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**HEALTH AND SAFETY PLAN FOR SAMPLING OF WELLS AND
SURFACE WATER PERFORMED IN SUPPORT OF SAMPLING AT THE
FEMP**

04/00/92

ASI/IT FEMP
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H&S PLAN

B 1730 -

For Process Area Wells 1134, 1135, 1153, 1158,
1223, 1235, 1345 and 1361

6-19-92
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HEALTH AND SAFETY PLAN
FOR SAMPLING OF WELLS AND SURFACE WATER
PERFORMED IN SUPPORT OF SAMPLING
AT THE FEMP

Prepared by Stephen W. Duce and W. Lee Vittitow

April 1992

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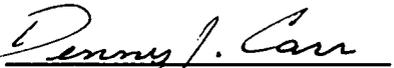
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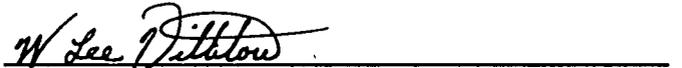
April 1992

REVIEWED AND APPROVED BY:


Greg McAnarney (ASI)


Stephen W. Duce, Chief of Health and Safety (ASI/IT)


Dennis Carr, WEMCO CTM


W. Lee Vittitow, Senior Industrial Hygiene (ASI/IT)


J.J. Volpe, WEMCO IRS&T

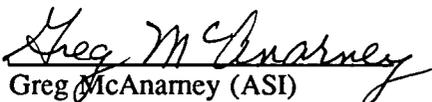
NOTE: This plan and associated permits shall be reviewed with each worker and be posted at the work site at all times when work is being performed. Compliance with this requirement is evidenced by signature in Section No. 14.

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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.

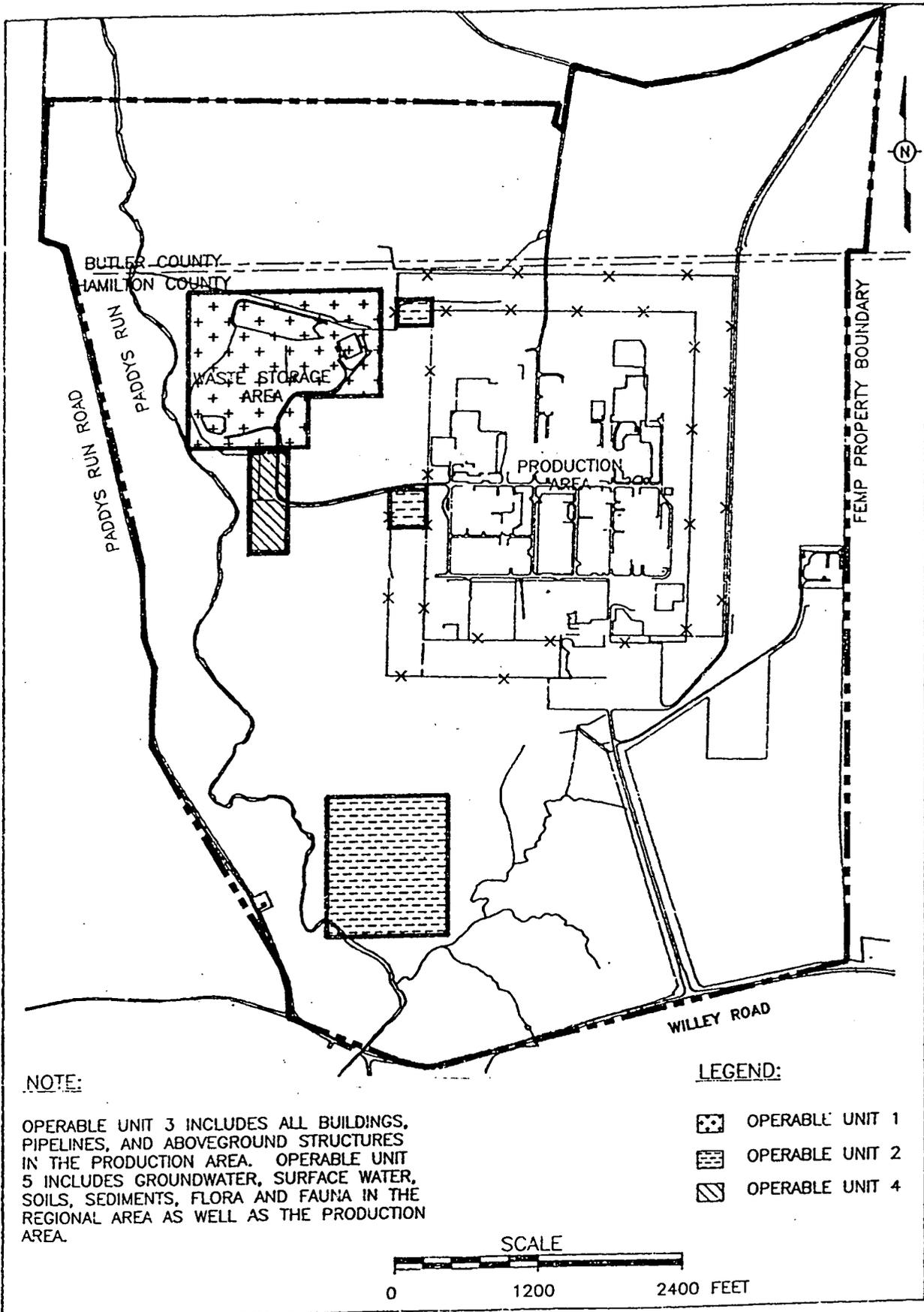
Activities Performed or Uses of the Area

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



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FIGURE 1 FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

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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 the 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 surface waters are contaminated with radiological and chemical contaminants at or slightly elevated above ambient background levels. Well water will normally have contaminant concentrations at levels similar to surface water. However, there may be instances where the head space gas in a well may contain volatile chemicals at measurable concentrations. Site identification and access control requirements will vary for each location due to methods used to sample, 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.

Surface water sampling normally involves obtaining water samples from small streams, rivers, or ponds. Surface water samples can be collected using dip techniques and/or depth sampling equipment. Well water samples are normally obtained using hand bailers. However, prior to obtaining the first sample from a well, the well must be developed. This requires the use of either hand bailers or, in the case of most wells, a large bailer attached to a cable tool rig. Water level measurements are also included within the scope of this health and safety plan.

When sampling surface water no work zone will be required as previous monitoring experience has shown that chemical/radiological hazards are minimal. When performing water level measurements no work zone will be required as previous work experience has shown chemical/radiological hazards are minimal. In both of these cases all permits, a copy of this health and safety plan, and any other required documentation will be kept in one of the vehicles at the work site. The water sample team leader is responsible for ensuring all personnel working at or visiting the work site are familiar with the safety requirements of this safety plan as well as ensuring all personnel sign the work site sign-in/sign-out log when coming to and leaving the work site. No sign-in/sign-out log is required for water level measurement teams as their field activity logs can provide time information. Additional monitoring requirements, other than those specified in Section 8.0, will be established by the Health and Safety Technician and all personnel will be required to adhere to those monitoring requirements. Contaminants found on workers will be removed prior to leaving the work site or, if unable to remove the contaminant the affected area will be isolated and the person transported to WEMCO for further decontamination efforts. In monitoring for radioactive contamination, if the background exceeds 200 cpm personnel can go to a low background area designated by the Health and Safety Technician for monitoring.

When developing and sampling a well using a cable tool rig, a support zone will be identified with 12 in. traffic cones. The work zone will encompass an area having, at a minimum, a radius which approximates the height of the cable tool mast. Within the support zone an exclusion zone will be set up during well development. 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 exclusion 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. Additional monitoring requirements, other than those specified in Section 8.0, will be established by the Health and Safety Technician for radioactive and organic contaminants. Personnel working within the zone will be required to adhere to those monitoring requirements. 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. Contaminants found on personnel will be removed prior to leaving the work site or, if unable to remove the contaminant, the affected area will be isolated and the person transported to WEMCO for further decontamination efforts.

When developing and sampling a well using hand bailers a support zone will be established using 12 in. traffic cones. All applicable signs and all permits, a copy of this health and safety plan, and any other required documentation will be posted at the boundary of the support zone. The water sample team leader is responsible for ensuring all personnel working at or visiting the work site are familiar with the safety requirements of this safety plan as well as ensuring all personnel sign the work site sign-in/sign-out log when coming to and leaving the work site. Additional monitoring requirements, other than those specified in Section 8.0, will be established by the Health and Safety Technician (see Section 8.0) and all personnel will be required to adhere to those monitoring requirements. Contaminants found on personnel will be removed prior to leaving the work site or, if unable to remove the contaminant the affected area will be isolated and the person transported to WEMCO for further decontamination efforts. In monitoring for radioactive contamination, if the background exceeds 200 cpm personnel can go to a low background area designated by the Health and Safety Technician for monitoring.

3.0 TASK ACTIVITIES/WORK PLAN

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

Well development involves removing any stagnant water that exists in the well casing and allowing the well to recharge. The amount of water removed is a function of well size and water depth in the well. The extracted water is drummed, in the case of small wells, or pumped into vehicle mounted tanks. All water is brought into the WEMCO Process area and discharged to the general sump.

Prior to obtaining a water sample from a well or measuring water level, the head space gas will be monitored with an HNu with a 10.2 eV probe or equivalent prior to opening the well cap if possible, or immediately following the opening of the well cap. If positive readings are observed in the head space, the breathing zone will be monitored. The requirement for monitoring the well head space

can be relaxed by the Health and Safety Department personnel if past history, previous sampling or head space results, or direct observations of the well indicates that volatile gases will not be present.

Water levels are monitored using a weighted tape measure. The same head space gas monitoring requirements will be followed as called out above for well sampling.

Surface water samples are obtained using dip samples techniques or depth sampling devices. No monitoring is required as historical information has shown contaminant levels to be minimal. However, if Health and Safety personnel identify a need to monitor the requirement will be identified in Section 15.0.

Water samples obtained from surface waters and from wells 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 in the water 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 water sampling or well water level measurements will be 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, previous sampling results, reports, and drawings; and on walkovers of the study area performed by ASI personnel in fall of 1991. Additional evaluation criteria were: experience of similar work packages and 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.

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. Asbestos air samples obtained in the incinerator area in December 1991 confirmed that no air sampling will be required since results were below permissible exposure limits.

Previous work experience sampling wells has shown that generally off-site wells do not have measureable volatile concentrations in the head space. Water samples in these wells have shown little to no organic or radioactive contaminants. On-site, outside of the process area, well water samples have had slightly elevated levels of radioactive and chemical contaminants but generally

no volatile vapors have been detected in the head space. Within the process area water levels of chemical and radiological contaminants are at higher levels, especially within wells in the waste pit area. Volatile chemical vapors have been detected in many of the existing wells.

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.

A buddy system is required for all personnel working near or sampling from wells or open bodies of water such as ponds, streams, or rivers.

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

Fences around grazing animals: barb wire and electric fences

Poison ivy or other irritant plants (Table 1)

Insects, spiders, snakes, and other wildlife (Table 1) **CAUTION:** wasps are known to inhabit the well casing, building nests just under the lid.

Fast moving high water or deep water can be encountered when sampling surface water

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.

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.

Within the process area, and more particularly the waste pit area, chemical contaminants will

be encountered. Volatile chemical vapors should be expected in all wells, until proven otherwise. When opening wells in the waste pit area proper respiratory protection is to be worn until the absence of volatile vapors is confirmed.

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.

**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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L. Vittitow
SAMPLING.HSP
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 suck 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.

L. Vittitow
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May 29, 1991

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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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L. Vititow
SAMPLING.HSP
May 29, 1991

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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 foraging 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.

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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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.

Within the process area and waste pit area the radiological and chemical contaminant hazard is increased. Most areas having radiological concerns have been posted by WEMCO IRS&T personnel. Following the posted requirements will generally ensure that personnel will not become contaminated while sampling.

5.0 STANDARD OPERATION PROCEDURES

Surface water and well sampling/development and water level monitoring 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 water sampling, well development, or water level measurement 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:
 - work around free flowing water or ponds
 - work operations
 - personal protective clothing
 - air monitoring data
 - hazard communication
 - monitoring results
 - hazard identification
 - avoidant of wasps and other stinging insects
 - 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 water sampling, well development, or water level measurements 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 elevated concentrations of 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 affected by humidity shall use ice bath dryers when instrument performance is degraded by high humidity.

A health and safety technician is required to monitor the surface area within an exclusion or support zone for organic and radiological contaminants prior to start of work within the zone. Monitoring will be performed with a 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 identify a safe area for support zone setup and 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.

-20F. SD

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 kv/m, H field > 1 mT or 0.1 mT for pacemaker wearers. **Action:** withdraw from the area.

Personnel working in Paddy's Run Creek must be aware of rapid water level increases due to rainfall. Paddy's Run Creek has been observed to rise rapidly during heavy rains. Personnel are to terminate work when water levels show rapid increases. Work is allowed to resume once water levels become stable. Additionally a buddy system is required for all personnel working on Paddy's Run Creek.

Cold water immersion can occur when sampling or working around open water. Cold water or the wearing of wet clothing can cause hypothermia in workers. If personnel become immersed they are to be taken to a warm location and wet clothing removed as soon as possible and dry clothing or blankets be put on to get the affected person warm. A buddy system is required for all personnel working near or sampling from open water.

Personnel sampling from streams, rivers, or ponds that are ≥ 3 feet in depth shall wear life preservers.

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
°C	°F												
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)	87 (92)	2h-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	25-50	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.

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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.

CAUTION: when opening a well in the waste pit area proper respiratory protection and PPE will be worn until the absence of volatile chemical vapors is confirmed.

Volatile organics/chemicals will be monitored using an HNu Model 101 with a 10.2 eV probe or equivalent photoionization meter during the opening of a closed well. Monitoring will be performed in the well head space and breathing zone to determine the presence of volatile organics/chemicals. **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.

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 $\mu\text{g}/\text{m}^3$ 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 on the surface area around a well or pond using a beta/gamma survey meter (HP 210 probe or equivalent). 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 is ≤ 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 results in a skin contamination or 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 skin contamination/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.

Personnel sampling water in the runoff retention basins or where the water depth is ≥ 3 feet must

wear personal floatation devices.

If a "cherry-picker" or crane is used to lift samplers out over open water for sampling the basket will have proper guard-rails and fall protection must be worn.

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 well development/sampling involving a cable tool rig, a work zone will be established using procedure FPP 906 Work Site Identification and Posting.

Daily, during hand bailing for well development/sampling, a support zone will be established using procedure FPP 906 Work Site Identification and Posting.

Personal decontamination supplies will be required for personnel taking water 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 must 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 Manager 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 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 may 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, if they chose to render aid, will 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

		Radio
Ambulance:	(513)738-6511	CONTROL
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.

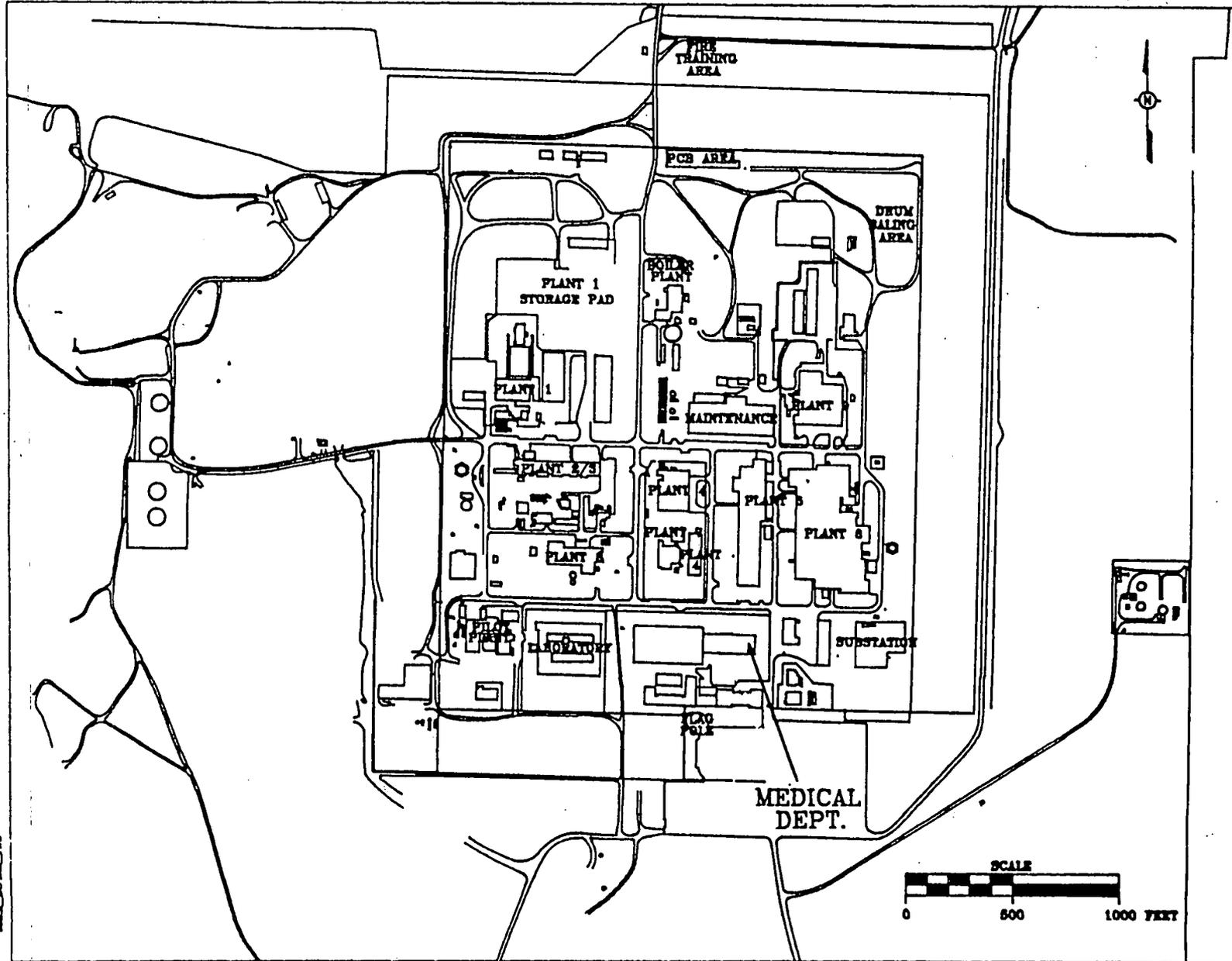


FIGURE 2. LOCATION OF MEDICAL DEPARTMENT

15.0 LOCATION SPECIFIC INFORMATION

Figure 3

16.0 ATTACHMENTS

Attachment 1

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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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/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 HBGRs (and Botsball readings) in °C and °F by combinations of clothing ensemble and metabolism

WBGT (ambushall)	°C	°F	Wool flannel Metabolism			Cotton Gauze Metabolism			Double Cotton Metabolism			Cotton-lyc Blend Metabolism		
			Low	Mod	High	Low	Mod	High	Low	Mod	High	Low	Mod	High
30 (47)	13-30	0-10	5-15	0-5	5-15	10-20	0-10	5-15	15-30	5-15	15-30	5-15	0-10	15-30
40 (63)	20-45	5-15	15-30	5-10	10-20	20-45	5-20	10-20	20-45	5-15	20-45	15-30	5-15	20-45
46 (63)	20-45	5-10	20-45	5-15	15-30	20-45	5-20	10-20	20-45	5-15	20-45	15-30	5-15	20-45
46 (41)	30-60	10-25	20-45	5-20	15-30	20-45	5-20	10-20	20-45	5-15	20-45	15-30	5-15	20-45
42 (39)	45-90	15-30	30-60	10-25	20-45	20-45	5-20	10-20	20-45	5-15	20-45	15-30	5-15	20-45
40 (37)	60-90	15-45	45-90	15-40	30-60	45-90	10-25	10-20	45-90	5-15	45-90	15-30	5-15	20-45
38 (35)	90-120	20-45	60-90	15-45	30-60	90-120	10-25	15-30	60-90	5-15	90-120	15-30	5-15	20-45
36 (33)	20-45	20-45	30-60	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
36 (31)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
32 (39)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
30 (37)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
28 (26)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
26 (24)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
24 (22)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
22 (20)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
20 (18)	20-45	20-45	20-45	15-40	20-45	30-60	15-30	10-20	30-60	5-15	30-60	15-30	5-15	20-45
<20	<68	<68	<68	<68	<68	<68	<68	<68	<68	<68	<68	<68	<68	<68

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

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Attachment 3

16.3 MATERIAL SAFETY DATA SHEETS

(See following sheets)

SAFETY DATA SHEET

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.

GENERAL INFORMATION	PRODUCT NAME	GASOLINE - UNLEADED	DATA SHEET NO.	05	DATE PREPARED	4-12-83	CODE NUMBER	RME
	PRODUCT CLASS	GENERAL OR GENERIC IDENTIFICATION LIGHT PETROLEUM DISTILLATE - MOTOR FUEL						
IDENTIFICATION	PASSES O.O.T. TEST FOR HAZARDOUS CLASSIFICATION	HAZARD CLASSIFICATION FLAMMABLE LIQUID U.N. 1203						

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

PHYSICAL DATA	INITIAL BOILING POINT	IF LIQUID AT 42°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 42°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 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)

HAZARDOUS DECOMPOSITION PRODUCTS	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
	KNOWN HAZARDOUS PRODUCTS RESULTING FROM HEATING, BURNING, ETC. OR UNREACTED RAW MATERIAL. MAY FORM TOXIC MATERIALS: CARBON DIOXIDE AND CARBON MONOXIDE, VARIOUS HYDROCARBONS.		

6565

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 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

PRODUCT IDENTIFICATION	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

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

PHYSICAL DATA	INITIAL BOILING POINT	IF LIQUID AT 66°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 cf
	VAPOR PRESSURE	IF LIQUID AT 66°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 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)

REVISION 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
	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

IF WATER IS NOT TO BE USED
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.

EXTIN-
GUISHING
MEDIA

DRY CHEMICAL WATER FOG CARBON DIOXIDE
 REGULAR FOAM ALCOHOL FOAM OTHER: _____

THRESHOLD
LIMIT VALUE

OSHA ESTABLISHED VALUE
NOT ESTABLISHED FOR PRODUCT. SEE SECTION II.

EFFECTS
OF
OVER-
EXPOSURE
FOR
 PRODUCT
 COMPONENT

KNOWN EFFECTS LISTED, UNLESS NOT APPLICABLE DUE TO PHYSICAL FORM OF PRODUCT
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.

HEALTH
HAZARD
DATA


SPECIAL
FIRST
AID
ACTION

IF ON SKIN
THOROUGHLY WASH EXPOSED AREA WITH SOAP AND WATER, REMOVE CONTAMINATED CLOTHING. LAUNDRY CONTAMINATED CLOTHING BEFORE RE-USE.

IF IN EYES
FLUSH WITH LARGE AMOUNTS OF WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, GET MEDICAL ATTENTION.

IF SWALLOWED
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.

IF BREATHED
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.

POLY-MERIZATION	<input type="checkbox"/> CAN OCCUR <input checked="" type="checkbox"/> CANNOT OCCUR
STABILITY	CONDITIONS TO AVOID IF UNSTABLE UNDER NORMAL CONDITIONS <input checked="" type="checkbox"/> STABLE <input type="checkbox"/> UNSTABLE
INCOMPATIBILITY (MATERIALS TO AVOID)	COMMON MATERIALS OR CONTAMINANTS WHICH WOULD RESULT IN A HAZARDOUS REACTION WITH THE PRODUCT ARE SHOWN AVOID CONTACT WITH STRONG OXIDIZING AGENTS (E.G. NITRIC ACID, PERMANGANATES, ETC.).
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	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.
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.

ATLANTIC RICHFIELD COMPANY FILED A TSCA 8(e) NOTICE WITH THE ENVIRONMENTAL PROTECTION AGENCY ON DECEMBER 9, 1981 CONCERNING AN AMERICAN PETROLEUM INSTITUTE UNSUPPORTED CHRONIC INHALATION STUDY. THE STUDY HAS SHOWN CHRONIC EXPOSURE TO UNLEADED GASOLINE VAPORS HAS CAUSED ADVERSE HEALTH EFFECTS IN CERTAIN LABORATORY 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 WIND DIRECTION AND IGNITED BY PILOT LIGHTS, OTHER FLAMES, SPARKS, HEATERS, SMOKING, ELECTRIC MOTORS, OR OTHER SOURCES AT LOCATIONS DISTANT FROM MATERIAL HANDLING POINTS.

NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT RESIDUES (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:

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.

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.

It contributes to one or more of the following hazards of the product:

- Flashpoint below 200°F (cc), or subject to spontaneous heating or decomposition.
- Causes skin burns. (DOT)
- Strong oxidizing agent. (DOT)
- Subject to hazardous polymerization.

When 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%, or greater than 60%, or by other means if such information is proprietary. Adopted ACGIH values are only listed, with appropriate OSHA values where OSHA values are not available.

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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 DOSES 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%, 10-20%, 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.

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LIQUID CARBONIC
 SPECIALTY GAS CORPORATION
 133 SOUTH LA SALLE STREET • CHICAGO, ILLINOIS 60607-4232
 PHONE: (312) 853-2500

Isobutylene 6565

Revision Feb. 1987

24 Hour Emergency Phone Numbers: (504)673-8831; CHEMTREC (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 UNITS
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)

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

INCOMPATIBILITY (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

STEPS 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 out doors, and allow to vent to atmosphere. Incinerate gas by controlled burning in flare 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, eyewash, 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 fluorine. 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.

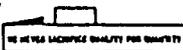
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** TOTAL PAGE.002

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TOTAL P.03

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TEXAS LEAD & SUPPLY CO. INC.

Phone: (409) 713-6623
682-3604
Post Office Box 19961
5606 CENTRAL CREST
HOUSTON, TEXAS 77011

DEC. 17 1991

NFPA



MATERIAL SAFETY DATA SHEET

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

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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 (H₂O = 1)	11.0 - 11.3	VAPOR PRESSURE	Not Applicable
VAPOR DENSITY (AIR = 1)	Not Applicable	SOLUBILITY IN H₂O (% 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

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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 hemosiderin 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: Not Applicable	Not Applicable
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 metal 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 as appropriate for the industrial environment. Personal clothing and shoes should be protected from contamination with this product.

IX SPECIAL PRECAUTIONS

PRECAUTIONARY STATEMENTS	<p>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.</p> <p>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.</p> <p>Wash hands, face, neck and arms thoroughly before eating or smoking.</p> <p>The product is intended for industrial use only, and should be isolated from children and their environment.</p>
OTHER HANDLING AND STORAGE REQUIREMENTS	<p>Store in dry area where accidental contact with acids is not possible.</p> <p>Avoid skin contact.</p> <p>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.</p> <p>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.</p>
PREPARED BY	TEXAS LEAD & SUPPLY CO., INC.
ADDRESS	P.O. Box 10901, 5800 Central Green, Houston, TX 77018
DATE	

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MATERIAL SAFETY DATA SHEET 9.112

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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 ODDOR:
COLORLESS LIQUID, SLIGHT ALCOHOLIC ODDOR

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.

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MATERIAL SAFETY DATA SHEET 9.112

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SECTION V - HEALTH HAZARD DATA

THRESHOLD-LIMIT-VALUE:

A STD-AIR: TWA 200 PPM

TXDS: ORL-HMN LDLO: 340 MG/KG

EFFECTS OF OVEREXPOSURE:

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

EMERGENCY AND FIRST AID PROCEDURES:

V: WASH WITH SOAP/WATER; GET MEDICAL ASSISTANCE FOR SKIN IRRITATION.
 I: FLUSH WITH WATER 15 MINUTES; GET MEDICAL ASSISTANCE.
 IRRITATION: REMOVE TO FRESH AIR; GET MEDICAL ASSISTANCE.
 INGESTION: 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):
 POLYMERIZERS

HAZARDOUS DECOMPOSITION OR BY PRODUCTS:

POLYMERIZATION CONDITIONS TO AVOID:
 N/A

SECTION VII - SPILL OR LEAK PROCEDURES OR DISPOSAL

MATERIAL RELEASE OR SPILL PROCEDURES:

EVACUATE NON-ESSENTIAL PERSONNEL. ABSORB WITH SAND.

WASTE DISPOSAL METHOD:

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

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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

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

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