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**HEALTH AND SAFETY PLAN FOR HAND AUGURING FIELD TASKS
PERFORMED IN SUPPORT OF SAMPLING AT THE FEMP**

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ASI/IT FEMP
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H&S PLAN

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Prepared by Stephen W. Duce and W. Lee Vittitow

February 1992

REVIEWED AND APPROVED BY:

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J.J. Volpe, WEMCO IRS&T

NOTE: This plan and associated permits shall be reviewed with each worker and be posted at the work site at all times when work is being performed. Compliance with this requirement is evidenced by signature in Section No. 14.

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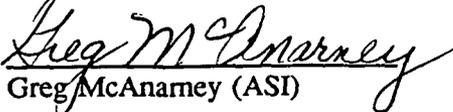
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TABLE OF CONTENTS

1.0 History and Description of the Fernald Environmental Management Project 1

2.0 Work Area Organization and Site Access Control 3

3.0 Task Activities/Work Plan 3

4.0 Hazard Assessments 4

5.0 Standard Operating Procedures 11

6.0 Education and Training 11

7.0 Medical Surveillance 12

8.0 Monitoring 13

9.0 Personal Protective Equipment Requirements 16

10.0 Basic Task Safety Equipment 17

11.0 Decontamination Procedures 17

12.0 Emergency Plans 18

13.0 Amendments 23

14.0 Statement of Compliance 25

15.0 Location Specific Information 27

16.0 Attachments 29

Attachment 1 - Cold Stress

Attachment 2 - Heat Stress

Attachment 3 - Material Safety Data Sheets

TABLE OF FIGURES

1. Fernald Environmental Management Project Area 2

2. Map to WEMCO Medical 24

3. Approximate Sampling Locations 28

TABLE OF TABLES

1. Animal Hazards 6

2. EPRI Stay Times 14

1.0 HISTORY AND DESCRIPTION OF AREA

Purpose of the Study

A study of the immediate environs on and around the Fernald Environmental Management Project (FEMP) property is to be conducted to obtain information that will be used in evaluating removal activities at the FEMP. The overall study includes field sampling, laboratory analyses, and related field tasks to support the evaluation/decision making process.

Description of Area

The FEMP is located on 1050 acres in a rural area of Hamilton and Butler counties approximately 18 miles northwest of Cincinnati, Ohio. The production area is limited to an approximate 136-acre tract near the center of the FEMP site.

Activities Performed or Uses of the Area

Past operations at this facility focused on the processing of uranium and its compounds from natural uranium ore concentrates and recycled recoverable residues. A pilot plant was completed in 1951 and was the first operational facility at the FEMP; a metals fabrication plant (Plant 6) began operations in 1952. Two metals production plants (Plants 5 and 6), the green salt plant (Plant 4), recovery plant (Plant 8), sampling plant (Plant 1), and the refinery (Plants 2 & 3) began operations in 1953. The hex plant (Plant 7) and the special products plant (Plant 9) were operational in 1954. Figure 1 shows the current layout of the FEMP Site. Normally, natural or depleted uranium was handled in the facilities. However, some enriched uranium (i.e., <20%) was handled at the FEMP as well as thorium metals. The normal radioactive contaminants expected while working at the FEMP are U-238, U-235, Th-232, and their associated radioactive progeny which includes Rn-222. Low levels of long half-life fission products and Pu-239 may be present due to past handling of uranium that had been reclaimed from spent fuel at other DOE sites. The immediate environs around the FEMP process area has experienced some radioactive contamination from past practices.

Examples of chemicals that were used within the processes included organic process and cleaning solvents, nitric and hydrochloric acids, magnesium metal, anhydrous hydrogen fluoride, caustic soda, various heavy metals (e.g. lead, cadmium, arsenic, chromium), various chemical states of uranium and fuel oils (e.g. kerosene, gasoline, and diesel).

Currently, land adjacent to the process area is used as a buffer zone while land beyond the buffer zone is used for grazing of dairy cattle. Fencing is used around many of the grazing areas to keep the cattle contained. Underground utilities for water/sewage run from the process area east to a sewage treatment facility. An active sewage treatment facility is within the FEMP site. Overhead power lines used to supply power to the facility buildings and to air monitoring stations run throughout the FEMP area. Overhead high-power utility lines also run through the FEMP property. Underground gas lines run to the east of the process area fence and within the process area.

Unusual Features

The main feature of this area is that it resides on a bench formed by geologic erosion of the river valley floor by the Miami River. This bench area has steep sides that could be difficult to traverse during inclement weather, i.e. rain, snow, or dew conditions. Additionally there are swales that

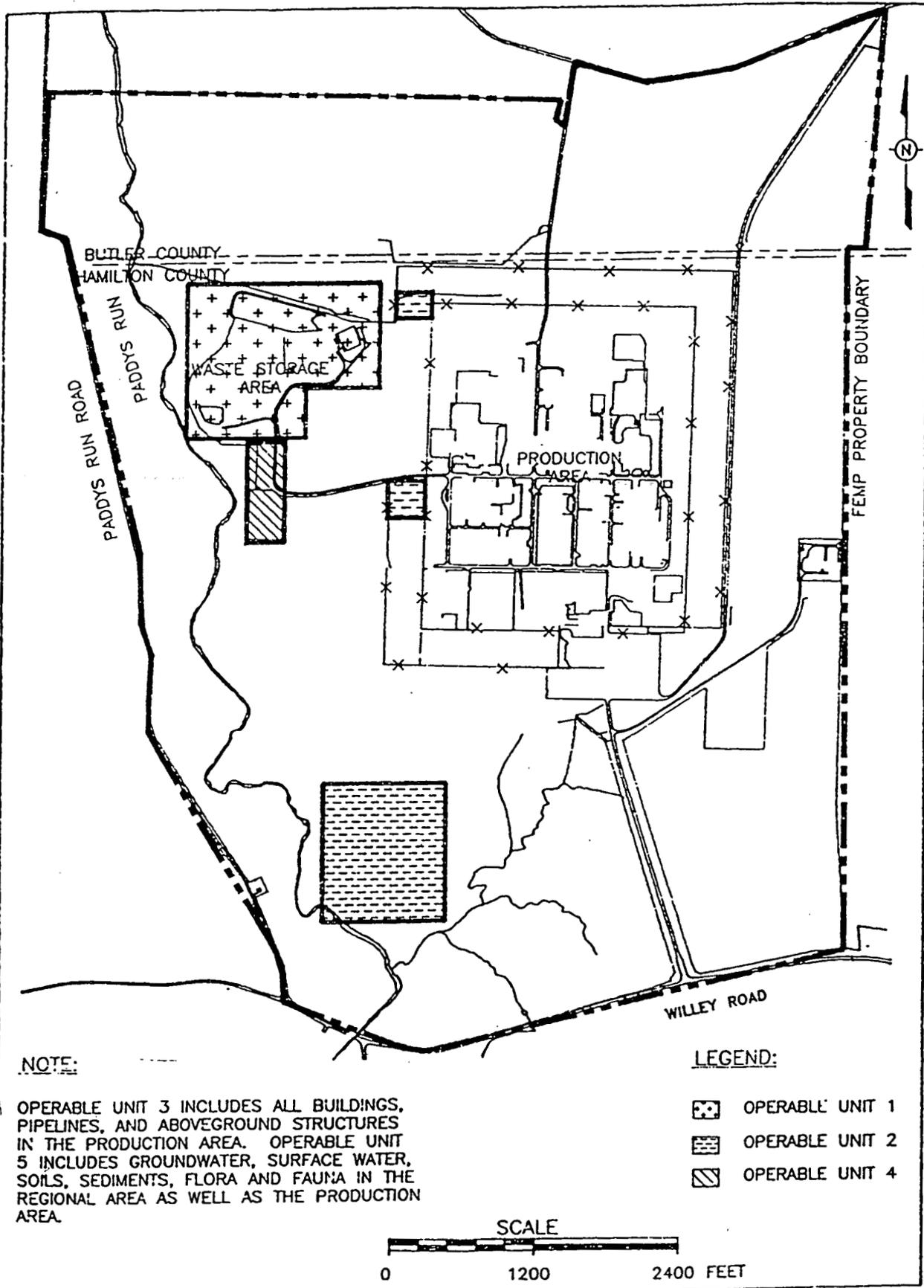


FIGURE 1 FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

carry surface water runoff from the local area. Several areas outside of the process area have been used for storage of fly-ash from boiler plant operations and collection of storm water run-off in retention basins. Two areas exist on the FEMP property where hand held weapons (shotguns and security weapons) were and are fired. The first is an abandoned skeet shooting range located to east of the parking lots and to the south of the sewage treatment access road. The second area is located in the southeast corner of the FEMP property where the security force has a practice range. There are two heavily wooded areas on the northern and southwestern regions of the property.

2.0 WORK AREA ORGANIZATION AND SITE ACCESS CONTROL

The ASI/IT Chief of Health and Safety or his designee will act as the Health and Safety Officer (HSO) to provide over-sight of all task activities to ensure the requirements of this Health and Safety Plan are followed.

This generic plan uses for a base assumption that the work site will have radiological and chemical contaminants at or slightly elevated above ambient background levels. Site identification and access control requirements will vary for each location due to task hazards and degree of chemical or radiological hazards. The following describes the minimum site identification and control measures. Any change or additions to these requirements will be identified in Section 15.0.

Hand auguring involves obtaining corings of upper surface soil, with nominal depth of sample being 12 in. and ranging from 2 in. to 24 in. Daily, a work zone will be identified with 12 in. traffic cones. The work zone will encompass the area where surface soils will be obtained during the day. All permits, a copy of this health and safety plan, and any required safety signs will be posted at the boundary of the support zone. The lead geologist or his designee is required to restrict access of non-authorized personnel to the support area or stop work until the unauthorized personnel leave the work zone. All personnel entering the support zone shall sign a work site sign-in/sign-out log when entering or leaving the site area. The lead geologist is responsible for maintenance of this log. Personnel working within the work zone will be required to monitor themselves with appropriate instrumentation prior to leaving the work zone. Monitoring requirements will be established by the health and safety personnel for radioactive and organic contaminants (see Section 8). If radioactive or organic materials are found in the samples then all personnel leaving the work zone will be required to monitor themselves. If the background count rate exceeds 200 cpm personnel can move outside of the support zone to a low background area designated by the Health and Safety Technician to perform a survey.

3.0 TASK ACTIVITIES/WORK PLAN

Sample personnel will contact CONTROL at start and end of work on a daily basis for personnel accountability.

Surface soil samples will be collected using an hand auger. Sample depth will normally range from 2 in. to 24 in. At each location the samples will be monitor for organics using an HNu or equivalent photoionization detector, and for radioactivity using an alpha survey and/or a beta/gamma survey meter. Monitoring results will be logged by the Lead Geologist. All samples will be radiologically screened and packaged on-site for shipment to outside analysis laboratories following the requirements of ASI procedures FPP 600 and 601.

4.0 HAZARD ASSESSMENTS

For purposes of this generic health and safety plan a baseline level of hazards has been assumed. The generic sampling task area is located outside of the process area yet within or adjacent to the FEMP property. This area is assumed to have levels of radioactive and chemical contaminants at or slightly elevated above ambient background concentrations. Radon and airborne uranium are considered to be at levels consistent with the FEMP environmental monitoring data results. Hazard(s) identification/assessment will be performed at each location where a well will be installed or a boring performed prior to the start of work. Hazards not covered by the requirements of this generic safety plan will be specifically addressed in Section 15 of this plan.

The following hazard identification is based on historical information obtained from WEMCO personnel, reports, and drawings; and on a walkover of the study area performed by ASI personnel in October 1991. Additional evaluation criteria were: a) the seasons of the year when work is to be performed, b) experience of similar work packages, and c) previous worker experience.

Interviews with WEMCO Environmental Monitoring and IRS&T personnel indicate little or no significant physical hazards. Review of environmental monitoring data (1989 and 1990) show very low levels of radioactive surface contamination in the study area. An interview with WEMCO Site Services indicated that normal incinerable trash was burned in the incinerator, with waste oils and U contaminated pallets being burned occasionally. No records indicate that waste chemicals were burned in the incinerator.

Measurements, performed in October 1991 by ASI/IT's Industrial Hygienist, of electrical/magnetic field strength under the high voltage supply lines show that levels are within ACGIH limits. Visual inspection, performed in October 1991 by ASI/IT's Chief of Health and Safety, of the condition of the transite walls associated with the incinerator show them to be in good repair. Therefore, it is reasonable to assume that the incinerator walls do not pose a significant asbestos hazard and no monitoring is required. Asbestos air samples obtained in the area in December 1991 confirmed that no air sampling will be required.

In addition to this assessment, the field team will routinely reassess the hazards before starting work to assure that conditions have not changed. All newly identified hazards will be addressed with the ASI/IT Health and Safety professionals to determine the degree of hazard and if any changes to the safety plan are warranted. New hazards will be identified in Section 15.0 for each new location.

A) Physical Hazards

Many of the physical hazards listed below do not have monitoring requirements but instead rely on worker observation. In the area of environmental factors, this is especially true. Workers must be aware of potential hazards posed by physical factors and react appropriately, normally avoidance is the easiest method.

Augering hazards

Cold stress (see Attachment 1)

Heat stress (see Attachment 2)

Slick surfaces in the environs of the study area (slips and falls)

Tripping hazards due to deadfall of trees, mammal dens, fences, etc

Dairy and other farm animals in grazing areas
 Overhead power lines: high voltage transmission and 240 volt lines
 Underground utilities: water/sewage and natural gas
 Fences around grazing animals: barb wire
 Poison ivy or other irritant plants (Table 1)
 Insects, spiders, snakes, and other wildlife (Table 1)

B) Chemical Hazards

Chemical hazards are serious and are not to be taken lightly. The lead geologist is to notify the industrial hygienist of new boring or well locations. Notification should be given a minimum of one week prior to activities at the new location to allow for research of nearby well sample data for potential chemical hazards.

The following lists those chemicals that are generic for all tasks. Additional chemicals may be associated with other task locations, these will be identified in Section 15.

Chlorine fumes near the sewage treatment plant
 Methanol for decontamination
 Lead in surface soils (abandoned skeet range and security firing range)
 CO in running vehicles being used for breaks during cold weather

Appropriate MSDS forms are found in Section 16.

C) Radiological Hazards

Surface soil contamination (total uranium) is at or slightly above background in the study area ranging from 3 to 9 pCi/g with background being approximately 2 to 4 pCi/g. One exception to this is north (approximately 150 ft.) of the old incinerator where activity is about 80 pCi/g. Direct shine from the old incinerator is approximately 50 uR/h at the fence. Airborne contamination, as measured in the 1989 and 1990 environmental monitoring program, is at background levels in the study area for all radionuclides. Radon in the study area is in the 0.6 to 0.9 pCi/l range with background ranging from 0.4 to 0.6 pCi/l.

Subsurface water in the area has approximately 1 to <30 pCi/l of U. The proposed EPA drinking water standard is 30 pCi/l, therefore, the subsurface water represents a minimal radiological risk.

**TABLE 1
ANIMAL HAZARDS
INSECTS, ARACHNIDS, AND CENTIPEDES**

Organism	Description	Habitat	Problem	Severity	Protection
Assassin Bug	Usually gray with well-developed wings. Has a "cogwheel" crest on the thorax which is distinctive.	Tree trunks and grassy vegetation.	Stabs with mouth parts. Mildly venomous.	Can cause secondary infections and anaphylactic reactions vector for chagas disease.	Avoidance. If one lands on you, do not swat it. Instead, brush it off quickly.
Bees	Generally has yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings	Stings when annoyed. Leaves venom sac in victim.	If person is allergic nausea, shock, unconsciousness, or constriction of the airway, can result. Death may result.	Be careful and watch where you walk. Wear head netting and cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still if bees are swarming about you.
Brown Recluse Spider	Eight long legs, light yellow to brown in color. Has distinctive fiddle shaped mark on back.	Old trash piles debris, rough ground, under old boards, etc.	Bite may be painless. Victim rarely sees the spider.	After two to eight hours, pain may be noticed followed by blisters, swelling, hemorrhaging or ulcerations. Possible rash, nausea, jaundice, chills, fever, cramps or joint pain.	Check inside shoes or clothing if left outside. Wear gloves when looking under objects. Use caution in old buildings.
Black Widow Spider	Dark brown to glossy black. Red or yellow hour glass marking on underside.	Vacant rodent holes under stones, logs in long grass, brush piles, hollow stumps.	Bites cause local redness. Pain is immediate. Larger muscles become rigid. Usually becomes difficult to talk.	Venom is more toxic than a rattle snake's but given in smaller amounts. Approximately 5% of bites result in death.	Wear gloves when working in areas where black widows might be.

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May 29, 1991

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**TABLE 1
ANIMAL HAZARDS
INSECTS, ARACHNIDS, AND CENTIPEDES**

Organism	Description	Habitat	Problem	Severity	Protection
Centipedes	Fast-moving and wormlike with fairly long legs. Only one pair of legs per body segment.	Under logs, old boards, stones, etc.	Venomous with large fangs to inject venom. Can kill mice.	Severe pain followed by redness and swelling. Can cause necrosis or tissue ulceration.	Wear gloves if looking under rocks, boards or logs.
Chiggers	Red velvety covering and oval body. Very tiny approximately 1/20 of an inch long.	High grass or weeds	Attaches to victim by inserting mouthparts into a hair follicle. Injects a digestive fluid that causes cells to disintegrate on which it feeds.	Causes swelling and considerable irritation. May transmit serious diseases.	Apply insect repellent to clothing and skin. Spray or dust infested areas.
Hornets	One inch long with some body hair. Abdomen is mostly black.	Round, paperlike nest hanging from trees, shrubs or under eaves of buildings.	One nest may contain up to 100,000 hornets which will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest, If one investigates you, do not move.
Mosquito	Small dark fragile body with transparent wings. From 1/8 to 1/4 inch long	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellent. Wear mosquito head net and gloves. Stay in windy areas.
Ticks	Oval shape with a small head. Brown or gray in color. Sizes range from 1/4 inch to 3/4 inch. Species are dog ticks, deer ticks, wood ticks and seed ticks	Shrubs, grass and trees.	Will attach to the skin and sucks blood. Secondary infection is a real problem.	Vector for rocky mountain spotted fever, Q fever, tularemia, Colorado tick fever and lyme disease.	Cover exposed areas of the body. Use insect repellent. Remove ticks attached to clothing, check neck and hair areas. Take hot showers and use soap.

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TABLE 1
ANIMAL HAZARDS
INSECTS, ARACHNIDS AND CENTIPEDES (Continued)

Organism	Description	Habitat	Problem	Severity	Protection
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paperlike honey comb nest in abandoned buildings, hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid nest. Do not swat at them.

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May 29, 1991

6563

TABLE 1
ANIMAL HAZARDS
ANNELIDS AND REPTILES

Organism	Description	Habitat	Problem	Severity	Protection
Common Water Leech	Body is segmented, suckers on the anterior and posterior end, moves by looping movement like an inch worm. One to four inches long.	Ponds, lakes and quiet streams	Attaches to the skin and sucks blood.	Mostly a nuisance. Can cause secondary infections.	Stay out of the water or use waders. Always check yourself for leeches after getting out of the water. Remove by touching with a hot match or shave off with a knifepoint. Use betadine on wound.
Common Snapping Turtle	Can grow to 18.5 inches long and weigh up to 86 pounds.	Slow moving streams and ponds forging along the bottom or floating on the surface	Bites with powerful jaws and scratches with claws. These turtles are very quick.	A large turtle can break a broom handle. They can break a finger and they do not let go even if you cut the head off. Secondary infections from bite or claw wounds.	Avoid snapping turtles. Leave them alone.
Copperhead Snake	Generally one to three feet long with chestnut brown hourglass markings on the back. The belly is white and the head is copperish or pinkish in color. It has cat-like slit eyes and a heat sensing pit organs between the eyes and nostrils. The head is triangular shaped and the vent scute (scale) is not segmented.	Behind or underneath rocks, pipes, wood piles or boards	Bites with long, hinged front fangs, which can deliver 40-70 mg of hemotoxic venom.	The estimated LD ₅₀ dose for man is 100 mg	Learn to recognize a copperhead and avoid their habitat. Wear heavy leather high-top boots.
Eastern Timber Rattle Snake	Size ranges from 3.5 feet to 5 feet in length. Has a thick body and a triangular shaped head. The eyes are split like a cat's. There is a wide color variation, which includes a dark and light phase. The tail terminates in series of buttons which gives the rattle snakes its name.	Generally found in rocky areas either sunning itself on a rock or coiled under a rock ledge	Bites with front fangs, which can be 13 mm long. Can deliver 100 to 200 mg of hemotoxic venom.	The estimated LD ₅₀ dose for man is 75 to 100 mg.	Learn to recognize rattle snake habitat. Do not stick your hands into places you cannot see into. Wear heavy leather high-top boots and or snake leggings.

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Organism	Description	Habitat	Problem	Severity	Protection
Coyotes	Large gray or reddish gray canids which look like a small german shepherd dog. Long yellowish legs with a dark vertical line on the lower foreleg. Tail is bushy with a black tip. Belly and throat area is white.	Dens are found in riverbanks and drainage slopes. Brushy areas.	Rabid animals	Bites can transmit rabies to humans.	Leave coyotes alone. If you run, they will chase you, so don't. Have a big stick or rock available.
Red Fox	Small and dog like. Has elliptical pupils, white underside, throat and chin. Upper coat is rusty-reddish and the tail is long with a white tip. Ears are pointed and the lower legs are black.	Wooded areas, brushlands, cultivated areas	Rabid animals	Bites can transmit rabies to humans.	Leave foxes alone.
Feral Dogs	Domestic dogs which have gone back to the wild. They are of many breeds. Usually weary of humans.	Farmland, forest	Wild dogs hunt in packs. If food is scarce or a human looks vulnerable, they have been known to attack.	People have been killed by wild dog packs. Note that most dog attacks are by pets.	Running will trigger a chase response from dogs. A human will not out run a dog pack. The best defense is avoidance. Defenses include mace spray, a spray bottle filled with ammonia or a good walking stick. If possible, climb a tree and wait for help.
Feral Cats	Domestic cats that have gone back to the wild. They are of many breeds.	Farmland, forest	Fearsome fighters if cornered. Bites and scratches.	Can transmit rabies, cat-scratch fever, toxoplasmosis and hookworms.	Leave cats alone. Do not pickup a wild kitten.
Skunks	The striped skunk is black with two broad white stripes on the back and a thin white strip down the center of the face. Large bushy tail tipped with white. They waddle when they walk.	Found all over the U.S.	Defensive spray, chief carrier of rabies in the U.S.	Spray has a strong fetid odor. Can cause a temporary loss of vision and intense burning pain. Bites can transmit rabies to humans.	Stay away from skunks. Their spray has a range of 10 to 15 feet. If you should come across a skunk, stand still until it leaves.

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5.0 STANDARD OPERATION PROCEDURES

Hand augering will be performed in accordance with the methods described in the Remedial Investigation/Feasibility Work Plan and in the RI/FS Quality Assurance Program Plan. Potentially contaminated waste will be collected using ASI procedure FPP 905. Work areas will be posted using ASI procedure FPP 906. Screening and shipping of samples will be performed using ASI procedures FPP 600 and 601.

6.0 EDUCATION AND TRAINING

Project field personnel shall not engage in field activities until they have been trained to a level commensurate with their job function, responsibilities, and the degree of anticipated hazards. The following worker categories specify required pre-training. Documentation of training for all personnel will be provided to WEMCO Centralized Training prior to commencement of work.

A) Worker Category

1. general site worker: 40 hr OSHA, documented 24 hr supervised field training, 8 hr Refresher as needed, WEMCO safety training: OSHA and You, Fire Extinguisher, General Safety, Radiation Safety (typical personnel under this requirement: lead geologist, sampling technicians, drillers, driller helpers, and health and safety technicians)
2. occasional site worker: 24 hr OSHA, 8 hr supervised field training, 8 hr Refresher as needed, WEMCO safety training: OSHA and You, Fire Extinguisher, General Safety (typical personnel under this requirement: field surveyor personnel and site project managers)
3. task supervisor: same as general site worker plus 8 hr Supervisor Training (typical personnel are lead geologist or designee, and other field supervisory personnel)

B) Safety Meeting

1. All personnel working on field investigation work involving hand auguring activities will attend a "Kick Off" safety meeting which will review scope of work, review the requirements and hazards listed in this health and safety plan, and document their attendance at the meeting by signature in this document. The Kick Off meeting will be conducted by a Health and Safety representative. Personnel new to the task will be informed of all applicable information given in the initial Kick Off meeting and any modifications to the health and safety plan.

2. A Tailgate Safety Meeting will be conducted daily during work periods. Meeting time will be prior to the start of daily work tasks. Meeting topics and attendees will be documented on a Tailgate Safety Meeting Form. Topics areas that can be addressed in a meeting are:
 - augering safety hazards
 - work operations
 - personal protective clothing
 - air monitoring data
 - hazard communication
 - monitoring results
 - hazard identification
 - hearing conservation
 - operational safety
 - physical stress
 - emergency procedures
 - communications
 - housekeeping
 - engineering controls
 - general safety topics
 - special topics as assigned by ASI/IT Health and Safety
3. Visitors to the site will be informed of the requirements of this health and safety plan prior to obtaining access within a support zone.

7.0 MEDICAL SURVEILLANCE

All personnel working on well installation and soil boring operations will be required to maintain a current physical work status and a medical summary form on file in the ASI/IT Health and Safety department files prior to any field work covered within the scope of this health and safety plan or the work sampling and analysis plan. The medical summary must contain a medical physician's assessment and disposition statement which contains wording to the effect that the individual is medically capable and authorized to wear a respirator and personal protective equipment, and that the individual can perform work activities at a hazardous waste site.

Any medical restriction noted on a personal medical summary form will be complied with until such time as new documentation rescinding the restriction is received by the ASI/IT Chief of Health and Safety or his designee.

Biological specimens may be required to determine baseline metabolic levels prior to working in an area which contains known chemical hazards. Required sampling will be determined by the Senior Industrial Hygienist. Samples will be required if a significant exposure occurs during sampling operations.

8.0 MONITORING

All monitoring equipment used is to have a current calibration and/or a current response check or function normally during performance testing. Instruments that are affected by humidity shall use ice bath dryers when instrument performance is affected by high humidity.

* A health and safety technician is required to monitor the surface area within an exclusion zone for organic and radiological contaminants prior to start of work within the zone. Monitoring will be performed with and beta/gamma survey meter and a photoionization detector (e.g., HNu with a 10.2 eV probe or equivalent). Results of this survey will be used to initially determine appropriate exit monitoring requirements.

A) Physical Hazards

Cold Stress monitoring will be performed when daytime temperatures are less than 40°F. A Taylor wind chill meter or thermometer and wind speed indicator will be used to determine effective chill temperature. **Action Levels:** When ambient temperature is $\leq 35^{\circ}\text{F}$ or when wind chill charts indicate a temperature less than 20°F . **Action:** protect exposed extremities from cold, take frequent breaks to warm the individual, consume warm fluids. Work will be suspended if ambient temperature drops below 0°F or if the windchill factor drops below -29°F . Vehicles will be used as break areas.

Heat Stress monitoring will be performed when daytime temperatures are greater than 70°F using a WGBT monitor or sling psychrometer. **Action Levels:** Proper action will be mandated by protective clothing worn. Table 2 shall be used for determining proper work/rest cycles. **Action:** Work/rest cycles will be followed as indicated in Table 2. All work will stop when the effective temperature exceeds 120°F .

Electromagnetic field exposure will be monitored prior to the start of any field operations. Areas of monitoring will be under overhead power lines, near transformers, or other large electrical equipment. An ELF radiation survey meter (50-60 Hz) will be used to measure all exposure rates. **Action Levels:** E field $> 25\text{ kv/m}$, H field $> 1\text{ mT}$ or 0.1 mT for pacemaker wearers. **Action:** withdraw from the area.

Underground utilities will be identified, prior to commencement of work, by WEMCO personnel or the Ohio Utilities Protection Services (phone 800-362-2764). No action limits are applicable to this item other than no ground penetration greater than 8 inches will be allowed within 15 feet of any identified underground utility.

B) Chemical Hazards

Chemical hazards are serious and should not be taken lightly. In the event an unknown or suspicious odor is detected personnel will leave the area and the Health and Safety department personnel will be contacted to investigate the situation.

TABLE 2

EPRI STAY TIMES

Ranges of stay times in minutes (or "h" for hours) for different WBGTs
(and Botsball readings) in °C and °F by combinations of clothing
ensemble and metabolism

WBGT (Botsball)		Work Clothes Metabolism			Cotton Coveralls Metabolism			Double Cottons Metabolism			Cottons plus Plastics Metabolism		
		Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
30 (47)	122 (116)	15-30	0-10		5-15	0-5		5-15					
48 (45)	118 (112)	20-45	5-15		15-30	5-10		10-20			5-15		
46 (43)	115 (109)	20-45	5-20		20-45	5-15		15-30	0-10		15-20		
44 (41)	111 (105)	30-60	10-25		20-45	5-20		20-45	5-15		15-30	0-10	
42 (39)	108 (102)	45-90	15-30	5-10	30-60	10-25		20-45	5-20		20-45	5-15	
40 (37)	104 (99)	60-90	15-45	10-20	45-90	15-40	5-10	30-60	10-25		20-45	5-20	
38 (35)	100 (95)	90-120	20-45	15-30	60-90	15-45	10-25	45-90	15-30	5-10	30-60	10-25	
36 (33)	97 (92)	7h-4h	30-60	15-40	90-120	25-45	15-30	60-90	15-45	10-20	45-90	15-30	5-10
34 (31)	93 (88)	3h-8h	45-90	20-45	2h-4h	30-60	15-45	90-120	20-45	15-30	60-90	15-45	10-20
32 (29)	90 (85)	ML	90-120	30-60	3h-8h	60-100	25-30	2h-4h	30-60	15-40	90-120	20-45	15-30
30 (27)	86 (81)	ML	2h-4h	60-120	ML	1h-2h	30-90	3h-8h	45-90	20-45	2h-4h	30-60	15-40
28 (26)	82 (78)	ML	ML	2h-4h	ML	1h-4h	1h-3h	ML	90-120	30-60	3h-8h	45-90	20-45
26 (24)	79 (75)	ML	ML	4h-8h	ML	ML	3h-8h	ML	2h-4h	60-120	ML	90-120	30-60
24 (22)	75 (71)	ML	ML	ML	ML	ML	ML	ML	ML	2h-4h	ML	2h-4h	60-120
22 (20)	72 (68)	ML	ML	ML	ML	ML	ML	ML	ML	4h-8h	ML	ML	2h-4h
20 (18)	68 (64)	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	4h-8h
<20	<68	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML

SOURCE:

"Metrosonics hs-371," Heat Stress Monitor Manual Rev. F, West
Henrietta, NY, pg. 6.

Volatile organics will be monitored using an HNu Model 101 with a 10.2 eV probe or equivalent photoionization meter during the hand augering. Monitoring will be performed in the breathing zone, at the bore hole, and on the sampler to determine the presence of volatile organics. **Action Level: detection to 10 ppm in breathing zone. Action: withdraw from the area or use full-face APR's with an organic vapor/acid gas/HEPA filter cartridge. When readings are >10 ppm withdraw from the area and call for health and safety review of the area.**

Unknown odors will be monitored first with an HNu with a 10.2 eV probe or equivalent. If the HNu shows no response, additional sampling will be performed using a Drager Tube HazMat Kit. The first tube to use is a polytest scan. If the odor cannot be identified an air sample must be collected using an air sampling pump using appropriate standard methodologies.

Chlorine vapors will be monitored intermittently using Drager Tubes specific for chlorine (0.3 to 5.0 ppm range) when work is to be performed in the immediate vicinity and or downwind of the waste treatment facility. **Action level: ≥ 0.5 ppm Action: use of full-face APR's with organic vapor/acid gas/HEPA filter cartridge. When readings are >5ppm withdraw from the area and call for health and safety review of the area.**

Carbon monoxide (CO) will be monitored using a passive detector placed in the cab of each vehicle. **Action level: observed color change Action: personnel exit the vehicle and contact health and safety personnel.**

Lead is a potential contaminant in the abandoned skeet shooting range and in the current security firing range. Air monitoring for lead will be required for drilling or boring operations being conducted in these suspect areas only when significant dust is generated during the penetration of the surface soil. **Action level: 30 ug/m^3 TWA Action: if previous sampling data indicate action level concentrations to exist during drilling operations APRs with HEPA filters will be worn.**

Any circumstance which could have resulted in an intake of chemicals by inhalation, ingestion, or absorption shall immediately be reported to a supervisor and ASI Health and Safety. Health and Safety will evaluate the situation. ASI's Health and Safety personnel will report the circumstance of possible chemical exposure to WEMCO's AEDO. The AEDO will determine what reporting requirements the incident mandates.

C) Radiological Hazards

Radiological hazards will be monitored using an alpha survey meter and a beta/gamma survey meter (HP 210 probe or equivalent) on each soil boring. During any personnel frisking only a beta/gamma survey probe will be required. Note: If the background exceeds 200 cpm workers will find an area where the background in < 100 cpm to perform monitoring. Monitoring will be done on the soil to determine the presence of radioactive contaminants. A pre-job survey of the study area will be performed using a Micro-R meter and a beta/gamma survey meter to detect areas having high surface contamination levels. **Action Level: > 2 mR/h or > 5000 cpm beta/gamma. Action: withdraw from the area and contact ASI/IT Health and Safety personnel.**

Airborne particulate radioactivity samples will be taken with breathing zone air sample pumps (2 lpm) if surface soil contamination exceeds the action level. Action Level: surface soil contamination > 5000 cpm/100 cm².

Full face respirators with a particulate cartridge will be worn if air sampling data indicate airborne activity > 2 E-12 uCi/ml.

Radon monitoring will not be required as existing environmental monitoring data (1989 and 1990) show that concentrations in the generic task area are significantly below regulatory limits.

Any circumstance which could have resulted in an intake of radioactive materials by inhalation, ingestion or absorption shall immediately be reported to a supervisor and ASI Health and Safety. ASI's Health and Safety personnel will report the circumstance of possible radioactive material intake to IRS&T Radiological Safety Section for evaluation. A urine sample and Incident Investigation Report form will be provided as required.

D) Environmental Conditions Monitoring

Environmental conditions shall be monitored when taking samples. Conditions to be monitored are wind speed, wind direction, temperature, and relative humidity. These parameters will be measured, at a minimum, at the start, stop, and midpoint of sampling. Appropriate instrumentation will be required and the type of instrument used documented. If personnel are on-site outside of buildings CONTROL can be used to determine wind speed, wind direction, and temperature. At all other locations the environmental conditions will be measured at the sample site.

9.0 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Level D clothing will be required as a minimum for all field personnel. Level D clothing is basically a work uniform and provides no protection against chemicals. Level D is intended for use on sites where the risk inhalation and or contact from chemical contaminants is very low to non-existent. **Level D clothing is not street clothes!** Level D clothing consists of:

- safety shoes (high top)
- safety glasses or goggles (safety glasses ANSI Z87.1 approved)
- coveralls
- work gloves
- hard hat (when in drilling exclusion zone)
- safety goggles shall be worn by the workers performing decontamination of the sampling equipment.

Hearing protection will be required when noise levels exceed 85 dBA for any field operation or impact noise exceeds 140 dBA.

For cold weather, appropriate personal clothing should be worn to protect against exposure to the elements. In this situation, Tyvek will be used as an outer coverall, meeting the requirement of Level D clothing. Hard hat liners will be provided by Health and Safety personnel upon request.

If monitoring results indicate readings to any chemical greater than 50% of the PEL or radiological contaminant at or greater than the Action Limit, Level C clothing will be required. Level C clothing consists of:

- hard hat
- face shield (optional)
- air purifying respirator with appropriate filter cartridges (HEPA filter for particulate and combination particulate-organic vapor/acid gas for particulates and chemical vapors)
- disposable outer coverall (Tyvek, Saranex, or equivalent)
- inner gloves (latex or PVC)
- outer chemical resistant gloves
- chemical resistant boots
- outer disposable booties (latex)

10.0 BASIC TASK SAFETY EQUIPMENT

All field teams will be required to have available two methods for communication with FEMP site and ASI/IT. This requirement can be satisfied by the use of a Cellular Phone and a two-way radio operating on the same frequency as the FEMP site radio frequency, or having multiple two-way radios at the work site.

Daily, during soil sampling periods, a work zone will be established using procedure FPP 906 Work Site Identification and Posting.

Personal decontamination supplies will be required for personnel taking soil samples for removal of any chemical or radiological contamination.

Equipment decontamination supplies will be required at each sample location or collection site where sampling equipment is to be decontaminated prior to any further sampling work. These supplies consist of collection basins, appropriate decontamination agents, plastic bags for collection of solid wastes, and collection drums for liquid wastes.

A minimum of five quarts of warm water for initial flushing of eyes until the affected person can be taken to WEMCO Medical Services for further treatment.

11.0 DECONTAMINATION PROCEDURES

On a daily basis a decontamination area will be set up, as required, for the removal of possible contamination of personnel, PPE as required for the removal of Level C clothing, and equipment. Dry decontamination will consist of the removal of the outer protective clothing (Tyvek, booties, gloves, respirator, etc.). Plastic bags will be used to collect the generated waste and used respirators. The bags of waste are to be handled according to procedure FPP 905. Used respirators will be returned to the WEMCO respirator cleaning facility.

All field personnel will be required to monitor themselves for radioactive and organic contamination as required in this plan using an HP 210 probe or equivalent for beta/gamma and an HNu Model 101 with a 10.2 eV probe or equivalent for organics. In the event of skin contamination notify an ASI/IT Health and Safety person who will come to the site and assist in getting the contamination removed. WEMCO Radiation Safety will be notified by the lead geologist or ASI Health and Safety representative. If a Health and Safety person is not available, the affected area is to be covered and the individual involved is to report to WEMCO HPs for decontamination. Skin contamination is to be removed only by ASI/IT Health and Safety or WEMCO HP/Medical Services.

Chemical contamination will be removed by washing with soap and water and rinsing the affected area. These steps will continue until monitoring results are negative.

Equipment will be decontaminated as required by the sampling plan, or the RI/FS QAPP. If the decontamination is to be performed in the field, an area will be set up where this is to take place. A ground cloth will be required to collect any spillage of the decontamination agents. Appropriate containers will be used to wash, rinse and dry the equipment such that all liquid is collected. Waste liquids are to be collected in a container and held until turned over to WEMCO for final disposition. Dry wastes are to be handled according to procedure FPP 905. Personnel performing the decontamination shall wear gloves, aprons, and safety goggles or face shields or respirators as required.

12.0 EMERGENCY PLANS

WEMCO has an established Emergency Response Plan and organization and this will be utilized for any emergency. The WEMCO program includes emergency medical service, fire suppression service, and security on all shifts, seven days a week. ASI/IT personnel will not attempt:

a) a confined-space rescue, b) to fight significant fires, c) to control significant chemical spills, or d) to stop significant releases. When necessary, contact CONTROL by radio or by calling 738-6511 on the phone system.

In the event of an accident or injury, the ASI Field Operations Manger will be contacted (mobile 1-646-9504 or office 738-9921). He will then contact the WEMCO AEDO by phone (738-6431). In the event that the Field Operations Manager cannot be reached, the lead geologist or field leader will call the AEDO and inform him of the situation status. Written reporting requirements will be directed by the AEDO.

12.1 Injuries

In the event of injuries, site personnel ^{may} will try to minimize the consequences as directed by WEMCO Medical when possible. The process of determining what is appropriate to do requires that each situation be evaluated on a case-by-case basis. Personnel will render first aid (CPR, severe bleeding, etc.) only in life threatening situations, as per directive from WEMCO's Medical Services Director.

A) Minor Injuries

Minor injuries (sprains, strains, and cuts) are expected to be taken to WEMCO Medical for first aid. Field treatment will be limited to pressure bandaging to control bleeding. All injured personnel will report to WEMCO medical in a timely manner for final treatment and evaluation of injuries, and all injuries will be reported to ASI/IT project health and safety.

B) Serious Injuries

WEMCO CONTROL will be notified immediately of any serious injury by radio or calling 738-6511. The ASI/IT crew will, ^{if they choose to render aid,} use standard first aid procedures to stabilize the bleeding and/or treat for shock pending arrival of WEMCO response personnel. CPR should be administered only by persons currently certified in CPR. Prior to performing CPR, the rescuer should consider what caused the victim to collapse. Chemicals around the nose and mouth can endanger the rescuer. Additionally the would be rescuer should use latex gloves and a pocket mask resuscitator with a one way valve or filter, when available, to minimize exposure to contagious pathogens.

C) Chemical Splashes

Eyes

Move the victim to an uncontaminated area. Hold the victim's eyes open and flush eyes with available water or isotonic saline directing the flow from the bridge of the nose across the eye. The natural response to eye pain is to close the eyes. The rescuer must keep the eyes open to remove chemicals from under the eyelids. The flushing solution can cause extreme discomfort if it is too hot or too cold; try to maintain solution near body temperature. Following the initial flush the individual should be transported by ambulance, if available, to WEMCO Medical Services for further treatment.

Additionally:

- Notify CONTROL (radio or call 738-6511)
- Request an ambulance
- State location of injured employee
- Tell CONTROL the name of the chemicals, if know
- Tell CONTROL what was done to treat the patient(s)
- Tell how many patients to expect

Skin

Skin contamination can involve less hazardous chemicals (methanol) or strongly hazardous chemicals (strong acids). Treatment for skin contamination should take into consideration the concentration and effects of the chemical(s) involved. As a general rule the following steps should be performed: Move the victim to an uncontaminated location. Remove contaminated clothing and wash the affected skin areas. Initially flush the skin and then go to WEMCO Medical Services for further treatment.

D) Injuries Complicated by Contamination

Radio CONTROL or call 738-6511. All injuries within the process area, i.e., the fenced area around the SWI, will be assumed to involve contamination until proven otherwise by WEMCO. Injuries complicated by chemical contamination will be evaluated after considering the hazards associated with the contamination. In most instances, the site contamination is only of concern if long-term exposures occur. In these instances, the injury will be given the highest priority and contamination reduced as soon as practical.

Injuries of persons contaminated with acutely toxic chemicals will be treated so as to minimize the hazard to both the rescuer and the victim. If the rescuer cannot safely attempt rescue, he/she should not attempt it.

E) General Procedures for Injuries

- The victim should be moved into an uncontaminated area and given a preliminary decontamination.
- Preliminary decontamination generally consists of flushing with water to dilute and remove most of the contaminant. It also includes removal of contaminated clothing.
- As soon as the hazard has been reduced to an acceptable level, the rescuer should stabilize the victim. More thorough decontamination can be performed at a later time.
- Care should be taken to minimize the spread of contaminant through runoff.
- Notify WEMCO CONTROL of:
 - The contaminant(s) involved
 - Any field instrument readings
 - Extent of injuries
 - What treatment has been performed (including decontamination)
 - Number of victims
 - Your location
 - Telephone number
- CALLER HANGS UP LAST. The dispatcher is trained to be calm and ask for the appropriate information in the order that it appears on his/her form. In some instances, the facility may be complex and require additional information such as cross streets or an escort from the entrance to the site.
- If rescuer calls the hospital, notify the emergency room and the ambulance service of the contaminant(s) involved so that they can prepare for the arrival.

12.2 Chemical/Radiological Releases and Spill Containment

The proposed operations pose a possibility for spilling or releasing hazardous materials. Potentially spillable material is methanol. If a minor spill or methanol (<1 gal) occurs, ASI/IT will take steps to control/contain or clean the release such as shoveling contaminated soil into a drum. If a large release in the form of a spill greater than one gallon, or a vapor cloud is observed, ASI/IT personnel will immediately withdraw at least 300 feet upwind or offwind and notify WEMCO emergency services.

Radio CONTROL or call 738-6511. CONTROL will dispatch the necessary personnel to handle the situation. If possible, the following information should be included in the notification:

- Cause of release, if known
- Location of release
- Time of release
- Chemical identity
- Quantity involved
- If radioactive material is involved
- If materials are leaving the area as a vapor/gas/liquid
- If fire is involved
- The number of known exposures or injuries (if any)

Additional information may be requested such as:

- What has been/is being done to minimize the hazard
- Degree of hazard to responders based on caller's knowledge of the contaminants

12.3 Fire Hazards

Radio CONTROL or call 738-6511. Fire hazard operations include field activities such as using flammable decontamination solutions. Report all fires before making any effort to control or fight the fire. All uncontrolled fires will be reported to WEMCO, and the fire brigade requested before attempting any fire suppression activity. Small fires which appear to be controllable by field personnel will be controlled only if the safety of the field personnel is not jeopardized.

12.4 Adverse Weather

Work will be stopped if lightning, heavy or persistent rain, or other adverse weather conditions are in the area. This includes any weather conditions whose impact is judged to be detrimental by the ASI/IT field staff or appropriate Health and Safety representatives or by the U.S. Weather Service.

12.5 Emergency Telephone Numbers and Points of Contact

Ambulance:	(513)738-6511	Radio
Hospital:	(513)738-6511	CONTROL
Fire:	(513)738-6511	CONTROL

POINTS OF CONTACT**Work****Home****Radio**ASI/IT

Alvin Lutrell, V.P. (WMD)	(615)483-1274		
John Wood, Proj. Director	(513)738-3100		
Bruce Myers, Field Manager	(513)738-9221		Mobile 1-646-9504
Stephen Duce, H.P. HSO	(513)738-3100		
Lee Vittitow, Sr. IH	(513)738-3100		
Greg McAnarney, H&S (Corp)	(505)828-0959		

WEMCO

Utility Engineer (AEDO)	(513)738-6431	202
Industrial Hygiene	(513)738-6207	357
Radiation Safety	(513)738-6889	355
Fire and Safety	(513)738-6235	303

ADDITIONAL HELP NUMBERS

Center for Disease Control	(404)633-5313
Chemtrec	(800)424-9300
CMA Chemical Referral Center	(800)262-8200
DOT Hazardous Materials Information	(202)366-4488
Emergency Planning and Community Right-to-Know	(800)535-0202
Federal Emergency Management Agency	(817)898-9104
National Response Center Hotline	(800)424-8802
Occupational Safety and Health Administration	(800)582-1708
American Chemical Society	(202)872-4600
Substance Identification	(800)848-6538
National Safety Council	(312)527-4800

HOSPITALS

The nearest medical facility is the WEMCO medical department. It is the primary choice for on-site injuries. First aid and ambulance service is normally available at the WEMCO medical department. Radio or call 738-6511 to contact CONTROL. WEMCO maintains an emergency response capability which includes an ambulance and EMT trained personnel. The WEMCO ambulance will transport the injured workers to the nearest hospital if necessary or WEMCO Medical Services personnel will arrange for local transportation to the nearest hospital.

If WEMCO ambulances are unavailable for any reason, CONTROL will call for a community ambulance. The lead field person should confirm that an ambulance has been called. Location of the WEMCO Medical Department can be seen in Figure 2.

13.0 AMENDMENTS

This Health and Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise which require reassessment of safety procedures or this health and safety plan. It is important that personnel protective measures be thoroughly assessed by the supervisor in charge and by as ASI/IT Health and Safety representative prior to and during the planned task activities. Unplanned activities and/or changes or additions in the degree of hazard status shall require a review and may require changes in this plan (i.e. Section 15).

Changes in the anticipated hazard status or unplanned activities are to be submitted as an amendment to this Health and Safety Plan. All changes and amendments shall be approved by the plan author, ASI/IT Health and Safety (both Corporate and Site), and WEMCO IRS&T.

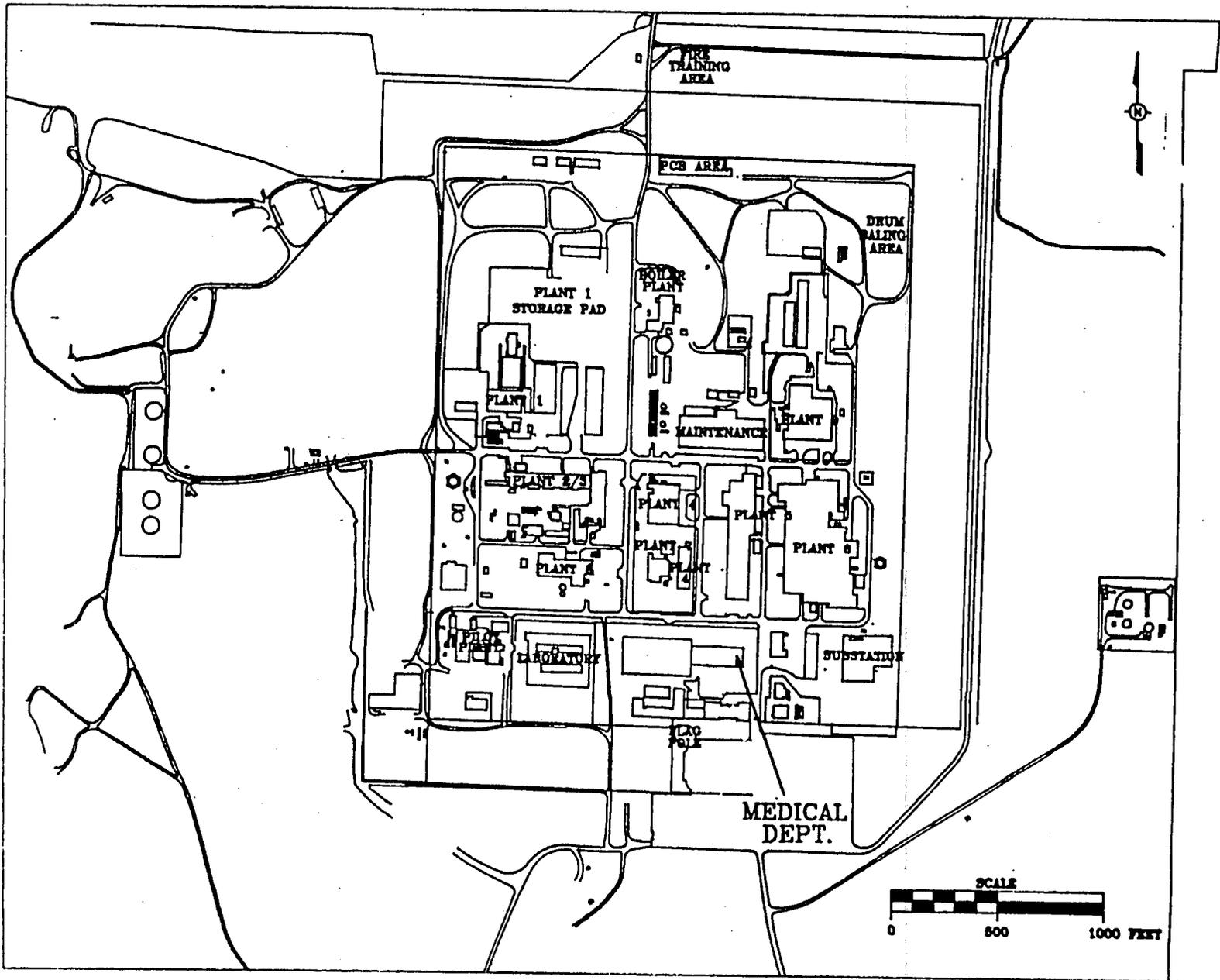


FIGURE 2. LOCATION OF MEDICAL DEPARTMENT

15.0 Location Specific Information

The following addendum describes those additional safety measures required for hand augering in the KC-2 Warehouse, Scrap Metal Yard, Electrical Substation, and Fire Training areas as indicated in Figures 1 through 4.

3.0 Task Activities/Work Plan

Surface soil samples will be collected from the KC-2 Warehouse, Scrap Metal Yard, Electrical Substation, and Fire Training areas at a nominal depth of 6 inches, ranging down to 18 inches. A normal hand auger tool will be used to collect the samples in all areas except the Electrical Substation. Samples will be taken in the Electrical Substation with stainless steel spoons instead of hand augers, to reduce the potential for contacting live electrified components.

Penetration permits will be obtained for all borings that will be deeper than 6 inches.

4.0 Hazard Assessments

Previous sampling from all of these areas indicated that there was a possibility for contamination with polychlorinated biphenyls (PCBs). Soil samples will be taken at all of these sites to evaluate the average PCB soil contamination. PCBs are classified as a carcinogen. PCBs have a low vapor pressure indicating that they are not very volatile; therefore, the probability of encountering PCB vapors is low. The main mechanism for airborne contamination would be mechanical disturbance of dry surface soils. Hand augering is not likely to produce airborne dust.

Prior to initiation of work, the level of PCB contamination of the soil will be measured by EPA-Approved kits. If soil contamination exceeds 1 mg/gm and the soil is dry and easily resuspended, then samplers will wear full face APRs equipped with HEPA filters. If the soil is damp or wet, the ASI/IT Health & Safety Manager or designee will evaluate the potential for work activities to cause soil resuspension and PPE will worn as necessary.

Potential exists for loose radioactive contamination in all localized areas of the former process area. Below grade soil contamination is likely to exist in most areas of the former process area. Unstable forms of "fixed" contamination are also likely to exist in most areas of the former process area.

KC-2 Warehouse

A. Physical Hazards

The sampling area is immediately adjacent to railroad tracks. This is a semi-active track. There are the hazards of moving trains, tripping on the crossies,

and unsure footing in the gravel railroad bed.

B. Chemical Hazards

This area has been used for RCRA storage of PCBs. If soil in the work area is dry, the soil will be wetted down with deionized water to minimize the possibility of dust containing PCBs from becoming airborne.

C. Radiological Hazards

This is a Contamination Zone, follow posted instructions.

Scrap Metal Area

A. Physical Hazards

Portions of this sampling work will also be adjacent to railroad tracks. Appropriate control measures should be followed, as indicated above for the KC-2 Warehouse.

B. Chemical Hazards

This area has been used for storage of abandoned equipment, including transformers; hence, the concern for PCBs.

C. Radiological Hazards

This area is designated as a Contamination Zone. Follow posted instructions.

Electrical Substation

A. Physical Hazards

Hazards here include live electrified equipment, overhead power lines, and electromagnetic fields. Power coming into the substation is rated at 132,000 volts. The substation equipment steps down the voltage for distribution throughout the facility.

B. Chemical Hazards

The proximity to electrical transformers enhances the possibility of PCB contamination.

C. Radiological Hazards

This area is in the Control Zone, but is not posted as a Contamination Zone.

Fire Training Area

A. Physical Hazards

No unusual hazards are located here that are not addressed in the generic plan.

B. Chemical Hazards

Because of the chemicals used in the past for fire training, it is anticipated that volatile and semi-volatile organics, heavy metals, and PCBs may be encountered.

C. Radiological Hazards

The sampling area is in a Contamination Zone. Call J. Wentzel at ext. 6802 for entry information.

8.0 Monitoring

KC-2 Warehouse

A. Physical Hazards

This is a semi-active railroad siding, so supervisors will need to be aware of movement of trains. There are also tripping hazards from the cross-ties and footing is unsure in the gravel.

B. Chemical Hazards

If visible dust is generated during augering, use full face APRs equipped with HEPA filter.

Monitoring for other organics will be conducted in the normal manner using the HNu with a 10.2 eV probe or equivalent photoionization meter (calibrated with 100 ppm isobutylene gas). Monitoring will be conducted at the breathing zone, bore hole site, and on the person performing the sampling. **Action Level: detection to 10ppm in breathing zone. Action: withdraw from the area or use full-face APRs with organic vapor/acid gas/HEPA filter cartridge.**

If the soil is dried out, then the sampling area will be kept wetted down to prevent suspension of particles.

C. Radiological Hazards

Radiological hazards will be monitored in the usual manner using an alpha survey and a beta/gamma survey meter (HP 210 probe or equivalent) on each soil boring. A pre-job survey will be performed using a Micro-R meter and a beta/gamma survey meter to detect areas having high contamination levels. **Action Level: ≥ 2 mR/h or ≥ 5000 cpm beta/gamma. Action: withdraw from the area and contact ASI/IT Health and Safety.**

Scrap Metal Area

A. Physical Hazards

This sampling area is also located adjacent to railroad tracks. Hazards and precautions are the same as above for KC-2 Warehouse.

B. Chemical Hazards

Monitoring for PCBs and other chemicals will be conducted as above for the KC-2 Warehouse.

C. Radiological Hazards

Radiological hazards will be monitored in the usual manner as indicated above for KC-2 Warehouse.

Electrical Substation

A. Physical Hazards

Electromagnetic force will be monitored with EMF-ELF radiation survey meter. **Action Level: $E > 25$ kV/m, $H > 1$ mT or 0.1 mT for pacemaker wearers. Action: withdraw from the area and contact ASI/IT Health and Safety.**

B. Chemical Hazards

Chemicals will be monitored as indicated above for KC-2 Warehouse.

C. Radiological Hazards

Radiological hazards will be monitored as above for KC-2 Warehouse.

Fire Training Area

A. Physical Hazards

No hazards are located here that are not covered in generic plan.

B. Chemical Hazards

Chemical will be monitored as indicated above for KC-2 Warehouse.

C. Radiological Hazards

Radiological hazards will be monitored as above for KC-2 Warehouse.

9.0 Personal Protective Equipment Requirements

For all four locations, Level D clothing will be the minimum requirement. If monitoring results indicate readings for chemicals or radiological contamination at or greater than the Action Levels, then Level C clothing will be required. If PCBs are encountered, clothing will be modified to have the same dermal protection as Level B- a hooded chemical-resistant one piece garment with wrists, ankles, and hood taped. For those areas posted as Contamination Zones, all WEMCO PPE requirements will be met prior to entry into these work areas.

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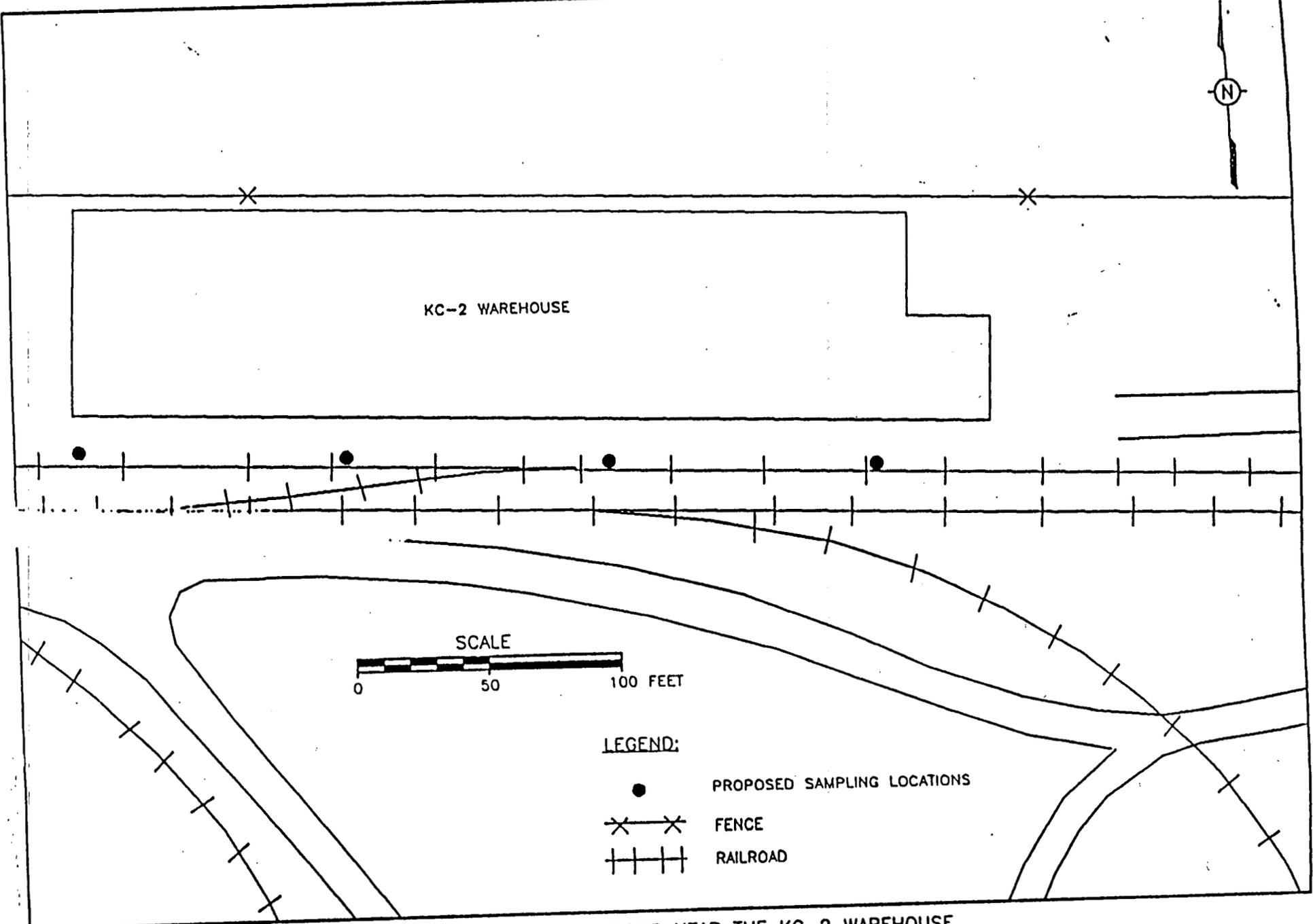


FIGURE 1. PROPOSED SAMPLING LOCATIONS NEAR THE KC-2 WAREHOUSE

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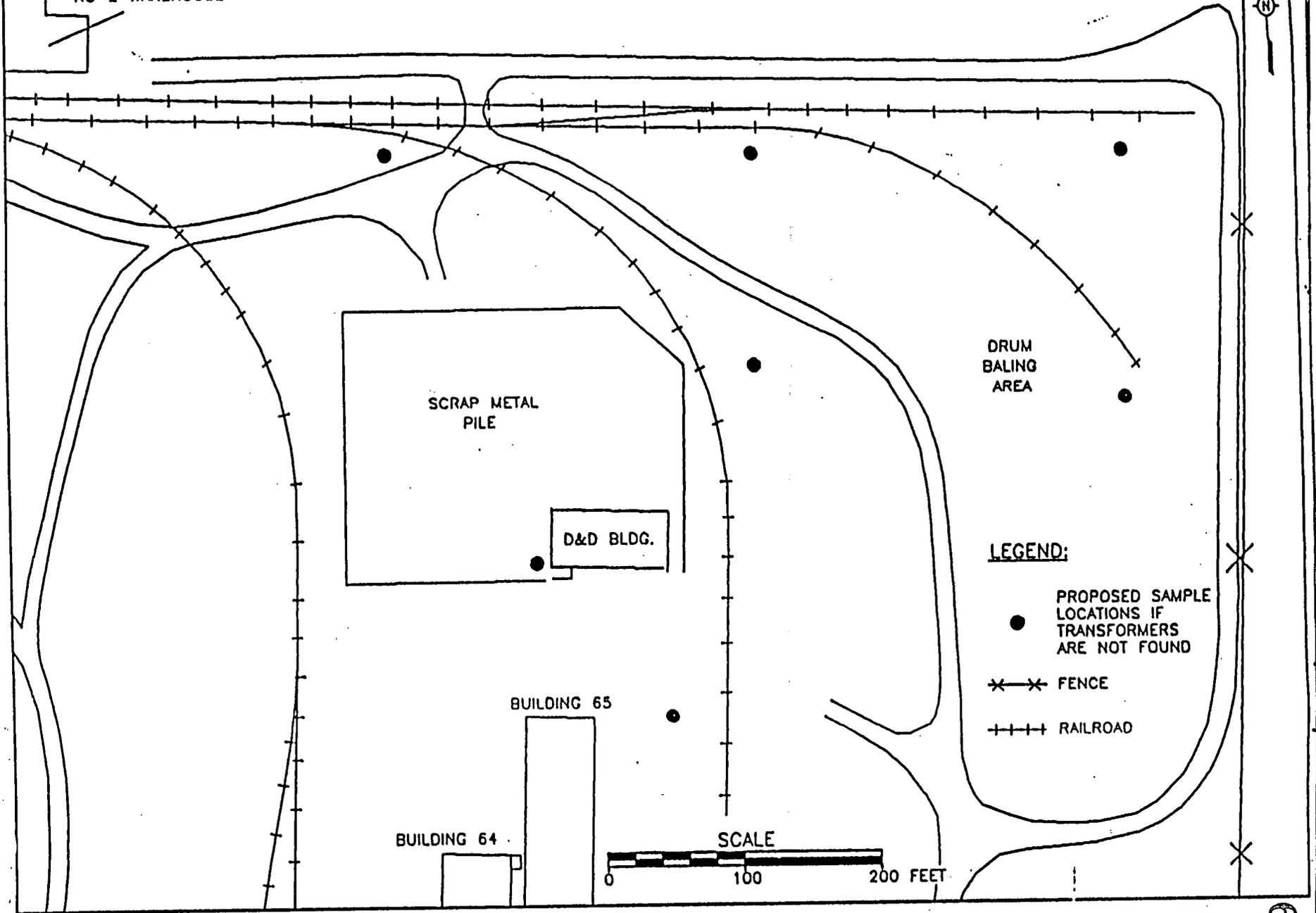
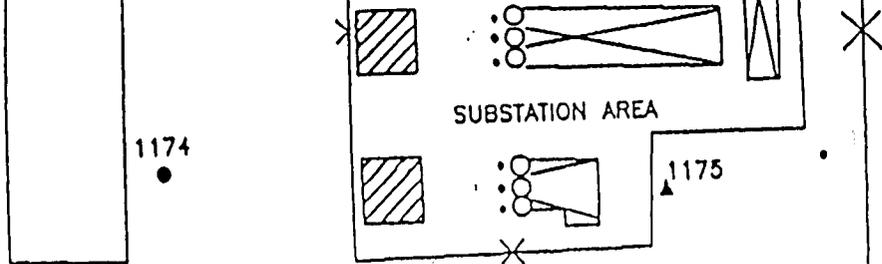


FIGURE 2. PROPOSED SAMPLING LOCATIONS IN THE SCRAP METAL AREA

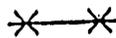
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LEGEND:

-  TRANSFORMER BASINS
-  OIL TANKS
-  ANALYSIS FOR PCBs
-  EXISTING BORING LOCATION
-  EXISTING PIEZOMETER LOCATION
-  FENCE

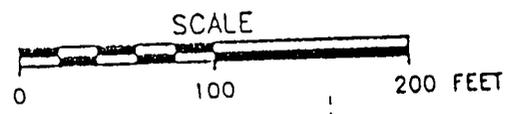


FIGURE 3 PROPOSED SAMPLING LOCATIONS IN THE SUBSTATION AREA

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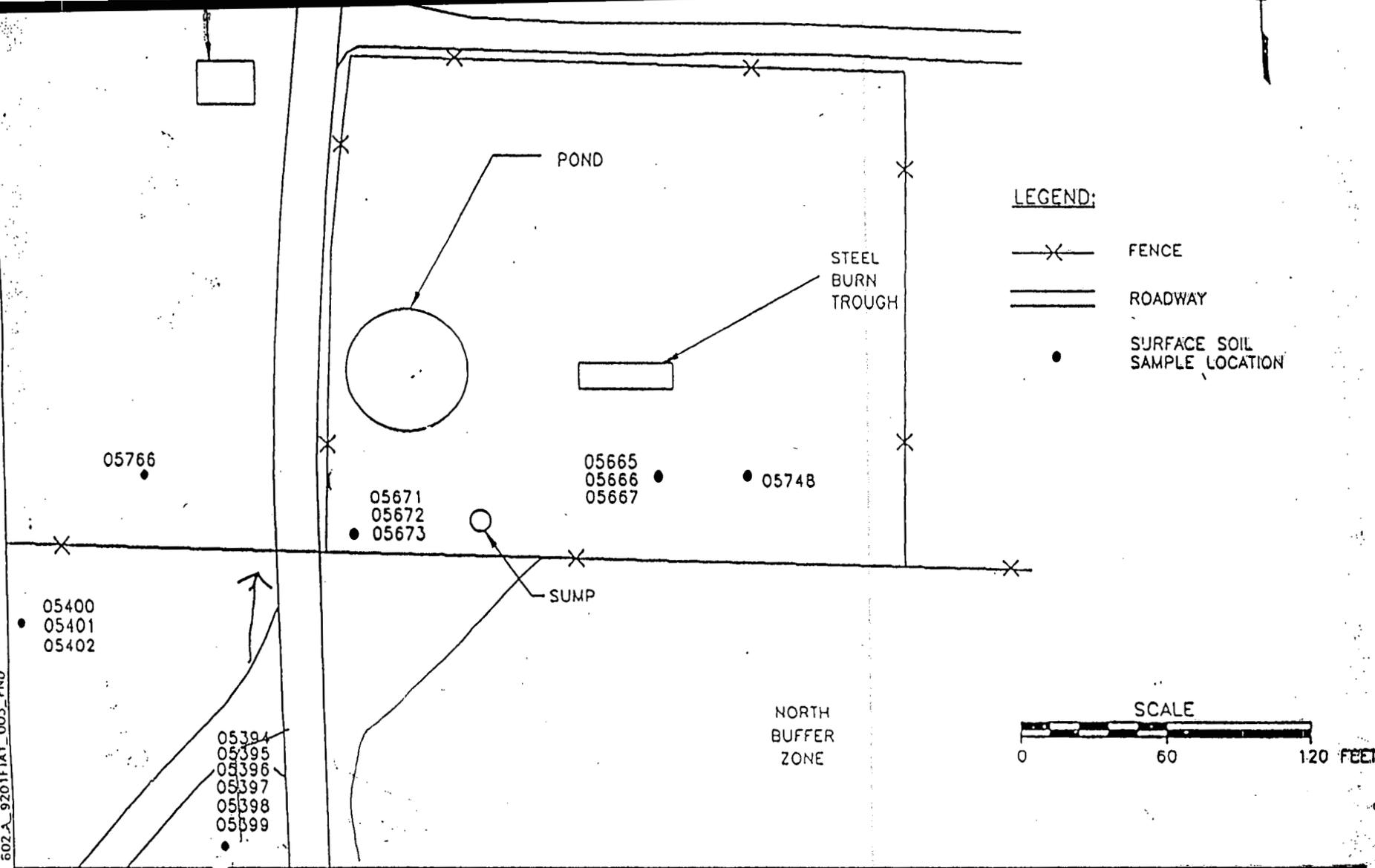


FIGURE 4 FIRE TRAINING AREA AND SURFACE SOIL SAMPLING LOCATIONS

RISECA
Date: October 1997
Vol. WP - Sec 4.0
Page 44 of 178

6563

6563

16.0 ATTACHMENTS

16.1 COLD STRESS

Cold stress will be an occupational hazard if project work takes place in the winter months. Persons working outdoors in temperatures at or below freezing will be susceptible to cold stress hazards. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling. Areas of the body which have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at -18°F.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration.

Localized personal injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost nip or initial frostbite: characterized by suddenly blanching or whitening of skin
- Superficial frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient
- Deep frostbite: tissues are cold, pale, and solid; extremely serious injury
- Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature; its symptoms are usually exhibited in five stages:
 - shivering
 - apathy, listlessness, sleepiness, and sometimes rapid cooling of the body core to less than 95°F
 - unconsciousness, glassy stare, slow pulse, and slow respiratory rate
 - freezing of the extremities
 - death

16.1.1 Prevention of Cold Stress Injuries

Thermal socks, long cotton or other thermal underwear, hard hat liners, glove liners, and other cold weather gear can aid in the prevention of hypothermia. Various layering of clothes is the best technique. Blankets, warm drinks (other than caffeinated coffee), and warm break areas are essential. The overall goal is to keep from getting wet. If workers do get wet, they should dry off and change clothes.

Cold stress training is appropriate for work at this site and can be carried out during the daily tailgate safety meeting.

A) The Windchill Meter

Windchill can be monitored using a Taylor Windchill meter or equivalent when conditions warrant.

B) Exposure Limits

See Windchill chart in Table 1 of this attachment.

C) Alerting Mechanism

The primary means of alerting work crews of dangerous windchill conditions will be the windchill meter on site. Other methods include contacting the Health and Safety office by telephone (738-3100), or by weather radio.

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)*

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security.				INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.			
Trenchfoot and immersion foot may occur at any point on this chart.												

* Developed by U.S. Army Research Institute of Environmental Medicine, Natick, M.A.

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6563

Attachment 2

16.2 Heat Stress

Heating of the body occurs from three sources:

1. Radiant heating from heat sources or sunlight
2. Convective heating from contact with a warmer object or liquid
3. Metabolic heating caused by activity

Cooling occurs through three mechanisms:

1. Respiration: the air we exhale is warm; as the body overheats, the respirations become more rapid.
2. Radiation: heat is released at the surface of the skin; as the body overheats, the superficial blood vessels dilate and allow more heat to be lost.
3. Evaporation: perspiration is released to the skin surface and evaporates; the skin is cooled by evaporative cooling.

PPE reduces the body's ability to shed excess heat through radiation and evaporation of sweat. PPE can also act like a greenhouse and collect radiant heat.

These facts mean that heat stress can become a serious problem to hazardous waste site workers if preventative measures and monitoring are not taken or performed. The following discussion is intended to familiarize personnel with the symptoms of heat stress.

Heat stress is a progressive condition. Its mildest form is a slight elevation of body core temperature. Normal body core temperature is generally near 98.6°F. Working in high temperatures may elevate the temperature to 100-101°F. By the time the body temperature reaches 101°F, the worker generally has a headache. This is not a serious condition and can be treated through increased rest periods and cool fluid intake. The worker should not be allowed to return to work until the body temperature has been reduced to below 99°F.

If work continues when the first symptoms occur, the person may develop heat cramps. Heat cramps are brought about by continued exposure to heat without preventative control measures. The outside temperature does not have to be much higher than the "normal" environment. The person perspires heavily, often drinking large quantities of water. As the sweating continues, salts are lost by the body bringing about painful muscle cramps.

16.2.1 Heat Exhaustion

Heat exhaustion symptoms include a near-normal body temperature and profuse sweating. The body temperature can reach 103°F. Victims of heat exhaustion have cool, wet, pale, clammy skin and can feel lethargic, dizzy, and/or nauseous.

Treatment: Remove the person from field work. Have the person rest in a cool area such as an air conditioned car or shaded area. Provide cool liquids to drink. Avoid beverages which contain caffeine or alcohol. Do not allow the person to go back to work for at least one or two days.

Any worker with a heat-related illness or emergency will be immediately transported to the WEMCO medical department for medical evaluation. The worker should be given rest, cool fluids, and removed from work for at least the remainder of the day. The person is likely to have an increased susceptibility to heat for the next few days.

16.2.2 Heat Stroke

Heat stroke is a life-threatening condition. The person's body temperature-regulating mechanism fails and the body can not rid itself of excess heat. Heat stroke symptoms include high body temperatures (103° and greater) and HOT DRY SKIN. Most cases of heat stroke are reported on hot humid days.

Treatment: Heat stroke victims must be transported immediately to WEMCO Medical for treatment. The individual must not be allowed to drive since cases are on record where the victim's condition worsens, lapsing into unconsciousness and death. Heat stroke victims are not to return to field work without the physician's written consent.

16.2.3 Prevention of Heat Stress-Induced Illness

Become acclimatized to heat for several days prior to performing task work whenever possible. Work in the cooler portions of the day. Early morning and evening hours are cooler.

Take frequent breaks in shaded areas and consume at least one pint of cool fluid every hour. Replenish electrolytes through the consumption of diluted drinks. The body loses more water than electrolytes. Concentrated salt, electrolyte, or juices can make you more susceptible to heat stress.

A) Monitoring

Heat stress monitoring shall be performed whenever temperatures exceed 80°F and respiratory protection or PPE use is required. Oral temperatures and pulse rates shall be taken at the end of each break. A basic guide for handling elevated temperatures or elevated pulse rates is:

Oral Temp: less than 99°F	Continue work
Oral Temp: 99-100.3°F	Reduce rate of work or take more frequent breaks; consume more cool fluids.
Oral Temp: > 100.4°F	Remove from work until temperature reduced to 99°F or less.
Pulse Rate: > 110 bpm	Remove from work until pulse rate falls below 110 beats per minute.

If the body temperature exceeds 100.4°F, or the pulse rate exceeds 110 bpm at rest, the person must not continue to work. These precautions have been found to prevent most heat related illnesses.

Occasionally, high heat conditions combined with poor eating, sleeping, and drinking habits have resulted in heat stroke occurring in less than 20 minutes.

Additional information on heat related illnesses is presented in Table 1. Figure 1 presents Electric Power Research Institute (EPRI) method of determining work/rest periods to reduce the occurrence of heat stress related illness.

TABLE 1
SIGNS AND SYMPTOMS OF HEAT RELATED ILLNESS

	Signs/Symptoms
Heat rash	Results from continuous exposure to heat or humid air.
Heat cramps	Caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include muscle spasms, pain in the hands, feet, and abdomen.
Heat exhaustion	Occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include pale, cool, moist skin, heavy sweating, dizziness, nausea, and fainting.
Heat stroke	The most serious heat related illness. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms include red, hot, unusually dry skin, lack of/or reduced perspiration, dizziness and confusion, strong, rapid pulse, and coma.

B) The Heat Stress Monitor¹

Heat stress can also be monitored using a Metrosonics hs-371 Heat Stress Monitor/Logger when conditions warrant. The heat stress monitor is based on the Wet Bulb Globe Temperature Index (WBGT). The WBGT values are calculated by using the following calculations:

1. For work outdoors with a solar load:
$$\text{WBGT} = 0.7 \text{ NWB} + 0.2 \text{ GT} + 0.1 \text{ DB}$$
2. For work indoors without a solar load:
$$\text{WBGT} = 0.7 \text{ NWB} + 0.3 \text{ GT}$$

NWB = Natural Wet-Bulb Temperature

DB = Dry Bulb Temperature

GT = Globe Temperature

C) Alerting Mechanism

A WBGT monitor can be used as a primary means for alerting work crews of dangerous heat stress conditions. The WBGT monitor and the TLV values normally do not take into account Hazardous Waste Worker PPE use. The factors are normally set for workers not wearing PPE. Other methods include contacting the Health and Safety office by telephone (738-3100), or by weather radio. The WBGT monitor results can be used in conjunction with the Figure 1 to determine work/rest periods.

¹For additional information on clothing correction factors and TLV, see: ACGIH, 1990-1991, "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, pgs. 87-94.

FIGURE 1

EPRI STAY TIMES

Ranges of stay times in minutes (or "h" for hours) for different WBGTs (and Botsball readings) in °C and °F by combinations of clothing ensemble and metabolism

WBGT (Botsball)		Work Clothes Metabolism			Cotton Coveralls Metabolism			Double Cottons Metabolism			Cottons plus Plastic Metabolism		
		Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
50 (47)	122 (116)	15-30	0-10		5-15	0-5		5-15					
48 (45)	118 (112)	20-45	5-15		15-30	5-10		10-20			5-15		
46 (43)	115 (109)	20-45	5-20		20-45	5-15		15-30	0-10		15-20		
44 (41)	111 (105)	30-60	10-25		20-45	5-20		20-45	5-15		15-30	0-10	
42 (39)	108 (102)	45-90	15-30	5-10	30-60	10-25		20-45	5-20		20-45	5-15	
40 (37)	104 (99)	60-90	15-45	10-20	45-90	15-40	5-10	30-60	10-25		20-45	5-20	
38 (35)	100 (95)	90-120	20-45	15-30	60-90	15-45	10-25	45-90	15-30	5-10	30-60	10-25	
36 (33)	97 (92)	2h-4h	20-60	15-40	90-120	25-45	15-30	60-90	15-45	10-20	45-90	15-30	5-10
34 (31)	93 (88)	3h-8h	45-90	20-45	2h-4h	30-60	15-45	90-120	20-45	15-30	60-90	15-45	10-20
32 (29)	90 (85)	ML	90-120	30-60	3h-8h	60-100	25-50	2h-4h	20-60	15-40	90-120	20-45	15-30
30 (27)	86 (81)	ML	2h-4h	60-120	ML	1h-2h	30-90	3h-8h	45-90	20-45	2h-4h	20-60	15-40
28 (26)	82 (78)	ML	ML	2h-4h	ML	1h-4h	1h-3h	ML	90-120	30-60	3h-8h	45-90	20-45
26 (24)	78 (73)	ML	ML	4h-8h	ML	ML	3h-8h	ML	2h-4h	60-120	ML	90-120	30-60
24 (22)	75 (71)	ML	ML	ML	ML	ML	ML	ML	ML	2h-4h	ML	2h-4h	60-120
22 (20)	72 (68)	ML	ML	ML	ML	ML	ML	ML	ML	4h-8h	ML	ML	2h-4h
20 (18)	68 (64)	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	4h-8h
<20	<68	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML	ML

SOURCE:

"Metrosonics hs-371," Heat Stress Monitor Manual Rev. F, West Henrietta, NY, pg. 6.

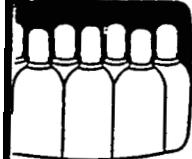
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6563

Attachment 3

16.3 MATERIAL SAFETY DATA SHEETS

(See following sheets)



MATHESON GAS PRODUCTS MATERIAL SAFETY DATA SHEET

6563

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PAGE 01 OF 09

MATERIAL SAFETY DATA SHEET

MATHESON GAS PRODUCTS
80 SEAVIEW DRIVE
SECAUCUS, NEW JERSEY 07096
(201) 867-4100

EMERGENCY CONTACT:
CHEMTREC 1-800-424-9300

#10102

SUBSTANCE IDENTIFICATION

CAS-NUMBER 7782-50-5

SUBSTANCE: CHLORINE

TRADE NAMES/SYNONYMS:

CHLORINE MOLECULAR; CHLORINE MOL.; DIATOMIC CHLORINE; DICHLORINE;
MOLECULAR CHLORINE; STCC 4904120; UN 1017; CL2; MAT04600

CHEMICAL FAMILY:

HALOGEN

INORGANIC GAS

MOLECULAR FORMULA: CL2

MOLECULAR WEIGHT: 70.906

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=0 PERSISTENCE=0

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: CHLORINE
CAS# 7782-50-5

PERCENT: 100.0

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

CHLORINE:

0.5 PPM (1.5 MG/M3) OSHA TWA; 1 PPM (3 MG/M3) OSHA STEL

0.5 PPM (1.5 MG/M3) ACGIH TWA; 1 PPM (3 MG/M3) ACGIH STEL

0.5 PPM NIOSH RECOMMENDED 15 MINUTE CEILING

100 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY

10 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

10 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING.

PHYSICAL DATA

DESCRIPTION: PALE GREENISH-YELLOW GAS WITH A CHARACTERISTIC, SUFFOCATING ODOR.

BOILING POINT: -31 F (-35 C) MELTING POINT: -150 F (-101 C)

SPECIFIC GRAVITY: 3.214 G/L @ 0 C VAPOR PRESSURE: 5168 MMHG @ 21 C

SOLUBILITY IN WATER: 1.46% @ 0 C ODOR THRESHOLD: 0.01 PPM

000051

INHALATION-MOUSE LC50; 660 PPM/4 HOURS INHALATION-RABBIT LCLO; 330 PPM/7 HOURS INHALATION-GUINEA PIG LCLO; 800 PPM/30 MINUTES INHALATION-DOG LCLO; 660 PPM/4 HOURS INHALATION-CAT LCLO, 500 PPM/5 MINUTES INHALATION-MAMMAL LCLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS).

RCINOGEN STATUS: NONE.

CAL EFFECTS: CORROSIVE- SKIN, EYE; IRRITANT- MUCOUS MEMBRANES.

UTE TOXICITY LEVEL: TOXIC BY INHALATION.

RGET EFFECTS: POISONING MAY AFFECT THE LUNGS.

INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING HEART DISEASE OR TUBERCULOSIS.

HEALTH EFFECTS AND FIRST AID

HALATION:

HLORINE:

ORROSIVE/TOXIC.

PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- MUCOUS MEMBRANE IRRITATION MAY OCCUR AT 0.2 TO 16 PPM AND COUGH AT 30 PPM. INHALATION OF 500 PPM FOR 5 MINUTES HAS BEEN LETHAL IN HUMANS AND 1000 PPM MAY BE FATAL AFTER A FEW DEEP BREATHS. OCCUPATIONAL EXPOSURES HAVE RESULTED IN BURNING OF THE NOSE AND MOUTH WITH RHINORRHEA, RESPIRATORY DISTRESS WITH COUGHING, CHOKING, WHEEZING, RALES, RETCHING, HEMOPTYSIS, SUBSTERNAL PAIN, DYSPNEA, AND CYANOSIS. TRACHEOBRONCHITIS, PROGRESSING TO IMMEDIATE OR POSSIBLY DELAYED PULMONARY EDEMA AND OCCASIONAL PNEUMONITIS HAVE ALSO BEEN REPORTED. COUGH GENERALLY INCREASES IN FREQUENCY AND SEVERITY AFTER TWO TO THREE DAYS AND BECAME PRODUCTIVE OF THICK MUCOPURULENT SPUTUM, WHICH DISAPPEARS BY THE END OF 14 DAYS. LUNG DAMAGE IS USUALLY NOT PERMANENT; RESPIRATORY DISTRESS USUALLY SUBSIDES WITHIN 72 HOURS. AT HIGH CONCENTRATIONS, CHLORINE MAY ACT AS AN ASPHYXANT BY CAUSING CRAMPS OF THE LARYNX MUSCLES AND SWELLING OF THE THE MUCOUS MEMBRANES. OTHER SYMPTOMS MAY INCLUDE SALIVATION, ANXIETY, SNEEZING, PALLOR OR REDNESS OF THE FACE, WEAKNESS, HOARSENESS, HEADACHE, DIZZINESS, AND GENERAL EXCITEMENT AND RESTLESSNESS. MASSIVE INHALATION MAY ALSO CAUSE DEATH BY CARDIAC ARREST.

CHRONIC EXPOSURE- PERSONS REPEATEDLY EXPOSED TO LOW CONCENTRATIONS MAY DEVELOP CHLORACNE, OLFACTORY DEFICIENCY AND TOLERANCE BUILD-UP. PROLONGED AND REPEATED EXPOSURE TO 0.8-1.0 PPM MAY CAUSE PERMANENT, ALTHOUGH MODERATE REDUCTION IN PULMONARY FUNCTION. CHRONIC EXPOSURE AT 5 PPM MAY RESULT IN INFLAMMATION OF THE MUCOUS MEMBRANES OF THE NOSE, DISEASE OF THE BRONCHI, AND INCREASED SUSCEPTIBILITY TO RESPIRATORY INFECTION INCLUDING TUBERCULOSIS. DENTAL EROSION MAY OCCUR. ANIMALS SURVIVING SUBLETHAL EXPOSURES FOR 15 TO 193 DAYS AFTER GASSING SHOWED MARKED EMPHYSEMA.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

KIN CONTACT:

HLORINE:

ORROSIVE:

ACUTE EXPOSURE- HIGH VAPOR CONCENTRATIONS MAY IRRITATE THE SKIN AND CAUSE BURNING AND PRICKING SENSATIONS, INFLAMMATION, AND VESICLE FORMATION. CONTACT WITH LIQUID MAY CAUSE BURNS, BLISTERING, TISSUE DESTRUCTION, AND

AL ISOTHIUREA SALTS: FORMATION OF EXPLOSIVE NITROGEN TRICHLORIDE.
NIA: EXPLODES WHEN HEATED.
MONY: IGNITION REACTION.
NIC: SPONTANEOUS IGNITION.
NLSULFINAMIDES: POSSIBLE VIOLENT REACTION.
NE: EXPLOSIVE REACTION CATALYZED BY LIGHT.
N: IGNITES ON CONTACT.
NINE PENTAFLUORIDE: EXPLOSIVE REACTION.
NIUM CHLORITE: FORMS EXPLOSIVE CHLORINE DIOXIDE.
NIUM NITRIDE: INCANDESCENT REACTION.
NON (ACTIVATED): IGNITES ON CONTACT.
NON DISULFIDE: EXPLOSIVE REACTION IN THE PRESENCE OF IRON CATALYST.
NUM NITRIDE: ATTACKED BY CHLORINE.
NOROPROPYNE: POSSIBLE EXPLOSION.
NOMYL CHLORIDE + CARBON: POSSIBLE EXPLOSION.
NOSTIBLE MATERIALS: CONTACT WITH THE LIQUID IS LIKELY TO RESULT IN AN EXPLOSION. CONTACT WITH THE GAS MAY RESULT IN IGNITION OR AN EXPLOSION.
NRANE: EXPLODES ON CONTACT AT AMBIENT TEMPERATURES.
NOROMETHYLARSINE: POSSIBLE EXPLOSION.
NYL ETHER: EXPLODES.
NYLZINC: IGNITION.
NYLFORMAMIDE: EXPLOSION HAZARD.
NYL PHOSPHORAMIDATE: MAY FORM EXPLOSIVE NITROGEN TRICHLORIDE.
NYGEN DIFLUORIDE: IGNITION OR EXPLOSIVE REACTION.
NYL OXIDE: EXPLOSIVE REACTION.
-DITHIODIMORPHOLINE: MAY FORM EXPLOSIVE COMPOUND.
NLENE: EXPLOSIVE REACTION IN THE PRESENCE OF LIGHT OR CATALYSTS.
NLENE IMINE: FORMATION OF EXPLOSIVE 1-CHLOROETHYLENE IMINE.
NLPHOSPHINE: EXPLOSION ON CONTACT.
NMBABLE COMPOUNDS: CONTACT WITH THE LIQUID IS LIKELY TO RESULT IN AN EXPLOSION. CONTACT WITH THE GAS MAY RESULT IN IGNITION OR AN EXPLOSION.
NDRINE: IGNITION FOLLOWED BY EXPLOSION ON SPARKING.
NCHLORODISILANE: IGNITION ABOVE 300 C WITH POSSIBLE EXPLOSION.
NAZINE: IGNITION REACTION.
NOCARBONS: CONTACT WITH THE LIQUID IS LIKELY TO RESULT IN AN EXPLOSION. CONTACT WITH THE GAS MAY RESULT IN IGNITION OR AN EXPLOSION. ADDITION OF LEWIS ACID TO CHLORINE-HYDROCARBON MIXTURES WILL RESULT IN THE RELEASE OF LARGE VOLUMES OF HYDROGEN CHLORIDE.
NOGEN: EXPLOSIVE MIXTURES.
NOGEN PEROXIDE + POTASSIUM HYDROXIDE: LUMINESCENT REACTION.
NOXYLAMINE: SPONTANEOUS IGNITION.
NE: VIOLENT REACTION.
N CARBIDE: INCANDESCENT REACTION.
NIUM SILICIDE: INCANDESCENT REACTION WHEN HEATED.
NLS AND ALLOYS: IGNITION ON CONTACT; SOME METALS MAY BE CORRODED IN THE PRESENCE OF MOISTURE.
NL ACETYLIDES: IGNITION REACTION.
NL HYDRIDES: IGNITION.
NL OXIDES: VIGOROUS REACTION AND POSSIBLE IGNITION.
NL PHOSPHIDES: IGNITION.
NOGEN COMPOUNDS: MAY FORM EXPLOSIVE NITROGEN TRICHLORIDE.
NOGEN TRIIODIDE: EXPLOSIVE REACTION ON CONTACT.
-METAL HYDRIDES: IGNITE ON CONTACT.
NEN: EXPLOSION ON HEATING.
NEN DIFLUORIDE: EXPLODES ON WARMING.
NYLMAGNESIUM BROMIDE: POSSIBLE EXPLOSION.
NPHOROUS: EXPLOSIVE REACTION ON CONTACT WITH THE LIQUID; IGNITION ON CONTACT WITH THE GAS.

DISPOSAL

6563

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D001. 100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

CONDITIONS TO AVOID

AVOID CONTACT WITH COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC); CONTACT MAY RESULT IN IGNITION OR EXPLOSION. MATERIAL MAY BE POISONOUS; AVOID INHALATION OF VAPORS OR CONTACT WITH SKIN. DO NOT ALLOW MATERIAL TO CONTAMINATE WATER SOURCES.

SPILL AND LEAK PROCEDURES**SOIL SPILL:**

DIG A PIT, POND, LAGOON OR HOLDING AREA TO CONTAIN LIQUID OR SOLID MATERIAL. DIKE SURFACE FLOW USING SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB BULK LIQUID WITH FLY ASH OR CEMENT POWDER. ADD CAUSTIC SODA.

AIR SPILL:

APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

WATER SPILL:

NEUTRALIZE WITH CAUSTIC SODA.

IF DISSOLVED, AT A CONCENTRATION OF 10 PPM OR GREATER, APPLY ACTIVATED CARBON AT TEN TIMES THE AMOUNT THAT HAS BEEN SPILLED.

USE MECHANICAL DREDGES OR LIFTS TO EXTRACT IMMOBILIZED MASSES OF POLLUTION AND PRECIPITATES.

OCCUPATIONAL SPILL:

STOP LEAK IF YOU CAN DO IT WITHOUT RISK. KEEP COMBUSTIBLES AWAY FROM SPILLED MATERIAL. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE AREA AND DENY ENTRY UNTIL GAS HAS DISPERSED. VENTILATE CLOSED SPACES BEFORE ENTERING.

REPORTABLE QUANTITY (RQ): 10 POUNDS

THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT**VENTILATION:**

PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS

000054

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED: MATHESON GAS PRODUCTS; NO DISTRIBUTION EXCEPT AS REQUIRED BY LAW.
CREATION DATE: 01/24/89 REVISION DATE: 08/09/90

-ADDITIONAL INFORMATION-

MATHESON MAKES NO WARRANTIES, GUARANTEES OR REPRESENTATIONS OF ANY KIND OR NATURE WITH RESPECT TO THE PRODUCT OR THIS DATA, EITHER EXPRESSED OR IMPLIED, AND WHETHER ARISING BY LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE WHATSOEVER, WHETHER SPECIAL, INDIRECT, CONSEQUENTIAL OR COMPENSATORY, DIRECTLY OR INDIRECTLY RESULTING FROM THE PUBLICATION, USE OR RELIANCE UPON THIS DATA*

6563

SAFETY DATA SHEET

IDENTIFICATION	ACCEPTED BY OSHA AS ESSENTIALLY SIMILAR TO OSHA FORM 20	THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH ASHLAND OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.		
	PRODUCT NAME GASOLINE - UNLEADED	DATA SHEET NO. 05	DATE PREPARED 4-12-83	CODE NUMBER RME

CLASSIFICATION	PRODUCT CLASS GENERAL OR GENERIC IDENTIFICATION LIGHT PETROLEUM DISTILLATE - MOTOR FUEL	10378
	PASSES D.O.T. TEST FOR HAZARDOUS CLASSIFICATION HAZARD CLASSIFICATION FLAMMABLE LIQUID U.N. 1203	

INGREDIENT	%	TLV
PETROLEUM DISTILLATE (BOILING POINT RANGE 80-440° F)	> 90	300* PPM
* ACGIH RECOMMEND 9 HOUR TIME WEIGHTED AVERAGE EXPOSURE LIMIT FOR GASOLINE.		
NOTE: SEE SECTION IX FOR A SPECIFIC TOXICITY STATEMENT CONCERNING GASOLINE		

INITIAL BOILING POINT	IF LIQUID AT 44°F <input checked="" type="checkbox"/> PRODUCT <input type="checkbox"/> COMPONENT (%)	80 °F @ 760 mmHg
SPECIFIC GRAVITY	<input type="checkbox"/> GREATER THAN WATER <input type="checkbox"/> EQUAL TO WATER <input type="checkbox"/> LESS THAN WATER	@ 0.6 - 0.7 g/cc
VAPOR PRESSURE	IF LIQUID AT 44°F OR WHICH SUBLINE <input type="checkbox"/> PRODUCT <input type="checkbox"/> COMPONENT (%)	@ 500-700 mmHg 68 °F
PERCENT VOLATILES	INGREDIENT WITH INITIAL BOILING POINT BELOW 423°F	100%
VAPOR DENSITY	FOR VOLATILE PORTION OF PRODUCT <input type="checkbox"/> LIGHTER THAN AIR <input checked="" type="checkbox"/> HEAVIER THAN AIR	(air = 1)
EVAPORATION RATE	<input type="checkbox"/> FASTER THAN ETHER <input checked="" type="checkbox"/> SLOWER THAN ETHER	(= 1)

FLASH POINT	<input type="checkbox"/> LESS THAN 73°F <input type="checkbox"/> 73-100°F <input type="checkbox"/> 100-200°F <input type="checkbox"/> MORE THAN 200°F	-45 °F
LOWER EXPLOSION LIMIT	<input checked="" type="checkbox"/> PRODUCT <input type="checkbox"/> LOWEST VALUE OF COMPONENT	1.4
HAZARDOUS DECOMPOSITION PRODUCTS	KNOWN HAZARDOUS PRODUCTS RESULTING FROM HEATING, BURNING, ETC. OR UNREACTED RAW MATERIAL. MAY FORM TOXIC MATERIALS: CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS.	

6563

MATERIAL SAFETY DATA SHEET

GENERAL INFORMATION	ACCEPTED BY OSHA AS ESSENTIALLY SIMILAR TO OSHA FORM 20	THE INFORMATION ACCUMULATED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE WHETHER ORIGINATING WITH AERLAND OR NOT. RECIPIENTS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT THE INFORMATION IS CURRENT, APPLICABLE, AND SUITABLE TO THEIR CIRCUMSTANCES.		
	PRODUCT NAME GASOLINE - UNLEADED	DATA SHEET NO. 05	DATE PREPARED 4-12-83	CODE NUMBER RME

PRODUCT IDENTIFICATION	PRODUCT CLASS LIGHT PETROLEUM DISTILLATE - MOTOR FUEL	GENERAL OR GENERIC IDENTIFICATION 10378
	PASSES O.O.T. TEST FOR HAZARDOUS CLASSIFICATION FLAMMABLE LIQUID	HAZARD CLASSIFICATION U.N. 1203

HAZARDOUS COMPONENTS	INGREDIENT	%	TLV
(SEE DEFINITION ON REVERSE SIDE) * ACGIH RECOMMEND 8 HOUR TIME WEIGHTED AVERAGE EXPOSURE LIMIT FOR GASOLINE. NOTE: SEE SECTION IX FOR A SPECIFIC TOXICITY STATEMENT CONCERNING GASOLINE	PETROLEUM DISTILLATE (BOILING POINT RANGE 80-440° F)	> 90	300* PPM

PHYSICAL DATA	INITIAL BOILING POINT	IF LIQUID AT 68°F <input checked="" type="checkbox"/> PRODUCT <input type="checkbox"/> COMPONENT (%)	80 °F @ 760 mmHg
	SPECIFIC GRAVITY	<input type="checkbox"/> GREATER THAN WATER <input type="checkbox"/> EQUAL TO WATER <input type="checkbox"/> LESS THAN WATER	@ 0.6-0.7 °F
	VAPOR PRESSURE	IF LIQUID AT 68°F OR WHICH SUBLIME <input type="checkbox"/> PRODUCT <input type="checkbox"/> COMPONENT (%)	500-700 mmHg @ 68 °F
	PERCENT VOLATILES	INGREDIENT WITH INITIAL BOILING POINT BELOW 425°F	100%
	VAPOR DENSITY	FOR VOLATILE PORTION OF PRODUCT <input type="checkbox"/> LIGHTER THAN AIR <input checked="" type="checkbox"/> HEAVIER THAN AIR	(air = 1)
	EVAPORATION RATE	<input type="checkbox"/> FASTER THAN ETHER <input checked="" type="checkbox"/> SLOWER THAN ETHER	(= 1)

FIRE AND EXPLOSION DATA	FLASH POINT	<input type="checkbox"/> LESS THAN 73°F <input type="checkbox"/> 73-100°F <input type="checkbox"/> 100-200°F <input type="checkbox"/> MORE THAN 200°F	-45 °F
	LOWER EXPLOSION LIMIT	<input checked="" type="checkbox"/> PRODUCT <input type="checkbox"/> LOWEST VALUE OF COMPONENT	1.4
(CONTINUED BACK OF THIS PAGE)	HAZARDOUS DECOMPOSITION PRODUCTS	KNOWN HAZARDOUS PRODUCTS RESULTING FROM HEATING, BURNING, ETC. OR UNREACTED RAW MATERIAL. MAY FORM TOXIC MATERIALS: CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS.	

FIRE AND EXPLOSION DATA (CONTINUED)	SPECIAL FIRE FIGHTING PROCEDURES	WATER MAY BE INEFFECTIVE. SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.
	UNUSUAL FIRE AND EXPLOSION HAZARDS	PRODUCT IGNITES EXPLOSIVELY. *SEE SECTION IX.
	EXTINGUISHING MEDIA	<input checked="" type="checkbox"/> DRY CHEMICAL <input type="checkbox"/> WATER FOG <input checked="" type="checkbox"/> CARBON DIOXIDE <input checked="" type="checkbox"/> REGULAR FOAM <input type="checkbox"/> ALCOHOL FOAM <input type="checkbox"/> OTHER: _____
HEALTH HAZARD DATA	THRESHOLD LIMIT VALUE	<small>OSHA ESTABLISHED VALUE</small> NOT ESTABLISHED FOR PRODUCT. SEE SECTION II.
	EFFECTS OF OVER-EXPOSURE FOR <input type="checkbox"/> PRODUCT <input type="checkbox"/> COMPONENT	<small>KNOWN EFFECTS LISTED, UNLESS NOT APPLICABLE DUE TO PHYSICAL FORM OF PRODUCT</small> EYES-CAN CAUSE SEVERE IRRITATION, REDNESS, TEARING BLURRED VISION. SKIN-PROLONGED OR REPEATED CONTACT CAN CAUSE MODERATE IRRITATION, DEFATTING, DERMATITIS. BREATHING-EXCESSIVE INHALATION OF VAPORS CAN CAUSE NASAL AND RESPIRATORY IRRITATION, DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE, POSSIBLE UNCONSCIOUSNESS, AND EVEN ASPHYXIATION. SWALLOWING-CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING, DIARRHEA. ASPIRATION OF MATERIAL INTO THE LUNGS CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.
	SPECIAL FIRST AID ACTION 	<small>IF ON SKIN</small> THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER, REMOVE CONTAMINATED CLOTHING. LAUNDRY CONTAMINATED CLOTHING BEFORE RE-USE. <small>IF IN EYES</small> FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION. <small>IF SWALLOWED</small> DO NOT INDUCE VOMITING, KEEP PERSON WARM, QUIET, AND GET MEDICAL ATTENTION. ASPIRATION OF MATERIAL INTO THE LUNGS DUE TO VOMITING CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL. <small>IF BREATHED</small> IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR. IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. KEEP PERSON WARM, QUIET, AND GET MEDICAL ATTENTION.

6563

ACTIVITY DATA	FULFILLMENT	<input type="checkbox"/> CAN OCCUR	<input checked="" type="checkbox"/> CANNOT OCCUR
	STABILITY	CONDITIONS TO AVOID IF UNSTABLE UNDER NORMAL CONDITIONS	
	INCOMPATIBILITY (MATERIALS TO AVOID)	COMMON MATERIALS OR CONTAMINANTS WHICH WOULD RESULT IN A HAZARDOUS REACTION WITH THE PRODUCT ARE SHOWN	
ALL RISK DURES	STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	SMALL SPILL	ELIMINATE ALL SOURCES OF IGNITION. VENTILATE AREA, ABSORB LIQUID ON PAPER, VERMICULITE FLOOR ABSORBENT OR OTHER ABSORBENT MATERIAL AND TRANSFER TO HOOD. ALLOW TO EVAPORATE.
		LARGE SPILL	ELIMINATE ALL IGNITION SOURCES (FLARES, FLAMES INCLUDING PILOT LIGHTS, ELECTRICAL SPARKS). PERSONS NOT WEARING PROTECTIVE EQUIPMENT SHOULD BE EXCLUDED FROM AREA OF SPILL UNTIL CLEAN-UP HAS BEEN COMPLETED. STOP SPILL AT SOURCE, DIKE AREA OF SPILL TO PREVENT SPREADING, PUMP LIQUID TO SALVAGE TANK. REMAINING LIQUID MAY BE TAKEN UP ON SAND, CLAY EARTH, FLOOR ABSORBENT, OR OTHER MATERIAL AND SHOVEL INTO CONTAINERS.
WASTE DISPOSAL METHOD	WASTE DISPOSAL METHOD	SMALL SPILL	ALLOW VOLATILE PORTION TO EVAPORATE IN HOOD. ALLOW SUFFICIENT TIME FOR VAPORS TO COMPLETELY CLEAR HOOD DUCT WORK. DESTROY REMAINING MATERIAL BY BURNING IN AN IRON PAN.
		LARGE SPILL	DESTROY BY LIQUID INCINERATION.
EFFECTIVE EQUIPMENT TO BE USED	RESPIRATORY PROTECTION	IF TLV OF THE PRODUCT OR ANY COMPONENT IS EXCEEDED, A NIOSH MESA JOINTLY APPROVED SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IS ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MESA RESPIRATORS UNDER SPECIFIED CONDITIONS. (SEE YOUR SAFETY EQUIPMENT SUPPLIER).	
	PROTECTIVE GLOVES	WEAR RESISTANT GLOVES SUCH AS: NEOPRENE, BUNA-N.	
	EYE PROTECTION	CHEMICAL SPLASH GOGGLES IN COMPLIANCE WITH OSHA REGULATIONS ARE ADVISED; HOWEVER, OSHA REGULATIONS ALSO PERMIT OTHER TYPE SAFETY GLASSES. (CONSULT YOUR SAFETY EQUIPMENT SUPPLIER).	
	VENTILATION	PROVIDE SUFFICIENT MECHANICAL (GENERAL), AND/OR LOCAL EXHAUST VENTILATION TO MAINTAIN EXPOSURE BELOW TLV'S.	
	OTHER PROTECTIVE EQUIPMENT	TO PREVENT REPEATED OR PROLONGED SKIN CONTACT, WEAR IMPERVIOUS CLOTHING AND BOOTS.	

THE ATLANTIC RICHFIELD COMPANY FILED A TSCA 8(e) NOTICE WITH THE ENVIRONMENTAL PROTECTION AGENCY ON DECEMBER 9, 1981 CONCERNING AN AMERICAN PETROLEUM INSTITUTE SPONSORED CHRONIC INHALATION STUDY. THE STUDY HAS SHOWN CHRONIC EXPOSURE TO UNLEADED GASOLINE VAPORS HAS CAUSED ADVERSE HEALTH EFFECTS IN CERTAIN LABORATORY TEST ANIMALS. MALE RATS EXPOSED FOR APPROXIMATELY TWO YEARS TO VARIOUS LEVELS OF UNLEADED GASOLINE VAPORS SHOWED INCREASED LEVELS OF DEGENERATIVE KIDNEY DISEASE AND KIDNEY CANCER. IT SHOULD BE NOTED THAT THE KIDNEY CANCERS OCCURRED LATE IN THE ANIMALS' LIVES AND WERE NOT THE CAUSE OF DEATH IN ANY CASE. THE KIDNEYS OF FEMALE RATS AND MALE AND FEMALE MICE ALSO IN THE STUDY DID NOT SHOW SIMILAR TOXIC RESPONSES. HOWEVER, FEMALE MICE EXPOSED TO THE HIGHEST DOSE LEVELS OF UNLEADED GASOLINE DID SHOW SLIGHTLY HIGHER LEVELS OF LIVER CANCER.

*(CONTD. FROM SECTION IV)

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR MAY BE MOVED BY VENTILATION AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, OR OTHER SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THIS DATA SHEET MUST BE OBSERVED.

HAZARDOUS INGREDIENT IS ONE WHICH MEETS ONE OR MORE OF THE FOLLOWING CRITERIA:

1. It is listed in the annual Registry of Toxic Effects of Chemical Substances, or is known to be toxic within the parameters of that Registry, and is present at a level of 1% or greater. DOT Poisons are listed if present at any level.
2. It has an OSHA established 8-hour time-weighted average or acceptable ceiling concentration (c), or an American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Value, and by the nature of the product or its known use, is likely to become airborne.
3. It contributes to one or more of the following hazards of the product:
 - a. Flashpoint below 200°F (cc), or subject to spontaneous heating or decomposition.
 - b. Causes skin burns. (DOT)
 - c. Strong oxidizing agent. (DOT)
 - d. Subject to hazardous polymerization.

Each hazardous ingredient is listed by chemical, generic, or proprietary name, its level in the product is expressed as 1% or less, 1-10%, 10-30%, 30-60%, or greater than 60%, or by other means if such information is proprietary. Adopted ACGIH values are only listed, with appropriate notation, where OSHA values are not available.

THE ATLANTIC RICHFIELD COMPANY FILED A TSCA 8(e) NOTICE WITH THE ENVIRONMENTAL PROTECTION AGENCY ON DECEMBER 9, 1981 CONCERNING AN AMERICAN PETROLEUM INSTITUTE SPONSORED CHRONIC INHALATION STUDY. THE STUDY HAS SHOWN CHRONIC EXPOSURE TO UNLEADED GASOLINE VAPORS HAS CAUSED ADVERSE HEALTH EFFECTS IN CERTAIN LABORATORY TEST ANIMALS. MALE RATS EXPOSED FOR APPROXIMATELY TWO YEARS TO VARIOUS LEVELS OF UNLEADED GASOLINE VAPORS SHOWED INCREASED LEVELS OF DEGENERATIVE KIDNEY DISEASE AND KIDNEY CANCER. IT SHOULD BE NOTED THAT THE KIDNEY CANCERS OCCURRED LATE IN THE ANIMALS' LIVES AND WERE NOT THE CAUSE OF DEATH IN ANY CASE. THE KIDNEYS OF MALE RATS AND MALE AND FEMALE MICE ALSO IN THE STUDY DID NOT SHOW SIMILAR TOXIC RESPONSES. HOWEVER, FEMALE MICE EXPOSED TO THE HIGHEST DOSE LEVELS OF UNLEADED GASOLINE DID SHOW SLIGHTLY HIGHER LEVELS OF LIVER CANCER.

CONTD. FROM SECTION IV)

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL ALONG THE GROUND OR MAY BE MOVED BY WIND DILUTION AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, OR OTHER SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINT.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPOR, LIQUID, AND/OR SOLID), ALL HAZARD PRECAUTIONS GIVEN IN THIS DATA SHEET MUST BE OBSERVED.

HAZARDOUS INGREDIENT IS ONE WHICH MEETS ONE OR MORE OF THE FOLLOWING CRITERIA:

1. It is listed in the annual Registry of Toxic Effects of Chemical Substances, or is known to be toxic within the parameters of that Registry, and is present at a level of 1% or greater. DOT Poisons are listed if present at any level.
2. It has an OSHA established 8-hour time-weighted average or acceptable ceiling concentration (c), or an American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Value, and by the nature of the product or its known use, is likely to become airborne.
3. It contributes to one or more of the following hazards of the product:
 - a. Flashpoint below 200°F (lcc), or subject to spontaneous heating or decomposition.
 - b. Causes skin burns. (DOT)
 - c. Strong oxidizing agent. (DOT)
 - d. Subject to hazardous polymerization.

A hazardous ingredient is listed by chemical, generic, or proprietary name, its level in the product is expressed as 1% or less, 1-10%, 10-20%, 21-60%, or greater than 60%, or by other means if such information is proprietary. Adopted ACGIH values are only listed, with appropriate notation, where OSHA values are not available.

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LIQUID CARBONIC
 SPECIALTY GAS CORPORATION
 133 SOUTH LA SALLE STREET • CHICAGO, ILLINOIS 60607-4732
 PHONE: (312) 833-2500

Isobutylene 6563

Revision Feb. 1987

24 Hour Emergency Phone Numbers: (504)673-8831; CHEMREC (800)424-9300

SECTION I--PRODUCT IDENTIFICATION

CHEMICAL NAME: Isobutylene

COMMON NAME AND SYNONYMS: Isobutene, 2-Methylpropene

CHEMICAL FAMILY: Aliphatic Hydrocarbons

FORMULA: $(CH_2)_2CH$

SECTION II--HAZARDOUS INGREDIENTS

MATERIAL	VOLUME %	CAS NO.	1985-6 ACGIH TLV LIMITS	
Isobutylene	99.5	115-11-7	TWA	1,000 ppm
			STEL	1,250 ppm

for LPG (Liquified Petroleum Gas)

SECTION III--PHYSICAL DATA

BOILING POINT (°F.)	19.6	SPECIFIC GRAVITY (H ₂ O=1)	0.594 @ 20°C
VAPOR PRESSURE (mmHg.)	24.3 psig @ 70°F	% VOLATILE BY VOLUME	100
VAPOR DENSITY (AIR=1)	2.011	EVAPORATION RATE (BUTYL ACETATE=1)	Rapid
SOLUBILITY IN WATER	Insoluble		
APPEARANCE AND ODOR	A colorless flammable gas with an unpleasant odor similar to coal gas.		

SECTION IV--FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) -105°F(C.C.) FLAMMABLE LIMITS LEL 1.8 UEL 8.8
 EXTINGUISHING MEDIA: Carbon Dioxide, dry chemical, halon and water.
 SPECIAL FIRE FIGHTING PROCEDURES: Stop flow of gas if possible. Use water spray to cool fire exposed containers. If feasible, allow fire to burn itself out to avoid accumulation of an unburned flammable mixture.
 UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep personnel away from fire scene since containers can rupture violently when exposed to fire. Fire fighters should use self-contained breathing apparatus and protective clothing. Unless gas supply is shut-off, it can reignite or explode. Vapor can flow to distant ignition source than flash back.

SECTION V--HEALTH HAZARD DATA

Route(s) of Entry: Inhalation? Yes Skin? Yes Ingestion? No
 Carcinogenicity: NTP? No IARC Monographs? No OSHA? No
 EFFECTS OF OVEREXPOSURE: Isobutylene is defined as a simple asphyxiant by displacing air. Can cause dizziness, drowsiness, and eventual unconsciousness. Liquid contact with eyes or skin may cause tissue freezing or frostbite.
 EMERGENCY AND FIRST AID PROCEDURES: If inhaled: Remove to fresh air. Obtain prompt medical assistance. Unconscious persons should be given artificial resuscitation and supplemental oxygen. Keep warm and at rest.
Eye or skin contact: Promptly flush affected areas with copious quantities of tepid water (105-115°F). Remove contaminated clothing. A physician should see the patient promptly, if cryogenic burn has resulted in blistering of the dermal surface or deep tissue freezing.

ABILITY: UNSTABLE () STABLE (X)

CONDITIONS TO AVOID: Heat, flame, direct sunlight and ignition sources.

COMPATABILITY (MATERIALS TO AVOID): Oxygen and strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS: CO₂ and water vapor. Can produce carbon monoxide when oxidized with deficiency of oxygen.

HAZARDOUS POLYMERIZATION: MAY OCCUR () WON'T OCCUR (X)

CONDITIONS TO AVOID: N/A

SECTION VII--SPILL OR LEAK PROCEDURES

ACTIONS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Evacuate all personnel from affected area. Stop leaks if possible. Emergency personnel should use self-contained breathing apparatus and should have protective clothing. Eliminate sources of ignition. -Supply maximum ventilation with explosion-proof equipment.

WASTE DISPOSAL METHOD: Relocate leaking containers in a remote downwind area, close doors, and allow to vent to atmosphere. Incinerate gas by controlled burning, if possible. Follow Federal, State and Local regulations.

SECTION VIII--SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Use self-contained breathing apparatus when necessary.

VENTILATION: LOCAL EXHAUST (X) Provide adequate ventilation in sumps, MECHANICAL (GENERAL) (X) confined areas and to meet TWA standards.

PROTECTIVE GLOVES: Rubber or plastic EYE PROTECTION: Safety goggles, safety glasses or face shield.

OTHER PROTECTIVE EQUIPMENT: Safety shoes, eye-wash, safety shower and protective clothing if liquid contact potential exists.

SECTION IX--SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat and ignition. Keep away from oxidizers such as oxygen, chlorine and acetylene. Electrical equipment should be explosion-proof. Piping connections and containers should be grounded. Use check valve or trap in discharge line to prevent hazardous back flow. Post "No Smoking" or "Open Flame" signs in storage and use areas. Cylinder temperature should be kept under 130°F.

OTHER PRECAUTIONS: Use only DOT or ASME coded containers. Electrically ground all lines and equipment. Cylinders must not be recharged except by or with consent of Liquid Carbonic. For more information, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres" and CGA Pamphlet P-1 "Safe Handling of Compressed Gases in Containers."

No guaranty is made as to the accuracy of any data or statement contained herein. While this material is furnished in good faith, NO WARRANTY EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS OR OTHERWISE IS MADE. This material is offered only for your consideration; investigation and verification and Liquid Carbonic shall not in any event be liable for special, incidental or consequential damages in connection with its publication.

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6563

WE BELIEVE SACRIFICING QUALITY FOR PROFIT

TEXAS LEAD & SUPPLY CO. INC.

Phone (409) 712-6622
662-3884
P.O. Office Box 19981
1506 CENTRAL EXPRESS
HOUSTON, TEXAS 77218

DEC. 17 1991



MATERIAL SAFETY DATA SHEET

VENDOR AND THIRD PERSONS ASSUME THE RISK OF INJURY PROBABLY CAUSED BY THE MATERIAL IF REASONABLE SAFETY PROCEDURES ARE NOT FOLLOWED AS PROVIDED FOR IN THIS DATA SHEET, AND VENDOR SHALL NOT BE LIABLE FOR SUCH INJURY. FURTHERMORE, VENDOR SHALL NOT BE LIABLE FOR INJURY TO VENDOR OR THIRD PERSONS PROBABLY CAUSED BY ABNORMAL USE OF THE MATERIAL EVEN IF REASONABLE SAFETY PROCEDURES ARE FOLLOWED.

ALL PERSONS USING THIS PRODUCT, ALL PERSONS WORKING IN AN AREA WHERE THIS PRODUCT IS USED, AND ALL PERSONS HANDLING THIS PRODUCT SHOULD BE FAMILIAR WITH THE CONTENTS OF THIS DATA SHEET. POSTING THIS DOCUMENT FOR EMPLOYEE NOTIFICATION IS RECOMMENDED BY THE VENDOR.

10324
LEAD

TRADE NAMES	Soft Lead
SYNONYMS	Calcium, Strontium and/or Tin Lead Alloy; Pure Lead
INTENDED USE	Industrial

II HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT (CAS#)	WEIGHT %	HAZARD DATA
Lead (CAS# 7439-92-1)	97-100	50 ug/m ³ *
Calcium (CAS# 7440-70-2)	0-3	5 mg/m ³ *
Strontium (CAS# 7440-24-6)	0-3	N/A
Tin (CAS# 7440-31-5)	0-3	2 mg/m ³ **
Copper (CAS# 7440-50-8)	0-1	100 ug/m ³ *
Aluminum (CAS# 7429905)	0-1	5 mg/m ³ *

* Ref: Occupational Safety & Health Standards, General Industry, Standards Part 1910
** 1981 ACGIH Threshold Limit Values

III PHYSICAL DATA

BOILING POINT @ 760 MM Hg	Greater than 2709°F	MELTING POINT	621-1112°F
SPECIFIC GRAVITY (H ₂ O = 1)	11.0 - 11.3	VAPOR PRESSURE	Not Applicable
VAPOR DENSITY (AIR = 1)	Not Applicable	SOLUBILITY IN H ₂ O (% BY WT)	Negligible
% VOLATILES BY VOL	Not Applicable	EVAPORATION RATE (BUTYL ACETATE = 1)	Not Applicable
APPEARANCE AND ODOR	Metallic silver-gray; no apparent odor		

IV HEALTH HAZARD INFORMATION

1126

Routes of Exposure When Processing or Handling	
Inhalation	Dust, vapor and/or fume may be irritating to the respiratory system, and can result in both acute and chronic overexposure.
Skin Contact	Dust, vapor and/or fume may cause irritation.
Skin Absorption	Dust, vapor and/or fume are not readily absorbed through the skin.
Eye Contact	Dust, vapor and/or fume may cause irritation.
Ingestion	Dust, vapor and/or fume may be absorbed by the digestive system, and can result in both acute and chronic overexposure.
Effects of Overexposure	
Acute Overexposure	If left untreated: headache, chills, nausea, weakness, vomiting, loss of appetite, uncoordinated body movements, convulsions, stupor, and possibly coma.
Chronic Overexposure	If left untreated: weakness, insomnia, hypertension, slight irritation to skin and eyes, metallic taste in mouth, anemia, constipation, headache, muscle and joint pains, metal fume fever, ulceration of nasal septum, neuromuscular dysfunction, possible paralysis and encephalopathy.
Emergency and First Aid Procedures	
Eyes	Flush with copious quantities of water. Get immediate medical attention.
Skin	Wash thoroughly with soap and water.
Inhalation	Remove from exposure. Get medical attention if experiencing effects of overexposure.
Ingestion	Get immediate medical attention.
Notes to Physician	
Lead and its inorganic compounds are neurotoxins which may produce peripheral neuropathy. For an overview of the effects of lead exposure, consult Occupational Safety and Health Administration Appendix A of Occupational Exposure to Lead (29CFR1910.1025). Tin and its inorganic compounds are primary chemical irritants of the skin, and stannic oxide has been shown to cause benign pneumoconiosis. Calcium and strontium compounds should be considered toxic only when they contain toxic substances. Calcium oxide and strontium oxide can be irritating to the skin, eyes and mucous membranes. Inhalation of copper dust has caused, in animals, hemolysis of the red blood cells, deposition of hemofusin in the liver and pancreas, and injury to the lung cells. Copper is not normally toxic when ingested orally in amounts expected from occupational exposure. Exposure to copper dust, vapor or fumes may cause metal fume fever. Aluminum powder causes pneumoconiosis in humans when inhaled as a very fine powder in massive concentrations.	

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V FIRE AND EXPLOSION DATA

Flash Point (Test Method)	Not Applicable	Autoignition Temperature	Not Applicable
Flammable Limits in Air (% By Vol)	Lower	Not Applicable	Upper
Extinguishing Media	Dry chemical or carbon dioxide should be used on surrounding fire. Do not use water on fires where molten metal is present.		
Special Fire Fighting Procedures	Use full body protective clothing and full-facepiece, self-contained breathing apparatus operated in a positive-pressure mode.		
Unusual Fire and Explosion Hazard	Molten metals produce fume, vapor, and/or dust that may be toxic and/or respiratory irritants. The product, or its dust, can react vigorously with strong oxidizing agents.		

VI REACTIVITY DATA

Conditions Contributing to Instability	Not Applicable
Incompatibility	Strong oxidizers and this product may liberate hydrogen gas.
Hazardous Decomposition Products	High temperatures may produce heavy metal fume, vapor and/or dust.
Conditions Contributing to Hazardous Polymerization	Not Applicable

VII SPILL OR LEAK PROCEDURES

Steps To Be Taken if Material is Released or Spilled	Dust material should be vacuumed, or wet swept where vacuuming is not feasible. Particulate matter should be stored in dry containers for later disposal. Do not use compressed air or dry sweeping as a means of cleaning.
Neutralizing Chemicals	Not Applicable
Waste Disposal Method	Dispose of toxic substances and hazardous wastes in accordance with local, state and federal regulations.

VIII SPECIAL PROTECTION INFORMATION

Ventilation Requirements	Ventilation, as described in the Industrial Ventilation Manual produced by the American Conference of Governmental Industrial Hygienists, shall be provided in areas where exposures are above the permissible exposure limits or threshold limit values specified by OSHA or other local, state and federal regulations.
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SPECIFIC PERSONAL PROTECTION EQUIPMENT

Respiratory	As specified by 29CFR 1910.1025 Subpart (f) of the Federal Occupational Safety and Health Administration Standard for Occupational Exposure to Lead. Other local and state regulations may also apply.
Eye	Face shield or vented goggles should be used around molten metal.
Glove	Gloves should be worn when handling the product is necessary.
Other Clothing and Equipment	Coveralls, or other full body clothing, shall be worn during product use and properly laundered after use, with the wash water disposed of in accordance with local, state and federal regulations. Hard hat, safety boots and other safety equipment should be worn if appropriate for the industrial environment. Personal clothing and shoes should be protected from contamination with this product.

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS

There are two major means of heavy metal absorption; namely, inhalation and ingestion. Most inhalation problems can be prevented with adequate use of aforementioned ventilation and respirator information. Always exercise normal, good personal hygiene prior to smoking or eating. Smoking and eating should be confined to non-contaminated areas.

Work clothes and equipment should remain in designated lead contaminated areas, and never taken home or laundered with personal clothing. Launder contaminated clothing before reuse.

Wash hands, face, neck and arms thoroughly before eating or smoking.

The product is intended for industrial use only, and should be isolated from children and their environment.

OTHER HANDLING AND STORAGE REQUIREMENTS

Store in dry area where accidental contact with acids is not possible.

Avoid skin contact.

Adhere to all personal protection equipment procedures when handling, and ventilation requirements when in heavy metal exposures are above permissible exposure limits or threshold limit values.

Before Using This Product Be Familiar With The Information Contained In:

The Federal Standard for Occupational Exposure to Lead (29CFR 1910.1025); Published in the Federal Register on Tuesday, November 14, 1978, by the Occupational Safety and Health Administration.

PREPARED BY: TEXAS LEAD & SUPPLY CO., INC

ADDRESS: P.O. Box 10901, 5800 Central East, Houston, TX 77018

DATE

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05/10/86

MATERIAL SAFETY DATA SHEET 9.112

1491

SECTION I - NAME AND PRODUCT

MFG NAME AND ADDRESS
EM SCIENCES /MCB
P.O. BOX 5018

CHEMICAL NUMBER: MMX0485-5
ITEM NUMBER : 432168
VNDR CATLG NBR :
ENTRY DATE : 11-13-85
CHANGE DATE :
EMERGENCY PHONE: 609 3549200

CHERRYHILL
NJ 080340395

CHEMICAL NAME :
METHANOL ANHYD RGT

TRADE NAME SYN :
METHYL ALCOHOL, WOOD ALCOHOL
CHEMICAL FAMILY :
ALCOHOLS

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS:
REFER TO SECTION 4-9

SECTION III - PHYSICAL DATA S/10 = SEE SECTION X

BOIL. POINT	SPECIFIC GRAVITY	VAPOR PRESS.	MELT. POINT	VAPOR DENSITY	EVAP. RATE	SOLUBLE IN WATER	PERCENT VOLATILE
64.5C	0.79	96	-144F	1.1	5.91	SOLBLE	100

BUTYL ACETATE

APPEARANCE AND ODOR:
COLORLESS LIQUID, SLIGHT ALCOHOLIC ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 52 DEG. F. (TCC)
FLAMMABLE LEL: 6.7%
FLAMMABLE UEL: 35%

EXTINGUISHING MEDIA:
CO2, DRY CHEMICAL, FOAM, WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.
WATER SPRAY TO DISPERSE VAPORS.

SPECIAL FIRE FIGHTING PROCEDURES:
WEAR SELF-CONTAINED BREATHING APPARATUS

UNUSUAL FIRE AND EXPLOSION HAZARDS:
ADDITION OF WATER TO BURNING FUEL MAY REDUCE INTENSITY OF FLAME.

000066

MATERIAL SAFETY DATA SHEET 9.112

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SECTION V - HEALTH HAZARD DATA

THRESHOLD-LIMIT-VALUE:
STD-AIR: TWA 200 PPM

TXDS: ORL-HMN LOLO: 340 MG/KG

EFFECTS OF OVEREXPOSURE:

(TOXIC BY FUMES AND CONTACT; INGESTION MAY BE FATAL AND DAILY
IT WILL HAVE CUMULATIVE EFFECT. MAY CAUSE INEBRIATION, NAUSEA,
ING; CENTRAL NERVOUS SYSTEM DAMAGE; BLINDNESS; DEFATTING, DRYING AND
ING OF THE SKIN.

EMERGENCY AND FIRST AID PROCEDURES:

WASH WITH SOAP/WATER; GET MEDICAL ASSISTANCE FOR SKIN IRRITATION.
FLUSH WITH WATER 15 MINUTES; GET MEDICAL ASSISTANCE.
TION: REMOVE TO FRESH AIR; GET MEDICAL ASSISTANCE.
ION: INDUCE VOMITING IF CONSCIOUS; GET MEDICAL ASSISTANCE.

SECTION VI - REACTIVITY DATA

INDICATORS: STABILITY - STABLE POLYMERIZATION - MAY NOT OCCUR
CONDITIONS TO AVOID:
SPARKS, OPEN FLAME

INCOMPATIBILITY (MATERIAL TO AVOID):
OTHERS

HAZARDOUS DECOMPOSITION OR BY PRODUCTS:

POLYMERIZATION CONDITIONS TO AVOID:
N/A

SECTION VII - SPILL OR LEAK PROCEDURES OR DISPOSAL

MATERIAL RELEASE OR SPILL PROCEDURES:

REMOVE NON-ESSENTIAL PERSONNEL. ABSORB WITH SAND.

WASTE DISPOSAL METHOD:

PERFORMED IN COMPLIANCE WITH ALL CURRENT LOCAL, STATE, AND
REGULATIONS.

000067



05/10/86

SEQ. NO. 1490

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:
WEAR AIR-SUPPLIED MASK. DO NOT BREATHE VAPOR.
VENTILATION - LOCAL:
PROVIDE ADEQUATE LOCAL EXHAUST VENTILATION
VENTILATION - MECHANICAL:
PROVIDE ADEQUATE GENERAL MECHANICAL VENTILATION.
VENTILATION - SPECIAL:
N/A
OTHER
DO NOT GET IN EYES OR ON CLOTHING. FACE SHIELD MAY BE NECESSARY
PROTECTIVE GLOVES:
SAFETY GLOVES
EYE PROTECTION:
SAFETY GOGGLES

SECTION IX - SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:
KEEP CONTAINER TIGHTLY CLOSED. NO SMOKING OR FLARES. STORE IN A WELL-VENTILATED AREA, AWAY FROM SOURCES OF IGNITION. AVOID PROLONGED OR REPEATED CONTACT WITH SKIN. IF INGESTED, CAN CAUSE BLINDNESS; CANNOT BE MADE NON-POISONOUS.

SECTION X - OTHER INFORMATION

NFPA 704: 1 3 0
HEALTH FLAMMABILITY REACTIVITY

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATION PURPOSES ONLY. WE MAKE NO WARRANTIES, EXPRESS OR IMPLIED, AND ASSUME NO LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION.

NOTE: NA OR N/A DENOTES NOT-AVAILABLE OR NON-APPLICABLE

000068



New Jersey Department of Health

HAZARDOUS SUBSTANCE FACT SHEET

COMMON NAME: POLYCHLORINATED BIPHENYLS

CAS NUMBER: 1336-36-3 **DOT NUMBER:** UN 2315

HAZARD SUMMARY

- * Polychlorinated Biphenyls can affect you when breathed in and by passing through your skin.
- * Polychlorinated Biphenyls are CARCINOGENS--HANDLE WITH EXTREME CAUTION.
- * They may be teratogens and may damage the adult reproductive system.
- * Exposure can cause an acne-like skin rash (called "chloracne").
- * They can damage the liver.
- * High exposure can damage the nervous system, causing numbness, weakness and tingling ("pins and needles") in the arms and legs.

IDENTIFICATION

Polychlorinated Biphenyls are a mixture of chemicals that are clear to yellow oily liquids or solids. They are used in closed electrical systems of capacitors, transformers and insulating fluids.

REASON FOR CITATION

- * Polychlorinated Biphenyls are on the Workplace Hazardous Substance List because they are regulated by OSHA and cited by NIOSH, DOT, IARC and NTP.
- * These chemicals are on the Special Health Hazard Substance List because they are CANCER-CAUSING AGENTS and TERATOGENS.
- * Definitions are provided on page 5.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 1 mg/m³ (42% Chlorine) and 0.5 mg/m³ (54% Chlorine) averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 0.001 mg/m³ averaged over a 10-hour workshift.

- * The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
- * Polychlorinated Biphenyls are PROBABLE CANCER-CAUSING AGENTS in humans. There may be no safe level of exposure to carcinogens, so all contact should be reduced to the lowest possible level.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

- * Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.20.
- * If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WAYS OF REDUCING EXPOSURE

- * A regulated, marked area should be established where Polychlorinated Biphenyls are handled, used, or stored as recommended by NIOSH.
- * Wear full body protective work clothing.
- * Wash thoroughly immediately after exposure to Polychlorinated Biphenyls and on exit from the work area.
- * Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of Polychlorinated Biphenyls to potentially exposed workers.

Sheet is a summary source of information for workers, employers, and residents. Health professionals will find it useful. If this is a part of a mixture, this Fact Sheet should be used along with the manufacturer-supplied Material Safety Data Sheet (MSDS).

ADDITIONAL INFORMATION

Acute Effects
Exposure to Polychlorinated Biphenyls can cause acute (short-term) health effects to occur immediately or shortly after exposure.

Inhalation of the vapor can irritate the nose and throat. High concentrations can damage the liver.

Chronic Effects
Exposure to Polychlorinated Biphenyls can cause chronic (long-term) health effects to occur at some time after exposure. Polychlorinated Biphenyls and can cause effects over months or years.

Polychlorinated Biphenyls are PROBABLE CARCINOGENS in humans. There is limited evidence that they cause cancer in humans and they have been shown to cause liver cancer in rats. Scientists believe there is no safe level of exposure to a cancer-causing agent. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard
Polychlorinated Biphenyls may be TERATOGENS in humans since they have been shown to be teratogens in animals. They can be passed to a child through breast milk.

Polychlorinated Biphenyls can affect the reproductive system of adults.

Long-Term Effects
Prolonged exposures can cause liver damage.

Polychlorinated Biphenyls can cause a skin-like rash (chloracne). These rashes can persist for years. High concentrations can damage the nervous system, causing numbness, weakness, and

tingling ("pins and needles") in the arms and legs.

MEDICAL

Medical Testing
Before beginning employment and at regular intervals after that, the following are recommended:

- * Liver function tests.
- * Serum triglycerides level.
- * Exam of the skin.

If symptoms develop or overexposure is suspected, the following may be useful:

- * Blood PCB levels.
- * Nerve conduction studies should be considered.

Any evaluation should include a careful history of past and present symptoms with a physical exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.20.

Mixed Exposures

Because more than light alcohol consumption can cause liver damage, drinking alcohol can increase the liver damage caused by Polychlorinated Biphenyls.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, ENGINEERING CONTROLS are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace, and (3) whether harmful skin or eye contact could occur. Special controls should be

in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

- * Where possible, automatically transfer Polychlorinated Biphenyls from drums or other storage containers to process containers.
- * Specific engineering controls are recommended for this chemical by NIOSH. Refer to the NIOSH criteria document on Occupational Exposure to Polychlorinated Biphenyls #77-225.

Good WORK PRACTICES can help to reduce hazardous exposures. The following work practices are recommended:

- * Workers whose clothing has been contaminated by Polychlorinated Biphenyls should change into clean clothing promptly.
- * Do not take contaminated work clothes home. Family members could be exposed.
- * Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to Polychlorinated Biphenyls.
- * If there is the possibility of skin exposure, emergency shower facilities should be provided.
- * On skin contact with Polychlorinated Biphenyls, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted Polychlorinated Biphenyls, whether or not known skin contact has occurred.
- * Do not eat, smoke, or drink where Polychlorinated Biphenyls are handled, processed, or stored, since the chemicals can be swallowed. Wash hands carefully before eating or smoking.
- * If solid, when vacuuming, a high efficiency particulate absolute (HEPA) filter should be used, not a standard shop vacuum.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a

while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

- * Avoid skin contact with Polychlorinated Biphenyls. Wear protective gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
- * All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
- * VITON is recommended as a good protective material.

Eye Protection

- * Eye protection is included in the recommended respiratory protection.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in OSHA 1910.134.

- * At any exposure level, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in the positive pressure mode or with a full facepiece, hood, or helmet in the continuous flow mode, or use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive pressure mode.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?

A: Yes, because long-term effects can occur from repeated exposures to a chem-

levels not high enough to make
fatally sick.

my chances of getting sick
I've been exposed to chemicals?
likelihood of becoming sick from
is increased as the amount
of exposure increases. This is deter-
mined by the length of time and the
amount of material to which someone is

higher exposures more likely?
What are the activities which increase risk of ex-
posure? (e.g., dust releasing opera-
grinding, mixing, blasting,
etc.), other physical and me-
chanical processes (heating, pouring,
spills and evaporation from
surface areas such as open con-
tainers, and "confined space" expo-
sures (working inside vats, reactors,
small rooms, etc.).

Is the risk of getting sick higher for
community residents?
Exposures in the community, ex-
cept in cases of fires or
accidents, are usually much lower than
found in the workplace. How-
ever, people in the community may be
exposed to contaminated water as well
as chemicals in the air over long
periods. Because of this, and because
of the vulnerability of children or people who
are already ill, community exposures
can cause health problems.

Do all chemicals cause cancer?
Not all chemicals tested by science
are cancer-causing.

Can I be concerned if a chemical
causes cancer in animals?
Most scientists agree that a
chemical that causes cancer in animals
should be treated as a suspected human
carcinogen unless proven otherwise.

Do they test animals using much
higher levels of a chemical than peo-
ple are exposed to?
That's so effects can be seen
earlier using fewer animals. But
high doses alone don't cause cancer.
If it's a cancer agent. In fact,
the lowest dose of a chemical that causes cancer in ani-

mals at high doses could cause cancer
in humans exposed to low doses.

6563

Q: Can men as well as women be affected
by chemicals that cause reproductive
system damage?

A: Yes. Some chemicals reduce potency or
fertility in both men and women. Some
damage sperm and eggs, possibly lead-
ing to birth defects.

Q: Who is at the greatest risk from re-
productive hazards?

A: Pregnant women are at greatest risk
from chemicals that harm the develop-
ing fetus. However, chemicals may af-
fect the ability to have children, so
both men and women of child-bearing
age are at high risk.

Q: Should I be concerned if a chemical is
a teratogen in animals?

A: Yes. Although some chemicals may af-
fect humans differently than they af-
fect animals, damage to animals sug-
gests that similar damage can occur in
humans.

The New Jersey State Department of Health,
Occupational Disease Prevention and Infor-
mation Program offers multiple services in
occupational health. These include: Right
to Know Information Resources, Public Pre-
sentations, General References, Industrial
Hygiene Information, Surveys and Investi-
gations, and Medical Evaluation. Consult
another Fact Sheet for a more detailed de-
scription of these services or call (609)
984-1863.

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is the American Conference of Gov-
 ermental Industrial Hygienists. It recom-
 mends upper limits (called TLVs) for expo-
 sure to workplace chemicals.

the Carcinogens Assessment Group of
 the Federal EPA.

A mutagen is a substance that causes

A hazard number is assigned by the Chemical
 Hazard Information Service to identify a specific
 hazard.

A combustible substance is a solid, liq-
 uid or gas that will burn.

A corrosive substance is a gas, liquid or
 solid that causes irreversible damage to
 human tissue or containers.

the New Jersey Department of Envi-
 ronmental Protection.

the Department of Transportation,
 a federal agency that regulates the
 transportation of chemicals.

the Environmental Protection Agency
 is the federal agency responsible for
 identifying environmental hazards.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid,
 liquid or gas that will ignite easily and
 burn readily.

A flash point is the temperature at
 which a liquid or solid gives off vapor
 that can form a flammable mixture with
 air.

the International Agency for Re-
 search on Cancer, a scientific group that
 classifies chemicals according to their
 carcinogenic potential.

A miscible substance is a liquid or gas
 that will evenly dissolve in another.

A concentration of milligrams of a chemical in a
 liter of air. It is a measure of
 exposure (weight/volume).

MSHA is the Mine Safety and Health Admin-
 istration, the federal agency that regu-
 lates mining. It also evaluates and ap-
 proves respirators.

6563

A mutagen is a substance that causes muta-
 tions. A mutation is a change in the gene-
 tic material in a body cell. Mutations
 can lead to birth defects, miscarriages,
 or cancer.

NCI is the National Cancer Institute, a
 federal agency that determines the cancer-
 causing potential of chemicals.

NFPA is the National Fire Protection Asso-
 ciation. It classifies substances accord-
 ing to their fire and explosion hazard.

NIOSH is the National Institute for Occu-
 pational Safety and Health. It tests
 equipment, evaluates and approves respi-
 rators, conducts studies of workplace haz-
 ards, and proposes standards to OSHA.

NTP is the National Toxicology Program
 which tests chemicals and reviews evidence
 for cancer.

OSHA is the Occupational Safety and Health
 Administration, which adopts and enforces
 health and safety standards.

ppm means parts of a substance per million
 parts of air. It is a measure of concen-
 tration by volume in air.

A reactive substance is a solid, liquid or
 gas that can cause an explosion under cer-
 tain conditions or on contact with other
 specific substances.

A teratogen is a substance that causes
 birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the
 workplace exposure limit recommended by
 ACGIH.

The vapor pressure is a measure of how
 readily a liquid or a solid mixes with air
 at its surface. A higher vapor pressure
 indicates a higher concentration of the
 substance in air and therefore increases
 the likelihood of breathing it in.

~~PCB POLYCHLORINATED BIPHENYLS~~

UN 2315
 Availability: No Citation
 Toxicity: No Citation

CANCER CAUSING AGENT
 POISONOUS GASES ARE PRODUCED IN FIRE
 Health hazards on front page

HANDLING AND STORAGE

Polychlorinated Biphenyls may burn, but do not readily ignite.

Use fire extinguishers, chemical, CO₂, water spray, or dry chemical extinguishers.

GASES ARE PRODUCED IN FIRE, including Dioxin and Chlorinated Hydrocarbons.

Firefighters are expected to fight fires involving these materials. They must be trained and equipped as stated in OSHA 1910.156.

EMERGENCIES

If Polychlorinated Biphenyls are spilled, take the following steps:

Evacuate persons not wearing protective clothing from area of spill or leak until clean-up is complete.

Isolate the area of spill or leak.

Prevent liquids in vermiculite, dry earth, peat, or a similar material and unsealed containers.

Use absorbent powdered material in the most effective and safe manner and deposit in sealed containers.

It is necessary to contain and dispose of Polychlorinated Biphenyls as a HAZARDOUS WASTE. Contact the NJ Department of Environmental Protection (DEP) regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

FOR FIRE: CALL FIRE DEPARTMENT FOR FIRE. CALL CHEMICAL FIRE DEPARTMENT FOR FIRE. You can get emergency information from:

(609) 292-7172
 (609) 424-9300

* Prior to working with Polychlorinated Biphenyls you should be trained on its proper handling and storage.

* Store in tightly closed containers in a cool well-ventilated area away from STRONG OXIDIZERS (such as CHLORINE, BROMINE, and FLUORINE).

* Polychlorinated Biphenyls should be handled only in an established, controlled, regulated area.

FIRST AID

NJ POISON INFORMATION 1-800-962-1253

Eye Contact

* Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting upper and lower lids.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water.

PHYSICAL DATA

Flash Point: 383°F

Water Solubility: Slightly soluble

OTHER COMMONLY USED NAMES

This Fact Sheet also covers the following substances:

PCB-1242 (Chlorodiphenyl-42% Chlorine)

CAS # 53469-21-9;

PCB-1254 (Chlorodiphenyl-54% Chlorine)

CAS # 11097-69-1.

Not intended to be copied and sold for commercial purposes.

New Jersey Department of Health
 CN 368 Trenton, NJ 08625
 (609) 984-2202

Date prepared: March 1986

Revision:

OES-16

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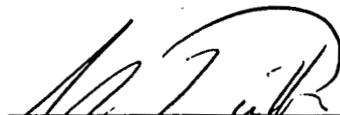
HEALTH AND SAFETY PLAN ADDENDUM
to the
HEALTH AND SAFETY PLAN
FOR HAND AUGURING FIELD TASKS PERFORMED
IN SUPPORT OF SAMPLING AT THE FEMP

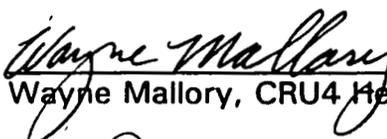
for

ADDITIONAL CHARACTERIZATION OF VADOSE AND
PERCHED WATER IN THE K-65 AREA

FEBRUARY 4, 1993

APPROVALS:

 02/05/93
Wilf Pickles, CRU4 Program Manager

 2-5-93
Wayne Mallory, CRU4 Health & Safety Officer

 2-05-93
Daryl Mills, Occupational Safety & Health

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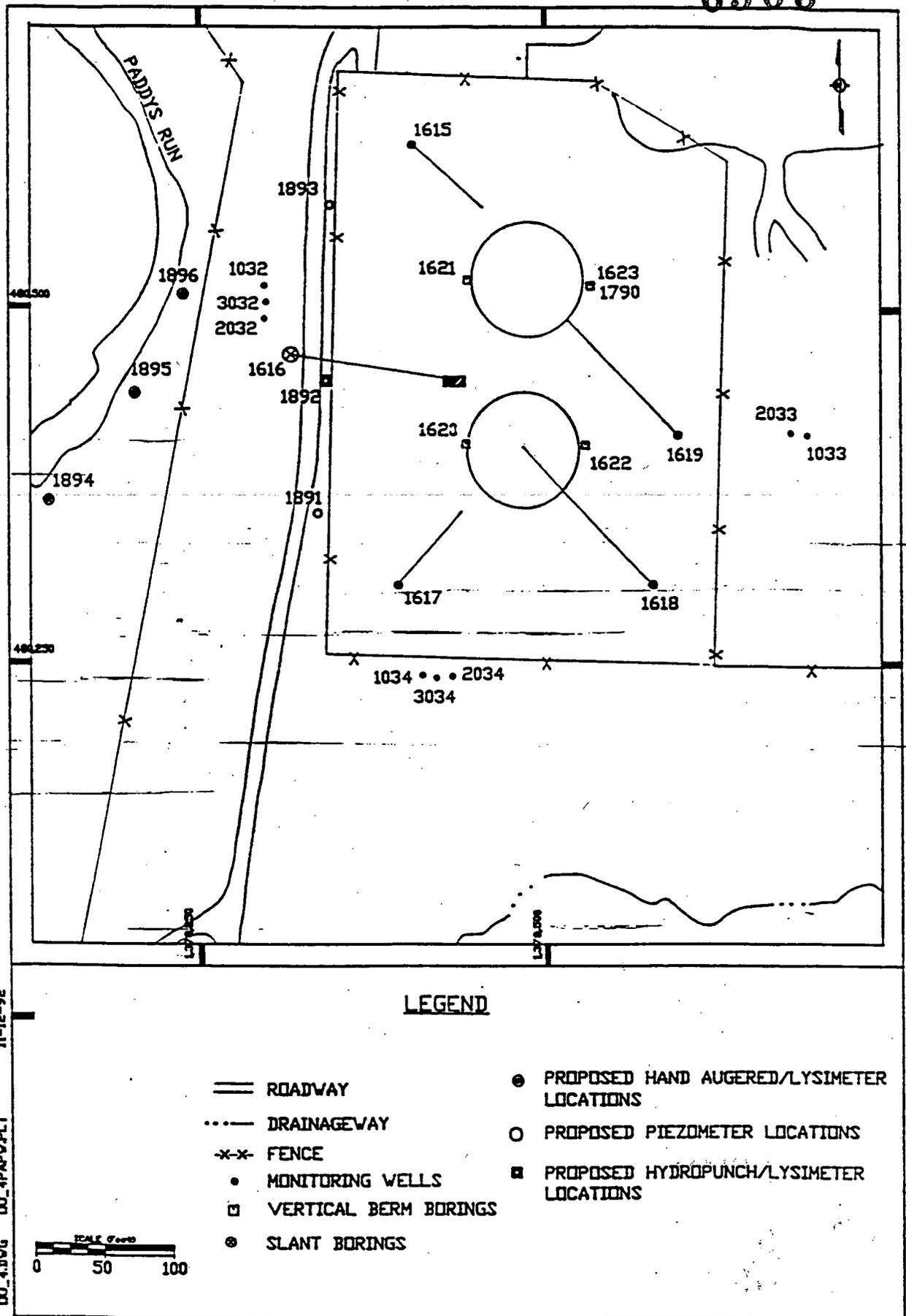


FIGURE 1. PROPOSED ADDITIONAL PERCHED WATER SAMPLE LOCATIONS