Phase II Environmental Site Assessment
Sampling and Analysis Plan

47 Williams Street, SW
Grand Rapids, Michigan

Prepared For:

City of Grand Rapids Economic Development Office
CA# BF-00E00416-0
Determination of Eligibility – February 22, 2011

NTH Project: 74-090095-14

March 8, 2011
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1.0 INTRODUCTION

NTH Consultants, Ltd. (NTH) has prepared this Phase II Environmental Site Assessment (ESA) Sampling and Analysis Plan (SAP) on behalf of the City of Grand Rapids Economic Office (City). The Phase II ESA activities will be performed under the City's U.S. Environmental Protection Agency (U.S. EPA) Brownfield Assessment Grant project.

The City has identified a property that they have determined is eligible for assessment under the Petroleum Substances Grant due to previous auto repair uses of the Property. The Property is located at 47 Williams Street SW in the City of Grand Rapids, Michigan. The site is located on the near the northeast corner of Williams Street and Ionia Avenue SW at the approximate location shown on Figure 1 "Property Location Map."

The site is approximately 0.16 acres in size. The Property consists of one parcel and is identified by the address of 47 Williams Street SW. The slab on grade building is comprised of brick masonry and totals approximately 6,500 square feet. The layout of the site is shown on the attached Figure No. 2 "Boring Location Plan". The source of Figure 2 is the Regional Geographic Information System (REGIS), an agency of the Grand Valley Metropolitan Council.

Dixon Environmental consulting, Inc. (Dixon) recently performed an Initial Assessment Report (IAR) for the site, the results of which were presented in a report dated January 20, 2011. The following areas of known contamination and/or data gaps were identified in the IAR:

- The unknown extent of 1,2,4-trimethylbenzene, 1,2-dichlorethane, 1,3,5-trimethylbenzene, benzene, ethylbenzene, toluene, and xylenes identified in the soil and/or groundwater at levels exceeding the Michigan Department of Natural Resources and Environment's Risk Based Screen Levels.

2.0 SCOPE OF WORK

The objective of the Phase II ESA exploration is to further define the soil and groundwater contamination previously identified at the site at levels exceeding the Michigan Department of Natural Resources and Environment (MDNRE) Generic Cleanup Criteria developed under Part

201 of the Natural Resources and Environmental Protection Act (NREPA), 1994 P.A. 451, as amended.

Phase II ESA activities will be performed in accordance with the Quality Assurance Project Plan (QAPP) prepared by NTH. Exploration activities conducted by NTH will also be performed in accordance with the site-specific health and safety plan (HASP). The sampling program outlined in the following sections may be modified in the field based on real-time observations and field-screening results. The objective of any modifications, if deemed appropriate, will be to collect data that can more accurately assess soil and groundwater conditions at the site.

NTH will contact the MISS DIG utility locating service three (3) working days prior to initiation of field activities to locate and mark utilities within the work area.

2.1 SUBSURFACE EXPLORATION

A subsurface exploration will be performed using a stainless steel hand auger to collect discrete soil and groundwater samples and evaluate subsurface conditions. Soil and groundwater sampling will be performed in accordance with NTH's standard procedures identified in the QAPP.

Five (5) soil borings (B-1 through B-5) are proposed on the site at the approximate locations shown on the attached Figure 2, these locations are based on the areas of known contamination and/or potential data gaps identified in the IAR. Based on available data, the depth to groundwater beneath the site is estimated to be about 4 feet below ground surface; therefore, borings will be advanced to a maximum depth of approximately 9 feet below ground surface, or to the groundwater table if shallower. The rationale for each proposed boring is summarized on the attached Table No. 1 "Summary of Proposed Borings and Samples."

Details of exploration activities are described as follows:
Continuous soil samples will be collected from each boring. Subsurface samples will be visually characterized in the field. Physical indicators of environmental contamination such as staining and odors will be documented on soil boring logs.

- Samples will be field-screened using a portable photoionization detector (PID) to determine the approximate concentrations of total volatile organic compounds (VOCs). Field screening data will also be recorded on the soil boring logs.

- One (1) "worst case" unsaturated soil sample will be collected from select borings as outlined on Table No. 1. Worst-case soil samples will be determined based on visual and olfactory observations, field screening results, the presence of a confining layer (i.e. clay), and the presence of debris/fill material. If evidence of impact is observed at separate intervals then additional samples will be collected.

- Up to 3 permanent two-inch diameter polyvinyl chloride (PVC) monitoring wells will be installed at boring locations where groundwater is encountered to collect groundwater samples for chemical testing. Groundwater samples will be collected using a peristaltic pump.

- Borings will be backfilled with soil cuttings generated from the respective borehole. The remaining void space will be filled with hydrated bentonite. The ground surface will be restored to match surrounding conditions. Boring locations will be surveyed to fixed site features and added to a site exploration plan.

2.2 QUALITY ASSURANCE / QUALITY CONTROL

Quality assurance and quality control (QA/QC) procedures will be implemented in accordance with the approved QAPP. The following QA/QC samples will be collected:

- Duplicate soil and groundwater samples will be collected to provide precision information regarding sample homogeneity, handling, transportation, storage, and analysis. Sample frequency is one per 15 samples per matrix, therefore, one duplicate soil sample and one duplicate groundwater sample will be collected.

- One laboratory prepared trip blank will be used to ensure that no cross-contamination has occurred during transportation and storage of samples.

- One additional groundwater sample will be collected from one boring for the laboratory's matrix spike/matrix spike duplicate (MS/MSD).
- One methanol blank sample will be prepared.

To minimize the potential for cross contamination, supplies used to collect groundwater samples (i.e. peristaltic pump tubing) will be replaced and disposed between each boring. Only new/unused peristaltic pump tubing will be used.

2.3 LABORATORY TESTING

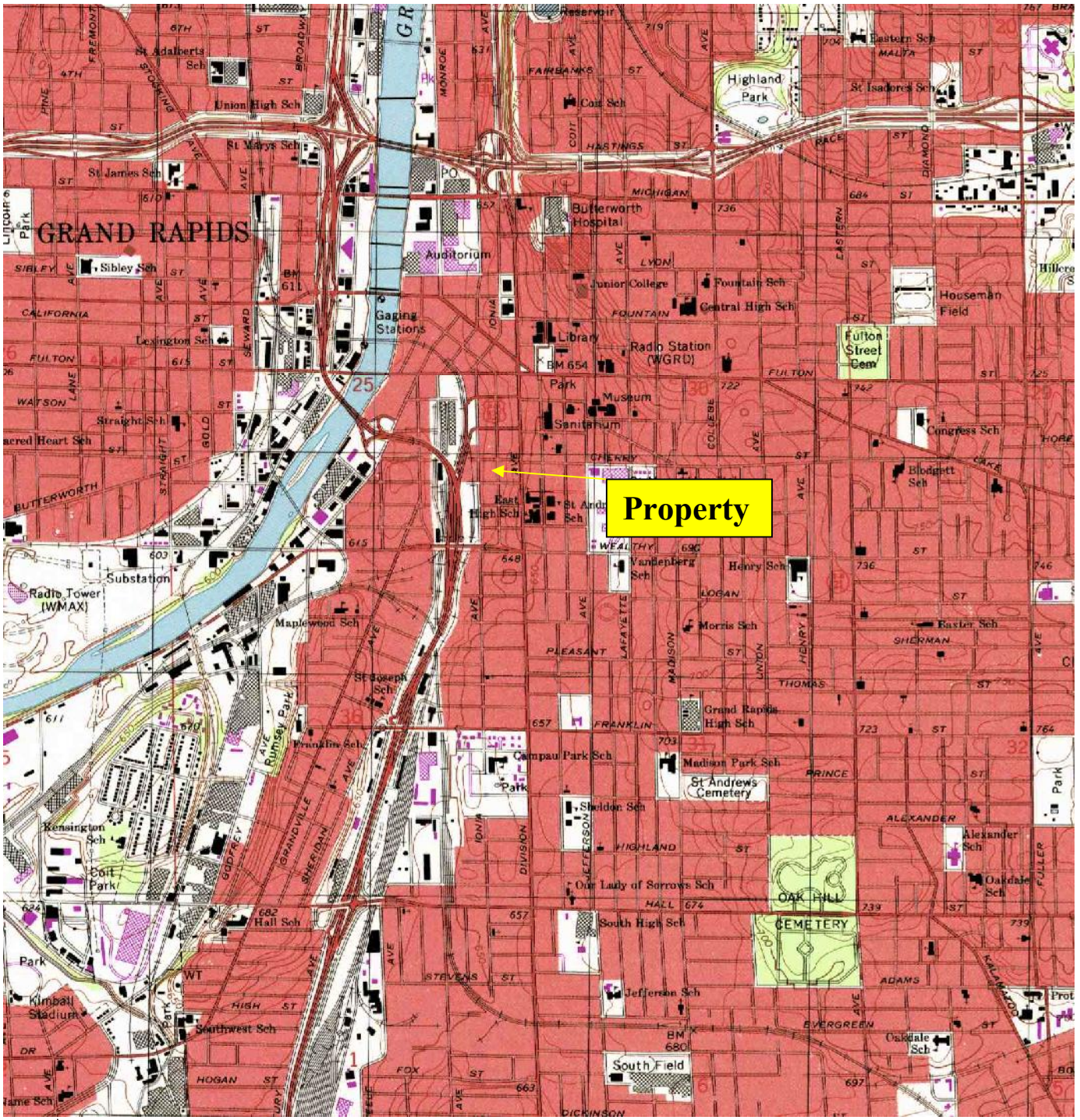
Soil and groundwater samples will be handled and transported in accordance with the protocol outlined in the QAPP. Fibertec Environmental Services of Holt, Michigan will provide laboratory testing services. Soil and groundwater samples will be tested for VOCs and/or lead depending on the purpose of the boring location and field observations. As described in this SAP and as outlined on Table No. 1, the number of samples ultimately submitted for laboratory testing will depend on observed conditions during investigation activities.

3.0 REPORTING

Analytical results from soil and groundwater samples will be compared to the MDNRE's Generic Cleanup Criteria developed under Part 201 of P.A. 451, as amended. A Phase II ESA Report will be prepared, and will include the following:

- Text describing field sampling methodologies, environmental conditions observed (if any), and analytical findings.
- Soil boring logs.
- Figure(s) illustrating sampling locations relative to the property boundary and/or fixed site features.
- Tables comparing chemical testing results to applicable cleanup criteria, and summarizing QA/QC data.
- Laboratory data reports, including QA/QC data and chain-of-custody forms.

- If evidence of contamination is identified during the Phase II ESA activities, the Phase II ESA reporting elements may be incorporated into a MDNRE allowed Final Assessment Report (FAR) or Closure Report on behalf of the owner.



Source: USGS 1996 Topographic Map

Project No.: 74-090095-14	Project Name:	Title:
Scale: 1:24000	**47 Williams Street SW, Grand Rapids, MI**	**Property Location Map**
Drawn By: SLK Checked By: GRJ	**NTH Consultants, Ltd.** **Infrastructure Engineering and Environmental Services**	Figure No.: 1

Project No.: 74-090095-13 Scale: As Shown	Project Name: Mel Trotter Ministries	Title: Boring Location Plan	Date: 3-2011
Drawn By: SLK Checked By: GRJ	**NTH Consultants, Ltd.** **Infrastructure Engineering and Environmental Services**		Fig No.: 2

TABLE NO. 1
Summary of Proposed Borings and Samples
47 Williams Street SW, Grand Rapids, Michigan

DRAFT

Boring Number	Location / Rationale	Proposed Boring Depth (Feet)	Soil Samples to be Collected	Analytical Parameters for Soil Samples	Groundwater Samples to be Collected	Analytical Parameters for Groundwater Samples
B-1 and B-2	Western sidewall of the Former UST area to define the extent of soil impacts identified in that area.	8 feet	One "worst case" sample per boring.	VOCs, Lead	A groundwater sample will NOT be collected	
B-3	North of the Former UST area to assess the extent of groundwater impact identified in that area.	9 feet, or to groundwater if shallower	No soil sample will be collected.		A groundwater sample will be collected from one location.	VOCs, lead
B-4	North of the Former UST area to assess the extent of groundwater impact identified in that area.	9 feet, or to groundwater if shallower	No soil sample will be collected.		A groundwater sample will be collected from one location.	VOCs, lead
B-5	North of the Former UST area to assess the extent of groundwater impact identified in that area.	9 feet, or to groundwater if shallower	No soil sample will be collected.		A groundwater sample will NOT be collected.	VOCs, lead

VOCs = (1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, 1,2-dichlorethane, 1,2-dibromoethane, benzene, ethylbenzene, toluene, naphthalene, 2-methylnaphthalene and total xylenes

SITE SPECIFIC HEALTH AND SAFETY (H&S) PLAN

. **To check any box in this document, double click on box. Default value is "not checked". To set as checked box, choose "checked".**

. Instructions for completing this form are available from Judi McInerney ext.5318
Please open file, save it under another name, and do not work off the file in shared drive.

GENERAL INSTRUCTIONS

Check item 1, 2, or 3 and proceed as directed. If information requested in the plan does not apply to your project, insert "N/A" in appropriate space. Please do not leave spaces blank.

Project Name: **GR EPA Mel Trotter Ministries**
Project No.: **74-090095-14**

1. ☐ If no worker exposures to chemicals are anticipated and no safety precautions beyond the listed H&S rules are required, check the box at the left. Complete **SITE INFORMATION** and **EMERGENCY PHONE NUMBERS AND DIRECTIONS** on page 13; brief field staff on the abbreviated plan. Place a copy of the abbreviated plan (signed by the staff designated on page 22) in the project file. No further action is required.

2. ☒ If no worker exposures to chemicals are anticipated, but safety precautions beyond the listed H&S rules are required, check the box at the left. Complete **SITE INFORMATION** and **EMERGENCY PHONE NUMBERS AND DIRECTIONS** on page 13, the **ACTIVITY SPECIFIC PROCEDURES** on page 17, and brief field staff on the abbreviated plan. Provide a copy to field staff so an onsite copy is available. Place a copy of the plan (signed by staff designated on page 22) in the project file. No further action is required.

3. ☐ If chemical exposures are anticipated, the entire plan must be completed.

HEALTH AND SAFETY RULES FOR FIELD WORK

GENERAL

Staff performing fieldwork will read and sign the health and safety plan. Field staff will be briefed before work begins and whenever any changes in the working conditions occur that require a revision of the H & S plan. Hard hats should be worn while on the construction site. Safety toe shoes, eye protection, hearing protection, and gloves may also be necessary. Safety toe shoes shall be worn on all drilling sites, sites where heavy equipment is in use or on any site where objects could fall or roll onto one's foot. Access to a phone is also necessary, either mobile or landline.

OSHA requires personal protective equipment (PPE) to meet the following ANSI standards:

Eye and Face Protection: ANSI 87.1 –1989

Head Protection: ANSI Z89.1-1986

Foot Protection: ANSI Z41.1-1991 or the ASTM standard F2413 issued in 2005 (I/75/C/75). For hand protection, there is no ANSI standard for gloves but OSHA recommends that selection be based on the tasks to be performed and the characteristics of the glove material. For protection against chemicals, glove selection

must be based upon the chemicals encountered, the chemical resistance and the physical properties of the glove material.

ELECTRICAL TRANSFORMERS AND CSE

Electrical transformers located on a jobsite often contain a nitrogen purge or dry air. Workers, particularly electricians and power plant operators, will enter these transformers through hatches on top for various work-related reasons. Testing for oxygen deficiency and for toxic atmospheres is mandatory. Before they are opened, they must be well vented by having air pumped in. When performing the task of obtaining a sample for PCB analysis, transformer has to be locked out/tagged out and taken out of service and also employees need to be aware of the nitrogen residual prior to opening.

EXCAVATIONS, TRENCHES AND PITS

Do not enter an excavation unless someone is outside to observe and provide assistance.

Do not enter an excavation if soil is loose on the sides or if the sides otherwise appear unstable.

Do not enter an excavation deeper than five feet without sloped sides or shoring unless you are certain it conforms to the OSHA excavation standard. Any excavation less than 5 feet in depth shall also be effectively protected when visible observation indicates that hazardous earth movement may be expected. Barricade an open hole left unattended.

Any excavation or trench, more than 4 feet in depth, shall have a ramp or ladder for means of access. If an employee's task involves performing tests in a trench, the ramp must be made up of material stable enough so that a person can walk into and out of the trench. Ladders used to exit from a trench shield must extend 3 feet above shield.

Before starting any intrusive work begins, ensure that utilities have been properly located (refer to “Safety During Drilling Operations”).

FLAMMABLE HAZARDS

If performing intrusive work, flammable hazards in the form of methane gas or hydrogen sulfide may be encountered. No smoking or spark producing instruments should be used around flammable hazards. Only explosion proof equipment should be used.

If hydrogen sulfide odor is detected (smell of rotten eggs), position yourself upwind and use a meter that measures the quantity of hydrogen sulfide before resuming. **NOTE: H_2S renders the nose unable to smell H_2S**. After initially smelling H_2S, one may no longer smell H_2S due to olfactory paralysis. Only use of a meter will ensure one determines the concentration of H_2S present in the atmosphere.

If one encounters methane, allow it to dissipate and when concentration of methane, as measured by a meter, is less than 10% of the Lower Explosive Limit (LEL), drilling may resume.

When transferring flammable or combustible liquid to another container (ex. drum), ensure that tank or drum is ground and bonded.

HOUSEKEEPING

Work areas should be kept free of work materials, debris obstructions and substances such as ice, grease or oil that could cause a surface to become slick or otherwise hazardous.

MATERIAL HANDLING

Before lifting any object, make sure that the load is within your personal lifting capacity. If it is too heavy, ask for assistance.

When lifting or moving a load:

- Take a balanced stance, feet shoulder-width apart
- Squat down to lift or go down on one knee
- Get as close as you can; hug the load
- Lift gradually using your legs, keep load close to you and keep your back and neck straight
- Once standing, change directions by pointing your feet and turn your whole body. Avoid twisting at your waist
- To put load down, use these guidelines in reverse.
- Always bend at the knees - never at the waist
- Whenever possible, use a cart or dolly to carry the object
- If the load is too heavy, ask for help

PERSONAL PROTECTIVE EQUIPMENT

Approved hard hats must be worn by everyone working near a drill rig, near powered construction equipment and in designated hardhat areas. Hard hats must be worn if there is a chance of anything falling from above or if something could bump the head.

When performing fieldwork, staff will wear a hard sole work shoe that provides ankle support and protection from puncture of the sole. Safety toe shoes are to be worn whenever there is the potential for a foot injury resulting from either falling or rolling objects. Athletic shoes, sandals and short pants are not permitted on construction sites.

If gloves are necessary, gloves appropriate for the potential hazard must be used. Make sure they fit snugly. If the potential exists for contact with materials contaminated with petroleum products, wear surgical style nitrile gloves to prevent any skin contact.

The OSHA permissible noise exposure is 90 decibels for an 8-hour day. A rule-of-thumb approach to estimate this noise intensity follows. If standing shoulder-to-shoulder one must shout to communicate to a co-worker, the sound level probably is excessive. In this case earmuffs or plugs must be worn. When in doubt, they should be worn. Insert hearing protection by gently pulling back on ear and insert hearing protection into the ear canal. Do NOT push into ear canal; you just need a good seal at the opening. Hold hearing protection in place for approximately 15-20 seconds and let go of ear to allow for a good seal.

If while working the potential exists for splashed liquids or flying particulates or projectiles, wear safety glasses, goggles or a face shield as appropriate.

SAFETY DURING DRILLING OPERATIONS

While a drill rig is in operation, stand at least ten feet away from the auger.

As the operator raises the tower of a drill rig, ensure that no overhead obstructions are present.

Drill rigs are not to be moved from hole to hole with the mast in an upright position. However, if the drill rig operator does so, do not stand on the side of a drill rig. Also, make sure that no overhead obstructions are present.

No smoking is permitted while drilling at landfill sites. Since the possibility exists that one may encounter methane at a landfill, the presence of a lighted cigarette could result in an explosion.

During freezing weather, do not touch any metal parts of the drill rig with exposed flesh. Freezing of moist skin to metal can occur almost instantaneously.

Know where the "emergency shut off" switch is located on the drill rig.

Overhead Lines

When overhead electrical power lines exist at or near a drilling site or project, consider all wires to be alive and dangerous. The drill rig mast must be a distance of at least 10 feet from overhead power lines. Depending on the line's voltage, it may be necessary to maintain a increase the distance between the mast and power line. Windy conditions may mandate more distance between the mast and power lines. If there are any questions

concerning the safety of drilling on sites in the vicinity of overhead power lines, call the power company.

Underground Utilities

If areas are snow-covered, the potential exists that all underground lines and utilities have not been adequately marked or markings may be difficult to find. Exercise caution when drilling and use hand digging if necessary.

Locating Utilities

Buried utilities should be located, noted and emphasized on all boring location plans and boring assignment sheets. If this information is not noted, contact the Project Manager immediately. Give adequate notice to utility companies before digging so the location of underground utilities can be marked. Digging up or rupturing lines such as power lines or gas lines can be hazardous or deadly! Locate all underground utilities before you start to dig; carefully hand or vacuum excavate.

If a vactor truck is used to vacuum excavate, consider allowing some distance between you and the work area where the vacuum tube and water lance nozzle are used. The truck operator may move the vacuum tube up or down, or side to side during excavating. Prior to vactor use, the operator should confirm that no overhead obstructions are present at the test boring location. Secure all loose objects near the work area, as they may be sucked up by the vactor truck. Hard hats and eye protection shall be worn at all times due to the presence of overhead booms and suction tube, and the possibility that small rocks and debris dislodged by the water lance may not be sucked into the vactor truck and could fly out of the excavation. If working in proximity of the vactor truck, hearing protection should be worn.

Michigan Notification

Notify MISS DIG in the State of MI 1-800-482-7171 and give a full 3 working days notice. Additionally in the State of Michigan, all utility locating must be conducted in accordance with the Best Practices measures as prescribed in the Michigan Infrastructure and Transportation Association (MITA) Best Practices Contract. This includes information regarding:

- actions to be taken prior to excavating;
- ticket life;
- notification of positive response;
- lack of marks designating location of utilities;
- safe zones;
- caution zones and
- requests for additional assistance.

SAFE USE OF ELECTRICITY

Make sure all electrical circuits are properly grounded. All extension cords and temporary wiring must be three-wire conductor. Ground fault interrupters should be used as needed. When working with electrical tools around water, a ground fault circuit interrupter is required.

SAFE USE OF HAND TOOLS

When a tool becomes damaged, notify the Equipment Coordinator of the problem so the tool can be repaired or replaced.

SLIPS, TRIPS AND FALLS

Since work is to take place on uneven terrain, the possibility exists that slips, trips or fall may occur if preventive measures are not implemented. Anticipate that the terrain surface may be somewhat unpredictable. Exercise caution when walking and anticipate that if temperatures are near freezing, slippery surfaces may be present. Attempt to maintain good footing. Snow on the ground will hinder one's ability to judge the evenness of the terrain so walk in a restrained fashion. **NEVER WALK BACKWARDS**.

On certain projects, geofoam blocks are being placed in an excavation. Oftentimes they are also used as the means of access to an excavation; when walking on geofoam blocks, extra caution is required during wet or cold weather. Surfaces of the EPS blocks tend to be more slippery when wet than when dry. In addition, when air temperatures approach or go below freezing, a thin layer of ice can readily develop on the exposed surfaces of EPS blocks if the dewpoint is sufficiently high. Thus, the surfaces of the EPS blocks can pose particular slip hazards in this condition."

TRAFFIC HAZARDS

Wear reflective vests whenever working near roadway. Do not proceed with work until traffic control has been set up and **checked** to ensure it gives adequate notice to oncoming traffic. Traffic control measures will be implemented in accordance with the U. S. Department of Transportation Federal Highway Administration Manual on Uniform Traffic Control Devices.

WEATHER

Rain and snow reduces the visibility of drivers and increases the cars' stopping distance. If working near vehicular traffic in adverse weather, every effort should be made to reduce amount of time that tasks are carried out in susceptible areas; in some cases, carry out the tasks when there are less vehicles in proximity to the tasks taking place. If work must continue, provide oncoming motor vehicles with effective warning. The warning should be an adequate distance in advance of work and designed to provide high visibility.

Cold Stress

Persons working outdoors in low temperatures, especially at or below freezing, are subject to cold stress. Exposure to extreme cold for a short term can cause severe injury to the surface of the body, or result in profound generalized cooling and may cause death. Fingers, toes, and ears, are the most susceptible to injury. Ambient temperature and the velocity of the wind influence the development of a cold stress injury

Frostbite

Local injury resulting form cold temperatures is included in the generic term frostbite. To administer first aid for frostbite, bring the victim indoors, and rewarm the areas quickly in warm water. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes even thought the tissue will be very painful as it thaws. Never place frostbitten tissue in hot water, near heat lamps, against a hot water bottle to rewarm frostbitten area as the affected skin will have reduced heat awareness and such treatment could result in burns. Give a warm drink, but not coffee, tea or alcohol. The victim must not smoke. Do not allow blisters to be broken. Keep the victim warm and summon immediate medical assistance. Do not rub the frostbitten area this may cause gangrene.

For additional information please see following fact sheet: OSHA fact sheet on Cold Stress.doc

Heat Stress

Heat stress can range from heat rash to heat stroke with varying stages in between. The ideal situation for preventing heat stress is changing the time of day when performing required tasks to cooler times of day (early in the morning and later in the day) but in construction, this is usually not feasible. To prevent heat stress, drink plenty of fluids (not alcoholic or caffeinated), acclimate oneself to hot and humid conditions, take periodic breaks when the heat and humidity are high, rest in shaded areas (preferably air conditioned), and be aware of the effects of heat stress.

Employees **often will not feel thirsty** but they are losing fluids and salts through sweating, and **must replenish the fluids to prevent heat exhaustion** or other heat related ailments. Employees should try to drink as much as a quart or liter of water an hour.

Listen to your body! Don't wait until you become dizzy or get a headache before you take a break.

The various stages of heat stress and their respective general symptoms include the following:

- Heat Rash - Decreased ability to tolerate heat, chafing clothes.
- Heat Fatigue – extreme weakness, dizziness, nausea or headache with possible unconsciousness, skin clammy and moist with complexion pale
- Heat Cramps - Muscle spasms and pain in the extremities and abdomen.

- Heat Exhaustion - Shallow breathing; pale, cool, moist skin; profuse sweating; headache, nausea, dizziness, weakness, thirst and giddiness.
- Heat Stroke - Red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong rapid pulse; coma. ***This is a medical emergency! Brain damage and death are possible. Immediate medical assistance must be obtained!*** While awaiting medical aid, victims should be cooled as rapidly as possible. Cool the individual down by any means possible; get person into a shaded area and fan them and/or cover individual with cloths soaked in cold water or ice packs.

To calculate heat index, see hyperlink: http://www.srh.noaa.gov/shv/Heat_Awareness.htm

Other Weather conditions:

- Lightning: Persons should not work in open areas, near trees or other equipment outside during lightning storms. Stop work until the storm passes. If possible, clear the site until the storm passes.
- High Winds: If high winds are forecast, then the site should be cleared of NTH personnel before the winds become hazardous. Workers should be instructed to go to an appropriate shelter. Work on scaffolds or other elevated structures should not proceed if winds exceed 20 miles per hour. (See Beaufort Wind Scale below).
- Tornado Safety - If conditions warrant, seek shelter and contact your supervisor.
- Winter Storm Warnings: If local winter forecasters have posted storm warnings, work should be stopped before conditions become hazardous. Hazardous conditions include blizzard conditions, ice storms and severely low wind chills.
- If an evacuation is called, account for all persons before leaving the site.
- Notify the Project Manager of any work stoppage due to severe weather.

To obtain current weather conditions via the internet, see links below:

NOAA Weather Service **http://www.weather.gov/view/states.php**

WeatherMichigan.com **http://www.weathermichigan.com/outlook.htm**

Beaufort Wind Scale

Windspeed (MPH)	**Description - Visible Condition**
0	Calm: smoke rises vertically
1 - 4	Light air: direction of wind shown by smoke but not by wind vanes
4 - 7	Light breeze: wind felt on face; leaves rustle; ordinary wind vane moved by wind
8 -12	Gentle breeze: leaves and small twigs in constant motion; wind extends light flag
13 – 18	Moderate breeze: raises dust and loose paper; small branches are moved
19 – 24	Fresh breeze: small trees in leaf begin to sway; crested wavelets form on inland water
25 – 31	Strong breeze: large branches in motion; telephone wires whistle; umbrellas used with difficulty
32 – 38	Moderate gale: whole trees in motion; inconvenience in walking against wind
39 – 46	Fresh gale: breaks twigs off trees; generally impedes progress

47 – 54	Strong gale: slight structural damage occurs; chimney pots and slates removed
55 – 63	Whole gale: trees uprooted; considerable structural damage occurs
64 – 72	Storm: very rarely experienced; accompanied by widespread damage
73+	Hurricane: devastation occurs

WORKING AROUND ENVIRONMENTAL CONTAMINATION

When working with contaminated soil or other environmental contamination, no eating, drinking, smoking, chewing or any activity that could lead to hand-to-mouth transfer of any kind is allowed in the work area. When leaving the work area for breaks, lunch, bathroom, etc., hands and face must be washed.

WORKING AROUND POWERED CONSTRUCTION EQUIPMENT

When approaching any powered construction equipment, alert the operator of your presence. While working around powered construction equipment, position yourself so the equipment is in your line of sight. Do not depend on the equipment operator for your personal safety.

Remove yourself from a work area if you feel the operation of construction-powered equipment is reckless.

SITE SPECIFIC HEALTH AND SAFETY PLAN

(This form applies only to sites where Level D or C protection is adequate)

SITE INFORMATION

Job Name: GR EPA – Mel Trotter Ministries JOB NO: 74-090095-14

Site Location: 47 Williams Street SE

Site Description/Nature Of Work: Subsurface soil borings (hand auger) with soil and groundwater sampling

EMERGENCY PHONE NUMBERS AND DIRECTIONS

EMERGENCY PHONE NUMBERS

Location of Nearest Phone: Cellular Phone

AMBULANCE: 911 FIRE: 911 POLICE 911

HOSPITAL INFORMATION

Map Of Route To Nearest Hospital Attached

NOTE: (Unless project work involves working adjacent to or on a hospital site, including a map to the hospital is mandatory) YES ☒ NO ☐

Hospital Name: Spectrum Health: Butterworth Hospital

Address (including city and state): 100 Michigan St NE, Grand Rapids, MI

Telephone: 616-391-1774

Other: Judi McInerny, Corporate/Site H&S Officer Telephone No. 248-361-2494

SITE HAZARDS

Potential Hazards at the Site are based upon:

Site History ☒ Previous Sampling Data ☐ Current Use ☐

Potential hazards include:

Aerial lifts/Manlifts	☐	AERIAL WORK PLATFORMS
chemical hazards	☒	
Cold stress	☒	Cold Stress.doc
		coldfact.pdf
confined space entry	☐	CSE2007.doc
		Hazardous Atmospheres in Confined Spaces
Crane hazards	☐	Eight Crane Danger Signs to Watch For.doc
		Crane Suspended Personnel Platforms
Demolition Hazards	☐	Demolition work and unexpected hazards
	☐	Demolition Dangers.doc
Electrical Safety for Non-Qualified Workers	☐	Elect safety for non qualified workers.doc
Fall potential	☐	detailed fall protection program summary
		Fall Protection for H&S plan
		Scaffold Safety.doc
heat stress	☒	Heat Stress.doc
noise hazards	☒	NOISE PROGRAM.doc
Ticks or Lyme disease	☐	Prevention of Lyme Disease.doc
	☐	lyme facts
Heavy equipment	☐	Construction Equipment Dangers.doc
Traffic and vehicles	☐	work safety traffic control.doc

CHEMICAL HAZARDS (overview, include source, locations and highest measured concentration of the contaminants):
Previous use of the property was auto repair. Known contamination on the property includes volatile organic compounds (VOC's) as well as semi-VOCs, and metals (e.g. lead) associated with the former auto repair activities completed at the Property.

POTENTIAL HEALTH EFFECTS, SYMPTOMS OF OVEREXPOSURE ("HEALTH EFFECTS") AND EXPOSURES LIMITS

While on a site, NTH employees may come in contact with various chemicals. Listed below are common chemicals encountered on a site. If exposure to a chemical is possible on a site, double click on the box and "click on checked in default value" when pop up appears. If potential health effects and exposure limits (8-Hour TWA, STEL, and CEILING) are required for chemicals other than those listed above, they can be found in the NIOSH Pocket Guide available from Judi McInerney.

☐ ACETONE
Health Effects -- Irritation of the eyes, nose and throat; headache; dizziness; dermatitis.
8-Hour TWA (1) -- 750 ppm STEL (2) -- 1000 ppm

☐ ASBESTOS
Health Effects -- Shortness of breath, restricted lung function, fibrous of the lungs. Carcinogen.
8-Hour TWA (1) -- 0.2 fiber/cc STEL (2) -- 1 fiber/cc for 30 minutes

☒ BENZENE
Health Effects -- Irritation of eyes, nose and respiratory system; giddiness; headache; nausea. Carcinogen.
8-Hour TWA (1) -- 1 ppm STEL (2) -- 5 ppm

NOTE: ACGIH has lowered the 8-hour time-weighted-average (TWA) for benzene to 0.5 ppm and has adopted a STEL of 2.5 ppm.

☐ o-DICHLOROBENZENE
Health Effects -- Irritation of eyes and nose; liver and kidney damage; skin blistering.
8 Hour TWA (1) -- N/A CEILING (2) -- 50 ppm

☐ p-DICHLOROBENZENE
Health Effects -- Headache, irritation of the eyes; loss of appetite; nausea; vomiting.
8-Hour TWA (1) -- 75 ppm STEL (2) -- 110 ppm

☒ ETHYLBENZENE
Health Effects -- Irritation of eyes and mucous membranes; headache; dermatitis; sleepiness.
8-Hour TWA (1) -- 100 ppm STEL (2) -- 125 ppm

☐ HYDROGEN SULFIDE
Health Effects -- Eye irritation and watering; dizziness; headache; fatigue; interruption of breathing; coma, convulsions.
Note: Hydrogen sulfide smells like rotten eggs but individuals typically experience olfactory fatigue upon exposure. A meter should be used especially when drilling if any sulfur odor is noticed.
8-Hour TWA (1) -- 10 ppm STEL (2) -- 15 ppm

☒ LEAD
Health Effects -- Fatigue, insomnia, paleness in eyes; loss of weight; abdominal pain, anemia; probable human carcinogen, teratogen (affects fetus)
8-Hour TWA (1) -- 0.05 mg/m^3 STEL (2) -- N/A

☐ METHYLENE CHLORIDE
Health Effects -- Irritation of eyes and skin; fatigue; weakness; drowsiness; light-headed; numbness in limbs; probable human carcinogen.
8-Hour TWA (1) -- 500 ppm CEILING (2) -- 1000 ppm

☐ PERCHLOROETHYLENE
Health Effects -- Irritation of eyes, nose and throat; dizziness; nausea; flush face and neck; possible human carcinogen.
8-Hour TWA (1) -- 25 ppm STEL (2) -- N/A

☐ STYRENE
Health Effects -- Irritation of eyes, nose and throat; drowsiness; unsteady gait.
8-Hour TWA (1) -- 50 ppm STEL (2) -- 100 ppm

☐ TRICHLOROETHYLENE
Health Effects -- Headache; irritation of eyes; drowsiness; nausea; vomiting; probable human carcinogen.
8-Hour TWA (1) -- 50 ppm STEL (2) -- 200 ppm

☒ TOLUENE
Health Effects -- Fatigue and weakness; confusion and euphoria; dizziness; headache; insomnia.
8-Hour TWA (1) -- 100 ppm STEL (2) -- 150 ppm
☒ XYLENE
Health Effects - Dizziness; drowsiness; irritation of eyes, nose, and throat; nausea; vomiting; loss of appetite; staggering gait; lack of coordination.
8-Hour TWA (1) -- 100 ppm STEL (2) -- 150 ppm
TWA= Time Weighted Average (2) STEL= Short-term Exposure Limit (3) CEILING= Ceiling Value

CHEMICALS NOT LISTED ABOVE

Potential health effects and exposure limit data is available from chemicals_additional updated 2004.doc for:

Aluminum	Copper	Polynuclear Aromatic (PNA) Hydrocarbons
Antimony	Cyanide	Selenium
Arsenic	1,1-dichloroethane	Silver
Barium	Iron	Tetrachloroethane
2-butanone (MEK)	Manganese	Vanadium
Cadmium	Mercury	Vinyl Chloride
Chloroform	Methyl tertiary-butyl ether	Zinc
Chromium compounds	Nickel	
Cobalt	Polychlorinated Biphenyls (PCB)	

Polychlorinated Biphenyls (PCB): PCBs attach to dust particles so even if there is no odor and the PCBs are not volatilizing into the atmosphere. Inhalation of dust bound to the PCBs is potentially dangerous. Minimize any inhalation around material being excavated that is contaminated with PCBs. If soil is highly contaminated with PCBs and excavation involves visible dust emissions, wear respirator with P100 cartridges to capture any dust potentially laden with PCB. Exposure to PCBs.doc

Chemical _____

Health Effects _____

8-Hour TWA (1) _____ STEL (2) or CEILING (3) _____

(1) TWA= Time Weighted Average (2) STEL= Short-term Exposure Limit (3) CEILING= Ceiling Value

IMPORTANT NOTE:
Various project tasks require the use of acids, bases, and methanol associated with sample preservation. The employee should ensure that the containers are properly labeled and that a MSDS for each chemical is available on the job site. In addition all employees using these chemicals shall receive training on proper use/handling as needed pursuant to 29 CFR 1910.1200. Please use hyperlink to access the MSDS for the chemical to be used. We will add additional chemicals as they become necessary.

Nitric Acid
NITRIC ACID, 50-70% or nitric acid
Methanol
Methanol
Hydrochloric Acid
HYDROCHLORIC ACID, 33 - 40%

SITE HEALTH & SAFETY PROCEDURES

HEALTH AND SAFETY RULES
Site personnel will follow the Health and Safety Rules for Field Work that appears at pages 1 through 7.

AIR MONITORING EQUIPMENT:

All air monitoring equipment will be calibrated and maintained in accordance with the manufacturer's specifications.

☒ Photoionization detector: either HNu meter or Photovac- state brand and lamp 10.2 eV for Hnu and 10.6 eV for Photovac are typical (also available for rental is 11.7 eV lamp)
☐ Tri-gas Meter (O_2, H_2S, combustible gas)
☐ Quad Gas meter (O_2, H_2S, combustible gas, carbon monoxide)
☐ Other (Specify) _____

HNu is used for field analyses of soil samples.

☐ (Check if appropriate) **PID MONITORING PROCEDURE**: Monitor the breathing zone of workers frequently using a PID as the work begins. After the work conditions stabilize, take PID readings at 30- minute intervals until three consecutive readings are at background levels. Report the half hour interval measurements and time on the Daily Field Report. Take PID readings also when the work activity changes or the intensity of hydrocarbon odor changes. Select personal protective equipment per the table below based on the PID measurements. Note that PID does not distinguish between individual pollutants. The reading displayed represents the total concentration of all photoionizable chemicals present in the sample. NTH Equipment Services issues a Photovac containing a 10.6 eV lamp or HNu containing a 10.2 eV lamp.

Presence of benzene
If the presence of benzene is suspected, and concentrations of PID indicate sustained readings of 2 ppm for 5 minutes or more, take colorimetric tube readings to determine the concentration of benzene. If indeed benzene is present in concentrations exceeding 1 ppm as determined by the colorimetric tubes, Level C PPE is required.

PID MEASUREMENT **(see note above for benzene presence)**	PERSONAL PROTECTIVE EQUIPMENT
Less than 5 ppm above background	Use first ensemble specified in PERSONAL PROTECTIVE EQUIPMENT page 14.
5 ppm to 50 ppm above background	Use second ensemble specified in PERSONAL PROTECTIVE EQUIPMENT page 14.
Greater than 50 ppm	Suspend work activities. If work resumes, Level B protection will be used.

When practical, personnel should work from a position upwind to minimize potential exposure.

TRI-GAS METER MONITORING PROCEDURE: _____

If using a tri-gas or quad gas meter, review the following document prior to going out in the field:
Gas monitoring notes

Tri-Gas Meter Readings must be as follows:

O_2 >19.5% but < 23.5% (atmospheric O_2 content is 20.9%)
LEL <10%, and
H_2S < 10 ppm

When using the Tri-Gas meter, make sure battery is adequate for the amount of time you plan to use it. If outdoor temperature is at or around 32 degrees F, gas meter manufacturers typically recommend that you consider bringing instrument inside overnight to maximize battery and sensor capabilities. The units have been tested to as low as 35 degrees Celsius so the sensors will work properly but the display may show strange numbers or symbols. Before using the meter to obtain a reading, **always fresh air calibrate**. Turn meter on for approximately 5 - 10 minutes before taking a reading.

- Persons who use a tri-gas or quad gas meter must be trained to calibrate these meters. See Jeff Stamper.

SITE CONTROL (e.g.: site security, work zones, site communications, and site-specific H&S procedures):
Work zones will be set up around all equipment and work related activities. Communication will be verbal via phone and in person.

USE OF BUDDY SYSTEM
Whenever performing work within the Exclusion Zone, onsite personnel must use the buddy system. Maintain visual contact with other project members and be alert to any signs of chemical exposure or heat or cold stress. Visual signs and symptoms of chemical exposure and heat stress indicating a potential medical emergency include:

- Difficulty in breathing,
- Changes in complexion or skin color,
- Changes in coordination,
- Changes in speech pattern, or
- Drooling or tearing of the eyes.

Onsite personnel experiencing symptoms that may not be visibly apparent to other onsite personnel have an obligation to disclose symptoms that might compromise their safety, other personnel safety or the safety of the project. Symptoms that personnel might be experiencing that are not visible to other onsite personnel and indicative of excessive chemical exposure or heat or cold stress include:

- Dizziness,
- Confusion,
- Nausea,
- Tightness in the chest,
- Irritation of the eyes, nose, respiratory tract, skin or throat, and
- Lightheadedness.

If voice communication is not possible due to equipment noise or personal protective equipment hampering ability to communicate, onsite personnel must be familiar with hand signals indicating that they must leave the site immediately. Hand signals include:

- Hands gripping throat = Out of air, can't breathe
- Grip partner's wrist or both hands around waist = Leave area immediately
- Hands on top of head = Need assistance
- Thumbs up = OK, I am all right, I understand
- Thumbs down = No, negative

Personnel must ensure that they maintain visual line of sight with their buddy at all times.

ACTIVITY-SPECIFIC PROCEDURES:

1.	Task Name:	Subsurface Exploration
	Task Description:	Advance multiple soil borings using a truck-mounted earthprobe rig. Soil samples will be taken at the each boring location for physical observation and / or chemical testing purposes, and groundwater samples will be collected for chemical testing.
	Precautionary Measures	Workers will don Level D PPE (employees will wear surgical style nitrile gloves) during this task, including hearing protection, and will screen soil samples using a PID or HNu. If conditions are observed that may indicate the presence of potentially hazardous contaminant concentrations, the second ensemble outlined on page 16 of this plan will be donned. If conditions are encountered that may pose a hazard to workers and/or the nearby public, NTH employees shall follow emergency procedures stated on page 17. Employees will practice good personal hygiene and will not eat, drink, smoke or apply Chapstick or cosmetics while on the site. In addition, employees will wash hands and face prior to eating, drinking, or smoking.

PERSONAL PROTECTIVE EQUIPMENT

Respiratory protective equipment shall be National Institute for Occupational Safety and Health (NIOSH) approved and use shall conform to OSHA 29 CFR 1910.134 requirements.

1. Based on available analytical data, the nature of the site (open) and proposed activities, the work will be conducted in Level D or Modified Level D PPE.
2. Based on available analytical data, the nature of the site (open) and proposed activities, it is not anticipated that PPE will exceed Level C protection, and that the majority if not all of the work will be conducted in Level D or Modified Level D PPE.
3. Based on available analytical data, it is anticipated that all work will be performed in Level C protection.

TYPES OF PPE

Level D

Hard hat
Safety glasses, goggles or face shield
Safety toe work boots
Nitrile rubber outer gloves (at discretion of SSHO)
Rubber overboots or disposal booties (at discretion of SSHO)
Cotton long sleeve shirt and pants (or coveralls at discretion of SSHO)

Criteria for use

No indication of airborne health hazards present
Total vapor levels less than 1 ppm above background on the PID
No indication of skin contact hazards present.

Modified Level D Personal Protective Equipment

Hard hat
Safety glasses, goggles or face shield
Safety toe work boots
Nitrile rubber outer gloves
Latex or nitrile surgical inner gloves (to be worn underneath outer gloves)
Rubber overboots or disposal booties (at discretion of SSHO)
Polyethylene coated tyvek coverall taped at ankles/wrists (use and type at discretion of SSHO)

Criteria for use

No indication of airborne health hazards present
Total vapor levels less than 5 ppm above background on the PID
A higher level of skin protection than standard works clothes is required.

Level C Personal Protective Equipment

Hard hat
Safety glasses, goggles or face shield
Safety toe work boots
Nitrile rubber outer gloves
Latex or nitrile surgical inner gloves (to be worn underneath outer gloves)
Silver Shield gloves to be worn under nitrile outer gloves (to be worn underneath outer gloves at the discretion of SSHO)
Rubber overboots or disposal booties
Polyethylene-coated tyvek coverall taped at ankles/wrists (type to be at discretion of SSHO)

Criteria for Use

Site known to contain potentially hazardous materials resulting in air concentrations requiring respiratory protection afforded by a full-face air purifying respirator (NIOSH approved)
Total vapor levels within the limits of appropriate cartridges. Frequent air monitoring should be conducted while wearing Level C protection.
A higher level of skin protection than standard works clothes is required.

Requirements for respirator use: **All** personnel who will be required to don air purifying respirators must have been qualitatively or quantitatively fit tested for the particular brand and size respirator he/she will be wearing onsite within the last twelve months. Please note that regular eyeglasses may not be worn under full face respirators since the temple bars interfere with the respirator's face seal. For workers requiring corrective face piece lenses, special spectacles designed for use with respirators must be used.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

The minimum required items for Level D PPE are 1 and 2.
The minimum required items for Level C PPE are 1, 2, 8, 9b, 9c, 12, and 13.

If Level A or B PPE is required, ignore the checklist below and select PPE with the assistance of the Health and Safety Manager.

Numbered footnotes may be added at the bottom of this page corresponding numbers beside PPE items to specify how, when, and where PPE should be used.

Workers Shall Wear (check needed items):	FIRST ENSEMBLE	SECOND ENSEMBLE
1. Coveralls or similar work clothes	☒	☐
2. Safety shoes with hard sole	☒	☐
3. Chemical resistant boots or shoes with steel toe and shank	☐	☐
4. Hard hat	☒	☐
5. Face shield	☐	☐
6. Safety glasses or chemical splash goggles	☒	☐
7. Tyvek suit (uncoated)	☐	☐
8. Coated Tyvek suit (for splash protection)	☐	☐
9. Gloves		
a. Leather or cloth	☐	☐
b. Chemically resistant outer	☐	☐
c. Inner (latex)	☐	☐
d. Inner (blue nitrile)	☒	☐
e. Silver shield gloves	☐	☐
10. Chemically resistant outer boots	☐	☐
11. Hearing protection	☐	☐
12.* Respirator (select one for each ensemble)		
a. Disposable half-face	☐	☐
b. Half-face	☐	☐
c. Full-face	☐	☐
13.* North Respirator cartridges (for half-face)		
** a. Organic vapors (black cartridge)	☐	☐
** b. Organic vapors / P100 (piggyback cartridge)	☐	☐
c. HEPA filter (magenta colored or P100)	☐	☐
d. Other (specify and assure cartridge is in stock before project work is to begin) Cartridge type: _____	☐	☐
14. Other (specify): _____	☐	☐

Notes regarding PPE usage _____

The P100 cartridge is 99.97% efficient against all particulate of 0.3 micron size or larger. This cartridge is effective against particulates (see size diameter above), metal dusts and fumes, silica, and radionuclides.

* If questions arise concerning respirator selection, contact Judi McInerney.

** When using organic vapor cartridges, if a solvent odor is noticed inside the mask, change the cartridges. If the odor persists, withdraw from the source of hydrocarbons. As feasible, work upwind of the source.

If gloves or protective clothing is to be worn, review the PPE Inspection Checklist.doc and donning of equip on HAZWOPER sites.doc

REMEMBER: You can only wear a respirator if the contaminated atmosphere contains at least 19.5% oxygen. Immediately leave the work area if:

- ✓ **Breathing becomes difficult**
- ✓ **Dizziness or other distress occurs or**
- ✓ **You taste, smell or sense irritation from the contaminants in the work area.**

EMERGENCY PROCEDURES

Typically, NTH personnel shall not respond to emergencies but shall contact appropriate emergency response departments listed under Emergency Contacts. If an emergency occurs, including but not limited to a fire, explosion, or unplanned chemical release, all onsite personnel will be alerted and the area evacuated immediately. Follow measures for specific emergency if listed below. Only those emergency personnel required to assist injured personnel, control spills or conduct fire-fighting will be allowed to reenter the site but only after donning appropriate protective equipment.

FIRE: Only if the fire can be easily contained and extinguished, an employee may do so with fire extinguisher. If an explosion risk is present, do not attempt to extinguish--**EVACUATE** all personnel to a safe area and call the fire department.

PERSONAL INJURY: Administer appropriate first aid. If injury is serious, transport the victim to the nearest hospital. If possible, notify hospital in advance of incoming patient and nature of injury. If there is a question about whether it is safe to move the victim, DO NOT move the victim--instead, make him/her as comfortable as possible, and summon emergency assistance.

CHEMICAL EXPOSURE: If site personnel show signs of inhalation exposure, retreat to fresh air for recovery. If symptoms are serious, such as nausea or fainting, bring the victim to the nearest hospital for observation, and discontinue work at the location and consult with H & S representative. In case of skin or eye irritation due to chemical contact, wash affected skin with soap and water, or flush eyes with generous amounts of water. If irritation is serious, seek medical attention.

Natural disasters may occur at the site due to weather. These include lightning, high winds, and winter storm warnings.

- Lightning: Persons should not work in open areas, near trees or other equipment outside during lightning storms. Stop work until the storm passes. If possible, clear the site until the storm passes.

- High Winds: If high winds are forecast, then the site should be cleared before the winds become hazardous. High winds may cause objects to fly that may result in injury or even death. Objects that have the potential to pose a hazard under windy conditions shall be secured at all times. In high wind conditions, workers should be instructed to go to an appropriate shelter. If an evacuation is called, account for all persons before leaving the site. The National Weather Service classifies high wind speeds at 30 mph but in many cases, wind speeds in excess of 20 mph may prove to be dangerous to personnel during the performance of certain tasks. At no point should employees perform tasks where they believe they are in danger and unable to perform the job in a safe manner.

  Project tasks especially susceptible to high wind conditions:
  - Items that are susceptible to high winds include geofoam blocks and geomembrane panels during loading, unloading, storage or placement operations. If project tasks involve working with materials (i.e. geofoam blocks and geomembrane) that may be affected by high winds, work activities shall be halted if wind speeds are in excess of 20 miles per hour.

  - Work on scaffolds or other elevated structures should be suspended at high wind speeds.

- Winter Storm Warnings: If local winter forecasters have posted storm warnings, work should be stopped before conditions become hazardous. Hazardous conditions include blizzard conditions, ice storms and severely low wind chills.

- Tornado Safety: Insert information from hyperlink if applicable. tornado safety.doc

- Notify the Project Manager of any work stoppage due to severe weather.

- Refer to any additional Emergency Procedures listed in the Site Specific Health and Safety Plan.

TRAINING

Personnel working at sites listed below must have completed a forty-hour health and safety course for hazardous waste operations (HAZWOP) meeting the requirements of 29 CFR 1910.120. Personnel must also complete a HAZWOP health and safety refresher course within the past year. The HAZWOPER standard's regulations apply for the following locations:

a) A site on the National Priority List,
b) A site undergoing a corrective action pursuant to the Resource Conservation and Recovery Act, or
c) A site undergoing a corrective action recognized by a federal, state or local environmental agency.

At other sites untrained personnel may work when accompanied by trained staff.
Staff may not wear a respirator unless they have been fit tested, trained in respirator use and its limitations, and have been medically approved to wear a respirator. All work, involving use of respiratory equipment will be performed in accordance with the NTH Written Respirator Program.

MEDICAL MONITORING

Site personnel working on HAZWOPER sites must be participants in the medical monitoring program and have received an exam within the past twelve months unless otherwise indicated by the medical physician. If the exam indicates the need for medical restrictions, they shall be followed. Site personnel must have medical clearance prior to wearing a respirator.

DECONTAMINATION OF PERSONNEL AND PERSONAL PROTECTIVE EQUIPMENT

If one or more of the decontamination procedures, which appear below, are suitable for this job, put the letter "X" in the box that proceeds the procedure. If different decontamination procedures are required, describe them in the space provided at the end of this section.

☒ 1. Decontamination of equipment will be performed according to procedures outlined in the work plan.
☒ 2. At the end of the day and before leaving the worksite, workers will wash hands and face. Workers will also wash hands and face before eating, smoking and using a lavatory.
☐ 3. At the end of the day personal protective equipment such as boots, respirators and gloves will be washed at the site with soap and water. Disposable protective clothing will be discarded on site following the procedures of the property owner/manager.
☐ 4. (See note below) At the end of the day personal protective equipment such as boots, gloves and respirators will be washed at the site with soap and water. Disposable clothing will be packaged in a plastic bag and discarded in the dumpster behind the NTH as nonhazardous waste.

NOTE: Standard decon procedure 4 (above) may only be used if the disposable clothing is not hazardous per RCRA regulations. This would be the case in two situations. First, if the clothing is contaminated with RCRA characteristic wastes, but the contaminated clothing does not display the characteristic. Second, if the clothing is contaminated with wastes that are not RCRA hazardous. If you have questions in this regard, contact the Project Manager.

For detailed procedures on decontamination if using Tyvek and respirator please refer to the following document: Field decontamination.doc

OTHER DECONTAMINATION PROCEDURES

_____

_____

********** **IMPORTANT NOTE** **********

IF SITE OBSERVATIONS, SAMPLING RESULTS, OR ANY OTHER INFORMATION INDICATES THE PRESENCE OF CHEMICAL CONTAMINANTS OTHER THAN THOSE SPECIFIED HEREIN, THIS HEALTH & SAFETY PLAN BECOMES VOID, AND A NEW PLAN MUST BE PREPARED AND APPROVED!!

****

The plan preparer, Project Manager, and the Health and Safety Coordinator should all sign or initial plan.

Project Name:	GR EPA – Mel Trotter Ministries	Project No.	74-090095-14
Project Manager:	Brian Smits	Date:	3/10/2011
Home Phone Number:	616-283-4559		
Prepared By:	Sherry Kirkbride	Date:	3/10/2011

********** **IMPORTANT NOTE** **********

ALL EMPLOYEES WHO WORK ON SITE MUST READ AND FOLLOW THIS HEALTH AND SAFETY PLAN

****

I have read and understand this Health and Safety Plan.

FIELD STAFF: _____ DATE: _____

FIELD STAFF: _____ DATE: _____

FIELD STAFF: _____ DATE: _____

JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Geoprobe Drilling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

- X **Safety Glasses w/ Side Shields**
- X **Safety-Toed Boots**
- X **Other (Nitrile Gloves)**
- X **Hearing Protection**
- X **Hard Hat**

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
GeoProbe Drilling and Soil Sampling	Struck-By Machine Hazard	Be sure to allow plenty of space between yourself and the GeoProbe rig to avoid being hit by any portion of the rig
	High Noise Levels	Hearing protection is required when working around operating equipment if noise levels are suspected to be >85 dBA (If you have to yell to another person at a distance of 3 ft to be heard, noise levels are likely exceeding 85 dBA).
	Weather	If working outdoors in low temperatures, especially at or below freezing, take periodic rest periods to warm up. Protect your feet, hands, face and head by wearing several layers of dry, loose-fitting, wind-resistant, water-resistant, insulated clothing. If working outdoors in heat and high humidity, take periodic rest periods in a cool area (preferably air-conditioned) and drink plenty of liquids. Drink plenty of water; you may wish to supplement fluids with electrolyte fluids (Gatorade, Squinch etc.). Avoid diuretics or caffeinated beverages; be alert to potential adverse effects of medication. Activities will be suspended if lightning is seen or thunder is heard regardless of the distance of the approaching storm. Radio weather reports may also provide advance notice of a storm approaching.
	Underground Utilities	Ensure that all underground features have been identified in the area by "One Call System"[1] and client representative prior to the start of boring Conduct a site inspection for indications of obvious indications of unmarked utilities such as street lights, gas, water, electric (in residential areas) and transformers and overhead lights (in industrial areas). Often, storm and sanitary sewer lines are not marked.
	GeoProbe Rig Operation	Observe condition of equipment upon arrival and ensure GeoProbe rig is on stable ground prior to drilling. Wear appropriate PPE (hard hat, steel-toed boots, gloves) when working around GeoProbe and wear hearing protection whenever rig is running. Stand clear of the rig while in operation. Have the operator bring samples to you away from the rig. Do not attempt to help operators.

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JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Geoprobe Drilling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

X Safety Glasses w/ Side Shields
X Safety-Toed Boots
X Other (Nitrile Gloves)
X Hearing Protection
X Hard Hat

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
	Cutting Liner	When cutting open a plastic GeoProbe liner, always cut away from your body and keep all hands and other body parts away from the blade. If you need to hold the liner in place, do so with your foot, not your hands.
	Slips, Trips and Falls	Examine terrain prior to walking and always watch where you are going. Be careful when walking near GeoProbe liners, loose soil and boring holes; remove obstacles, if possible. Make sure that all boring holes are adequately filled in order to avoid potential fall hazards. Step carefully and avoid slippery areas and steep slopes, if possible. Never walk backwards. When driving off-road or on uneven ground, consideration should be given when parking/exiting the vehicle. Particular care should be exercised when exiting the vehicle onto rutted terrain.
	Traffic	If drilling in a roadway, parking lot or any other area where traffic may be encountered, always wear a reflective vest and use traffic control devices. Provide traffic control in accordance with MUTCD (note: refer to NTH Health and Safety webpage for State-Specific manual). Depending on the site, pylons, traffic cones or even electronic signs may be needed to route traffic away from the drilling machine and yourself. Discuss with the Project Manager what types of traffic control devices are required for your specific site. During sample logging, work in non-traffic (shoulder), if possible. Park NTH vehicles out of roadway if possible. Do not work where there is significant precipitation or poor visibility. If drilling within a road right-of-way (even if we are not blocking traffic), you may be required to obtain a permit. Permit requirements will depend on who owns the road and right-of-way.
	Overhead Utilities	Look up before booming up GeoProbe rig every time. At all times, keep a minimum ten (10) foot overhead clearance from electric lines.
	Railroad Tracks	If the boring requires drilling within a railroad right-of-way, a permit is required. Compliance with E-railsafe may also be necessary.

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JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Geoprobe Drilling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

- X Safety Glasses w/ Side Shields
- X Safety-Toed Boots
- X Other (Nitrile Gloves)
- X Hearing Protection
- X Hard Hat

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
	See "Soil and/or Groundwater Sampling" JSAs for other hazards related to soil/groundwater sampling while GeoProbe drilling.	

The hazards identified in this Job Safety Analysis are not necessarily meant to be all inclusive; for additional information, refer to the NTH Health and Safety Plan.

1 **Indiana Notification**

Contact Indiana Underground Plant Protection Service (IUPPS) at 1-800-382-5544 before performing any intrusive work. The law requires all persons excavating to call at least two (2) full working days before digging and no more than twenty (20) calendar days. IUPPS will notify only member utilities; contact of non-member utilities will be the responsibility of the excavator. You will need the County and the Township as well as the street address and cross street for IUPPS to properly process your locate request. IUPPS is a communications link between the excavator and the underground facility owner.

Michigan Notification

Notify MISS DIG in the State of MI 1-800-482-7171 and give a full three (3) working days notice. Additionally in the State of Michigan, all utility locating must be conducted in accordance with the Best Practices measures as prescribed in the Michigan Infrastructure and Transportation Association (MITA) Best Practices Contract. This includes information regarding: actions to be taken prior to excavating; ticket life; notification of positive response; lack of marks designating location of utilities; safe zones; caution zones and requests for additional assistance. If working within a road right-of-way under the jurisdiction of the Michigan Department of Transportation, an Underground Infrastructure Staking/Locating Request (MDOT Form 5300) must be received by MDOT at least five (5) working days before the start of excavation/drilling.

Ohio Notification

Call Ohio Utilities Protection Service (OUPS) (1-800-362-2764) with the location of the proposed excavation site 48 hours, but not more than ten (10) working days in advance. For additional information in the state of OH: http://www.oups.org. Also you must notify Oil and Gas Products Underground Protection Service at 1-800-925-0988.

Pennsylvania Notification
Call the Pennsylvania One Call System 1-800-242-1776. PA One Call System notifies all utilities of any excavation work to be performed enabling them to locate and mark their utility lines. PA Act 38 of 1991 requires notification to a one-call system three (3) working days prior to the start of any digging.

Notification in States other than IN, MI, OH or PA
If working in states other than IN, MI, OH or PA, call the national one call center's information number at 1-888-258-0808.

JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Soil Sampling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

X Safety Glasses w/ Side Shields

X Disposable Nitrile Gloves (or other disposable gloves as specified)

X Other (As Specified Below)

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
Soil Sampling	Exposure to Soil Contamination	Always wear disposable nitrile gloves when dealing with soils believed to contain oil, gasoline or other types of fuels. Other types of gloves may be needed for other contaminants. Refer to the MSDS sheet or consult with the Health and Safety Manager for guidance on which gloves to use when working with other contaminants. Thoroughly wash hands before leaving site and before eating, drinking or smoking. If possible, do not wear rings or anything else that might rip or puncture the gloves. Whenever possible, wear long sleeves and pants to limit exposure. Additional PPE, such as Tyvek suits or respirators with appropriate cartridges may be required depending on the contaminants.
	Exposure to Chemical Preservatives	Be sure to wear gloves and goggles/safety glasses with side shields when working with preservatives to avoid exposure due to splashing or spills. Whenever possible, wear long sleeves and pants to limit exposure. Prior to working with any chemical preservatives, reference Material Safety Data Sheets (MSDSs). Have ready access to water should a vial (containing chemical preservatives) inadvertently break and its contents come in contact with one's skin.
	Lifting Hazards	If samples must be stored in a cooler with ice, make sure to that the cooler is only as heavy as you can comfortably carry. Use multiple coolers if needed. When lifting heavy objects, take a balanced stance, feet shoulder-width apart. Squat down to lift or go down on one knee. Lift gradually using your legs, keep load close to you and keep your back and neck straight. Once standing, change directions by pointing your feet and turn your whole body. Avoid twisting at your waist. A hand cart may be used to move the coolers from place to place.
	Cuts and Scrapes	When breaking glass methanol ampule, wrap the ampule in spare disposable gloves to avoid cuts or scrapes due to jagged edges on glass.

JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Soil Sampling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

X Safety Glasses w/ Side Shields

X Disposable Nitrile Gloves (or other disposable gloves as specified)

X Other (As Specified Below)

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
	Slips, Trips and Falls	Be aware of uneven terrain and maintain sure footing while walking. To prevent falls, maintain proper housekeeping of sampling equipment. Step carefully and avoid slippery areas and steep slopes, if possible. Never walk backwards. When driving off-road or on uneven ground, consideration should be given when parking/exiting the vehicle.
	Weather	If working outdoors in low temperatures, especially at or below freezing, take rest periods to warm up. Protect your feet, hands, face and head by wearing several layers of dry, loose-fitting, wind-resistant, water-resistant, insulated clothing. If working outdoors in heat and high humidity, take rest periods in a cool area and drink plenty of fluids.
	Traffic	If sampling in a roadway, parking lot or other area where traffic may be encountered, always wear a reflective vest and use traffic control devices. Provide traffic control in accordance with Manual on Uniform Traffic Control Devices (MUTCD). In MI, provide traffic control in accordance with MMUTCD. Depending on the site, pylons, traffic cones or electronic signs may need to be placed to route traffic away from you. Discuss with the project manager what sort of traffic control devices is needed at your specific site. Work in non-traffic (shoulder) if possible. Do not work in periods of significant precipitation or poor visibility. If working within a road right-of-way (even if we are not blocking traffic), a permit may be required, depending on who owns the road and right-of-way.

The hazards identified in this Job Safety Analysis are not necessarily meant to be all inclusive; for additional information, refer to the NTH Health and Safety Plan.

JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Groundwater Sampling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

_x_ Safety Glasses w/ Side Shields

___ Safety-Toed Boots

_x_ Disposable Nitrile Gloves (or other disposable gloves as specified)

_x_ Other (As Specified Below)

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
Groundwater Sampling	Exposure to Groundwater Contamination	Always wear disposable Nitrile gloves when dealing with groundwater believed to contain oil, gasoline or other types of petroleum hydrocarbons. Other types of gloves may be needed for other contaminants. Thoroughly wash hands before leaving the site and before eating, drinking or smoking. Do not wear rings or anything else that might rip or puncture the gloves. Whenever possible, wear long sleeves and pants to limit exposure. Additional PPE, such as Tyvek suits or respirators with appropriate cartridges may be required depending on the contaminants.
	Exposure to Chemical Preservatives	Be sure to wear gloves and goggles/safety glasses when working with preservatives to avoid exposure due to splashing or spills. Prior to working with any chemical preservatives, refer to information contained in Material Safety Data Sheets (MSDS). Have available onsite the MSDS for the chemical preservatives being used. Have ready access to water should a vial containing chemical preservatives inadvertently break.
	Slips, Trips, and Falls	Be aware of uneven terrain. Proper housekeeping of sampling equipment should be applied around the well to prevent falls. Replace all flush-mount covers. When driving off-road or on uneven ground, consideration should be given when parking/exiting vehicle. Particular care should be exercised when exiting the vehicle onto rutted terrain. Never walk backwards.

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JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Groundwater Sampling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

_x_ Safety Glasses w/ Side Shields

___ Safety-Toed Boots

_x_ Disposable Nitrile Gloves (or other disposable gloves as specified)

_x_ Other (As Specified Below)

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
	Traffic	If sampling groundwater in a roadway, parking lot or any other area where traffic may be encountered, always wear a reflective vest and use traffic control devices. Provide traffic control in accordance with MUTCD (note: Refer to State Specific manuals located on Health and Safety webpage). Depending on the site, pylons, traffic cones or even electronic signs may need to be used to route traffic away from personnel. Talk to the project manager about what sort of traffic control devices need to be used at your specific site. Do not work in periods of significant precipitation or poor visibility. Park NTH vehicles out of the roadway, if possible. If working within a road right-of-way (even if we are not blocking traffic), a permit may be required, depending on who owns the road and right-of-way.
	Weather	If working outdoors in low temperatures, especially at or below freezing, take rest periods to warm up. Protect your feet, hands, face and head by wearing several layers of dry, loose-fitting, wind-resistant, water-resistant, insulated clothing. If working outdoors in heat and high humidity, take periodic rest periods in a cool area (preferably air-conditioned) and drink plenty of liquids. Drink plenty of water; you may wish to supplement fluids with electrolyte fluids (Gatorade, Squinch etc.). Avoid diuretics or caffeinated beverages; be alert to potential adverse effects of medication.
	Electrical Equipment	Obtain proper training for all field equipment to be used and use field equipment only as directed and for its intended use. A generator with a ground fault circuit interrupter is necessary when using electrically powered equipment to remove groundwater from a well. The generator should remain in bed of truck during operation. Keep electrical equipment dry and at a distance from the well.

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JOB SAFETY ANALYSIS FORM

JOB TITLE/TASK: Groundwater Sampling

RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT (PPE):

_x_ Safety Glasses w/ Side Shields

___ Safety-Toed Boots

_x_ Disposable Nitrile Gloves (or other disposable gloves as specified)

_x_ Other (As Specified Below)

TASK	HAZARD	MEASURES TO TAKE TO REDUCE HAZARD
	Lifting Hazards	Use proper lifting procedures when moving heavy items. Generators should only be moved utilizing a lift or with the assistance of two people. If samples must be stored in a cooler with ice, make sure that the cooler is only as heavy as you can comfortably carry. Use multiple coolers, if needed. A hand cart may be used to move the coolers from place to place.

The hazards identified in this Job Safety Analysis are not necessarily meant to be all inclusive; for additional information, refer to the NTH Health and Safety Plan.

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MSDS Number: **M2015** * * * * * *Effective Date:* ***09/08/09*** * * * * * *Supercedes:* ***05/04/07***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ALCOHOL

1. Product Identification

Synonyms: Wood alcohol; methanol; carbinol
CAS No.: 67-56-1
Molecular Weight: 32.04
Chemical Formula: CH3OH
Product Codes:
J.T. Baker: 5370, 5595, 5794, 5811, 5842, 5869, 9049, 9063, 9065, 9066, 9067, 9069, 9070, 9071, 9073, 9076, 9077, 9091, 9093, 9096, 9097, 9098, 9190, 9193, 9263, 9822, 9830, 9863, V654, XL-319
Mallinckrodt: 3004, 3006, 3016, 3017, 3018, 3024, 3041, 3701, 4295, 5160, 8814, H080, H488, H603, H985, V079, V571

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Alcohol	67-56-1	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Once absorbed into the body, it is very slowly eliminated. Symptoms of overexposure may include headache, drowsiness, nausea, vomiting, blurred vision, blindness, coma, and death. A person may get better but then worse again up to 30 hours later.
Ingestion:
Toxic. Symptoms parallel inhalation. Can intoxicate and cause blindness. Usual fatal dose: 100-125 milliliters.
Skin Contact:
Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure.
Eye Contact:
Irritant. Continued exposure may cause eye lesions.
Chronic Exposure:
Marked impairment of vision has been reported. Repeated or prolonged exposure may cause skin irritation.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:
lel: 6.0; uel: 36
Flammable Liquid and Vapor!
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Moderate explosion hazard and dangerous fire hazard when exposed to heat, sparks or flames. Sensitive to static discharge.
Fire Extinguishing Media:
Use alcohol foam, dry chemical or carbon dioxide. (Water may be ineffective.)
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Vapors can flow along surfaces to distant ignition source and flash back.

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6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

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7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Methyl Alcohol:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA)
- ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 250 ppm (STEL) skin
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Miscible in water.
Specific Gravity:
0.8
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
64.5C (147F)
Melting Point:
-98C (-144F)
Vapor Density (Air=1):
1.1
Vapor Pressure (mm Hg):
97 @ 20C (68F)
Evaporation Rate (BuAc=1):
5.9

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
May form carbon dioxide, carbon monoxide, and formaldehyde when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents such as nitrates, perchlorates or sulfuric acid. Will attack some forms of plastics, rubber, and coatings. May react with metallic aluminum and generate hydrogen gas.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Methyl Alcohol (Methanol) Oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data-standard Draize test: skin, rabbit: 20mg/24 hr. Moderate; eye, rabbit: 100 mg/24 hr. Moderate. Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Alcohol (67-56-1)	No	No	None

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12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to exist in the aerosol phase with a short half-life. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHANOL
Hazard Class: 3
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 358LB

International (Water, I.M.O.)

Proper Shipping Name: METHANOL
Hazard Class: 3, 6.1
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 358LB

15. Regulatory Information

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--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                      TSCA  EC   Japan  Australia
---------------------------------------------  ----  ---  -----  ---------
Methyl Alcohol (67-56-1)                        Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                        --Canada--
Ingredient                                      Korea  DSL   NDSL  Phil.
---------------------------------------------  -----  ---   ----  -----
Methyl Alcohol (67-56-1)                        Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Methyl Alcohol (67-56-1)                  No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                  -RCRA-    -TSCA-
Ingredient                                CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Methyl Alcohol (67-56-1)                  5000       U154       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: Yes Pressure: No
Reactivity: No          (Pure / Liquid)
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Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM AND LIVER.
Label Precautions:
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Keep container closed.
Use only with adequate ventilation.
Keep away from heat, sparks and flame.
Label First Aid:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS

INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **H3880** * * * * * *Effective Date:* ***11/21/08*** * * * * * *Supercedes:* ***01/19/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HYDROCHLORIC ACID, 33 - 40%

1. Product Identification

Synonyms: Muriatic acid; hydrogen chloride, aqueous
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: HCl
Product Codes:
J.T. Baker: 5367, 5537, 5575, 5800, 5814, 5821, 5839, 5861, 5862, 5894, 5962, 5963, 5972, 5994, 6900, 7831, 9529, 9530, 9534, 9535, 9536, 9538, 9539, 9540, 9544, 9548, 9551
Mallinckrodt: 2062, 2515, 2612, 2624, 2626, 3861, 5583, 5587, H611, H613, H616, H987, H992, H999, V078, V628

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	33 - 40%	Yes
Water	7732-18-5	60 - 67%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea. Swallowing may be fatal.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Extreme heat or contact with metals can release flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
If involved in a fire, use water spray. Neutralize with soda ash or slaked lime.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

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7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
2 ppm (Ceiling), A4 Not classifiable as a human carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Colorless, fuming liquid.

Odor:
Pungent odor of hydrogen chloride.
Solubility:
Infinite in water with slight evolution of heat.
Density:
1.18
pH:
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
53C (127F) Azeotrope (20.2%) boils at 109C (228F)
Melting Point:
-74C (-101F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
190 @ 25C (77F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is incompatible with many substances and highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight.

11. Toxicological Information

Inhalation rat LC50: 3124 ppm/1H; oral rabbit LD50: 900 mg/kg (Hydrochloric acid concentrated); investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 475LB

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 475LB

15. Regulatory Information

Risk and Safety Phrases:
Symbol: C
Risk: 34-37
Safety: (1/2-)26-45

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                      TSCA  EC   Japan  Australia
---------------------------------------------  ----  ---  -----  ---------
Hydrogen Chloride (7647-01-0)                   Yes  Yes   Yes      Yes
Water (7732-18-5)                               Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                       --Canada--
Ingredient                                      Korea  DSL   NDSL  Phil.
---------------------------------------------  -----  ---   ----  -----
Hydrogen Chloride (7647-01-0)                   Yes   Yes   No     Yes
Water (7732-18-5)                               Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Hydrogen Chloride (7647-01-0)             5000  500*    Yes        No
Water (7732-18-5)                         No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                -RCRA-    -TSCA-
Ingredient                                CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Hydrogen Chloride (7647-01-0)             5000       No         No
Water (7732-18-5)                         No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Mixture / Liquid)
```

Australian Hazchem Code: 2R
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **1**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **N3660** * * * * * *Effective Date:* ***11/07/08*** * * * * * *Supercedes:* ***02/15/08***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID, 50-70%

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%
CAS No.: 7697-37-2
Molecular Weight: 63.01
Chemical Formula: HNO3
Product Codes:
J.T. Baker: 5371, 5796, 5801, 5826, 5856, 5876, 5896, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9608, 9610, 9616, 9617, 9670, 9761
Mallinckrodt: 1409, 2704, 2705, 2706, 2707, 2716, 6623, H862, H988, H993, H998, V077, V650

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	50 - 70%	Yes
Water	7732-18-5	30 - 50%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.
Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
Water spray may be used to keep fire exposed containers cool. Do not get water inside container.
Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA), 4 ppm (STEL)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

Colorless to yellowish liquid.
Odor:
Suffocating, acrid.
Solubility:
Infinitely soluble.
Specific Gravity:
1.41
pH:
1.0 (0.1M solution)
% Volatiles by volume @ 21C (70F):
100 (as water and acid)
Boiling Point:
122C (252F)
Melting Point:
-42C (-44F)
Vapor Density (Air=1):
2-3
Vapor Pressure (mm Hg):
48 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 6.5GL

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\--------

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\--------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\--------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\--------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0** Other: **Oxidizer**
Label Hazard Warning:
POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 14.
Disclaimer:
****
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

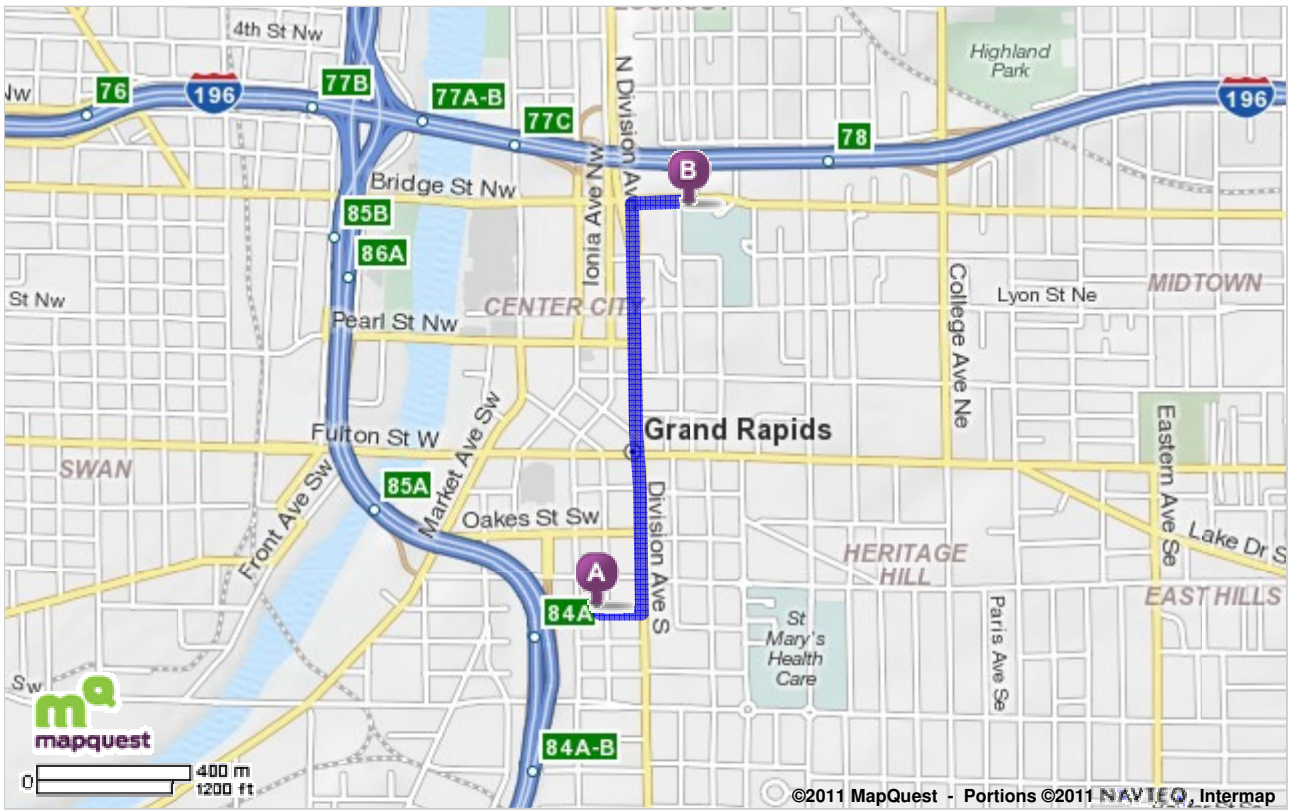
mapquest

Notes

Trip to:
100 Michigan St NE
Grand Rapids, MI 49503-2560
1.00 miles
3 minutes

		Miles Per Section	Miles Driven
A	**47 Williams St SW** Grand Rapids, MI 49503-4135	**Miles Per Section**	**Miles Driven**
	1. Start out going EAST on WILLIAMS ST SW toward COMMERCE AVE SW.	**Go 0.08 Mi**	0.08 mi
	2. Turn LEFT onto DIVISION AVE S.	**Go 0.8 Mi**	0.9 mi
	3. Turn RIGHT onto MICHIGAN ST NE.	**Go 0.1 Mi**	1.0 mi
	4. 100 MICHIGAN ST NE is on the RIGHT. *Your destination is just past BOSTWICK AVE NE* *If you reach LIVINGSTON AVE NE you've gone a little too far*		1.0 mi
B	**100 Michigan St NE** Grand Rapids, MI 49503-2560	**1.0 mi**	**1.0 mi**

Total Travel Estimate: **1.00 miles - about 3 minutes**



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