CITY OF BOTHELL
Bothell Multiple Sites
HEALTH AND SAFTEY PLAN

Project No. 2007-098-700

February 25, 2009

HWA GEOSCIENCES INC.

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SITE HEALTH AND SAFETY PLAN

SUMMARY INFORMATION

SITE LOCATION	Bothell Multiple Sites Bothell Way/SR 522 Site Telephone - None
NEAREST HOSPITAL	Care Plus Medical Ctr: 17511 68th Ave Ne Kenmore, WA 98028 425-486-8300 The route from the facility to the hospital is depicted on Figure 1.
EMERGENCY RESPONDERS	Police Department ..... 911 Fire Department ..... 911 Ambulance 911
EMERGENCY CONTACTS	HWA Lynnwood Office ..... (425) 774-0106 HWA H&S Officer, Vance Atkins. (425) 774-0106 cellular ..... (206) 794 3124 HWA PM Arnie Sugar ..... (425) 774-0106 cellular ..... (206) 794 3130 National Response Center ..... (800) 424-8802

In the event of an emergency, call for help as soon as possible.
Give the following information:

- WHERE the emergency is - use cross street or landmarks
- PHONE NUMBER - you are calling from
- WHAT HAPPENED - type of injury
- HOW MANY - persons need help
- WHAT - is being done for the victim(s)
- YOU HANG UP LAST - let the person you called hang up first

SITE HEALTH AND SAFETY PLAN SUMMARY

LOCATION: Bothell Riverside Site (10005 Woodinville Drive);
Bothell Landing (18120, 18126, and 18132 Bothell Way, and 10001 Woodinville Drive);
Bothell Paint and Decorating (18004 Bothell Way)

PROPOSED DATES OF ACTIVITIES: April-December, 2009

TYPE OF FACILITY: Vacant and Mixed Commercial

LAND USE OF AREA SURROUNDING FACILITY: Commercial

POTENTIAL SITE CONTAMINANTS: Petroleum, volatile organic compounds (VOCs), Metals

POTENTIAL SITE HAZARDS:

1. Chemical - Exposure to site contaminants listed above
2. Physical - heavy equipment, rotating drilling machinery, open excavations, noise, overhead and underground utilities, heat/cold stress, site traffic, slips, trips and falls, fire, explosion

ROUTES OF ENTRY: Airborne vapors and dust; skin contact with soil, free product, or groundwater; and incidental ingestion of soil.

PROTECTIVE MEASURES: Engineering controls, safety glasses, safety boots, hard hat, gloves, protective clothing, and respirators.

MONITORING EQUIPMENT: Photoionization detector

SITE ACTIVITIES: Subsurface investigation to assess the presence and/or extent of affected soils and ground water resulting from historic releases at the sites.

1.0 INTRODUCTION

1.1 Purpose and Regulatory Compliance

This site-specific Health and Safety Plan (H&S Plan) addresses procedures to minimize the risk of chemical exposures and physical accidents to on-site workers, as described above. The H&S Plan covers each of the 11 required plan elements as specified in WAC 296-843-12005. To help the reader find this required information, Table 1 shows the major sections where each of these elements are discussed. Additional supporting information is presented throughout this plan, and the reader is advised to thoroughly review the entire plan. When used together with the HWA GeoSciences Inc. (HWA) Corporate H&S Plan, this site-specific plan meets applicable regulatory requirements.

Table 1 - Location of Required Health and Safety Plan Elements

Required Health and Safety Plan Elements *		Location in this Health and Safety Plan (Section number shown)
Required Elements		
(i)	Safety and hazard analysis	2.0 Hazard Evaluation and Control Measures (see also 2.7 Hazard Analysis by Task)
(ii)	Organization chart	1.3 Chain of Command
(iii)	Comprehensive work plan	1.4 Work Activities (and Site-Specific Sampling and Analysis Plan, by reference)
(iv)	Site control plan	intro. Health and Safety Plan Summary 1.5 Site Location and Description 5.0 Exclusion Areas 9.0 Site Security and Control
(v)	Personal protective equipment	3.0 Protective Equipment 4.0 Safety Equipment List
Additional Elements		
	Monitoring program	2.3 Air Monitoring and Action Levels
	Site Control Measures	9.0 Site Security and Control
	Decontamination	7.0 Decontamination
	Spill containment	10.0 Spill Containment
	Standard operating procedures for sampling, managing and handling drums and containers	Not Applicable, or Site-Specific Sampling and Analysis Plan, by reference
	Confined space entry	2.6 Confined Spaces
	Training, briefing and information	13.0 Training Requirements
	Medical surveillance	12.0 Medical Surveillance
	Emergency response plan	11.0 Emergency Response Plan
	Lighting	Corp H&S Plan Sec. 8.7
	Excavations	Corp H&S Plan Sec. 8.7

*Required H&S Plan elements are numbered according to their listing in WAC 296-843-12005

1.2 Distribution and Approval

This H&S Plan will be made available to all HWA personnel involved in field work on this project. It will also be made available to subcontractors and other non-employees who may need to work on the site. Subcontractors and non-employees will follow the provisions in this plan as minimum recommendations. Specific work activities of a subcontractor may require different or more stringent safety measures than contained in this plan. For non-HWA employees, it must be made clear that this plan represents minimum safety procedures and that they are responsible for their own health and safety and regulatory compliance while present on site.

The plan has been approved by the HWA Health and Safety (H&S) Manager. By signing the documentation form provided with this plan, project workers also certify their approval and agreement to comply with the plan.

1.3 Chain of Command

The chain of command for Health and Safety in HWA projects involves the following individuals: the Corporate H&S Manager, Project Manager, Project H&S Manager, and the Field H&S Manager. In some cases, based on the complexity of the project and level of staffing, the project and field related H&S positions may be combined. If the specified Field H&S Manager is unable to be present on-site during work activities, the Project H&S Officer will serve as the on-site safety officer or, alternatively, another Field H&S Manager will be named.

Project Manager: Arnie Sugar. The Project Manager is charged with overall responsibility for the successful outcome of the project. The Project Manager, in consultation with Corporate H&S Manager, makes decisions regarding the implementation of the Site H&S Plan. The Project Manager may delegate this authority and responsibility to the Project and /or Field H&S Managers

Corporate H&S Officer: Vance Atkins. The HWA Corporate H&S Officer has overall responsibility for preparation and modification of this H&S Plan. In the event that health and safety issues arise during site operations, he will attempt to resolve them in discussion with the appropriate members of the project team.

Project H&S Officer: Vance Atkins. The Project H&S Manager has overall responsibility for health and safety on this project. This individual ensures that everyone working on this project understands this H&S Plan. He will maintain liaison with the HWA Project Manager so that all relevant safety and health issues are communicated effectively to project workers.

Field H&S Manager: Jeff Speck. The Field H&S Manager is responsible for implementing this H&S Plan in the field. This individual also observes subcontractors to

verify that they are following these procedures, at a minimum. The Field H&S Manager will also assure that proper protective equipment is available and used in the correct manner, decontamination activities are carried out properly, and that employees have knowledge of the local emergency medical system should it be necessary.

1.4 Work Activities

Planned site work includes GeoProbe, hollow-stem auger and/or soil knife soil boring, soil sampling, and ground water sampling HWA has prepared specific Sampling and Analysis plans for each of the three locations.

1.5 Site Location and Description

The three sites are located along the south side of Bothell Way (State Route 522) south of downtown Bothell, Washington. We understand the City of Bothell plans to purchase the subject properties for rerouting of SR 522, followed by redevelopment of the remainder of the properties. This work is being performed under an Agreed Order between the City of Bothell and the Washington Department of Ecology.

2.0 HAZARD EVALUATION AND CONTROL MEASURES

2.1 Toxicity of Chemicals of Concern

Based on previous site information and knowledge of the types of activities conducted at this location, petroleum hydrocarbons, volatile organic compounds, halogenated volatile organic compounds, and metals may be present in the soils or ground water at several of the sampling locations.

Pertinent toxicological properties of these chemicals are discussed below. This information generally covers potential toxic effects which may occur from relatively significant acute and/or chronic exposures, and is not meant to indicate that such effects will occur from the planned site activities. In general, chemicals which may be encountered at this site are not expected to be present at concentrations which could produce significant exposures. The types of planned work activities should also limit potential exposures at this site. Furthermore, appropriate protective and monitoring equipment will be used as discussed below to further minimize any exposures which might occur.

As a point of reference, standards for occupational exposures to these chemicals are included where available. Site exposures are generally expected to be of short duration and well below the level of any of these exposure limits. These standards are presented using the terminology defined by the Washington State General Occupational Health Standards (WAC 296-62, Part H) as follows:

PEL - Permissible exposure limit.

TLV – Threshold Limit Value for any 8-hour work shift or 40-hour work week

TWA - Time-weighted average exposure limit for any 8-hour work shift or 40-hour work week.

STEL - Short term exposure limit expressed as a 15-minute time-weighted average and not to be exceeded at any time during a work day.

C - Ceiling exposure limit not to be exceeded at any time during a work day.

IDLH - The concentration at which a compound is considered immediately dangerous to life and health.

Total Petroleum Hydrocarbons. Total petroleum hydrocarbons (TPH) refers to a broad range of chemicals including those compounds reported under EPA method 418.1. TPH can include different hydrocarbon mixtures, such as gasoline, kerosene, diesel, fuel oil, motor oil, hydraulic oil, and asphalt. These materials may be toxic by ingestion, inhalation, and skin absorption. Typical symptoms include dizziness, central nervous system depression, and coma. TPH can have a defatting effect on the skin, and long-term exposure can result in liver and kidney damage. No PEL has been established for TPH. For comparison, the PEL-TWA for gasoline is 300 ppm, with 500 ppm as a 15-minute STEL.

Gasoline. Gasoline is a mixture of more than 100 alkane and aromatic hydrocarbon constituents with trace levels of additives. A typical gasoline is primarily 4 to 12-carbon hydrocarbons, with significant levels of aromatics including benzene, ethyl benzene, toluene, and xylene. Prolonged exposure to gasoline causes irritation of the skin, eyes, and mucous membranes, and can produce defatting and dermatitis. Inhalation of gasoline vapor can cause central nervous system depression, confusion, unconsciousness, coma, and death. Liver and kidney damage can also occur. The current PEL-TWA for gasoline is 300 ppm, with a 15-minute STEL of 500 ppm. The toxicity of gasoline can also be significantly affected by the amount of benzene, which typically ranges up to 3.5 percent in motor fuel. Benzene is recognized as a human carcinogen, and the current PEL-TWA is 1 ppm with an STEL of 5 ppm and a REL (recommended exposure limit) of 0.3 ppm.

Other potentially significant toxic materials present in association with gasoline may include the organic lead compounds tetraethyl (TEL) and tetramethyl lead (TML). These chemicals are colorless liquids which have been used principally as anti-knock compounds in gasoline. When used as such, they are generally mixed with soluble dyes for identification purposes. In the environment, TEL is reported to decompose under

sunlight to form crystals of mono-, ki-, and triethyl lead compounds, which have a characteristic garlic-like odor.

TEL and TML can be toxic via inhalation, ingestion, percutaneous absorption, and skin and eye contact. Major target organs include the kidneys and the nervous, gastrointestinal, and cardiovascular systems. TEL is irritating to the eyes, and its decomposition products may be inhaled as dust, leading to irritation of upper respiratory tract and convulsive sneezing. The dust may also cause itching, burning, and redness of eyes and mucous membranes.

TEL and TML are also readily absorbed into the nervous system and are considerably more neurotoxic than inorganic lead. Minor intoxication by TEL or TML can result in nervous excitation, insomnia, and gastrointestinal symptoms. The most notable symptom of TEL poisoning and repeated exposure is encephalopathy (disease of the brain), characterized by symptoms of anxiety, delirium with hallucinations, delusions, convulsions, and acute psychosis. In contrast to inorganic lead intoxication, peripheral nerve damage is not observed. The current PEL-TWA for both TEL and TML is 0.075 mg/m^3 as lead.

Benzene. Benzene exposure can occur by inhalation, percutaneous absorption, ingestion, and skin and eye contact. Like other aliphatic and aromatic hydrocarbons, acute overexposure to benzene can cause central nervous system depression. Headache, dizziness, nausea, convulsion, coma, and death can result from elevated exposures. In some cases, acute exposure has resulted in death due to ventricular fibrillation. The odor threshold for benzene is variable, therefore there are no reliable warning properties. The principal chronic hazard associated with benzene exposures is its ability to cause changes in blood cells, including anemia and cell abnormalities. Benzene has been demonstrated to cause leukemia in epidemiological studies, and it is recognized as a human carcinogen by NIOSH and other agencies. The US EPA currently classifies benzene as a Group A, or confirmed, human carcinogen. The current PEL-TWA for benzene is 1 ppm with an STEL of 5 ppm (OSHA) and 0.1 ppm with an STEL of 1 ppm (NIOSH). Many petroleum companies maintain at least a recommended exposure limit of 0.3 ppm. Supplied air respiratory protection is required for potential benzene exposure.

Ethylbenzene. Ethylbenzene exposure can occur by inhalation, ingestion, and skin and eye contact. Like other aliphatic or aromatic hydrocarbons, acute overexposure to ethylbenzene can cause central nervous system depression. Headache, dizziness, nausea, convulsions, coma, and death can result from elevated exposures. Ethylbenzene can also cause skin drying and defatting, and eye and mucous membrane irritation can result from overexposure. The current PEL-TWA for ethylbenzene is 100 ppm with an STEL of 125 ppm.

Toluene. Toluene exposure can occur by inhalation, percutaneous absorption, ingestion, and skin and eye contact. Toluene can cause eye, respiratory, and skin irritation. Drying

and defatting on the skin can occur with prolonged skin contact. The chief symptom of acute exposure to toluene vapor is depression of the central nervous system function. Symptoms include headache, dizziness, drowsiness, lack of coordination, and coma. The current PEL-TWA for toluene is 100 ppm with an STEL of 150 ppm.

Xylene. The major route of xylene toxicity is via inhalation of vapor, with percutaneous absorption and ingestion of liquid playing lesser roles. Xylene can cause irritation of the eyes, nose, and throat. Repeated skin contact may cause drying and defatting, and dermatitis. Acute exposure to vapors via inhalation may cause central nervous system depression, and liver and kidney damage. The current PEL-TWA for xylene is 100 ppm with an STEL of 150 ppm.

Arsenic. Arsenic is toxic by inhalation and ingestion of dusts and fumes or by inhalation of arsine gas. Trivalent arsenic compounds are the most toxic to humans, with significant corrosive effects on the skin, eyes, and mucous membranes. Dermatitis also frequently occurs, and skin sensitization and contact dermatitis may result from arsenic trioxide or pentoxide. Trivalent arsenic interacts with a number of sulfhydryl proteins and enzymes, altering their normal biological function. Ingestion of arsenic can result in fever, anorexia, cardiac abnormalities, and neurological damage. Liver injury can accompany chronic exposure. Skin and inhalation exposure to arsenic has been associated with cancer in humans, particularly among workers in the arsenic-pesticide industry or copper smelters. Arsine is a highly toxic gaseous form of arsenic, causing nausea, vomiting, and hemolysis. The current PEL-TWA for organic and inorganic forms of arsenic is 0.2 mg/m^3. The PEL-TWA for inorganic arsenic under WAC 296-62-07346 is 10 $\mu g/m^3$. Arsenic is also regulated as a carcinogen under WAC 296-62-07347.

Cadmium. Cadmium is toxic via inhalation or ingestion of fumes or dust. Fumes are contacted normally during exposure to heated metals (plating operations, welding , etc.). Acute effects resulting from such exposure include respiratory distress irritation which may culminate in chronic emphysema. Chronic exposures to fumes or dust may result in emphysema and kidney damage. These effects may be worsened by smoking. Cadmium is considered to be a probable human carcinogen. The current PEL-TWA for cadmium is 0.05 mg/m^3 as cadmium dust as salts.

Chromium. Chromium metal and insoluble chromium salts can affect the body if inhaled or swallowed. Ferrochrome alloys have been associated with lung disease in humans. Certain forms of chromium (VI) compounds have been found to cause increased respiratory cancer among workers. Unless it can be demonstrated that no chromium (VI) compounds are present, it should be treated as a carcinogen. The PEL-TWA for chromium (III) compounds is 0.5 mg/m^3, and for chromic acids and chromates (chromium VI) the PEL is 0.1 mg/m^3.

Inorganic Lead. Inorganic lead and its compounds (excluding lead arsenate) can cause a disease known as lead poisoning. This disease is hard to diagnose, but may include

symptoms of decreased physical fitness, fatigue, sleep disturbances, headaches, aching bones and muscles, digestive symptoms, abdominal pains, and decreased appetite. These symptoms are reversible and complete recovery is possible. Severe exposure could lead to anemia, pallor, a "lead-line" on the gums, and decreased hand-grip strength. Nerve damage may occur, with symptoms such as "wrist-drop". These symptoms may be irreversible. The PEL-TWA for lead is 0.05 mg/m^3.

Vinyl Chloride. Vinyl chloride is a colorless gas with a sweet odor. Vapors are heavier than air, and are flammable. If inhaled, it can cause irritation to the eyes, nose and throat. Inhalation can cause dizziness, difficult breathing, and in sufficient concentrations, asphyxiation by displacement of oxygen. Vinyl chloride is considered a NIOSH occupational carcinogen, and has a PEL-TWA of the lowest reliably detectable concentration. OSHA's PEL is 1 ppm, with a 15 minute ceiling of 5 ppm. Supplied air respiratory protection is required for potential vinyl chloride exposure.

Tetrachloroethene. Tetrachloroethene, also known as perchloroethylene, or PCE, is a commonly used solvent in dry cleaning and degreaser, and is a common environmental contaminant. PCE is a colorless liquid with a somewhat sweet odor. PCE vapor can be irritating to the eyes, nose and throat. Inhalation can cause nausea, sleepiness, dizziness, confusion, and loss of consciousness. PCE is a is a potential human carcinogen, with a PEL-TWA of 100 ppm (OSHA) and a STEL of 200 ppm.

Trichloroethylene. Trichloroethylene, also known as trichloroethene, or TCE, is a commonly used solvent and degreaser, and is one of the most common environmental contaminants. TCE vapor can be irritating to the eyes, nose and throat. Inhalation can cause nausea, difficult breathing, and loss of consciousness. TCE is a potential human carcinogen, with a PEL-TWA of 25 ppm (NIOSH), 50 ppm (OSHA) and a STEL of 200 ppm.

1,2-Dichloroethane. 1,2-Dichloroethane, also known as ethylene dichloride, EDC, or 1,2-DCA is used in the manufacturing of vinyl chloride, PCE, and TCE. It is also used as a solvent and as a gasoline additive. 1,2-DCA is a colorless liquid with a somewhat sweet odor. 1,2-DCA vapor can be irritating to the eyes, nose and throat. Inhalation can cause bronchitis, central nervous system depression, dizziness, vomiting, partial paralysis, and liver and kidney damage. 1,2-DCA is a is a potential human carcinogen, with a PEL-TWA of 1 ppm (4 mg/m^3) (NIOSH), 50 ppm (OSHA) and a STEL of 2 ppm (8 mg/m^3) (NIOSH).

2.2 Potential Exposure Routes

Inhalation. Exposure via this route could occur if volatile chemicals become airborne during site activities, especially upon exposure to open air, warm temperatures, and sunlight. Air monitoring and control measures specified in this plan will minimize the possibility for inhalation of site contaminants.

Skin Contact. Exposure via this route could occur if contaminated soil, water or product contacts the skin or clothing. Dusts generated during soil movement may also settle on exposed skin and clothing of site workers. Protective clothing and decontamination activities specified in this plan will minimize the potential for skin contact with the contaminants.

Ingestion. Exposure via this route could occur if individuals eat, drink, use tobacco products, or perform other hand-to-mouth contact in the contaminated (exclusion) zones. Decontamination procedures established in this plan will minimize the inadvertent ingestion of contaminants.

2.3 Air Monitoring and Action Levels

Air monitoring will be conducted to determine possible hazardous conditions and to confirm the adequacy of personal protection equipment. The results of the air monitoring will be used as the basis for specifying engineering controls, personnel protective equipment (PPE) and determining the need to upgrade protective measures. If possible, engineering controls should be implemented to meet air monitoring action levels before upgrading protective measures. Engineering controls include applying water for dust control, forced air ventilation (brush fans), and moving work activities upwind of contaminant sources.

All air monitoring equipment will be calibrated prior to use as specified by the instrument manuals and results will be documented in the instrument log. All equipment will be maintained as specified by the manufacturer or more frequently as required by use conditions, and repair records will be maintained with the instrument log.

PID Monitoring. Air monitoring will be conducted with a photoionization detector (PID) to measure organic vapor concentrations during site work activities. PID readings will be taken at the beginning of each day, at each new test pit or boring location, and whenever field personnel report or detect petroleum or other odors. If PID measurements are 5 ppm above ambient background levels in the worker's breathing zones for five consecutive minutes, then site workers exposed to these levels will use air purifying respirators with organic vapor cartridges. At this point, air monitoring downwind from the work site will also be initiated. If the downwind monitoring indicates potential for off-site exposure, work will cease pending re-evaluation of the task. If PID measurements exceed 100 ppm in the breathing zone, site work will cease pending re-evaluation of the situation by the H&S Manager.

Detector Tube Monitoring. Although volatile organic compounds are not anticipated at the site, specific detector tube monitoring for petroleum hydrocarbons will be performed if PID readings exceed the 5 ppm action level described above using a Sensidyne air pump and benzene detector tube model number 121L (or equivalent). This

tube is capable of detecting benzene at levels below the PEL of 1 ppm and is also reported to be relatively specific and free from interference by other petroleum hydrocarbons. If benzene measurements exceed 1 ppm in the breathing zone, site work will cease pending re-evaluation of the situation by the H&S Manager.

Table 2 summarizes site action levels and response measures.

TABLE 2 - ACTION LEVELS (use engineering controls first)

PID* (BZ)	PID* (SB)	LEL (BZ)	OXYGEN (BZ)	ACTION
< 5 ppm		<10%	19.5 - 23.5%	Level D
5-50 ppm		<10%		Upgrade to level C or modified level D** Begin downwind air monitoring
>50 ppm	>5 ppm	>10%	<19.5% >23.5%	Cease Operations ***

* Concentrations above ambient background concentrations
** See Section 3.2 for conditions for respiratory protection
*** If any of the listed conditions are met
BZ - Breathing zone
SB - Site boundary

2.4 Fire and Explosion Hazard

Potentially explosive conditions may be encountered where petroleum hydrocarbons or other flammable gases or vapors have accumulated. Care will be exercised at all times during field activities where flammables are known or suspected to be present.

If flammable chemical products are encountered as a separate phase or as vapors, constant attention to readings obtained from the CGM will be necessary to avoid exceeding the lower explosive limit. Observe basic precautions such as no smoking or creation of sparks or open flames.

2.5 Heat and Cold Stress

Heat Stress. Use of impermeable clothing reduces the cooling ability of the body due to evaporation reduction. This may lead to heat stress. If such conditions occur during site activities, employees will maintain appropriate work-rest cycles and drink water or electrolyte-rich fluids (Gatorade or equivalent) to minimize heat stress effects. Water will be available either in capped bottles or dispensed into clean disposable cups. Refilling of open containers will not be permitted. Also, when ambient temperatures exceed 70^{o} F, employees will conduct monitoring of pulse rates. Personnel will plan for the weather and arrange to take breaks in the shade as much as possible.

Each employee will check his or her own pulse rate at the beginning of each break period. Take the pulse at the wrist for 6 seconds, and multiply by 10. If the pulse rate exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

Example: After a one-hour work period at 80 degrees, a worker has a pulse rate of 120 beats per minute. The worker must therefore shorten the next work period by one-third, resulting in a work period of 40 minutes until the next break.

Hypothermia. Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment, and wind-chill as well as wetness or water immersion can play a significant role. The following sections discuss signs and symptoms as well as treatment for hypothermia.

Signs of Hypothermia. Typical warning signs of hypothermia include fatigue, weakness, lack of coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90^{o} F require immediate treatment to restore temperatures to normal.

Treatment of Hypothermia. Current medical practice recommends slow rewarming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations where body temperature falls below 90^{o} F and heated shelter is not available, use a sleeping bag, blankets and/or body heat from another individual to help restore normal body temperature.

2.6 Other Physical Hazards

Trips/Falls. As with all field work sites, caution will be exercised to prevent slips on wet surfaces, stepping on sharp objects, etc. Work will not be performed on elevated platforms without fall protection.

Confined Spaces. Confined space entry is not anticipated for this project. Personnel will not enter any confined space without specific approval of the Project Manager and H&S Manager. In addition, no entry into a confined space will be attempted until the atmosphere of the confined space is properly tested and documented by the Field H&S Manager or designated representative and a self contained breathing apparatus is available on-site. A confined space entry permit must also be issued and followed. All specified precautions must be carefully followed, including upgrading of personal protective equipment as directed by the Field H&S Manager or designated representative.

Noise. Appropriate hearing protection (ear muffs or ear plugs) will be used if high noise levels are generated. High noise is determined by having difficulty hearing or conversing in a normal tone of voice.

2.7 Hazard Analysis and Applicable Safety Procedures by Task

Drilling. Drilling activities will be conducted with appropriate splash protection as discussed under personnel protective equipment requirements. Noise protection must also be available and used whenever drilling activities are in progress. In addition, exclusion zones will be established for worker protection as discussed below.

Atmosphere Testing/Conditioning for Soil Borings. The following procedures are designed to address the atmosphere testing/conditioning procedures necessary for soil borings which may involve release of flammable and/or toxic gases .

1. If gas or vapor venting occurs from a soil boring or other source, immediately position upwind from the source. If necessary, use respiratory protection as discussed below.

   If the odor of natural gas is detected or if it is suspected that a pipeline has been hit, immediately stop work, evacuate the area, and contact the proper authorities.

2. Always keep the following points in mind when soil venting or other release of gas or vapor occurs:

   - Never work in an area which is above 10% of the combustible gas LEL or above the hydrogen sulfide warning limit, as discussed below.

   - Never continue to work in an area, even if LEL and hydrogen sulfide tests are acceptable, if you begin to notice strange odors or symptoms of overexposure (such as dizziness, nausea, tearing of the eyes, etc.). If this occurs, always stop work and evacuate the area pending further evaluation.

3. If natural gas or other pipeline material is not involved and the venting continues, stop work and perform appropriate testing using a combustible gas/hydrogen sulfide gas monitor (e.g., MSA 361 or equivalent). Proceed as follows:

   - If testing indicates no hazard, resume work and continue periodic testing.

- If testing indicates combustible gases present below 10% of the LEL, verify the absence of hydrogen sulfide and resume work with continued monitoring. If vapors are detected in the work area, use fans or other means to disperse as appropriate. Consult with the H&S Manager to determine whether other types of testing may be required to verify that exposure levels are within acceptable limits. Use respiratory protection as necessary, based on testing results and other site-specific information.

- If testing indicates combustible gases present above 10% of the LEL, assume that an explosion hazard exists. Do not resume work until testing shows the hazard had been removed. In some cases, this may be accomplished by allowing the gas to dissipate by natural or fan-forced ventilation. It also may be necessary or useful to inert a well or boring by introducing nitrogen or carbon dioxide through a non-conductive line. Water or drilling mud may be used to replace air in some bore holes and thereby eliminate the explosion risk. Verify the absence of hydrogen sulfide and resume work only when testing shows the explosion hazard has been removed. Continue to test on a regular basis to ensure that the atmosphere remains inert.

- If testing indicates presence of hydrogen sulfide, apply the same ventilation or inerting procedures as described above. Do not work in areas where the hydrogen sulfide concentration is above the applicable exposure level (the Washington State PEL-TWA for hydrogen sulfide is 10 ppm, with STEL of 15 ppm) without appropriate respiratory protection (supplied air). Resume work only when testing shows that the exposure level is within acceptable limits. Continue to monitor on a regular basis to ensure that the atmosphere remains safe.

4. Prior to any welding, cutting, or other hot work at the borehole, test the borehole atmosphere with a CGM. If the work area atmosphere exceeds 10 % LEL, do not proceed with the work until engineering controls can be implemented and the hot work area atmosphere reduced to below 10 % LEL. Test the work area continuously during hot work to ensure safe conditions for the duration of the work. Full-face shield welding masks will be worn during any welding or cutting at the borehole.

3.0 PROTECTIVE EQUIPMENT

In this plan, Level D is presented as a protection level, incorporating respiratory or skin contact protection only where required by site conditions or as specified under the

previous discussion. Situations requiring Level A or B protection are not anticipated for this project. Should they occur, work will stop and the H&S Plan will be amended as required prior to resuming work

3.1 Level D Activities

Workers performing general site activities where skin contact with free product or contaminated materials is not likely and inhalation risks are not expected will wear regular work clothes, regular or polyethylene coated Tyvek coveralls if needed, eye protection and hard hat (as required) nitrile or neoprene coated work gloves (as required), and safety boots.

Workers performing site activities where skin contact with free product or contaminated materials is possible will wear chemical-resistant gloves (nitrile, neoprene, or other appropriate outer gloves, surgical inner gloves) and saranex or polyethylene coated Tyvek or other chemically-resistant suit. Make sure the protective clothing and gloves are suitable for the types of chemicals which may be encountered on site. Use face shields or goggles as necessary to avoid splashes in the eyes or face.

3.2 Level C Activities

Upgrading to Level C will occur if inhalation and skin contact hazards exist. Level C will consist of Level D equipment plus air purifying respirators (APRs) with organic vapor cartridges, surgical inner gloves, Nitrile outer gloves, rubber work boots or rubberized overboots, and saranex or polyethylene-coated Tyvek or other chemically-resistant suit. If inhalation hazards exist without skin contact hazards, a modified level D protection level can be used, consisting of level D protection plus APRs.

The following conditions must be met prior to any respirator use:

- Employee must be certified fit to use a respirator by the occupational physician, at least annually.
- Employee must be trained in proper respirator use, maintenance, selection, and limitations.
- Employee must have a current fit test for the respirator being used.
- Respirator must be in proper working order and inspected before use.
- In the event a positive pressure, supplied air breathing apparatus or positive pressure respirator becomes necessary, individual instructions detailing the need, use and limitations of these systems will be provided by the H&S officer.

An air purifying respirator (APR) should be used only if:

- Contaminants are known and measurable with proper monitoring equipment. APRs will not offer protection from hydrogen sulfide (H_2S), hydrogen cyanide (HCN), carbon monoxide (CO), other toxic gases, and oxygen deficient atmospheres.
- Contaminant has adequate warning properties.
- Concentrations are < IDLH (immediately dangerous to life and health).
- Ambient atmosphere contains 19.5 - 23.5 percent oxygen.
- Concentrations are < maximum use limit of the cartridge.
- Appropriate and fresh cartridges are used.
- Air monitoring is continued during APR use.
- Concentrations are < PF x PEL or TLV (see below).

	PF
1/4 or 1/2 mask APR	10*
1/4 or 1/2 mask PD SCBA	10
1/4 or 1/2 mask supplied air	10
full face APR	100*
full face PD SCBA	100
PP SCBA / supplied air	100

PF - Protection factor PEL - Permissible exposure limit
TLV - Threshold limit value SCBA - Self contained breathing apparatus
PD - Pressure demand PP - Positive pressure
* or maximum use limit of cartridge, whichever is less

- If any of the following danger signals are sensed while using the respirator, immediate evacuation to fresh air is compulsory (the cartridge or filter may be spent and abnormal conditions may create vapor concentrations which are beyond the limit of the respirator):

    a. Smell or taste of chemicals.
    b. Irritation of the eyes, nose and/or throat.
    c. Difficulty in breathing.
    d. Temperature elevation of inspired air.
    e. Loss of equilibrium, nausea, and/or dizziness.

- Positive and negative pressure tests should be performed each time a respirator is used, and intermittently during use.
- Before and after entering an area of known exposure, cartridges should be discarded and replaced. If there is no known exposure, the maximum life of a cartridge is 15 working days, as long as preventative maintenance techniques are observed.

4.0 SAFETY EQUIPMENT LIST

The following Safety Equipment must be available on site:

- First Aid Kit
- Mobile Telephone
- Half or full face APR - Organic Vapor/HEPA Cartridge (MSA GMA or equivalent) or Combination Cartridge (MSA GMC-H or equivalent)
- Hard Hat
- Tyvek Coveralls/Polyethylene coated Tyvek Coveralls
- PVC (or similar) Rain suit
- Safety Boots (Steel-toe and shank)
- Nitrile Outer Gloves/Latex Inner Gloves
- Hearing protection

5.0 EXCLUSION AREAS

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, site control will be maintained by establishing clearly identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below.

5.1 Exclusion Zone

Exclusion zones will be established as needed around each hazardous waste activity location. Only persons with appropriate training and authorization from the Field H&S Manager will enter this perimeter while work is being is being conducted there. Traffic cones, barrier tapes, and warning signs will be used as necessary to establish the zone boundary. Plastic stanchions or temporary fencing will be placed as required to prevent unauthorized access to within 10 feet from the sides of open excavations.

5.2 Contamination Reduction Zone

A contamination reduction zone will be established as needed just outside each temporary exclusion zone to decontaminate equipment and personnel as discussed below. This zone will be clearly delineated from the exclusion zone and support zone using the means noted above. Care will be taken to prevent the spread of contamination from this area.

5.3 Support Zone

A support zone will be established as needed outside the contamination reduction area to stage clean equipment, don protective clothing, take rest breaks, etc. This zone will be clearly delineated from the contaminant reduction zone using the means noted above.

6.0 MINIMIZATION OF CONTAMINATION

In order to make the work zone procedure function effectively, the amount of equipment and personnel allowed in contaminated areas must be minimized. In addition, the amounts of soil, water, or other media collected should not exceed what is needed for typical laboratory analysis. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Use plastic drop cloths and equipment covers where appropriate. Eating, drinking, chewing gum, smoking or using smokeless tobacco are forbidden in the exclusion and contamination reduction zones.

7.0 DECONTAMINATION

Decontamination is necessary to limit the migration of contaminants from the work zone(s) onto the site or from the site into the surrounding environment. Equipment and personnel decontamination are discussed in the following sections, and the following types of equipment may be used to perform these activities:

- Boot and Glove Wash Bucket
- Scrub Brushes - Long Handled
- Spray Rinse Applicator
- Plastic Garbage Bags
- 5-Gallon Container with Alconox Decontamination solution or household detergent and water.

7.1 Equipment Decontamination

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the site. These procedures will also ensure that contaminated materials generated during site operations and during decontamination are managed appropriately.

All non-disposable equipment will be decontaminated in the contamination reduction zone. Prior to demobilization, all contaminated portions of heavy equipment should be thoroughly cleaned. Heavy equipment may require steam cleaning. Soil and water sampling instruments should be cleaned with detergent solutions in buckets.

7.2 Personnel Decontamination

If contamination of personnel or PPE is observed or suspected, personnel working in exclusion zones will perform a mini-decontamination in the contamination reduction zone prior to changing respirator cartridges (if worn), taking rest breaks, drinking liquids, etc. They will decontaminate fully before eating lunch or leaving the site. The following describes the procedures for mini-decon and full decon activities.

Mini-decon procedure:

1. In the contamination reduction zone, wash and rinse outer gloves and boots in buckets.
2. Inspect protective outer suit, if worn, for severe contamination, rips or tears.
3. If suit is highly contaminated or damaged, full decontamination as outlined below will be performed.
4. Remove outer gloves. Inspect and discard if ripped or damaged.
5. Remove respirator (if worn) and clean using premoistened towelettes. Deposit used cartridges in plastic bag.
6. Replace cartridges and outer gloves, and return to work.

Full decontamination procedure:

1. In the contamination reduction zone, wash and rinse outer gloves and boots in buckets.
2. Remove outer gloves and protective suit and deposit in labeled container for disposable clothing.
3. Remove respirator, and place used respirator cartridges (if end of day) in container for disposable clothing.
4. If end of day, thoroughly clean and dry respirator then store properly in a sealed container.
5. Remove inner gloves and discard into labeled container for disposable clothing.
6. Remove work boots without touching exposed surfaces, and put on street shoes. Put boots in individual plastic bag for later reuse.
7. Immediately wash hands and face using clean water and soap.
8. Shower as soon after work shift as possible.

8.0 DISPOSAL OF CONTAMINATED MATERIALS

All disposable sampling equipment and materials will be placed inside two plastic bags or other appropriate containers and placed in storage as directed by the client.

9.0 SITE SECURITY AND CONTROL

Site security and control will be the responsibility of the Project Manager, The "buddy-system" will be used when working in designated hazardous areas. Any security or control problems will be reported to appropriate authorities.

10.0 SPILL CONTAINMENT

Sources of bulk chemicals subject to spillage are not expected to be encountered in this project. Accordingly, a spill containment plan should not be needed for this project. The

only chemicals likely to be on site are vehicle fuels kept in the vehicles. In the event of a spill, if it is safe to do so, personnel will put absorbent materials onto the spilled material and keep it from entering drains or water bodies. If the spill is large and a potential safety or environmental hazard personnel will call 911 as soon as possible. Only properly trained personnel will respond to an emergency or to a spill larger or more serious than what can easily be wiped up.

11.0 EMERGENCY RESPONSE PLAN

The HWA Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for HWA projects.

11.1 Plan Content and Review

The principal hazards addressed by the Emergency Response Plan include the following: fire or explosion, medical emergencies, uncontrolled contaminant release, and situations such as the presence of chemicals above exposure guidelines or inadequate protective equipment for the hazards present. However, in order to help anticipate potential emergency situations, field personnel shall always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- visible or odorous chemical contaminants;
- drums or other containers;
- general physical hazards (traffic, moving equipment, sharp or hot surfaces, slippery or uneven surfaces, etc.);
- possible sources of radiation;
- live electrical wires or equipment;
- underground pipelines or cables; and
- poisonous plants or dangerous animals

These and other problems should be anticipated and steps taken to avert problems before they occur.

The Emergency Response Plan shall be reviewed and rehearsed, as necessary, during the on-site health and safety briefing. This ensures that all personnel will know what their duties shall be if an actual emergency occurs.

11.2 Plan Implementation

The Field H&S Manager shall act as the lead individual in the event of an emergency situation and evaluate the situation. He/she will determine the need to implement the emergency procedures, in concert with other resource personnel including client

representatives, the Project Manager, and the Corporate H&S Manager. Other on-site field personnel will assist the Manager as required during the emergency.

In the event that the Emergency Response Plan is implemented, the Field H&S Manager or designee is responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn) or visual or shouted instructions, as appropriate.

Emergency evacuation routes and safe assembly areas shall be identified and discussed in the on-site health and safety briefing, as appropriate. The buddy-system will be employed during evacuation to ensure safe escape, and the Field H&S Manager shall be responsible for roll-call to account for all personnel.

11.3 Emergency Response Contacts

Site personnel must know whom to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the site in a location known to all workers:

- Emergency Telephone Numbers -- see list at the beginning of this plan;
- Route to Nearest Hospital -- see list at the beginning of this plan and route map at the end of this plan;
- Site Descriptions -- see the description at the beginning of this plan; and
- If significant environmental release of contaminants occurs, the federal, state, and local agencies noted in this plan must be immediately notified. If the release to the environment includes navigable waters also notify:

    - National Response Center (800) 424-8802
    - EPA (908) 321-6660

In the event of an emergency situation requiring implementation of the Emergency Response Plan (fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personnel protection equipment for hazards present, etc.), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protection equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave work area, pending approval by the Field Safety Manager for re-start of work. The following general emergency response safety procedures should be followed.

11.4 Fires

HWA personnel will attempt to control only very small fires if the person is comfortable doing so and only after 911 has been called. If an explosion appears likely, evacuate the area immediately. If a fire occurs which cannot be controlled, then immediate

intervention by the local fire department or other appropriate agency is imperative. Use these steps:

- Evacuate the area to a previously agreed upon, upwind location
- Contact fire agency identified in the site specific plan; and
- Inform Project Manager or Field H&S Manager of the situation.

11.5 Medical Emergencies

Contact the agency listed in the site-specific plan if the medical emergency occurs. If a worker leaves the site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome or the medical evaluation as soon as possible. For minor cuts and bruises, an on-site first aid kit will be available.

- If a worker is seriously injured or becomes ill or unconscious, immediately request assistance from the emergency contact sources noted in the site-specific plan. Do not attempt to assist an unconscious worker in a confined space without applying confined space entry procedures. Do not attempt to assist an unconscious worker in an untested or known dangerous atmosphere area without using proper respiratory protection.

- In the event that a seriously injured person is also heavily contaminated, use clean plastic sheeting to prevent contamination of the inside of the emergency vehicle. Less severely injured individuals may also have their protective clothing carefully removed or cut off before transport to the hospital.

11.6 Uncontrolled Contaminant Release

In the event of a tank rupture or other material spill, attempt to stop and contain the flow of material using absorbents, booms, dirt, or other appropriate material, if it is safe to do so. Prevent migration of liquids into streams or other bodies of water by building trenches, dikes, etc. Drum the material for proper disposal or contact a spill removal firm for material cleanup and disposal, as required. Observe all fire and explosion precautions while dealing with spills.

11.7 Potential Chemical Exposure/Inadequate PPE

In some emergency situations, workers may encounter a localized work area where exposure to previously unidentified chemicals could occur. A similar hazard includes the situation where chemicals are present above permissible exposure levels and or/above the levels suitable for the personnel protective equipment at hand on-site. If these situations occur, immediately stop work and evacuate the work area. Do not reenter the area until

appropriate help is available and/or appropriate personnel protective equipment is obtained. Do not attempt to rescue a downed worker from such areas without employing confined space entry procedures. Professional emergency response assistance (fire department, HAZMAT team, etc.) may be necessary to deal with this type of situation.

11.8 Other Emergencies

Depending on the type of project, other emergency scenarios may be important at a specific work site. These scenarios will be considered as part of the site-specific plan and will be discussed during the on-site safety briefing, as required.

11.9 Plan Documentation and Review

The Field H&S Manager will notify the Project H&S Manager as soon as possible after the emergency situation has been stabilized. The Project Manager or H&S Manager will notify the appropriate client contacts, and regulatory agencies, if applicable. If an individual is injured, the Field H&S Manager or designate will file a detailed Accident Report with the Corporate H&S Manager within 24 hours.

The Project Manager and the Field, Project, and Corporate H&S Managers will critique the emergency response action following the event. The results of the critique will be used in follow-up training exercises to improve the Emergency Response Plan.

12.0 MEDICAL SURVEILLANCE

A medical surveillance program has been instituted for HWA employees having exposure to hazardous substances. Exams are given before assignment, annually thereafter, and upon termination. Content of exams is determined by the Occupational Medicine physician in compliance with applicable regulations and is detailed in the General H&S Plan.

Each team member will have undergone a physical examination as noted above in order to verify that he/she is physically able to use protective equipment, work in hot environments, and not be predisposed to occupationally-induced disease. Additional exams may be needed to evaluate specific exposures or unexplainable illness.

13.0 TRAINING REQUIREMENTS

HWA employees who perform site work must understand potential health and safety hazards. All employees potentially exposed to hazardous substances, health hazards, or safety hazards will have completed 40 hours of off-site initial hazardous materials health and safety training or will posses equivalent training by past experience. They will also

have a minimum of three days of actual field experience under the direct supervision of a trained supervisor. All employees will have in their possession evidence of completing this training. Employees will also complete annual refresher, supervisor, and other training as required by applicable regulations.

Prior to the start of each work day, the Field H&S Manager will review applicable health and safety issues with all employees and subcontractors working on the site, as appropriate. These briefings will also review the work to be accomplished, with an opportunity for questions to be asked.

14.0 REPORTING, REPORTS, AND DOCUMENTATION

HWA staff will sign the Acknowledgment of Understanding (Attachment 1), which will be kept on site during work activities and recorded in the project files. The Daily Safety Meeting Checklist (Attachment 2) will also be completed daily by the HWA Field Representative. In the event that accidents or injuries occur during site work, the Health and Safety Manager and the client shall be immediately notified.

Attachment 1

Employee Acknowledgment Form

HWA GeoSciences Inc.
EMPLOYEE ACKNOWLEDGMENT FORM

To be Executed by HWA GeoSciences Inc. Employees Following Their Review of:

Bothell Multiple Site
Bothell Way/SR 522
Sampling Plans
&
Health and Safety Plan

I hereby certify that I have read and understand the health and safety guidelines contained in the above referenced plan.

Employee Name: _____
Employee Signature: _____ Date: _____

In case of emergency, please contact:

1. Name: _____Relationship: _____ Telephone No.: _____

2. Name: _____Relationship: _____ Telephone No.: _____

Received By: _____

Site Safety Manager: _____

Signature: _____ Date: _____

Attachment 2

Daily Safety Meeting Checklist

Daily Safety Meeting Checklist

_____ _____
Site Safety Manager Date

Attendee Signatures:

Print Name_____ Print Name_____
Signature_____ Signature_____

Print Name_____ Print Name_____
Signature_____ Signature_____

Print Name_____ Print Name_____
Signature_____ Signature_____

Print Name_____ Print Name_____
Signature_____ Signature_____

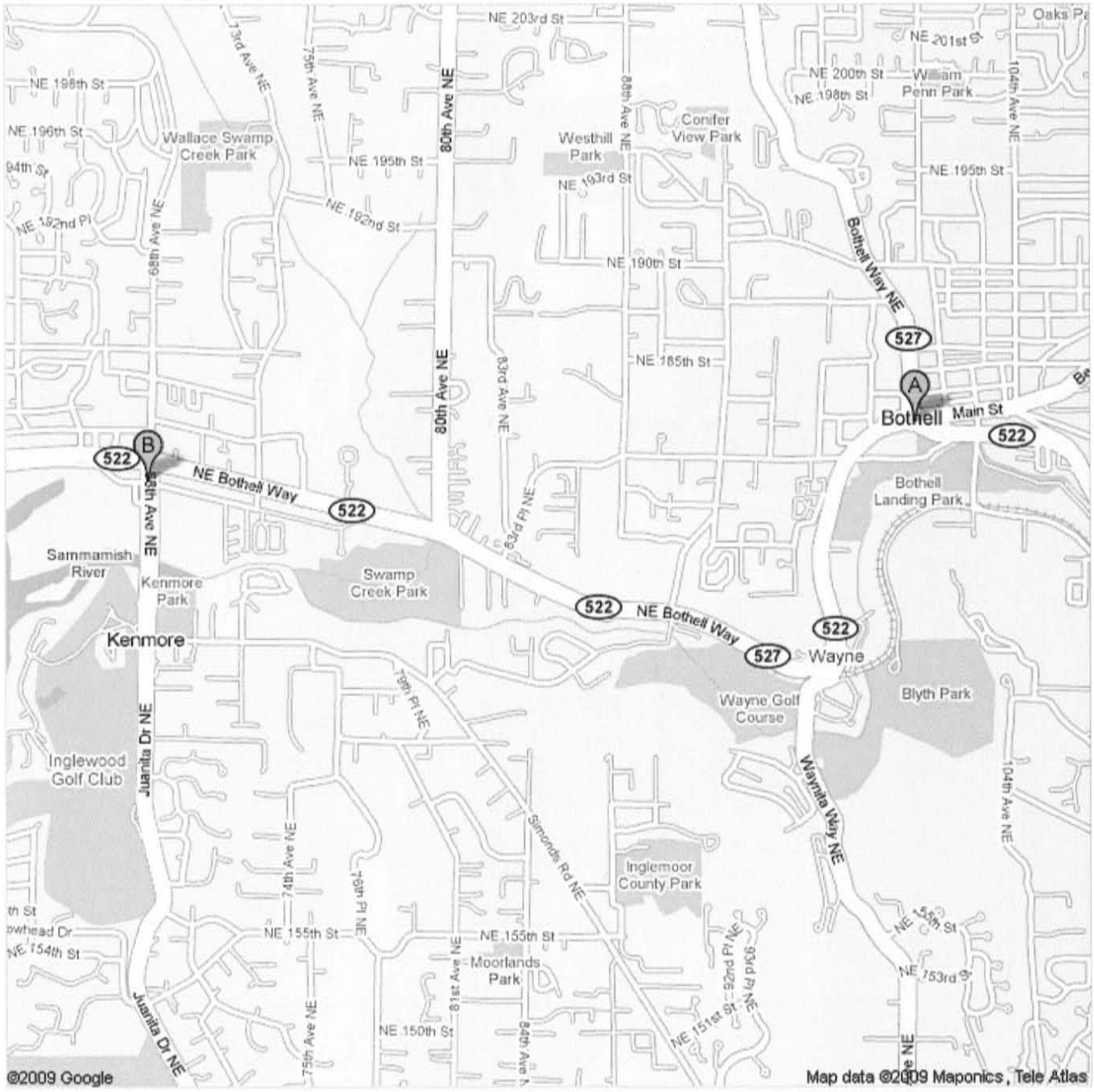
Meeting Topics

Topic	Site Safety manager Initials
Days planned work activities	
Site hazards	
Route to hospital	
Safety equipment and equipment operation	
Review assigned duties	
Confirm review of HSP	
Review site action levels	

Google Maps

Directions to 17511 68th Ave NE, Kenmore, WA 98028

2.8 mi – about **6 mins**



A 10001 Woodinville Dr, Bothell, WA 98011

522	1. Head **southeast** on **WA-522/Woodinville Dr** toward **NE 180th St**	go 492 ft total 492 ft
↱	2. Turn **right** at **NE 180th St** About 1 min	go 0.3 mi total 0.4 mi
522	3. Turn **left** at **NE Bothell Way/WA-522/WA-527** Continue to follow NE Bothell Way/WA-522 About 5 mins	go 2.4 mi total 2.8 mi
↰	4. Turn **left** at **68th Ave NE** Destination will be on the right	go 308 ft total 2.8 mi

B 17511 68th Ave NE, Kenmore, WA 98028

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.