STANDARD OPERATING PROCEDURE

HAZARDOUS WASTE INVENTORY AND SAMPLING

WRANGELL-ST. ELIAS NATIONAL PARK AND PRESERVE

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INTRODUCTION

The existence of hazardous waste materials within Wrangell-St. Elias National Park and Preserve (WRST) has been suspected since the park was established. The need for information and assessment of the presence and amount of hazardous materials within WRST was identified in the Resource Management Plan. In 1984, a Waste and Refuse Site Inventory conducted throughout WRST identified waste sites and provided preliminary information on the type and quantity of waste materials.

Title 40 of the Code of Federal Regulations provides the following definitions of hazardous waste:

241.101 "any waste or combination of waste which pose a substantial present or potential hazard to human health or living organisms because such wastes are nondegradeable or persistent in nature or because they can be biologically magnified, or because they can be lethal, or because they may otherwise cause or tend to cause detrimental cumulative effects."

243.101 "a waste or combination of wastes of a solid, liquid, contained gaseous, or semisolid form which may cause or contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness, taking into account the toxicity of such waste, its persistence and degradability in nature, its potential for accumulation or concentration in tissue, and other factors that may otherwise cause or contribute to adverse acute or chronic effects on the health of persons or other organisms."

For the purpose of this project, the actual characteristics of hazardous wastes as defined in 40 CFR part 261, subpart C are to be used as guidelines and working definition. This lists the four characteristics of hazardous waste as:

1) Ignitability

2) Corrosivity

3) Reactivity

4) Toxicity

Hazardous waste materials as defined above were found to exist at many locations throughout WRST during the 1984 Waste and Refuse Site Inventory. The majority of materials were found at old mining, milling, and exploration sites. However, household dumps may also contain hazardous materials such as creosote, propane, naphthalene and pentachlorophenol.

The objective of the Hazardous Waste Inventory and Sampling project (HWI) is to safely collect samples of suspected material to identify them and catalog their location and quantity. The findings of the

HWI project will assist with determining the proper course of action and workload for future removal, neutralization or mitigation of these materials.
The background information and procedures described here are intended as guidelines to safely and effectively achieve this goal.

CHARACTERISTICS OF HAZARDOUS WASTE

This section, although not specifically operating procedures, is considered important to give personnel unfamiliar with hazardous waste materials a better understanding of what hazardous wastes are and some of their properties. This section addresses most of the waste types suspected to exist in WRST and how they are categorized by 40 CFR and "Dangerous Properties of Industrial Materials" by Sax. It should be kept in mind that many commonly handled materials are hazardous and the worker should not assume a substance is safe even if he knows what it is.

Ignitability

According to 40 CFR 261.21, an ignitable substance is "a liquid other than an aqueous solution containing less than 24% alcohol by volume and has a flash point less than 60 degrees C (140 degrees F) as determined by a Pensky-Martens closed cup flash point tester...or a Setaflash closed cup tester".

Containerized liquids which are suspected to be petroleum or other fuels will be tested for flash point with a Setaflash closed cup flash point tester. A flash/ no flash test will be used to determine if the liquid will flash at 140 degrees F as indicated in 40 CFR; this being the critical temperature for identifying hazardous material. Any material flashing at this temperature will be considered ignitable and therefore hazardous. Materials that do not flash at 140 degrees F are not considered ignitable. Due to the nature of the flash point tester, testing for exact flash point is tedious and can not be done for materials with a flash point below ambient temperature without an expensive super cooling unit attached to the tester. Because all materials with flash points below 140 degrees F are considered ignitable, they all fall under the same legal restrictions for handling, shipping and disposal.

Materials which can be categorized as ignitable or not by flash point may not be further laboratory tested to more closely identify them. Container labeling and appearance of the contents, when combined with the flash/no flash test often provides sufficient information for identifying the substance. It is not critical to know if a substance is JP-4 or diesel fuel, gasoline or avgas. For safe handling and disposal purposes it is sufficient to know which are classified as ignitable substances.

Although the flash point tester can be used in the field when powered by a 12 volt battery, the tedious nature of the tests and the expense of the instrument dictate that tests should be conducted at the

Gulkana Operations Center. Sampled will be transported from the field in accordance with federal standards and stored in a fireproof locker at the Gulkana Operations Center. They may then be tested for flash point as time and convenience allows. Flash point tests will be conducted in a safe and well ventilated area. Results of the flash point tests will be recorded in the appropriate column in the field logbook.

Other ignitable materials outlined in 40 CFR 261.21 are "not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it creates a hazard". This definition includes materials such as calcium carbide, which is often found at abandoned mine sites, and containerized propane gas which is extremely ignitable upon release.

Corrosivity

40 CFR 261.22 describes a corrosive substance as "aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5 as determined by a pH meter". Acids for testing and processing minerals may be found at abandoned mining or milling sites. Materials suspected of being corrosive will be tested with pH test paper to estimate their pH. Any sample with a pH in the corrosive range as outlined in 40 CFR will be regarded as such and handled accordingly. Samples suspected of being corrosive will be sent to a certified laboratory for positive identification.

Reactivity

According to 40 CFR 261.23 a reactive substance has any of the following properties:

1. Normally unstable and readily undergoes violent change
2. Reacts violently with water
3. Forms potentially explosive mixtures with water
4. When mixed with water it generates toxic gas
   CaC_2 CARBIDE WHEN MIXED $\subset$ H_2O = ACETYLENE
5. Capable of detonation or explosive reaction if subjected to a strong initiating source or heated under confinement
6. Readily capable of detonation or explosive decomposition at standard temperature and pressure
7. A class A or B explosives

Blasting gelatin (dynamite) of 40% and 60% was identified at several sites in the 1984 Waste and Refuse Site Inventory. Dynamite is a class A explosive and therefore regarded as reactive and very hazardous. The major constituent of dynamite is nitroglycerin or "explosive oil".

Nitroglycerin is a powerful explosive extremely sensitive to mechanical shock. Nitroglycerin is also highly toxic. Dynamite is graded by the percent of explosive oil content by weight. That is 40% Dupont blasting gelatin has 40% nitroglycerin as its contents. The explosive oil is mixed with a "dope" to alter its explosive properties and make it safe to handle. Fresh dynamite can be handled with little risk of explosion unless combined with a detonating device. Old, weathered dynamite tends to leach nitroglycerin from the dope resulting in the explosive oil crystallizing in the form of a white powdery substance on the outside of the wrapper and crate. This makes the dynamite a very dangerous contact explosive that may explode if disturbed.

Any dynamite encountered will be assumed to be old and possibly unstable. If it can be done safely and without contacting the dynamite, the production date and the percent strength of the blasting gelatin will recorded from the case. Dynamite will not be sampled or handled.

Blasting caps and detonators are predominantly made with fulminates (usually fulminate of mercury) which are high explosives very sensitive to heat, impact, and friction. They are used to detonate dynamite and are fired by burning fuse or electrical charge. When found, blasting caps will be noted as to type (fuse or electrical) number and location. Blasting caps will not be sampled or removed.

All explosives or suspected explosives will be cataloged without handling and left to be disposed of by qualified explosives experts. Appendix D contains a loading and handling chart for hazardous and explosive materials with lists of class A, B, and C explosives.

Toxicity

Toxicity of a substance is difficult to define. 40 CFR provides lists of materials considered hazardous because of toxicity as well as test methods to determine toxicity. Many materials are disputed and most all are considered toxic at certain concentrations. Toxic materials which may be found in WRST include petroleum oils, gasolines, kerosenes, propane, methanol, acetone, creasote, pentachlorophenol, lead and mercury. Properties of these and other materials can be found in Sax and the Merc Index. The severity of the toxic properties of these materials may be disputed but all are toxic to some degree.

Examples of several of the more commonly encountered materials and their characteristics are listed below to give the reader an indication of their potential severity. A brief outline of their effects on man is followed by a discussion of their effects on the environment.

gasoline: high to moderately toxic by inhalation, causes central nervous system depression, even brief inhalation of high concentration can cause severe pneumonitis; flash point -50 F; used as engine fuel.

kerosene: (similar to jet fuel and diesel fuel) low toxicity when ingested orally, high toxicity when inhaled, can cause headache and stupor; used as heating and engine fuel.

propane: severe explosive hazard; an asphyxiant, severe effects on the central nervous system, can cause severe and instant frostbite if contacted at the exit point from the tank where it is still close to the liquid state; liquid at -45 F, under pressure in the tank; inhalation can cause hallucinations; used as heating and cooking fuel

methanol: highly toxic; absorbed through the skin or inhaled, effects the nervous system, so slowly eliminated from the body as to be considered a cumulative poison, produces in body by products of formaldehyde and formic acid both of which are toxic; used as deicer.

pentachlorolphenol: highly toxic when inhaled or absorbed through the skin, respiratory system effected; when burned it gives off chlorine gas which is highly toxic; used to preserve wood.

PCB's

Polychlorinated biphenyls (PCB's) are a much publicized compound of a nondegradable and persistent nature which are highly carcinogenic and highly toxic. Inhalation or oral ingestion of PCB's can have severe effects on the skin and the liver resulting in chlorachne and liver lesions. Prolonged exposure may cause severe deterioration of the skin and liver to the point of death. PCB's were often used in the 1930's and 40's as an oil additive to alter its properties at high temperatures. Commonly, PCB's were added to electrical transformer oils to improve their insulating qualities. Oils found in or associated with electrical equipment will be handled as if they contained PCB's. All such oils will be laboratory tested for PCB's.

40 CFR part 761 imposes stringent restrictions on the use, inspection and disposal of PCB containing materials. These regulations set 50 ppm PCB's as the upper limit allowable. Materials containing concentrations of PCB's above 50 ppm are classified as toxic.

Oil Spills

The majority of information on oil spills applies to crude oil. Although crude oil is not a problem in WRST, this information gives some indication of the effects of refined petroleum products. One of the main differences between crude and refined oils is that the more refined the oil, the higher the volatile oil content. Volatile oils are the most toxic of the oil components. Therefore, refined petroleum products are more toxic and immediately damaging to flora and fauna. Petroleum products with lower volatile oil content such as motor oils and greases are not as toxic as diesel fuels and gasolines. The viscous and tenacious nature of the thicker products can have an asphyxiating effect on any organism it contacts. Crude oil is both neoplastic (tumor causing) and an equivocal tumeric agent.

Ground spills of crude oil tend to exhibit the following characteristics:

1. Downslope movement is primarily in the organic soils.
2. Organic matter slows movement.
3. Most movement is subsurface.
4. Evaporation of volatile oils reduces volume and mobility of oil.
5. Thawing of permafrost layer is greatly increased by surface blackened areas.
6. Oil may not biodegrade for several years.
7. Oil continues to move for several years.
8. Oil moves differently in different soil types and at different times of year.
9. Vegetation mortality is highest within areas of surface flow.
10. Damage to vegetation is delayed and reduced in areas of subsurface flow.
11. There is no evidence of recovery of vegetation in areas of subsurface flow after several years.
12. Some of the volatiles tend to persist in the soil making the soil toxic to plants and microorganisms.
13. Soil respiration rates may be enhanced by the end of a growing season due to an increase in petroleum degrading organisms as well as decaying of vegetation killed by the oil spill.

Refined petroleum fuels such as gasoline, kerosene, and motor oils will vary somewhat from each other and from crude oil in their evaporation rates and movements through the soil, but all will more or less follow the above patterns.

Petroleum products leaking into streams create different problems from those spilled on land. Petroleum spilled in water ways will travel faster and farther than land spills. It will also impact a greater number of organisms. Because the oil will spread over the water surface and is carried to fauna in a more restricted habitat, there is little chance for avoidance by stream dwellers. Distilled petroleum products are immediately toxic to aquatic life. Below are some examples of toxic concentrations of refined fuels in historic stream spills.

Gasoline at 100 mg /liter is lethal to trout and fingerling salmon

Jet fuel at 500 mg /liter is lethal to fingerling salmon

Diesel fuel at 350 to 1,000 mg /liter is highly toxic to trout

These concentrations are approximately 7.5 gallons of gasoline and 32.5 gallons of jet fuel for every 100 gallons of water.

Some other ways in which petroleum products effect aquatic life are:

1. Petroleums act on epithelial surfaces of fish interfering with respiration

2. Some of the petroleum settles to the bottom of the stream destroying benthic invertebrates and their habitat.

3. Settled oils effect spawning beds, eggs, and fry.

4. Surface oil deoxygenates water by interfering with absorption of atmospheric oxygen.

5. Heavy coatings of free oil on the water surface interferes with photosynthesis of aquatic vegetation.

What conditions encountered during an oil spill create a detrimental environmental situation remains unanswered. No specific information on what type of oil product, quantity and under what conditions is cause for environmental or health concerns exists. EPA considers 5 gallons to be significant. However, in a remote area is this enough to warrant the cost of clean up? For relatively small spills (which may be as much as 2,000 gals. on land and 100 gals. in a stream) perhaps the effects of equipment and work crews cleaning up the site will cause more damage than the material spilled. Removal of containerized waste fuels from a remote site prior to leakage is undoubtedly the best policy.

Drilling Muds

Unused drilling muds were found stacked in large quantity at a site during the 1984 Waste and Refuse Site Inventory. Drilling muds are materials used to aid in the drilling of oil and gas wells. Some of the drilling muds main functions are:

1. Remove formation cuttings from the drill hole

2. Transmit hydraulic force to the drill bit

3. Cool and lubricate the drill bit and drill string

4. Walling the hole with impermeable cake

5. Prevent caving of the drill hole

The composition of drilling muds varies greatly but all consist of at least a base fluid, viscosifiers, and weighting materials. The following outline shows the most common constituents of drilling muds.

Base fluids

1. Fresh water
2. Salt water
3. Oil based fluids

Viscosifiers

1. Wyoming bentonite (sodium montmorillonite)

Weighting materials

1. Barite (barium sulfate)
2. Iron oxide

Additives

1. pH control agents
   - sodium hydroxide
   - calcium hydroxide
2. Deflocculants
   - lignite
   - diesel oil
3. Thermal stability agents
   - modified lignites
4. Viscosifiers
   - guar gum
5. Fluid loss control agents
   - starches
   - polymers
6. Lost circulation materials
   - mica
   - walnut hulls
7. Special weighting agents
   - iron oxide
   - lead

8. Lubricants and torque reducers

   fatty acids
   triglycerides

9. Other special additives

   asbestos
   asphalt
   paraformaldehyde
   plant fibers and by products

Information on the environmental effects of drilling mud wastes addresses used muds and their associated waste waters. Drilling muds are not hazardous waste according to EPA regulations. Various oil companies and private firms have conducted tests on the effects of used drilling muds and have concluded that muds can have some detrimental environmental effects. On land the constituents of drilling mud that reduce plant growth are excess soluble salts and exchangeable sodium. Drilling muds will kill any plant growth upon which it is piled as a result of it forming an impermeable layer through which nothing can grow. Land disposal of many muds can safely be done by mixing the mud with soil in a ratio of 1 part (or less) mud to 4 parts soil. This concentration has been determined to have no hazardous effect when done with used drilling muds. Used drilling muds are usually more toxic than unused muds because they contain cuttings from the drill hole. Cuttings often add heavy metals to the muds which may be environmentally detrimental.

Drilling mud waste discharged into marine and aquatic environments are generally not lethal to aquatic life. Mud can be toxic if it is in concentrations of 10,000 ppm or higher. Shallow water will normally be more severely effected. In fresh water streams drilling muds are more likely to increase suspended solids and coat the substrate harming benthic invertebrates. Some of the weighting materials and special additives used with drilling muds may contain high concentrations of heavy metals such as barium, chromium, and lead. The amount of these metals in the waste muds will greatly effect their toxicity. Metal content of the muds needs to be considered prior to disposal.

Asbestos

Although not a toxic material, the EPA recognizes airborne asbestos contamination in buildings as a significant health threat. Old buildings located at milling sites within WRST can potentially contain asbestos material as insulation.

Asbestos was commonly used for:

1. surfacing material

2. pipe and boiler insulation

3. tiles and wall boards

Relationships between the amount of exposure to asbestos fibers and disease is complex and not fully understood or defined. The existence of asbestos in a building does not necessarily constitute a health problem if the material is in good condition. Damaged asbestos coverings, either by physical break down or by water damage and erosion, makes asbestos potentially more harmful due to increased fibers in the air. Friable asbestos (material which can be crumbled, pulverized, or reduced to powder by hand pressure) is the greatest health hazard. Moisture applied to friable asbestos reduces the fibers ability to become airborne. The EPA considers 1% asbestos as an asbestos containing material of health concern.

Health problems related to asbestos exposure are:

1. Asbestosis - a serious lung disease

2. Lung cancer

3. Mesothelioma - a cancer of the lining of the lung or abdominal cavity

Asbestos is not considered detrimental to the general environment so much as it is to man. The best policy concerning asbestos is one of avoidance. If friable asbestos is found in buildings frequented by the public, removal of the asbestos and/or warning signs to alert the public should be considered.

SITE IDENTIFICATION

The WRST 1984 Waste and Refuse Site Inventory identified sites which may potentially have hazardous waste materials. Additional sites of interest may be determined by mining records or reports from field personnel working on other projects throughout the park and preserve.

This information will also be used to estimate the amount of time necessary to sample materials and the number and types of samples to be expected.

SITE ACCESS

Due to the remoteness of the waste sites in WRST, access will be predominantly by aircraft. A helicopter on contract to WRST will provide access to the majority of sites but fixed-wing and amphibious aircraft will also be employed to access certain locations. Due to the limited payload of most aircraft, equipment must be kept compact and at a minimum without omitting items which are necessary for safe and accurate sampling of suspected materials. Recommended equipment is listed in the appendices A, B, and C.

ARRIVAL AT SITE AND ESTABLISHING WORK ZONES

Because most of the HWI sites will be accessed by aircraft, arrival of personnel and equipment will be in stages. The first flight into a remote site should carry the project supervisor and support equipment such as camping gear, food tent, stove and fuel. While the aircraft (usually a helicopter) departs for the second load of personnel and equipment, the supervisor will conduct a preliminary reconnaissance of the site. The supervisor will decide where to set up the three zones described in the following sections. After determining where the different zones will be located the supervisor will begin setting up the personnel quarters in the support zone. Upon arrival of the second flight, the crew will finish establishing the support zone. Once the support zone is established the crew will conduct a survey and reconnaissance of the exclusion zone and set up the contamination reduction zone.

Support Zone (S zone)

This area will contain the personnel living quarters and unused equipment. Cooking, eating, sleeping and paper work will all be conducted in this zone. Depending on weather and the number of facilities available the S zone may be used by personnel to suit up in protective gear for entry into the exclusion zone. The S zone should be well removed and preferably up wind from the exclusion zone. No clothing or equipment which may have been contaminated during the inventory and sampling procedures will be permitted into the S zone. This zone must have adequate water supply either available on site or hauled in for personal use and decontamination. A list of equipment to be contained in the S zone is listed in appendix B.

Contamination Reduction Zone (D zone)

This zone will be set up adjacent to the exclusion zone. It will be used for decontamination of all personnel and equipment exiting the exclusion zone. This zone will normally be used for a staging and suiting area. The staging section of this zone should contain unused protective clothing, sampling equipment and recording equipment. All equipment must be in weather proof containers; preferably in a tent or under a tarpaulin. All collected and properly packaged samples will be kept in this area until moved from the site to the storage facility. A fireproof locker at the Gulkana Operations Center will be used to store samples. The decontamination section of this zone will contain a portable shower/eye wash unit, wash tubs with detergent solution and rinse water, scrub brushes, paper towels, and waste container for disposal of contaminated equipment. Materials to be contained in this zone are listed in appendix C .

Exclusion Zone (X zone)

The exclusion zone is the area contaminated with or potentially contaminated with hazardous waste materials. The on site supervisor is responsible for determining the boundaries of the X zone. The

perimeter will then be marked with brightly colored survey flagging. Wind indicators of flagging will be placed near the X zone and readily visible from both the ground and the air. Access corridors will be established for passage between the D and X zones. An ABC rated fire extinguisher of 10 lbs. or more capacity will be kept at the entrance of the X zone and ready for immediate use. Only adequately protected and trained personnel will be permitted into the X zone.

LEVELS OF PROTECTION

All personnel entering the X zone will be required to wear protective equipment for the level of protection determined by the on-site supervisor. Protective safety equipment is divided into four categories depending upon the amount of protection necessary:

1. Level A: will be worn when the highest level of respiratory, skin, and eye protection is needed.

2. Level B: will be worn when the highest level of respiratory protection is required, but a lesser degree of skin protection.

3. Level C: will be worn when adequate respiratory protection is provided by the type of filter used.

4. Level D: will be used only when the supervisor has determined that there is no respiratory threat; no respiratory protection and little or no skin protection is provided

Level A protection consisting, of fully encapsulated suits and self contained breathing apparatus (SCBA), is not anticipated as necessary for this project. Level A protection is worn when high concentrations of airborne substances are known or thought to be present and these substances could severely effect the skin. Fully encapsulated suits are designed to provide a gas or vapor tight barrier between the wearer and contaminants. If a situation is found that requires level A protection, WRST personnel will not attempt to sample or in any way handle the material. The EPA will be contacted for assistance.

Level B protection will be the highest level of protection used during this project. Chemical resistant suits provide good but not maximum level of skin protection. SCBA provides the wearer with maximum respiratory protection. This level of protection will be used if atmospheric concentrations of toxic substances are suspected to exceed levels considered to be immediately dangerous to life and health (IDLH) as determined by the National Institute for Occupational Safety and Health (NIOSH). If the oxygen level in an enclosed area is suspected to be below 19.5%, level B protection will be used.

Level B Protection Components

1. Disposable chemical resistant suit
2. Chemical resistant hood
3. Chemical resistant boots with steel toe
4. Disposable boot covers
5. Chemical resistant aprons
6. Inner gloves-latex
7. Outer gloves-PVC liquid proof
8. Pressure demand SCBA
9. Taped joints

Level C protection will be worn when it has been determined that respiratory dangers are low enough to warrant the use of air purifying respirators. Air purifying respirators require oxygen levels above 19.5%. Atmospheric concentrations of contaminants must be below levels considered to be immediately dangerous to life and health as determined by NIOSH. The respiratory equipment (SCBA versus air purifying respirator) is the only difference between level B and level C protection.

Level D protection provides no respiratory protection and minimal skin and eye protection. For the purposes of this project however, level D protection will be nearly the same level of skin protection as levels B and C. Due to the open atmosphere of the sites to be encountered on this project, level D protection shall be adequate for initial reconnaissance and staging of containers under most circumstances. If the containers appear in poor condition and the possibility of leakage or rupture exists, level C protection will be worn for reconnaissance.

Level D Protection Components

1. Disposable Tyvek coveralls
2. Chemical resistant boots with steel toe
3. Inner gloves (latex)
4. Outer gloves (PVC)
5. Hard hats (optional in most sites)
6. Safety glasses (optional in most sites)

Levels of protection will vary depending upon the materials found at a site. Level C protection, for example, may be conducted in Tyvek suits at some sites, polyethylene coated Tyvek at other sites, or heavy acid resistant suits for other sites. Weather may also determine a change in suiting. Light rain will require heavy acid resistant suits since they are also waterproof and necessary to protect personnel. The decision as to what variation in suiting is used will be made on-site by the supervisor and documented in the site logbook.

SURVEY AND RECONNAISSANCE OF THE X ZONE

Initial reconnaissance of the X zone will be conducted at the level of protection determined necessary by the supervisor on site. Level D protection will normally be used for initial reconnaissance. Generally, the initial entry will be a relatively rapid screening process for collecting information necessary for the planning of sampling procedures. The time required for the initial reconnaissance will be determined by the size of the X zone and the amount of materials confined there. The initial entry and reconnaissance team will accomplish the following objectives:

1. Determine existing hazards to personnel and the environment such as leaking materials or potential fire hazards.

2. Verify existing information concerning the site.

3. Become familiar with layout of the X zone.

4. Estimate types and quantities of samples to be taken

5. Determine arrangement for staging of drums or other containers to facilitate sampling and recording of data.

6. Estimate time required for sampling of materials at the site.

After initial reconnaissance of the X zone is accomplished the general site information sheet contained in the field logbook will be completed in accordance with the procedures described in the documentation section of this paper.

DECONTAMINATION PROCEDURES

Personnel involved in X zone operations may become contaminated in any of the following ways:

1. Contacting vapors, gases, mists or particulates in the air

2. Splashing by materials while sampling or opening containers

3. Walking through contaminated puddles or soil.

4. Using contaminated instruments or equipment

Decontamination is the physical removal of contaminants from protective safety equipment and recording instruments. The extent of decontamination required depends upon the type of material and extent of contaminant upon the equipment. Proper decontamination procedures minimize cross contamination from protective clothing to wearer, equipment to personnel and one area to another.

Initial decontamination procedures assume that any one entering the X zone has been contaminated. A system of washes and rinses, a minimum

of one each, will be set up to clean all the protective equipment. Regular detergent in a basin of water will be used for decontamination. Nylon bristle scrub brushes will be used to scrub down equipment. Camp stools will be available at decontamination stations to ease the scrubbing of boots. Personnel will step from the detergent bath to a rinse bath to minimize the spread of contaminants. A portable pressurized field shower with eye wash and hand spray facilities will be positioned next to the rinse bath to facilitate the rinsing of protective gear.

Decontamination will be eased by the use of disposable Tyvek suits, hoods, and over-boots. Recording equipment will be kept in plastic bags as much as possible to reduce or prevent contamination. After equipment has been decontaminated, personnel will be required to wash their bodies. Full showers will be taken in cases of gross contamination. For personnel returning from the X zone who have been only mildly contaminated, washing of face, hands and any contaminated equipment may be all that is necessary.

SAMPLING OF CONTAINERIZED LIQUIDS

Sampling of liquids contained in tanks, cans, or drums constitutes the major portion of this project. Specialized containers such as electrical transformers containing oils may also be encountered. It will not be possible to observe the content of most containers before sampling. This prevents determining if the contents are stratified or if there are sediments in the bottom of the container. Since layering or sedimentation is likely to occur in solutions left undisturbed for a length of time, samples must be taken that represent the entire depth of the container.

Agitation of the container which may disrupt layers is generally undesirable. Staging of drums and containers for sampling should be done in a manner which minimizes the movement and agitation of containers to be sampled.

Containers found in mine adits will be removed (if possible) from the mine before sampling. If the supervisor determines that conditions are unsafe for moving containers, they will be opened and sampled one at a time. Containers which are more than 50 ft. into an adit will be considered unsafe to open due to the potential of creating a combustible atmosphere within the adit.

Severe weather such as snow, rain, fog, or winds can make sampling potentially dangerous. Heavy precipitation can effect sample quality by contaminating it with water. Face masks on air purifying respirators often fog to the point of zero visibility during a rainstorm. For these reasons sampling during inclement weather will not be attempted.

Light precipitation should not prevent staging and sampling of containers. However, wet containers will not hold the paint used to spray identification numbers on them. If weather is poor, it will be

the decision of the on-site supervisor what types of work can be conducted.

Access to most containers will be by means of an existing port or bung. Drums which have a solid-banded lid may contain caustic materials and will be handled as such.

Opening Of Drums

The opening of closed drums prior to sampling entails considerable risk if not done properly. Exposure to vapors, splashing or spraying during drum opening poses potential risk. An explosion could result from sparks caused by tools used to open a container. Drums and other containers which have been warmed by solar radiation may build up pressure causing spraying of materials or the bung to be ejected with considerable force upon opening. All containers should be opened slowly and cautiously. A piece of clear plastic placed over the container should reduce chances of contamination by spraying or bung ejection.

Prior to sampling, the drums should be staged to allow easy access. Staging of containers should be accomplished with minimal agitation to contents. Standing water or other materials should be removed from the surface of the container in order to avoid mixing with the liquid to be sampled. This provides for a more representative sample and reduces the possibility of encountering problems with water reactive substances.

Usually, access to the contents of drums will be by removal of a threaded bung. A universal bung wrench of non-sparking brass will be employed for this task. Although this type of wrench prevents wrench-to-bung friction, bungs must be removed slowly and carefully to prevent possible sparking between the bung and the barrel. Old rusted barrels may require an extension bar or pipe to gain leverage to loosen the bung.

Drums which have non-removable or rusted closed bungs will require deheading. A drum deheader will be used to open a small portion of the drum which can then be carefully pried wide enough with a padded prybar to allow the glass drum thief to enter for sampling.

If any hissing is heard during opening, the sampler should back away and wait for the hissing to stop. Drums should always be opened slowly and preferably with a piece of clean plastic covering the drum. Full face respirators and chemical resistant clothing (level C protection) will be used as minimal protective equipment during all container openings.

Drums with solid, banded lids generally are closed by means of a threaded bolt. Large crescent wrenches will be used to remove the bolt. A hacksaw will be used to cut rusted bolts. Care should be used when cutting with a hacksaw to prevent excess heat build-up, or possible sparks. Caution should be maintained when the bolt breaks and pressure may be suddenly released on the closure band.

After sampling is completed, bungs will be replaced on the appropriate drums. Drums which were partially or completely deheaded will be covered with six mil plastic and securely taped in place over the drum to prevent water from entering the drum.

DRUM THIEVES

Flint glass tubes of 12 mm outside diameter (9.4 mm inside diameter) and 122 cm in length, referred to as drum thieves, will be used to remove liquid samples from containers. Melting the end of a drum thief with an acetylene torch while turning it to form an evenly tapered end with a smaller opening greatly aids in the tubes ability to hold liquids. A 4 to 5 mm opening works well. If there is sludge in the container bottom, an untapered drum thief may be preferred in order to pick up sludge samples.

To prevent breakage, drum thieves must be packed very carefully. Repacking in the original box with a layer of cardboard between each layer of drum thieves works well. This provides a snug fit of 24 drum thieves per box. The box should then be securely taped for transport, and its contents clearly marked on the outside.

SAMPLE BOTTLES

Sample bottles will generally be wide mouth, flint glass bottles with screw caps. Teflon lined amber bottles should be used if chlorinated hydrocarbons are suspected. Sixteen ounce bottles should be used for large samples but 8 ounce bottles are more easily transported and sufficient for most samples. Caps on sample bottles must be checked for cracks before use and flawed caps discarded. Care must be taken when tightening a cap in place to prevent cracking. For shipping, one 16 ounce bottle or two 8 ounce bottles per gallon paint can be packed.

SAMPLING PROCEDURES

After staging and carefully opening drums, sample bottles will be placed on the open drums. To sample the contents, slowly and carefully lower the drum thief to the bottom of the drum. The fluid level in the drum thieves must then be allowed to equalize with the fluid level in the drum. If bottom sludge is encountered, the fluid level must be equalized before the drum thief is pushed into the sludge. After all drums are staged with drum thieves, the sample will be removed by plugging the upper end of the drum thief with a gloved hand and holding only the uncontaminated end, slowly draw the thief from the drum (to help prevent spread of contaminants, that portion of the thief that was placed in the liquid should not be handled). The lower end of the drum thief will be placed into the mouth of the sample bottle and the upper end unstopped, releasing the liquid. If more liquid is needed, repeat the process until the desired quantity is reached.

In some instances a particular container may be fitted with a valve or pour spout. These containers may be sampled more easily by using the

valve or spout rather than a drum thief. Other containers may be of such size or shape that pouring the sample from the opened container is less likely to cause spills than a dripping drum thief. If pouring is the method used, it must be done with great care and caution. All filled sample bottles will have a 10% airspace to allow room for expansion during shipment.

After the sample bottle is filled, the drum thief will be lowered into the drum and left until all samples are taken. When the sampling is completed the drum thieves will be collected in a large trash bag, then broken and deposited into an empty deheaded drum for on-site disposal. Other contaminated equipment such as tyvek suits, hoods and over-boots, inner-gloves, and grossly contaminated scoops will also be disposed of with the drum thieves. Tyvek clothing will be ripped up before disposal in order to prevent any attempt of use by others. This refuse will be removed when the site is cleaned up.

As soon as the sample bottle is filled, it will be capped and the cap tightly sealed with fiber tape. If any substance contaminates the outside of the bottle, the bottle will be decontaminated before taping. An identification tag filled out in accordance with the procedures outlined in this document will then be attached to the bottle. The labeled bottle will be placed in a ziplock plastic bag with the label clearly visible. The bagged bottle will then be placed in an empty one gallon paint can and packed with vermiculite. An identical tag will be attached to the outside of the paint can and appropriate warning stickers attached. The samples will then be stored outside the X zone for shipment.

Paint cans containing samples will be packed in large coolers or specially constructed wooden boxes for transportation to laboratory or storage facilities. Transportation containers will be large enough to hold 10 to 15 paint cans, be leak proof, and have secure lids. Taping a transportation container closed with fiber tape or duct tape is a recommended security measure. Transportation containers will have warning labels to indicate they contain hazardous materials. "This end up" labels will also be placed on the containers. If the waste material is suspected to be extremely hazardous, labels warning not to load in passenger aircraft will also be used.

All samples will be transported to the Gulkana Operations Center where they will be be removed from the paint cans but left in the plastic bag and stored in a fire proof locker. This locker will be marked as containing hazardous materials and be kept locked at all times. Flash point tests will be conducted at the end of the field season, after all samples have been collected. Samples which can not be identified by flash point will require laboratory testing. Samples sent to the laboratory will contain only a portion of the sample material in storage. This will provide a back up sample in case of unforeseen complications arise.

The following pages taken from the EPA sampling manual summarize the procedures for the collection of containerized waste using glass tubes.

COLLECTION OF LIQUID CONTAINERIZED WASTES USING GLASS TUBES

Description

Liquid samples from opened containers (55-gallon drums) are collected using lengths of glass tubing. The glass tubes are normally 122 cm in length and 6 to 16 mm inside diameter. Larger diameter tubes may be used for more viscous fluids if sampling with the small diameter tube is not adequate. The tubing is broken up and discarded in the container after the sample has been collected, eliminating difficult cleanup and disposal problems. This method should not be attempted with less than a two-man sampling team.

Uses

This method provides for a quick, relatively inexpensive means of collecting concentrated containerized wastes. The major disadvantage is from potential sample loss which is especially prevalent when sampling low viscosity fluids. Splashing can also be a problem and proper protective clothing (e.g., butyl rubber apron, face shields, boot covers) should always be worn.

Procedures for Use

1. Remove cover from sample container opening.

2. Insert glass tubing <u>almost</u> to the bottom of the container. Try to keep at least 30 cm of tubing above the top of the container.

3. Allow the waste in the drum to reach its natural level in the tube.

4. Cap the top of the tube with a safety-gloved thumb or a rubber stopper.

5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.

6. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity.

7. Repeat steps 2 through 6 if more volume is needed to fill the sample container.

8. Remove the tube from the sample container and replace the tube in the drum.

9. Cap the sample container tightly with a Teflon-lined cap and affix the sample identification tag.

10. Break the glass sampling tube in such a way that all parts of it are discarded inside the drum. (Note: see the initial discussion to this section for exceptions.)

11. Replace the bung or place plastic over the drum.

12. Place sample container in a Ziplock plastic bag (one per bag).

13. Place each bagged container in a 1-gallon metal paint can (or appropriate sized container) and pack in vermiculite packing material. Place lid on the can.

14. Mark the sample identification number on the outside of each paint can and complete chain-of-custody log and the field logbook.

Optional Method (if sample of bottom sludge is desired)

1. Remove cover from container opening.

2. Insert glass tubing slowly almost to the bottom of the container. Try to keep at least 30 cm of tubing above the top of the container.

3. Allow the waste in the drum to reach its natural level in the tube.

4. Gently push the tube towards the bottom of the drum into the sludge layer. Do not force it.

5. Cap the top of the tube with a safely-gloved thumb or rubber stopper.

6. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container.

7. Release the thumb or stopper on the tube and allow the sample container to fill to approximately 90 percent of its capacity. If necessary, the sludge plug in the bottom of the tube can be dislodged with the aid of a stainless steel laboratory spatula.

8. Repeat if more volume is needed to fill sample container and recap the tube.

9. Proceed as in Steps 9 through 14 above.

Note:

1. If a reaction is observed when the glass tube is inserted (violent agitation, smoke, light, etc.) the investigators should leave the area immediately.

2. If the glass tube becomes cloudy or smoky after insertion into the drum, the presence of hydrofluoric acid is indicated and a comparable length of rigid plastic tubing should be used to collect the sample.

3. When a solid is encountered in a drum (either layer or bottom sludge) the optional method described above may be used to collect a core of the material, or the material may be collected with a disposable scoop attached to a length of wooden or plastic rod.

SAMPLING SOLID BULK MATERIALS

Solid bulk materials are generally a homogeneous collection of a single identifiable product. They are usually contained in bags, drums, or other smaller containers. Occasionally they may be piled directly on the ground, either deliberately or as the result of a spill. Bulk materials in an unconsolidated state may be readily collected by means of a scoop or trowel. A series of samples should be collected to form a representative composite of the material. Any solid materials of questionable or potentially hazardous content will be sampled and sent for laboratory analysis.

Sampling Solid Bulk Materials With A Scoop

A scoop made of 1.5 inch or larger (inside diameter) PVC pipe (figure 1, appendix F) will be used to collect samples of bulk materials. Relatively small amounts of material will be taken from several points in the bulk material to form a composite sample. Rotating of the scoop may be necessary to cut a core from dense materials. The scoop will then be carefully extracted and the material placed in a collection bottle which will be tagged and packaged for transport in the same manner as liquid samples.

A scoop or trowel used for sampling bulk materials must be decontaminated after each sample is taken. If several types of bulk materials are sampled at a site, different scoops may be used for each sample and all the scoops decontaminated after sampling.

GENERAL SAFETY PRACTICES

To insure the highest possible level for safety of personnel working at hazardous waste sites, the following guidelines and procedures established by the Environmental Protection Agency should be adhered to.

1. Hand to mouth contact such as eating, drinking, or smoking are prohibited in the contaminated zone.

2. Thorough washing of face and hands will always be done after leaving contaminated zone.

3. Washing of the entire body will be done whenever decontamination of outer garments is required.

4. Unnecessary contact with contaminated surfaces, equipment, and ground will be kept to a minimum.

5. No excess facial hair which will interfere with respirator or SCBA mask fit is permitted.

6. Prescribed drugs and alcohol may not be used during sampling by on-site personnel.

7. Any personnel present in the contaminated zone must wear protective equipment for the level of entry designated by the supervisor.

8. On-site personnel must remain in visual contact with one another.

9. On-site personnel must work in pairs and are responsible for the safety of each other including checking each other's equipment and watching for signs of physical and psychological stress in one another.

10. All on-site personnel must be familiar with necessary procedures.

11. Wind indicators visible to all personnel will be placed around the contaminated zone.

12. Work areas for various stages of the sampling and recording of data must be set up.

13. Routes to and from the contaminated and decontamination zones must be designated.

14. Emergency medical supplies will be kept on site at the support zone and all personnel will know where these supplies are located and how to use them.

15. A fire extinguisher will be kept near the entrance to the contaminated zone when dealing with flammable substances.

16. Emergency shower and eye wash facilities will be kept in the decontamination area and always ready for immediate use.

17. Adequate shelter to protect personnel using safety equipment must be provided to protect against heat, cold, rain, snow, or other adverse conditions.

18. On-site personnel should avoid working in adverse weather (heat, cold, precipitation) which may affect their safety.

19. Plenty of liquids with salt and electrolytes must be made available during all operations conducted in hot weather.

20. Personnel wearing protective clothing must monitor each other for heat stress when ambient temperatures rise above seventy degrees fahrenheit.

21. Personnel showing signs of heat rash, heat cramps, or heat exhaustion must cease all operations until fully recovered.

22. Heat stroke is a medical emergency and requires evacuation and medical treatment of affected personnel.

23. All personnel involved in sampling will receive medical training to identify heat exhaustion and heat stroke.

24. If daytime temperatures are too high for working in SCBA or respirators, work periods will be confined to cooler morning and evening hours to reduce stress on personnel.

25. Heart rate (HR) should be monitored during rest periods when operations are conducted in adverse heat. HR should not exceed 110 beats per minute.

26. Work periods should be no longer than 30 minutes when using SCBA or respirators.

27. Rest periods of 20 minutes should be used when using SCBA or respirators and should be lengthened to 30 minutes in excessive heat.

28. Working pairs of on-site personnel should monitor each other for signs of toxic exposure such as:

a. Change of complexion or skin discoloration

b. Lack of coordination

c. Changes in demeanor

d. Excessive salivation

e. Pupillary response

f. Changes in speech

Such signs may indicate a serious condition and any personnel showing any of the above signs should discontinue work immediately. If conditions are severe or mild symptoms persist for several hours, the victim will be evacuation to the nearest medical facility.

29. Individual on-site personnel must be aware of indications of toxic exposure not observable by others such as:

a. Headaches

b. Dizziness

c. Blurred vision

d. Cramps

e. Irritations to eyes, skin, or lungs.

Persistence of any of these symptoms is cause for immediately leaving the work site and evacuation, should they persist.

30. Contact lenses may not be worn by personnel wearing respiratory equipment.

31. An FM radio, with all the WRST frequencies, will be kept in camp and contact with the WRST contract helicopter, headquarters or a ranger station will be made every morning and evening. If radio contact can not be made by a previously agreed to time, the helicopter will travel to and land at the site to investigate any potential problems.

DOCUMENTATION PROCEDURES

All information pertinent to the sampling of materials or other field activities must be thoroughly and accurately recorded. This information is necessary to determine future actions concerning these materials. General procedures as well as standard forms for the site logbook, sample tags, chain of custody for samples, photograph logbook, waste container location, and site mapping procedures are described below.

GENERAL FIELD PROCEDURES

All containers from which samples have been taken will be marked with a three digit container number using white spray paint. This number will be the same as that used in the field logbook and on the sample bottle label. Unsampled containers which have waste in them will also be marked in white paint with a three digit number. Empty containers will be marked with a three digit number in black spray paint. All container numbers will be recorded in the field logbook. All sample and container numbers recorded in the field logbook will be followed by the letter S (sampled), E (empty), or U (unsampled) accordingly.

Lids on spray paint cans should be securely taped during transport to and from the site to prevent accidentally dislodging the lid and spraying equipment.

Original data should not be carried back into the field once it has been brought out. Xeroxed copies of any data needed from the field logbook or photo log should be used. When going from one field session to another, it is necessary to have the number of the last sample taken as well as the number of the last roll of film used and the last photo number used.

Field Logbook

This log is designed to be used in a 3 ring binder form. The title page for each site will be a general site information form. This form provides an overall view of site location, conditions, collections, and participants in the operation. The other two forms in the log book are designed to lay in the binder so that they face each other forming, in effect, one large form for recording barrel and sample information.

The following pages are completed examples of the forms used for site logbook.

HAZARDOUS WASTE INVENTORY

General Site Information

Location Name: site name Location Code: 4 letter code (e.g. SAGL)

USGS Quad name: self explanatory (SE) T SE R SE 1/4S SE 1/4S SE S SE

Arrival Date: SE Departure Date: SE

Personnel: actual on-site participants

Waste Producer: if known (e.g. USGS, XYZ Mining Co., hunting camp, etc.)

Total Samples Taken: Liquid: actual # Solid: SE Other: include here unsampled & greases

Photo Roll No.: SE Photo No's.: numbers from each roll

No. And Types of Containers: total number of containers on site, not just sampled ones (e.g. 87-55 gal. drums; 16-5 gal. cans; 3-1 qt. cans); include here level of protection for recon, opening containers, and sampling

Site Type (mill site, mine, adit, ect.): general information known about the site type (e.g. mining site, mill site, base camp, etc.)

Site Size: sq. ft. and acreage of contaminated or potential contamination zone

Accessibility: method used and methods that can be used

Topographical Features:

Vegetation Type(s): major vegetation types and approximate percent cover of each

Slope: give percent Aspect: SE Elevation: SE

Drainages: closest drainage then successively to major watershed name

Onsite Weather: general information on weather to indicate what working and sampling conditions were like; list presence and location of on-site water source

Comments (environmental, safety, ect.): notes on apparent environmental damage and any other pertinent site information (additional information can be continued on the back of this page)

[illegible] SAMPLE IDENTIFICATION INFORMATION

[illegible]:

[illegible] Sample No.	Date year	Container Type & Condition	Container Label	Samp. Init.	Sampling Method
ins the four letter cation code, 3 container number, or E for sample ty or U for pled	month/ day	note size and type of container and its condition using the following descriptions: good: no rust; small or no dents; no leakage. fair: some rusting; dents present; no leakage. poor: rusted through; leaking; dented or crushed.	indicate any manufacturers name, product number or other designation.	initials of samplers name	Coded: DT= drum thief SC= scoop PR= pour
AMPLE:					
CL-001-S	7/15	55 gal. drum; good	Chevron; Avgas 100	RH	DT
CL-002-E	7/15	5 gal. can; poor	Dupont Chemical # 123	KM	none

[illegible] CONTINUED

[illegible]

[illegible]	Bottle Type	Flash Pt. °F	Suspected Wastetype	Disp./ Date	Lab Results & Date	Comments
ose as poss- estimate am- of sample in e bottle.	coded: F= flint T= teflon lined bottle	as deter- mined by set-a- flash unit.	best estimate of what mater- ial is	disposition/ location; coded: S= storage/ date. L=lab/date	results from lab when they come in and date	note anything that may be of interest e.g. barrel colo contents, viscosit ect.
MPLE:						
14 oz.	F	< 140° F	Avgas	S/7-21-85	Avgas/ 9-20-85	----------------
none	------	------	---------	--------	none requested	dried white mater- ial on inside of container.

Chain Of Custody Procedures

The primary objective of chain of custody documentation is to create an accurate written record which traces the possession and handling of the sample from its collection through transportation, analysis and storage or disposal. This record is necessary if a particular sample becomes important in a legal dispute. The record will show who was responsible for the sample and when. If necessary, these people can testify in court that the sample was not tampered with.

Each transfer of custody requires the signature of the person relinquishing the sample and the signature of the person receiving the sample. Chain of custody forms should then be kept in the back of the site logbook. A sample chain of custody form is shown in appendix E.

Photograph Log

Complete and accurate documentation of a waste site necessitates the taking of numerous photographs. The field logbook contains photolog data sheets with the following columns for recording all required information.

Photo Logbook

Roll No. 1

Date	Phr.	Photo No.	Location	Description
date photo taken	initials of photogr-apher	No. of photo	location of waste site	description of what photo indicates
Examole: 6/9	RH	No.8	Rock Lake	X zone looking west

Sample Label Format

Labels for marking sample bottles and shipping containers are five by two and one half inch fiber paper tags. One side is stamped with the name and address of the park. The other side should contain the following information written in indelible ink:

1. Site location: name and code
2. Sample no.: number of sample
3. Date: date sample taken
4. Suspected material: best estimate form on-site information

Mapping Procedures

An accurate map of the waste site must be drawn to indicate the layout of the site. The map should be sketched on site after sampling is completed and personnel are familiar with the site layout. Measurements of zones, buildings, discarded equipment, distances between buildings and containers or other pertinent features should be included on the map. The following details should be included:

1. S zone location
2. D zone location
3. X zone location
4. X zone perimeter measurement
5. X zone acreage
6. Arrangement of waste containers
7. Buildings on site and their size
8. On-site equipment, type, size, and location
9. Mine adits
10. Arrangement of vegetation types
11. Layout of terrain (e.g. hills and streams)
12. Compass directions
13. Any other pertinent information

APPENDIX A

General Equipment For Personnel	Quantity:
Dome tent	
Peak 1 stove	2 ea.
Blazo fuel	1 gal.
Cooking facilities	
Food	
Sleeping bags and pads	
Personal gear, e.g. clothing, toiletries, etc.	
Cotton long underwear	
Mosquito repellent	

APPENDIX B

Support Zone (S Zone) Equipment List

- Hardhats
- Headlamp with battery packs
- Tyvek coveralls
- Tyvek boot covers
- Tyvek hood
- Polyethylene coated Tyvek coveralls
- Acid resistant suits
- Warning labels
- Spray paint-white and black
- Tent-wall type
- Radio (FM)
- Camera and film
- Measuring tape-100 ft.
- Clinometer
- Compass
- Field maps
- Standard Operating Procedure manual
- Site logbook
- Photolog
- Chain of custody forms
- General office supplies

APPENDIX C

Contamination Reduction Zone (D Zone) Equipment	Quantity:
Wash tubs	2
Wash basin	4
Scrub brush	3
Portable wash unit with eye wash	1
Detergent	1 bx
Bar soap	2
Campstool	3
Air compressor	1
Mixed gasoline	1 gal
SCBA	1
SCBA extra tanks	3
Air purifying respirators	3
Respirator replacement filters	6
Respirator test kit	1
Respirator alcohol wipes	1 bx
Tyvek suits, hoods, and overboots	varies
PVC gloves	varies
Latex gloves	1 bx
Chemical resistant boots	1 pr/per
Chemical resistant aprons	1/pers.
Drum thieves	varies
Sample collection bottles	varies
Duct tape	4 rolls
Strapping tape	4 rolls
1 gallon paint cans	varies
Sample labels and labeling pens	250
Vermiculite (contained in paint cans)	varies
Tool bag with tools	1
First aid kit	1
Fire extinguisher (ABC)	1
Sample scoop	1
Garbage bags	50
1 gallon ziplock bags	250
Flagging tape	6 rolls
Bung wrench	2
Drum deheader	1
Sleeve protectors	varies
tarpaulin	2
Cord (parachute)	200 ft.
Pry bar	1

SUBPART C—LOADING AND STORAGE CHART HAZARDOUS MATERIALS

§177.848 Loading and storage chart of hazardous materials. (a) Hazardous materials must not be loaded, transported or stored together, except as provided in the Loading and Storage Chart of hazardous materials shown in this section.

The following table shows the hazardous materials which must not be loaded or stored together. The letter X at an intersection of horizontal and vertical columns shows that these articles must not be loaded or stored together, for example: Detonating fuzes class A, with or without radioactive components g horizontal column must not be loaded or stored with high explosives or propellant explosives, class A b vertical column.

Column headings:

- a — Low explosives or black powder
- b — High explosives or propellant explosives, class A
- c — Initiating or priming explosives, wet: Diazodinitrophenol, fulminate of mercury, guanyl nitrosamino guanylidene hydrazine, lead azide, lead styphnate, nitro mannite, nitrosoguanidine, pentaerythrite tetranitrate, tetrazene, lead mononitroresorcinate
- d — Detonators, detonating primers
- e — Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles or shell, ammunition for small arms with incendiary projectiles, ammunition for small arms with explosive projectiles, rocket ammunition with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles, boosters (explosive), bursters (explosive), and supplementary charges (explosive) without detonators
- f — Explosive projectiles, bombs, torpedoes, mines, rifle or hand grenades (explosive), jet thrust units (jato), class A, igniters, jet thrust, class A; rocket motors, class A, igniters, rocket motor, class A
- g — Detonating fuzes, class A, with or without radioactive components
- 1 — Ammunition for cannon with empty, inert-loaded or solid projectiles, or without projectiles; rocket ammunition with empty, inert-loaded or solid projectiles
- 2 — Propellant explosives, class B; jet thrust units (jato), class B; igniters, jet thrust, class B; rocket motors, class B; rocket engines (liquid), class B; igniters, rocket motor, class B; starter cartridges, jet engine, class B
- 3 — Fireworks, special or railway torpedoes
- 4 — Small arms ammunition, or cartridges, practice ammunition
- 5 — Primers for cannon or small arms, empty cartridge bags—black powder igniters, empty cartridge cases, primed, empty grenades, primed, combination primers or percussion caps, toy caps, explosive cable cutters, explosive rivets
- 6 — Percussion fuzes, tracer fuzes or tracers
- 7 — Time, combination or detonating fuzes, class C
- 8 — Cordeau detonant fuse, safety squibs, fuse igniters, delay electric igniters, electric squibs, instantaneous fuse or igniter cord
- 9 — Item 9—Fireworks, common
- 10 — Blasting Agent
- 11 — Flammable liquids or flammable gases; Flammable liquid or flammable gas label
- 12 — Flammable solids or oxidizing material; Flammable solid, oxidizer, or organic peroxide label
- 13 — Corrosive liquids; Corrosive label
- 14 — Nonflammable gases; Nonflammable gas label
- 15 — Poisonous gases or liquids in cans (or tank) cylinders, projectiles or bombs; poison gas label
- 16 — Radioactive materials

		a	b	c	d	e	f	g	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
CLASS A EXPLOSIVES																								
Low explosives or black powder	a	....		X	.....	......	.....	.....	.....	.....	X	.....	.....	.....	.....	.....	X	...	X	X	X	X	X	[1] X
High explosives or propellant explosives, class A	b	...		X	• X	......	.....	X	.....	.....	X	.....	.....	.....	.....	.....	X	...	X	• X	X	X	X	[1] x
Initiating or priming explosives, wet: Diazodinitrophenol, fulminate of mercury, guanyl nitrosamino guanylidene hydrazine, lead azide, lead styphnate, nitro mannite, nitrosoguanidine, pentaerythrite tetranitrate, tetrazene, lead mononitroresorcinate	c	X	X	......	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	[1] X
Detonators, detonating primers	d	...	• X	X	.....	X	X	.....	.....	.....	• X	.....	.....	.....	.....	.....	• X	...	• X	•• X	• X	• X	X	[1] X
Ammunition for cannon with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles or shell, ammunition for small arms with incendiary projectiles, ammunition for small arms with explosive projectiles, rocket ammunition with explosive projectiles, gas projectiles, smoke projectiles, incendiary projectiles, illuminating projectiles, boosters (explosive), bursters (explosive) and supplementary charges (explosive) without detonators	e	.....	....	X	X	......	.....	X	.....	.....	X	.....	.....	.....	.....	.....	X	...	X	X	X	X	X	[1] x
Explosive projectiles, bombs, torpedoes, mines, rifle or hand grenades (explosive), jet thrust units (jato) class A, igniters, jet thrust, class A, rocket motors, class A, igniters, rocket motor, class A	f	.....	....	X	X	......	.....	X	.....	.....	X	.....	.....	.....	.....	.....	X	...	X	X	X	X	X	[1] X
Detonating fuzes, class A, with or without radioactive components	g	.....	X	X	.....	X	X	.....	.....	.....	X	.....	.....	.....	.....	.....	X	...	X	X	X	X	X	[1] X

CLASS B EXPLOSIVES																								
Ammunition for cannon with empty, inert loaded, or solid projectiles, or without projectiles; rocket ammunition with empty, inert loaded or solid projectiles	1			X																	b X		X	
Propellant explosives, class B; jet thrust units (jato) class B; igniters, jet thrust class B; rocket motors class B; rocket engines (liquid) class B; igniters, rocket motor class B; starter cartridges, jet engine class B	2			X																	b X		X	
Fireworks, special, or railway torpedoes	3	X	X	X	• X	X	X	X										X					X	
CLASS C EXPLOSIVES																								
Small arms ammunition	4			X																				
Primers for cannon or small arms; empty cartridge bags—black powder igniters; empty cartridge cases, primed; empty grenades, primed; combination primers or percussion caps; toy caps; explosive cable cutters; explosive rivets	5			X																				
Percussion fuzes, tracer fuzes or tracers	6			X																				
Time, combination or detonating fuzes class C	7			X																				
Cordeau detonant fuse; safety squibs; fuse lighters; fuse igniters; delay electric igniters; electric squibs; instantaneous fuse or igniter cord	8			X																				
Fireworks, common	9	X	X	X	• X	X	X	X															X	
OTHER HAZARDOUS MATERIALS																								
Blasting Agent	10			X							X													
Flammable liquids or flammable gases; Flammable liquid or flammable gas label	11	X	X	X	• X	X	X	X															X	
Flammable solids or oxidizing materials; Flammable solid, oxidizer, or organic peroxide label	12	X	• X	X	•• X	X	X	X													b X		X	
Corrosive liquids; Corrosive label	13	X	X	X	• X	X	X	X	b X	b X										b X			X	
Nonflammable gases; Nonflammable gas label	14	X	X	X	• X	X	X	X																
Poisonous gases or liquids in tank car tanks, cylinders, projectiles or bombs; poison gas label	15	X	X	X	X	X	X	X	X	X	X						X		X	X	X			
Radioactive materials	16	' X	' X	' X	' X	' X	' X	' X																

• Detonators, Class C Explosives may also be loaded and transported with articles named in vertical and horizontal columns 3, 9, 10, 11, 12 and 13. Loading and transportation of detonating primers or detonators except as prescribed in § 177.835, in any quantity, with articles named in vertical or horizontal columns b, c, e or f is prohibited.

• Corrosive liquids must not be loaded above or adjacent to flammable solids, oxidizing materials, ammunition for cannon with or without projectiles, or propellant explosives, except that shippers making truckload shipments of corrosive liquids and flammable solids or oxidizing materials packages and who have obtained prior approval from the Department may load such materials together when it is known that the mixture of contents would not cause a dangerous evolution of heat or gas.

• Explosives, class A and explosives, class B must not be loaded or stored with chemical ammunition containing incendiary charges or white phosphorus either with or without bursting charges.

• Bursters (explosive), boosters (explosive), or supplementary charges (explosive) without detonators when shipped by, to or for the Departments of the Army, Navy, and Air Force of the United States Government may be loaded with any of the articles named except those in columns c, d, 3, 9, 10, 11, 12, 13, 14, and 16.

• Does not include blasting agents, Ammonium Nitrate-Fuel oil mixtures or ammonium nitrate, fertilizer grade, which may be loaded, transported or stored with high explosives or with detonators containing not more than 1 gram of explosive each, excluding ignition and delay charges.

' Normal uranium, depleted uranium, and thorium metal in solid form may also be loaded and transported with articles named in vertical and horizontal columns a, b, c, d, e, f, and g.

Note 1. Charged electric storage batteries must not be loaded in the same vehicle with explosives, class A.

Note 2. Cyanides or cyanide mixtures must not be loaded or stored with acids or corrosive liquids.

Note 3: Gas identification sets may be loaded and transported with all articles named except those in column c.

Note 4: Nitric acid, when loaded in the same motor vehicle with other acids or other corrosive liquids in carboys, must be separated from the other carboys. A 2 by 6 inch plank, set on edge, should be nailed across the motor vehicle floor at least 12 inches from the nitric acid carboys, and the space between the plank and the carboys of nitric acid should be filled with sand, sifted ashes, or other incombustible absorbent material.

Note 5. Smokeless powder for small arms in quantities not exceeding 100 pounds net weight in one motor vehicle shall be classed as a flammable solid for purposes of transportation when examined for this classification by the Bureau of Explosives and approved by the Associate Director for OE

APPENDIX E

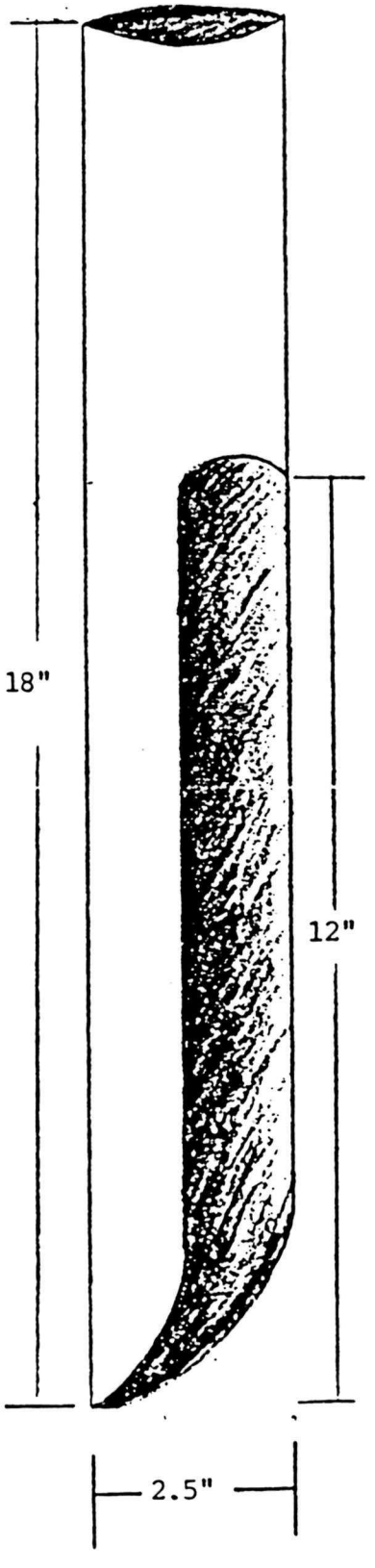
CHAIN OF CUSTODY RECORD

Project: project name e.g. WRST Hazardous Waste Inventory		Samplers: actual field personnel e.g. Kit Mullen, Ron Hicks	
Sample Number	Sample Type (liquid/solid)	Number Of Samples	Analysis Requested
as sample number from logbook.	actual physical state of sample.	self explanatory	type of analysis request for lab.
Example:			
WCL-001-S	liquid	1	test for PCB's

Relinquished by: signature	Recieved by: signature or: in storage at.....	Date:
Relinquished by:	Recieved by:	Date:
Relinquished by:	Recieved by:	Date:
Method of Shipment:	Recieved for lab by:	Date:

APPENDIX F

Figure 1. Sampling Scoop



APPENDIX G

Laboratory Facilities :

The following laboratories were utilized for analysis of samples:

Chemical and Geological Laboratories of Alaska, Inc.
5633 B Street
Anchorage, Alaska
Phone No. 562-2343 Contact: Steve Ede

Pittsburg Testing Laboratories
700 West 58th Avenue
Anchorage, Alaska
Phone No. 561-1391

APPENDIX H

Suppliers Of Materials :

Safety and Supply Company
901 A Orca Street
Anchorage, Alaska 99501
Phone No. 274-9506 Contact: Dave McCullum
They provide safety and protective gear such as Tyvek suits and respirators.

VWR Scientific
100 North Orca
Anchorage, Alaska 99501
Phone No. 272-6616 Contact: Vicki
Laboratory supplies, glassware, drum thieves, and sample bottles.

Lab Safety Supply
3430 Palmer Drive
Janesville, Wisconsin 53546
Phone No. 608-754-2345 Contact: Richard Schwarer
Scientific instruments, set-a-flash.

Direct Safety Company
7815 South 46 Street
Phoenix, Arizona 85040
Phone No. 602-968-7009
Safety equipment for handling materials. e.g. Tyvek suits, acid resistant suits, respirators, portable showers, eye wash, etc.

Survivair
3323 West Warner Avenue
Santa Ana, California 92702
Phone No. 714-540-8010
Manufactures SCBA and respirators.

Label Master
5724 North Pulaski Road
Chicago, Illinois 60646
Warning labels.

APPENDIX I

Reference literature and personal contacts for information:

American Conference Of Governmental Industrial Hygenists (ACGIH), 1984. Threshold Limit Values For Chemical Substances And Physical Agents In The Work Environment And Biological Exposure Indices With Intended Changes For 1984-85. Cincinnati, OH. 116 pp.

Bury, Bruce R., The Effects Of Diesel Fuel On A Stream Fauna, Calif. Fish and Game 58 (4): 291-295. 1972.

Ede, Steve, Oct. 1985, Personal Communication. Chemical & Geological Laboratories Of Alaska, Inc. Anchorage, Alaska.

Effects Of Crude Oil And Some Of Its Components On Young Coho And Sockeye Salmon, EPA Ecological Research Series, no. EPA-660/3-7-018. Jan. 1974.

Fate And Effects Of Crude Oil Spilled On Subarctic Permafrost Terrain In Interior Akaska, USA Cold Region Research And Engeneering Laboratory Report 80-29.

Gusmano, Jack, Oct. 1985, Personal Communication. Environmental Protection Agency, Anchorage, Alaska.

McCauley, Rita N., The Biological Effects Of Oil Pollution In A River, Limnology And Oceanography 11 (4): 475-486. 1966.

Merck Index, 10th Edition, 1984, Martha Windholz, ed. Merck And Co., Inc., Rahway, N.J.

Sax, Irving N., 6th Edition, 1984. Dangerous Properties Of Industrial Materials. Van Nostrand Reinhold Co., New York. 3124 pp.

Seminar On Onshore Disposal Of Drilling Muds And Cuttings, Alaska Oil And Gas Association Seminar, Nov. 1985.