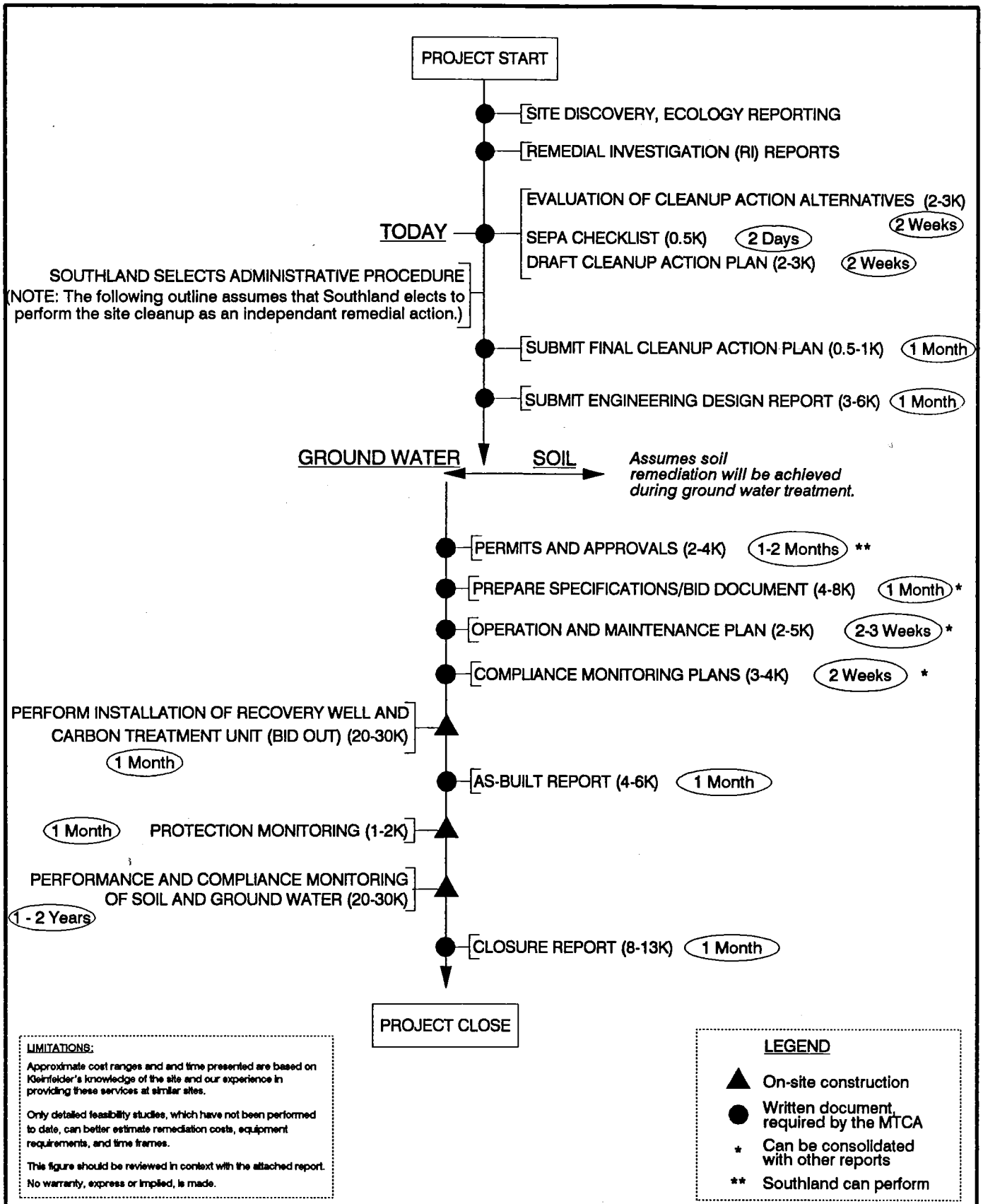
January 9, 1991

PROJECT NO. 60-1075-02

GROUNDWATER CONTOUR MAP
7-ELEVEN STORE NO. 25821
1824 GEORGE WASHINGTON WAY
RICHLAND, WASHINGTON

PLATE 3

M 7



KLEINFELDER

107503F1.DRW

MTCA SITE CLEANUP PROCESS AND REQUIRED ACTIONS/DOCUMENTS, SITE CLEANUP ACTION, STORE 25821 1824 GEORGE WASHINGTON WAY, RICHLAND, WA

Project # 60-1075-03

FIGURE 1

APPENDIX A

Richland

TABLE A-7. WORKSHEET FOR EVALUATING THE FEASIBILITY OF SOIL VENTING BEING EFFECTIVE AT YOUR SITE

CRITICAL SUCCESS FACTOR	UNITS	SITE OF INTEREST ▼	SUCCESS LESS LIKELY	SUCCESS SOMEWHAT LIKELY	SUCCESS MORE LIKELY
SITE RELATED					
• Dominant Contaminant Phase	Phase	Liquid	Sorbed to soil ○	Liquid ●	Vapor ○
• Soil Temperature	°C	10-13	Low (< 10) ○	Medium (10 - 20) ●	High (> 20) ○
• Soil Air Conductivity	cm/sec.	10^{-6} to 10^{-2}	Low (< 10^{-6}) ○	Medium (10^{-6}-10^{-4}) ●	High (> 10^{-4}) ○
• Moisture Content	% volume	10	Moist (> 30) ○	Moderate (10 - 30) ●	Dry (< 10) ○
• Geological Conditions	—	Assumed Homogeneous	Heterogeneous ○	— ○	Homogeneous ●
• Soil Sorption Capacity - Surface Area	m^2/g	0.005 to 0.1	High (> 1) ○	— ○	Low (< 0.1) ●
• Depth to Ground Water	meters	4.5 (15 feet)	Low (<1) ○	Medium (1-5) ●	High (>5) ○
CONTAMINANT- RELATED					
• Vapor Pressure	mm Hg	469	Low (< 10) ○	Medium (10 to 100) ○	High (> 100) ●
• Water Solubility	mg/L	158	High (> 1000) ○	Medium (100 - 1000) ●	Low (< 100) ○

OTHER CONSIDERATIONS

- Cost is from $15 to $80 per cubic yard.
- Effectiveness decreases after several months of treatment.
- Capable of removing thousands of gallons.
- Air emissions will likely need to be treated with GAC.
- Treatment can be done on-site
- Care must be taken to avoid explosions because vapors are concentrated
- Cleanup takes time so that this technology is not appropriate when emergency response is needed

Richland

TABLE A-8. WORKSHEET FOR EVALUATING THE FEASIBILITY OF BIORESTORATION BEING EFFECTIVE AT YOUR SITE

CRITICAL SUCCESS FACTOR	UNITS	SITE OF INTEREST ▼	SUCCESS LESS LIKELY	SUCCESS SOMEWHAT LIKELY	SUCCESS MORE LIKELY
RELEASE - RELATED					
• Time Since Release	Months	several years	Short (< 1) O	Medium (1 - 12) O	Long (> 12) ●
SITE RELATED					
• Dominant Contaminant Phase	Phase	Liquid	Liquid ●	Vapor O	Dissolved O
• Soil Temperature	°C	10-13	Low (< 5) O	Medium (5 - 10) O	High (> 10) ●
• Soil Hydraulic Conductivity	cm/sec.	10^{-5} to 10^{-1}	Low ($<10^{-5}$) O	Medium (10^{-5}-10^{-3}) ●	High ($> 10^{-3}$) O
• Soil pH	pH Units	Lo (estimated)	(< 6 or > 8) O	— O	(6 - 8) ●
• Moisture Content	% Volume	10	Dry (< 10) O	Moderate (10 to 30) ●	Moist (> 30) O
CONTAMINANT- RELATED					
• Solubility	mg/L	158	Low (< 100) O	Medium (100 to 1000) ●	High (> 1000) O
• Biodegradability - Refractory Index	Dimensionless	0.02	Low (< 0.01) O	Medium (0.01 to 0.1) ●	High (> 0.1) O
• Fuel Type	—	Gasoline	No. 6 Fuel Oil (Heavy) O	No. 2 Fuel Oil (Medium) O	Gasoline/ Diesel (Light) ●

OTHER CONSIDERATIONS

- Cost is from $60 to $125 per cubic yard.
- Completely destroys contaminants under optimal conditions
- Effectiveness varies depending on subsurface conditions
- Biologic systems subject to upset
- Public opinion sometimes against putting more chemicals in ground
- Difficult to monitor effectiveness
- Minimizes health risk by keeping contaminants in ground and on site
- Takes long time to work—not for emergency response

Richland

TABLE A-9. WORKSHEET FOR EVALUATING THE FEASIBILITY OF SOIL FLUSHING BEING EFFECTIVE AT YOUR SITE

CRITICAL SUCCESS FACTOR	UNITS	SITE OF INTEREST ▼	SUCCESS LESS LIKELY	SUCCESS SOMEWHAT LIKELY	SUCCESS MORE LIKELY
SITE RELATED					
• Dominant Contaminant Phase	Phase	Liquid	Vapor ○	Liquid ●	Dissolved ○
• Soil Hydraulic Conductivity	cm/sec.	10^{-5} to 10^{-1}	Low ($<10^{-5}$) ○	Medium (10^{-5}-10^{-3}) ●	High ($>10^{-3}$) ○
- Soil Surface Area	m^2/g	0.005 to 0.1	High (>1) ○	Medium (0.1 - 1) ○	Small (<0.1) ●
- Carbon Content	% Weight	0.2	High (> 10 %) ○	Medium (1 - 10%) ○	Low (< 1%) ●
• Fractures in Rock	—	Absent	Present ○	— ○	Absent ●
CONTAMINANT- RELATED					
• Water Solubility	mg/L	158	Low (< 100) ○	Medium (100 to 1000) ●	High (>1,000) ○
• Sorption Characteristics - Soil Sorption Constant	L/kg	38-220	High (>10,000) ○	Medium (100-10,000) ●	Low (< 100) ○
• Vapor Pressure	mm Hg	469	High (> 100) ●	Medium (10 - 100) ○	Low (< 10) ○
• Liquid Viscosity	cPoise	0.45	High (>20) ○	Medium (2 -20) ○	Low (< 2) ●
• Liquid Density	g/cm^3	0.73	Low (< 1) ●	Medium (1 -2) ○	High (> 2) ○

OTHER CONSIDERATIONS

- Cost is from $150 to $200 per cubic yard.
- Using surfactants may increase effectiveness
- Effluent requires separation techniques such as distillation, evaporation, centrifugation
- Most effective when used ex-situ (above ground)

Richland

TABLE A-10. WORKSHEET FOR EVALUATING THE FEASIBILITY OF HYDRAULIC BARRIERS WORKING AT YOUR SITE

CRITICAL SUCCESS FACTOR	UNITS	SITE OF INTEREST ▼	SUCCESS LESS LIKELY	SUCCESS SOMEWHAT LIKELY	SUCCESS MORE LIKELY
RELEASE - RELATED					
• Time Since Release	months	several years	Long (> 12 months) ●	Medium (1 - 12 months) O	Short (< 1) O
• Volume of Spill	gallons	unknown	Small (<100) O	Medium (100 - 1000) ●	Large (> 1000) O
SITE RELATED					
• Dominant Contaminant Phase	phase	liquid	Vapor O	— O	Liquid ●
• Soil Hydraulic Conductivity	cm/sec.	10^{-5} to 10^{-1}	High (> 10^{-3}) O	Medium (10^{-5}-10^{-3}) ●	Low (< 10^{-5}) O
• Soil Sorption Capacity • Surface Area	m2/g	0.005 to 0.1	High (> 1) O	Medium (0.1 - 1) O	Low (< 0.1) ●
• Carbon Content	% weight	0.2	High (> 10%) O	Medium (1 - 10) O	Low (< 1) ●
• Temperature	°C	10-13	Low (<5) O	Medium (5 - 10) O	High (>10) ●
• Depth to Groundwater	meters	4.5 (15')	High (>5) O	Medium (1 - 5) ●	Low (< 1) O
CONTAMINANT- RELATED					
• Liquid Viscosity	c Poise	0.45	High (> 20) O	Medium (2 to 20) O	Low (< 2) ●

OTHER CONSIDERATIONS

- Cost is from $10 to $90 per cubic meter.
- Only affects liquid portion of release—not portion sorbed to soil.
- Typically limited to shallow (<3 meters) depths.
- Not effective in removing contaminants to low levels.
- Most effective when contamination is confined to small areas.
- Not effective for #6 fuel oil and other viscous fluids.
- Not effective if contamination is greater than 15 meters deep.

Richland

TABLE A-11. WORKSHEET FOR EVALUATING THE FEASIBILITY OF EXCAVATION BEING EFFECTIVE AT YOUR SITE

CRITICAL SUCCESS FACTOR	UNITS	SITE OF INTEREST ▼	SUCCESS LESS LIKELY	SUCCESS SOMEWHAT LIKELY	SUCCESS MORE LIKELY
SITE RELATED					
• Proximity of Above and Below Ground Structures	—	Nearby	Buildings nearby Buried pipes and cables ●	— O	No nearby structures O
• Volume of Soil Contaminated	Cubic Meters	Greater than 1000	Large (> 1,000) ●	Medium (100 -1,000) O	Small (< 100) O
• Depth of Contamination	Meters From Surface	From 4.5 to approx. 10	Deep (> 5) ●	Medium (1-5) O	Shallow (< 1) O
• Proximity of Site to • Traffic	—	Near	Near ●	—	Far O
• Businesses	—	Near	Near ●	—	Far O
• Disposal Site	—	Far	Far ●	—	Near O
• Backfill Source	—	Far	Far ●	—	Near O

OTHER CONSIDERATIONS

- Cost is from $50 to $300 per cubic yard.
- Appropriate when urgent response is necessary
- Brings contaminants to surface, thereby increasing exposure risks
- Significant amounts of surface area disturbed relative to depth excavated
- Requires suitable means of disposal. This is becoming increasingly difficult because some landfill operators consider petroleum-laden soil to be a hazardous waste.

APPENDIX B

Use of checklist for nonproject proposals:

Complete this checklist for nonproject proposals, even though questions may be answered "does not apply." IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NONPROJECT ACTIONS (part D).

For nonproject actions, the references in the checklist to the words "project," "applicant," and "property or site" should be read as "proposal," "proposer," and "affected geographic areas," respectively.

TO BE COMPLETED BY THE APPLICANT

A. BACKGROUND

1. Name of proposed project, if applicable:

Pump and treat groundwater at 7-11 Store No. 25821, George Washington Way, Richland , WA.

2. Name of applicant: Southland Corporation

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

Name: Mr. Lane Premo Title: Construction Manager

Firm: Southland Corp. Telephone: 575-6711

PO Box/Street: 1035 Andover Park West

City/State/Zip: Tukwila, Wa 98188

4. Date checklist prepared: _____

5. Agency requesting checklist: DOE, Central Region

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

Construct ground water recovery well and treatment system one month after receiving agency approval.

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

No. Upon completion of the water treatment, the equipment will be removed from the property.

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

Kleinfelder has prepared the following reports: Underground Fuel Storage Tank Closure 6/89; Phase II Soil and Ground Water Assessment 7/89; Quartely Ground Water Monitoring Reports 1990, and 1991.

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

None to our knowledge

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

Potential waste water discharge permit from the Department of Ecology's Central Region office.

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

The site has a convenience store/sandwich shop and a paved parking lot. The project would involve constructing a ground water recovery well and setting up a ground water treatment system involving: total fluids pump, carbon treatment unit, a flow meter, and associated plumbing. The cleaned water would be discharged to the City of Richland's sanitary sewer system.

The ground water is contaminated with petroleum products from former gasoline spills & leaking underground storage tanks.

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

7-11 Store #15821, located at 1824 George Washington Way, Richland WA.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): (Flat) rolling, hilly, steep slopes, mountainous, other: _____.

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

1 - 2%

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

brown sand & brown sandy gravel

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

No. Property on which project is located is developed and covered with a building and paved parking areas.

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

No filling or grading will be required by this project.

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

No. The project will not involve clearing. Only drilling and installing the ground water recovery well plus the treatment system.

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

100% of the site is now covered with impervious surfaces, and this condition will be the same after construction is completed.

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

None needed

2. Air

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

None

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

None

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

None

3. Water

a. Surface:

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

No

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

No

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

None

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

No

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

No

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

No

b. Ground:

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

Ground water will be withdrawn, run through a carbon filter to remove petroleum contaminants, and the cleaned water will be discharged to the storm water sewer system. A regular sampling program will document discharged waters cleanliness.

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

None

c. Water Runoff (including storm water):

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

Runoff will not be affected by the planned system.

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

No

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

None

4. Plants

None

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

___ deciduous tree: alder, maple, aspen, other
___ evergreen tree: fir, cedar, pine, other
___ shrubs
___ grass
___ pasture
___ crop or grain
___ wet soil plants: cattail, buttercup, bullrush, skunk cabbage, other
___ water plants: water lily, eelgrass, milfoil, other
___ other types of vegetation

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

None

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

None known. This area is an urban/commercial environment.

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

None

5. Animals

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

Birds: hawk, heron, eagle, songbirds, other:

None known.

Mammals: deer, bear, elk, beaver, other:

None known

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

None known

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

None known

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

None known

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

None

6. Energy and Natural Resources

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

Electric power will be required for the pump.

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

No

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

None.

7. Environmental Health

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

None are anticipated. Filter system has a fail safe built in - if the filter overloads or becomes clogged the pump shuts off, so no untreated water will be discharged to the storm sewer system.

1) Describe special emergency services that might be required.

None anticipated

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

None

b. Noise

The fluids pump is not very loud. Noise should therefore not be a problem.

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

Traffic noise in the area is not anticipated to affect the project.

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

Operation of the pump will be continually - 24 hours a day for the life of the project.

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

None

8. Land and Shoreline use

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

Convenience store, retail

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

No

c. Describe any structures on the site.

Convenience store building

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

No

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

Urban/Commercial

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

Unknown

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

N/A

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

No

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

System is automated, and would require only periodic maintenance.

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

None

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

N/A

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

Project intent is to remediate soil and ground water contaminated with gasoline product beneath the property. We believe this intent is compatible with any land use plans.

9. Housing

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

N/A

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

N/A

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

N/A

10. Aesthetics

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

Ground water treatment equipment will be five to seven feet high, and take up a 10 SF area in one corner of the site.

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

None

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

None

11. Light and Glare

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

None

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

None

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

None

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

None

12. Recreation

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

None known

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

No

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

None required.

13. Historic and Cultural Preservation

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

None known

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

None known

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

N/A

14. Transportation

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

Store is located at the intersection of George Washington Way and McMurray St. Access to the site is from either street.

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

Yes

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

Site parking would not be affected by the operating system.

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

No

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

No

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

1 trip, for system maintenance, every one to two weeks.

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

None

15. Public Services

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

No

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

None

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other.

b. Describe the utilities that are proposed for the project, the utility providing the service, and service, and the general construction activities on the site or in the immediate vicinity which might be needed.

Electricity will be used for the project, but no new lines will be installed.

C. SIGNATURE

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

Signature:_____ Lane Premo

Date Submitted:_____

DRAFT

APPLICATION FOR AUTHORIZATION TO USE

FEASIBILITY REVIEW AND CLEANUP ACTION PLAN 7-ELEVEN STORE NO 17381, RAINIER AVENUE SOUTH SEATTLE, WASHINGTON

KLEINFELDER PROJECT NUMBER 60-1047-07

DATED
, 1991

TO:Kleinfelder, Inc.
1200 112th Avenue Northeast, C-226
Bellevue, Washington 98004

FROM:

Gentlemen:

Applicant _____ hereby applies for permission to:
[State here the use(s) contemplated]

for the purpose(s) of:
[State here why you wish to do what is contemplated as set forth above]

Applicant understands and agrees that the **FEASIBILITY REVIEW AND CLEANUP ACTION PLAN, 7-ELEVEN STORE NO 17381, RAINIER AVENUE SOUTH, SEATTLE, WASHINGTON** is a copyrighted document, that Kleinfelder, Inc. is the copyright owner and that unauthorized use or copying of **FEASIBILITY REVIEW AND CLEANUP ACTION PLAN, 7-ELEVEN STORE NO 17381, RAINIER AVENUE SOUTH, SEATTLE, WASHINGTON** is strictly prohibited without the express written permission of Kleinfelder, Inc. Applicant understands that Kleinfelder, Inc. may withhold such permission at its sole discretion, or grant such permission upon such terms and conditions as it deems acceptable, such as the payment of a re-use fee.

Dated: _____

_____
Applicant

by_____

its_____