

SAMPLE and ANALYSIS PLAN
for
LINCOLN APARTMENTS SOIL GAS SAMPLING

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for the
WASHINGTON STATE DEPARTMENT OF ECOLOGY
TOXICS CLEANUP PROGRAM
SOUTHWEST REGIONAL OFFICE

February 1993

PROJECT DESCRIPTION

Problem Description

In the early 1980s, subsurface fuel contamination was detected in the daylight crawl space of Lincoln Apartments in Port Angeles, Washington (Figure 1). Fuel odors had been a nuisance to apartment residents on several occasions. To mediate the problem a ventilation system was installed to disperse fuel odors. Subdrains were placed to direct all drainage beneath the apartment to a common sump. The sump drains to the Port Angeles storm sewer system and eventually into nearby Peabody Creek. Water within the sump has had an intermittent fuel sheen for several years. Samples collected from the sump have confirmed that the water is contaminated with gasoline. Although there are several gas stations within the immediate area, the most likely source of the fuel contamination appears to be Round the Clock Deli. Round the Clock Deli is located about 200 feet southwest of Lincoln Apartments. There are three underground gasoline tanks on the Deli property which are no longer in use. Onsite tanks and lines have leaked in the past. Although the leaks were repaired, the suspected contaminated soil was never removed.

A soil boring log from the corner of Lincoln and 8th Street shows eight inches of sandy gravel fill, eight feet of clayey silty sand, two feet of a sandy gravel with perched water at eight feet, and a dense sandy silt to the bottom of the hole (14 feet). Ground water flow is thought to be generally northward towards the Strait of Juan De Fuca. The Strait is about one-half mile north of Lincoln Apartments. The regional water table lies at a depth of about 30 feet below ground surface.

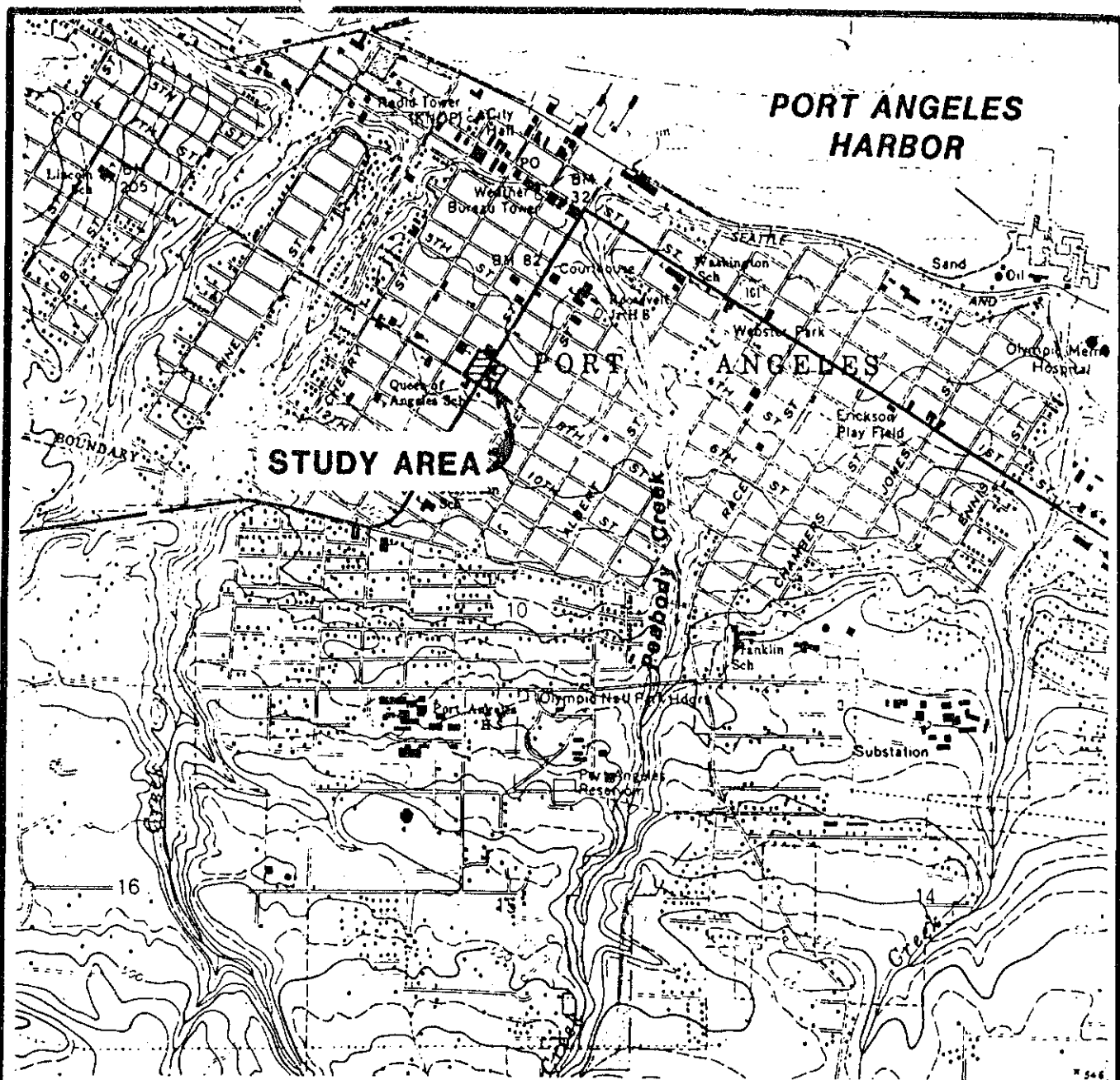
The soil gas survey and collection of soil samples will be conducted in March 1993, weather permitting.

Objective

The objective of the soil gas survey is to determine if Round the Clock Deli is a source of fuel contamination beneath Lincoln Apartments. Tasks to meet this objective are:

- Conduct a soil-gas survey using a portable gas chromatograph to provide information on possible source areas of the fuel contamination.
- Based on field soil gas results, collect and test soil samples for volatile organic contaminants from suspected contaminated areas.

If possible, the study will provide information on the extent of the contaminant plume.



REFERENCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE MAP
"PORT ANGELES, WASH."

VICINITY MAP

FIGURE 1

SAMPLING PROCEDURES

Site Selection

Soil gas sample locations have been selected up- and down-gradient of Round the Clock Deli and Lincoln Apartments. Sample locations for soil gas and soil samples will be determined relative to site landmarks (buildings, fences, etc.) using a surveyor's tape. Where possible, sample locations will be recorded with a Global Positioning System (GPS NAV 1000 Plus Magellan).

Soil Gas

Soil gas samples will be collected from about 20 locations as shown on Figure 2. Samples locations have been selected up- and down-gradient of Round the Clock Deli and Lincoln Apartments. At 10% of the sample locations, vertical profile samples will be collected and analyzed at 3-foot intervals to a maximum depth of 12 feet to help determine an optimum depth for sampling.

Soil Samples

Soil samples will be collected from areas of concern based on soil gas results. Soil samples will be sent to the laboratory for analysis.

Quality Control Samples

Sampling activities will be supported for the soil gas and soil samples by preparing and analyzing quality control samples. These quality control samples are discussed below.

Soil Gas Samples

Calibration Standard: The gas chromatograph will be calibrated after every five analysis runs with a standard pressurized mixture of 1.01 ppm benzene and 1.52 ppm trichloroethylene. If the instrument response has changed significantly since the previous calibration, the last five samples will be re-analyzed.

Quality Control Standard: A quality control standard will be analyzed daily to determine the accuracy of the gas chromatograph. The standard will consist of a Tedlar bag filled with the 1.01 ppm benzene/1.52 ppm trichloroethylene calibration mixture.

Duplicate Measurements: Duplicate analysis (repeat analyses of the same sample) will be conducted on at least 10% of all soil gas samples. Duplicate analyses will be conducted only on samples with positive results. Duplicate samples will be used to estimate analytical precision.

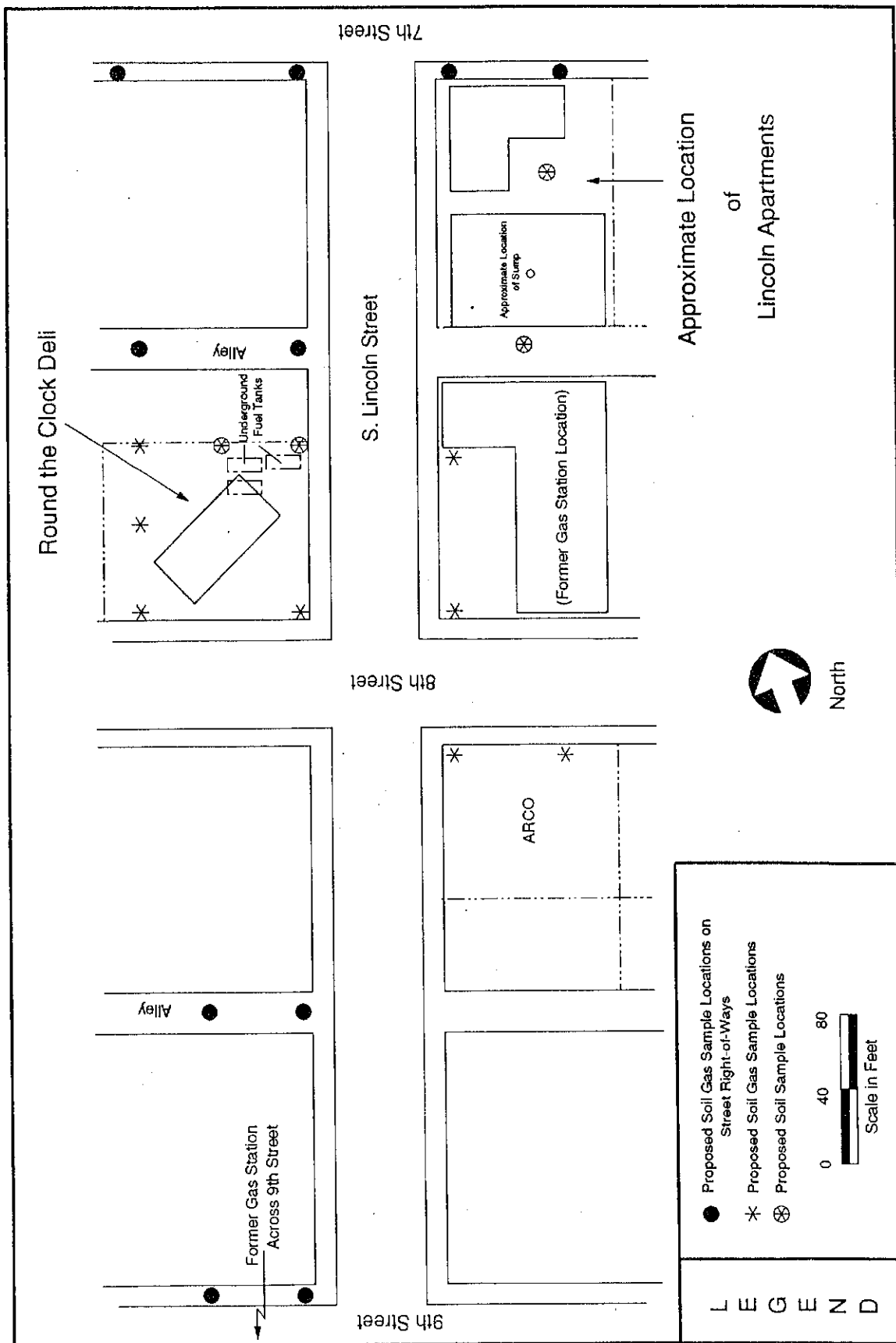


Figure 2: Lincoln Apartments - Proposed Soil Gas Sample Locations

Blank Samples: Blank samples of ambient air will be run through the gas chromatograph periodically to determine if contamination of the analytical system has occurred. Blank samples will be run after the analyses of samples with high concentrations.

Soil Samples

Duplicate Samples: Duplicate samples will be collected from at least 10% of all soil sample locations. Duplicate samples will be collected from suspected contaminated areas.

Rinsate Blank: A rinsate blank will be prepared by passing organic free water through decontaminated soil sampling equipment to determine the completeness of the cleaning procedures.

Sampling Methods

Soil Gas Sampling

A pilot hole will be drilled to the required depth using a 1/2-inch diameter, solid steel rod. After removing the pilot hole rod, a stainless steel retractable soil gas sampling tip (Retract-a-Tip) will be driven to the required depth in the pilot hole. The retractable tip will be pulled back about two inches to expose the sampling screen. Soil gas samples will be withdrawn using a suction pump through 3/16-inch ID teflon tubing, and collected under vacuum pressure in labeled 1-liter Tedlar bags. Teflon tubing will be discarded between test holes.

Soil gas samples will be analyzed using a portable gas chromatograph within one hour of collection by field staff. Analyses operating parameters, peak identification, retention time, peak area and component concentration will be displayed on the gas chromatograph computer screen and stored on a site specific computer diskette. Backup copies of the site specific data discs will be made for further in-office review and interpretation.

Soil Sampling

Soil samples will be obtained using the JMC portable soil sampler. A hollow, three-foot-long, one-inch diameter sampling tube fitted with a stainless steel liner will be driven through the soil column. The sampling tube will be pulled from the hole and the liner removed from the sampler. The soil will then be extracted from the liner by inserting a cylindrical rod. Portions of the soil column corresponding to the soil gas sample depth will be placed in four ounce glass jars and sent to the laboratory for analysis. If additional deeper samples are needed, a new liner will be inserted into the sampling tube and the tube lowered down the same hole to the desired depth. Extensions will be attached to the sampling tube so that the tube may be driven to the next required depth.

Soil samples will be described and logged. Descriptions will include depth interval, color, texture, estimated grain size, odor, and any visible contamination.

Test holes will be plugged using hydrated bentonite. Overlying fill and asphalt cover (cold mix) will be placed as necessary.

Sample Containers

Soil gas samples will be collected in 1-liter Tedlar® bags with polypropylene fittings. Soil samples will be collected in four ounce wide mouth glass jars with teflon lined septa lids.

Equipment Decontamination

All non-dedicated down-hole equipment will be decontaminated between test holes using sequential washes of deionized water with Liquinox® detergent, deionized water, and laboratory grade methanol. Retractable tips will be completely disassembled for cleaning and decontamination between holes.

Management of Investigation-Derived Wastes

Excess soil from soil sampling will be sealed in five gallon buckets and stored onsite until laboratory results are available to determine proper disposal methods.

Sample Identification

Soil gas samples will be labeled as follows LNA1 . . LNA_n in the order that samples are collected. At sample locations in which vertical profile sampling is conducted, samples will be labeled as described previously followed by a letter denoting the three-foot depth intervals. The letter "a" will represent the shallowest depth, three feet. Soil samples will be labeled in conjunction with the soil gas samples. All sample locations will be recorded in a field notebook and on a site map.

Sample Custody

Upon sample collection and proper labeling, ground water and soil samples will be stored on ice in an ice chest. Chain-of-custody procedures will be followed according to Manchester Laboratory protocol (Ecology, 1991).

SAMPLE ANALYTICAL PROCEDURES

Soil Gas Samples

Soil gas samples will be analyzed in the field using a portable gas chromatograph (Sentex Scentograph Plus). The gas chromatograph is equipped with an Argon Ionization Detector (AID), a 12' 10%SP-1000 (80/100 mesh) packed column and a chemical compound library (Sentex). The gas chromatograph will be calibrated using a standard pressurized mixture of 1.01 ppm benzene and 1.52 ppm trichloroethylene. Operating parameters will be set so that

calibration peaks coincide with retention times established on the industrial solvents chemical compound library (Sentex). The 19 compounds contained in the library will be used to help identify onsite contaminants. Operating parameters such as sample time, temperature, and chart duration will be adjusted in the field to maximize results.

Soil Gas Samples

Soil samples will be analyzed for volatile organics and Hydrocarbon Identification (HCID). Samples will be analyzed using EPA SW846 Method #8260 (EPA 1986) and in-house laboratory procedures, respectively.

Data Reduction, Validation, and Reporting

Since the soil gas survey is purely for site screening and source identification, all compounds identified are considered to be tentatively identified and associated concentrations estimates. Data obtained during this study will be reported in a technical document.

REFERENCES

Washington State Department of Ecology, 1974-present. Lincoln Apartment Files.

Washington State Department of Ecology, 1991. Manchester Environmental Laboratory - Laboratory Users Manual. Edited by D. Huntamer and J. Hyre.

U.S. Environmental Protection Agency, 1986. Test Methods for Evaluating Solid Waste, SW-846. Office of Emergency Response, Washington D.C.

- (1) Solvents (volatile) _____, _____, _____, _____
(2) Corrosives _____
(3) Oxidizers _____
(4) Pesticides _____
(5) Dusts _____
(6) Metals _____

- (7) Gases, vapors _____
 (8) Flammables X _____
 (9) Explosives _____
 (10) Carcinogens _____
 (11) Other/explain _____

INFECTIOUS AGENTS _____

EXPOSURE CONTROL METHODS: Avoidance _____ Work Practices X _____
 PPE X _____ Other/describe _____

SURVEY EQUIPMENT:

- * (1) CGI-Multimeter (O2, LEL, H2S, CO) _____
 (2) TIP(PID) X _____
 (3) OVA(FID) _____
 (4) RAM 1(particulate) _____
 (5) Radiation Meter _____
 (6) Sensidyne Tubes(specify) _____
 (7) Calibration Info: _____
 (8) Other, explain: _____

KNOWN ACTION LEVELS	INSTRUMENT READINGS		
	Type	Response	Location
(1) _____	_____	_____	_____
(2) <u>NONE -> CHECK</u>	<u>TIP</u>	<u>EVACUATE</u>	<u>Lincoln / 7th</u>
(3) <u>AREA w/ DERRICK TUBES OF AIR SAMPLER</u>	_____	_____	_____
(4) <u>IF READING EXCEEDS 5 ppm</u>	_____	_____	_____

REQUIRED PERSONAL PROTECTIVE EQUIPMENT:

Level of Protection: (B) _____ (C) _____ (D) X _____
 Comments _____

- (1) Body: Tyvac _____, Keppler _____, Sarenex _____, Raingear X _____
 Coveralls X _____, Other _____
 (2) Head: HardHat X _____, Goggles _____, Earplugs X _____
 Faceshield _____
 (3) Hands: Gloves X _____, Outer _____, Inner _____
 Specify Type _____
 (4) Footwear: Workshoes X _____, CPC boots _____, Booties _____

RESPIRATORY PROTECTION: Level B _____, Level C _____, Level D X _____

Comments _____
 Full face _____, Half Face _____, Cartridge/Canister _____
 LISA (Supplied Air) ESCAPE ONLY _____

LEVEL B RESPIRATOR USE SHALL REQUIRE TCP STAFF TO FOLLOW THE SOP FOR
LEVEL B ACTIVITY

MISC EQUIPMENT: Drinking Water(electrolyte?) X,
Eye Wash _____, Fire Extinguisher X, Camera X, Binocular _____,
Radio _____ Flashlight _____, Safety Vest X,
Other _____

COMMUNICATION INSTRUCTIONS: _____

EMERGENCY CONTACTS: Police 911 Medical 911
Ecology _____

NOTICE:HAZARDS NOT ADEQUATELY PROTECTED FOR.PRECLUDE WORK IN THE VICINITY
OF THE HAZARD. AND MAY PRECLUDE SITE ENTRY ENTIRELY.

Total Time on the Site _____; Known Chemical Exposure _____
_____, Protected _____ Unprotected _____

Signature: _____ Date _____ Time _____

Space for: sketches, diagrams or comments.