Geo Engineers

8410 - 154th Avenue NE
Redmond, Washington 98052
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FAX TRANSMITTAL

To: US EPA
Region 10

Date: August 22, 1991

File: 0249-023-B14

Fax Number: 553-0110

Attention: Ms. Eileen Heilman

Regarding: Weyerhaeuser Snoqualmie PCB Assessment

Pages	Date	Description
1	08/22/91	Fax Transmittal
01	08/22/91	Cover Letter from John Cross at Weyerhaeuser
01	08/22/91	Preliminary Chemical Analytical Results MW-1 and MW-2
06	08/22/91	Field Procedures Letter from GeoEngineers to Weyerhaeuser
19	08/08/91	Site Safety Plan
02	08/16/91	Work Plan
01	08/19/91	Ground Water Sampling Plan

Total Pages: 31

Comments: 15 data = 16 pages

Signed:

Kurt Fraese

Weyerhaeuser

Corporate Headquarters
Tacoma, Washington 98477
Tel (206) 924 2345

August 22, 1991

Ms. Eileen Heilman
US EPA
Region 10
1200 6th Avenue
Seattle, WA 98101

RE: Snoqualmie Mill Site

Dear Ms. Heilman:

As you requested in our conversation this morning, attached is information about:

- QA/QC on August 16th & 19th;
- Field Procedures on August 16th & 19th;
- Plan for surface sampling to be done August 23rd.

I hope this meets your needs. Please contact me if there are any questions.

Sincerely,

John P. Gross
Remediation Manager
abm\to\jg8-22a

Weyerhaeuser

32901 Weyerhaeuser Way South
Federal Way, Washington 98003
Analytical Chemistry Laboratories
Tacoma, Washington 98477
Tel (206) 924 6872
Fax (206) 924 6654

Weyerhaeuser Analysis and Testing Services
Service Request 06459

GEO ENGINEERS INC. SOIL SAMPLES

Aroclor Analysis

Seven soil were analyzed for Aroclors, using a modified method 3050 for sample preparation and method 8080 for GC analysis. The results summarized below.

Lab Sample Number	Sample Description		Depth (feet)
76051	MW-1-2	8/12/91	7.5
76052	MW-1-6	8/12/91	15.5
76053	MW-1-9	8/12/91	
76054	MW-2-2	8/12/91	23.0
76055	MW-2-7A	8/12/91	7.0
76056	MW-2-7B	8/12/91	18.0
76057	MS-2-10	8/12/91	25.5

UNITS IN PPM (UG/G)

CAS NO.	COMPOUND	76051	76052	76053	76054	76055
12674-11-2	Aroclor-1016	<0.025	<0.025	<0.025	<0.025	<25
11104-28-2	Aroclor-1221	<0.025	<0.025	<0.025	<0.025	<25
11141-16-5	Aroclor-1232	<0.025	<0.025	<0.025	<0.025	<25
53469-21-9	Aroclor-1242	<0.025	<0.025	<0.025	<0.025	<25
12672-29-6	Aroclor-1248	<0.025	<0.025	<0.025	<0.025	<25
11097-69-1	Aroclor-1254	<0.025	<0.025	<0.025	<0.025	<25
11096-82-5	Aroclor-1260	<0.025	<0.025	<0.025	0.073	300

CAS NO.	COMPOUND	76056	76057
12674-11-2	Aroclor-1016	<2.5	<0.25
11104-28-2	Aroclor-1221	<2.5	<0.25
11141-16-5	Aroclor-1232	<2.5	<0.25
53469-21-9	Aroclor-1242	<2.5	<0.25
12672-29-6	Aroclor-1248	<2.5	<0.25
11097-69-1	Aroclor-1254	<2.5	<0.25
11096-82-5	Aroclor-1260	32	1.5

Approved _____ Date 8/20/91

GeoEngineers

August 22, 1991

Weyerhaeuser
CH 1K31
Tacoma, Washington 98477

Attention: Mr. John Gross

Geotechnical,
Geoenvironmental and
Geologic Services

Field Procedures
Subsurface PCB Assessment
Snoqualmie Falls Plywood Plant
Fire Site
Snoqualmie, Washington
File No. 0249-023-B14

INTRODUCTION

This letter provides a summary of GeoEngineers field procedures and quality assurance/quality control program that were employed during the assessment of potential subsurface PCB-related (polychlorinated biphenyls) contamination in soil and ground water at the former site of Weyerhaeuser's Snoqualmie Falls Plywood Plant. Monitor wells were constructed in two exploratory borings (MW-1 and MW-2) that were drilled on August 12, 1991 and in two additional borings (MW-3 and MW-4) that were drilled on August 16, 1991. Ground water samples were obtained from the four monitor wells on August 19, 1991. A copy of GeoEngineers site safety plan is attached.

FIELD PROCEDURES ON AUGUST 12, 1991

The site safety plan and the strategy for drilling was presented and discussed with the drillers at the site prior to starting MW-1. The field geologist from GeoEngineers used tape and traffic cones to mark the hot zone around the drill rig and the sample truck. The GeoEngineers geologist and the drillers wore steel toed rubber boots, hard hats, rubber gloves and safety goggles while in the hot zone. Ear protection was used by the drillers.

Soil samples were obtained every 2.5 feet while drilling MW-1 and MW-2. Soil cuttings from the drilling and sampling process were placed in labeled 55-gallon drums. Soil samples were examined and logged by the GeoEngineers geologist on the tailgate of the sample truck.

A decon area was established approximately 300 feet northeast of the

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hot zone on a concrete pad. No evidence of PCB-related contamination was detected in soil samples from MW-1 based on field screening. Chemical analysis of soil samples from MW-1 did not detect PCB contamination. After finishing MW-1 the drillers moved the augers and the drill rig to the decon area and steam cleaned both. The steam cleaning water was collected in labeled 55-gallon drums.

Field screening headspace tests using a Photovac MicroTIP and a "moth ball" odor suggested the potential presence of PCBs in the soil sample obtained from a depth of 18 feet in MW-2. The GeoEngineers geologist put Tyvek coveralls on and MW-2 was completed.

The decon area was upgraded prior to steam cleaning the augers and drill rig after MW-2 was completed. Wooden boards were used to construct a berm around the decon area and plastic sheeting was placed on the concrete pad and over the berm to contain the steam cleaning water. All steam cleaning operations occurred within the bermed area. Steam cleaning water was removed with 5-gallon buckets from the bermed area and placed in labeled 55-gallon drums. All plastic sheeting and buckets used by the driller during decon were placed in the hot zone in a debris stockpile after decon was completed. The debris stockpile was placed on plastic sheeting and covered with plastic sheeting before leaving the site.

A small quantity of soil cuttings from the drilling and sampling operation fell to the ground in five areas around the drill rig and the sample truck. These areas were marked with flagging as being potentially contaminated by the operation. The area taped to mark the hot zone was expanded to include these areas. Additionally, plywood attached to the tailgate of the sample truck was considered potentially contaminated.

Soil cuttings which fell on the ground and the upper approximately four inches of soil beneath them were removed with a steam cleaned shovel and placed in a labeled 55-gallon drum. The areas of surface soil removal were covered with plastic sheeting pending sampling to confirm that the areas contain no PCBs. The plywood on the tailgate of the sample truck was removed, wrapped in plastic sheeting, and placed in the debris stockpile. All 55-gallon drums were placed on plastic sheeting.

The geologist's boots were washed in a trisodium phosphate wash and a fresh water rinse after field operations were completed. The drillers boots were steam cleaned in the decon area prior to leaving the site. Decon water and steam cleaning water was placed in labeled 55-gallon drums. Tyvek and rubber gloves were placed in the debris stockpile. The area of the hot zone was surrounded with marking tape before leaving the site. The geologist and drillers showered upon returning home.

FIELD PROCEDURES ON AUGUST 16, 1991

Field procedures were upgraded prior to drilling on August 16, 1991. All soil cuttings for the remainder of the drilling program were considered potentially contaminated with PCBs. A copy of the work plan used by the drillers and geologists on site on August 16, 1991 is attached. The field procedures followed while drilling MW-3 and MW-4 included:

1. Plastic sheeting was placed on the ground surface in all areas of operation in the hot zone. The areas covered with plastic sheeting included the ground surface at the rear of the drill rig and sample truck and along the corridor between the two vehicles.
2. The decon area was established within the hot zone on plastic sheeting. Plastic sheeting also was placed on the ground surface along the corridor between the decon area and the drill rig.
3. Plastic sheeting and a 4 by 8 foot piece of plywood was placed over the ground surface at each boring location to isolate the drill cuttings from the ground surface. The borings were drilled through a hole in the plastic sheeting and the plywood.
4. Large tubs were used in the decon area to contain the steam cleaning water.
5. The soil cuttings were placed in labeled 55-gallon drums using a shovel.
6. The steam cleaning water was placed in labeled 55-gallon drums using 5-gallon buckets.
7. Tyvek coveralls, steel toed rubber boots, rubber gloves and safety glasses were worn in the hot zone.
8. The tailgate of the sample truck was covered with plastic sheeting.
9. A new piece of plastic sheeting was placed on the ground surface at the boring locations and a hole was cut in a sheet of plastic sheeting to accommodate construction of the well monument and to protect the ground surface during well development.
10. The monitor wells were developed using a bailer and the well development water was placed in labeled 55-gallon drums.
11. All plastic sheeting, plywood and disposable equipment was placed in the debris stockpile within the hot zone.
12. The geologist's boots were washed in a trisodium phosphate wash and a fresh water rinse after field operations were completed. The drillers boots were steam cleaned in the decon area prior to leaving the site. Decon water and steam cleaning water was placed in labeled 55-gallon drums. The geologists and the drillers showered after returning home.
13. The hot zone was clearly defined with marking tape before leaving

the site.

FIELD PROCEDURES ON AUGUST 19, 1991

The work plan for ground water sampling on August 19, 1991 is attached. Field procedures for ground water sampling included:

1. A new piece of plastic sheeting was placed on the ground surface at the well locations and a hole was cut in the plastic sheeting to protect the ground surface during well purging and ground water sampling.
2. The monitor wells were purged and sampled using a bailer and the purge water was placed in labeled 55-gallon drums.
3. Plastic sheeting and disposable equipment was placed in the debris stockpile within the hot zone.
4. The geologist's boots were washed in a trisodium phosphate wash and a fresh water rinse after field operations were completed. Decon water was placed in labeled 55-gallon drums. The geologist showered after returning home.
5. The hot zone was clearly defined with marking tape before leaving the site.

QUALITY CONTROL AND QUALITY ASSURANCE PROCEDURES

During both days of drilling the following quality control and quality assurance procedures were followed.

1. The drilling and soil sampling equipment was steam cleaned between each boring.
2. Monitor well casing was steam cleaned prior to each well construction.
3. The soil sampling equipment, well development, purging equipment and ground water sampling equipment was cleaned in a trisodium phosphate wash and distilled water rinse between each sampling attempt.
4. Bailer cord was changed between developing, purging and sampling ground water in each monitor well.
5. Disposable rubber gloves were worn during all phases of soil and ground water sampling and equipment cleaning. Thin rubber liner gloves were worn under the outer rubber gloves. The gloves were changed between each boring and when they became soiled or damaged.
6. All gloves, plastic bags, rags, tyvek, bailer cord and other

disposable equipment which was used during sampling was placed in the debris stockpile within the hot zone.

7. A geologist from GeoEngineers examined and classified the soils encountered and prepared a detailed log of each boring. Soils encountered were classified visually in general accordance with ASTM D-2488-83.
8. Soil samples obtained from the borings were field screened for the presence of PCBs. Field screening methods consisted of visual examination, water sheen testing and headspace vapor testing using a Photovac MicroTIP.
9. Soil samples were placed in plastic bags and/or laboratory cleaned sample jars and labeled.
10. Three soil samples were submitted for chemical analysis from each boring. Two duplicate soil samples also were submitted for chemical analysis. All of the other soil samples are being stored in a refrigerator at the laboratory.
11. The monitor wells were developed by removing a minimum of 5 well volumes of water from each well casing using a bailer.
12. The monitor wells were purged prior to sampling ground water by removing a minimum of 3 well volumes of water from each well casing and documenting that pH, conductivity and temperature had stabilized in the ground water removed from the well.
13. One ground water sample was obtained from each monitor well for chemical analysis. One duplicated ground water sample also was obtained for chemical analysis. A trip blank prepared by GeoEngineers and carried in a cooler with blue ice during the ground water sampling also was submitted for chemical analysis.
14. The soil and ground water samples were placed in coolers with blue ice for storage in the field and during transportation to the laboratory.
15. Chain-of-custody procedures were observed in transporting the soil and ground water samples to the laboratory for analysis and storage.
16. The chemical analytical laboratory is running at least one matrix spike, one duplicate and one method blank analysis for each soil and ground water analytical method.

WORK PLAN FOR SAMPLING SURFACE SOIL ON AUGUST 23, 1991

A GeoEngineers geologist will visit the site on August 23, 1991 to obtain surface soil samples from areas potentially contaminated during the drilling of MW-2 on August 12, 1991. Composite soil samples will be

obtained for chemical analysis of PCBs from each of the five areas where soil cuttings were observed to come in contact with the ground and from the decon area used during the drilling of MW-1 and MW-2. Additionally, a sampling grid with 15 by 15 foot spacing will be set up across the work area used during the drilling of MW-2 and along the corridor used by the drill rig between the work area and the decon area. Composite soil samples will be obtained for chemical analysis of PCBs from each of the 15 by 15 foot areas defined by the grid.

Composite soil samples will consist of at least three discrete soil samples obtained from the area of interest. The discrete soil samples will be obtained using a stainless steel spoon and composited in a stainless steel bowl. The spoon and the bowl will be cleaned in a trisodium phosphate wash and a distilled water rinse between each sampling location. The wash water and rinse water will be placed in a labeled 55-gallon drum. Additionally, the debris stockpile will be placed in 55-gallon drums.

Disposable rubber gloves will be worn throughout the sampling procedure. The samples will be placed in laboratory-supplied glass sample containers and kept in a cooler with blue ice during field storage and transportation to the laboratory. Chain-of-custody procedures will be followed during transportation to the laboratory. The hot zone will be clearly defined with marking tape before leaving the site and will remain marked until laboratory results are received and debris and drums are removed from the site.

Please call if you have any questions concerning this letter. A detailed description of the field exploration activities, subsurface conditions and analytical results will be provided in the project report which is being prepared.

Yours very truly,
GeoEngineers, Inc.

Kurt Fraese
Senior Geologist

John H. Biggane,
Associate

KRF:JHB:wd
Attachments

8/8/91

GEOENGINEERS, INC.
SITE SAFETY PLAN CHECKLIST

I. GENERAL PROJECT INFORMATION

Project Name:	Weyerhaeuser, Snoqualmie
Project Number:	0249-023-B14
Type of Project:	Site PCB Assessment
Start/Completion Dates:	08/12/91 to 08/16/91
Subcontractors:	Holt Drilling

II. PERSONNEL/CONTACT INFORMATION PHONE NUMBERS

Site Safety Officer:	Sarah Kingery
Project Manager:	Kurt Fraese
Health and Safety Program Manager:	Dan Crevenston
Field Engineer/Geologist:	Sarah Kingery
Client:	Weyerhaeuser

III. LIST OF FIELD ACTIVITIES

Check the activities applicable to project (See Section 2.2 of the site safety plan for complete task descriptions)

_X_ Exploratory borings
_X_ Monitor well installation
_X_ Surveying
_X_ Ground water depth and free product measurement
___ Recovery of free product
_X_ Monitor well development
_X_ Ground water sampling
_X_ Vapor measurements
___ Remediation system monitoring
___ Test pit exploration
___ Underground storage tank removal monitoring
___ Remedial excavation
___ Soil stockpile testing
_X_ Field screening of soil samples
_X_ Site reconnaissance

IV. SITE DESCRIPTION -- Attach map

Location/Size: Former Snoqualmie Falls Plywood Plant - 10 acres
Topography: Flat
Current Owner: Weyerhaeuser
Site Security: Ron Forslin (888-2511), hot zone access limited
Road access: yes
Water access: yes
Electrical access: yes
Utility check complete: Site check 8/9/91 @ 10:00 #91322176
Additional information applicable to site: David Watkins (888-2535) is the Weyerhaeuser contact. EPA may observe drilling.

History of the site: Plywood plant burned in February 1989. Transformer T-12 was damaged in the process and a small PCB spill occured. Remedial excavation of soil contianing PCBs by Olympus Environmental took place in June 1989. The extent of PCBs encountered was greater than what could be attributed to the spill. Therefore, it is believed that the transformer had leaked PCBs for sometime before the fire. Remedial excavation was terminated at a depth of 13 feet because a clay unit was encountered that acts an aquitard to an aquifer located at a depth of 15 feet. The EPA has asked that Weyerhaeuser ... evaluate the potential presence of PCBs in the aquifer.

V. EMERGENCY INFORMATION

Attach map marking route to the nearest hospital/clinic.
Hospital Name: Overlake Hospital in Bellevue
Phone Numbers: Hospital 454-4011
Ambulance 911
Poison Control: Seattle 256-2121;
Other 1-800-732-6985
Police 911
Fire 911
Location of Nearest Telephone: Main office at Snoqualmie Mill
Nearest Fire Extinguisher: GEI vehicle
Nearest First Aid Kit: GEI vehicle

VI. HAZARDS/PRECAUTIONS

1. Free petroleum product at site? no

2. Check substances known or suspected to occur at the site:

_X_ Motor oil (used or unused)
___ Leaded and unleaded gasoline
___ Nos. 1 and 2 fuel oil (vehicle fuel and home heating oil)
_X_ Nos. 4 and 5 fuel oil
___ No. 6 fuel oil (bunker C fuel oil)
_X_ Hydraulic oil
___ Transmission fluid
___ JP-3, 4, 5 (jet fuels)
___ Gasohol
___ Solvents (nonchlorinated)
_X_ Transformer oils containing PCBs

3. Known chemical characteristics:

	Soil Chemistry (mg/kg)	Water Chemistry (mg/l)
TPH		
Trichlorobenzene	1,400	0.003
Tetrachlobenzene	60	0.0001
PCBs	34,000	0.014
Xylene (total)		
Fuel Hydrocarbons		

Other constituents (TCLP, pH, metals, etc.)

4. Physical Hazards: Check equipment/conditions applicable to specific project.

_X_ Drill rig
___ Backhoe
___ Excavations/trenching
___ Shored/braced excavation if greater than 4 feet of depth
___ Overhead hazards/powerlines
___ Debris on site (tripping/puncture hazards)
_X_ Unusual traffic hazard

___ Other expected physical hazards _____

5. Other potential hazards on site:

Heat stress potential?	no
Cold exposure?	no
Confined space entry?	no
Asbestos-containing materials?	no

If YES to above questions, see appropriate sections and documentation forms of GEI Health and Safety Program Manual.

VII. PERSONAL PROTECTIVE EQUIPMENT

Check applicable level of protection to be used initially:

_X_ Level D - to start, upgrade to Level C if necessary
___ Level C
___ Modifications (specify): water proof tyvek's

VIII. AIR MONITORING PLAN

Check instrumentation to be used:

_X_ Bacharach TLV Sniffer
_X_ Photovac TIP
___ Other (i.e., detector tubes): _____

Check monitoring frequency/locations:

		Type (specify-workspace, borehole, breathing zone)
___	Continuous	_____
_X_	15 minutes	in the breathing zone, record results _____
___	30 minutes	_____
___	Hourly	_____

Hot zone (Define): Within 20 feet of the drilling rig and in a ten foot wide corridor between the drill rig and the field vehicle.

Action levels:

If combustible vapor concentration exceeds 150 ppm for an 8-hour TWA measured in the breathing zone, upgrade to Level C PPE or move to a noncontaminated area.

If combustible vapor concentration exceeds 250 ppm continuously for a 15-minute period, measured in the breathing zone, upgrade to Level C PPE or move to a noncontaminated area.

If combustible vapor concentration exceeds 2,000 ppm instantaneously measured in the breathing zone, stop work, stabilize conditions if possible, move to a noncontaminated area and notify the PM and HSPM.

If combustible gas exceeds 10% of the LEL measured in the breathing zone, stop work, stabilize conditions if possible, move to a noncontaminated area and notify the PM and HSPM.

If the volatile organic compound concentration exceeds 5 ppm above background concentrations at any time, measured in the breathing zone, upgrade to Level C PPE, stabilize conditions if possible, leave the site move to a noncontaminated area and notify the PM & HSPM.

NOTE: The Field Log is to contain the following information:

Air monitoring calibration, maintenance information.
Air monitoring results; personnel, locations monitored.
Combustible gas indicator readings. MicroTIP readings.
Action levels for upgrading protection level.
Meteorological conditions (temp., wind direction, speed, humidity, etc.).

IX. DECONTAMINATION PROCEDURES

Minimal decontamination consists of washing soiled boots and respirator; discarding protective clothing and gloves; and removing used respirator cartridges prior to leaving the site.

Specify other decontamination procedures: ______________________

X. WASTE DISPOSAL OR STORAGE (Drill cuttings, purge water, used PPE)

_X__ On site, pending analysis and further action, in drums.
____ Other (describe destination, responsible parties):

____

XI. DOCUMENTATION EXPECTED TO BE COMPLETED:

Required forms:

Health and Safety Plan acknowledgement by GEI employees
Contractors Health and Safety Plan Disclaimer

Conditional forms: Accident Report
Heat stress
Exposure report

XII. HEALTH AND SAFETY MEETING

All personnel participating in this project must receive initial health and safety orientation. Thereafter, brief tailgate safety meetings as required as deemed necessary by the site Safety Officer.

The orientation and the tailgate safety meetings shall include a discussion of emergency response, site communications and site hazards.

Date	Topics	Attendee	Company Name	Employee Initials

XIII. APPROVALS

As modified 8-14-91

1. Plan Prepared [signature] 8/8/91
Signature Date

2. Plan Approval [signature] 8/8/91
P.M. Signature Date

[signature] for Dan Crevensten [signature] 8/8/91 [signature]
HSPM Signature Date

FORM 3 CONTRACTOR AND SUBCONTRACTOR SITE SAFETY PLAN DISCLAIMER

GeoEngineers, Inc. is not responsible for the site safety of its subcontractors/contractors. GeoEngineers recommends that subcontractors and contractors provide a site safety plan for their employees to cover exposure to anticipated hazardous materials. All work by the subcontractor/contractor should be completed in accordance with their own plans. If the subcontractor/contractor chooses to use GeoEngineers site safety plan, they use the GeoEngineers plan completely at their own risk, and shall hold GeoEngineers harmless from, and indemnify it against, all liability in the case of any injury or death. GeoEngineers, Inc. maintains no responsibility whatsoever for the safety and welfare of any on-site personnel except its own employees.

PROJECT NUMBER: 0249-23-B14

PROJECT DESCRIPTION/NAME: PCB Exploration /

LOCATION: Snoqualamie

CLIENT: Weyerhaeuser

KNOWN (OR ANTICIPATED) HAZARDOUS SUBSTANCES

Petroleum Hydrocarbons:
- naphthenes
- paraffins
- aromatic hydrocarbons (benzene, ethylbenzene, toluene and xylenes)
- gasoline
- diesel fuel
- chlorinated and nonchlorinated solvents
- used motor oil
- hydraulic oil
- transmission fluid
- methyl tertbutyl ether

Lead-contaminated soil

PCBs

Physical hazards: drill rigs, backhoes, trenches

I, _____, verify that a copy of the current site Safety Plan has been provided by GeoEngineers, Inc. to inform me of the hazardous substances on site and to provide safety procedures and protocols which will be used by GeoEngineers' staff at the site. If I choose to use GeoEngineers' site safety plan, I agree to do so on behalf of the undersigned company only at my own risk, and shall hold GeoEngineers harmless and indemnify it against all liability in the case of any injury or death. By accepting and using this site Safety Plan, I agree that the safety of my employees is the responsibility of the undersigned company.

SIGNED William T. Baum / Charles E. Scott Date: 8-12-91

Firm: Holt Testing

Geo Engineers

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Telephone: (206) 861-6000
Fax: (206) 861-6050

FAX TRANSMITTAL

To: US EPA
Region 10

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Signed:

Kurt Fraese

Polychlorinated biphenyls (PCBs) are classified as B2 probable human carcinogens by EPA based on "sufficient" animal data and "inadequate" human data. The animal studies found hepatocellular carcinomas in three strains of rats and two strains of mice. The studies were conducted properly and used sufficient numbers of animals and dosing levels.

Data for humans is inadequate because of confounding exposures to impurities in the PCBs or other chemicals in the work place and a general lack of exposure quantification. The human data suggests excess risk of liver cancer by ingestion, inhalation or dermal contact.

Reproductive system effects of PCBs, including gynecological disorders, decreased fetal growth, low birth weight and poor survival have also been reported.

According to EPA (1990) the PCB mixtures used in the animal studies were commercial grade chemicals and might not be the same mixtures of isomers found in the environment. The particular PCB cogener responsible for the effects is unknown. The effects of decomposition products, contaminants, or metabolites is also unknown.

The human equivalent dose at which significant tumor incidence would be expected is 0.59 mg/kg/day. The NIOSH (National Institute of Occupational Safety and Health) recommended exposure limit is 1 $\mu g/m^3$. The OSHA (Occupational Safety and Health Administration) permissible exposure limit is 0.5 mg/m^3 with a "skin" notation. NIOSH recommends blood testing, prevention of skin contact and warning female workers of child-bearing age and nursing mothers of potential reproductive system effects.

NIOSH recommends the use of supplied air or self-contained breathing apparatus operated in a positive pressure mode. Full-face air purifying respirators with organic vapor and high efficiency particulate filters may be used for escape or while mitigation measures, such as mechanical ventilation, are in use.

GeoEngineers personnel will wear waterproof tyvek and suits and gloves during all work activities within the hot zone (see attached map).

MTCA cleanup Method A cleanup levels for PCBs are 0.1 ppb (PCB mixture) in water and 1 ppm (PCB mixture) in soil. Note that the detection limit for individual PCB alochlors in water is typically 0.1 ppb.

GENERAL SAFE WORK PRACTICES

The following safe work practices should be used, as appropriate, to protect GeoEngineers' employees during the conduct of their work.

1. Hold a site safety orientation meeting (tailgate safety meeting) with all project personnel on-site before beginning work each day. Attendance at the meetings shall be documented and acknowledged in Section XII of the site safety plan checklist (Form 1).
2. Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the contaminated or potentially contaminated area (hot zone), or where there is a possibility for transfer of contamination. The hot zone should be defined in Section VIII of the site safety plan checklist (Form 1).
3. Contact with potentially contaminated substances should be avoided. If possible, do not walk through puddles, pools, mud, etc. Avoid kneeling, leaning or sitting on equipment or on the ground whenever possible. Do not place monitoring equipment or personnel protective equipment on a potentially contaminated surface (for example, on the ground). Lay down a piece of plastic to provide a clean surface for equipment.
4. Precautions should be taken to avoid spilling contaminated materials. Sample preparation should take place within the exclusion zone. Splashing of contaminated liquids should be avoided.
5. Use plastic drop cloths and equipment covers where appropriate.
6. Field staff should use their senses to alert them to potentially dangerous situations (strong, irritating or nauseating odors, skin or eye irritation). Air monitoring should proceed, if not already called for, when significant concentrations of hydrocarbon vapors are suspected (see Section VII of the site safety plan checklist, Form 1).
7. Be aware constantly of the location and motion of heavy equipment. Maintain a safe distance between field personnel and heavy equipment. Do not approach drill rigs, backhoes or other heavy equipment unless absolutely necessary for sample collection,

observation or communication. Stay within visual contract by the operator, if possible. Do not approach heavy equipment unless the operator of that equipment acknowledges your presence and has indicated that it is safe to do so.

8. Use highly visible clothing when working around heavy equipment. Orange safety vests are recommended.
9. Be familiar with the site environment, including the following:
   A. Wind direction.
   B. Accessibility to other site personnel, equipment and vehicles.
   C. Hot zone boundaries (as shown on Form 1).
   D. Site access and escape routes.
   E. Location of fire extinguisher and first aid kits.
   F. Nearest water source.
   G. Nearest phone.
   H. Routes and procedures to be used during medical emergencies.
10. Personnel and equipment in the hot zone should be limited to the minimum number necessary to achieve the objectives while providing for safe site operations.
11. Position equipment and work stations so that all workers are upwind of contamination sources, whenever possible.
12. Personnel on-site should use the buddy system (pairs) whenever communication is restricted. The pair should prearrange hand signals for emergency communication for situations where voice communication becomes impaired. Visual contact should be maintained between pairs on-site, with the pair remaining in proximity to assist each other in case of emergencies. If only one GeoEngineers' employee is on-site, a buddy system can be arranged with subcontractor/contractor personnel.
13. Work area entrance and exit routes should be defined and emergency escape routes should be delineated by the Site Safety Officer.

SAFE WORK PRACTICES FOR DRILLING, EXCAVATING, AND SAMPLING OPERATIONS

1. All underground utilities must be located and marked prior to drilling or excavating.
2. Observe the locations of all overhead utility lines on-site. The drill rigs (including the mast) and excavator buckets must not be

operated within 20 feet of an overhead power line. Other approach distances or work practices can be worked out with the local utility company. Remember that hoist lines and overhead power lines can move toward each other during windy conditions.

3. All drilling and sampling equipment should be cleaned prior to working on site. Drilling or sampling equipment should be cleaned after each use. Cleaning should be done with a hot-water pressure washer or with a TSP (trisodium phosphate) wash and distilled water rinse.
4. Work in less contaminated areas should be conducted first, where practical.
5. Only the minimum number of personnel necessary to achieve the project objectives should be within 25 feet of the drilling or excavation activity. Emergency personnel, backup subcontractor/ contractor personnel and observers should remain at least 25 feet from the drilling or sampling activity, where practical.
6. An exclusion zone should be established for all sites. Delineation of an exclusion zone using barricades, traffic cones, tape or other means may reflect the expected extent of the areas at or above a predetermined hazard or threshold contaminant concentration. This delineation will be based on available data, including the results of previous monitoring and chemical analyses, information from site personnel regarding historical site activities, and general observations. This delineation will be made by the Site Safety Officer or the Project Manager.
7. Excavations, test pits or trenches 4 feet deep or deeper must be sloped, benched, shored or braced if entry is anticipated. Excavations must be guarded with barricades no farther than 20 feet apart and connected with yellow or yellow/black tape not less than 3/4-inch wide. The barricades must be placed no less than 2 feet from the edge of the excavation. Fencing may also be used in place of barricades.
8. Confined spaces present special hazards. Be aware of the potential for organic vapors to reach explosive or flammable concentrations in confined spaces. Provide adequate ventilation, do not allow smoking, and keep hot motors/pumps, and electrical

equipment away from areas with vapors. Do not enter confined spaces without adequate training, preparation and prior testing for oxygen content. Confined space entry is not as authorized under this site safety plan.

9. Neoprene or nitrile outer gloves and vinyl inner gloves should be worn when sampling soil, water or petroleum products.
10. Air-purifying respirators should be readily accessible for immediate use if air monitoring of the workspace indicates the presence of organic vapors in excess of action limits. Air monitoring is required at all sites. Indications of potentially high concentrations of hydrocarbon vapors include strong and persistent odors and the presence of free petroleum product.

PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment is necessary to prevent contact with potentially hazardous materials while working on site. Level D protective equipment shall be used by all personnel working within the exclusion zone. The protective equipment shall be upgraded to Level C if conditions are dusty or if air monitoring indicates a health risk. If, in the opinion of the SSO, site conditions require an upgrade to Level B protective equipment, the HSPM shall be notified and site work will be suspended to evaluate specific project health and safety requirements. Personal Protective Equipment for Level D:

Combustible gas meter and/or photoionization meter
Eyewash splash kit or nearby eyewash facility
First aid kit
Fire extinguisher
Hard hat
Steel toe neoprene boots
Neoprene or nitrate outer gloves, vinyl inner gloves
Safety Glasses/goggles, if warranted
No respiratory protection required

Personal Protective Equipment for Level C:

Same as above except:
Full-face or half-face air-purifying respirator
Organic vapor (usually black) and HEPA dust cartridges
Polyethylene-coated or saran coated (SARANEX) Tyvek coveralls

RESPIRATORY EQUIPMENT: USE AND CARE

1. Air-purifying cartridges, when used, shall be replaced at the end of each shift, as a minimum. Unused or slightly used cartridges may be resealed and saved for later use.
2. Employees wearing air-purifying respirators shall change filter elements whenever an increase in breathing resistance or breakthrough is detected.
3. Only employees who have had a recent (annual) qualitative fit test and training shall be allowed to work in atmospheres where respirators are required.
4. If an employee experiences difficulty in breathing during use or fit-testing, he or she shall be reexamined by a physician to determine whether the employee can wear a respirator while performing required duties.
5. Employees who wear respirators shall leave the work area to wash their face and respirator facepiece as needed to prevent potential skin irritation associated with respirator use. Appropriate decontamination will be conducted prior to exiting work areas.
6. Facial hair, such as beards, that interferes with achieving a good facepiece seal, is prohibited at sites which may require the use of air-purifying respirators.
7. Wearing contact lenses with a full-face respirator is prohibited (29 CFR Part 1910.134). Eyeglasses with conventional temple pieces will interfere with the respirator-to-face seal of a full facepiece. A spectacle insert kit should be installed in the face masks of workers requiring vision correction.
8. All respiratory equipment will be inspected and maintained each week. The users of the respiratory equipment are responsible for this maintenance.

EMERGENCY INFORMATION

Site personnel must be able to respond effectively to emergencies that may develop. The following information must be provided on the site safety plan checklist (Form 1).

1. Telephone numbers of the local hospital or urgent care facility, ambulance, poison control center, police and fire department.
2. Nearest telephone location to the site.

3. Fire extinguisher locations at the site.

4. First aid kit and eyewash kit locations at the site.

A map showing the route to the nearest hospital or urgent care facility must be attached to Form 1.

Emergency Procedures

If an emergency occurs on-site, the procedures listed below are to be followed.

Fire or Explosion: Have one person leave the site and call 911 or the fire department immediately. Inform the dispatcher of the nature of the fire and the site address. If immediate risk to personnel and equipment has been eliminated, then on-site personnel may attempt to put the fire out using a fire extinguisher or shovel.

Medical Emergency: Have one person leave the site and call 911 or another emergency number immediately. Inform the dispatcher of the nature of the emergency and the site address. First aid should be administered to the victim if the health and safety of other site personnel is not at risk in administering the first aid. Be prepared to transport the victim to the hospital.

If any member of the field crew experiences adverse exposure symptoms while on site, the entire field crew should halt work and follow the instructions provided by the SSO.

The discovery of any condition that suggests a situation more hazardous than anticipated should result in the evacuation of the field personnel from the site, the re-evaluation of the existing hazards, a review of the site safety plan and reconsideration of the level of personal protective equipment required. The site should be secured to prevent accidents or incidents.

An accident/exposure occurs, the SSO and the injured person are to complete an Accident Report (Form 4) and an Exposure Report (Form 5) for submittal to the HSPM. The HSPM and PM must be contacted as soon as possible after an accident/exposure occurs.

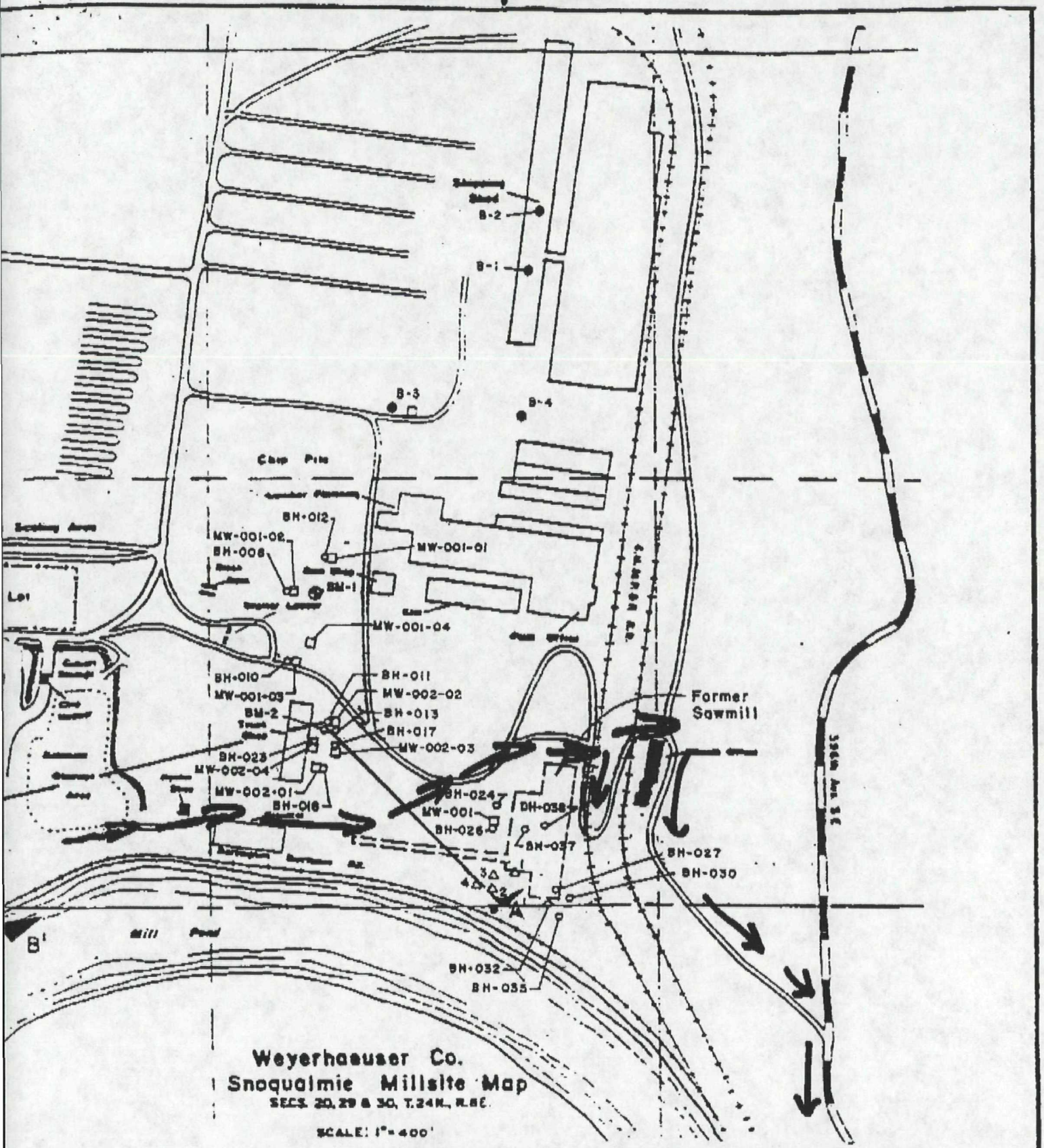
Followup action to correct the situation that caused the accident/exposure must be taken before work on the site can be continued.

DECONTAMINATION

All personnel will go through the following decontamination procedure before leaving the site.

1. Detergent wash (TSP or Alconox) and rinse boots and outer gloves.
2. Remove outer gloves and any protective suit (i.e., Tyvek) and dispose of them in a garbage bag.
3. Remove respirator cartridges and dispose of them in a garbage bag. Unused or slightly used cartridges may be resealed and saved for later use.
4. Remove respirator and wash and rinse it. Disinfect the respirator using 2 to 3 teaspoons of bleach per gallon of water.
5. Remove inner gloves and dispose of them in a garbage bag.
6. Wash hands and face as soon as possible after leaving the exclusion zone.
7. Shower upon returning to the office or home.
8. Wash clothing worn in field.

MAP To Hospital



HDR

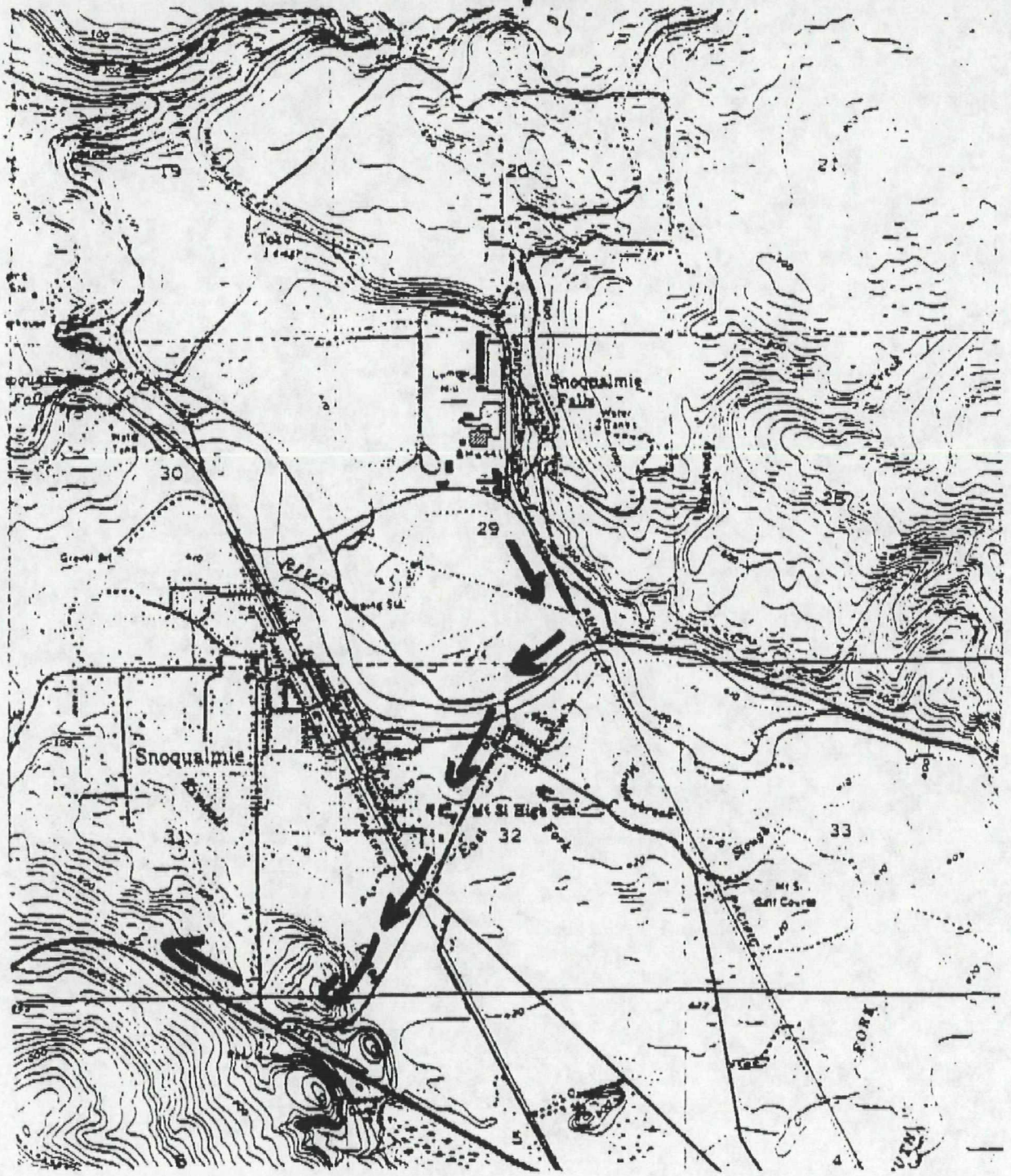
WEYERHAEUSER SNOQUALMIE MILLSITE

BORE HOLE LOCATIONS SITE WIDE

Date: MAY, 1991

FIG 4.1

MRF to Hospital

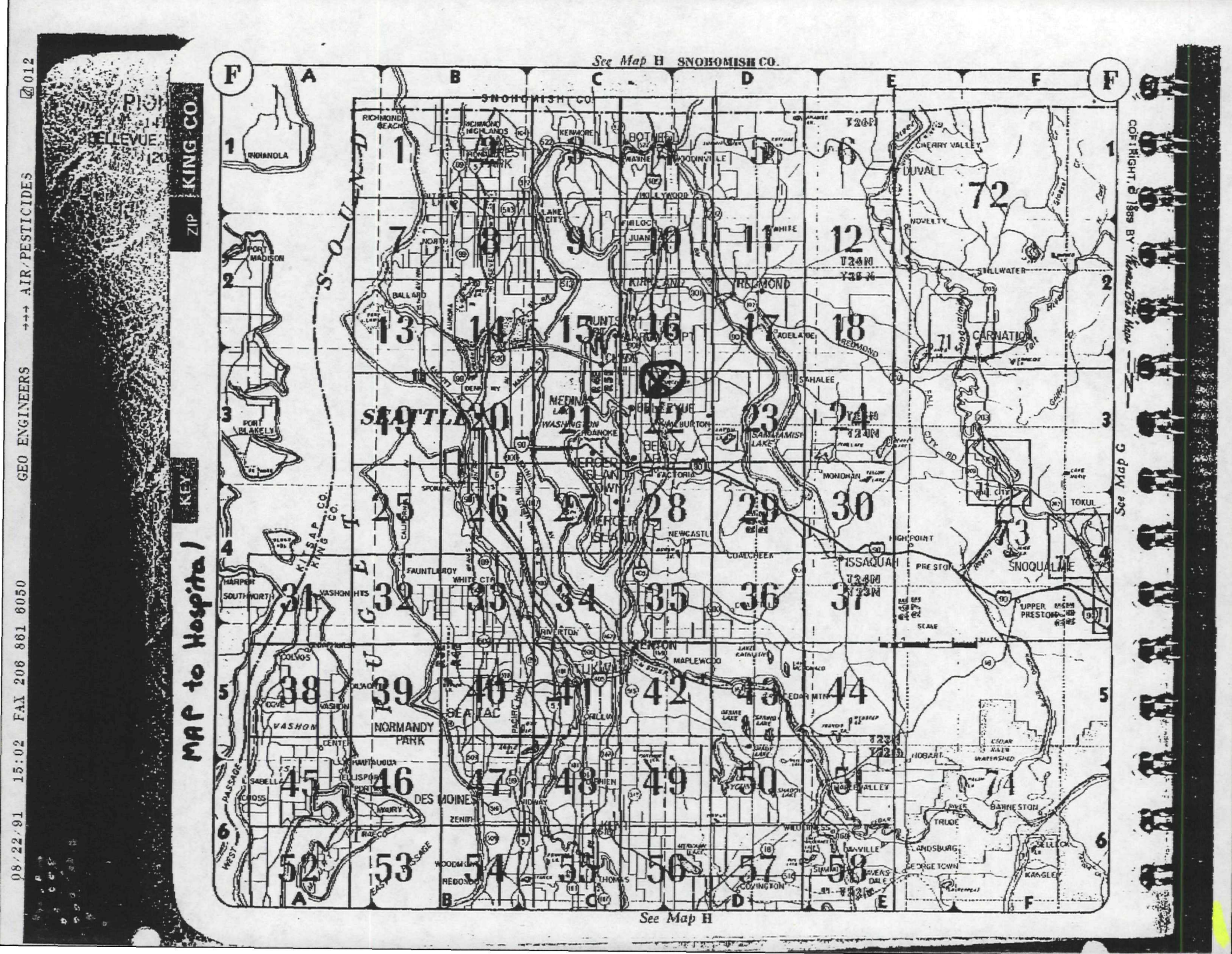


1 INCH - 2000 FEET

N

SITE LOCATION MAP

FIGURE 1.1


See Map H SNOHOMISH CO.
SEATTLE
BELLEVUE
KING CO.
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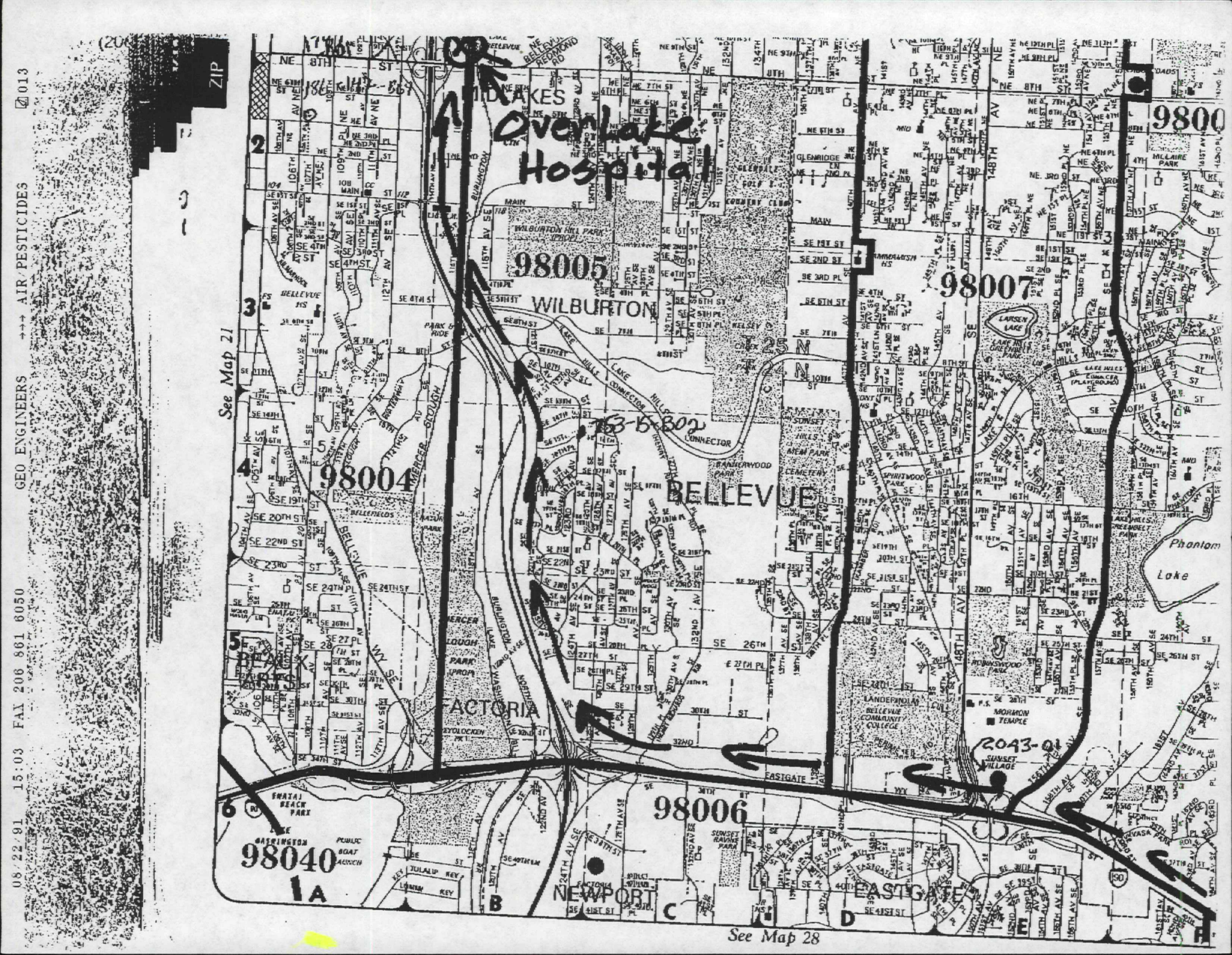
MAP to Hospital
08/22/91 15:02 FAX 206 881 6050 GEO ENGINEERS +++ AIR/PESTICIDES 012
See Map H
See Map G


Overlake Hospital
98005
WILBURTON
98004
BELLEVUE
98007
98006
98040
NEWPORT
EASTGATE
FACTORIA
MEDINA
MIDLAKES
See Map 21
See Map 28
ZIP
GEO ENGINEERS ↔↔↔ AIR/PESTICIDES
08/22/91 15:03 FAX 206 861 6050 013

8/14/91

Weyerhaeuser, Snoqualmie
249-023-B14

WORK PLAN FOR DRILLING 8/16/91

1. Meet with the drillers at 8:00 and make sure that they have:

   a) Plastic Sheeting (enough to set up around two borings, see diagram).

   b) Two pieces of plywood to drill through

   c) Decon tubs for the auger

   d) Health and safety equipment - tyvex, steel toed rubber boots, respirators

2. Go through health and safety plan with the drillers. Emphasize the most important points:

   a) We will upgrade to respirators if TIP readings in the breathing zone exceed 5 ppm above background.

   b) No one can leave the hot zone without going through decon.

   c) No smoking, eating or drinking in the hot zone.

3. Set up the drilling area so that no soil cuttings will touch the ground (see diagram).

   a) Place plastic sheeting everywhere in the work zone including the corridors between the drill rig, the support truck and the GEI truck.

      Plastic sheeting must also be placed along the sides of the drill rig and in the two decon areas.

   b) Place a piece (4' x 8') piece of plywood over the boring location. The drillers will drill through the plywood.

4. Tape plastic sheeting to the work area on the back of the GEI pickup

5. Set up two decon areas. One for the augers and one for personnel and sampling equipment

6. Use caution tape to define the Hot Zone. Restrict access to the hot zone

7. Set up drums for soil cuttings on the plastic sheeting close to the rear of the rig

8. Take background vapor readings using the TIP

9. Put on Tyvex, gloves, safety goggles, and ear protection

10. Begin drilling

11. Replace damaged areas of plastic sheeting if necessary during drilling.

12. Stop drilling if contamination is encountered in the upper fill unit or the clay aquitard. Call KRF and we will schedule a cable tool rig to complete the job

13. Monitor the breathing zone every 15 minutes with a TIP

14. Obtain soil samples every 2.5 feet.

14. Field screen using TIP and TLV and sheen method.

15. Put all soil samples in jars on ice in coolers.

16. Select soil sample from the top of the aquitard, from just above the water level and from within the screened interval of the well for chemical analysis. Sample selection is subject to change based on EPA's input and field screening results (submit most contaminated sample). A minimum of three soil samples should be selected from each boring.

16. Obtain one duplicate soil sample

17. See diagram for well installation specifications

18. Clean up area after well construction is complete. All plastic sheeting and debris should be placed on plastic sheeting in the debris pile area. Care should be taken to keep soil cuttings off the ground surface. Any soil cuttings dropped on the ground will be considered contaminated and soil in the area must be removed and placed in a 55 gallon drum.

19. Survey well casing elevations and stickup, Don Hanson will assist.

20. Determine gradient.

21. Mark the fourth boring location based on the results of the previous borings (contamination detected in MW-2), the gradient (down gradient) and EPA's input, if present.

22. Set up the drilling area like before, around the fourth boring location.

23. Don Hanson will develop the wells, removing 5 well volumes and taking pH, temperature and conductivity readings. Plastic sheeting should be placed around each well and in the corridors between the wells the disposal drums and the decon area.

24. Cleanup as before.

25. Label all 55 gallon drums.

26. Cover the debris pile with plastic sheeting.

27. Mark the hot zone with caution tape before leaving.

Weyerhaeuser, Snoqualmie
0249-023-B14

Ground Water Sampling Work Plan

1. Assist TTF with drilling and surveying and water level measurements (decon between each well).

2. Cut a hole in plastic sheeting to fit around the well monument and place the plasitic sheeting around each well so that spills and drips during well development, purging and sampling do not touch the ground surface.

3. Set up decontamination equipment on the plastic sheeting and a 55 gallon drum on the plastic sheeting for decon water and purge/development water.

4. Develop each well on Friday 8/15/91, removing at least 5 well volumes and testing for pH, conductivity and temperature stablization.

5. Remove the plastic sheeting upon completion and place in the debris stockpile. The debris stockpile itself should be on clean plastic sheeting.

6. Look for the surveyors on-site on Monday 8/19. Have them:

   a) Determine the well location to within +/-1 foot horizontally

   b) Determine the top of well casing elevation to within +/- 0.01 feet

   c) Determine the ground surface elevation at the well to within +/-0.01 feet

   d) Determine the water level in the Mill Pond to within +/- 0.01 feet.

7. Repeat the plastic sheeting and decon setup on Monday prior to beginning water level measurements and well purging.

8. Purge at least 3 well volumes from each well prior to sampling and test for pH, conductivity and temperature stabilization.

9. Sample each well for PCBs by EPA Method 8080 (REQUEST VERY LOW DETECTION LIMITS, PREFERRABLY LOWER THAN 0.1 ppb) and total trichlorobenzenes and total tetrachlorobenzenes by EPA Method 8120. At each well fill 2 liter jars with water.

10. Obtain duplicate water samples (2 liter jars) from 2 of the wells.

11. Place the used plastic sheeting in the debris pile.

12. Test the water in the Mill Pond for pH, conductivity and temperature.

12. Send the samples to Weyerhaeusers lab by courier.