

Ecology and Environment, Inc.

**SITE-SPECIFIC  
HEALTH AND SAFETY PLAN**

Project: Red Devil Mine RI/FS

Project No.: 001096.OX70

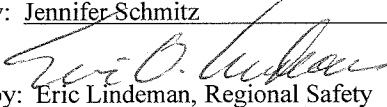
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## ACRONYMS/ABBREVIATIONS

ALARA	as low as reasonably achievable
ANSI	American National Safety Institute
BLM	Department of the Interior Bureau of Land Management
dBA	decibels
CHSP	<i>Corporate Health and Safety Program</i>
E & E	Ecology & Environment Inc.
LOP	levels of protection
PPE	personal protective equipment
RDM	Red Devil Mine
RI/FS	Remedial Investigation/Feasibility Study
SHASP	Site-Specific Health and Safety Plan
SOP	Standard operating procedure
SSO	Site Safety Officer
TLD	Thermoluminescent Dosimeter



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## 1. INTRODUCTION

### 1.1 POLICY

It is Ecology and Environment, Inc.'s (E & E) policy to ensure the health and safety of its employees, the public, and the environment during the performance of work it conducts. This site-specific health and safety plan (SHASP) establishes the procedures and requirements to ensure the health and safety of E & E employees for the above-named project. E & E's overall safety and health program is described in *Corporate Health and Safety Program* (CHSP). After reading this plan, applicable E & E employees shall read and sign E & E's SHASP Acceptance form, included as Attachment A. Any changes to this document will be noted on a SHASP Addendum Form, included as Attachment B.

This SHASP has been developed for the sole use of E & E employees and is not intended for use by firms not participating in E & E's training and health and safety programs. Subcontractors are responsible for developing and providing their own safety plans.

This SHASP has been prepared to meet the following applicable regulatory requirements and guidance:

Applicable Regulation/Guidance
29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
Other:

### 1.2 SCOPE OF WORK

Description of Work: E & E personnel will collect surface and subsurface soil samples using hand augers and truck-mounted drilling equipment. A backhoe may be used to re-construct old roads for drilling equipment access. The truck-mounted drilling equipment and backhoe will be operated by subcontractors, not E & E personnel. E & E personnel will be responsible for decontaminating sampling tools; subcontractors will be responsible for decontaminating vehicles and equipment used for the sampling effort. Where possible, sampling tools will be dedicated and disposed of along with personal protective equipment (PPE) in a refuse depository. E & E will collect groundwater samples from existing monitoring wells on-site with the use of a peristaltic pump and attached flow-through cell. E & E will collect surface water and sediment samples from strategic locations along the banks of Red Devil Creek and the Kuskokwim River. A boat will be used to collect off-shore sediment samples from the Kuskokwim River. Attachment C contains a Health and Safety Plan for Safe Boating.

Equipment/Supplies: Attachment D contains a checklist of equipment and supplies that will be needed for this work.

The following is a description of each numbered task.

Task Number	Task Description
1	Collect subsurface soil samples from soil borings
2	Collect surface soil and vegetation samples
3	Collect groundwater samples from existing monitoring wells
4	Collect surface water and sediment samples from Red Devil Creek
5	Collect sediment samples from the Kuskokwim River

### 1.3 SITE DESCRIPTION

Site Map: See Remedial Investigation/Feasibility Study (RI/FS) Work Plan Figures 1-2 and 1-3.

Site History/Description (see project work plan for detailed description: The Red Devil Mine (RDM) is a former mercury mine and retort facility that was in operation from the late 1940's through the early 1970's. The Department of the Interior Bureau of Land Management (BLM) began investigation and cleanup efforts at RDM in the late 1980's to the present. Annual groundwater sampling has been conducted since the fall of 2005.

Is the site currently in operation?  Yes  No

Locations of Contaminants/Wastes: Please refer to the RI/FS Work Plan Figure 1-3 for specific locations of known and suspected areas of contamination.

Types and Characteristics of Contaminants/Wastes:

- Liquid  Solid  Sludge  Gas/Vapor  
 Flammable/Ignitable  Volatile  Corrosive  Acutely Toxic  
 Explosive  Reactive  Carcinogenic  Radioactive  
 Medical/Pathogenic Other: fine grain size allows for easy wind transportation and inhalation hazard

### 2. ORGANIZATION AND RESPONSIBILITIES

E & E team personnel shall have on-site responsibilities as described in E & E's standard operating procedure (SOP) for Site Entry Procedures (GENTECH 2.2). The project team, including qualified alternates, is identified below.

Name	Site Role/Responsibility
Mark Longtine	RI Task Manager/Field Team Leader
Andy Uhrig	Site Safety Officer/Field Team Member
Rebecca Jarvis	Field Team Member
Andy McDonald	Field Team Member
Bryan Ciecko	Field Team Member

### 3. TRAINING

Prior to work, E & E team personnel shall have received training as indicated below. As applicable, personnel shall have read the RI/FS Work Plan, Sampling and Analysis Plan, and/or Quality Assurance Project Plan prior to project work.

Training	Required
40-Hour OSHA HAZWOPER Initial Training and Annual Refresher (29 CFR 1910.120)	X
Annual First Aid/CPR	X
Hazard Communication (29 CFR 1910.1200)	X
Other: _____	
CFR – Code of Federal Regulations HAZWOPER - Hazardous Waste Operations and Emergency Response OSHA - Occupational Safety and Health Administration	

#### 4. MEDICAL SURVEILLANCE

##### 4.1 MEDICAL SURVEILLANCE PROGRAM

E & E field personnel shall actively participate in E & E's medical surveillance program as described in the CHSP and shall have received, within the past year, an appropriate physical examination and health rating.

E & E's health and safety record form will be maintained on site by each E & E employee for the duration of his or her work. E & E employees should inform the site safety officer (SSO) of any allergies, medical conditions, or similar situations that are relevant to the safe conduct of the work to which this SHASP applies.

Is there a concern regarding radiation at the site?  Yes  No

If no, go to 5.1.

##### 4.2 RADIATION EXPOSURE

###### 4.2.1 External Dosimetry

Thermoluminescent Dosimeter (TLD) Badges: TLD badges are to be worn by all E & E field personnel on certain required sites.

Pocket Dosimeters: \_\_\_\_\_

Other: Innov-X x-ray fluorescence (XRF) instrument is a potential source of exposure when the x-ray is energized and the shutter is open. E & E field personnel should stand as far away as possible from the instrument when measuring samples. This includes propping the XRF with a foot or leg. Field personnel should never expose head, abdomen, eyes, or any sensitive areas to potential exposure from the XRF. See Attachment E for the Innov-X XRF Field Screening Protocol. \_\_\_\_\_

###### 4.2.2 Internal Dosimetry

Whole body count       Bioassay       Other

Requirements: \_\_\_\_\_

### 4.2.3 Radiation Dose

Dose Limits: E & E's radiation dose limits are stated in the CHSP. Implementation of these dose limits may be designated on a site-specific basis.

Site-Specific Dose Limits: \_\_\_\_\_

ALARA Policy: Radiation doses to E & E personnel shall be maintained at levels as low as reasonably achievable (ALARA), taking into account the work objective, state of technology available, economics of improvements in dose reduction with respect to overall health and safety, and other societal and socioeconomic considerations.

## 5. SITE CONTROL

### 5.1 SITE LAYOUT AND WORK ZONES

Site Work Zones: The site work zone will include all areas within the Red Devil Creek drainage. All equipment and vehicles leaving this area shall be decontaminated prior to exiting the creek drainage area.

Site Access Requirements and Special Considerations: There are no roads into RDM. Site access will require the use of all-terrain vehicles (ATV). See Attachment F for ATV Use Requirements and SOP.

Illumination Requirements: Work will be performed outdoors during daylight hours.

Sanitary Facilities (e.g., toilet, shower, potable water): To be determined on-site.

On-Site Communications: Cell phones will be used to communicate where cell transmission is unobstructed. A satellite phone will be available for use if cell phone signal is unattainable.

Other Site-Control Requirements: None

### 5.2 SAFE WORK PRACTICES

Daily Safety Meeting: A daily safety meeting will be conducted for all E & E personnel and documented on the Daily Safety Meeting Record Form (Attachment G) and in the field logbook. The information and data obtained from applicable site characterization and analysis will be addressed in the safety meetings and also used to update this SHASP, as necessary.

Work Limitations: Work shall be limited to a maximum of 12 hours per day. If 12 consecutive days are worked, at least one day off shall be provided before work is resumed. Work will be conducted in daylight hours unless prior approval is obtained and the illumination requirements in 29 CFR 1910.120(m) are satisfied.

Weather Limitations: Work shall not be conducted during electrical storms. Work conducted in other inclement weather (e.g., rain or snow) will be approved by project management and the regional safety coordinator or designee.

Other Work Limitations: Work will not be conducted if wind speeds are sustained above 20 miles per hour.

Buddy System: Field work will be conducted in pairs of team members according to the buddy system.

Line-of-Sight: Each field team member shall remain in the line-of-sight and within verbal communication of at least one other team member.

Eating, Drinking, and Smoking: Eating, drinking, smoking, and the use of tobacco products shall be prohibited in the exclusion and contamination reduction areas, at a minimum, and shall only be permitted in designated areas.

Contamination Avoidance: Field personnel shall avoid unnecessary contamination of personnel, equipment, and materials to the extent practicable.

Sample Handling: Protective gloves of a type designated in Section 7 will be worn when containerized samples are handled for labeling, packaging, transportation, and other purposes.

Other Safe Work Practices:

- Transportation to and from the site may involve ATV travel. E & E employees will adhere to the corporate ATV use policy attached to the end of this SHASP.
- The boat SOP is attached at the end of this SHARP.
- No team member will enter any underground mine workings at any time.

## 6. HAZARD EVALUATION AND CONTROL

### 6.1 PHYSICAL HAZARD EVALUATION AND CONTROL

Potential physical hazards and their applicable control measures are described in the following table for each task.

Hazard	Task Number	Hazard Control Measures
Biological (flora, fauna, etc.)	1,2,3,4	<ul style="list-style-type: none"> <li>■ Potential hazard: Bears, moose, insect bites</li> <li>■ Establish site-specific procedures for working around identified hazards.</li> <li>■ Other: <u>Make noise while in the field.</u></li> </ul>
Cold Stress	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Provide warm break area and adequate breaks.</li> <li>■ Provide warm, non-caffeinated beverages.</li> <li>■ Promote cold stress awareness.</li> <li>■ See <i>Cold Stress Prevention and Treatment</i> (attached at the end of this plan if cold stress is a potential hazard).</li> </ul>
Compressed Gas Cylinders	None	<ul style="list-style-type: none"> <li>■ Use caution when moving or storing cylinders.</li> <li>■ A cylinder is a projectile hazard if it is damaged or its neck is broken.</li> <li>■ Store cylinders upright, and secure them by chains or other means.</li> <li>■ Other:</li> </ul>
Confined Space	None	<ul style="list-style-type: none"> <li>■ Ensure compliance with 29 CFR 1910.146.</li> <li>■ See SOP for Confined Space Entry. Additional documentation is required.</li> <li>■ Other:</li> </ul>
Drilling	1,2,3	<ul style="list-style-type: none"> <li>■ Additional documentation may be required.</li> <li>■ Landfill caps will not be penetrated without prior discussions with corporate health and safety staff.</li> <li>■ Other:</li> </ul>

Hazard	Task Number	Hazard Control Measures
Drums and Containers	1,2,3	<ul style="list-style-type: none"> <li>■ Ensure compliance with 29 CFR 1910.120(j).</li> <li>■ Consider unlabeled drums or containers to contain hazardous substances and handle accordingly until the contents are identified.</li> <li>■ Inspect drums or containers and assure integrity prior to handling.</li> <li>■ Move drums or containers only as necessary; use caution and warn nearby personnel of potential hazards.</li> <li>■ Open, sample, and/or move drums or containers in accordance with established procedures; use approved drum/container-handling equipment.</li> <li>■ Other:</li> </ul>
Electrical	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Ensure compliance with 29 CFR 1910 Subparts J and S.</li> <li>■ Locate and mark energized lines.</li> <li>■ De-energize lines as necessary.</li> <li>■ Ground all electrical circuits.</li> <li>■ Guard or isolate temporary wiring to prevent accidental contact.</li> <li>■ Evaluate potential areas of high moisture or standing water and define special electrical needs.</li> <li>■ Other:</li> </ul>
Excavation and Trenching	1,2,3	<ul style="list-style-type: none"> <li>■ Ensure that excavations comply with, and personnel are informed of, the requirements of 29 CFR 1926 Subpart P.</li> <li>■ Ensure that any required sloping or shoring systems are approved, as per 29 CFR 1926 Subpart P.</li> <li>■ Identify special PPE (see Section 7) and monitoring (see Section 8) needs if personnel are required to enter approved excavated areas or trenches.</li> <li>■ Maintain line-of-sight between equipment operators and personnel in excavations/trenches. Such personnel are prohibited from working close to operating machinery.</li> <li>■ Suspend or shut down operations at signs of cave-in, excessive water, defective shoring, changing weather, or unacceptable monitoring results.</li> <li>■ Other:</li> </ul>
Fire and Explosion	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Inform personnel of the location(s) of potential fire/explosion hazards.</li> <li>■ Establish site-specific procedures for working around flammables.</li> <li>■ Ensure that appropriate fire-suppression equipment and systems are available and in good working order.</li> <li>■ Define requirements for intrinsically safe equipment.</li> <li>■ Identify special monitoring needs (see Section 8).</li> <li>■ Remove ignition sources from flammable atmospheres.</li> <li>■ Coordinate with local fire-fighting groups regarding potential fire/explosion situations.</li> <li>■ Establish contingency plans and review daily with team members.</li> <li>■ Other:</li> </ul>
Heat Stress	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Provide cool break area and adequate breaks.</li> <li>■ Provide cool, non-caffeinated beverages.</li> <li>■ Promote heat stress awareness.</li> <li>■ Use active cooling devices (e.g., cooling vests) where specified.</li> <li>■ See <i>Heat Stress Prevention and Treatment</i> (attached at the end of this plan if heat stress is a potential hazard).</li> </ul>

Hazard	Task Number	Hazard Control Measures
Heavy Equipment Operation	1,2,3	<ul style="list-style-type: none"> <li>■ Define equipment routes, traffic patterns, and site-specific safety measures.</li> <li>■ Ensure that operators are properly trained and equipment has been properly inspected and maintained. Verify back-up alarms.</li> <li>■ Ensure that ground spotters are assigned and informed of proper hand signals and communication protocols.</li> <li>■ Identify special PPE (Section 7) and monitoring (Section 8) needs.</li> <li>■ Ensure that field personnel do not work close to operating equipment.</li> <li>■ Ensure that lifting capacities, load limits, etc., are not exceeded.</li> <li>■ Other:</li> </ul>
Heights (Scaffolding, Ladders, etc.)	NA	<ul style="list-style-type: none"> <li>■ Ensure compliance with applicable subparts of 29 CFR 1910.</li> <li>■ Identify special PPE needs (e.g., lanyards, safety nets, etc.)</li> <li>■ Other:</li> </ul>
Noise	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Establish noise-level standards for on-site equipment/operations.</li> <li>■ Inform personnel of hearing protection requirements (Section 7).</li> <li>■ Define site-specific requirements for noise monitoring (Section 8).</li> <li>■ Other:</li> </ul>
Overhead Obstructions	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Wear hard hat.</li> <li>■ Other:</li> </ul>
Power Tools	NA	<ul style="list-style-type: none"> <li>■ Ensure compliance with 29 CFR 1910 Subpart P.</li> <li>■ Other:</li> </ul>
Sunburn	1,2,3,4,5	<ul style="list-style-type: none"> <li>■ Apply sunscreen.</li> <li>■ Wear hats/caps and long sleeves.</li> <li>■ Other:</li> </ul>
Utility Lines	NA	<ul style="list-style-type: none"> <li>■ Identify/locate existing utilities prior to work.</li> <li>■ Ensure that overhead utility lines are at least 25 feet away from project activities.</li> <li>■ Contact utilities to confirm locations, as necessary.</li> <li>■ Other:</li> </ul>
Weather Extremes	1,2,3,4	<ul style="list-style-type: none"> <li>■ Potential hazards.</li> <li>■ Establish site-specific contingencies for severe weather situations.</li> <li>■ Provide for frequent weather broadcasts.</li> <li>■ Weatherize safety gear, as necessary (e.g., ensure that eye wash units cannot freeze, etc.).</li> <li>■ Identify special PPE (Section 7) needs.</li> <li>■ Discontinue work during severe weather.</li> <li>■ Other:</li> </ul>
Other: Boat Operations for Kuskokwim River Sediment Sampling	5	<ul style="list-style-type: none"> <li>■ All staff will wear Coast Guard approved personal flotation devices.</li> <li>■ E &amp; E staff will comply with the Skipper's directions regarding safety.</li> </ul>

**6.2 CHEMICAL HAZARD EVALUATION AND CONTROL**

**6.2.1 Chemical Hazard Evaluation**

Potential chemical hazards are described by task number in Table 6-1. Hazard Evaluation Sheets for major known contaminants are attached at the end of this plan.

**6.2.2 Chemical Hazard Control**

An appropriate combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below published exposure levels (see Section 6.2.1).

Applicable Engineering/Administrative Control Measures: Spray water on ground to control airborne dust. Limit driving through areas of highest contamination and limit vehicle speeds to decrease generation of dust.

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PPE: See Section 7.

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**6.3 RADIOLOGICAL HAZARD EVALUATION AND CONTROL**

**6.3.1 Radiological Hazard Evaluation**

There are no radiological hazards at RDM. There are non-radiological contaminants at the site. Hazard Evaluation Sheets for major known contaminants are attached at the end of this plan as Attachment H.

**6.3.2 Radiological Hazard Control**

Engineering/administrative controls and work practices shall be instituted to reduce and maintain employee exposures to a level at or below the permissible exposure/dose limits (see Sections 4.2.3 and 6.3.1). Whenever engineering/administrative controls and work practices are not feasible or effective, any reasonable combination of engineering/administrative controls, work practices, and PPE shall be used to reduce and maintain employee exposures to a level at or below permissible exposure/dose limits.

Applicable Engineering/Administrative Control Measures: \_\_\_\_\_

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PPE: See Section 7.

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Table 6-1

## CHEMICAL HAZARD EVALUATION

Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure <sup>b</sup>	Acute Symptoms	Odor Threshold/Description	FID/PID	
		OSHA PEL	NIOSH REL <sup>a</sup>	ACGIH TLV					Relative Response	Ionization Potential (eV)
1,2, 3, 4	PAHs *	0.2 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	NA	Y	DA, IH, IN, SC	Irritation to skin, warts	Aromatic		
1,2, 3, 4	Antimony	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Irritation to eyes, skin, nose, throat, mouth; cough, dizziness, headache, nausea, vomiting, diarrhea, stomach cramps, loss of sense of smell	Silver-white, lustrous solid		
1,2, 3, 4	Arsenic	0.01 mg/m <sup>3</sup>	0.002 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	Y	DA, E, IH, IN, SC	Ulceration of nasal septum, respiratory irritation, dermatitis, gastrointestinal disturbances, peripheral neuropathy, hyperpigmentation	Garlic odor		
1,2, 3, 4	Asbestos	0.1 fibers/ cc air	0.1 fibers/ cc air	0.1 fibers/ cc air	Y	E, IH, IN, SC	Difficulty breathing, eye irritation	White or greenish, blue, or gray-green fibrous, odorless solid		
1,2, 3, 4	Chromium	1 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	0.5 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Irritation to the eyes, skin; lung fibrosis (histological)	Blue white/ steel gray odorless solid		
1,2, 3, 4	Cobalt	0.1 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	0.02 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Cough, difficulty breathing, wheezing decreased pulmonary function, weight loss, dermatitis, asthma	Odorless silvery-gray/black solid		
1,2, 3, 4	Lead	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Lassitude, insomnia, weight loss, abdominal pain	Heavy, ductile, soft gray solid		
1,2, 3, 4	Mercury	0.1 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	0.025 mg/m <sup>3</sup>	Y	DA, E, IH, IN, SC	Eye and skin irritation; coughing, chest pain, dyspnea, bronchitis, irritability, indecision, headache, lassitude, stomatitis, and salivation,	Silver white odorless liquid		
1,2, 3, 4	Nickel	1 mg/m <sup>3</sup>	0.015 mg/m <sup>3</sup>	1.5 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Irritation to skin, nasal cavities, lungs, allergic asthma.	Odorless Solid		

**Table 6-1**

**CHEMICAL HAZARD EVALUATION**

Task Number	Compound	Exposure Limits (TWA)			Dermal Hazard (Y/N)	Route(s) of Exposure <sup>b</sup>	Acute Symptoms	Odor Threshold/Description	FID/PID	
		OSHA PEL	NIOSH REL <sup>a</sup>	ACGIH TLV					Relative Response	Ionization Potential (eV)
1,2, 3, 4	PCBs (42%/54% chlorine)	0.5 mg/m <sup>3</sup> / 1 mg/m <sup>3</sup>	0.001 mg/m <sup>3</sup> / 0.001 mg/m <sup>3</sup> <a href="http://www.cdc.gov/niosh/npg/nengapdxa.html">http://www.cdc.gov/niosh/npg/nengapdxa.html</a>	1 mg/m <sup>3</sup> / 0.5 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Eye irritation, chloracne,	Colorless to light colored liquid with hydrocarbon odor		
1,2, 3, 4	Thallium	0.1 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	0.1 mg/m <sup>3</sup>	Y	E, IH, IN, SC	Nausea, diarrhea, abdominal pain, vomiting, tremor, chest pain, convulsions, green tongue	Varies		
1,2, 3, 4	Zinc	5 mg/m <sup>3</sup>	5 mg/m <sup>3</sup>	2 mg/m <sup>3</sup>	N	IH	Chills, aches, nausea, fever, cough, dry throat, headache, blurred vision, vomit, fatigue	Odorless Solid		
<p>ACGIH – American Conference of Governmental Industrial Hygienists  <sup>3</sup>  mg/m – milligram per cubic meter  FID – flame ionizing detector  NIOSH – National Institute for Occupational Health and Safety  OSHA – Occupational Safety and Health Administration  PEL – permissible exposure level  REL – reasonable exposure level</p> <p>PID – photo ionization detector  TLV – threshold limit value  TWA – time-weighted average  E IH DA IN SC</p>										

## 7. LEVEL OF PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT

### 7.1 LEVEL OF PROTECTION

The following levels of protection (LOPs) have been selected for each work task based on an evaluation of the potential or known hazards, the routes of potential hazard, and the performance specifications of the PPE. On-site monitoring results and other information obtained from on-site activities will be used to modify these LOPs and the PPE, as necessary, to ensure sufficient personnel protection. The authorized LOP and PPE shall only be changed with the approval of the regional safety coordinator or designee. Level A is not included below because Level A activities, which are performed infrequently, will require special planning and addenda to this SHASP.

Task Number	B	C	D	Modifications Allowed
1		(X)	X	
2		(X)	X	
3		(X)	X	
4		(X)	X	
5		(X)	X	

Note: Use "X" for initial levels of protection. Use "(X)" to indicate levels of protection that may be used as site conditions warrant.

### 7.2 PERSONAL PROTECTIVE EQUIPMENT

The PPE selected for each task is indicated below. E & E's PPE program complies with 29 CFR 1910.120 and 29 CFR 1910 Subpart I and is described in detail in the CHSP. Refer to 29 CFR 1910 for the minimum PPE required for each LOP.

PPE	1/D	2/D	3/D	4/D	5/D
Full-face APR	(X)	(X)	(X)	(X)	(X)
PAPR					
Cartridges:					
P100	(X)	(X)	(X)	(X)	(X)
GMC-P100					
GME-P100					
Other: Mersorb/Particulate combo cartridge	(X)	(X)	(X)	(X)	(X)
Positive-pressure, full-face SCBA					
Spare air tanks (Grade D air)					
Positive-pressure, full-face, supplied-air system					
Cascade system (Grade D air)					
Manifold system					

PPE	1/D	2/D	3/D	4/D	5/D
5-Minute escape mask					
Safety glasses	X	X	X	X	X
Monogoggles					
Coveralls/clothing	X	X	X	X	X
Protective clothing:					
Tyvek	(X)	(X)	(X)	(X)	(X)
Saranex					
Other:					
Splash apron					
Inner gloves:					
Cotton					
Nitrile	X	X	X	X	X
Latex					
Other:					
Outer gloves:					
Viton					
Rubber					
Neoprene					
Nitrile					
Other:					
Work gloves	X	X	X	X	X
Safety boots (as per ANSI Z41)	X	X	X	X	X
Neoprene safety boots (as per ANSI Z41)					
Boot covers (type: _____)	(X)	(X)	(X)	(X)	
Hearing protection (type: _____)		X			
Hard hat		X			
Face shield					
Other:					
Other:					
ANSI – American National Safety Institute APR - Air purifying respirator PAPR - Powered air purifying respirator SCBA – self-contained breathing apparatus					

## 8. HEALTH AND SAFETY MONITORING

Health and safety monitoring will be conducted to ensure proper selection of engineering/administrative controls, work practices, and/or PPE so that employees are not exposed to hazardous substances at levels that exceed permissible exposure/dose limits or published exposure levels. Health and safety monitoring will be conducted using the instruments, frequency, and action levels described in Table 8-1. Health and safety monitoring instruments shall have been appropriately calibrated and/or performance-checked prior to use.

## 9. DECONTAMINATION PROCEDURES

All equipment, materials, and personnel will be evaluated for contamination upon leaving the exclusion area. Equipment and materials will be decontaminated and/or disposed of, and personnel will be decontaminated, as necessary. Decontamination will be performed in the contamination reduction area or any designated area such that the exposure of uncontaminated employees, equipment, and materials will be minimized. Specific procedures are described below.

Equipment/Material Decontamination Procedures (specified by Work Plan): Where possible, dedicated sampling equipment will be used. Other non-dedicated sampling equipment will be decontaminated with a water/Alconox wash and then rinsed with distilled water. Subcontractors will use a heavy bristle broom or brush to knock soil particles from cars and equipment. A high-pressure washer will be used to decontaminate tools and backhoe equipment that comes into contact with subsurface soil.

Ventilation: All decontamination procedures will be conducted in a well-ventilated area.

Personnel Decontamination Procedures: Remove and discard all disposable PPE, wipe down safety goggles and hard hats with Alcohol-free swabs, boot wash, and hand and face wash with warm soapy water prior to leaving site

PPE Requirements for Personnel Performing Decontamination: Level D

Personnel Decontamination in General: Following appropriate decontamination procedures, all field personnel will wash their hands and faces with soap and potable water. Personnel should shower at the end of each work shift.

Disposition of Disposable PPE: Disposable PPE must be rendered unusable and disposed as indicated in the work plan.

Disposition of Decontamination Wastes (e.g., dry wastes, decontamination fluids, etc.): Disposable PPE must be rendered unusable and disposed of as indicated in the work plan.



**Table 8-1**

**HEALTH AND SAFETY MONITORING**

<b>Instrument</b>	<b>Task Number</b>	<b>Contaminant(s)</b>	<b>Monitoring Location</b>	<b>Monitoring Frequency</b>	<b>Action Levels<sup>a</sup></b>	
<input type="checkbox"/> PID (e.g., RAE mini RAE) <input type="checkbox"/> FID (e.g., OVA 128-) <input type="checkbox"/> TVA 1000					<b>Unknown Vapors</b> Background to 1 ppm above background: Level D 1 to 5 ppm above background: Level C 5 to 500 ppm above background: Level B >500 ppm above background: Level A	<b>Contaminant-Specific</b>
Oxygen Meter/Explosimeter					<b>Oxygen</b> <19.5% or >22.0%: Evacuate area; eliminate ignition sources; reassess conditions. 19.5 to 22.0%: Continue work in accordance with action levels for other instruments.	<b>Explosivity</b> ≤10% LEL: Continue work in accordance with action levels for other instruments; monitor continuously for combustible atmospheres. >10% LEL: Evacuate area; eliminate ignition sources; reassess conditions.
Radiation Alert Monitor (Rad-mini or RAM-4)					<0.1 mR/hr: Continue work in accordance with action levels for other instruments. ≥0.1 mR/hr: Evacuate area; reassess work plan, and contact radiation safety specialist.	
Mini-Ram Particulate Monitor	1-6	Arsenic Dust	With Field Teams	Continuous	<b>General/Unknown</b> Evaluate health and safety measures when dust levels exceed 2.5 mg/m <sup>3</sup> .	<b>Contaminant-Specific</b> <b>Arsenic</b> = 0.28 mg/m <sup>3</sup> in areas with enriched concentrations-tailings impoundments.
HCN/H <sub>2</sub> S (Monitox)					≥4 ppm: Leave area and consult with SSO.	
Draeger Colorimetric Tubes					<b>Tube</b>	<b>Action Level</b> <b>Action</b>
Air Monitor/Sampler Type: _____ Sampling medium: _____					<b>Action Level</b>	<b>Action</b>
Personal Sampling Pump Type: _____ Sampling medium: _____					<b>Action Level</b>	<b>Action</b>

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Table 8-1

HEALTH AND SAFETY MONITORING

Instrument	Task Number	Contaminant(s)	Monitoring Location	Monitoring Frequency	Action Levels <sup>a</sup>			
Micro R Meter					<2 mR/hr: Continue work in accordance with action levels for other instruments. 2 to 5 mR/hr: In conjunction with a radiation safety specialist, continue work and perform stay-time calculations to ensure compliance with dose limits and ALARA policy. >5 mR/hr: Evacuate area to reassess work plan, and evaluate options to maintain personnel exposures ALARA and within dose limits.			
Ion Chamber					See micro R meter action levels above.			
Radiation Survey Rateometer/Scaler with External Detector(s)					<table border="1"> <thead> <tr> <th>Detector</th> <th>Action Level</th> <th>Action</th> </tr> </thead> </table>	Detector	Action Level	Action
Detector	Action Level	Action						
Noise Dosimeter (Sound Level Meter)					≤85 dBA as measured, using the A-weighted network (dBA): Use hearing protection if exposure will be sustained throughout work shift. >85 dBA: Use hearing protection. >120 dBA: Leave area and consult with safety personnel.			
Other: Lumex or Jerome Mercury Meter	1,2, 3, 4	Mercury vapor	Work Zones	Continuous	Action level: Any instantaneous (not TWA) reading at or above 0.05 mg/m <sup>3</sup> requires upgrade to level C.			

<sup>a</sup> Unless stated otherwise, airborne contaminant concentrations are measured as a time-weighted average in the worker's breathing zone. Acceptable concentrations for known airborne contaminants will be determined based on OSHA/NIOSH/ACGIH and/or NRC exposure limits. As a guideline, 1/2 the PEL/REL/TLV, whichever is lowest, should be used.

ALARA – as low as reasonably achievable

dBA - decibels

FID – flame ionization detector

mg/m<sup>3</sup> – milligram per cubic meter

PID – photo ionization detector

RAE - Rae Systems of monitoring equipment

ppm – parts per million

TWA – time-weighted average

2mR/hr - 2 millirem per hoUF



## 10. EMERGENCY RESPONSE

This section contains additional information pertaining to on-site emergency response and does not duplicate pertinent emergency response information contained in earlier sections of this plan (e.g., site layout, monitoring equipment, etc.). Emergency response procedures will be rehearsed regularly, as applicable, during project activities.

### 10.1 EMERGENCY RESPONSIBILITIES

All Personnel: All personnel shall be alert to the possibility of an on-site emergency; report potential or actual emergency situations to the team leader and SSO and notify appropriate emergency resources, as necessary.

Team Leader: The team leader will determine the emergency actions to be performed by E & E personnel and will direct these actions. The team leader will also ensure that applicable incidents are reported to appropriate E & E and client project personnel and government agencies.

SSO: The SSO will recommend health/safety and protective measures appropriate to the emergency.

Other:

### 10.2 LOCAL AND SITE RESOURCES (including phone numbers)

Ambulance: Request emergency air transportation from Vanderpol's Flying Service, Red Devil Alaska to hospital or clinic.

Hospital: Clara Morgan Sub-regional Clinic. 269 Morgan's Road, Aniak, Alaska 907-675-4556. See map to hospital and site sketch/map Attachment J.

Also, Providence Alaska Medical Center. 3200 Providence Dr., Anchorage Alaska 907-562-2211

Directions to Hospital (map attached at the end of this plan): \_\_\_\_\_

Poison Control: 907- 261-3193 (Anchorage)

Police Department: N/A

Fire Department: N/A

Client Contact: Mike McCrum, BLM Project Manager: 907- 271-4426; Larry Beck, BLM Inspector: 907- 267-1226

Site Contact: N/A

On-Site Telephone Number: None. In case of emergency, E&E personnel will use telephone at Red Devil Lodge to call for help.

Cellular Telephone Number: No cell service available on site.

Radios Available: Two Motorola hand-held radios for on-site communication

Other: Red Devil Lodge 907-447-3225, only means of communication in Red Devil, Alaska

### 10.3 E & E EMERGENCY CONTACTS

E & E Emergency Operations Center (24 Hours): 716-684-8060

Corporate Health and Safety Director: Dr. Paul Jonmaire 716-684-8060 (office) 716-655-1260 (home)

Assistant Corporate Safety Director: Tom Siener, CIH: 716-684-8060 (office) 716-662-4740 (home)

Regional Office Contact:

Len Marcus 907-257-5000 (office)

907-276-1608 (home)

**10.4 OTHER EMERGENCY RESPONSE PROCEDURES**

On-Site Evacuation Signal/Alarm (must be audible and perceptible above ambient noise and light levels): Rapid Whistle  
Blasts

On-Site Assembly Area: TBD in field. To be identified at the first daily safety briefing and documented in the Daily Safety Meeting Form (Attachment G).

Emergency Egress Route to get off site: TBD in field. To be identified at the first daily safety briefing and documented in the Daily Safety Meeting Form (Attachment G).

Off-Site Assembly Area: TBD in field. To be identified at the first daily safety briefing and documented in the Daily Safety Meeting Form (Attachment G).

Preferred Means of Reporting Emergencies: Use Red Devil Lodge telephone to request Vanderpol Flying Service for transportation to Aniak, if necessary, then contact William Richards, then contact Paul Jonmaire, then contact client.

Site Security and Control: In an emergency situation, personnel will attempt to secure the affected area and control site access.

Spill Control Procedures: N/A

Emergency Decontamination Procedures: Douse with copious amounts of water. Remove contaminated clothing and/or PPE

PPE: Personnel will don appropriate PPE when responding to an emergency situation. The SSO and Section 7 of this plan will provide guidance regarding appropriate PPE.

Emergency Equipment: Appropriate emergency equipment is listed in Attachment C. Adequate supplies of this equipment shall be maintained in the support area or other approved work location.

Incident Reporting Procedures: Notify appropriate local emergency services, notify E & E Regional Health and Safety Officer (Len Marcus), notify E & E Corporate Health and Safety Office (Paul Jonmaire).

**ATTACHMENT A SITE-SPECIFIC HEALTH AND SAFETY PLAN ACCEPTANCE**







**ATTACHMENT B EXISTING SITE SAFETY PLAN ADDENDUM FORM**





ecology and environment, inc.  
**EXISTING SITE SAFETY PLAN ADDENDUM FORM**

<b>Site Name:</b>			
<b>Date of original SSP:</b>			
<b>Date of amendment:</b>			
<b>Date of proposed new work:</b>			
<b>Added activities and hazard evaluations:</b>			
<b>Added monitoring activities:</b>			
<b>Level of protection: 9A 9B 9C 9D</b>			
<b>Reason for up/downgrading:</b>			
<b>PPE:</b>			
<b>Decon:</b>			
<b>Team Members</b>		<b>Responsibility</b>	
<b>Equipment</b>	<b>Quantity</b>	<b>Equipment</b>	<b>Quantity</b>
<b>The terms of the original SSP shall be in effect except as noted on this form.</b>			
<b>Prepared by:</b>		<b>Date:</b>	
<b>Reviewed by:</b>		<b>Date:</b>	



**ATTACHMENT C HEALTH AND SAFETY PLAN FOR SAFE BOATING**



# Health and Safety Plan Attachment for Safe Boating

## Introduction

For many of E & E's activities, it is necessary to use conventional boats or airboats to transport personnel and conduct work tasks. These tasks can be accomplished safely with the right combination of equipment, safety awareness and common sense.

## Equipment Required for Boat Operations

### 1. Personal Flotation Devices (PFD)

All boats must carry one wearable PFD (Type I, II, III or Type V PFD) for each person aboard. A Type V PFD provides performance of a Type I, II, or III PFD (as marked on its label) and must be used according to the label requirements. Any vessel 16 ft and longer (except canoes and kayaks) must also carry one throwable PFD (Type IV PFD).

#### **PFDs must be**

- Coast Guard approved,
- in good and serviceable condition, and
- the appropriate size for the intended user.

#### **Accessibility**

- A PFD should be worn at all times when the vessel is underway. A wearable PFD can save your life, but only if you wear it.
- They should not be stowed in plastic bags, in locked or closed compartments or have other gear stowed on top of them.
- The best PFD is the one you will wear.
- Throwable devices must be immediately available for use.

### 2. Visual Distress Signals

All vessels used on coastal waters, the Great Lakes, territorial seas, and those waters connected directly to them, up to a point where a body of water is less than two miles wide, must be equipped with U.S.C.G. Approved visual distress signals. Vessels owned in the United States operating on the high seas must be equipped with U.S.C.G. Approved visual distress signals.

#### **Pyrotechnic Devices**

Pyrotechnic Visual Distress Signals must be Coast Guard Approved, in serviceable condition, and readily accessible.

- They are marked with an expiration date. Expired signals may be carried as extra equipment, but can not be counted toward meeting the visual distress signal requirement, since they may be unreliable.
- If pyrotechnic devices are selected a minimum of three are required. That is, three signals for day use and three signals for night. Some pyrotechnic signals meet both day and night use requirements.
- Pyrotechnic devices should be stored in a cool, dry location, if possible.
- A watertight container painted red or orange and prominently marked "DISTRESS SIGNALS" or "FLARES" is recommended.

### 3. **Fire Extinguishers**

Coast Guard Approved fire extinguishers are required on boats where a fire hazard could be expected from the motors or the fuel system. Extinguishers are classified by a letter and number symbol. The letter indicates the type fire the unit is designed to extinguish (Type B for example are designed to extinguish flammable liquids such as gasoline, oil and grease fires). The number indicates the relative size of the extinguisher. The higher the number, the larger the extinguisher.

Coast Guard approved extinguishers required for boats are hand portable, either B-I or B-II classification and have a specific marine type mounting bracket. It is recommended the extinguishers be mounted in a readily accessible position, away from the areas where a fire could likely start such as the galley or the engine compartment.

Extinguisher markings can be confusing because extinguishers can be approved for several different types of hazards. For instance, an extinguisher marked "Type A, Size II, Type B:C, Size I" is a B-I extinguisher.

Look for the part of the label that says "**Marine Type USCG**"

- Make sure Type B is indicated
- Portable extinguishers will be either size I or II. Size III and larger are too big for use on most recreational boats.

### 4. **Ventilation**

A powered ventilation system is required for each compartment in a boat that has a permanently installed gasoline engine with a cranking motor for remote starting.

### 5. **Sound Producing Devices**

Any vessel less than 39.4 feet/12 meters in length may carry a whistle or horn, or some other means to make an efficient sound signal to signal your intentions and to signal your position in periods of reduced visibility.

### 6. **Navigation Lights**

Recreational vessels are required to display navigation lights between sunset and sunrise and other periods of reduced visibility (fog, rain, haze, etc.).

### 7. **Communication**

Cell phones should be fully charged prior to leaving the dock

### 8. **Additional Safety Equipment**

- First Aid Kit
- Marine Radio, As applicable
- Dewatering Device & Backup bilge pump operable, alternative bailing device available
- Anchor and Line for Area
- Capacity/Certification of Compliance
- Charts of the area and compasses
- Mooring lines - bow, stern, and spring lines
- Bright flashlight or searchlight
- Alternate propulsion - paddle or oar
- Compass, As applicable
- Sunscreen and sunhat
- Drinking water

## **Weather conditions**

On a warm sunny day there is nothing better than being in a boat on the water enjoying the elements while working. Slight changes in weather conditions, however, can adversely affect a body of water in a relatively short time period. If a boat and crew are in an exposed position this change could seriously jeopardize their safety. A boat operator should be knowledgeable relative to the weather patterns typical of the area in which work is to be done, and able to identify rapidly approaching frontal systems that could place the boat and crew in danger.

### **1. Wind**

Heavy wind is one of the greatest hazards to a small boat on a large body of water. Wind can quickly whip the water surface into a severe chop with breaking white-capped waves. The greater the fetch (upwind distance over water) from the boat's position the worse the wind driven surface waves can be. If the boat is located in a shallow area downwind from deeper water the height of the wind driven waves can be expected to increase dramatically as they enter the shallows. Wind blowing in opposition to the direction of flow can create large swells and threaten the safety of boat and crew.

A boat operator must carefully assess wind conditions upon arrival to work in an area and determine if a significant hazard exists that could be avoided on a calmer day. A rule-of-thumb for estimating wind speed is to look for white caps which generally begin to appear at wind speeds approaching 20 miles per hour over calm water.

If possible, working with the bow into the wind is the safest position for the boat in windy conditions. However, working in a river requires that the bow be held against the direction of flow. If the wind opposes the current this could place the boat and crew in jeopardy as the steep wind driven swell will impact the boat's stern. This situation could potentially swamp the boat if the waves increase in size and begin to break over the transom.

### **2. Rain**

Aside from personal discomfort, light rain does not present an extreme hazard to crews in small boats. Heavy rain over long durations can constitute a significant hazard if allowed to accumulate in the bottom of the boat. If the boat is transporting a load near maximum for its hull configuration the weight of the accumulated rain water could adversely effect stability or significantly reduce freeboard (distance from the waterline to the gunwale). Either of these could result in swamping or capsizing. Lightning storms are common in some locations and must be considered as a serious threat to the safety of boat and crew.

Again it is the operator's responsibility to assess the severity of the situation and react to protect the safety of the boat and crew. This action could be nothing more than pumping the excess rain water overboard on a periodic basis or may require that the work effort be temporarily aborted until the rain or lightning dissipates to a non-threatening level.

### **3. Extreme Conditions**

Weather extremes range from hot temperatures and sun exposure to cold temperatures and freezing conditions. Most often small work boats do not provide protection from the elements. Working in the middle of a body of water almost always means complete exposure to the existing weather extremes. The hazards here may be health risks as well as some potential for physical injury. In the case of extreme heat and sun exposure, the crew should always carry drinking water to help minimize the potential for dehydration. Some form of protection from the sun is essential and will aid in reducing the potential for dehydration in addition to minimizing the harmful effects of ultraviolet rays on human skin. Extreme heat combined with high wind can increase the rate of dehydration.

Extreme cold and freezing conditions may be more hazardous than heat. In addition to the more obvious concerns about hypothermia, dehydration is still a potential problem. Protective clothing is essential to minimize the effects of hypothermia. An accidental fall overboard could prove fatal if the victim is not

properly clothed. Water robs the body of heat 25 times faster than air so the immediate problem is rescuing the overboard victim. Remember the 50/50 rule (i.e., an unprotected overboard victim in water less than or equal to 50 degrees Fahrenheit has a 50 percent chance of surviving for 50 minutes). In addition to these potential health risks a boat operator working in extreme cold and freezing conditions must watch for ice build-up on the boat's hull. Even though ice floats its mass above the waterline adds to the weight of the boat and its load. If ice is allowed to accumulate above the waterline as a result of splash from the wake or spray from wind blown waves the boat can become overloaded and settle in the water to a point where an otherwise insignificant volume of water could swamp and sink the boat.

### **3. Restricted Visibility**

The most common cause of restricted visibility is fog. Heavy rain and snow, or in some areas, blowing dust can reduce visibility in the extreme as well. Operation during periods of extreme restricted visibility is not advised particularly in areas frequented by large commercial vessel traffic. When operation is essential during periods of restricted visibility standard navigation lights must be displayed. If the small work boat is not equipped with navigation lights it should not be used in these conditions. Also, proper horn or bell signals should be given as required by inland or international navigation rules for the size of vessel underway or anchored during periods of restricted visibility.

## **Navigation**

### **1. Tidal Reaches**

Streams in coastal areas present the boat operator with flow conditions generally unknown or inexperienced by most inland boat operators. The lower reaches of nearly all coastal streams are tidally affected. Changes in flow characteristics associated with daily tidal variations include some or all of the following: rise and fall of stage; increase and decrease in flow velocity; sudden appearance of breaking waves and turbulence; and possible reversals in flow direction. Boat operators working in tidal affected areas must understand these flow characteristics. Consulting tide and current tables, and navigation charts is essential to planning daily activities and minimizing potential hazards. Basic rules-of-thumb to operating in tidal reaches include: moving through shallows during rising (flood) tides to provide the greatest margin for error in the event of grounding the boat; timing of bar crossings from riverine into marine conditions during flood tides and never during the maximum ebb currents; and timing of sampling and measuring activities relative to tidal effects when flow reversals are common.

### **2. Flow Around Fixed Structures**

Fixed structures including bridges, and dams are of particular concern to operators and crews working from boats. Boat operators should always familiarize themselves with any in-channel structure that could ultimately threaten the safety of their vessel and crew. Charts or maps of an area can provide valuable information related to the size and location of a structure across the channel. Regulatory agencies such as the State Department of Transportation, Corps of Engineers, Bureau of Reclamation, etc. can generally provide more detailed local information.

- **Bridges**

Bridges may constitute major hazards to the boating public by restricting overhead clearance, generating extreme turbulence in the vicinity of piers located in the flow, or trapping debris and reducing the opening available between piers. During high stages, overhead clearance may be minimal for the passage of river traffic. In this case, if work must be done downstream of the bridge, one of two courses of action are necessary to protect the safety of vessel and crew: find an alternate location for launching the boat below the bridge; or call the bridge tender and request an opening of the lift or swing span if so equipped. The following list of



actions will help to ensure the safety of vessel and crew when working in the vicinity of bridges.

- Never work from a boat in close proximity to and upstream of an excessively submerged bridge structure.
- If it is necessary to work from a boat upstream from a bridge during high flow or anytime the structure presents a threat to safety, two sources of power (main engine plus auxiliary or twin engines) should be onboard and running in the event the backup is immediately needed.
- Always carry an anchor of adequate size and design securely attached to a length of chain equal to one boat length, and a length of nylon line equal to three to five times the anticipated depth, to stop the vessel and hold it against the flow. This equipment must be ready to deploy in an instant with the end of the line attached to the boat.
- Cutting devices adequate to clear any line that becomes fouled on the boat and threatens its safety must be at the ready. These should include but are not limited to garden loppers, bolt cutters, cable shears, and a hatchet or machete.
- Avoid working in close proximity to bridge piers if possible.
- If it is necessary to work close to a bridge pier, approach the pier in the tail-wake from downstream keeping a sharp lookout for debris caught on the pier. Carefully work along side the pier and inside the wake or eddy line generated by its upstream face.
- Never put the boat across the upstream face of the pier where it could become trapped by the force of the current.

- **Dams**

Dams impounding the flow are another source of hazards to boats operating in their vicinity. Dams are generally of two types which present different hazards to boat operators and crews. The first to consider is the large structure tens or possibly hundreds of feet high, and impounding a large reservoir for the purpose of power generation and/or flood control. These structures may have a lock channel to allow passage of vessels from one pool level to the next in the upstream or downstream direction. Boat operation in the vicinity of these large structures should be limited to the approaches to the navigation lock.

Operation near any intake structure or in the tail race channel should be avoided as flow volumes, stream velocities, river stages, and associated turbulence can change unexpectedly. As an example, a small boat can be easily swamped or capsized by an unexpected wave surging from the outflow as the gates are reset to increase power generation or flows are increased to pass storm runoff.

Low-head dams are the second type to consider. These structures may constitute the most dangerous man-made obstruction a boat operator might encounter. Most low-head dams span the entire width of the channel usually to pool the flow for diversion into an irrigation system or for some other purpose requiring a low hydraulic head as the driving force. Water passing over the face of these structures appears as a smooth even flow across the entire stream width usually falling ten feet or less. To the uninitiated there doesn't seem to be any hazard because the flow appears to be benign and almost tranquil in nature. The danger here is real and extreme. The plunging water creates a turbulent zone of reverse current (a hydraulic) at the downstream base of the

dam. A boat can be drawn into the falling water and easily swamped. The tumbling action will then roll the boat over, submerge it, and push it away from the dam below the surface only to pull it and its occupants back into the falling water as they reach the surface. This continuous action can easily trap the boat and crew at the face of the dam with no hope of escape. The following list of actions will help to ensure the safety of vessel and crew when working in the vicinity of low-head dams. If possible avoid working above, below, or otherwise in close proximity to a low-head dam. This may not be appropriate either.

### **3. Canals**

Canals are normally highly regulated man-made waterways. Any operator using a boat to transit these conduits of flow must understand the flow system and its hazards. Typically the water in any given canal system is allocated for some specific use. Regulation may be seasonal or associated with storm runoff. The system may consist of a series of diversions conveying flow to various points of use, and may include flow through tunnels or large diameter pipes, in addition to open channel conveyances. In short, use of boats in these types of flow systems should be avoided if at all possible and only undertaken after the operator and crew have contacted the agency responsible for management and regulation to become familiar with potential hazards built into the system.

## **Carbon Monoxide**

CO - When docked, or rafted with another boat, be aware of exhaust emissions from the other boat.

## **Seasickness**

Seasickness is caused when the minute inner ear organs that enable a human to balance are disturbed by the motion of the boat swaying and pitching. This movement sets off alarm signals to the brain causing nausea, headache, dizziness, and sometimes vomiting. This condition can be intensified by the lack of fresh air and inactivity. It can also be a person's worst nightmare at sea.

Fortunately, several remedies can be taken before setting sail. Pills can be obtained over the counter which help most people by sedating the balancing organs. The pills can cause drowsiness and should be taken with care. Some people find special wrist bands effective. There are also stick-on patches that can be worn on the skin behind the ear, but these are obtained by doctor's prescription only.

You can often avoid seasickness by staying busy and keeping your mind occupied by taking over the helm or any other activity that will keep you above decks. Look at the distant horizon rather than the water close at hand. Take deep breaths and drink plenty of water. The worst thing that a person can do is go below decks with no land or horizon to look at. Reading or staring at an object will assuredly bring on the affects of seasickness. If you are seasick and can't bear it anymore, lie down on your back with your eyes closed. This will greatly reduce the affects.

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Nautical Know How  
<http://www.boatsafe.com/nauticalknowhow/seasick.htm>



**ATTACHMENT D EQUIPMENT/SUPPLIES CHECKLIST**



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**EQUIPMENT/SUPPLIES CHECKLIST**

<b>Instrumentation</b>	<b>No.</b>	<b>Emergency Equipment</b>	<b>No.</b>
TVA 1000 (Probe: eV)		First Aid Kit	1
MiniRAE (Probe: eV)		Stretcher	
OVA		Portable Eye Wash	
HNu (Probe: eV)		Blood Pressure Monitor	
Thermal Desorber		Fire Blanket	
O <sub>2</sub> /Explosimeter with Calibration Kit		Fire Extinguisher	2
Photovac Tip		Thermometer (Medical)	
Magnetometer		Spill Kit	
Pipe Locator			
Weather Station		<b>Decontamination Equipment</b>	
Draeger Tube Kit (Tubes: )		Wash Tubs	2
Brunton Compass		Buckets	2
Real-Time Cyanide Monitor		Scrub Brushes	4
Real-Time H <sub>2</sub> S Monitor		Pressurized Sprayer	1
Heat Stress Monitor		Spray Bottle	2
Noise Equipment		Detergent (Type: TRISODIUM PHOSPHATE)	1
Personal Sampling Pumps and Supplies		Solvent (Type: DENATURED ALCOHOL)	1
Mini Ram Dust Monitor	1	Plastic Sheeting	
Mercury Monitor	1	Tarps and Poles	
Spare batteries (Type: )		Trash Bags	X
XRF	1	Trash Cans	
<b>Radiation Equipment/Supplies</b>		Masking Tape	
Documentation Forms		Duct Tape	X
Portable Ratemeter		Paper Towels	X
Scaler/Ratemeter		Face Mask	
1" NaI Gamma Probe		Face Mask Sanitizer	
2" NaI Gamma Probe		Step Ladders	
ZnS Alpha Probe		Distilled Water	X
GM Pancake Probe		Deionized Water	
Tungsten-Shielded GM Probe			
Micro R Meter		<b>Miscellaneous</b>	
Ion Chamber		Pump	
Alert Monitor		Surveyor's Tape	
Pocket Dosimeter		100' Fiberglass Tape	
Dosimeter Charger		300' Nylon Rope	
Radiation Warning Tape		Nylon String	
Radiation Decontamination Supplies		Surveying Flags	
Spare Batteries (Type: )		Camera	2
		Film	
<b>Sampling Equipment</b>		Bung Wrench	
8-oz Bottles	X	Soil Auger	
Half-Gallon Bottles		Pick	
VOA Bottles		Shovel	X
String		Catalytic Heater	
Hand Bailers		Propane Gas	
Thieving Rods with Bulbs		Banner Tape	
Spoons	X	Surveying Meter Stick	
Knives		Chaining Pins and Ring	
Filter Paper		Logbooks ( Large, Small)	
Bottle Labels	X	Required MSDSs	
		Intrinsically Safe Flashlight	
<b>Shipping Equipment</b>		Potable Water	X
Coolers	X	Gatorade or Equivalent	
Paint Cans with Lids, Seven Clips Each		Tables	1
Vermiculite		Chairs	2

**ecology and environment, inc.**  
**EQUIPMENT/SUPPLIES CHECKLIST**

<b>Instrumentation</b>	<b>No.</b>	<b>Emergency Equipment</b>	<b>No.</b>
Shipping Labels		Weather Radio	
DOT Labels:		Two-Way Radios	
“Up”		Binoculars	1
“Danger”		Megaphone	
“Inside Container Complies...”		Cooling Vest	
“Hazard Group”		First Aid Kit	1
Strapping Tape	X	Satellite Phone	1
Baggies	X	Cellular Phones	4
Custody Seals	X		
Chain-of-Custody Forms	X		
FedEx Forms	X		
Clear Packing Tape	X		
Permanent Markers	X		



**ATTACHMENT E INNOV-X XRF FIELD SCREENING PROTOCOL**



**REGION 10  
SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM  
(START-3)**

**STANDARD OPERATING PROCEDURE  
FOR  
INNOV-X  
X-RAY FLUORESCENCE  
FIELD SCREENING**

January 2007

Prepared by

Region 10 START-3  
Ecology and Environment, Inc.  
Seattle, Washington



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## **1.0 INTRODUCTION**

X-ray fluorescence (XRF) has proven itself to be a cost-effective and time-saving technique for metals screening and analysis on environmental sites. The Removal Program within Superfund has especially benefited from XRF because of its ability to provide immediate information on contaminants, and its low per-unit cost of analysis. Contaminant assessment error is reduced by increasing sampling density rather than increasing the precision of the analytical method. One of the greatest advantages to XRF field screening is its ability to direct on-going removal activities, which reduces costly manpower/equipment down-time and more accurately defines the area of contamination.

This document outlines recommended and required procedures and equipment for representative collection and/or analysis of samples for XRF field screening.

For further information on the instrument, instrument procedures, instrument maintenance, and instrument trouble shooting please refer to the instrument manual or the manufacturer's website at [www.innov-xsystems.com](http://www.innov-xsystems.com).

## **2.0 METHOD SUMMARY**

The analytical method referenced by this SOW is EPA SW-846 Method 6200, A Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment. The Sampling Plan/ Quality Assurance Project Plan should address the site-specific data quality objectives.

XRF field screening situations vary widely and therefore no universal analytical procedure can be recommended. Likewise, XRF instruments vary in technology and capability. The Sampling Plan/ Quality Assurance Project Plan should address these variables based on site characteristics and required data quality objectives.

The Innov-X XRF is a fundamental parameters instrument. This fundamental parameters instrument is factory calibrated. Before use, the instrument should undergo a self-calibration and the instrument precision and accuracy should be checked with samples of known concentrations (NIST certified). Following calibration or optimization, the sample is collected and prepared. Sample preparation of in-situ analysis may only consist of removing surface debris and placing the probe on the surface to be analyzed. However, if more precision is required to address the site data quality objectives, samples may need to be sieved, dried, crushed, and placed into x-ray cells prior to analysis.

Samples are then analyzed by exposing the matrix to the selected source for no less than 30 seconds. The instrument displays the concentration of the selected elements in the units in which they were calibrated. Depending on the application and data quality objectives, a variety of quality assurance measures are taken to ensure data validity. Additionally, a portion of the samples are sent to a laboratory or analyzed by a second fundamental parameters instrument for confirmation of results.

## **3.0 INSTRUMENT CALIBRATION**

### **3.1 Site-Specific Empirical Calibration**

The following instrument calibration criteria apply to non-fundamental parameters instruments incorporating empirical calibrations. The instrument should be calibrated according to vendor specifications, and the following considerations.

- Pure elements should be re-analyzed prior to each calibration.
- A minimum of 10 site-specific samples must be used for the calibration.
- The sample concentrations of site-specific samples used for the calibration should range the concentrations of interest. Several samples from the calibration suite should be at or near the decisive action level.
- The gain channel should be monitored and recorded during the initial calibration.

- Field in-situ analysis time versus the measurement time used during initial calibration is not considered critical and may vary depending on the application.
- A minimum r2 value of 0.70 is required for an acceptable initial calibration. No criteria are established for deleting points from the initial calibration. The benefit of maximizing the r2 value versus the detriment of reducing calibration population and eliminating some potential real matrix effects must be weighed.

### 3.2 Fundamental Parameters Performance Check

The performance of a fundamental parameters software-driven instrument will be monitored by analyzing a National Institute of Standards and Technology (NIST) primary standard. Available standards include Standard Reference Material (SRM) 2709, 2710, and 2711 (low, medium, and high concentration metal concentrations in environmental samples matrix). SRMs of similar concentrations to the samples will be analyzed prior to analysis, and during sample analysis at a frequency of at least every ten samples. Acceptable results will be within + 20% of the certified values.

A site-specific sample characterized to at least 99.5% elemental constituency by a high-resolution (less than 100 KeV Mn K $\alpha$ ) fundamental parameters instrument is an acceptable substitute for NIST SRMs, provided that the concentrations of the analytes of interest are near the area of interest, or action level.

## 4.0 SAMPLE PREPARATION

Because of the impromptu and diverse nature of work performed by the Removal Program, every effort has been made to preserve the project manager's freedom to vary the degree of sample preparation to meet particular site specific data quality objectives or time/budget constraints. It should be noted that XRF field screening results can be dramatically improved if samples are dried, sieved, and crushed prior to analysis. No matter the degree of sample preparation, the samples from the site should be analyzed in the same manner as the samples analyzed during the empirical calibration.

### 4.1 Mandatory Sample Preparation Measures:

- Interfering surface debris will be removed for in-situ XRF measurements.
- A minimum measurement time of 30 seconds will be used.
- A single thickness plastic bag should be used as a protective layer between probe and sample for in-situ measurements. Instrument calibration should be performed with the same material between the sample and probe.
- Samples used for confirmation will be collected and homogenized as a minimum prior to XRF and laboratory analysis.

### 4.2 Optional Sample Preparation Measures:

- A minimum of three measurements should be taken and averaged for every grid point or measurement node to minimize error caused by microheterogeneity (nugget effect).
- Microwave drying of samples is acceptable (excluding mercury analysis).
- Sample preparation with a 10-mesh sieve will provide more precise results, but is left to the discretion of the analyst. Sieving samples must be consistent with the calibration.
- The prepared portion of the sample analyzed by XRF should be sent for laboratory confirmation to reduce the effects of microheterogeneity.

## 5.0 QUALITY ASSURANCE

### 5.1 Quality Assurance Requirements (EPA 540-R-93-071, Data Quality Objective Process for Superfund)

Screening Data (Definitive Data Without Error and Bias Determination) objectives are met by XRF

analysis if either fundamental parameters modeling is used, or if the  $K\alpha$  and  $K\beta$  peak, or the  $L\alpha$  and  $L\beta$  peaks are positively identified for the element in question. Ten percent of the samples must be sent for independent laboratory confirmation to meet Definitive Data criteria. On larger sites, once calibration confirmation has been established, the number of samples sent for confirmation may taper off to 5%.

Definitive Data criteria are met if in addition to meeting the Definitive Data objectives, error analysis is determined per matrix by analyzing 8 samples in replicate, and variance is calculated.

## 5.2 PARCC Parameter Criteria

- **Precision** will be established by measuring an action-level concentration standard and a low concentration standard at a frequency of 10% of all field measurements. An acceptable level of  $\pm 20\%$  Relative Percent Difference (RPD) from the XRF value after initial calibration (not laboratory assay value) was established. If this control limit is exceeded, all samples from the last acceptable measurement must be reanalyzed. The low concentration sample would be used to establish the detection limit and the analytical quantitation limit as defined by 3 times the standard deviation of this measurement.
- **Accuracy** will initially be established by sending high, medium and low concentration field samples for verification analysis. Following this initial accuracy check, calibration accuracy will be monitored by sending 10% of the project samples for laboratory confirmation.
- **Representativeness** will heavily depend on project-specific data quality objectives and will not be monitored directly. It should be noted in the project-specific quality assurance plan that representativeness can be increased by reducing the geostatistical error associated with sample point density.
- **Comparable** data will be generated if the continuing calibration results are within  $\pm 20\%$  RPD. It is critical to note that XRF results will be comparable to the method used in assaying the initial calibration samples. For most purposes, samples will be analyzed by atomic absorption spectroscopy or inductively coupled plasma emission spectroscopy following the EPA 3050 nitric acid/peroxide digestion, and the results by XRF are more representative of the digestion procedure than the actual analytical method.
- **Completeness** will be established by a simple percentage of the number of measurements taken compared to the number of measurements planned.

## 5.3 Replicate Sample Analysis

Eight replicates of one sample are to be collected and analyzed whenever error determination is required. No duplicate sample analysis (2 replicates) is required.

## 5.4 Performance Evaluation Samples

Performance Evaluation (PE) sample analysis is appropriate for fundamental parameter instrumentation. However, because empirical calibration models are highly matrix dependent, PE sample analysis is not suggested.

## 6.0 DATA VALIDATION

Throughout sample analysis, a mid-range or action level concentration standard will be analyzed at a frequency of 10%. This analysis will serve as a continuing calibration check and results must be within  $+20\%$  of the true sample value, as determined by the appropriate EPA CLP-style analysis. If sample results from this analysis lie outside the  $+20\%$  control limit, all samples from the last successful continuing calibration check must be re-analyzed following adjustment of the appropriate instrument parameters.

In addition, a low concentration standard will be analyzed at the same frequency. From the standard deviation of this measurement, the detection limit and analytical quantitation limit will be calculated as defined by 3 times the standard deviation of this low concentration standard.

Following the field project, a follow-up data summary report will be written evaluating XRF conformance to standard operating procedures and appropriate quality control criteria. Additionally, from laboratory confirmation analyses and XRF results, a correlation coefficient will be calculated. Data sets above the upper calibration range may be eliminated due to model bias (heteroscedasticity), unless an even distribution is apparent. Data pairs below XRF and analytical detection limit will be left to the discretion of the reviewer. A correlation coefficient of 0.70 or greater must be obtained for data to be considered acceptable.

## **7.0 HEALTH AND SAFETY**

All field-portable XRF units either incorporate radioactive sources, or X-ray tubes. All site-specific health and safety precautions as outlined in the site safety plan must be adhered to when performing XRF field screening analyses.

In addition to site chemical hazards is the consideration of radiological activity of the source(s). A current wipe test certification should accompany the instrument, dated no more than 6 months from the current date. A real-time monitoring instrument should be used periodically to monitor the instrument with the shutter closed to ensure adequate shielding. Site personnel will not be allowed to operate XRF instrumentation unless they are equipped with a dosimetry monitoring device (e.g., TLD badge, pocket dosimeter).

Prior to the removal of the instrument from the hot zone, or from the site, the instrument should be thoroughly decontaminated with a mild solution of soap and water.

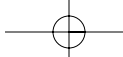
## **8.0 POTENTIAL SOURCES OF ERROR**

The following are recognized sources of error when using XRF for field screening applications. Some sources of error are unavoidable, or may cause error within acceptable limits as established by the data quality objectives. Although they will not be discussed in detail, the user should be aware of these error sources.

- Sample matrix causes the greatest potential for error during analysis, especially with instruments with high pressure gas proportional detectors (resolution greater than 800 eV). Causes of error include factors such as chemical, geomorphology, surface texture, particle size, density (average Z number), microheterogeneity, and moisture content.
- High energy sources and radio frequency generators may cause software and detector interferences. Interfering sources may include site radios and video monitors.
- Certain unavoidable site characteristics are inherent for error in XRF analysis such as particle size, temperature, humidity, and geomorphology.
- Chemical interferences may lead to increased error especially with proportional gas detectors. More common chemical interference may include Pb and As, Fe with Cr and Ni, Pb with Bi and Rb.
- Instrumental factors may lead to error such as battery loss, gain control, drift, and temperature fluctuations.

**ATTACHMENT F ALL TERRAIN VEHICLES USE REQUIREMENTS STANDARD OPERATING PROCEDURE**





For more information contact:

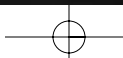
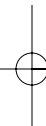


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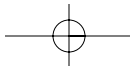
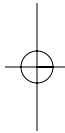
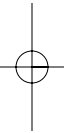
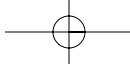
# ***Tips and Practice Guide*** ***for the*** ***All-Terrain Vehicle*** ***Rider***



A Division of the Specialty Vehicle Institute of America







## Foreword

It is important to carefully read and follow the instructions and warnings in the owner's manual and on labels. ATVs handle differently from other vehicles such as motorcycles and cars. Proper instruction and practice are important.

ATVs can be hazardous to operate. For your safety, always wear a helmet, eye protection and protective clothing. Always avoid paved surfaces. Never ride on public roads. Never carry passengers or engage in stunt riding. Avoid excessive speeds. Riding and alcohol or other drugs don't mix. Be extra careful on difficult terrain.

The ATV Safety Institute is a division of the Specialty Vehicle Institute of America, a national not-for-profit association

representing U.S. distributors of all-terrain vehicles. Supporting members are AlphaSports, Arctic Cat, Bombardier, Cannondale, Honda, Kawasaki, KTM, Suzuki, and Yamaha.

For more information contact:



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**Tips And Practice Guide For The ATV Rider** *i*

## ***Be Cautious***

ATVs are not toys. Serious injury can result from improper use of ATVs, but with preparation and practice, you can safely develop and expand your riding skills. Riding ATVs can be an enjoyable form of outdoor recreation when done properly. ATVs can also be used for agricultural or utility use.

In addition to the information provided in this booklet, it is important to read and follow the instructions and warnings contained in the ATV owner's manual and on labels.

ATVs handle differently from other vehicle, such as motorcycles and cars. Proper instruction and practice are important. The *ATV RiderCourse*<sup>SM</sup>,

a half-day hands-on training program is available nationwide. If you purchased a new ATV, you may be eligible for free training. Once training is completed, you may also be eligible to receive an incentive. To find out if you are eligible for free training and to register for classes, contact the *ATV Enrollment Express*. Call toll-free (800) 887-2887 for the rider training location nearest you. Those not eligible for free training may take the course for a nominal fee. We recommend you take advantage of the free training program, and perform the exercises in this booklet.

Remember that riders under 16 years of age must be supervised by an adult. In addition, follow the *ATV Model Size* and *Minimum Age* information listed on page iii.

***Do not ride an ATV that is not recommended for your age group.***

If you have a youngster who is about ready to ride an ATV, there are special considerations that you should keep in mind. Although a child may be the recommended age to ride a particular size ATV, not all youngsters have the strength, skills, or judgment needed to operate an ATV. You should supervise your youngster's operation of the ATV at all times, and should permit continued

use only if you determine that your youngster has the ability and judgment to operate the ATV safely. You should read *Parents, Youngsters and All-Terrain Vehicles* available from the ASI (see page 62 for more information).

For more information about ATV safety, call the Consumer Product Safety Commission at (800) 638-2772 or the Distributors' ATV Safety Hotline at (800) 852-5344.

***RIDER AGE & ENGINE SIZE***

<b>ATV Size</b>	<b>Minimum Age</b>
Under 70cc. . . . .	6 years and older
70-90cc. . . . .	12 years and older
Over 90cc. . . . .	16 years and older

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## **Introduction Part 1**

The purpose of this booklet is to answer your questions about All-Terrain Vehicles (ATVs) and help you increase your knowledge of their operation and use. It will help you to learn and respect the capabilities of your ATV.

If you are new to ATVs, you can look forward to lots of fun and excitement. An ATV can be ridden in many types of off-road conditions, but its capabilities depend on your riding experience and ability.

All ATV riders, regardless of what type of riding they do, should read this booklet thoroughly to learn tips that may be helpful in future riding experiences.

This booklet should not be used as a replacement for a training program.

You should consider taking the *ATV RiderCourse*<sup>SM</sup>, available nationwide. Call toll-free, (800) 887-2887, for information about this course.

## ***The All-Terrain Vehicle (ATV)***

Knowing all you can about your ATV and the places you can ride is good preparation for safe and enjoyable riding.

Remember, ATVs are intended for off-road use only. Never operate an ATV on public roads, and always avoid paved surfaces. ATVs are not designed to be used on paved surfaces because pavement may seriously affect handling and control.

ATVs are different from other vehicles, as well as from one another. The following is a list of some differences among ATVs:

- Handling characteristics among ATVs vary depending upon their basic design and how they are equipped.
- Most ATVs have front and rear brakes, while some may have linked brakes. Be sure to learn the recommended stopping techniques for your machine.
- There are ATVs with electric starters, kick-starters, and pull starters.
- There are liquid-cooled ATVs and air-cooled ATVs.
- Some ATV transmissions have automatic clutches; some have hand-operated clutches; some transmissions are fully automatic.
- Some ATVs have a reverse gear.
- Most ATVs have solid drive axles and some have differentials.
- Some ATVs have two-wheel drive, and some have four-wheel drive.
- Some ATVs have chain drives, others have shaft drives.
- Most throttles are controlled by pushing a thumb lever next to the handgrip; others may be controlled by twisting a handgrip.
- Controls and their locations differ from one ATV model to another.



## ***Be Prepared***

You may be anxious to take a test run, but before you do, be sure you and your machine are ready. If you are not, the results can range from embarrassment to severe injuries.

Be sure to follow the age and ATV model size recommendations for young riders (see page iii ). A safety booklet called *Parents, Youngsters and All-Terrain Vehicles* is available from the ATV Safety Institute.

This easy-to-read booklet is designed to assist parents in determining whether a youngster is ready to ride an ATV. It contains readiness guidelines and checklists for parents to review with their youngsters. It also includes important safety tips and information for youngsters who are learning to ride an ATV.

## Protective Gear

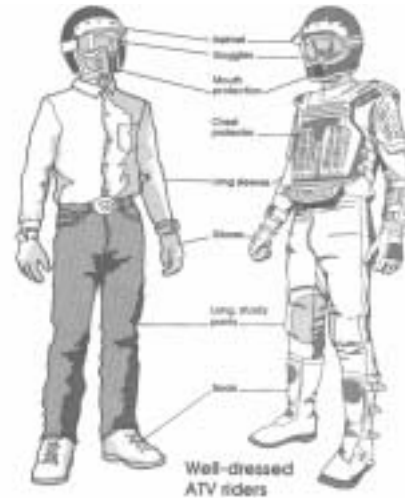
The nature of ATV riding demands that you wear protective clothing. Although complete protection is not possible, knowing what to wear and how to wear it can make you feel more comfortable when you ride and reduce the chance of injury.

Never operate an ATV without an approved motorcycle helmet, eye protection, boots, gloves, long pants, and a long-sleeved shirt or jacket.

### **Clothing**

Good gloves can help keep your hands from getting sore, tired, or cold, as well as offer protection in the event of a spill. Off-highway style gloves, available at ATV dealerships, are padded over the knuckles to help prevent bruising, and provide the best combination of protection and comfort.

The recommended protective footwear is a pair of strong, over-the-ankle boots with low heels to help prevent your feet from slipping off the footrests. Off-highway style boots offer the best protection for feet, ankles, and lower legs.



It is important to protect your skin from scratches. A long-sleeved shirt or jersey and long pants are minimum requirements for rider protection. Off-highway riding gear such as off-highway pants with kneepads, jersey, and chest/shoulder protectors provides better protection. You can look stylish and ready for action, and still be well-protected.

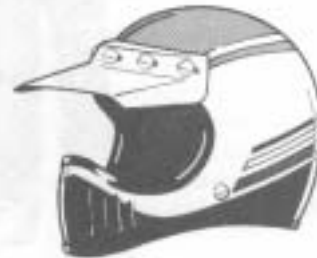
### **Helmets**

Your helmet is the most important piece of protective gear for safe riding. A helmet can help prevent a serious head injury.



There are a few basic tips to keep in mind when selecting a helmet. Selecting an approved helmet that meets or exceeds your state's safety standards and carries either the Department of Transportation (DOT) label, the American National Standards Institute label (ANSI z90.1), or the Snell Memorial Foundation label.

Your helmet should fit snugly and fasten securely. Full-face helmets help protect your face as well as your head. Open-face helmets are lighter and may be cooler, but should



be used with mouth protection. Eye protection should be used with both types of helmets.

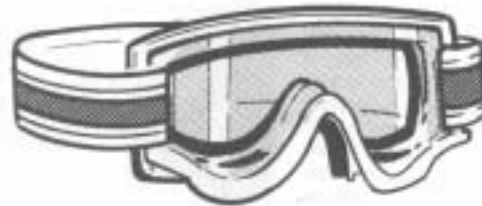
There is also a special time not to wear a helmet. When you stop to talk with landowners or other people you meet on the trails, always take your helmet off. To some people your helmet is a mask and can be intimidating.

### **Eye Protection**

You must be able to see clearly to ride safely. An object such as a rock, branch, or even a bug that hits you in the face can distract you. If you are hit in the eyes without proper protection, you can be blinded. Regular sunglasses do not provide proper protection while riding an ATV. A face shield or goggles will provide you with more protection and should be:

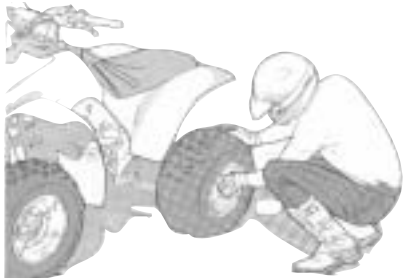
- Free from scratches and bear the standard marking VESC8 (or V-8) or z87.1 in one corner, or should be made of a hard-coated polycarbonate
- Fastened securely
- Well ventilated to prevent fogging

In addition, you may wish to use gray tinted eye protection for riding on bright days or yellow for overcast days. Always use clear eye protection for riding at night.



## ***Pre-Ride Inspection***

Inspecting the mechanical condition of your ATV before each ride is important to minimize the chance of being injured or stranded. This also ensures long enjoyment of your ATV. Remember, you can ride farther in one hour than you can walk in a day. Your owner's manual will show you what equipment to check on your particular machine. Listed are the most common items to check:



### ***Tires and Wheels***

- 1. Air pressure** – Always maintain the recommended tire pressure. Be sure that all tires are inflated to proper pressure. Check that tires on the left side of your ATV are inflated to the same pressure as the corresponding tires on the right side. If the tire pressure on one side is higher than the other side, the vehicle may pull to one side. Under-inflated tires may also cause wheel damage when riding over bumpy terrain. Over-inflation may damage the tires. If the tires are over- or under-inflated, your ATV may not steer or handle properly. To measure pressure accurately (usually 2 to 6 psi), you will need a low-pressure gauge; automotive tire gauges are not accurate for use on ATVs.

- 2. Condition** – Check for cuts or gouges that could cause air leakage.
- 3. Wheels** – To avoid loss of control or injury, make sure axle nuts are tight and secured by cotter pins, and make sure wheel nuts are tightened properly. Grasp the tire at the front and the rear and try to rock it on its axle to detect worn-out bearings or loose nuts. There should be no free play or slip as you rock the wheel.

### **Controls**

- 1. Throttle and other cables** – Make sure the throttle moves smoothly and snaps closed with the handlebars in any position. Check throttle operation while moving the handlebars from fully left to fully right. If your ATV is equipped with an adjustable throttle limiter, check to make sure the adjustment is appropriate for the rider, and that the adjustment is securely set. Check cables and controls for damage from a spill or accumulated dirt and mud, which may restrict full operation.
- 2. Brakes** – Make sure the controls operate smoothly and are adjusted according to the instructions in the owner's manual. The controls should be positioned for your easy reach. Your brakes are a crucial part of riding and they must always be in excellent working condition.
- 3. Footshifter** – Make sure the footshifter is firmly attached and positioned for safe operation. It should not be so low that your toes are pointed downward at the ground or so high that shifting is awkward.

### **Lights and Switches**

- 1. Ignition switch** (if equipped) – Check the condition of the switch and make sure it works properly by switching it off and on during your warm-up period.
- 2. Engine stop switch** – Be sure it turns off the engine.
- 3. Lights** (if equipped) – Be sure all lights are working.

### **Oil and Fuel**

- 1.** Check oil level while the engine is off. You could get stranded because you are out of oil or fuel.
- 2.** Always start your ride with a full tank of gasoline to give you the best chance of getting home from a long ride.
- 3.** Check for fuel or oil leaks.

### **Chain/Driveshaft and Chassis**

- 1. Chain** – Inspect your chain for proper adjustment and adequate lubrication. Check for wear.
- 2. Driveshaft** – If your ATV is equipped with a driveshaft rather than a chain, check for oil leaks. Maintain the oil supply as outlined in your owner's manual.
- 3. Nuts 'n bolts** – Rough terrain will loosen parts. Look and feel for loose parts while the engine is off. Shake handlebars, footrests, etc., before each ride, and periodically check major fasteners with a wrench.

**Tool Kit**

After completing the pre-ride inspection, check to make sure you have an adequate tool kit in case you encounter any mechanical problems.

Carrying the right tools and equipment with you when you go riding is important for the safe enjoyment of your ATV riding experience. Examine the tool kit that came with your machine. You may want to add a few spare parts — a spark plug or two,

perhaps some wire and tape, maybe a headlight bulb. Prepare for the unexpected, and carry what you need to handle any emergencies. Consider carrying a good strong tow rope.

Also remember that off-road riding is hard on your ATV, so it is especially important to perform periodic maintenance as outlined in your owner's manual. Do not risk injury or vehicle breakdown due to lack of proper maintenance.



## Let's Prepare To Ride

### **Riding Area**

Be sure you have a large, flat, open practice area, free of obstacles and hazards, to use while you practice. Take a few minutes to review the rest of the riding tips in this booklet before you start your engine.

### **Starting Procedure**

Consult your owner's manual for the correct starting procedure.

- Check that the transmission is in NEUTRAL or PARK (if equipped).
- Set PARKING BRAKE.
- Turn the FUEL valve on.
- Check that the engine stop switch is in the RUN or ON position.

- If the engine is cold, put the CHOKE in the ON position.
- Start the engine.

### **Posture**

The correct riding posture will help you to easily operate the controls and help you react more quickly when shifting your body weight. Proper straight line riding posture includes:

- Head and eyes up, looking well ahead
- Shoulders relaxed, elbows bent slightly out, away from your body
- Hands on the handlebars
- Knees in toward the gas tank
- Feet on the footrests, toes pointing straight ahead

Always keep both hands on the handlebars and both feet on the footrests of your ATV during operation. Removing even one hand or foot can reduce your ability to control the ATV, or could cause you to lose your



balance and fall off. If you remove a foot from a footrest, your foot or leg may come into contact with the rear wheels, which could injure you or cause an accident.

ATVs are rider-active; to enhance the performance capabilities of the ATV, you must shift your body weight. This is especially true in maneuvers such as turning, negotiating hills, and crossing obstacles.

## Let's Start Riding

### Get Moving

- Always keep your feet on the footrests while riding to help prevent injury.
- Be sure that the engine is sufficiently warmed up before you start riding.
- Apply the rear brake and shift into first gear.
- Release the parking brake and apply the throttle slowly.
- If the vehicle has a manual clutch, release it slowly. If the clutch is engaged too quickly, the ATV may move suddenly, causing you to lose control or fall off the ATV.

### Shifting Gears

See your owner's manual for instructions on shifting your model of ATV. There are several types of transmissions on ATVs.

Be certain you know how to operate the transmission of the ATV you are riding.

- Always close the throttle while shifting to prevent the front wheels from lifting.
- Learn the sounds of your engine so you can shift to keep the engine speed in the most efficient range.
- If your ATV has a manual clutch, learn where the engagement zone is to prevent stalling, and to allow for smooth shifting.

### Braking

Your owner's manual describes your ATV's braking system. You may have both front and rear brake, or linked brakes. Of course, your braking technique will depend upon your ATV's braking system and the type of terrain you are riding on.

Many ATVs are available with four-wheel drive. When operating in four-wheel-drive mode, keep in mind:

- Using only the front brake or the rear brake has the effect of braking both the front and rear wheels.
- Abrupt deceleration from shifting to a lower gear (engine braking) will affect both the front and rear wheels.

Consult your owner's manual for more detailed information.

***Some tips for braking are:***

- Releasing the throttle.
- Shifting to a lower gear to use the engine to slow the vehicle.
- Applying both brakes equally. (if equipped)

- Avoiding excessive braking while cornering.
- Applying brakes lightly on slippery surfaces.
- Shifting to a low gear when descending a hill and not riding the brake for long periods of time.

***Parking***

When parking your ATV you should:

- Stop the ATV. Place the transmission in neutral or park and apply the parking brake or engage the parking mechanism (if not already activated by placing the transmission in park). If the ATV is equipped with a parking mechanism, allow the drive train to lock.
- Avoid parking on an incline.

## Turning Basics

Always check your owner's manual for the recommended turning technique for your ATV.



The following basic turning technique applies to ATVs being ridden at low to moderate speeds.

- Move your body weight forward and to the inside of the turn.
- Turn the handlebars while looking in the direction of the turn.

As you increase speed or turn more sharply, move your body weight farther toward the inside of the turn to maintain your balance.

If your ATV starts to tip while turning, lean your body farther into the turn while gradually reducing the throttle and making the turn wider, if possible.

## ***Riding On Hills***

### ***Going Up Hills***

Climbing hills improperly could cause loss of control or cause the ATV to overturn. Always follow procedures described in your owner's manual. Remember:

- Some hills are too steep for your abilities. Use your common sense. If the hill you are approaching looks too steep, it probably is.
- Some hills are just too steep for your ATV, regardless of your abilities.
- Never ride past the limit of your visibility; if you cannot see what is on or over the crest of a hill, slow down until you have a clear view.
- The key to being a good hill rider is to keep your weight uphill at all times.



When approaching an uphill climb, you should:

- Keep your feet firmly on the footrests.
- Shift the ATV into a lower gear and speed up **BEFORE** climbing the hill so you can maintain momentum.
- When approaching the uphill climb, move up on the seat and lean forward, or stand and position your torso over the front wheels.

As you are climbing, you may need to shift to a lower gear to prevent lugging the engine or stalling. To shift into a lower gear on a hill, remember:

- Keep your body weight forward as you prepare to shift gears. For steeper hills, lean forward as much as possible.
- Shift quickly while momentarily releasing the throttle; this will help keep the front wheels from lifting.

If you do not have enough power to reach the top of the hill, but still have forward momentum and enough room to turn around safely:

- Keep your weight uphill.
- Make a U-turn before you lose speed.
- Proceed downhill in a lower gear, keeping your weight to the uphill side.

If you are riding uphill and lose all forward momentum:

- Keep your weight uphill and apply the brakes to come to a stop. Never allow the ATV to roll backward.
- Apply the parking brake while keeping your weight uphill.
- Dismount on the uphill side or to a side if pointed straight uphill, and follow the procedures described in your owner's manual.

Do not attempt to ride backward down a hill. Should you begin rolling backward, do not apply the rear brake abruptly. Using the rear brake only or abruptly could cause the ATV to roll over backward.

If you begin rolling backward follow these steps:

- Keep your weight uphill and apply the front brake. If your ATV has linked brakes, or if you are in four-wheel drive, follow the procedures described in your owner's manual.
- When you have come to a complete stop, apply the rear brake. Then apply the parking brake and dismount on the uphill side. If pointed straight uphill, dismount to either side and follow the procedures described in your owner's manual.

- If the ATV continues to roll backward, dismount to the uphill side immediately.

### **Going Down Hills**

Always check the terrain carefully before you start down any hill. Choose a downhill path as straight as possible, with a minimum of obstacles. Shift your weight to the rear





and use a low gear. Follow the procedures described in your owner's manual for the special braking techniques for going down hills.

When going downhill, remember to:

- Shift your weight to the rear (uphill).
- Keep the speed low.
- Use gradual braking.
- Use a lower gear.
- Look ahead.

### ***Traversing a Slope***

When you go across a slope rather than directly up or down, it is called traversing. Sometimes when a hill is steep it is necessary to climb it or descend it by traversing.

Traversing a slope requires additional attention. Avoid traversing slopes with excessively slippery, rough, or loose surfaces.

Here are some of the basic guidelines for traversing:

- Keep both feet firmly on the footrests.
- Lean your upper body uphill.
- When riding on soft terrain, you may need to turn your front wheels gently uphill to keep your ATV on a straight line across the hill.
- If your ATV begins to tip, turn the front wheels downhill if the terrain allows. If the terrain does not permit, dismount on the uphill side immediately.
- Avoid making sudden throttle changes.

## ***Riding Strategies***

### ***Reading Terrain***

To get the most out of your ride, you have to know the land you are riding on and what your machine can do. Carefully choose the places you ride. Use existing trails. Stay away from terrain where you do not belong, such as dangerous slopes and impassable swamps. Watch carefully for sharp bumps, holes, ruts, or obstacles.

An expert rider stays out of trouble by handling the ATV well and avoiding any risky situation. Learn to read the trail as you ride. An expert rider looks well ahead on the trail. Know what is coming up; be prepared to react long before you get there. Be constantly alert for hazards. Never operate an ATV at excessive



speeds. Go at a speed which is proper for the terrain, visibility, operating conditions and your experience. Always be careful when operating an ATV, especially when approaching hills, turns, and obstacles and when operating on unfamiliar terrain.

### ***Choosing Proper Speeds***

Always look well ahead and choose a speed that is proper for the terrain, visibility, operating conditions, and your experience.

By scanning far enough down the trail, you will be able to pick the best “lines” (or safest paths of travel) around or over hazards or small obstacles. As you approach a hazard, do not fixate on it. Instead, continue to search for other clues in the environment and adjust your speed well in advance.

## ***Riding Different Terrain***

### ***Sand Dunes***

Dune riding offers great thrills and fun, but certain safety precautions are necessary to fully enjoy this type of terrain. Remember to:

- Use an antenna flag on your ATV.
- Be prepared for changing sand.
- Avoid wet sand.
- Avoid riding on vegetation.
- Watch for slip faces and razorbacks.
- Be careful when the sun is overhead; lack of shadows make it difficult to see hazards.

### ***Mud and Water***

Your ATV is equipped to ride through mud and shallow water, but you should avoid water crossings where you might damage

streambeds and fish spawning grounds, or where you might cause erosion to the banks of a stream or creek. This precaution not only adds to your personal safety and fun, but it preserves the environment for others to enjoy. If you are riding through mud or water remember:

- Footrests may become slippery.
- Determine water depth before attempting a crossing; do not exceed the water depth specified in your owner's manual.
- Avoid fast-flowing water.
- If you cross a stream, use an established ford or place where the stream banks have a gradual incline.
- Be prepared to shift your weight in any direction to maintain balance.

- Watch for submerged obstacles.
- Test brakes after leaving water.

### **Snow**

Riding on firm snow can be great fun. However, riding in soft snow, under the wrong conditions, can be damaging to the terrain. Ride only on firm snow or groomed trails and be sure to have the landowner's permission. Remember to:

- Keep alert to weather conditions.
- Know the weather forecasts.
- Check with local law enforcement to be sure that ATVs are allowed on snowmobile trails before using them.
- Dress appropriately for the weather conditions.

### **Crossing Roads and Highways**

ATVs are designed to be used OFF-ROAD ONLY. A leading cause of accidents and

fatalities to ATV riders is riding on or crossing a road illegally or improperly. The hazards of crossing roads cannot be over-emphasized, but you may find it necessary on occasion to cross a road or highway. This is particularly true in farming areas where ATVs are used for various work purposes. If you must cross a road, use the following guidelines to reduce risk:

- Make sure you know your state's laws and regulations before you cross any road.
- Before crossing, bring your ATV to a complete stop on the shoulder of the road.
- Yield the right of way to all oncoming traffic. Look both ways.
- Ride cautiously. Your ATV will handle differently on pavement and may be

difficult to maneuver, increasing the danger of collision.

- Cross the road at a 90-degree angle where there are no obstructions and your visibility is good.
- If you are riding in a group, have the first rider (leader) dismount on the shoulder before crossing and watch for traffic as he waves the group across the road. Have the last rider dismount on the shoulder after crossing and watch traffic, to help the group leader across.
- Remember, crossing roads improperly or riding illegally on the road is a major cause of serious accidents and fatalities to ATV users, so use extra caution. Always assume the drivers DO NOT SEE YOU, since most drivers look for cars, not ATVs.

## ***Safe Riding Practices***

### ***Don't Ride Alone***

Always make a plan before you ride. Tell someone where you are going and when you expect to be back. Ride in a group of two or more. Each rider should be responsible for keeping track of one of the others. It's called the "buddy system" and it's good insurance on any ride.

### ***The Effects of Alcohol, Drugs, and Fatigue***

Riding an ATV can be more demanding than driving a car. You have to be in good physical and mental condition to ride safely. Three factors that keep ATV riders from being in top shape for riding are alcohol, drugs, and fatigue. Each of these can affect your ability and your decision-making process.

### ***Alcohol***

Drinking and riding can be fatal. Consumer Product Safety Commission studies show that 30 percent of all ATV riders killed in ATV accidents had been drinking. Fourteen percent of all reported accidents with injuries indicated alcohol consumption by the operator.

Alcohol affects all the skills you need to ride safely. The amount of alcohol in your body is referred to the "Blood Alcohol Concentration" or "BAC." Most states consider people intoxicated at a BAC of .08 percent. Physical and mental reactions usually became impaired at a BAC of .05 percent. **ALCOHOL AND ATVs DO NOT MIX.**

### **Other Drugs**

Almost any drug puts an ATV rider at risk. Many over-the-counter prescription and illegal drugs have side effects much like alcohol, which affect the skills you need to ride safely. Depressant drugs such as tranquilizers and barbiturates have effects similar to alcohol on the body systems. Even cold tablets and allergy pills can make you feel weak, dizzy, and drowsy as well as affecting your vision, coordination, and judgment.

Marijuana decreases your ability to see at night and recover from headlight glare. Marijuana users cannot react as quickly as usual, nor operate the ATV as well. Amphetamines or cocaine, while they may increase your attentiveness temporarily, bring on extreme fatigue once they wear off. Furthermore, they produce a mild

euphoria, which often causes riders to take foolish risks. Never consume drugs before or while operating an ATV.

### **Fatigue**

Riding an ATV is more tiring than driving a car. Remember that fatigue can affect your ability to control your ATV. Here are some things you can do to keep from getting too tired:

- Protect yourself from the elements. Wind, cold, rain, and heat make you tire quickly. Dress appropriately for the conditions.
- Limit your distance and riding time until you know your limits.
- Take frequent rest breaks. Stop and get off the ATV. No one should go more than one hour without pulling over, stopping, getting off the ATV, and walking around.



### **Know the Laws**

The laws and regulations that control how and where to use your ATV are important for you to be aware of and to follow. They are established for your protection as well as everyone else's. By controlling less responsible riders, the laws and regulations allow others to enjoy the sport. They also help protect the land you ride on and the people who own it. Dealers and ATV clubs can often provide you with a summary of local laws, or direct you to park rangers, game wardens, or other sources who will be glad to help you.

### **Registration**

In many states the laws require that you register your ATV as part of the state's off-highway vehicle registration program. ATV used for agricultural or utility purposes may be subject to different provisions than

recreational vehicles. You should check this out when you buy your ATV—your dealer should know the law, and can often help you with registering your vehicle. Fines for riding an unregistered vehicle can be expensive, and you also take the risk of having your ATV impounded. Some states use registration fees to develop riding trails and facilities. So by registering your ATV, you and your friends may be helping to secure and maintain places to ride.

### **You and the Rest of the World**

There is one fundamental factor that controls your riding — access to land. Developing and maintaining riding opportunities means getting along with the rest of the world - private landowners, public land managers, and people you meet on the trails. The better you get along with these people, the easier it will be to locate and preserve good riding areas.

### **TREAD Lightly!**

Riding behavior that harms the land is self-defeating and irresponsible.

Learn to protect and preserve your riding areas. In other words, TREAD Lightly!

- Travel only where the motorized vehicles are permitted.
- Respect the rights of hikers, skiers, campers and others to enjoy their activities undisturbed.
- Educate yourself by obtaining travel maps and regulations from public agencies; comply with signs and barriers; and ask owners' permission to cross private property.
- Avoid streams, lake shores, meadows, muddy roads and trails, steep hillsides, and wildlife and livestock.
- Drive (ride) responsibly to protect the environment and preserve

opportunities to enjoy your vehicle on wild lands.

Here some tips to help you TREAD Lightly!

- Obtain a travel map from the Forest Service or from other public land agencies. Learn the rules and follow them.
- Keep your ATV quiet. Do not make your exhaust system noisier—there is nothing people dislike more than a loud off-highway vehicle. Do not tamper with the spark arrester.
- Avoid running over young trees, shrubs, and grasses. You will damage or kill them.
- Stay off soft, wet roads and trails readily torn up by vehicles (particularly during hunting seasons). Repairing the damage is expensive.
- Travel around meadows, steep hillsides, stream banks, and lake shores. They are easily scarred by spinning wheels.

- Resist the urge to blaze a new road or trail, or to cut across switchbacks.
- Be courteous when you meet others on the trail. Pull to the side and yield to horseback riders and hikers. It is best to shut off the engine whenever you are near horses — a panicked horse is a danger to you and its rider.
- Stay away from wild animals that are rearing their young or suffering from food shortage.
- Obey gate closures and regulatory signs. Remember, vandalism is costly.
- Stay out of designated wilderness areas. They are closed to all vehicles, even bicycles. Know where your boundaries are.
- Get permission to travel across private land and respect the rights of the landowners.

Future opportunities for exciting travel with your ATV are in your hands, so — TREAD Lightly!



### ***Expanding Your Horizons***

How do you find good places to ride?

You can start by talking to you dealer and asking questions such as:

- Where do other customers ride?
- Who owns riding land?
- What are the regulations for use?

ATV clubs provide a way of working together to find good riding areas.

If you are working on your own, topographic maps can be a good way to find open land with suitable trails.

Find out who owns the land and whether they mind you using it. In this way, you can develop a network of good riding areas.

## **Introduction Part 2**

This Practice Guide has several exercises that will help you develop the fundamental skills you need to safely and enjoyably operate your ATV. However, you will need many additional hours of riding before you consider yourself an experienced ATV rider.

Do not attempt these exercises until you have read your owner's manual and "Part I - Tips for the ATV Rider" portion of this booklet thoroughly. These exercises are designed for unmodified machines with low-pressure knobby tires. Read this guide completely before you start practicing.

This guide contains exercises which should be done by only one rider at a time. Keep practicing until you can do each exercise at least five times in a row without a problem. Be sure to take a break when you get tired. Do not push yourself; when you get tired you can make mistakes. These exercises should take about three to four hours to complete.

## **About Your ATV And Skills Exercises**

Handling characteristics of ATVs vary depending upon basic design and how they are equipped. The exercises in this Practice Guide apply to most ATVs with one exception: ATVs with unlocked differentials. If your ATV has a differential, be sure to lock the rear axle before practicing the exercises in this guide. Refer to your owner's manual for instructions.

ATVs with solid rear axles (and those with locked differentials) turn both rear wheels at the same speed. The technique to use when turning is described on page 19 under "Turning Basics." ATVs with unlocked differentials allow the rear wheels to turn at different speeds. If a rear wheel leaves the ground, it will spin freely. Then

when it touches the ground again, it may grab and cause you to lose some control.

Some ATVs are equipped with four-wheel drive. When operating in a four-wheel-drive mode, keep in mind:

- Use of only the front brake or only the rear brake has the effect of braking both the front and rear wheels.
- Abrupt deceleration from shifting to a lower gear (engine braking) will affect both the front and rear wheels.

Consult your owner's manual for more detailed information.

## **Preparation**

### **Choosing a Practice Area**

Choose an open, off-road area (about 100 feet x 200 feet) away from other riders and free of obstructions. The terrain should be flat for Exercises 1, 2, 3, 4, 5, 6, and 9. For Exercises 7 and 8 you will need a hill. The hill should not be very steep and should be easy to climb on foot! Practicing on a hard dirt surface will make it easier for you to learn the basic maneuvers. If you are riding on private property, be sure you have permission from the owner. Do not do these exercises on public roads or paved surfaces. ATVs are designed for off-road use only.

### **What to Bring**

Bring five objects that you can use as markers. Milk cartons or plastic bottles with sand in them work well. Do not use glass bottles or other breakable items. You should also bring a tape measure to mark distances; or at least measure your stride so you can pace off the distances. (One hundred feet is approximately 35 to 40 paces.)

### **Safety Rules**

The practice exercises in this guide can be hazardous if you do not follow the instructions provided. Also follow these safety rules:

- Wear proper protective clothing. This includes an approved motorcycle helmet, over-the-ankle boots, gloves, eye protection, a long-sleeved shirt, and long pants.
- Inspect your ATV before you begin. Consult your owner's manual.
- Check the practice area for potential hazards.
- Bring an experienced friend along to help if anything goes wrong, and to critique your progress.
- Do not mix alcohol or other drugs with ATV riding.
- DO NOT carry passengers.
- Pay attention to additional safety tips found throughout this guide.



## ***How To Use This Guide***

This guide is divided into three levels:

***Level 1 – Basics of ATV Riding***

***Level 2 – Elementary Maneuvers***

***Level 3 – Intermediate Maneuvers***

Even if you have been an ATV rider for more than three months, be sure you have mastered the Level 1 drills before you move on to the other levels.

***Level 1 – Drills***

Level 1 drills cover the basics of ATV riding. (If the terrain you are riding on has ruts or other obstacles, do Exercise 9 following Exercise 3.)

***Exercise 1 – Controls***

- Location and operation

***Exercise 2 – Braking***

- Straight path
- In a turn

***Exercise 3 – Turning***

- Large oval
- Small circles
- Figure 8

### **Level 2 Drills**

Level 2 drills are for practicing elementary maneuvers. All ATV riders should practice these drills before going on to Level 3.

#### ***Exercise 4 - Sharp Turns***

#### ***Exercise 5 - Quicker Turns***

#### ***Exercise 6 - Quick Stops***

- Straight path
- In a turn

#### ***Exercise 7 - Hills***

- Climbing, turning, and descending
- Stopping while descending

### **Level 3 Drills**

Level 3 drills are for practicing intermediate maneuvers.

#### ***Exercise 8 - Traversing Hills***

#### ***Exercise 9 - Riding Over Obstacles***

## Exercise 1 – Controls

**Objective:** To mount and sit on the ATV correctly, locate and operate the controls, and dismount.

**Skills:** Familiarization and operation of controls.

### Directions

**Drill 1:** Take out your owner's manual and locate your ATV's parking brake. Set the parking brake (if equipped). ATV controls may vary from vehicle to vehicle.

Your ATV may not have all of the following controls, but familiarize yourself with the controls it does have. Locate the following controls as you consult your owner's manual:

- Parking brake
- Throttle (full, half, quarter)
- Engine stop switch
- Choke
- Reverse gear lever (if equipped)
- Hand brake, foot brake
- Ignition switch
- Fuel supply valve
- Transmission hi/lo lever (if equipped)
- Starter (pull, kick, electric)
- Clutch lever
- Shift lever

**Drill 2:** Mount the ATV, taking care not to step on the shifter. Maintain proper posture and identify and operate each control. Without looking down, try mounting your ATV while remembering to keep your head and eyes looking straight ahead. Be sure

you learn the shift pattern for your ATV. Consult your owner's manual.

### ***Tips***

- Make sure all the controls work properly. Use your owner's manual and the Pre-Ride Inspection section in this booklet to help you check out your ATV.
- Remember that controls may vary from model to model and you should do this exercise whenever you ride a different ATV.

### ***Watch For***

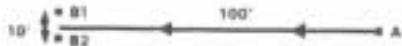
- Using the left brake lever as a clutch.
- Shifting to a lower gear instead of to a higher gear and vice versa.

- Trouble changing the hi/lo lever or finding reverse.
- Awkwardness in reaching controls.

### ***Suggestions***

- Motorcyclists must modify old reflexes for controls and turning.
- Shift patterns vary among ATVs. Be sure you know the shift pattern of your ATV.
- Consult the owner's manual. Try rocking the ATV slightly while moving the lever.
- Reposition handlebars or controls for ease of operation and check adjustment as stated in the owner's manual.

## Exercise 2 - Braking



**Objective:** To use the brakes properly to bring your ATV to a smooth, safe stop.

**Skills:** Starting out, shifting, stopping, turning.

### Directions

#### Drill 1: Braking - Straight path

Put marker A down to indicate your starting point. Then place markers B1 and B2 100 feet down a straight path. Start your ATV and ride straight toward the second markers. Begin to slow down before you reach markers B1-B2. Come to a smooth, non-skidding stop with your



front tires between markers B1 and B2. Practice this a few times in first gear. Then try it in second gear. Ride straight toward B1-B2, accelerate and shift into second. Begin to slow down and shift back to first gear **BEFORE** you reach markers B1 and B2. Come to a smooth, non-skidding stop with your front tires between markers B1 and B2.

#### Drill 2: Braking - In a turn

Place markers C and D as indicated in the diagram. Start at marker A and ride toward B1-B2. Accelerate and shift into second. Begin to slow down and shift

back to first gear as you go through markers B1-B2. Once through the markers, turn the handlebars to the left so that you make a gradual turn and come to a smooth, non-skidding stop with your front tires next to marker C. Practice this to the right with your front tires stopping next to marker D. As in Drill 1, practice a few times in second gear; then practice in higher gears until you can stop smoothly and consistently at markers C and D.

### **Tips**

- Keep your feet on the footrests at all times.
- Keep your head and eyes up.
- Look straight ahead when stopping in a straight line. Look around the turn as you slow down in the curve.
- Shift to a lower gear as you decelerate.

### **Watch For**

- Overshooting the final marker.
- ATV turning to one side during braking in a straight line.
- Rear end sliding or skidding.
- ATV turning too wide in the curve.
- Rough or inconsistent shifting.

### **Suggestions**

- Begin to slow down earlier.
- Keep the handlebars straight and look ahead.
- Begin to slow down earlier. Apply brake pressure more gradually.
- Steer with the handlebars. Move forward and lean in slightly. Begin to slow down earlier.
- Move foot clear of the shift pedal after each shift. Release the throttle before each shift.

## Exercise 3 - Turning



**Objective:** To demonstrate basic turning skills by shifting your weight properly to maintain balance and avoid the possibility of losing control of your ATV.

**Skills:** Throttle control, shifting weight, turning, braking.

### **Directions**

#### **Drill 1: Turning - Large oval**

Place markers A and B 60 feet apart as indicated in the diagram. Ride around the outside of the markers so that you have made a large oval. Ride to the left a few times and then ride around

to the right. Do not shift gears during the exercise.

#### **Drill 2: Turning - Small circles**

Now use those same markers as the center of two large circles. Ride around marker A to the left. Continue riding around to the left and decrease the radius of the circle so that you are making tighter turns, then ride around marker B to the right and practice decreasing your turning radius.

### **Drill 3: Turning – Figure 8**

Combine the circles around marker A and marker B so that you are doing a large figure 8. As your skills increase, move the marker closer together (25 feet apart) so that the figure 8 becomes smaller.

#### ***Tips***

- Keep your feet on the footrests at all times.
- Look ahead, concentrating on your intended path of travel.
- Slow down before the turn and gently increase the throttle as you exit the turn.
- Use body positioning (leaning in) to help maintain balance during turns.

- Move your body weight forward and to the inside of the turn.
- Turn the handlebars while looking in the direction of the turn.

#### ***Watch For***

- ATV tipping.
- ATV turning wide.

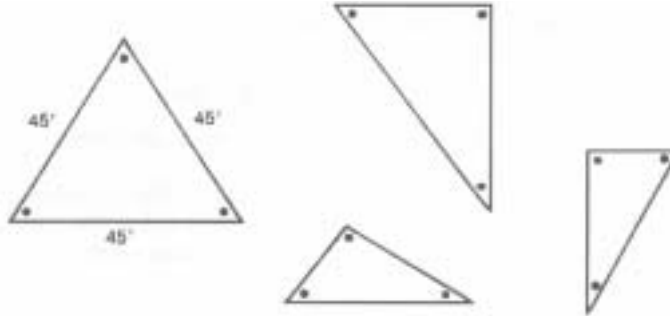
#### ***Suggestions***

- Lean your body farther into the turn.
- Slow down. Put more weight up front, use more effort to turn the handlebars, and look in the direction of the turn.

NOTE: If the terrain you are using has ruts or other obstacles, include Exercise 9 after Exercise 3.



## Exercise 4 - Sharp Turns



**Objective:** To make sharp turns without tipping the ATV by coordinating braking, weight shifting, and throttle control to maneuver the ATV in tighter turns.

**Skills:** Shifting weight, turning, throttle control, braking.

### ***Directions***

**Drill:** Place three markers down to create a triangle with sides of equal length. The sides should be at least 45 feet long. Ride around the outside of the triangle going to the left. Stay within three feet of the triangular path. After this is mastered, ride the triangle to the

right. Then change the sides and angles of the triangle and practice with each new triangle.

### ***Tips***

- Keep your feet on the footrests at all times.
- Slow down before the turn.
- Look through the turn at your intended path of travel.
- Gently increase the throttle as you exit the turn.
- Lean in and turn the handlebars in the direction of the turn.

### ***Watch For***

- ATV turning wide.

### ***Suggestions***

- Slow down more prior to the turn.
- Lean into the turn more.
- Apply throttle gradually to avoid unweighting the front end.
- Bend your elbows and lean forward a bit to maintain weight on the front wheels.

## Exercise 5 - Quicker Turns



**Objective:** To make quicker turns to avoid an obstacle by coordinating speed, body position, and weight shift to help you make quick directional changes.

**Skills:** Shifting weight, steering with the throttle, changing direction.

### **Directions**

**Drill:** Put five markers down at 35-foot intervals. Travel to the left of the first marker and then to the right of the second and continue until you reach the last marker. At first, practice at slow speeds, then gradually increase your speed. Do not exceed second gear. After you have mastered this, move the markers closer together. Do not move them closer than 18 feet apart.

**Tips**

- Keep your feet on the footrests at all times.
- Shift your weight quickly to initiate the turn. To shift your weight effectively, rise up slightly standing on the footrests, quickly move your hips, lean your body to the inside of each turn.
- To go left, apply a slight left turn to the front wheels, quickly lean left, and apply a short burst of throttle. To go right, do the opposite.
- Do not look at the next marker you are approaching. Look ahead; do not fixate on a marker.

**Watch For**

- Running over markers as you try to go around.

**Suggestions**

- Swing wider as you go around the marker, and shift your weight more.
- Use a quicker burst of throttle but not enough to un-weight the front end.

## Exercise 6 – Quick Stops



**Objective:** To make a smooth, safe stop in the shortest possible distance. Practicing these drills will help enable you to stop quickly should an obstacle suddenly appear in your path.

**Skills:** Shifting gears, stopping, braking while turning.

### Directions

#### Drill 1: Quick Stops – Straight path

Place markers A, B1, and B2 as indicated in the diagram. Start at marker A and ride toward B1-B2 in



second gear. Be sure to maintain your speed until you pass B1-B2. When the ATV PASSES markers B1-B2, stop as quickly and as safely as you can. Notice where you stop. Put some sort of marker down there (a small rock perhaps). Do it again and stop smoothly and quickly, but in a shorter distance. Make your first two attempts in second gear. Remember to begin braking and to shift back to first gear only AFTER you have passed markers B1-B2. Shift to higher gears when you have mastered the exercise in second gear.

**Drill 2: Quick Stops – In a turn**

Place markers C and D as indicated in the diagram. Start at marker A and ride toward B1-B2. When you reach B1-B2, veer left and ride in second gear toward C. When you PASS marker C, stop as quickly and safely as you can. Note where you stop. Put some sort of marker down. Do it repeatedly and stop smoothly and quickly, but in a shorter distance. Make your first two attempts in second gear. Remember to begin braking and to shift back to first gear only AFTER you have passed marker C. Shift to third gear when you have mastered the exercise in second gear. Practice this to the right and stop quickly after you have PASSED marker D.

**NOTE:** It is best to avoid excessive braking in a turn, but certain conditions may require you to brake while in a turn.

**Tips**

- Keep your feet on the footrests at all times.
- Keep your head and eyes up.
- If you accidentally lock the wheels, release the brakes momentarily and reapply the brakes more gradually.

**Watch For**

- ATV swerving to one side.
- Rear end sliding or skidding.
- Front end sliding or skidding.

**Suggestions**

- Center your body on the ATV. Look where you want to go.
- Apply less rear brake pressure. Shift to a lower gear more smoothly.
- Apply less front brake pressure.

## Exercise 7 - Hills



**Objective:** To ride up, turn around, and ride down a hill by using the proper techniques for safely making a U-turn.

**Skills:** Maintaining balance, shifting weight, application of brakes, throttle control.

### **Directions**

Make sure your parking brake is in working order before doing this exercise.

### **Drill 1: Climbing, turning, and descending**

For this exercise, select an easy hill, free of obstructions (easy to climb on foot). Start your approach to the hill by accelerating before the base of the hill. Shift into a lower gear at the base of the hill, if necessary, to maintain momentum while climbing the hill. Turn the ATV to the left, in an arc, before you reach the top. Keep turning, using your remaining momentum until you are facing downhill. Descend the hill in a lower gear and as you descend, slow down by applying the brakes. Then practice to the right.

If you are riding uphill and lose all forward momentum:

- Keep your weight uphill, and apply the brakes to come to a stop. Never allow the ATV to roll backward.
- Apply the parking brake while keeping your weight uphill.
- Dismount on the uphill side or to a side if pointed straight uphill, and follow the procedures described in your owner's manual.

Do not attempt to ride backward down a hill. Should you begin rolling backward, do not apply the rear brake abruptly. Using the rear brake only or abruptly could cause the ATV to roll over backward.

If you begin rolling backward follow these steps:

- Keep your weight uphill, and apply the front brake. If your ATV has linked brakes or if you are in 4WD, follow the procedures described in your owner's manual.
- When you have come to a complete stop, apply the rear brake. Then apply the parking brake and dismount on the uphill side. If pointed straight uphill, dismount to either side and follow the procedures described in your owner's manual.
- If the ATV continues to roll backward, dismount to the uphill side immediately.





### **Drill 2: Stopping while descending**

As you descend the hill, slow down by gradually applying the brake(s) and then stop.

### ***Tips: Climbing***

- Some hills are too steep for your abilities. Do not exceed your capabilities.
- Some hills are too steep for your ATV regardless of your abilities.
- Keep both feet firmly on the footrests.
- Shift your body weight forward on the seat as you go up the hill. For steeper hills, lean forward more, move up on the seat, or stand and position your torso over the front wheels.

- As you near the top and turn, shift your body weight to the uphill side for balance by leaning into the hill.

### ***Tips: Descending***

- To go downhill, shift your weight back. On steeper downward slopes, straighten but do not lock your knees and elbows. Then bend forward sharply at the waist so that your posterior is over the back of the seat.
- Use the brake(s) to slow you down as you descend the hill and always descend in a low gear.
- The key to successfully performing this exercise is to shift your weight smoothly from forward (as you climb) to the uphill side (as you turn) and to the rear

(as you descend). For smooth weight shifts, rise up slightly off the seat.

### ***Watch For***

- ATV losing all momentum going up the hill.
- ATV descending too quickly.
- Wheels locking, creating a slide.
- ATV rolling backward while you are on it.

### ***Suggestions***

- Approach at a higher speed. Do not attempt to turn your ATV if you do not have the momentum to make the 180-degree turn. Apply the brake(s) before you lose speed. Do not let the ATV roll backward.

- Maintain smooth braking. Use a lower gear. Do not apply the throttle.
- Release brakes and then immediately reapply brakes gradually.
- **DO NOT LET THE ATV ROLL BACKWARD ON A HILL.** If your ATV has an independent front brake, you can try to stop the ATV by using only the front brake. Move your body weight forward and use the front brake to slow the ATV to a stop. If the front brake does not slow the ATV, dismount to the side immediately. Do not attempt to ride backward down a hill. Using the rear brake only or abruptly could cause you to roll over backward.

## Exercise 8 - Traversing Hills



**Objective:** To use the correct technique to ride across a hill so that you will not lose your balance or directional control.

**Skills:** Shifting weight, maintaining balance, throttle control.

### **Directions**

**Drill:** For this exercise, select an easy hill free of obstructions. Start your approach and accelerate before the base of the hill. Shift into a lower gear at the base if necessary to maintain momentum while climbing the hill. Turn the ATV to the left, ride across the slope, and

then ride down the hill. Repeat the exercise to the right.

**Reminder:** Traversing hills is tricky, so practice this carefully. Remember, **DO NOT LET THE ATV ROLL BACKWARD.**

### **Tips**

- Keep both feet on the footrests.
- Apply the same principles for climbing and descending as you did in the previous exercise.
- Exaggerate your weight shifts.
- If the ATV starts to turn downhill as

you traverse the slope, turn the front wheels slightly uphill to keep the ATV going straight across the hill.

- If the ATV begins to tip, turn the front wheels downhill if the terrain allows you to do so. If the terrain prohibits your turning downhill, and shifting weight into the hill does not help, then dismount on the uphill side immediately.

### **Watch For**

- ATV losing momentum going uphill.
- Front wheels lifting as you climb the hill.
- ATV tipping as you traverse the hill or turn.
- Rear end sliding downhill while traversing.
- Excessive jarring as front wheels encounter bumps on descent.

### **Suggestions**

- Approach at a slightly higher speed.
- Lean forward more; move way up on the seat or stand and position your torso over the front wheels. Do not accelerate as quickly up the slope.
- Lean into the hill more. Move off the seat toward the uphill side. Weight the uphill footrest.
- Avoid abrupt changes in throttle position that could cause the rear wheels to lose traction.
- Shift more weight to the rear. Descend more slowly.

## Exercise 9 - Riding Over Obstacles



**Objective:** To use the proper technique to safely ride over obstacles which you cannot avoid.

**Skills:** Surmounting obstacles, shifting weight.

### **Directions**

**Drill:** Choose small obstacles for your initial practice. A small rut, mound, or small log will work fine. Approach the obstacle at walking speed and as close

to a 90-degree angle as possible. Rise up slightly on the footrests and apply a small amount of throttle as the front wheels reach the obstacle. Lean forward and release the throttle after the front wheels clear the obstacle. Return to your normal riding position after the rear wheels clear the obstacle.

**NOTE:** If the terrain you are using has ruts or other obstacles, include Exercise 9 after Exercise 3.

### ***Tips***

- Be sure to stand on the footrests when performing the exercise.
- Be sure to bend your elbows and knees so that you can use them as shock absorbers.
- Mounds and ruts are considered obstacles.
- If only one front or rear wheel goes over the obstacle, be prepared to shift your weight and maintain balance as the ATV leans to one side.

### ***Watch For***

- Excessive jarring from impact.
- ATV failing to continue straight over the obstacle: i.e., as front wheels clear, the ATV turns to one side.
- Front wheels pushing the obstacle rather than crossing over it.

- Rear wheels hitting the obstacle with excessive impact.

### ***Suggestions***

- Bend knees and arms more.
- Keep a firm grip on the handlebars (even though your arms are bent) to keep the ATV pointed straight ahead.
- Apply a small amount of throttle as the front wheels meet the obstacle. Release the throttle as soon as the front wheels have gone over the obstacle.
- Lean forward slightly once the front wheels have gone over the obstacle in order to un-weight the rear wheels. The throttle must be released before the rear wheels hit.

## **From the ATV Safety Institute**

### **Videos, Publications and More**

#### ***Parents, Youngsters and All-Terrain Vehicles***

Especially developed for parents who are teaching their youngsters, this booklet provides important safety information and tips on learning to ride an ATV. *Parents, Youngsters and All-Terrain Vehicles* is designed to help parents determine whether their youngsters are ready to ride an ATV. It contains easy-to-use readiness guidelines and checklists for parents to review with their youngsters. It also covers pre-operating and operating procedures, protective gear, riding techniques, and many other safety points.

#### ***“ATV Rally” Interactive Riding Game***

Now you can boot up your computer to try your skills in this CD-ROM-based ride that features six different trails in woods, sand, and mountains with surprises and obstacles to test your awareness and reaction time. See what it takes to ride safe from the comfort of your computer station.

## **Videos, Publications and More**

### ***“Ride Safe, Ride Smart” Video***

This nine-minute tape is a rider-friendly look at how to get a proper start in ATV riding. It profiles two families: one who rides for recreation only, the other who uses their ATVs first for working the farm, then as camping and trail riding machines.

Both sets of parents lead by example, emphasizing riding an ATV that is right for your age, wearing proper protective gear and respecting the environment.

They also recommend taking an ATV *RiderCourse*<sup>SM</sup> to get the most from your ATV, enjoy the opportunity to meet other

enthusiasts, and find out about the best places to ride. Single copies of *Parents, Youngsters and All-Terrain Vehicles* and “Ride Safe, Ride Smart” are available free by contacting:

### **ATV Safety Institute**

2 Jenner Street, Suite 150  
Irvine, CA 92618-3806  
(949) 727-3727

To purchase large quantities of the publication, contact ASI for prices.  
To order the CD-ROM, call (877) 806-7813.

**ENROLL IN AN ATV RIDERCOURSE**

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For more information contact:



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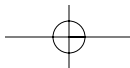
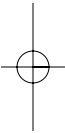
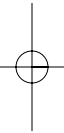
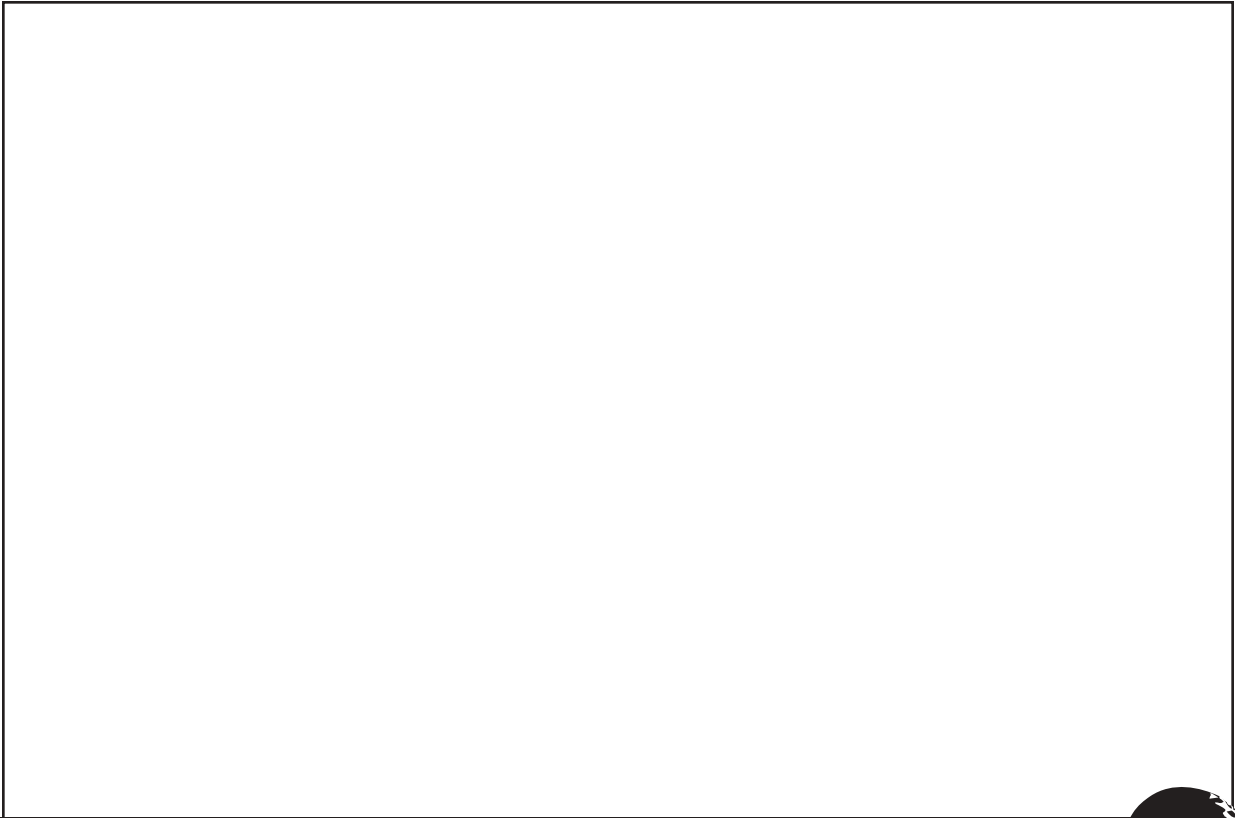
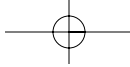
[www.atvsafety.org](http://www.atvsafety.org)

For the rider training location  
nearest you call: (800) 887-2887

U.S. Version

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**64 From The ATV Safety Institute**



**ATTACHMENT G DAILY SAFETY MEETING RECORD FORM**



**ecology and environment, inc.**  
**DAILY SAFETY MEETING RECORD**

**General Information**

Project: Red Devil Mine RI/FS

Project No: 001096.OX70

Project Location: Red Devil Mine, Alaska

Date:

Time:

Weather:

Specific Location:

Planned Activities:

**Safety Topics Presented**

Chemical Hazards Update:

Physical Hazards Update:

Radiation Hazards Update:

Review of Previous Monitoring Results:

Protective Clothing/Equipment Modifications:

Special Equipment/Procedures:

Drilling Safety Issues (including testing the operation of drill rig emergency stop switches):

Emergency Procedures:

Additional Topics/Observations:

Team Members' Comments/Suggestions:



**ecology and environment, inc.  
DAILY SAFETY MEETING RECORD**

**Initial Project Safety Checklist**

1. Emergency information reviewed? \_\_\_ and made familiar to all team members?
2. Route to nearest hospital driven? \_\_\_ and its location known to all team members?
3. Health and safety plan readily available and its location known to all team members?
4. E & E drilling SOP on site? \_\_\_ and available for team member review?

**ATTENDEES**

**Meeting shall be attended by all personnel who will be working within the exclusion area. Daily informal update meetings will be held prior to work and when site tasks and/or conditions change.**

Name (Printed)	Name (Signature)	Date	Representing (Company/Agency)
Meeting Conducted By:			





**ATTACHMENT H HAZARD EVALUATION SHEETS FOR MAJOR KNOWN CONTAMINANTS**





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NIOSH Publication 2005-149

September  
2005

# NIOSH Pocket Guide to Chemical Hazards

[NPG Home](#) | [Introduction](#) | [Synonyms & Trade Names](#) | [Chemical Names](#) | [CAS Numbers](#) | [RTECS Numbers](#) | [Appendices](#) | [Search](#)

<b>Antimony</b>	<b>CAS</b>		
	7440-36-0		
<b>Sb</b>	<b>RTECS</b>		
	<a href="#">CC4025000</a>		
	<b>DOT ID &amp; Guide</b>		
<b>Synonyms &amp; Trade Names</b>	1549 <a href="#">157</a> (inorganic compounds, n.o.s.) 2871 <a href="#">170</a> (powder) 3141 <a href="#">157</a> (inorganic liquid compounds, n.o.s.)		
Antimony metal, Antimony powder, Stibium			
<b>Exposure Limits</b>	NIOSH REL*: TWA 0.5 mg/m <sup>3</sup> [*Note: The REL also applies to other antimony compounds (as Sb).] OSHA PEL*: TWA 0.5 mg/m <sup>3</sup> [*Note: The PEL also applies to other antimony compounds (as Sb).]		
<b>IDLH</b>			
	<b>Conversion</b>		
50 mg/m <sup>3</sup> (as Sb) See: <a href="#">7440360</a>			
<b>Physical Description</b>			
Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder.			
MW: 121.8	BP: 2975°F	MLT: 1166°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 6.69
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid in bulk form, but a moderate explosion hazard in the form of dust when exposed to flame.			
<b>Incompatibilities &amp; Reactivities</b>			

Strong oxidizers, acids, halogenated acids [Note: Stibine is formed when antimony is exposed to nascent (freshly formed) hydrogen.]

#### Measurement Methods

NIOSH [7301](#), [7303](#), [P&CAM261 \(II-4\)](#); OSHA [ID121](#), [ID125G](#), [ID206](#)

See: [NMAM](#) or [OSHA Methods](#)

#### Personal Protection & Sanitation

([See protection codes](#))

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

#### First Aid

([See procedures](#))

Eye: Irrigate immediately

Skin: Soap wash immediately

Breathing: Respiratory support

Swallow: Medical attention immediately

#### Respirator Recommendations

NIOSH/OSHA

##### Up to 5 mg/m<sup>3</sup>:

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. [Click here](#) for information on selection of N, R, or P filters.

(APF = 10) Any supplied-air respirator

##### Up to 12.5 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

##### Up to 25 mg/m<sup>3</sup>:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters.

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

##### Up to 50 mg/m<sup>3</sup>:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

##### Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

##### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly

**Target Organs**

Eyes, skin, respiratory system, cardiovascular system

See also: [INTRODUCTION](#) See ICSC CARD: [0775](#) See MEDICAL TESTS: [0016](#)



<b>Arsenic (inorganic compounds, as As)</b>		<b>CAS</b>	
		7440-38-2 (metal)	
<b>As (metal)</b>		<b>RTECS</b>	
		<a href="#">CG0525000</a> (metal)	
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>	
<p>Arsenic metal: Arsenia</p> <p>Other synonyms vary depending upon the specific As compound. [Note: OSHA considers "Inorganic Arsenic" to mean copper acetoarsenite &amp; all inorganic compounds containing arsenic except ARSINE.]</p>		<p>1558 <a href="#">152</a> (metal)</p> <p>1562 <a href="#">152</a> (dust)</p>	
<b>Exposure Limits</b>	<p><b>NIOSH REL:</b> Ca C 0.002 mg/m<sup>3</sup> [15-minute] <a href="#">See Appendix A</a></p> <p><b>OSHA PEL:</b> [1910.1018] TWA 0.010 mg/m<sup>3</sup></p>		
<b>IDLH</b>	<b>Conversion</b>		
Ca [5 mg/m <sup>3</sup> (as As)] See: <a href="#">7440382</a>			
<b>Physical Description</b>			
Metal: Silver-gray or tin-white, brittle, odorless solid.			
MW: 74.9	BP: Sublimes	MLT: 1135°F (Sublimes)	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.73 (metal)
F.I.P: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame.			
<b>Incompatibilities &amp; Reactivities</b>			
Strong oxidizers, bromine azide [Note: Hydrogen gas can react with inorganic arsenic to form the highly toxic gas arsine.]			
<b>Measurement Methods</b>			
<p>NIOSH <a href="#">7300</a>, <a href="#">7301</a>, <a href="#">7303</a>, <a href="#">7900</a>, <a href="#">9102</a>; OSHA <a href="#">ID105</a></p> <p>See: <a href="#">NMAM</a> or <a href="#">OSHA Methods</a></p>			
<b>Personal Protection &amp; Sanitation</b>		<b>First Aid</b>	
<p><a href="#">(See protection)</a></p> <p>Skin: Prevent skin contact</p> <p>Eyes: Prevent eye contact</p> <p>Wash skin: When contaminated/Daily</p> <p>Remove: When wet or contaminated</p> <p>Change: Daily</p> <p>Provide: Eyewash, Quick drench</p>		<p><a href="#">(See procedures)</a></p> <p>Eye: Irrigate immediately</p> <p>Skin: Soap wash immediately</p> <p>Breathing: Respiratory support</p> <p>Swallow: Medical attention immediately</p>	

## Respirator Recommendations

(See Appendix E) NIOSH

**At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

## Exposure Routes

inhalation, skin absorption, skin and/or eye contact ingestion

## Symptoms

Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [potential occupational carcinogen]

## Target Organs

Liver, kidneys, skin, lungs, lymphatic system

## Cancer Site

[lung & lymphatic cancer]



<b>Chromium metal</b>		<b>CAS</b>	
		7440-47-3	
<b>Cr</b>		<b>RTECS</b>	
		<a href="#">GB4200000</a>	
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>	
Chrome, Chromium			
<b>Exposure Limits</b>	<b>NIOSH REL:</b> TWA 0.5 mg/m <sup>3</sup> <a href="#">See Appendix C</a> <b>OSHA PEL*:</b> TWA 1 mg/m <sup>3</sup> <a href="#">See Appendix C</a> [*Note: The PEL also applies to insoluble chromium salts.]		
<b>IDLH</b>	<b>Conversion</b>		
250 mg/m <sup>3</sup> (as Cr) See: <a href="#">7440473</a>			
<b>Physical Description</b>			
Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.			
MW: 52.0	BP: 4788°F	MLT: 3452°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.14
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame.			
<b>Incompatibilities &amp; Reactivities</b>			
Strong oxidizers (such as hydrogen peroxide), alkalis			
<b>Measurement Methods</b>			
NIOSH <a href="#">7024</a> , <a href="#">7300</a> , <a href="#">7301</a> , <a href="#">7303</a> , <a href="#">9102</a> ; OSHA <a href="#">ID121</a> , <a href="#">ID125G</a> See: <a href="#">NMAM</a> or <a href="#">OSHA Methods</a>			
<b>Personal Protection &amp; Sanitation</b>		<b>First Aid</b>	
<a href="#">(See protection)</a> Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation		<a href="#">(See procedures)</a> Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately	

## Respirator Recommendations

NIOSH

**Up to 2.5 mg/m<sup>3</sup>:**

(APF = 5) Any quarter-mask respirator. [Click here](#) for information on selection of N, R, or P filters.\*

**Up to 5 mg/m<sup>3</sup>:**

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. [Click here](#) for information on selection of N, R, or P filters.\*

(APF = 10) Any supplied-air respirator\*

**Up to 12.5 mg/m<sup>3</sup>:**

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.\*

**Up to 25 mg/m<sup>3</sup>:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters.

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter\*

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

**Up to 250 mg/m<sup>3</sup>:**

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

## Exposure Routes

inhalation, ingestion, skin and/or eye contact

## Symptoms

Irritation eyes, skin; lung fibrosis (histologic)

## Target Organs

Eyes, skin, respiratory system

See also: [INTRODUCTION](#) See ICSC CARD: [0029](#) See MEDICAL TESTS: [0052](#)



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# NIOSH Pocket Guide to Chemical Hazards

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## Cobalt metal dust and fume (as Co)

CAS

7440-48-4

RTECS

[GF8750000](#)

Co

Synonyms & Trade Names

DOT ID & Guide

Cobalt metal dust, Cobalt metal fume

**Exposure** NIOSH REL: TWA 0.05 mg/m<sup>3</sup>

**Limits** OSHA PEL†: TWA 0.1 mg/m<sup>3</sup>

**IDLH**

### Conversion

20 mg/m<sup>3</sup> (as Co) See: [7440484](#)

### Physical Description

Odorless, silver-gray to black solid.

MW: 58.9

BP: 5612°F

MLT: 2719°F

Sol: Insoluble

VP: 0 mmHg (approx) IP: NA

Sp.Gr: 8.92

Fl.P: NA

UEL: NA

LEL: NA

Noncombustible Solid in bulk form, but finely divided dust will burn at high temperatures.

### Incompatibilities & Reactivities

Strong oxidizers, ammonium nitrate

### Measurement Methods

NIOSH [7027](#), [7300](#), [7301](#), [7303](#), [9102](#); OSHA [ID121](#), [ID125G](#), [ID213](#)

See: [NMAM](#) or [OSHA Methods](#)

Personal Protection & Sanitation

First Aid

([See protection codes](#))

Skin: Prevent skin contact

Eyes: No recommendation

Wash skin: When contaminated

Remove: When wet or contaminated

Change: Daily

([See procedures](#))

Eye: Irrigate immediately

Skin: Soap wash

Breathing: Respiratory support

Swallow: Medical attention immediately

### **Respirator Recommendations**

NIOSH

**Up to 0.25 mg/m<sup>3</sup>:**

(APF = 5) Any quarter-mask respirator. [Click here](#) for information on selection of N, R, or P filters.

**Up to 0.5 mg/m<sup>3</sup>:**

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. [Click here](#) for information on selection of N, R, or P filters.\*

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. [Click here](#) for information on selection of N, R, or P filters.\*

(APF = 10) Any supplied-air respirator\*

**Up to 1.25 mg/m<sup>3</sup>:**

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode\*

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.\*

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.\*

**Up to 2.5 mg/m<sup>3</sup>:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters.

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

**Up to 20 mg/m<sup>3</sup>:**

(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

**Emergency or planned entry into unknown concentrations or IDLH conditions:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

**Exposure Routes**

inhalation, ingestion, skin and/or eye contact

**Symptoms**

Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; respiratory hypersensitivity, asthma

**Target Organs**

Skin, respiratory system

See also: [INTRODUCTION](#) See ICSC CARD: [0782](#) See MEDICAL TESTS: [0055](#)



<b>Mercury compounds [except (organo) alkyls] (as Hg)</b>		<b>CAS</b>	
		7439-97-6 (metal)	
<b>Hg (metal)</b>		<b>RTECS</b>	
		<a href="#">OV4550000</a> (metal)	
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>	
Mercury metal: Colloidal mercury, Metallic mercury, Quicksilver Synonyms of "other" Hg compounds vary depending upon the specific compound.		2809 <a href="#">172</a> (metal)	
<b>Exposure Limits</b>	<b>NIOSH REL:</b> Hg Vapor: TWA 0.05 mg/m <sup>3</sup> [skin] Other: C 0.1 mg/m <sup>3</sup> [skin]		
	<b>OSHA PEL†:</b> C 0.1 mg/m <sup>3</sup>		
<b>IDLH</b>		<b>Conversion</b>	
10 mg/m <sup>3</sup> (as Hg) See: <a href="#">7439976</a>			
<b>Physical Description</b>			
Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.]			
MW: 200.6	BP: 674°F	FRZ: -38°F	Sol: Insoluble
VP: 0.0012 mmHg	IP: ?		Sp.Gr: 13.6 (metal)
F.I.P: NA	UEL: NA	LEL: NA	
Metal: Noncombustible Liquid			
<b>Incompatibilities &amp; Reactivities</b>			
Acetylene, ammonia, chlorine dioxide, azides, calcium (amalgam formation), sodium carbide, lithium, rubidium, copper			
<b>Measurement Methods</b>			
NIOSH <a href="#">6009</a> ; OSHA <a href="#">ID140</a> See: <a href="#">NMAM</a> or <a href="#">OSHA Methods</a>			
<b>Personal Protection &amp; Sanitation</b>		<b>First Aid</b>	
<a href="#">(See protection)</a> Skin: Prevent skin contact Eyes: No recommendation Wash skin: When contaminated Remove: When wet or contaminated Change: Daily		<a href="#">(See procedures)</a> Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately	

## Respirator Recommendations

### Mercury vapor: NIOSH

#### Up to 0.5 mg/m<sup>3</sup>:

(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†

(APF = 10) Any supplied-air respirator

#### Up to 1.25 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)

#### Up to 2.5 mg/m<sup>3</sup>:

(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

#### Up to 10 mg/m<sup>3</sup>:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

#### Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

#### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

### Other mercury compounds: NIOSH/OSHA

#### Up to 1 mg/m<sup>3</sup>:

(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern†

(APF = 10) Any supplied-air respirator

#### Up to 2.5 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern†(canister)

#### Up to 5 mg/m<sup>3</sup>:

(APF = 50) Any chemical cartridge respirator with a full facepiece and cartridge(s) providing protection against the compound of concern†

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern†

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/PAPRTS(canister)

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

#### Up to 10 mg/m<sup>3</sup>:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

#### Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

#### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)



## Exposure Routes

inhalation, skin absorption, ingestion, skin and/or eye contact

## Symptoms

Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria

## Target Organs

Eyes, skin, respiratory system, central nervous system, kidneys

See also: [INTRODUCTION](#) See ICSC CARD: [0056](#) See MEDICAL TESTS: [0136](#)





# NIOSH Pocket Guide to Chemical Hazards

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<b>Nickel metal and other compounds (as Ni)</b>		<b>CAS</b>	
		7440-02-0 (Metal)	
<b>Ni (Metal)</b>		<b>RTECS</b>	
		<a href="#">QR5950000</a> (Metal)	
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>	
Nickel metal: Elemental nickel, Nickel catalyst Synonyms of other nickel compounds vary depending upon the specific compound.			
<b>Exposure Limits</b>	NIOSH REL*: Ca TWA 0.015 mg/m <sup>3</sup> <a href="#">See Appendix A</a> [*Note: The REL does not apply to Nickel carbonyl.]		
	OSHA PEL*†: TWA 1 mg/m <sup>3</sup> [*Note: The PEL does not apply to Nickel carbonyl.]		
<b>IDLH</b>	<b>Conversion</b>		
Ca [10 mg/m <sup>3</sup> (as Ni)] See: <a href="#">7440020</a>			
<b>Physical Description</b>			
Metal: Lustrous, silvery, odorless solid.			
MW: 58.7	BP: 5139°F	MLT: 2831°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.90 (Metal)
Fl.P: NA	UEL: NA	LEL: NA	
Metal: Combustible Solid; nickel sponge catalyst may ignite SPONTANEOUSLY in air.			
<b>Incompatibilities &amp; Reactivities</b>			
Strong acids, sulfur, selenium, wood & other combustibles, nickel nitrate			

## Measurement Methods

NIOSH [7300](#), [7301](#), [7303](#), [9102](#); OSHA [ID121](#), [ID125G](#)  
See: [NMAM](#) or [OSHA Methods](#)

## Personal Protection & Sanitation

([See protection codes](#))

Skin: Prevent skin contact  
Eyes: No recommendation  
Wash skin: When contaminated/Daily  
Remove: When wet or contaminated  
Change: Daily

## First Aid

([See procedures](#))

Skin: Water flush immediately  
Breathing: Respiratory support  
Swallow: Medical attention immediately

## Respirator Recommendations

NIOSH

**At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

## Exposure Routes

inhalation, ingestion, skin and/or eye contact

## Symptoms

Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]

## Target Organs

Nasal cavities, lungs, skin

## Cancer Site

[lung and nasal cancer]

See also: [INTRODUCTION](#) See ICSC CARD: [0062](#) See MEDICAL TESTS: [0156](#)

<b>Coal tar pitch volatiles</b>		<b>CAS</b>
		65996-93-2
		<b>RTECS</b>
		<a href="#">GF8655000</a>
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>
<p>Synonyms vary depending upon the specific compound (e.g., pyrene, phenanthrene, acridine, chrysene, anthracene &amp; benzo(a)pyrene). [Note: NIOSH considers coal tar, coal tar pitch, and creosote to be coal tar products.]</p>		2713 <a href="#">153</a> (acridine)
<b>Exposure Limits</b>	<b>NIOSH REL:</b> Ca TWA 0.1 mg/m <sup>3</sup> (cyclohexane-extractable fraction) <a href="#">See Appendix A</a> <a href="#">See Appendix C</a>	
	<b>OSHA PEL:</b> TWA 0.2 mg/m <sup>3</sup> (benzene-soluble fraction) [1910.1002] <a href="#">See Appendix C</a>	
<b>IDLH</b>	<b>Conversion</b>	
Ca [80 mg/m <sup>3</sup> ] See: <a href="#">65996932</a>		
<b>Physical Description</b>		
Black or dark-brown amorphous residue.		
Properties vary depending upon the specific compound.		
Combustible Solids		
<b>Incompatibilities &amp; Reactivities</b>		
Strong oxidizers		
<b>Measurement Methods</b>		
OSHA <a href="#">58</a> See: <a href="#">NMAM</a> or <a href="#">OSHA Methods</a>		
<b>Personal Protection &amp; Sanitation</b>	<b>First Aid</b>	
<a href="#">(See protection)</a> Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: No recommendation Change: Daily	<a href="#">(See procedures)</a> Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately	

## Respirator Recommendations

NIOSH

**At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:**

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**

(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

## Exposure Routes

inhalation, skin and/or eye contact

## Symptoms

Dermatitis, bronchitis, [potential occupational carcinogen]

## Target Organs

respiratory system, skin, bladder, kidneys

## Cancer Site

[lung, kidney & skin cancer]

See also: [INTRODUCTION](#) See ICSC CARD: [1415](#) See MEDICAL TESTS: [0054](#)



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# NIOSH Pocket Guide to Chemical Hazards

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<b>Thallium (soluble compounds, as TI)</b>		<b>CAS</b>	
		<b>RTECS</b>	
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>	
Synonyms vary depending upon the specific soluble thallium compound.		1707 <a href="#">151</a> (compounds, n.o.s.)	
<b>Exposure Limits</b>	<b>NIOSH REL:</b> TWA 0.1 mg/m <sup>3</sup> [skin] <b>OSHA PEL:</b> TWA 0.1 mg/m <sup>3</sup> [skin]		
<b>IDLH</b>	<b>Conversion</b>		
15 mg/m <sup>3</sup> (as TI) See: <a href="#">thallium</a>			
<b>Physical Description</b>			
Appearance and odor vary depending upon the specific soluble thallium compound.			
Properties vary depending upon the specific soluble thallium compound.			
<b>Incompatibilities &amp; Reactivities</b>			
Varies			
<b>Measurement Methods</b>			
NIOSH <a href="#">7300</a> , <a href="#">7301</a> , <a href="#">7303</a> , <a href="#">9102</a> ; OSHA <a href="#">ID121</a> See: <a href="#">NMAM</a> or <a href="#">OSHA Methods</a>			
<b>Personal Protection &amp; Sanitation</b>		<b>First Aid</b>	
(See <a href="#">protection codes</a> ) Skin: Prevent skin contact		(See <a href="#">procedures</a> ) Eye: Irrigate immediately	

Eyes: Prevent eye contact  
Wash skin: When contaminated  
Remove: When wet or contaminated  
Change: Daily

Skin: Water flush promptly  
Breathing: Respiratory support  
Swallow: Medical attention immediately

### Respirator Recommendations

NIOSH/OSHA

**Up to 0.5 mg/m<sup>3</sup>:**

(APF = 5) Any quarter-mask respirator. [Click here](#) for information on selection of N, R, or P filters.

**Up to 1 mg/m<sup>3</sup>:**

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (inclu



<b>Zinc oxide</b>		<b>CAS</b>	
		1314-13-2	
<b>ZnO</b>		<b>RTECS</b>	
		<a href="#">ZH4810000</a>	
<b>Synonyms &amp; Trade Names</b>		<b>DOT ID &amp; Guide</b>	
Zinc peroxide		1516 <a href="#">143</a>	
<b>Exposure Limits</b>	<b>NIOSH REL:</b> Dust: TWA 5 mg/m <sup>3</sup> C 15 mg/m <sup>3</sup> Fume: TWA 5 mg/m <sup>3</sup> ST 10 mg/m <sup>3</sup>		
	<b>OSHA PEL†:</b> TWA 5 mg/m <sup>3</sup> (fume) TWA 15 mg/m <sup>3</sup> (total dust) TWA 5 mg/m <sup>3</sup> (resp dust)		
<b>IDLH</b>	<b>Conversion</b>		
500 mg/m <sup>3</sup> See: <a href="#">1314132</a>			
<b>Physical Description</b>			
White, odorless solid.			
MW: 81.4	BP: ?	MLT: 3587°F	Sol(64°F): 0.0004%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 5.61
Fl.P: NA	UEL: NA	LEL: NA	
Noncombustible Solid			
<b>Incompatibilities &amp; Reactivities</b>			
Chlorinated rubber (at 419°F), water [Note: Slowly decomposed by water.]			
<b>Measurement Methods</b>			
NIOSH <a href="#">7303</a> , <a href="#">7502</a> ; OSHA <a href="#">ID121</a> , <a href="#">ID143</a> See: <a href="#">NMAM</a> or <a href="#">OSHA Methods</a>			
<b>Personal Protection &amp; Sanitation</b>		<b>First Aid</b>	
( <a href="#">See protection</a> ) Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation		( <a href="#">See procedures</a> )  Breathing: Respiratory support	

## Respirator Recommendations

NIOSH/OSHA

### Up to 50 mg/m<sup>3</sup>:

(APF = 10) Any particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter-mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100. [Click here](#) for information on selection of N, R, or P filters.

(APF = 10) Any supplied-air respirator

### Up to 125 mg/m<sup>3</sup>:

(APF = 25) Any supplied-air respirator operated in a continuous-flow mode

(APF = 25) Any powered air-purifying respirator with a high-efficiency particulate filter.

### Up to 250 mg/m<sup>3</sup>:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters.

(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode

(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter

(APF = 50) Any self-contained breathing apparatus with a full facepiece

(APF = 50) Any supplied-air respirator with a full facepiece

### Up to 500 mg/m<sup>3</sup>:

(APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

### Emergency or planned entry into unknown concentrations or IDLH conditions:

(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

### Escape:

(APF = 50) Any air-purifying, full-facepiece respirator with an N100, R100, or P100 filter. [Click here](#) for information on selection of N, R, or P filters./Any appropriate escape-type, self-contained breathing apparatus

[Important additional information about respirator selection](#)

## Exposure Routes

inhalation

## Symptoms

Metal fume fever: chills, muscle ache, nausea, fever, dry throat, cough; lassitude (weakness, exhaustion); metallic taste; headache; blurred vision; low back pain; vomiting; malaise (vague feeling of discomfort); chest tightness; dyspnea (breathing difficulty), rales, decreased pulmonary function

## Target Organs

respiratory system

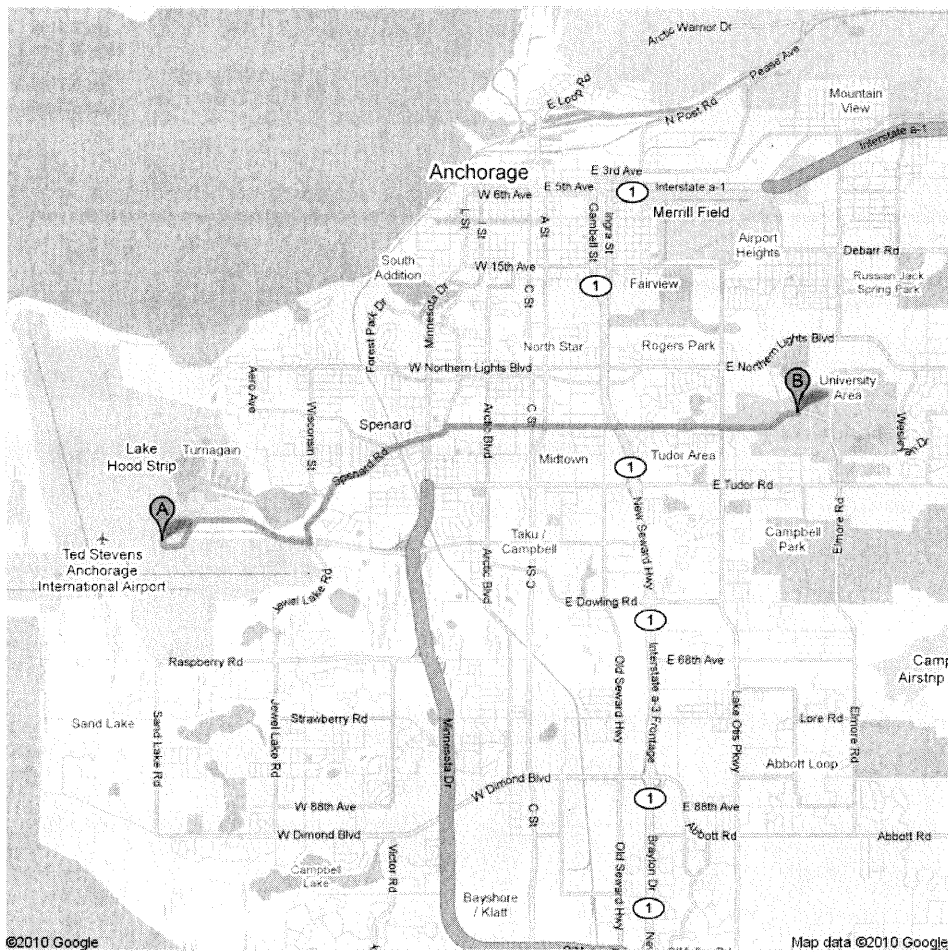
See also: [INTRODUCTION](#) See ICSC CARD: [0208](#) See MEDICAL TESTS: [0246](#)

**ATTACHMENT I MAP TO HOSPITAL AND SITE MAP/SKETCH**





**Directions to Providence Alaska Medical Center**  
 3200 Providence Drive, Anchorage, AK 99508 - (907) 562-2211  
 6.1 mi – about 17 mins



**A** ANCHORAGE airport, Anchorage, AK 99502

1. Head south on W International Airport Rd toward W 50th Ave  
 About 4 mins go 1.4 mi  
total 1.4 mi
2. Turn left at Jewel Lake Rd/Spenard Rd  
 Continue to follow Spenard Rd  
 About 5 mins go 1.7 mi  
total 3.1 mi
3. Turn right at W 36th Ave  
 About 7 mins go 2.3 mi  
total 5.5 mi
4. Continue onto Providence Dr  
 About 2 mins go 0.7 mi  
total 6.1 mi

**B** Providence Alaska Medical Center  
 3200 Providence Drive, Anchorage, AK 99508 - (907) 562-2211

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

Map data ©2010 Google

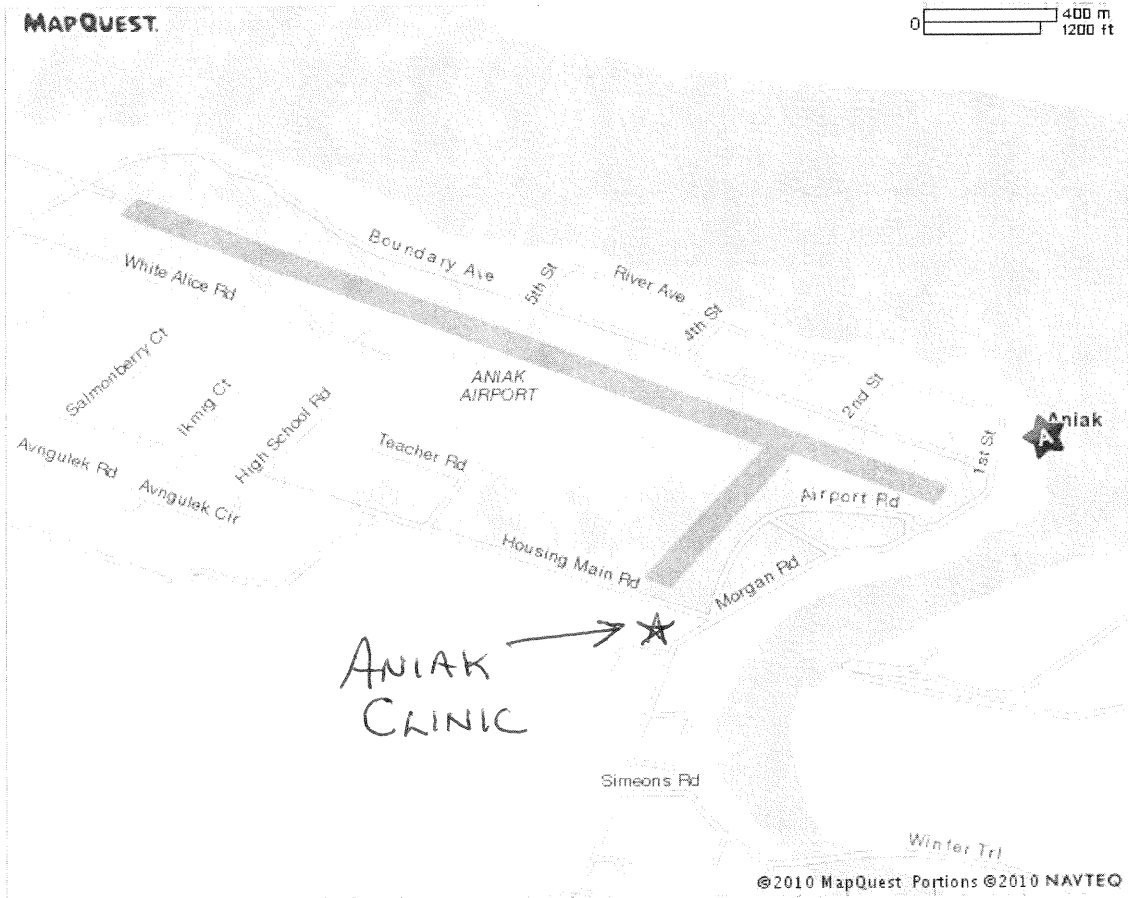
Directions weren't right? Please find your route on [maps.google.com](http://maps.google.com) and click "Report a problem" at the bottom left.



# MAPQUEST.

## Map of Aniak, AK

Notes



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