Environmental Assessment Program Safety Manual

Updated March 2017

Washington State Department of Ecology
Environmental Assessment Program

Revised 03/17

SAFETY IN THE WORK PLACE

IS EVERYONE'S RESPONSIBILITY

We can never list every possible situation or potential event.

This information provides the framework for a safe work environment.

However, it can never take the place of individual thinking.

Remember, the life you save may be your own.

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Foreword

The Environmental Assessment Program (EAP) *Safety Manual* is a commitment to the dedicated and professional employees carrying out our mission to plan, collect, analyze, and evaluate data. These data are used to generate information to support environmental decision-making.

Nothing we do is as important or essential as highly effective protection of the health and safety of every Department of Ecology employee.

EAP staff conduct extensive field work critical to our mission. In carrying out this work, staff can be exposed to numerous hazards.

This manual provides the safety requirements and procedures that allow for safe execution of the various jobs we do. All EAP employees must implement the procedures in this manual while doing field work. Safety is everyone's responsibility.

EAP will (1) provide training to review the procedures and expectations contained in the manual, and (2) remain committed to an effective Safety Committee. Our goal is to continually learn from past experience so that our safety practices are commensurate with a first-rate environmental monitoring program.

The manual has been a collaborative effort among experienced staff dedicated to employee safety, so let’s put it to use in our daily field activities.

Carol Smith
Program Manager
Environmental Assessment Program

March 2017

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Introduction

This *Safety Manual* for the Environmental Assessment Program (EAP) is intended to augment the (1) *Ecology Safety Program Manual*, and (2) *Ecology Headquarters Chemical Hygiene Plan*. All three documents are required reading for all EAP field staff and other staff who work with EAP or use chemicals.

This *Safety Manual* contains safety protocols for activities conducted by EAP staff. Before going in the field, all EAP staff must learn safety procedures governing their work.

A Reading Checklist follows this page; it is to ensure that all safety procedures have been read. Copies of all forms within this document are on the EAP SharePoint site.

This *Safety Manual* will be updated, as needed, by EAP management. To ensure the plan is up-to-date, the EAP Safety Committee will review it every two years. Employees are encouraged to become a part of this process by bringing suggestions for improvement to their supervisors or the EAP Safety Committee. Staff must also review the plan when there are new procedures.

Ensuring the safety of staff is a primary responsibility of supervisors. However, implementation of safety protocols is ultimately a personal responsibility and is an application of the employee's good judgment.

Approval

The EAP *Safety Manual* was originally approved by the EAP Management Team in October 1999. The August 2000, December 2002, March 2006, February 2009, July 2009, September 2010, May 2012, March 2015, and March 2017 updates were also approved by EAP managers.

Acknowledgements

The 1999 EAP Safety Committee (Robert Garrigues, Chrissy Ricci, and Bernard Strong) thank the many EAP employees who wrote, revised, or reviewed sections of this manual. Thanks also to Joan LeTourneau for editing and formatting the manual.

The 2000 manual was updated by the 2000 EAP Safety Committee (Keith Seiders, Jim Shedd, and Bernard Strong) with assistance from other EAP staff.

The 2002 manual was updated by the 2002 EAP Safety Committee (Bill Ward, Morgan Roose, and Bernard Strong). Thanks to Gayla Lord for editing and formatting the manual.

The 2005 manual was updated by the 2005 EAP Safety Committee (Ann Armstrong, Kristin Kinney, Howard Christensen, and Bernard Strong) and Department of Ecology (Ecology) Safety Officer Janet Hyre. Thanks to Gayla Lord for editing and formatting the manual.

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The 2010 manual was updated by the 2010 EAP Safety Committee (Howard Christensen, Jenna Durkee, Will Kendra, Brian Pickering, Dan Sherratt, and Janice Sloan), EAP Management, and Ecology Safety Officers Janet Hyre and Rodger Sesna. Thanks to Gayla Lord for editing and formatting the manual.

The 2012 manual was updated by the 2012 EAP Safety Committee (Howard Christensen, Jenna Durkee, Eiko Urmos-Berry, Patti Sandvik, Will Kendra, Brian Pickering, and Dan Sherratt), EAP Management, and Ecology Safety Officers Janet Hyre and Rodger Sesna. Thanks to Gayla Lord for editing and formatting the manual.

The 2015 manual was updated by the 2015 EAP Safety Committee (Howard Christensen, Eiko Urmos-Berry, Will Kendra, Tim Zornes, Patti Sandvik, and Jim Ross), EAP Management, and Ecology Safety Officer Janet Hyre. Thanks to Joan LeTourneau, Diana Olegre, and Cindy Cook for editing and formatting the manual.

The 2017 manual was updated by the 2017 EAP Safety Committee (Jessica Archer, Howard Christensen, Eiko Urmos-Berry, Tim Zornes, Patti Sandvik, and Jim Ross), EAP Management, and Ecology Safety Officer Janet Hyre. Thanks to Joan LeTourneau and Cindy Cook for editing and formatting the manual.

Reading Checklist – March 2017 Update
Safety Procedures for EAP Employees

This checklist is to be used by (1) all EAP employees every two years, (2) new EAP employees, and (3) employees preparing for field work new to them. The employee must read all procedures on the Required Reading list. The immediate supervisor will check procedures from the Supplemental Reading list that the employee must also read.

Before conducting field work, the employee and his/her supervisor are required to sign this checklist, verifying that the employee has read the appropriate safety and field procedures. Once filled out and signed, the original is retained in the supervisor's files.

Required Reading	*Employee Initial*	*Date Read*
1. ECOLOGY SAFETY PROGRAM MANUAL (July 2008)	____	____
2. ECOLOGY HEADQUARTERS CHEMICAL HYGIENE PLAN (Oct. 2011) or *REGIONAL OFFICE CHEMICAL HYGIENE PLAN (CRO) (ERO)*	____	____
3. *ENVIRONMENTAL ASSESSMENT PROGRAM SAFETY MANUAL (March 2017)*		
Chapter 1. General Field Work - All sections	____	____

Supplemental Reading *Supervisor check required sections*:

4. ENVIRONMENTAL ASSESSMENT PROGRAM SAFETY MANUAL (March 2017)

Chapter 2. Specialized Field Work	*Required*	*Employee Initial*	*Date Read*
Marine Flights	☐	_____	____
Measuring Flows in Rivers and Streams	☐	_____	____
Groundwater Sampling and Water-level Measurements	☐	_____	____
Using Hand or Power Tools	☐	_____	____
Using Brush Cutters and Trimmers	☐	_____	____
Chain Saw Operation, Maintenance, and Training	☐	_____	____
Using All-Terrain Vehicles	☐	_____	____
Driving on Logging Roads	☐	_____	____
Towing Trailers	☐	_____	____
Operating Winches on Small Boats, Trailers, and Vehicles	☐	_____	____
Sampling with Battery-Powered Backpack Electrofishers	☐	_____	____
Hazardous Waste Sites	☐	_____	____

Health and Safety Site Plan Required at Hazardous Waste Sites	☐	_____	____
Handling Formaldehyde and Formalin	☐	_____	____
Rescreening Marine Benthic Samples Preserved with Formaldehyde	☐	_____	____
Preparing and Cleaning Compositor Bottles	☐	_____	____
Using Pressure Washers	☐	_____	____

Chapter 3. Boating

EAP Boat Plan	☐	_____	____
Boat Checklist	☐	_____	____
Boat Emergency and Troubleshooting Guide	☐	_____	____
Boat Information	☐	_____	____
Mechanical Movers	☐	_____	____
Operating 17’ Boston Whaler	☐	_____	____
Operating McKee Craft Boat	☐	_____	____
Operating North River Jet Boat	☐	_____	____
Operating 26’ Almar Boat-Boat Master Program	☐	_____	____
Operating 16’ Wooldridge Jet Boat	☐	_____	____
Operating Electrofishing Boats	☐	_____	____
Operating Jon Boats (Valco or Grumman)	☐	_____	____
Operating the Livingston Boat	☐	_____	____
Using Kayaks for Field Work	☐	_____	____
Operating Inflatable Boats (Avon or Achilles)	☐	_____	____
Operating Bronco Pontoon Raft	☐	_____	____
Using Inflatable Rafts or Inflatable Kayaks for Field Work	☐	_____	____
Operating from Non-Ecology Boats	☐	_____	____

Employee_____ **Supervisor**_____

Date_____ **Date**_____

Chapter 1. General Field Work

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Introduction to General Field Work

Purpose

To provide fundamental safety procedures to be followed by EAP staff when conducting field work.

Application

For EAP staff when planning and conducting field work.

Requirements

Guidelines

Never compromise your feeling of personal safety by doing something that might risk personal injury. If you are uncomfortable with a procedure, find a means of obtaining the information you need without endangering yourself. If no such alternative exists, discontinue the activity. In any sampling situation, your personal safety is the highest priority.

First aid

ALL field staff are required to complete and maintain certification in FIRST AID and CPR. This course is available as core training at the Department of Ecology (Ecology). All field staff must take this course their first year and retake it every two years to maintain certification. Also, a Medical Monitoring program is available through Ecology (see the section in Chapter 2 of this *Safety Manual*, *Hazardous Waste Sites*).

Field staff who have significant allergies or illnesses (e.g. a condition that could result in anaphylactic shock or impaired breathing) are advised that their safety would be best served if they alert their field team of the proper response in case of emergency before the field work begins.

Team coordination

EAP managers are encouraged to assign field teams of two or more staff, when possible. Staff must work in teams when on or in the water or in remote areas. The "buddy system" does have its merits: a second driver when the first one is tired, a second set of hands for lifting heavy objects, a second set of eyes for sighting safe access routes or sampling locations – and, of course, an able body in case of an emergency. The buddy system may not be necessary for "lighter" field duties such as reconnaissance or drive-by surveys.

Share your itinerary. See the Field Work Notification Procedures section of this Safety Manual.

Preparing for field work

- Complete the EAP Field Plan and file it electronically on the EAP SharePoint website under Field Schedules-- http://teams/sites/EAP/Field%20Schedules/Forms/AllItems.aspx.
- Email a copy of the completed form to your primary contact person and field crew. Also, take a printed copy with you into the field.
- If you have specific run directions, check them for completeness. Note any planned modifications on the *EAP Field Plan*.
- During warmer months, field leads must ensure that the five-gallon water jug in their vehicle is filled with drinking water and ice at the start of each field day (see later section on *Preventing Heat-Related Injuries*). Check temperature and humidity conditions for the area of field work before departing.
- During winter months or inclement weather, check road conditions before departing. Dial 511 to check on state highway and weather information. If you have trouble reaching Washington's 511 system or are calling from outside of Washington, call1-800-695-ROAD or check the DOT website (www.wsdot.wa.gov).
- During heavy rains, check DOT and USGS for flooding information, and if boating, check NOAA (www.weather.gov) or the American Rivers website for logjam warnings.

While in the field

- As closely as possible, follow run directions or planned project work as outlined in the *EAP Field Plan*. If your plans change, notify your contact person on your EAP Field Plan. Follow safety guidelines for your particular field tasks, as outlined in other sections of this Safety Manual.

- Periodically monitor commercial radio or websites for local weather conditions. Do not drive on flooded roads. Avoid boating when rivers are at flood stage, unless your sampling program was designed for these conditions and appropriate safety precautions have been taken.

- Per Labor & Industries (L&I) regulations, you MUST WEAR a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as on the water, over the water, or alongside the water. The danger of drowning exists whenever the depth of water is more than a person's body thickness from front to back. Buoyant vests and inflatable PFDs are acceptable for use if (1) the label states that the PFD is approved by the US Coast Guard for use on commercial vessels and (2) the type of PFD (1-V) matches the work setting and in serviceable condition. When wading in deeper waters, use a buoyant vest to prevent the accidental triggering of an inflatable PFD. Check with a regional or HQ Safety Officer before purchasing. (Chapter 296-800-16070 WAC). As per the USCG and

Boat U.S. Foundation (https://www.uscg.mil/hq/cg5/cg5214/pfdselection.asp and http://www.boatus.org/life-jackets/care), PFD maintenance include:

- Check PFDs often for rips, tears, and holes, and to see that seams, fabric, straps, and hardware are okay. Make sure there are no signs of waterlogging, mildew odor, or shrinkage of the buoyant materials. Make sure that the label stating USCG approval is attached and readable.

- Allow the PFD to dry thoroughly in open air before storing in a well-ventilated area. Don't dry the PFD in a dryer, in front of a radiator, or other source of direct heat as this will destroy its buoyancy.

- Don't place heavy objects on the PFD and don't use a PFD as a kneeling pad or boat fender.

- Don't alter the PFD. Don't use harsh detergents or gasoline to clean it.

- In addition to the PFD maintenance listed above, inflatable PFD maintenance includes:

    - Check the status of the inflator every time to be certain cartridge is properly installed and the equipment is in working order.
    - Check for leaks every two months; inflate life jacket orally and leave it overnight to check for leaks. If it leaks then it should be replaced.
    - Immediately replace any spent CO2 cartridges with new ones.

While at the Operations Center

Procedures addressing safety and security at the EAP Operations Center (OC) can be accessed from the EAP OC SharePoint page.

Staff working at the OC outside normal business hours must exercise due caution. If you feel as though your safety may be compromised outside of normal work hours, use the buddy system. If the blue light is flashing in the front of the OC, it is possible an intruder has set off the motion detection system in the gated parking area. If an obvious break-in is otherwise discovered at the OC, call 911 and remain in a safe place until police arrive. Also notify the OC Manager, Tim Zornes, as soon as possible (cell phone 360-280-8289).

When visiting EAP's Eastern Regional Office Operations Center, the same precautions must be taken. If there are obvious signs of a break-in, do not open the gate or enter the complex. Leave the area and call 911. There is a State Patrol Office one block to the southeast of the complex on W. Rowand Road. This would be a safe place to wait in the event of an emergency.

Defensive driving

Driving on the state's highways is a significant exposure to risk. Agency-required refresher training in *Defensive Driving* is required for all EAP staff who:

- Have a job that requires them to use a state vehicle an average of one or more days per week or four or more days per month.
- Must drive a vehicle more than 500 miles a month to perform their job.
- Drive a vehicle more than 15 hours a week during any given month, but do not drive long distances (e.g., couriers).
- Have been involved in a preventable motor vehicle accident while driving a state vehicle on Ecology business, regardless of the cause of the accident.

See Policy 04-02, Attachment A

Some field work requires long work days with tight schedules. Fatigue is especially likely for a lone worker at the end of a long day when the urge to return home may cause the employee to go beyond his/her physical limitations.

Field-work days must not exceed 16 hours. Sample collection often provides a break from the monotony of driving. But on long, uninterrupted drives, you must take a minimum 15-minute break every two hours (or sooner if fatigue may impair your ability to drive safely).

If you need to spend the night to avoid the risk of an accident or poor driving conditions, EAP Management will reimburse your overnight travel expenses.

Never handle your cell phone while driving; if necessary, you may legally use a hands-free phone.

Confined spaces

Ecology policy is to AVOID ENTERING CONFINED SPACES. Confined spaces are enclosures with limited openings for entry and exit, with unfavorable ventilation. These spaces are not designed for continuous worker occupancy. Confined spaces include ditches, wells, manholes, vaults, tanks, etc.

Refer to the *Ecology Safety Program Manual* for required precautions and training for staff who must, with supervisor's approval, enter confined spaces.

Public confrontations

Working with the public involves the risk of facing a hostile client. Citizen anger is frequently a result of frustration with an unfamiliar bureaucracy. That anger and frustration may be directed

at you while you perform field work. Whatever the situation, your own attitude and response can make the difference between calming or escalating a heated situation. With a caring, composed, and objective manner, you may be able to calm an angry person. Remember that it takes two to argue. Maintain a calm and respectful demeanor, even if the other person does not.

Be careful with behaviors that may be "hot buttons" for members of the public, such as entering private property or disrupting the flow of traffic on "their" road. Be aware of your responsibilities regarding private property, and periodically review Policy #22-05 (Accessing Private Property).

Prepare yourself mentally and emotionally for dealing with angry or hostile persons. The *Ecology Safety Program Manual* offers suggestions for handling such situations (see *Personal Safety and Security* section). Learn how to diffuse a situation before it becomes hostile, and also what to do if a situation does escalate into hostility.

Review Ecology Policy #7-12, Responding to Assaults and Ecology Procedure #7-12-01, Responding to Assaults or Threats in the Field.

If you are physically threatened, leave the scene if possible, and call 911 immediately. If local police or sheriffs do not respond adequately, dial 911 again, and ask to be connected to the State Patrol. Then ask the State Patrol dispatcher to send help immediately. You may wish to contact the State Patrol dispatcher directly. State Patrol dispatcher phone numbers can be found on the EAP Field Plan form. If you are involved in any kind of threatening or violent incident, be sure to report it immediately using form #010-71, the *Security Incident Report Form*.

Chemical hazards

Some field and lab work may put an employee in contact with a variety of chemicals in gaseous, liquid, and solid form. The *Ecology Headquarters Chemical Hygiene Plan* and regional chemical hygiene plans contain guidelines for the safe handling, labeling, and storage of chemicals. Training is *required* for all staff who order and handle chemicals, and this training must be documented. Such training is provided by Ecology's Chemical Hygiene Officer and by supervisors.

If your work includes using chemicals of any type, familiarize yourself with the HQ or regional chemical hygiene plan and get proper training for the ordering, handling, labeling, and storage of chemicals. Also see the later section of Chapter 1, *Chemical Use in EAP Specialized Rooms*.

Ecology laboratory management and operations

Activities in the Ecology Headquarters (HQ) building basement and EAP Operations Center are managed by a team that represents the principal users. Each laboratory room is assigned a Room Coordinator from a section that has a significant interest in the space and its use. Room Coordinators are responsible for the smooth operation of their areas. They resolve day-to-day issues and other concerns or raise them to management as appropriate.

Coordinators for rooms commonly used by EAP staff are:

Room	Room Phone Number	Room Coordinator	Program - Region or Unit
0L-13 Inside Staging Area	407-6168	Janet Hyre: 407-6252	HR - HQ
0L-15 Chain of Custody Room	407-6148	Kirsten Alvarez: 407-6246	TCP - SWRO
		Janet Hyre: 407-6962	–Ecology Safety Manager
0L-14 Hazardous Materials Storage Room	none	Sandy Weakland: 407-6980	EAP - MMU
0L-16 Cleaning Room 0L-17 Bottle Room	407-6589	Christopher Clinton: 407-6060	EAP - TSU
L-X1 Hazardous Materials Storage Building at OC	none	Dany Burgess: 407-6685	EAP - MMU
Operations Center Benthic Lab	407-3970	Stephanie Estrella: 407-6688	EAP - GFFU
Operations Center Marine Lab	407-3971	Mya Keyzers: 407-6395	EAP - MMU
Operations Center Freshwater Lab	407-3971	Paul Anderson: 407-7548	EAP - DSU
Operations Center Walk-in Cooler	407-3972	Tim Zornes: 360-280-8289 (cell)	Operations Center

Physical hazards

Field work poses a multitude of physical hazards, any of which could result in serious injury or death. Hazards vary with the type of site and the work being performed. The kinds of hazards that are encountered include:

- holes, ditches, trenches, or pits
- tripping hazards
- sharp objects, nails, metal shards, or broken glass
- slippery surfaces, ice
- tide flats/mud
- steep grades
- uneven terrain
- unstable surfaces
- traffic hazards
- heavy equipment
- overhead equipment

In addition to inherent site hazards, some safety hazards can be a function of the work itself. For example, staff must take extra care when working around heavy equipment or boating on water.

Biological hazards

Animals and plants can also pose hazards while working in the field. Some examples:

- stinging insects
- toxics algal blooms (more on this shortly)
- snakes, dogs, or wildlife

Another biological hazard is the risk of potential exposure to zoonotic diseases, or diseases that are transmitted between animals and humans. These include West Nile virus (mosquitoes), Lyme disease (ticks), hantavirus (mice), and giardiasis (drinking water contaminated by animal feces). Additional information on these and other mammalian and avian zoonotic diseases can be found at the following DOH and USGS websites:

- http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease.aspx
- http://www.nwhc.usgs.gov/outreach/mammalian_zoonotic_course.jsp
- http://www.nwhc.usgs.gov/outreach/avian_zoonotic_course.jsp

Algal blooms

The following link will show you pictures of what blue-green algal blooms look like (www.ecy.wa.gov/programs/wq/plants/algae/monitoring/AlgaeBlooms.html).

Unfortunately there is no way to tell if a bloom is producing toxins from its appearance. Blooms that are not producing toxins one day may start producing toxins the next day. It's best to avoid contact when you see concentrated algae scums on the water. Avoid wading or swimming through heavy scums (which may look like a paint spill). Avoid barreling through a heavy scum in a boat; people have reported respiratory problems at times from this.

If you need to pull a sample at a scum site, wear gloves. The procedure for taking samples can be found on the NW Toxic Algae website, https://www.nwtoxicalgae.org/ReportBloom.aspx, under the *Report a Bloom* tab. Toxicity samples are shipped to the King County Environmental Lab in Seattle for testing. Sample results are forwarded to the Algae ListServe when they are reported from KCEL (http://www.ecy.wa.gov/programs/wq/plants/algae/ListServe.html).

Illegal activities hazards

If you come across an illegal activity such as a marijuana-growing operation or a methamphetamine lab, leave the site immediately and call 911. An eight-minute Colorado Department of Transportation video clip on Meth Lab Waste Recognition may be viewed online.

Heat stress and cold exposure

Other field hazards include exposure to temperature extremes. To reduce the risk of heat stress, you must avoid using more personal protective equipment than is necessary, schedule rest

periods throughout the day, and drink plenty of liquids. To guard against cold exposure, wear appropriate layered clothing, have warm shelter readily available, and carefully schedule work and rest periods. For both heat stress and cold exposure, you must monitor your physical condition and that of others working with you. Detailed information on Preventing Heat-related Injuries and Winter Safety/Hypothermia is provided later in this manual.

Electrical hazards

Electrical hazards include overhead power lines, downed electrical wires, and buried cables. All pose a danger of shock or electrocution if they are contacted or severed during site operations. Electrical equipment used on site may also pose a hazard to workers. To help minimize this hazard, only low-voltage equipment with ground-fault interrupters and water-tight, corrosion-resistant connecting cables should be used on site.

Lightning hazards

Lightning is a hazard during outdoor operations, especially for anyone handling metal objects, equipment, or working on boats. Monitor weather conditions, and suspend all site work during electrical storms.

Noise

The noise level around large equipment is often excessive (i.e., greater than 85 dBA). If you need to shout to make yourself heard above the noise, the level is probably at or above 85 dBA. Although susceptibility to hearing loss varies widely among individuals, some people experience hearing loss with prolonged exposure at 85 dBA. Protect your hearing by always wearing earplugs or earmuffs when working near loud equipment. You must keep hearing protection at hand whenever working with field equipment with a high noise level.

Coming upon a corpse while working in a field environment

Keep other staff away from the scene if possible. There are several reasons:

- It is traumatic to view a dead human body unexpectedly outside the dignity and context of our society's funeral customs. People who do come upon a body tend to experience visual "flashbacks" that are more vivid than those who did not actually view the scene.
- The death may have been caused by foul play, so do not disturb the scene or cover the body from view. We surely don’t wish to implicate ourselves in the investigation.

Call 911 or local police as soon as possible.

- When law enforcement arrives, let them know where you have walked and what you (or others) may have touched.

Do not touch the body if the person is clearly dead.

Falls

Avoid working at an unprotected (by railings or nets) height of 10 feet or above. If you must do so, use fall-protection gear, as required by Labor & Industries' Fall Protection, Fall Restraint & Fall Arrest guidelines.

EAP staff may encounter situations where there is little or no protection from falls greater than 10 feet in height. Examples include sampling from railroad and highway bridges, working on steep stream banks, and working from tall ladders. Inclement weather or other conditions can increase the risk of falls.

You must use a personal flotation device (PFD) when around water or where there is a risk of falling into the water.

See the section on *Fall Protection* in this manual (excerpted from the *Ecology Safety Program Manual*) to learn more about fall hazards and how to avoid or mitigate them.

Back injury

Back injury may happen anywhere but is more probable while lifting, twisting, or bending. Protect yourself from back injuries. Consider your fitness level and the task or movements you will make. Practice proper lifting techniques. Do not load coolers weighing more than 50 lbs. See the section on Lifting Safety in the *Ecology Safety Program Manual*. Ecology's Safety Office can help you get training in preventing back injuries.

Footwear

When working in the field or laboratory, be thoughtful about your selection of footwear. Do not wear sandals or other shoes that could expose your feet to physical or chemical hazards.

Telephones

A cell phone must be taken along on all field work projects. Be sure you know how to use the phone properly before leaving the office. Cell phones are available for check out from EAP administrative staff.

Follow the traffic laws regarding phones: Never handle your cell phone while driving; if necessary, you may legally use a hands-free phone.

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Field Work Notification Procedures

Purpose

To describe required procedures for documenting who is in the field, sampling itinerary and location, vehicle and boat information, lodging, contact person, search operations, and who to notify in case of emergency.

Application

For EAP field team leaders, or individual staff working alone, in planning field work.

Requirements

Prior to departing for the field, EAP staff planning to conduct any field operations must:

- Complete the *EAP Field Plan* covering all individuals participating in the field work. This form can be downloaded from EAP's SharePoint site – Field Schedules. This requirement also applies to any EAP staff working on other agency projects. Save the original to the Western, Eastern, or Statewide Operations folder. Email a copy of the completed form to your primary contact person and field crew and also take a printed copy with you into the field.
- The EAP Field Plan contact person is required to print the EAP Field Plan and keep it with them, or have it readily available in email until the plan is closed out.
- Fill out your weekly schedule in Outlook and be sure your weekly voice mail message is up-to-date.

EAP Field Plan

Staff must inform supervisors when heading into the field. Supervisors will typically serve as the contact person. A time to begin search operations must also be designated. Staff who will travel overnight must provide a time to begin search operations for each day they are scheduled to be in the field.

The *Contact Person* part of the form provides the contact person with guidance on when and how to implement search operations. The contact person is typically the EAP supervisor. Occasionally, the supervisor can designate and EAP employee as the contact person.

Staff who regularly conduct the same sampling run can reuse much of the information on the *EAP Field Plan* and submit it as part of a packet each time they leave for that run. Simply update the relevant information for each survey. Please ensure that the EAP Field Form has not changed if field forms are reused.

Staff should notify the contact person and supervisors about any significant deviations from the plan, such as changes in field work locations, dates, times, or field staff.

At the end of EACH field day

Notify your designated contact person that you are safe and have arrived at your destination. If it is going to be late at night, leave a message on the contact's voicemail or send him/her an email or text message.

If you fail to notify your contact person at the end of each work day, that person is expected to initiate search procedures specified in the *EAP Field Plan*.

Remember that the success of a search effort will be far greater if you have faithfully followed the run directions and all other required procedures.

EAP Field Plan

This field plan combines the Field and Float plans into one format. The field leader:

1. Completes the form, adding boating information if boats are to be used.
2. Files an electronic copy of the Field Plan in the appropriate SharePoint library.
3. Emails a copy of the completed form to the primary contact person and field crew.
4. Prints two paper copies of the completed form: one for the primary contact and one for the field leader to take into the field.

Staff Contact Information

Field Staff and Role	Home Phone	Cell Phone	Emergency Contact Phone/Name

Field staff who have significant allergies or illnesses (e.g. a condition that could result in anaphylactic shock) are advised that their safety would be best served if they alert their field team of the proper response in case of emergency before the field work begins.

Management Contacts *(List TWO)*	**Home Phone**	**Cell Phone**	**Work Phone**
Name 1: Unit Supervisor Choose an item. (Click & Select			
Name 2: Backup Choose an item. (Click & Select)			

EAP Contact Person for Field Plan	Home Phone	Cell Phone	Work Phone
Choose an item.			

The Contact Person for Field Plan is any employee supervisor or manager willing and able to begin search operations.

Timeframe

Expected departure date and time:

Expected dates and times to finish field work each day:

Expected return date and time:

Start search operations: __:__ hrs.

Locations

Give descriptive information about locations and itinerary for the field effort. Insert tables or maps into this document as needed to give a complete and clear description.

Location(s) of field work:

Transportation route to follow:

Lodging (hotel/motel) information

Hotel/Motel Name	Phone Number	Location (City or Town)	Dates Staying

Vehicle Information

- Click on "Choose an item."
- Click on down arrow to select the vehicle you'll be using.

License	Year, Make, and Model	Color	Cell Phone
Choose an item.			

Vessel Information *(fill out this section only if using a boat; otherwise delete.)*

Give Boat Info (make, model, length, year, hull material and colors), Engine Info, Fuel Capacity, Standard Equipment, Trailer Type, and License #.

Get EAP Vessel details by following these steps

1. Go to: http://teams/sites/EAP/Boat%20Reservations/Forms/AllItems.aspx
2. Click on EAP Boat Reservations file.
3. Open as read-only.
4. Click on "Vessel Info New Format" tab at the bottom of the sheet.
5. Use the filter function to select the vessel information:
   - Click on the down arrow in column A and in the drop-down list, then click on "(Select All)" to clear the checkmarks.
   - Scroll down the drop-down list and select the boat you will be using, then click "OK."
6. Copy the heading and your boat information from columns A-H (see example below).
7. Paste special as a "Picture Enhanced Metafile" over the top of the example below.
8. Exit Boat Reservation file.
9. Do not save changes to the EAP Boat Reservations file.

Other Contact Information

Give any other contact information that may help searchers locate field crew (e.g. non-Ecology staff involved in the field work, marinas where boats are launched).

List of State Patrol Dispatchers

- District 1 Office Directory - Tacoma: (253) 538-3240
- District 2 Office Directory - Bellevue: (425) 401-7788
- District 3 Office Directory - Yakima: (509) 575-2320
- District 4 Office Directory - Spokane: (509) 227-6566
- District 5 Office Directory - Vancouver: (360) 449-7999
- District 6 Office Directory - Wenatchee: (509) 682-8090
- District 7 Office Directory - Marysville: (360) 654-1204
- District 8 Office Directory - Bremerton: (360) 473-0300

Search Operations

The contact person should take the following steps if the field crew doesn't check in by the time given above to close the Field Work Plan for the day. The initial call effort is done by the EAP contact person. Subsequent search efforts involve Ecology managers and law enforcement organizations (e.g., WSP, Sheriffs, USCG).

1. Call the vehicle or boat's cell phone.

2. Call field crew members at their cell numbers and home numbers, as needed. Start with the field leader, then boat operator, and then other crew**.**

3. Call the scheduled hotel to see if the crew has checked in.

4. **AT THIS POINT, CONTACT THE SUPERVISOR / MANAGER AND THEY WILL TAKE OVER THE SEARCH OPERATIONS.**

5. Call the Emergency Contacts and other persons/places who may have information on the whereabouts of field crew (e.g. friends, family, and co-workers).

6. Check Ecology or other parking lots for the vehicle, boat, and trailer, as applicable.

7. Supervisor or Manager makes the decision whether to contact appropriate law enforcement or search organizations such as the Washington State Patrol (WSP), U.S. Coast Guard, county sheriffs, or city police.

8. If warranted, call the *Washington State Patrol Emergency Dispatch for the District* ***(see map and phone numbers above)*** and request a road check of the route that the vehicle would take while doing field work. Give vehicle and related information to the WSP. Ask WSP whether you should contact local law enforcement agencies such as county sheriffs or city police.

9. For field work involving boats, inform the WSP of the situation and determine who else to notify. Generally, for boats being operated on Puget Sound, coastal bays, or the navigable parts of rivers entering Puget Sound, or the Columbia/Snake River system, notify the *Coast Guard (206-217-6000)*. Be prepared to describe the boat, nature of the work, itinerary, vehicle, trailer, and other information that may be useful.

10. In case of extended search operations, update the Emergency Contacts and inform them of the situation.

11. Prepare to take an active role in search operations: remain in contact with various authorities and managers to keep all informed of status and progress in the search efforts.

Reporting Accidents and Hazards

Purpose

To describe procedures for EAP staff to report accidents or safety concerns.

Application

For all EAP staff, whether in the field or the office.

Requirements

Safety is the responsibility of all EAP staff. We all need to take an active role in maintaining safe practices and a safe workplace.

It is your responsibility to report significant safety concerns to your immediate supervisor as soon as possible, preferably within 24 hours. Use the *Report of Employee Personal Injury/ Accident* form to report any of the following: accident, injury, damage (vehicle, boat, or equipment), incident, hazard observed, near miss, illness, or exposure. Give the original paper form to your supervisor. Also give paper copies to the Ecology Safety Office, your section manager, your program manager, and your section secretary for filing.

The supervisor is required to follow up. The EAP section manager, the agency Safety Officer, or the agency Safety Committee may review the issues, but corrective action is the supervisor's responsibility.

The proper Labor & Industries (L&I) forms are needed if a personal injury claim is to be made; these can be obtained from your medical provider. If you traveled out of state, contact Walter Bennett, 360-407-6252, for an Out-of-State Accident Packet.

If you have questions, discuss them with your supervisor or your section or regional safety officer. Section safety officers perform the following duties on your behalf:

- Serve as point of contact for staff safety issues/concerns.
- Attend monthly headquarters safety meetings.
- Provide safety forms to staff on request.
- Keep copies of all safety manuals and publications, including supplemental reading materials.
- Assist in building evacuations and associated communications with facilities staff.
- Maintain first aid kit in kitchen drawer.
- Maintain emergency supplies kit in copy room, or other designated area.
- Maintain safety information board in copy room, or other designated area.

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Chemical Use in EAP Specialized Rooms

Purpose

To provide safety procedures to be followed by EAP staff working in laboratory settings.

Application

For EAP staff when working in the following rooms: Chain of Custody, Hazardous Materials Storage Room, Hazardous Materials Storage Building, Cleaning Room, Bottle Room, and at labs in the Operations Center and regional offices.

Requirements

Working with chemicals

Field sampling is often followed by sample analysis, separation, or dissection that occurs in the specialized rooms noted above. Chemical use and handling is often necessary to clean instruments or to process samples. This guidance is intended to serve as a resource for EAP staff to locate SOPs and other documents on safe chemical use. All EAP staff are required to read the *Ecology Headquarters Chemical Hygiene Plan*, or regional chemical hygiene plan.

Making chemical dilutions

EAP has published an SOP for Reagent Preparation entitled EAP 028 – Reagent Preparation. A commonly used chemical not addressed in this SOP is nitric acid, which is addressed in the *Ecology Headquarters Chemical Hygiene Plan* and copied below.

The most important safety precaution for dilution of acids and bases is to remember to ALWAYS add the concentrated reagent to the water. NEVER add water to a concentrated acid or base. The catchy phrase "Do as you oughta, add acid to water" can help you remember this.

10% Nitric Acid

Personal protective equipment includes: safety glasses, butyl or nitrile gloves (butyl offers better long-term protection), and a chemical apron for quantities greater than 10 mL or 10 g.

EAP staff typically purchase nitric acid at 67%, which is below the "fuming" nitric acid threshold which begins at 80%. A 10% solution is made for cleaning purposes; the concentration does not need to be exact. In an appropriate container, pour about nine volumes of deionized water (Type I or DI, also labeled Milli-Q). In the fume hood, slowly add one volume of nitric acid to the water. It will eat through aluminum foil, so clear that away first. In Ecology's Headquarters' cleaning room, there is a sturdy white plastic tray that fits in the hood; this tray can be used as a catch basin when mixing chemicals or cleaning equipment. Be conscious of your posture, and if necessary put the sash up and wear a full face shield. Mix gently. Label the

container with the chemical name and dilution.

According to Janet Hyre, Ecology Safety Manager, a 10% solution is roughly the same as "bad acid rain." Avoid getting it on your skin. Rinse with water if it does get on your skin. Store all acid solutions in a closed, labeled container in an acid cabinet.

Serial dilutions

Serial dilution is a method of sequentially diluting a sample through a series of dilution blanks. The dilution blank (diluent) used should be the same matrix as the sample/solvent (e.g., deionized water, seawater, or 90% acetone).

If you mix one part of sample with one part of diluent, you attain a 1:2 (one-to-two) dilution. One part of sample with nine parts diluent is a 1:10 dilution. If you take one part of the 1:10 dilution and place it in nine parts of diluent, you get an additional 1:10 dilution, yielding a final dilution of 1/10 X 1/10 = 1/100. The denominator of the final dilution is called the *dilution factor*. To determine the final dilution, multiply all dilution factors.

The point of dilution is to determine the concentration of a particular biological or chemical substance in the original sample. After analyzing the diluted sample, be sure to calculate back up to the original sample. When reporting a dilution factor on log sheets, record it in the style noted above or as a percentage:

3 mLs chla sample + 3 mLs 90% acetone = <u>1:2 dilution or 50%</u>

If you record it as a percentage, be sure to use the % sign to minimize misinterpretation.

Acid washing protocol

- Prepare an adequate volume of 5% HCl by mixing 1 part of concentrated HCl in 19 parts of deionized water. If using the acid wash tub, add 1 liter HCl to 19 liters deionized water. Remember to add acid to water, not water to acid.
- Keep a layer of absorbent diapers under the acid-washing tub.
- While WEARING appropriate acid-resistant gloves, lab coat, and goggles, fill each bottle with about 1 cm of 5% HCl, or carefully submerge bottles and lab-ware in the acid-wash tub.
- Cap tightly and invert to ensure that the entire inner surface of the bottle is covered with acid.
- Let bottles fume with caps on for at least 1 hour.
- Pour used acid down the sink. Flush with copious amounts of cold water.
- Rinse each bottle 3 times with deionized water. Let dry and then put lids on.

Vehicles – Use, Maintenance, and Safety

Purpose

To describe guidelines for EAP staff who operate and maintain EAP vehicles used in field work.

Application

For EAP staff using vehicles in the field.

Requirements

Vehicle use and care

Drive safely and courteously, both for yourself and the image you present to the public. Obey all traffic laws; you are personally responsible for citations issued by law enforcement staff. Use of seat belts is mandatory for all occupants. Never handle your cell phone while driving; if necessary, you may legally use a hands-free phone.

Do not compromise your sense of personal safety by using a vehicle in a way that might risk injury. For example, if inclement weather leaves road surfaces excessively snowy or icy, or if there is flood water on the road, delay your trip until conditions improve. Check the Internet or a local radio station for weather and road hazards. If your tire flattens on a busy highway, and you feel unsafe changing it on the shoulder, seek assistance from a repair facility. If you get tired, switch drivers, or pull off the road and rest.

Take care of our program's vehicles as if they were your own. Return vehicles so they are ready for use by your co-workers. If the gas gage reads less than half full when you are done for that day, fill it up. While pumping the gas, check the engine oil and windshield washer fluid. If additional fluids or other equipment (such as wiper blades) are needed, contact the Department of Enterprise Services (DES) for approval at (360) 664-9215 and select option 1. Be sure to conceal valuables and lock your vehicle if it will be left unattended for any period of time.

Use the vehicle mileage log to note any concerns or needed repairs. Notify the vehicle steward of such items, so that he/she can get repairs made in a timely manner. For serious safety concerns, notify the steward IN PERSON so that the problem can be addressed immediately.

Vehicles should also be returned clean; usual courtesy is to return the vehicle in a cleaner state than when you got it. If the inside or outside becomes dirty, wash, sweep, and vacuum as needed. Automatic car washes may be purchased with the fuel card when paying for gas at the pump. Many of our taller vans with roof vents cannot go through an automatic car wash due to height restrictions and resultant damage to the roof vent. Vehicles should not be washed in parking lots unless runoff drains into a sanitary sewer or is filtered/recycled. Vehicles can be

washed at the Operations Center; check with the OC manager for instructions.

Vehicle reservations

EAP vehicles should be reserved in advance. Vehicle scheduling conflicts have occurred due to high-use periods and the limited number of vehicles in our pool. Following are guidelines for scheduling:

- Staff should always reserve vehicles within their own section first and as far in advance as desired. If you anticipate the need for extended use of a vehicle (e.g., every other week for two months), notify others in the section ASAP to manage scheduling conflicts.
- Staff may reserve vehicles from another section only when a useable (not less preferable) vehicle is not available within their own section.
- Staff may reserve vehicles from another section up to two weeks in advance for a maximum of a one-week period. For reservations made greater than two weeks in advance, or longer than one week in duration, reservations can be made with the concurrence of the affected section manager.
- Once a reservation has been made, staff may only be bumped from a reservation with the concurrence of both affected section managers.
- Vehicle maintenance costs will be prorated based on usage (mileage from the logs).
- Some HQ vehicles may be reserved electronically by accessing Vehicle Reservations on the EAP SharePoint site. Other vehicles may be reserved by contacting the respective vehicle steward.

Vehicle maintenance

Routine

In addition to turning in travel logs every month, vehicle stewards are to maintain the vehicle according to the Department of Enterprise Services (DES) maintenance schedule. DES will notify EAP's or regional transportation coordinator when maintenance is due on a vehicle, and the transportation coordinator will forward the notification to the vehicle custodian.

If vehicle repairs are needed, contact Ecology's Transportation Office (Oliver Brock at 407-7078) to arrange for repairs to be done by DES or through a local vendor. In the regions, contact your regional transportation coordinator to arrange for repairs.

Emergency breakdowns and accidents

In the event of a breakdown, refer to the DES Fleet Operations packet in the vehicle's logbook titled *ROADSIDE ASSISTANCE*. In the event of an accident, follow the instructions under *ACCIDENTS*. In either case, notify your supervisor to apprise her/him of the situation.

Vehicle safety items

All EAP vehicles must contain the emergency safety gear listed below. The vehicle steward is responsible for stocking his/her vehicle with these items and maintaining that stock at all times. As a user of the vehicle, you must restock anything you use (e.g., water, oil, fuses, first aid supplies) and/or notify the vehicle steward of what's needed so it can be replaced as soon as possible.

<u>Emergency safety gear</u>

- Vehicle Auto Log binder which includes: Key holder should check for all of these.
  - Auto Logs
  - EAP Phone List
  - Fuel Guidance instructions on how to fuel Voyager and DOT cards.
  - Index of Hospitals by County
  - Insurance certificate
  - Pouch for cell phone, charger cord, hands-free device, pens, gas card
  - Roadside assistance sheet
  - DES procedures for Emergency Repair/Breakdown
  - State highway map (most recent edition)
  - DES vehicle accident instructions
- First-aid kit with booklet (check expiration dates of contents)
- EAP *Safety Manual*
- Blood-borne pathogen kit (first aid gloves and one-way respirator)
- Alcohol wipes or other anti-bacterial cleaner
- Thermal blanket or wool blanket (no cotton)
- Reflective triangles (3)
- Dayglow vests (2 for emergency use only, not for routine field work)
- Fire extinguisher (serviced each year before the start of the field season)
- Flashlight
- Tire chains as needed
- Jack and lug wrench that fits lug nuts
- Spare tire
- Jumper cables
- Shovel and rope
- Tool kit, electrical tape, and duct tape
- Long-handled window squeegee
- Ice scraper
- Tow rope

Additional emergency items should be stocked in the vehicle depending on the vehicle's routine

use. For example, if a vehicle will be used in remote forested or logging areas, it must contain an ax or machete, a saw, and other special equipment. If the vehicle will be used for roadside sampling, then traffic warning signs, a flashing amber light, and traffic control cones must be stocked (see *Working Near Traffic and From Bridges*).

During warm weather, cool drinking water must be available for staff working in the field. The cool water can be carried using a 5-gallon drinking water jug. These jugs may be stored at the OC when not in use. Field lead must fill with drinking water and ice at the start of each field day during warm weather.

Loading and Operating Ecology Vans and Field Trucks

Purpose

To describe guidelines and requirements for EAP staff who load and operate Ecology vans and trucks used in field work.

Application

For EAP staff preparing and using Ecology vans and trucks in the field.

Requirements

Chemical hazards

Familiarize yourself with the hazardous characteristics of all chemicals that may be carried to the sampling site. Check Material Safety Data Sheets (MSDSs) if necessary.

Store chemicals in the appropriate containers with labels, and secure containers in the van or truck to avoid breakage or spills. Also secure lead-acid batteries if you are transporting them to field sites.

Avoid storing compounds that may react with one another in the same location.

Breakage of glassware and shifting of equipment while in transit

Store glassware in divided boxes to prevent breakage. Store equipment in proper containers and secure in van or truck to minimize shifting during transit.

Inspect the safety screen separating passengers from equipment to ensure that it will stop debris in the event of an accident.

If breakage occurs, evaluate, eliminate chemical hazard, and remove loose glass shards before continuing transit.

Lifting hazards

Follow the lifting safety procedures recommended in the *Ecology Safety Program Manual.* Place equipment in locations that are as easy to access as possible, so that staff can avoid standing or squatting in awkward positions, for example. Be aware of protrusions and the low ceiling while moving near or in the van or truck.

Vehicle operation hazards

Check fluids, tires, brakes, lights, engine, and other vehicle components prior to operation.

Ensure that all vehicle emergency equipment is available.

If operating the trailer, check trailer tires, lights, and electric brake control to the van or truck. Make sure that tow ball is securely attached to the hitch. Check that safety chains and emergency brake cable are properly attached.

Due to the van or truck's length and poor rear visibility, take extra precautions when backing the van or truck, making turns, and changing lanes in traffic.

Working near Traffic and from Bridges

Purpose

To ensure public and EAP staff safety while working near traffic and from bridges.

Application

For EAP staff when working near traffic and from bridges.

Requirements

Working near traffic and from bridges poses serious hazards; this has been rated by EAP staff as our largest area of concern. Ecology has experienced two on-the-job fatalities in its history; one was when a Washington Conservation Corps (WCC) crew member was struck by a car alongside the highway.

Particularly dangerous are field sites along roads with narrow shoulders, on bridges without physical barriers between traffic and pedestrian walkways, and on bridges lacking outside railings. The primary hazards for the worker are traffic and the potential for flying debris (e.g., rocks). Hazards for motorists are collisions as they react to the presence of workers. Many drivers feel possessive of the road and are offended by people getting in their way.

State and federal regulations mandate that certain precautions be taken and certain procedures followed (e.g., about clothing, signs, barriers, flashing lights) to mitigate risks to motorists and workers alike.

Work near traffic and from bridges should be done only where (1) visibility is good, (2) there is adequate distance between traffic and workers, (3) there is adequate warning for motorists, and (4) traffic is not diverted or channeled. Exceptions can be made in areas of minimal traffic.

Hazard assessment

ALL EAP STAFF are responsible for their own safety and must not enter into any situation that makes them fear for their own safety or the safety of others. Therefore, every near-traffic or bridge site must be thoroughly evaluated for hazards. Even if you have been to a site before, be sure to reevaluate the situation because conditions may have changed to make the site more dangerous.

Field and road conditions vary, so it is impossible to write guidelines that will cover all situations staff might encounter. Therefore, before working at any near-traffic or bridge site, staff must evaluate the hazard level based on, but not limited to, the following hazard-criteria list:

- General exposure
  - How long will you be on site? The timeframes given in the following "Safety practices" section are general guidelines. The assessment of all potential hazards at individual sites may dictate changes in such timeframes.
  - What is the nature of your work?
- Environmental conditions
  - *Time of day*: Is it early morning, mid day, rush hour, dusk?
  - *Weather conditions*: Is it raining, snowing, windy?
  - *Lighting*: Can other drivers see you? Are you well lit? Is it dark? Do motorists face a blinding light because of the sun's position (i.e., are you between traffic and a low, blinding sun – or are you invisible in the shade?).
- Road conditions
  - Is it wet, dry, snowy, icy, oily, under construction, covered with loose gravel, or full of potholes? Is the road narrow for the traffic volume? Is there a fog line (white line)?
- Shoulder conditions
  - Is it wide enough to park a vehicle safely? When parked on the shoulder, can you open your door without it protruding into the traffic lane? Can you safely work around the vehicle without stepping over the fog line into traffic? If not, find a better place to park. Remember that the shoulder is part of the roadway and motorists expect to be able to use it as a "recovery area."
- Traffic conditions
  - Is there a high volume of traffic?
  - What is the traffic speed? High-speed and low-speed areas require different safety practices.
  - Is the road wide enough to handle the traffic load and speed?
- Relationship between road, traffic, and work site
  - Is there a safe distance between workers and traffic?
  - What's the motorist's sight distance?
  - Is the stopping distance for on-coming motorists adequate?
  - How does the work location relate to the course of the road? Are you on a straight stretch of road? If on a curve, are you on the inside or outside of the curve, and how does that affect your safety or the safety of motorists?

- Other safety factors
  - Is there pedestrian traffic near the work site? Be sure that pedestrians can get around your work site and vehicle without stepping into traffic lanes.
  - What is the attitude of local people about government workers? Is there a history of animosity in the area? If so, the worker must take precautions to avoid confrontations with local people and also be particularly careful about obstructing traffic.
  - Be sure to have a personal emergency escape route if something were to go wrong.

Safety practices

The traffic control selected for each situation must be based upon review of the preceding hazard assessment. "Traffic control" is defined as the procedures used to provide for the safety of motorists, pedestrians, and workers in areas where work is being done on or near the roadway.

Details about the need for, and placement of, traffic control devices are beyond the scope of this manual. However, such details and illustrations for various traffic control situations can be found in the DOT *Work Zone Traffic Control Guidelines*. This document is the appropriate reference for work zone safety and placement of traffic control devices. Supervisors must be familiar with how to access this document for use by EAP staff. In addition, the Ecology Safety Office may be contacted for this document and other traffic safety reference material.

The following practices were distilled from various guidance materials and should be adequate for most situations that EAP staff encounter.

EAP staff are prohibited from performing job duties that place the vehicle or the individual inside the fog line. This is considered encroachment into the lane of traffic; therefore, DOT is required to close a lane with certified DOT flaggers.

The following is REQUIRED when working on site for less than 60 minutes (short-duration work) AND when you can park and work outside the traffic lane:

> "Short duration work zones are planned work activities that last up to 60 minutes. Due to the short work time, simplified traffic control set-ups are allowed to reduce the hazards of traffic exposure to workers. The time it may take to set up a full complement of signs and devices could approach or exceed the amount of time it requires to perform the work. Work must be conducted as far from the traffic lane as possible and a safe distance outside the fog line when present." (*DOT Work Zone Traffic Control Guidelines*)

- Park vehicle as far away from the fog line as practical (e.g., way over on the shoulder). Any incursion on or over the fog line is PROHIBITED and considered encroachment, which requires flagging operations and other work zone traffic control devices.
- Place amber flashing light on vehicle's roof top; ensure it is visible to oncoming traffic.
- Turn on vehicle's emergency 4-way flashers.

- Wear reflective safety vest that complies with the current requirements for working within the right of way of the road. As of 2014, the safety vest must comply with ANSI/ISEA 107-2004 Class II certified.
- Wear hard hat and eye protection (safety glasses or impact-resistant sunglasses) when on bridges (optional for non-bridge work).
- Work within the right-of-way that exceeds 60 minutes may require implementing more strict work zone guidelines. This information can be found in the *DOT Work Zone Traffic Control Guidelines*. In general, placement of warning signs, cones, and other traffic control devices are needed to define the areas of the traffic control work zone.

Other considerations

- Review the *Flagger Certification Handbook* for insights into motorists' attitudes and behaviors as well as for procedures needed to mitigate risks to motorists and yourself.
- Prepare a "Traffic Control Plan" for each site. This could be a checklist that outlines hazards and safety practices to help you focus on traffic safety issues.
- Do a safety briefing with your co-workers before exiting the vehicle. Review hazards and your plans for protecting motorists and workers through safety practices.
- When you park along a road, you may want to angle the sampling vehicle as if it were trying to merge with traffic. This might give oncoming motorists the impression the vehicle will be re-entering traffic and thus might increase the motorists' level of caution as they pass.
- Sturdy footwear is recommended to help ensure good footing on and off the road. Other clothing must be appropriate for personal protection and to minimize motorists' distraction.
- Where a slip or fall into traffic is possible, the worker must wear a fall-restraint harness if conditions warrant.
- Be aware of traffic and motorists' behavior around the work site.
- Complete work quickly and safely, minimizing motorist and worker exposure to hazardous situations.

Safety equipment for near-traffic and bridge work

Field staff must have the following equipment in their vehicles when working at near-traffic sites and on bridges. The numbers of items needed depends on the number of workers and situation. Much of this equipment will be stocked in vehicles that are routinely used for such work. When other vehicles are used or additional items are needed, equipment can be checked out at the Operations Center.

The following safety gear supplements, rather than replaces, the required vehicle equipment as listed in *Vehicles – Use, Maintenance, and Safety*.

- Amber flashing light.
- Reflective safety vest that complies with ANSI/ISEA 107-2004 Class II certified.

- Hard hat.
- Safety glasses or impact-resistant sunglasses for eye protection.
- Flagger Certification Handbook.
- Orange traffic cones.
- Traffic warning signs.
- Leather work gloves.
- Fall restraint device or safety tether where necessary.
- Personal flotation device approved by the US Coast Guard for commercial use.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

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Working in Rivers and Streams

Purpose

To provide safety considerations and guidance to EAP staff who must work in streams.

Application

For EAP staff involved in water quality sampling, bio-assessment sampling, continuous monitoring device deployment/retrievals, time-of-travel studies, or other types of instream sampling activities.

Requirements

Evaluate each site to assess hazards and equipment needed to get the work done. Safety procedures may need to be modified for each type of situation. Experience, judgment, and a safety-conscious attitude will help produce safe and successful projects.

A minimum of two people is required when streams are to be waded to conduct stream sampling activities. One person needs to be experienced in wading and conducting the instream sampling activity. The assistant must know what to do in case of mishaps.

Hazards

- Treacherous footing and balance due to stream bottom and pressure of water current.
- Strains and sprains, torn ligaments, or broken limbs from slips and falls.
- Being struck by floating debris, losing footing, and becoming a floater/swimmer.
- Immersion in cold water, increasing risk of hypothermia.
- Drowning.
- Back injury from lifting and carrying heavy anchoring devices.

Safety equipment

Hip boots or chest waders, possibly with felt soles or other traction enhancements.

Per Labor & Industries regulations (WAC 296-800-16070**)**, a personal flotation device (PFD) MUST BE WORN when employees work in areas where the danger of drowning exists, such as on the water, over the water, or alongside the water. Buoyant vests and inflatable PFDs are acceptable if USGS-approved for commercial use. Use a buoyant vest when wading in deeper waters to prevent accidental triggering of an inflatable PFD. Check the date on the automatic inflator and replace when needed. Recommend checking with regional or HQ Safety Officer before purchasing PFDs.

Safety guidelines

Evaluate site hazards by discussing the following site conditions with field crew: water depth, velocity, temperature, stream substrate, floating debris, overhead hazards, downstream hazards, recovery should you be swept downstream, and other potential risks and situations.

If you are the assistant and the wader loses footing, try to help without endangering yourself. You can assist by scanning the stream ahead, telling the wader about approaching hazards, throwing a throw-line to the wader, or extending a branch or other object. At some point it may be appropriate for you to phone for help or seek help nearby from other persons. You must not attempt a swimming rescue, since this may result in two drownings instead of one (the wader and the would-be rescuer).

Any mishaps or near-accidents must be reported to your supervisor.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Fall Protection

Slips, trips, and falls cause many accidents both at work and at home. Cluttered, uneven, or slippery footing sets the stage for serious back or limb injury. You must continually be aware of your footing. For example, if you take a step that doesn't *feel right*, be certain you're on firm footing before you take the next one.

Working at heights can be even more dangerous, and this is a frequent cause of serious on-the-job injury and death. It's important to recognize the situations you encounter where fall protection is required and to understand how to mitigate the potential hazards they present.

Agency Policy

It is the policy of the Department of Ecology that, where possible, field staff will employ work practices that avoid unprotected heights of 10 feet and above that are not provided with adequate fall protection. If protective work practices are impractical, then fall protection must be used, as provided by health and safety WACs.

Definition

A *fall restraint system* is an approved device or component system to restrain a person from falling to a lower level. These devices may be as simple as standard guardrails. They also include safety belts and/or harnesses with lanyards attached to securely rigged lines in such a way as to prevent staff from approaching or sliding any closer than one foot to the edge of the unprotected, elevated surface.

Recognizing hazardous situations

Be alert for the following situations that may require the use of fall prevention measures. Both fall protection and other types of personal protective equipment must be used for some of these situations.

- Working in an unprotected area above a body of water where there are no man-made barriers that would prevent an accidental fall. Drowning is obviously a potential hazard if one falls directly into deep and/or fast moving water, but it's also a potential hazard from a fall from height into shallow water, that may render a person unconscious or incapacitated.

  Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

- Working on the perimeter or slope of an unattended excavation, trench, pit, deep hole, etc, where fall protection barriers have not been put into place or are inadequate. This includes spills, construction projects, open pits, and/or trenches for underground storage tanks.

Activities in these areas may induce sloughing or cave-in. Also, if a fall restraint is not used, you could come into contact with whatever hazard, contaminant, or chemical is present.

- Working in or around abandoned or unattended facilities when it's necessary to work from heights of 10 feet and above (e.g., platforms, ladders, scaffolds, roofs, shafts, pits). If fall protection barriers are not already present or are inadequate, a fall arrest or fall restraint device must be used.
- Working on or traversing hazardous slopes, where injury is likely if you were to fall.
- Working in icy or other inclement conditions where there are additional slipping hazards, or where adequate restraints are not available.

Identifying safe work surfaces

Even when you're working on a surface with a fall potential equal to or greater than 10 feet, fall protection measures may not be necessary, provided the following criteria can all be met:

- The slope of the work surface is such that you or your tools/equipment can't slide over an unprotected edge.
- Your work area is no closer than six feet to the nearest unprotected edge of the working surface.
- You don't need to come closer than six feet to any unprotected edge to enter and exit the work area.
- Fall protection for the location has been identified and discussed as a part of the overall work plan, to include routes for entry and exit.
- You and your co-workers fully understand the appropriate safety procedures.

If these tests are met, the area may be considered a safe work surface and no additional fall protection measures need to be implemented.

However, these criteria don't take into consideration inclement weather, unstable or slippery surfaces, and other hazardous conditions that compromise the safety of the working environment. If something happens to make the work area unsafe, stop work or avoid that location until conditions improve.

Fall protection at field and industrial sites

Fall protection requirements in industry are so varied that you may not immediately recognize the hazard without first consulting (1) the safety and health representative for the facility or contractor or (2) the appropriate site safety plan. This is an important consideration: one of only two on-the-job fatalities Ecology has experienced to date was from a fall in an industrial facility.

Working at heights

If you are conducting Ecology business at a facility or contractor site where it is necessary to work at heights of 10 feet or above, you must do one of the following:

- Follow the written fall protection guidelines of the facility or contractor, where appropriate, to accomplish work tasks in areas where fall protection is required.
- If there are no guidelines available, consider a harness and tether (6 feet in length), railings, cage, or some other type of physical barrier. If you use a restraint device and you're within six feet of an unprotected edge, the tether must not allow for free fall.
- Make use of alternative methods for completing work tasks in these areas, such as (1) remote sample collection by pole or rope or (2) having a facility representative or contractor perform the required task.

Fall Protection Work Plan

The Washington Administrative Code (WAC) requires that each employer "shall develop and implement a written fall protection work plan including each area of the work place where the employees are assigned and where fall hazards of 10 feet or more exists."

WAC 296-155-24505, the Fall Protection Work Plan

1. The fall protection work plan shall:
   - (a) Identify all fall hazards in the work area (including pictures or sketches where appropriate).
   - (b) Describe the method of fall arrest or fall restraint to be provided.
   - (c) Describe the correct procedures for the assembly, maintenance, inspection, and disassembly of the fall protection system to be used.
   - (d) Describe the correct procedures for the handling, storage, and securing of tools and materials.
   - (e) Describe the method of providing overhead protection for workers who may be in, or pass through the area, below the work site.
   - (f) Describe the method for prompt, safe removal of injured workers.
2. Prior to permitting employees into areas where fall hazards exist, the employer shall:
   - (a) Ensure that employees are trained and instructed in the items described in subsection (1) (a) through (f) of this section.
   - (b) Inspect fall protection devices and systems to ensure compliance with WAC 296-155-24510(1) through (3) (c) (ii).
3. Training of employees as required by this section shall be documented and shall be available on the job site.

Program responsibilities for fall protection procedures and equipment

It may be necessary for individual programs to purchase and employ specific fall protection equipment for certain job duties or tasks. Therefore, each program whose employees are required to work at heights is responsible to establish and implement a written Fall Protection Work Plan, as outlined above, in accordance with WAC 296-155-24505. The Work Plan must identify the jobs, tasks, and conditions under which fall protection is required and how the equipment will be used.

Programs are also responsible to ensure that:

- Staff receive proper training in the proper use of fall protection equipment.
- The equipment is approved for its intended purpose.
- The equipment is properly maintained.

Preventing Heat-Related Injuries

Purpose

To ensure EAP staff safety when working outside in warm or hot weather.

Application

For all EAP staff who may work outdoors in hot weather.

Requirements

Heat stress guidelines apply year-round to all outdoor work lasting 15 minutes or longer. Take action to avoid heat stress when the temperature is above 77°F (or 52°F if you're wearing a jacket or other layered clothing).

Actions include drinking plenty of water, removing clothing layers as necessary, monitoring your temperature and pulse, and following guidelines for regulating the duration of your work and rest periods.

Table 1 describes when actions are needed to avoid heat stress, relative to outside temperature, clothing, and Ecology program.

Table 1. When actions are needed to avoid heat stress.

Outside Temperature	Clothing Employee is Wearing	Affected Ecology Programs
89°F	Any type of work clothes	All Ecology programs with field activities
77°F	Double-layer woven clothes including coveralls, jackets, and sweatshirts	WCC, EAP, and other programs with back-country field work
52°F	Non-breathing clothes including vapor barrier clothing or PPE such as chemical-resistant suits	Spill Response, HWTR, and TCP

Drinking water

Each employee must have a sufficient quantity of drinking water that is readily accessible throughout each day's activities. Each employee must be given the opportunity to drink at least one quart of drinking water each hour. EAP management has delegated to field leads the responsibility for providing their field crews with sufficient drinking water every day and for providing water breaks every hour.

When working out of a state vehicle parked close to the field site, field leads are responsible for filling a five-gallon water jug with ice and water at the start of each field day and to have it

available for staff while working each day. The jug must be refilled during the day as needed to ensure that a sufficient quantity of drinking water is available throughout the day. In addition, field staff may bring their own personal drinking water supply.

When working in areas away from the state vehicle or in areas where local water sources are either not immediately available or unsafe to drink, field leads must establish a method to ensure that there is a sufficient supply of drinking water: at least one gallon for each employee during the first half of the day's work activities. Water filters may be provided for back-country work. Additional heat stress guidance for back-country work is provided in the *Ecology Safety Program Manual*.

Training

Field staff and supervisors must be trained annually in outdoor heat exposure. Required elements of this training are outlined in the *Ecology Safety Program Manual* and may be viewed as a pdf presentation on the EAP SharePoint safety site.

Heat stress

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, hydration, and the individual's physiological condition. Because heat stress is a reasonable safety concern during work activities in warm or hot weather, observing others and personally monitoring for heat stress-related signs and symptoms must be an integral part of preventing heat-related injuries.

- Dehydration can exacerbate the onset of heat stress injury. Field staff must be diligent to hydrate before, during, and after working in hot weather to ensure body fluids are replenished and maintained.
- Preventing the onset of heat stress is particularly important. Report to your supervisor, field lead, or co-worker if you or another field employee experiences symptoms of heat-related illness. Once someone has suffered from heat exhaustion or heat stroke, that person may be predisposed to additional heat injuries.
- Individuals vary in their susceptibility to heat stress. Individual physiological factors may predispose someone to a heat stress injury. Reduced work tolerance and the increased risk of excessive heat stress are also influenced by the work clothes and protective equipment worn.
- Personal protective equipment (PPE) adds weight and bulk, reduces the body's access to normal heat exchange mechanisms (i.e., evaporation), and increases energy expenditure.

Types, signs, and symptoms of heat-related illness

One type of heat-related injury is *heat cramps*, which are muscular pains and spasms due to heavy exertion. They usually involve the abdominal muscles or the legs.

Two major heat-related injuries are *heat exhaustion* and *heat stroke*. Heat exhaustion, if

untreated, may progress to deadly heat stroke. If you experience symptoms, take this seriously and take a break to cool down before returning to work. Always have a buddy present to help monitor conditions and administer first aid if necessary. If symptoms worsen or you do not recover within about 15 minutes, call 911 to be transported and medically evaluated. If that's not possible, have a co-worker take you to a medical facility. Do not delay transport.

Symptoms and first aid for treating heat exhaustion and heat stroke are shown in Tables 2 and 3.

Table 2: Symptoms of heat exhaustion and heat stroke.

Heat Exhaustion	Heat Stroke
• Heavy sweating • Exhaustion, weakness • Fainting /lightheadedness • Paleness • Headache • Clumsiness, dizziness • Nausea or vomiting • Irritability	• Sweating may or may not be present • Red or flushed, hot dry skin • Any symptom of heat exhaustion but more severe • Confusion / bizarre behavior • Convulsions before or during cooling • Collapse • Panting/rapid breathing • Rapid, weak pulse • *NOTE:* May resemble a heart attack

Table 3: What to do if someone is suffering from heat exhaustion or heat stroke.

Heat Exhaustion	Heat Stroke (medical emergency)
• Move the worker to a cool, shaded area to rest; DO NOT leave the worker alone. • Loosen and remove heavy clothing that restricts evaporative cooling. • Give cool water to drink, about a cup every 15 minutes. • Fan the worker, spray with cool water, or apply a wet cloth to his/her skin to increase evaporative cooling. • Recovery should be rapid. Call 911 if the worker does not feel better in a few minutes. • Do not further expose the worker to heat that day. Have him/her rest and continue to drink cool water or electrolyte drinks.	• Get medical help immediately, call 911, and transport as soon as possible. • Move the worker to a cool, shaded area and remove clothing that restricts cooling. • Seconds count. Cool the worker rapidly using whatever methods you can. For example, immerse the worker in a tub of cool water; place the worker in a cool shower; spray the worker with cool water from a garden hose; sponge the worker with cool water; or, if the humidity is low, wrap the worker in a cool, wet sheet and fan them vigorously. Continue cooling until medical help arrives. • If emergency medical personnel are delayed, call the hospital emergency room for further instruction. • Do not give the worker water to drink until instructed by medical personnel.

Calculating humiture

Tables 4 and 5 demonstrate the increasing risk of heat stress as temperatures and humidity rise.

Table 4: Heat stress risk potential. *Humiture* is the equivalent outside temperature after adjusting for humidity.

Humiture	Danger Category	Injury Threat
Above 130^0	**Extreme Danger**	**Heat stroke imminent!**
105^0 to 130^0	**Danger**	**Heat cramps, exhaustion likely, or heat stroke is possible if exposure is prolonged and there is physical activity.**
90^0 to 105^0	**Extreme Caution**	**Heat cramps and heat exhaustion are possible if exposure is prolonged and there is physical activity.**
80^0 to 90^0	**Caution**	**Fatigue possible if exposure is prolonged and there is physical activity.**
70^0-80^0	**Caution**	**Monitor fatigue/stress on a case-by-case basis related to the PPE worn, workload, and the individual.**
61^0-70^0	**None Indicated**	**Monitor fatigue/stress on a case-by-case basis.**
Below 60^0	**None**	**Little or no danger under normal circumstances.**

To use Table 5:

1. Determine or estimate the humidity and outside temperature.
2. Find that outside temperature in the first column.
3. Move right to where this temperature intersects the relative humidity column and find the heat stress index temperature, also known as the *humiture*. Humiture is the effective outside temperature after adjusting for humidity.

Table 5: Heat stress index, or humiture.

Degrees Fahrenheit			OUTSIDE RELATIVE HUMIDITY								
			10%	20%	30%	40%	50%	60%	70%	80%	90%
SHADE TEMPERATURE	(add 10 for direct sunlight)	104	98	104	110	120	132				
		102	97	101	108	117	125				
		100	95	99	105	110	120	132			
		98	93	97	101	106	110	125			
		96	91	95	98	104	108	120	128		
		94	89	93	95	100	105	111	122		
		92	87	90	92	96	100	106	115	122	
		90	85	88	90	92	96	100	106	114	122
		88	82	86	87	89	93	95	100	106	115
		86	80	84	85	87	90	92	96	100	109
		84	78	81	83	85	86	89	91	95	99
		82	77	79	80	81	84	86	89	91	95
		80	75	77	78	79	81	83	85	86	89
		78	72	75	77	78	79	80	81	83	85
		76	70	72	75	76	77	77	77	78	79
		74	69	70	73	74	75	75	75	76	77

Optional considerations for heat-related illness prevention

Work-rest periods are warranted and personal physiological monitoring is recommended when the temperature in the work area exceeds 70°F (21°C). Additional guidance on these topics is provided in the *Ecology Safety Program Manual*.

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Winter Safety/Hypothermia

Purpose

To ensure the safety of EAP staff who conduct field work during winter.

Application

For EAP staff needing to access sample sites in winter.

Requirements

Dress for the weather

When venturing out into cold weather, it's important to wear clothing that holds the body's heat. Clothing should be windproof, water-repellant, and capable of allowing moisture to evaporate from the body. Down is good in dry conditions but becomes ineffective when wet. Cotton next to the skin draws heat out of the body when it becomes damp. Wool is the best protection. Certain new synthetics are also good.

Layering clothing is advisable, as the air pockets between fabrics hold the body's heat. Layered clothing also has the advantage of being removable if the temperature rises.

Be prepared

When heading out for a day of winter field work, bring along the following items:

- Identification and emergency medical information
- Cell phone, or other communication devices for areas that lack cell coverage
- Extra food and water
- Extra clothing
- Thermal blanket
- Map
- Compass
- Knife
- Flashlight
- Matches/fire starter
- First aid kit
- Sunglasses/goggles

Hypothermia

Be prepared to recognize the signs of hypothermia. Hypothermia occurs when the body loses heat faster than the body can produce it. This causes the temperature of the main organs (heart, kidneys, lungs, and brain) to drop. Both dry and wet cold can cause this condition.

The first stage of hypothermia is shivering of the body. Shivering is the body's natural reaction to cold. It produces heat. A person in this stage of hypothermia must move closer to artificial heat, eat hot food, and/or add more clothing.

Once the condition has passed this stage, the cold will begin to affect the victim's brain. From this point on, the person will be able to recover only with the help of others. This more dangerous level of hypothermia occurs when the shivering stops. The person may look pale or blue. Movement will be slow. The body is reacting to heat loss by conserving all warmth for the main organs. Less blood is being pumped to hands, arms, feet, legs, and skin. The brain's reasoning power is affected, and main organs begin to slow down as their temperature drops.

It is vital that the person be removed from the cold. Wet clothing, if any, must be taken off. The person must be dried and wrapped in dry blankets, sleeping bags, and/or clothing. Body-to-body contact may be necessary to warm the victim. If the person is conscious, give warm liquids slowly. Take the victim to a medical facility as soon as possible.

Protect yourself from hypothermia

- Know basic first aid, including CPR.
- Take a co-worker with you. Before you go, be sure to fill out the *EAP Field Plan* that indicates where you are heading and when you are expected back.
- Wear appropriate layered clothing. Avoid cotton and down. Wear wool or suitable synthetics.
- Carry food, sweet drinks, clothing, some sort of shelter, and matches. Extra dry clothing may save your life.
- Maintain your energy supply by eating high-calorie foods frequently during your trip.
- Avoid becoming overly fatigued.
- Seek shelter from wind and rain if you are lost. Try to stay dry and put on extra clothing to keep warm. Cover yourself with a thermal blanket and dig a snow cave. Build a fire if dry wood is available.

Communication System Tools in Remote Areas

Purpose
To ensure that emergency communication is possible for EAP staff who conduct field work in remote areas.

Application
For EAP staff working in remote locations.

Requirements

All EAP staff should carry a remote communication device when working in remote areas that do not have consistent cell coverage. The Safety Team recommends the inReach by DeLorme. Always indicate on your field plan that you are carrying a satellite communication device.

Details:
EAP staff spend a lot of time in the field in remote places. Communication from these places can be poor or non-existent. We depend on our cell phone to communicate most of the time, but in these remote areas our cell phones may not work to either call or text because there is no cell tower close by. This means you must hike out or drive to an area where you have coverage. This can waste valuable time in the event of an emergency.

One way to manage this problem is to have a communication unit that will allow you to communicate using satellite technology. After reviewing the current options, we recommend the inReach by DeLorme. This product allows the user to send text a message both ways, send a global SOS, receive confirmation that your message has been received, create a message size of 160 characters, track and share GPS information, and locate the user via pinging.
InReach uses satellite communication rather than cell towers. This allows you to send and receive messages, trigger an interactive SOS signal, and also allows for tracking of your location. The reality is that 90% of the earth's surface lacks consistent, reliable coverage since most cell towers are located where people live, not necessarily where they enjoy the outdoors.

inReach allows you to create preset messages in order to quickly send and receive text messages. You can pair with other mobile devices, enable tracking, and transmit your location every 10 minutes for up to four hours. In the event of an emergency you can trigger an interactive SOS.

Working in Remote Areas during Winter

Purpose

To ensure the safety of EAP staff who conduct field work in remote areas during winter.

Application

For EAP staff using snowmobiles, skis, or snowshoes during winter conditions to access sample sites in remote areas.

Requirements

All EAP staff who plan to conduct this type of work must get supervisor and safety committee approval prior to submitting a completed *EAP Field Plan*. This form includes the necessary contact person and search operation information to conduct search and rescue operations (if needed).

No fewer than two qualified individuals will comprise a winter travel team; the buddy system must be used at all times. Qualified EAP staff are those who have completed a safety course in snowmobile operation and winter survival. Safety courses such as winter survival may be offered through R.E.I. or a Mountaineers Club. The Forest Service or a snowmobile club may offer training in snowmobile operations. In addition, qualified EAP staff must read and follow the recommendations in the *Winter Safety/Hypothermia* section of this manual. Qualified individuals from other agencies include those who have met a similar set of requirements.

Check the weather conditions, mountain weather forecasts, avalanche danger, and pass conditions before departing. It is up to the staff planning to access the remote area to determine if it is safe to enter the area. However, staff must not enter a remote area if the detailed AVALANCHE FORECAST **(**www.nwac.us/) indicates *Moderate* or higher conditions. Staff may consider entering remote areas only during *Low* or below avalanche forecast conditions.

Each person within the team will be equipped with a winter survival pack which includes, at a minimum, the following items:

- Map
- Compass
- Global Positioning System (GPS)
- Flashlight (headlamp preferred, check your batteries)
- Food and water
- Extra clothing (synthetics and wool only)
- Sunscreen and sunglasses (glacier glasses or goggles preferred)

- First aid kit
- Knife
- Waterproof matches
- Candle and fire starter
- Thermal/space blanket
- Personal identification and emergency medical information
- Cell phone and two-way radio (*Note*: many remote areas do not have cell phone coverage) or other emergency rescue beacon, such as inReach (See Communication System Tools in Remote Areas).
- Whistle
- Snow shovel
- Avalanche beacons (transceivers) and probes

Before departure, inspect each pack to ensure all equipment is present and in working order.

Note: Team members must remain in contact with each other while in the remote area.

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Chapter 2. Specialized Work

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Measuring Flows in Rivers and Streams

Purpose

Measuring streamflow is usually done by determining velocities at various depths and distances across a stream channel. Measurements are typically obtained by four methods: wading, from boats, from bridges, and bank to bank- rope deployment using an Acoustic Doppler Current Profiler (ADCP). Each of these methods presents safety concerns for field staff and the public.

These guidelines provide EAP staff with information and training requirements to safely perform flow measurements. Technical considerations and methods for measuring streamflow can be obtained from the EAP's stream hydrologists.

Application

For people measuring streamflows by wading, from boats, from bridges, and rope deployment bank- to- bank using an ADCP. This section may also apply to cases where collection of other river/stream data involves similar procedures and hazards (e.g., developing stream cross-section profiles).

Requirements for measuring flows by wading

Evaluate each site to assess hazards and equipment needed to get the work done. Safety procedures may need to be modified for each flow measurement situation. Experience, judgment, and a safety-conscious attitude will help produce safe and successful flow measurements.

A minimum of two EAP staff are required when streams are to be waded. One person is to be experienced in wading and performing stream measurements. The assistant must know what to do in case of mishaps.

Each field crew member must wear a Personal Floatation Device (PFD).

A tag-line safety system is required under certain conditions. Such use requires training that is provided by the EAP's stream hydrologists.

Hazards

- Treacherous footing and balance due to stream bottom and pressure of water current.
- Strains and sprains, torn ligaments, or broken limbs from slips and falls.
- Being struck by floating debris, losing footing, and becoming a floater/swimmer.
- Immersion in cold water increasing risk of hypothermia.
- Drowning.

Safety equipment

- Hip boots or chest waders, possibly with felt soles or other traction enhancements.
- A PFD for each person. Check the date of the Automatic Inflator for expiration date and replace when needed. A PFD is not an appropriate safety harness and must not be used as such.
- A tag-line system that increases protection for the wader in situations where the risk of losing footing and being swept downstream is higher. This system includes an appropriate safety harness, a short tether, a belay line and appropriate belaying point, a tag-line, a throw-line in bag, and proper training.
- The safety harness keeps the wader attached to a line if footing is lost. The harness must be a chest or full-body harness type. Waist or seat-type harnesses must not be used since these may prevent waders from keeping their heads above water while the harness is under load.
- The tether connects the harness-wearer to the tag-line and must be short enough to allow the wearer to grab onto the tag-line. The tether has a quick-release mechanism at the harness end that allows the wearer to release self while under a load. The tag-line end of the tether must have a snap hook that easily clips onto the tag-line or the belay line. The wader must be attached to one line only – either the tag-line or the belay line. Attachment to both lines at once can present additional hazards and negate other safety practices.
- The tag-line is the line stretched across the stream to which the wader can attach. The tag - line may be made of low-stretch material such as wire cable or Kevlar line. Both ends are anchored and the tag-line is commonly tensioned using a mechanical "come-along" winch.
- A belay line and system is used to protect the wader crossing the stream in order to anchor one end of the tag-line on the opposite bank. The belay line must be of adequate strength and length. The belay point must be adequate to allow the assistant to safely control the line (holding, taking up, and letting out) as needed for the wader to cross the stream or recover in case of a slip. The assistant may need gloves to protect hands while belaying. The belay line is attached to the snap-hook end of the tether. The tether at this point is not attached to the tag-line.
- A knife or cutter capable of cutting any part of the tag-line system if cutting is necessary. The assistant must have one at the tag-line anchor or at belay point or both.
- The throw-line is a weighted bag with >50 feet of line inside and is used for throwing to a swimmer (former wader) to help rescue.
- A cell-phone on site to call for help if needed.

Safety guidelines

Evaluate site hazards by discussing site conditions with field crew. Address water depth, velocity, temperature, stream substrate, floating debris, overhead hazards, downstream hazards, and recovery if you are swept downstream, and other potential risks and situations.

Determine whether a tag-line system is required. In general, use of a tag-line system is needed when site conditions are more hazardous (e.g., estimated depth times velocity ≥ 8: using feet and feet per second as units) or the dangers from being swept downstream are unacceptable (e.g., no place for recovery or self-rescue).

If needed, a tag-line system is set up with the equipment described above. The crew discusses their plan for setting up the tag-line and belaying system and also what options to pursue if the wader loses footing. The wader dons harness, tether, and PFD, and crosses the stream while belayed by the assistant. The wader anchors the far-shore side of the tag-line, returns to anchor and tension the near-shore side of the tag line, attaches tether to the tag-line, and proceeds to make flow measurements. During the wading work, the assistant keeps watch for hazards such as floating debris and boat traffic. The tag-line system can be taken down in the reverse of its setup.

If you are the wader and lose your footing, you may be able to regain your footing by grabbing the tag-line and pulling yourself up. You also have the option to release yourself from the tether and go downstream for self-recovery. If you've chosen to release from the tag-line and go with the flow, face downstream with feet out in front to protect self from rocks or debris. Check with your assistant for help. Scan the stream for opportunities to regain footing or make way to the shore. Anticipate where the current will take you and be prepared to deal with upcoming hazards. Be especially aware of being swept into downed trees and other "strainers." The pressure of stream current can pin you against such objects and increase the chance of drowning.

If you are the assistant and the wader loses footing, try to help without endangering yourself. If the wader releases from the tag-line or belay line, try to follow the wader while on shore. You can assist by scanning the stream ahead, telling the wader about approaching hazards, throwing the throw-line to the wader, or extending a branch or other object. At some point it may be appropriate for you to phone for help or seek help nearby from other persons. You must not attempt a swimming rescue, since this usually results in two drownings instead of one (the wader and the would-be rescuer).

Any mishaps, near-accidents, or drownings must be reported to unit supervisors.

Requirements for Measuring Flows from Boats

Evaluate each site to assess hazards and equipment needed to get the work done. You may need to modify safety procedures for each flow measurement situation. Experience, judgment, and a safety-conscious attitude will help produce safe and successful flow measurements.

The boat operator must have approved training and be authorized to operate Ecology watercraft in accordance with existing Ecology and EAP safety guidelines.

Safety of the public must be enhanced by using anchored warning signs and safety spotters equipped with adequate visual and auditory warning devices (e.g., warning flags, air horn). Additional warning efforts may be needed in some situations. Staff must have previous boat

flow-measurement experience and training and be familiar with the EAP stream hydrologists' written protocol for determining streamflows.

A minimum of a three-person crew is needed for measurements; two staff for the boat work and one person on shore to be a safety lookout. Section supervisor permission is required if a single person uses the boat.

Hazards

- Boaters and jet-skiers hitting low tag-line or cable at any speed.
- Hazards inherent in boating, especially capsize and crew overboard due to holding boat stationary in current and working with cables, other equipment, and floating debris. (See section on *Boating*).
- Site-specific characteristics must be reviewed to evaluate site hazards, such as: other boating traffic, channel morphology, velocity, depth, stream width, floating debris, weather, and capsize hazards from fixed objects such as boulders, downed trees, and bridge supports.

Safety equipment

- All safety equipment and procedures required for boating.
- When needed, a belay system (as described in wading section above) for boat-to-shore recovery.
- PFD for on-shore assistant.
- Brightly colored surveyor tape, for marking the tag-line at 2-meter intervals.
- At least two sets of warning buoys, anchors, and signs with concise warning of the hazard – at least one set each for upstream and downstream placement of the work zone.
- High-visibility orange or red warning flag on handle that can be waved to attract attention of boaters – one for each shore-based spotter and boat crew.
- Adequate sound-producing device such as an air horn that can be used to attract attention of boaters – one for each shore-based spotter and boat crew.
- Knife or other cutter adequate for emergency cutting of the tag-line or other gear that might present a hazard – one for each shore-based assistant and boat crew.

Safety guidelines

Select the appropriate boat to use for discharge measurements. Each boat lends itself for use in different situations. Boats and guidelines for their use in measuring streamflow are:

- Nine-foot Livingston (500 lbs carrying capacity): One person on-board. Use in slow current (< 1 ft/sec) conditions only. Use with oars or small displacement outboard motor. If conditions warrant, the on-shore assistant tends a belay-line attached to the boat. The belay-line is routed along the tag-line via some tear-away attachments (e.g., Velcro loops). In case of an emergency, the boat is released from the tag-line and can be pulled to shore with the belay-line.
- Fourteen-foot Jon Boat (600 lbs carrying capacity): One to two persons on-board. Use in slow to moderate (0 – 2 ft/sec) current conditions. Use with oars or small displacement outboard motor. If conditions warrant, the on-shore assistant tends a belay-line as described above. In case of an emergency, the boat is released from the tag-line and can be pulled to shore with the belay-line.
- Sixteen-foot Jet Sled (625 lbs carrying capacity): Two persons on-board. Use when challenging water conditions (> 2 ft/sec) are expected. Maintain a pair of oars on-board in case of emergencies. Use of a belay-line system is not recommended with this boat.

Warn others of the danger you present. Anchor warning buoys and signs in appropriate location (usually mid-channel) about 300 feet above and below the cross-section intended for discharge measurement. Multiple warning buoys and signs may be needed on larger streams to adequately warn boaters and jet-skiers of danger.

The tag-line stretched across the stream channel presents an EXTREME DANGER to boaters and jet-skiers. Warning floats must be colored bright orange and signs painted in bright red and white or other contrasting color. Sign messages must be short and to the point; boaters will have only a few moments to get the message. Example wording for signs: “DANGER - Low Cable Across Stream.”

Shore-based safety spotters must be stationed in adequate places so they can warn boaters and jet-skiers of danger ahead, tend a belay-line if used, and cut the tag-line if needed. Shore-based spotters must be equipped with warning flags, an air horn or other appropriate sound device, a knife or cutter adequate for cutting the tag-line, and warning signs that describe the danger. Spotters and boat crew must develop a communication plan in case a boater or jet-skier is not warned or ignores the warning. Multiple (> 7) short blasts of the air horn should alert the boat crew that a boat or jet-skier is approaching the danger zone. Should this happen, the boat crew must be ready to use flags and air horns to warn the approaching persons. The shore crew and boat crew must also be ready to cut the tag-line such that it drops into the water, thereby reducing the hazard to the approaching persons.

Assemble gear and prepare to set up the tag-line system. Anchor the tag-line on both sides of the stream and stretch taut. Flag the tag-line with brightly colored surveyor tape at about two-meter intervals to help make it more visible to boaters. The area near the boom and cross-piece must be kept clear of equipment, so the tag-line release mechanism is clear to operate. Extra equipment must be minimized and stowed in a manner that will avoid potential hang-ups during emergency release.

Practice holding the boat in the current attached to the tag-line by the boom and crosspiece before attempting an actual flow measurement, to ensure no complications arise when the boat is under load from the water current. The higher the velocities, the greater the potential for problems to arise. Operator and crew must ensure that emergency release options are in working order.

Perform the flow measurements while remaining aware of stream conditions and boating traffic. Emergency release from the tag-line may be needed to avoid incoming debris, approaching watercraft, prevent capsize, or other reason. When the tag-line is released, the boat will move backwards under the tag-line, and any crew upstream of the line could be injured or swept overboard. Following release, or cutting of the tag-line by shore assistant, the boat operator must quickly gain control of the boat by motoring or rowing to a safe location. When conducting measurements in higher velocities, it is advisable to keep the engine idling or oars ready in case of an emergency.

When the flow measurement is complete and the tag-line is retrieved from across the stream, the warning system can be dismantled (buoys, signs, anchors, and shore assistants).

Requirements for measuring flows from bridges

Staff must read the section on *Working Near Traffic and From Bridges* and the section on *Fall Protection* before participating in flow measurement from bridges. Working near traffic and from bridges can pose serious hazards, especially along roads with narrow shoulders and on bridges without physical barriers between traffic and pedestrian walkways, or bridges lacking outside railings. The primary hazards for the worker are traffic and the potential for flying debris. Hazards for motorists are collisions as they react to the presence of workers.

State and federal regulations mandate that certain precautions be taken and certain procedures followed regarding clothing, signs, barriers, flashing lights, etc., to mitigate risks to motorists and workers alike.

Work near traffic and from bridges must be done ONLY where (1) visibility is good, (2) distance between traffic and workers is adequate, (3) there is adequate warning for motorists, and (4) traffic is not diverted or channeled. Exceptions can be made in areas of minimal traffic.

Hazards

- Motorists' attitudes and workers' attitudes.
- See the section on *Working Near Traffic and From Bridges*.
- See the section on *Fall Protection*.
- Entanglement hazards to boaters and workers from the various gear used to lower weights and sensors to the stream.

Safety equipment

Evaluate each site to assess hazards and equipment needed to get the work done. Safety procedures may need to be modified for each flow measurement situation. Experience, judgment, and a safety-conscious attitude will help produce safe and successful flow measurements. Consider the following:

- Personal protective gear, equipment to warn motorists, and procedures as described in the section on *Working Near Traffic and From Bridges*.
- Personal protective gear and procedures to protect from falls as described in the section on *Fall Protection*.
- A large orange or brightly colored marker, such as a float, to hang near the measurement cable when boating traffic may be present.

Safety guidelines

See the section on *Working Near Traffic and From Bridges* for guidelines addressing traffic hazards and their management. See the section on *Fall Protection* for guidelines addressing fall hazards. Assess remaining hazards and take appropriate steps to reduce the risk to EAP staff and others.

Marine Flights

Purpose

To describe safety precautions for marine flights.

Application

For EAP staff conducting marine flights.

Requirements

Field sampling notification

Field sampling notification emails must be completed by staff prior to the flight. Two emails are sent the morning of a flight: one to key Ecology, Port of Olympia, and Olympia Rowing Club staff, and another to the Coast Guard and WA DOT. Field staff also complete a Western Operations field schedule form.

Notification of the US Coast Guard (USCG) on flight days

On the morning of a flight, notification of flight activities must be sent in the form of an email cover letter and flight map for the applicable flight to the U.S. Coast Guard at:

'SectorSeattleSWO@uscg.mil'; 'psvts@uscg.mil'; 'Ronald.A.Owens@uscg.mil'; USCG SEATTLE C; 'D13.CC@uscg.mil'; 'wsfwsup@wsdot.wa.gov'; 'wsfsecurity@wsdot.wa.gov'.

Flight operations near naval bases and vessels

Two of the Marine Monitoring Unit's long-term marine flight stations are located near Naval Operations Areas including the Bremerton Naval Shipyard (Sinclair Inlet) and the Indian Island Munitions Depot, Port Townsend. Due to the Navy's sensitivity regarding the security of these areas, it is advisable to use judiciousness and exercise cautious behavior when sampling in the vicinity of these bases. One of the long-term marine flight stations is now located in a no-fly (total security restriction) zone, near the submarine base at Bangor (Hood Canal). Access to this station is not allowed. Flight personnel must familiarize themselves with the boundaries of this area and avoid entering this air space.

Naval vessels must not be approached. All vessels must maintain a distance of at least 500 yards from any Navy vessel. When in the vicinity of a naval vessel, contact the vessel on VHF16 and contact the USCG senior watch officer at 206-217-6002, and notify them of flight activities.

Lifting hazards

Staff must be aware of the lifting hazards involved in loading and unloading the van and plane. Follow the lifting safety procedures recommended in the *Ecology Safety Program Manual.*

Safety in the air

Staff must familiarize themselves with the location and use of the emergency equipment (life preservers, life raft, first aid kit, radio, exits, etc). The pilot will provide this information to all staff and observers before take-off. Earplugs, seat belts, and non self-inflating life vests must be worn while in the air and during take-offs and landings. All sampling equipment should be secured with straps or behind netting in order to minimize the risk of getting hit by loose objects while the plane is in motion.

Safety on the water

The float plane is considered a watercraft while on the water and must follow all boating safety rules that apply to boats and other motorized watercraft. The pilot is responsible for the safe operation of the float plane. Staff must be aware that the float plane cannot maneuver as quickly, and is more affected by the wind than a boat of the same size. Paddles are located on the pontoons to help maneuver in an emergency situation.

Winch operation

Due to the close proximity to rotating equipment, the winch operator must wear proper clothing and avoid loose hair to prevent entanglement. Crew members must be instructed not to distract

or have conversations with the winch operator while the winch is in operation, except during an emergency. The winch operator must never leave the winch unattended while it is in operation.

The winch operator must make every effort to safely guide the Vectran line evenly onto the winch drum while the winch is re-spooling. This assures balanced distribution of the line, as well as preventing the line from jumping off the drum and entangling in the spindle and creating snarls and weaknesses in the line.

Snagging the Conductivity, Temperature, and Depth (CTD) Instrument

If the CTD becomes permanently snagged on the bottom, the line must be released and a buoy attached to mark the spot (allow sufficient extra line to account for tidal fluctuations and current set). Get a position (dead reckoning, GPS, pilot's fix) as soon as possible. Staff must not attempt to use the plane nor the marine flight winch and winch frame to free the instrument as this could lead to extremely unsafe situations or equipment failure or both. Staff must return by boat ASAP to retrieve the equipment.

Chemical use

Powdered or liquid chemicals for fixing dissolved oxygen as well as chemicals for preservation of phytoplankton samples are used on the flights. Staff must be familiar with the applicable Material Safety Data Sheets and wear appropriate protective gear such as eye protection and gloves. Staff must also follow safety guidelines in the *Ecology Headquarters Chemical Hygiene Plan*. The pilot and air crew must be made aware of the hazards of these chemicals and how they are to be employed during marine flight operations. The MSDSs must be made available for review by the flight crew.

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Groundwater Sampling and Water-Level Measurements

Purpose

To describe safety considerations and guidelines for conducting groundwater sampling and water-level measurements.

Application

For EAP staff who sample groundwater and conduct water-level measurements or water quality sampling surveys.

Requirements

New staff, or staff unfamiliar with sampling groundwater or measuring groundwater levels, must receive safety instructions from a knowledgeable person before going on site.

EAP staff who sample at hazardous waste sites must have completed a certified 40-Hour *Hazardous Material Training* course and be current on their annual (eight-hour) refresher requirements.

Hazards

Groundwater samples and water-level measurements are generally taken from three types of wells: water-supply, resource protection (monitoring), and piezometers.

Samples from water-supply wells are typically obtained from a tap near the well head. This usually presents few hazards. Water-level measurements, however, must be obtained directly at the well head, which puts staff in much closer proximity to potential hazards.

Numerous physical hazards are common around water-supply wells, particularly private wells. Well houses and well enclosures are enclosed spaces and, although they are usually benign, circumstances can make them dangerous. Staff must be careful when opening doors and hatches to well enclosures, pause and look around at the conditions before entering. Hazardous chemicals, tools, and other items are often stored in and around well houses; staff must beware of spills and fumes before entering well enclosures.

Many well heads are below ground level, and staff must be careful about entering below-ground enclosed spaces. Well heads for private wells are often wrapped with insulating materials that may house mice, snakes, wasps, and spiders. Staff should wear leather gloves or other protective clothing when handling such materials. Poisonous spiders (e.g. Black Widow and Brown

Recluse) are common in and around well enclosures, particularly east of the Cascades.

Dogs are also a potential hazard that staff must be aware of. Staff must obtain access permission from the well/property owner and be aware of the owner's attitude about the work being done on the well. It's best to work in teams of two, particularly at well sites new to the field staff.

Public-supply and irrigation well sites often have a variety of equipment and hazardous conditions associated with them. These sites are essentially industrial sites and must be treated as such. Overhead equipment is common in these areas. Therefore, hard hats must be worn, if appropriate. These wells usually run on high-voltage power, so electric shock hazard is a concern.

When irrigation-well pumps are removed for servicing, the well itself is often left open and may be covered only with a sheet of plywood or other temporary material. These open wells are as much as 36 inches in diameter at the surface, often extend to depths in excess of 1000 feet, and narrow with depth to a diameter of about 10 inches at the bottom. These open wells are extremely dangerous, are big enough for an adult to fall into, and pose a serious life-threatening hazard when encountered in the field.

When sampling resource protection (monitoring) wells, the degree of hazard varies depending on site conditions. Hazards can include chemical hazards caused by the presence of on-site contamination; or physical hazards such as steep, slippery, or uneven terrain, traffic, heavy lifting, noise, weather, and electricity. A *Health and Safety Site Plan* is required for all Ecology staff working at known or potentially hazardous waste sites. Monitoring wells are frequently located on or near active industrial sites, so field staff must remain aware of the typical hazards associated with such sites (for example, heavy equipment traffic).

Piezometers are small-diameter, shallow wells manually or mechanically installed by EAP staff near, or in, rivers and streams. They are normally removed from the site after the monitoring is finished. The installation, sampling, and removal of piezometers are generally associated with groundwater/surface water interaction studies (for example, Total Maximum Daily Load projects). They are normally located in remote sites where physical hazards such as steep, slippery, or uneven terrain, heavy lifting, noise, weather, and wading in streams can be expected. Samplers must carefully plan all aspects of the piezometer monitoring program, including obtaining permits.

Equipment

Groundwater sampling and water-level measurements involve the use of a variety of light portable equipment to heavier power-supplied equipment. Typical equipment used includes:

- Water quality meters and probes (e.g. pH, temperature, dissolved oxygen, and specific conductance.
- Water level measuring equipment (electric sounding meter, graduated steel tape)

- Chemicals (probe calibration standards, sample preservatives, cleaning and disinfecting supplies)
- Filtering equipment
- Air compressor
- Power supply (generator, battery)
- Pumps (submersible, bladder, peristaltic)

Observe special precautions to avoid electric shock when using electrical equipment, such as a generator, around wet site conditions. Keep the generator and electrical cords out of wet areas or standing water, and wear rubber boots.

Equipment decontamination may require the use of potentially hazardous chemicals. It is necessary on occasion to use hazardous chemicals while sampling groundwater. For instance, nitric acid is often used to preserve samples in the field. Wear protective clothing and eyewear when working with hazardous chemicals.

Follow safe lifting procedures when moving heavy equipment such as generators and pumps.

General safety guidelines

- All available site data must be reviewed before going on site to identify potential hazards.
- Equipment must be checked by a competent person to ensure equipment is operating correctly.
- Sampling crew must be attired at the appropriate level of protection as specified in a Site Safety Plan, if required.
- Proper lifting methods must be used for heavy equipment.
- Extension cords and plugs must be in good condition.

Well installation safety guidelines

- For wells greater than 10 feet deep, the drilling and installation activities must be done by or carried out under the supervision of a driller licensed in Washington State.
- The drilling crew must wear hard hats.
- The drill's mast must remain at least 10 feet from any above-ground power lines. A greater distance will be required from power lines with more than 50kV voltages to ground.
- When moving from one drilling area to another, masts, tripods, drill steel, and tools must be secured in safe positions.
- In case of an electrical storm the mast must be lowered and drilling stopped.
- All hook or lifting assemblies must be equipped with a safety catch or retainer mechanism.

- Machine guarding must be in place when rotating auger.
- Trenches must be dug to divert water from the site, to keep footing secure.
- Drill blocking must be adequate to be secure. Anchoring pins and chains must be installed before drilling.
- Loose-fitting clothes must not be worn around operating machinery.

Piezometer installation and removal safety guidelines

Piezometer installation by drop hammer, sledge hammer, or fence-post driver, presents significant physical hazards. At least two people are required for this task. In all cases, proper personal safety equipment must be in use (eye protection, ear plugs, hard hats, heavy work gloves, if necessary, a PFD, and if possible steel-toed wader boots).

A small step ladder is sometimes used to install piezometers; beware of falls from an unstable ladder resting on a gravelly or slippery streambed. Heavy drop hammers are frequently elevated well above head level of workers; field crews must take extra caution in these cases. Take particular care to avoid smashing fingers and hands during the work. The heavy weights and forces needed to drive piezometers into the ground or remove them from the ground can be very dangerous to field personnel.

Piezometers are often installed instream in swiftly moving waters. Field crew must avoid working in water above waist level. Also, watch for deadheads (e.g woody debris) floating from upstream. Field crew must take extra care to avoid falls into the current; chest waders and boots can fill quickly with water and drag the worker underwater or into a swifter portion of the current.

Using Hand or Power Tools

Purpose

To describe hand or power tool hazards, safety requirements, and guidelines.

Application

For EAP staff fabricating, installing, or repairing equipment in the shop or in the field.

Requirements

Hazards

Although tools are necessary to complete fabrication, installation, or repair projects, their use can be a safety issue for the user and adjacent people or equipment. Almost all tool injuries occur when the tool is used improperly or beyond its intended function. If you are uncertain of how to properly use a tool, arrange for Operations Center technicians to do the work or to provide you with training to finish the job.

Safety requirements

Hand Tools

Prevent hand tool injuries by using the following guidelines:

- Select the proper sized tool for the job.
- Read the tool instruction manual (if available).
- Think about what would happen if the tool slips or breaks during use.
- Avoid forcing a tool to do something it is not designed to do.
- Replace defective or broken tools.
- Keep tools clean (especially hand grips).
- Avoid using dull tools because they require more force than sharp ones.

Vehicle Tool Kits

Each EAP field vehicle must have a basic hand tool kit as part of the required operation and safety equipment list. Broken or lost tools need to be replaced. If the vehicle's normal users require additional tools, the users should purchase them and keep in the vehicle. Operations Center hand tools are not to be used as field tools.

General Shop Tools

A roll-around tool storage cabinet has basic hand tools for general use in the Operations Center area.

Technician Tool Boxes

The standard and specialized tools in the Operations Center technicians' tool boxes are reserved for Operations Center technicians and are not for general EAP staff use.

Power Tools

The EAP power tools have been separated into either general use or technician use classifications. EAP staff may use a specific general use power tool after receiving proper equipment use instruction from Operations Center technicians and after having been listed as trained on the tool. EAP staff are not authorized to use the technicians' power tools unless authorized on a case-by-case basis as determined by the technicians and management.

Power tool use classifications are as follows:

- General Use
  - Small portable 3/8 inch power drills.
  - Drill press with drill bits smaller than ½ inch.
  - Battery-powered ½ inch drill.
  - Bench grinders (2).

- Technician Use
  - Table saw.
  - Band saw.
  - Metal cutting band saw.
  - Metal lathe.
  - Drill press with drill bits over ½ inch.
  - Compressed air tools (nailers, grinders, impact wrenches).
  - Saber saw.
  - Circular saw.
  - Milwaukee ½ inch heavy duty portable drill.
  - Router.
  - Belt sander.

Most power tool accidents occur when the tool is overloaded for its capacity, operated improperly with protective guards removed, or used with the wrong work materials. Staff must use the following guidelines when considering a power tool for a job:

- Select the proper size and power source for the tool (bigger is not always better).

- Read the tool instruction manual prior to operation and observe all warning labels.
- Keep the tool guards in place.
- Wear proper protective clothing and safety equipment.
- Do not become distracted while using power equipment.
- Protect other people and equipment adjacent to the power tool during operation.
- Do not modify the tool from its intended task.
- Replace defective or broken tools, and always inspect the tool before use.
- Do not force the tool to work on materials faster than it is designed to.
- Keep the power tool and work area clean.
- Be prepared for the power tool to break or bind during operation.
- Properly secure and store the power tool when finished with the task.
- Never leave a power tool running unsupervised.

Note: EAP technicians are authorized to prohibit the use of any tool if it is being used in an unsafe manner until a safer method or tool can be used to finish a job.

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Using Brush Cutters and Trimmers

Purpose

To describe hazards and safety guidelines for operating brush cutters and trimmers.

Application

For EAP staff operating brush cutters or trimmers in the field.

Requirements

Because brush cutters and trimmers are high-speed cutting tools, some special safety precautions must be observed to reduce the risk of personal injury. Careless or improper use may cause damage from flying debris or serious injury to the operator or someone nearby. To receive maximum performance and satisfaction from the brush cutter or trimmer, it is important that you read and understand the maintenance and safety precautions before using the tool. *So be sure to read the manual.*

The use of any brush cutter or trimmer may be hazardous. If the rotating cutting tool comes in contact with your body, it will cut you. When it comes in contact with hard objects, such as rocks or bits of metal, it may fling them at high speed in the direction of the operator, bystander, or parked/moving vehicles. Striking a hard, solid object could damage the cutting attachment and may cause blade to crack, chip, or break. A cracked blade will make an "off" and deadened sound; it should have a clear ring sound. Also, sparks from striking these objects could cause a fire, so be alert and have fire extinguishing tools available.

The operator must be in good physical condition and mental health and not under the influence of any substance, such as drugs or alcohol, which might impair vision, dexterity, or judgment. Do not operate if you are fatigued. Be alert--if you get tired while operating a brush cutter or trimmer, take a break. Tiredness may result in loss of control. Grip the handles firmly to keep control of the equipment. Too tight of a grip ("death grip") may cause "white finger disease" due to vibration. Check area for unseen objects before starting. Remove objects if possible or flag them with flagging tape. Cut the grass only as short as necessary for the project or activity.

To reduce the risk of injury, the operator must wear proper protective apparel. The deflector provided on the brush cutter or weed eater may not protect the operator from all foreign objects such as gravel, glass, or wire thrown by the rotating attachment. Thrown objects may also ricochet and strike the operator. Proper apparel guidelines are:

- Wear eye protection such as safety glasses, safety goggles, or face shield.
- Wear ear protection such as ear plugs or ear mufflers.

- Protect your hands with gloves. Leather gloves are recommended.
- Wear clothing that is sturdy and snug-fitting, but allows complete freedom of movement. Long sleeves are recommended. Avoid loose-fitting jackets and clothing.
- Do not wear shorts when operating this type of equipment.
- Good footwear is a must. Wear sturdy boots with non-slip soles.
- Wear an approved safety hard hat to reduce the risk of injury to your head.
- Wear chaps to protect your legs.

Fueling

Gasoline is an extremely flammable fuel if spilled and ignited by a spark or other ignition source. It can cause fire and serious burn injuries or property damage. Use extreme caution when handling gasoline or fuel mix. Do not smoke or bring any fire or flame near the fuel or brush cutter/trimmer.

Fuel machines in a well-ventilated area, ideally outdoors. Always shut off the engine and allow it to cool before refueling. Gasoline vapor pressure may build up inside the fuel tank, depending on the fuel used, the weather conditions, and the tank venting system. To reduce the risk of burns and other personal injury from gas vapor, remove the fuel cap carefully to allow any pressure build-up in the tank to release slowly. Do not lean over gas tank while relieving pressure from tank because gas may bubble up in your face and eyes. Never remove the fuel cap while the engine is running.

Chain Saw Operation, Maintenance, and Training

Purpose

To describe hazards, safety and training guidelines for operating a chainsaw.

Application

EAP staff operating chainsaws at work sites.

NOTE: Except in emergencies, felling of trees is not allowed. Chainsaw use is restricted to removal of limbs and fallen trees only. Controlled felling of tree boles takes much training and experience and is beyond the scope of program usage.

Requirements

Chainsaws are high-speed cutting tools with exposed teeth so special precautions must be followed to reduce the risk of personal injury. The chain revolves at 88 feet/second and contact of the moving chain with rocks or other solid objects may break the chain or cause the saw to kick back, or throw sparks which can cause fire. The latter is why commercial logging is often restricted during dry summer months. These and other hazards all carry the potential to cause serious or fatal injury to the operator or bystanders. To receive maximum performance from a chainsaw, read and understand the maintenance and safety precautions before using the tool. PARTICIPATE in training, and READ the manual.

Safety

To reduce the risk of injury, all persons operating a chainsaw are required to wear the following safety equipment.

- Hard hat
- Safety glasses
- Ear protection
- Long pants and long-sleeve shirt
- Leather boots with lug soles
- Gloves
- Approved leg protection, e.g., chaps

The operator must be trained and physically able to safely handle the size and type of chainsaw being used (see training below).

Staff may not operate a chainsaw while under the influence of any substance, such as drugs or alcohol, which might impair vision, dexterity, or judgment.

DO NOT OPERATE A CHAINSAW IF you are FATIGUED or when taking over-the-counter MEDICATIONS that cause drowsiness or have cautions about operating machinery or driving.

Be alert--if you get tired while operating a chainsaw, take a break. Tiredness may result in loss of control.

A safety kit must be on hand at the worksite before operating the saw.

A fire extinguisher must be on hand at the worksite prior to operating the saw.

Training

Each potential chainsaw operator must be trained on how to inspect and maintain the saw as well as operate it. Chainsaws are very useful when handled properly, but few EAP field tasks are more risky than sending out a not very experienced operator with a not very well-maintained saw to do a not very easy job. The following two sources of training (or equivalent) are required:

- Stihl video: An hour-long program describing saw maintenance, operation, and safety in detail. http://www.stihl.com/video-tutorials.aspx
- Onsite practicum of full saw breakdown, cleaning, and cutting techniques overseen by a chainsaw shop, an agency such as the U.S. Forest Service, or other individual who has demonstrated appropriate training and experience.

Only persons who have received approved chainsaw training may operate chainsaws.

Trained operators must demonstrate that they can safely operate and physically handle the chainsaw they will use on the job.

Final authorization will be in writing and signed by the section manager.

Operation

Chainsaw operators must control the saw as well as manage the worksite for hazards. Chainsaw operators must plan their work before going into the field and must review and adjust the plan as needed for safety before starting work in the field. Training emphasizes these points but here are some helpful reminders.

- Before starting work, evaluate the weather. If the weather is too bad (wind, rain, snow), don’t use the saw. Wet gloves and chainsaw grips interfere with a firm grip, which is needed to control the saw.

- Never operate a chainsaw alone. Confirm that at least one other individual is available to assist you.
- The Field Lead must authorize saw use. This individual must be trained to operate chainsaws and be present at all times during their operation by EAP staff.
- Ensure that the designated spotter is in a safe location and that a method of communication is established before operating the saw.
- Clear the work area for hidden objects, establish proper footing, and identify an escape path.
- Check for hazards, such as dangling overhead limbs or unstable leaning trees.
- As needed, remove or flag objects which may interfere with planned work.
- Never work off balance or use the saw for overhead cuts.
- Before starting the saw, verify that the saw chain brake and trigger lock function correctly.
- Engage the chain brake when the saw is idling.
- Shut the saw off when carrying it any distance.
- Carry the saw with the bar to the rear to avoid falling onto the chain if you stumble.
- Hold the chainsaw grip firmly to maintain control. Too tight a grip ("death grip") may cause "white finger disease" due to vibration.

Maintenance

All chainsaws must be inspected and maintained for safe operation.

Saws that are found to be defective must be tagged and not used until the problem has been rectified.

All chainsaws must be cleaned at the end of each day's use.

Routine maintenance needs to be completed by crews at appropriate intervals.

All chains must be kept sharp with the appropriate round file. Most of our chains are 3/8", which corresponds to using a 7/32" round file. J&I Power Equipment also offers chain sharpening services.

Leather gloves and file handle must be used while sharpening chains.

Fueling

Gasoline, gasoline mixtures, and associated vapors are extremely flammable. Use extreme caution when handling gasoline or fuel mix—do not smoke or bring fire or flame near the fuel or chainsaw. Always shut off the saw and allow it to cool before refueling. Fuel saws in a well-ventilated area, ideally outdoors, and understand your fuel mixture ratio. Additionally:

- Gasoline vapor pressure may build up inside the fuel tank depending on the fuel used, the weather conditions, and the tank venting system.
- To reduce the risk of injury from ignition of fuel vapor, remove the fuel cap carefully to allow any tank pressure to release slowly. Do not lean over the tank; fuel vapors may bubble up in your face and eyes.
- Do not refuel the saw in a truck bed or tailgate with a plastic bed liner. Fuel can be ignited from static electricity build-up and spilled fuel can soak objects in the vehicle.

Using All-Terrain Vehicles

Purpose

To ensure that all-terrain vehicles (ATVs) owned or leased by Ecology are operated according to Ecology's safety policy and the ATV manufacturer's specifications to prevent personal injury and loss or damage to expensive field sampling equipment.

Application

For EAP staff operating utility ATVs owned or leased by Ecology to access sampling sites inaccessible by other vehicles. ATVs will be used only when carrying heavy equipment and if all other options have been exhausted.

Requirements

Safety

To reduce the risk of injury, all persons operating an ATV are required to wear protective clothing, which includes a Department of Transportation-approved helmet, long pants, long-sleeve shirt, steel-toed or fiberglass-reinforced boots with traction soles, and, as conditions require, goggles and gloves.

ATV operators must be physically able to safely handle the ATV, and must not be fatigued or under the influence of any substance which might cause drowsiness or impair judgment.

A safety kit and fire extinguisher must be on hand at the work site before operating the ATV.

Training

Each potential ATV operator must receive hands-on training in ATV operation. Sources of training include the Washington State Department of Natural Resources or the ATV Safety Institute. Training must cover pre-ride ATV inspection, starting, stopping, and turning an ATV, hill riding, emergency stopping and swerving, riding over obstacles, protective gear, local regulations, and environmental concerns.

Trained operators must demonstrate to the course instructor(s) that they can safely operate and physically handle the ATV they will use on the job.

Only persons who have received approved ATV training may operate ATVs.

Final authorization will be in writing and signed by the section manager.

Operation

ATV operators are responsible for the selection of the proper vehicle for towing the ATV on a trailer. Operators must consider size, power, and braking ability.

While towing the ATV on a trailer, consider the weather, road conditions, and traffic.

Before leaving Ecology's Operations Center or ATV rental company at the beginning of the day and the sampling site at the end of the day, verify the trailer clearance and the operation of running, turn signal, and stop lights. Ensure that the ATV is properly secured to the trailer and that all loose gear is stowed.

Check weather conditions before departing. Delay the trip if weather reports call for snow or icy conditions.

When starting or idling the ATV, avoid dry roadside vegetation that could be ignited by the exhaust. Use only ATVs with a Department of Natural Resources approved spark arrester.

Properly secure any sampling gear to the ATV before leaving the truck/trailer, ensuring the manufacturer's weight limit is not exceeded for front or rear cargo racks and the load is evenly distributed.

Never operate an ATV alone.

Never carry passengers on an ATV, unless specified by the manufacturer.

Operate the ATV at low speeds.

Operate the ATV only on safe road surfaces. If a road is abandoned, e.g., a logging road, the road must be even from shoulder to shoulder and not excessively banked. Avoid operating ATVs on paved or concrete surfaces.

Be aware of the rollover limits of the ATV, specifically on slopes, when cornering, and when carrying loads.

Scan the road ahead for hazards, such as bumps, potholes, water bars, and overhead tree limbs, and adjust the speed accordingly.

Carry a tow rope. In the event of a breakdown, one ATV could tow the other ATV back to the trailer. If conditions are too dangerous for towing, call the ATV rental company for suggestions.

Maintenance

ATVs must be inspected and maintained for safe operation. Check the ATV repeatedly (at the Operations Center, ATV rental company, and before leaving the truck/trailer) to ensure that the

ATV is not losing any fluids, the gas tank is full, the battery is charged, the tires are correctly inflated to the proper pressure for road conditions, and the braking, steering and suspension systems are functioning properly. If operating the vehicle between dusk and dawn or during low light conditions, make sure head and tail lights are functioning properly.

If there is a problem with the ATV in the field, tell Ecology staff responsible for the ATV or the ATV rental company upon returning the vehicle.

Fueling

Do not smoke or bring fire or flame near the fuel or ATV.

Always shut off the ATV and allow it to cool before refueling.

Fuel ATVs in a well-ventilated area, ideally outdoors.

Gasoline vapor pressure may build up inside the fuel tank depending on the fuel used, the weather conditions, and the tank venting system. To reduce the risk of injury from ignition of fuel vapor, remove the fuel cap carefully to allow any tank pressure to release slowly. Do not lean over the tank; fuel vapors may bubble up in your face and eyes.

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Driving on Logging Roads

Purpose

To describe potential safety hazards encountered while driving on logging roads, and offer guidance on how to mitigate those hazards.

Application

EAP staff driving on public or private logging or resource roads.

Requirements

Because it is impossible to describe every potential situation a driver may encounter on a logging road, this document is guidance only. Staff members are strongly encouraged to spend at least one day observing these practices applied by an experienced staff member, and demonstrate their ability to execute proper protocol before operating a vehicle on a logging road. Driving on active logging roads is dangerous and requires a unique skill set.

Before Leaving

Prioritize good communication with landowners, managers, and their contractors. These relationships are valuable sources of information, such as correct CB channels, harvest updates, etc., and should be treated with care.

Ensure that the vehicle is stocked with the following:

- Current forest road maps and access permits
- A first aid kit and emergency supplies
- Land owner and emergency contact information
- A functioning CB radio
- A full tank of gas
- Saws, a shovel and fire extinguisher. DNR Forest Fire Hotline: 800-562-6010, CB emergency channel: 9.

Plan your trip so that you do not need to drive on forest roads in the dark.

ALWAYS keep current maps and treat landowners and industry professionals with respect.

While Driving on Logging Roads

Observe the Basic Speed Rule (reasonable and safe speed given the conditions and with regard to hazards). On gravel logging roads, that generally means 20-35 miles per hour. Never exceed 35 mph on a logging road.

Always yield to heavy equipment. Many industrial vehicle drivers will pull off and yield to oncoming vehicles if they are able to do so safely first. However, if they fail to do so their vehicle will not stop regardless of how much room there is on the road.

The laws of physics dictate that a loaded logging truck, gravel truck, or other heavy equipment will ALWAYS have the right-of-way.

Consistently scanning for "escape routes" can be good practice for quickly pulling over in tight situations. Otherwise, do not stop on roads unless there is a safe passing point or turn out. Drive on the right side of the road unless road signs indicate otherwise. The fractions of a second that a driver gains when pulling over to allow a loaded truck to pass are valuable.

Be VIGILANT at all times.

Maintain a safe following distance so dust doesn't obscure vision, leading drivers can see following vehicles in rearview mirrors, and loosened gravel from leading vehicles does not damage following vehicles. Assume oncoming traffic when approaching blind corners. Consider using a spotter when making tight turns. Use low gears while driving down hills. Be aware of overheating brake pads and what they smell like.

Environmental Hazards

- Heavy dust, fog, smoky conditions, or glare.
- CB chatter, CB skip, or CB interference.
- Weather impacts: snow, ice, standing water, or mud.

ALWAYS pull over immediately when a loaded log truck is coming, drive at a reasonable speed, and remain alert.

Parking

Park on firm, solid ground off of the road. Be wary of the stability of shoulders and surfaces. Avoid parking on top of vegetation, especially during fire season. Avoid parking in mud or fresh logging debris.

Do not park in such a way that the vehicle impedes the opening or closing of a gate.

When parking in a pull out, landing, or spur, ensure there is enough room for other vehicles to get by.

If necessary, turn the vehicle around before parking or back into the spot, so that the vehicle faces in the direction of the exit: "Point the truck home."

Hide valuables out of sight. Lock vehicle doors and canopy.

Road Hazards

- Reduced traction and soft shoulders common to gravel roads.
- Steep sides without guardrails.
- Sharp, blind corners.
- Very steep gradients.
- Narrow roadways and bridges.
- Missing CB channel signs or markers.

ALWAYS set the parking brake, leave room for other vehicles to pass, turn off lights, and unplug devices.

Communicating

Do not rely on your Citizen's Band (CB) radio. Be prepared for recreational users without CBs, truck drivers using incorrect channels, poorly marked roads, and general confusion among traffic. NEVER BECOME COMPLACENT ON A LOGGING ROAD.

Use a CB if the access permit or road signs require it. Be confident and knowledgeable in its use. If there is no CB in the vehicle, follow a driver that has one. Request permission via CB before passing another driver. Take advantage of opportunities to inquire about road conditions, movement of equipment, or hazards when other drivers have pulled over.

CB use on logging roads is not a legal requirement, and channels are not monitored for usage or content (with the exception of the emergency broadcast channel). EAP staff are expected to use CBs for safe communication only, and remain polite and professional regardless of the behavior of other users.

Hazards Imposed by Other Drivers

- Overweight vehicles with increased stopping distance.
- Long logs overhanging the end of trailers, also known as Sweepers.
- Recreational users unfamiliar with logging road etiquette.
- Other vehicles without CBs, also known as Driving Blind.
- Interrupted CB communication, also known as being "walked over".

ALWAYS: Anticipate oncoming traffic even if the CB is silent.

Protocol for Use of CBs

1. Locate the sign at the logging road entrance that identifies the CB channel and road name. Take note of any additional warnings or restrictions posted by the landowner. If no channel is posted, try channel 14 for mainlines, then 12 or 13 for secondary haul lines.

2. Attach the CB antenna (also known as the "whip") to the top of the vehicle.
3. Turn the CB on to a volume that is loud enough to hear, but not so loud as to startle when a transmission comes through. Adjust the squelch so that the radio is just on the edge of static and clarity.
4. Press the button on the side of the receiver and announce your location, direction of travel, and vehicle type. For example:

   "Inbound pick-up on the 3200 road mainline at the gate."

5. Pause before proceeding to allow loaded vehicles close to the road entrance to respond. Proceed if clear.

6. Locate markers on the side of the road and use them as the location for calling out to others, in addition to announcing direction of travel. For example:

   "Inbound pick-up, marker 12."

7. If roads in the area are on different channels, it is not necessary to announce the road name at every called location. Instead, announce road names as they are entered and left. For example:

   "Outbound pick-up from the A3000 turning onto the A-line; moving to channel 17. [Turns to channel 17] *Inbound pick-up turning onto the A-line from the A3000 at marker 8."*

8. If all roads in the system use the same CB channel and distance between commonly numbered markers is close enough that signals transmit, announce the road name each time a location is called. For example:

   "Inbound pick-up on the Lund Road Mainline at marker 23."

9. When in doubt as to whether or not CB channels are shared among roads, listen to the transmission of other drivers and mimic their calls. If doubt remains after listening to other drivers, it does no harm to announce a road name at every marker, as long as the name announced is commonly known (calling a road by a name that other drivers are unfamiliar with, even if correct, can lead other drivers to believe they are not on the same road).

10. Call every marker encountered, especially if forward movement is inconsistent due to yielding.

11. NEVER, UNDER ANY CIRCUMSTANCES, DISCONTINUE CALLING based on the belief that no one else is driving on the same roads, even if other drivers suggest it. The risk is too high not to err on the side of caution.

12. Listen for the location of other drivers, especially those that are oncoming. If approaching another driver within a marker or two, look for a safe, stable place to pull over and yield.

13. When pulling over to yield, indicate doing so over the CB. When pulling back onto the road after the other driver has passed, indicate doing so, so that other drivers are aware that travel has resumed in their direction.

14. When moving in a convoy, the leading vehicle calls for all vehicles, indicating the number of followers. Announce convoy movement succinctly by stating the location as one normally would, then adding a statement that includes the number of vehicles (including the leading vehicle) and the word "Times." For example:

    "Inbound pick-up at marker 4, two times"

    means two pick-ups are moving in the inbound direction at marker 4.

15. After reaching the destination or leaving the area, announce being clear of the road.

Additional Resources

Work Safe BC video for commercial drivers on the hazards imposed by recreational drivers on resource roads.
http://www.speakingofsafety.ca/2011/04/12/driving-dangerously-and-safely-on-logging-roads/

WAC guidance on Traffic Rules for DNR roadways.
http://apps.leg.wa.gov/wac/default.aspx?cite=332-52-410

Glossary: CB Lingo

Radio Phrase	Meaning
Loaded	Vehicle is moving AWAY from the job site; traveling in a direction in which markers are going down; "outbound."
Empty	Vehicle is moving TOWARDS the job site; traveling in a direction in which markers are going up; "inbound." *Beware: An "empty" truck may be hauling a load. Remember, pick-ups must always yield the right of way to industrial vehicles in all instances.*
Inbound	Vehicle is traveling in a direction in which marker numbers are going up; moving toward a job site. This term leaves no question as to direction and is understood by industry professionals and lay-people alike.
Outbound	Vehicle is traveling in a direction in which marker numbers are going down; moving away from a job site. This term leaves no question as to direction and is understood by industry professionals and lay-person recreationists alike.
Pick-up	Any motor vehicle that is not an industrial vehicle.
Low bed or Low boy	Tractor trailer vehicle used for moving heavy, oversized loads.
Dump or Double dump	Dump truck or gravel mover. A double dump is a dump truck towing a trailer.
Pup	Trailer that is able to be used in combination with another trailer.
Sweeper	Log that hangs over the back end of the trailer far enough to add additional hazard.
Driving Blind	Driving on a logging road that requires the use of a CB without one.
Walk Over	To talk on the CB on top of someone else, interrupting their communication.
CB Skip	Phenomenon that occurs when CB transmission bounces off the ionosphere, allowing communications to be heard hundreds or thousands of miles away. Common in the Pacific Northwest in higher elevations, on south facing slopes, during good weather.
CB Hash	Interference of the CB frequency caused by electrical components of the vehicle such as electric windows or windshield wipers.
Convoy	Vehicles moving in tandem within 1 km of each other.
Line	Road. Often used in combination with a letter, the road name, or the word *main*. Mainline or A-line often indicates a road subject to heavy traffic.

Towing Trailers

Purpose

To describe guidelines for operating and maintaining EAP trailers.

Application

For EAP staff using vehicles to tow trailers.

Requirements

These requirements apply to all EAP staff who tow trailers, including all-terrain vehicles (ATVs), motorcycles, snowmobiles, rubber rafts, boats, and box trailers. Drivers must have a minimum of 20 hours of experience towing and backing up trailers, or until the driver has demonstrated competency in all aspects of towing operations. Drivers without 20 hours experience must be supervised by an experienced driver. Drivers while towing must take into consideration the weather, road conditions, and traffic; expect the unexpected.

Drivers must follow this safety guidance and be familiar with the terms in the glossary before towing any Ecology trailers. Drivers should also read through the Trailer Life Towing Guide.

Conventional Trailers

The ball and coupler hitch is used on a wide variety of tow vehicle and trailer combinations. This hitch consists simply of a ball attached to the rear of the tow vehicle and a coupler (socket) at the tip of a tongue or A-frame attached to the front of the trailer. The ball must match the coupler in size, 2” is standard and should be close to leave when the trailer is on the ball.

Pre-departure Safety Checklist

Before driving, make sure your vehicle maintenance and trailer maintenance are current. This is very important because towing puts additional stress on the tow vehicle.

- Check and correct tire pressure on the tow vehicle and trailer.
- Make sure the wheel lug nuts/bolts on the tow vehicle and trailer are tightened to the correct torque.
- Be sure the hitch, coupler, draw bar, safety chains, and other equipment that connect the trailer and the tow vehicle are properly secured and adjusted.
- Check that the wiring is properly connected and not touching the road, but loose enough to make turns without disconnecting or damaging the wires.

- Make sure all running lights, brake, turn signals, and hazard lights are working.
- Verify that the brakes on the tow vehicle and trailer are operating correctly.
- Check that all items are securely fastened on and in the trailer. This includes spare tires and items inside of boats and trailers that may shift during transit.
- Be sure the trailer jack, tongue support, and any attached stabilizers are raised and locked in place.
- Check load distribution to make sure the tow vehicle and trailer are properly balanced front to back and side to side.
- Check side and rear view mirrors to make sure you have good visibility.
- Check routes and restrictions on bridges and tunnels.
- Make sure you have wheel chocks and jack stands.

General Handling

Follow the law! You, the driver, are responsible for any tickets received while operating a state vehicle.

Speed

RCW 46.61.410 states the maximum speed limit for vehicles in combination (vehicle and trailer) shall not exceed 60 miles per hour. The word "trucks" used by DOT on signs giving notice of maximum speed limits applies to all vehicles in combination.

Remember to stay in control. Trailer instability (sway) is more likely to occur as speed increases. It may be necessary to go slower than the posted speed to maintain control over the vehicle and trailer. Avoid sudden stops and starts that can cause skidding, sliding, or jackknifing. Avoid sudden steering maneuvers that might create sway or undue side force on the trailer. Slow down when traveling over bumpy roads, railroad crossings, and ditches.

Lanes

RCW 46.61.100 states no vehicle towing a trailer may be driven in the left-hand lane of a limited access roadway having three or more lanes for traffic moving in one direction except when preparing for a left turn at an intersection, exit, or into a private road or driveway where a left turn is legally permitted. This does not apply to a vehicle using a high occupancy vehicle lane. A high occupancy vehicle lane is not considered the left-hand lane of a roadway.

Turns

Make wider turns at curves and corners. Because your trailer's wheels are closer to the inside of a turn than the wheels of your tow vehicle, they are more likely to hit or ride up over curbs.

Trailer Backing

Backing a trailer can be frustrating for inexperienced drivers. The most important item to remember is that a trailer will go in the opposite direction of the tow vehicle. Ask another person to help you back the trailer, especially when space is limited or there may be obstacles that you can't see.

Here are two methods for backing trailers:

1. Turn the vehicle's wheels to the right to make the trailer go left, and vice versa to go right.
2. Put your hand at the bottom of the steering wheel. The trailer will go in the same direction your hand moves (moving your hand to the right will cause the trailer to go right and vice versa).

Sharp steering wheel corrections may cause the trailer to jackknife and could damage the rear of the tow vehicle or the front of the trailer.

Wind

To control swaying caused by air pressure changes and wind buffeting when larger vehicles pass from either direction, release the accelerator pedal to slow down and keep a firm grip on the steering wheel.

Severe side winds while towing a trailer may decrease your ability to control the vehicle. Slow down until the winds dissipate.

Trailer Length

RCW 46.44.030 states it is unlawful for any person to operate upon the public highways of this state any vehicle having an overall length, with or without load, in excess of forty feet.

Braking

Allow considerable distance for stopping.

If you have an electric trailer brake controller and excessive sway occurs, activate the trailer brake controller by hand. Do not attempt to control trailer sway by applying the tow vehicle brakes; this will generally make the sway worse.

Always anticipate the need to slow down. To reduce speed, shift to a lower gear and press the brakes lightly.

Driving Gear

Use the driving gear that the tow vehicle manufacturer recommends for towing.

Downshift to assist with braking on downgrades and to add power for climbing hills. On long downgrades, apply brakes at intervals to keep speed in check. Never leave brakes on for extended periods of time or they may overheat.

Some tow vehicles have specifically calibrated transmission tow-modes. Be sure to use the tow-modes recommended by the manufacturer.

Hubs

The hubs of a trailer contain the bearings that allow the wheels to spin. It is important that these are maintained to prevent damage to the trailer and accidents. Follow the manufacturer's instructions for proper maintenance.

After an initial 15 minutes on the road, stop to check the hubs for excess heat. Place the back of your hand near, but not on, the hubs. If they are hot, do not continue on your trip. Instead, get them serviced immediately; failure to do so will result in further damage to the trailer or personal injury. Bad bearings can result in wheels locking, becoming loose, or even falling off while towing. These are serious consequences that could result in injury to you or other drivers.

Quick list of things to remember when towing

- Speed <60 MPH or posted truck speed, whichever is lower.
- Stay in control; this may involve slowing down.
- Don't use the left lane of a three+ lane highway when towing.
- Follow the tow vehicle manufacturer's recommendations when towing.
- Give yourself more room. You will need extra space for braking and turning.
- Make sure the trailer is properly attached to the vehicle. It is a good idea to walk around the entire rig and check before departure, even after brief stops.
- During stops, place the back of your hand near the trailer hubs to feel for excess heat. If the hubs are hot, do not continue on your trip: bearings or other parts may need to be replaced.

Glossary

***Ball Mount**:* A removable steel component that fits into a receiver. The hitch ball and spring bars (on load-distributing hitches) are attached to it.

Breakaway Switches: These are required for any trailer having a gross weight of 1500 pounds or more. They are designed to activate trailer brakes if the tow vehicle becomes separated from the trailer. One end of the breakaway switch is attached to an electrical switch on the trailer frame and the other end is looped around a stationary hitch component on the tow vehicle. If the two vehicles separate, the cable pulls a pin inside the breakaway switch and applies full power from the trailer battery to the trailer brakes.

Coupler: The ball socket at the front of the trailer A-frame that receives the hitch ball.

Receiver: Hitch platform fitted to the tow vehicle.

Safety Chains: These are required for all trailers. The purpose of safety chains is to prevent the trailer from separating from the tow vehicle in event of hitch failure such as a hitch ball that becomes loosened. The chains must be crossed in a "X" fashion below the ball mount, with enough slack that they do not restrict turning or touch the ground.

Spring Bars: Load-leveling bars used to distribute hitch weight among all axles of the tow vehicle and trailer.

Both the tow vehicle and the hitching system have weight capacities which affect the safe handling of the vehicle. The driver must be aware of this: tow vehicle must not exceed the Gross Vehicle Weight Rating (GVWR) of the tow vehicle. This includes the curb weight of the vehicle, payload, and hitch weight. Hitch weight is the percentage of the trailer weight that is placed on the trailer coupler of the tow vehicle. Payload and hitch weight must be divided evenly between the axles to conform to the maximum weight limits and to avoid over-steering problems. Approximately 10-15 percent of a trailer's gross weight is designed to be loaded in front of the front axle and onto the hitching mechanism.

The drawbar requirements or other connection between vehicles in combination shall be of sufficient strength to hold the weight of the towed vehicle on any grade where operated. No trailer shall whip, weave, or oscillate, or fail to follow substantially in the course of the towing vehicle (RCW 46.44.070).

Sway Control: A device designed to lessen the pivoting motion between tow vehicle and trailer when a ball hitch is used.

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Operating Winches on Small Boats, Trailers, and Vehicles

Purpose

To ensure EAP staff operating winches receive adequate on-the-job training to prevent personal injury and also loss/damage to expensive field sampling equipment.

Application

For EAP staff operating an electrically operated or mechanically operated winch on an Ecology-owned or -leased boat, boat trailer, winches, vehicle winches, portable winches, and marine float plane winches. This policy presents operating and safety considerations primarily for winches on boats, but for other winches as well.

Requirements

EAP boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or a boat leased to Ecology. This includes the winch system, as installed, for raising and lowering scientific equipment, anchors, and grabs.

The staff assigned to operate the winch controls must be instructed on proper winch boom positioning and locking, lowering control and cable pay-off considerations, raising control, and need for proper cable winding on the cable drum. Also, the need to restrict boom swing and the boom's load effect on boat stability must be demonstrated within safety limits. Staff assigned to operate other types of winches (e.g., boat trailer, will receive similar safe-operating instructions).

Due to the close proximity to rotating equipment, the winch operator must avoid loose clothing and hair to prevent entanglement. He/she must wear gloves to prevent being hooked by broken cable strands (*fish hooks*) as the cable is fed back on the cable drum.

Before actual winch operations, the operator must inspect the winch to ensure all mechanical and electrical components are in serviceable condition.

Equipment failure of the winch system requires an *Equipment Problem Report* be given to the Operations Center technician. Any injury sustained in operating the winch that is treated beyond first aid must be reported to the Ecology Safety Officer by the winch operator within 24 hours.

The winch operator needs to stay focused on operating the winch. The operator must not engage in eating or drinking, and crew members must be instructed not to distract the

winch operator while the winch is in operation.

Staff must always wear hard hats when overhead pipes, beams, sampling equipment, and other overhead objects are within the work area.

Sampling with Battery-Powered Backpack Electrofishers

Purpose

Electrofishing is the use of electricity to capture fish. This standard operating procedure (SOP) provides very general steps for using battery-powered electrofishing units that are carried on a person's back. The details of how one electrofishes are dependent upon the unit used, the objectives of a study, and local conditions at the site being sampled. Therefore, for specific procedures the reader must refer to manufacturer manuals.

Application

For EAP staff involved in backpack electrofishing activities.

Requirements

Training

Field supervisors and crew members must be trained before electrofishing. For fishing in waters containing listed salmon or steelhead, the federal government (NOAA, 2000) has imposed special requirements for field supervisors who train the crew members:

- 100 or more hours of documented electrofishing experience, and training in electric field theory, safety, and fish injury minimization. Training information can be found at nwetc.org for Northwest Environmental Training Center and smith-root.com for Smith-Root.
- NOAA (2000) spells out further details of training requirements for crew members.

Hazards

Electrofishing presents numerous hazards. These include electrical shock, falls and scrapes, and drowning. Therefore, personnel who electrofish must all be certified in CPR/First Aid and keep first aid kits readily available. Crews also must know directions to the nearest hospital. New personnel must be trained by EXPERIENCED STAFF before sampling.

While fishing with electricity, do not place hands in the water or work alone. Stop during heavy rain, when crew members are fatigued, or if streamflow or substrates are too treacherous. Crew members must always be aware of the location of their colleagues and surroundings.

Electrical shock

The hazard is related to the magnitude of the current, the duration of the shock, and the current waveform. Three categories of electrocution from energized conductors are listed below, in

descending order of severity.

- **Ventricular fibrillation** is an uncoordinated asynchronous contraction of the ventricular muscle fibers of the heart in contrast to their normal coordinated and rhythmic contraction (Bernstein, 1974). The greatest risk for this occurs when the electrical current flows through the chest. The natural heartbeat is replaced by an asynchronous quivering. This is extremely dangerous and death can occur in minutes unless correctional steps are taken immediately. A defibrillator must be used to restore a lasting pulse, but CPR can be used to stabilize the patient until then.
- **Respiratory arrest** can be caused by shocks or blows to the head (the respiratory control center is at the base of the skull). CPR can sometimes help.
- **Asphyxia** is caused by the chest muscles contracting and not releasing. Current from an electric shock can cause a person grasping a live wire to be unable to let go (Bernstein, 1974). This can be sufficient to cause the chest muscles to restrict and cause asphyxiation.

Falls and scrapes

Working in flowing waters with heavy equipment is inherently hazardous due to the uneven and often slippery substrates and limited visibility.

Drowning

When someone has fallen in the water where electricity is present, even low electrical current can induce drowning.

Set up

Carefully inspect all components to be sure there are no broken or deteriorating electrical or mechanical components. If there are, fix or replace the unit before fishing. Be sure the unit's power switch is in the "off" position before setting up or before connecting the battery. Do not connect the battery until all other connections have been made and all crew members are wearing electrically insulated boots (or waders) and gloves.

Connect the components

Screw the connection for the cathode (rattail or beavertail) into its receptacle on the backpack unit. Do not screw the cathode into the connection for the anode. Be sure to screw the connection completely. Screw the male connection on the anode (wand) into its receptacle. Make sure all connections are secure.

Don proper attire

Each crew member must don adequate foot wear (e.g. rubber boots, hip waders, or non-slip shoes), non-breathablewaders (e.g. neoprene to insulate against shock with wading belt,

depending on the anticipated depth of water), plus a personal flotation device (PFD). In order to see fish and obstacles in the water, each person should wear polarized sunglasses and a visor cap to eliminate reflective glare. One crew member should grab the unit from behind and lift it up (bending at the knees) so that another crew member can slip his/her arms into the straps.

Review safety checklist

The crew must review the following checklist before turning on the power:

- Non-breathable waders/boots with felt or non-slip insulated soles worn by all staff.
- Hand signals and voice commands discussed.
- Wires/connections checked.
- Instrument components and uses discussed.

Turn unit on

The crew member who lifted the unit must be sure that the unit is switched off, announce that he/she is connecting the battery, and then connect the battery. The same crew member will announce that he/she is switching on the power, and be sure that all crew members are alert and clear of the electrodes. Then he/she will switch the power on. Some units will emit auditory beeps to signal that they are on. For these, if a beep is not heard, switch the power off and recheck the connections or the battery.

Only Direct Current (DC) or Pulsed Direct Current (PDC) should be used.

Make adjustments

Each session should begin with the lowest settings needed to capture fish, such as minimum pulse width and rate.

Make adjustments for sampling objectives and local conditions (e.g., conductivity of the water) using the manufacturer's manual (e.g., Smith-Root, Inc., 1991, 1994). In waters of extremely low (< 100 :S/cm at 25EC) or high (> 2000 :S/cm at 25EC) conductivity, it will be necessary to increase the applied voltage. Power applied to the water, and drawn from the battery, increases with increasing pulse width and frequency. To avoid injuring fish or crew members, do not use more power than necessary to do the job. Different species of fish have different sensitivities to electricity; trout and salmon are generally the most sensitive. Large fish are more susceptible to shock than smaller fish due to the larger voltage gradient across their body.

Fishing

Review safety checklist.

Crews must review the following checklist before fishing:

- Safety switch on anode shuts off when not held down by thumb.
- Auditory circuit signal ("beeper") working.
- Unit shuts off when held at > 45° angle.
- Fishing strategy discussed (what species, habitats, stop time, etc.).
- Personal flotation devices on.

Capture fish

The crew should slowly and deliberately walk upstream (into the river current). One or two persons (two is best) called "netters" should capture fish using dip nets with electrically insulated handles. The netters must always be within view of the person ("the crew chief") carrying the electric fishing unit. Should any crew member feel his/her feet starting to slip, he/she must shout "Up and Out!" so that the crew chief knows to disconnect the circuit (by releasing the thumb switch on the anode) and raise the anode out of the water. Hand signals can be used in situations where noise is too loud to hear voices (e.g., waterfalls nearby).

The crew chief must place the anode in the water in front of him/her, and the cathode in the water behind him/her. Be very careful not to let the electrodes meet; this could cause costly equipment damage that can only be fixed by the manufacturer. Press down the thumb switch on the anode pole and sweep the water, avoiding contact with the netters and with fish. If fish come into contact with the anode, immediately release the thumb switch to disconnect the circuit. Netters must net fish as they come easily into reach, and never dive or lunge after fish. Netters must be careful not to knock other crew members in the head with their net poles.

Technique

When direct current (DC) is applied, fish react in phases; fright, inhibited swimming, forced swimming, narcosis, pseudo-forced swimming, and tetany (the fish will not be moving). With proper settings, generally the initial electrical introduction, fish line up with the direction of the electrical current. Then fish which are parallel with the current start to swim toward the anode. Fish in other positions line up parallel to the current, preparing for their trip to the anode. With continued application of current, all fish start to swim to the anode. This is called taxis, which is the movement of an organism in response to a stimulus. When fish get close to the anode their ability to move is reduced, and they may turn belly up and go into a state of narcosis (a state of stupor or unconsciousness). In this condition they are easily caught. The crew chief should take advantage of taxis by sweeping the anode toward a location within easy reach of the netters. Fish in taxes phases will recover quickly once removed from the electrical field.

Collecting can also be improved by introducing the element of surprise through intermittent fishing.

In swift water, netting for benthic species such as sculpins can be accomplished by netters holding their nets adjacent to the substrate, behind the anode, so that immobilized fish are swept into the nets by the water current.

Wrap up

Disassembly

When fishing is completed, note the time elapsed, turn voltage down to its lowest setting, and turn the power off. Unplug the battery from the unit before leaving the stream. Unscrew the anode and cathode from the unit and carefully pack them. Carefully pack the electrofishing unit in a safe place during vehicular transport. While handling the electrofishing equipment, inspect it for damage.

Battery care

Make a note of the amount of time the battery was used. Some batteries should be exhausted before recharging. They will develop a "memory" and only partially charge if repetitively charged before exhaustion. Check the battery type and follow the manufacturer's instructions for maintenance.

During vehicle transport, batteries must be stored in an electrically insulated container to protect against electrical shorts. Charge batteries overnight, using the special charger purchased from the manufacturer. Plug the battery to the charger before plugging the charger into the wall socket.

References and additional reading

Bernstein, T. 1974. Electrical safety and electrofishing. pp. 32-33. In Novotny, D.W. and G.R. Priegel (eds.) Electrofishing Boats. Wisconsin Department of Natural Resources, Technical Bulletin No. 73. 48 pp.

NOAA. 2000. Guidelines for Electrofishing Waters Containing Salmonids Listed Under the Endangered Species Act. National Marine Fisheries Service, Portland. http://www.westcoast.fisheries.noaa.gov/publications/reference_documents/esa_refs/section4d/electro2000.pdf

Smith-Root, Inc. 1994. Model 12-A BackPack Manual. Smith-Root, Inc., Vancouver, WA. 6 pp.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

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Hazardous Waste Sites

Purpose

This section presents an overview of planning, training, personal protection, medical monitoring, and physical/chemical field hazards to be considered in ensuring safe field activities at hazardous waste sites. If an EAP employee will be working at a hazardous waste site, an approved, site-specific Health and Safety Plan (HASP) or HASP Worksheet must be in place (See the following Section).

Application

For EAP staff conducting field work at hazardous waste sites. "Hazardous waste site" means any facility where there has been confirmation of a release or threatened release of a hazardous substance that requires remedial action. Typical EAP work conducted at hazardous waste sites consists of routine groundwater monitoring. Infrequently, EAP work at such sites can include subsurface investigations.

Requirements

All EAP field staff who work at hazardous waste sites are required to complete a 40-hour Hazardous Materials Safety & Health Training and take an annual eight-hour hazard recognition refresher training (known as HAZWOPER). They are also required to *maintain* certification in FIRST AID/CPR.

Health and Safety Plan (HASP)

All EAP staff working at designated hazardous waste sites must review and abide by the associated HASP provided by the client program. A HASP Worksheet is provided in this chapter which is used to summarize the practical and relevant elements of the HASP. The lead field staff must complete the HASP Worksheet, review its contents with field assistants or site visitors, and keep it on site during work activities.

If there is no client-provided HASP, or the HASP is no longer relevant, then staff should complete the HASP Worksheet form provided in this chapter in consultation with their supervisor, and proceed accordingly.

The purpose of a HASP is to inform field staff prior to commencing work, of hazardous waste site conditions, exposure potential, required personal protective equipment (PPE), emergency response procedures, and the names and contact information of key individuals. The site-specific HASP should contain the following elements:

- Names of Ecology staff performing work, and EAP main contact person

- Site description
- Identification of hazards and exposure routes
- Summary of work to be performed including decontamination processes
- Personal protective equipment (PPE) requirements
- Procedure and contact information in case of chemical exposure or other emergency – Med Mon physician 24-hr, local emergency response, local urgent care facility
- Required training and certifications

Personal protection

While conducting any type of field work, an appropriate level personal protective equipment is required. The level of protective equipment will be outlined in the HASP.

At a minimum, field staff working at hazardous waste sites must wear protective outerwear, suitable chemical resistant boots with steel toes (not leather boots), and gloves. When working around operating machinery, staff must wear hard hats and avoid wearing loose clothes.

If field work is being conducted around hazardous chemicals, varying levels of personal protection are required based on site conditions and chemicals present. State and federal regulations classify personal protective equipment in four distinct levels: A, B, C, and D. Level A provides the greatest protection, and Level D the least.

EAP staff MUST NOT ENTER AREAS OR PERFORM TASKS THAT REQUIRE LEVELS A AND B which is defined by the use of self-contained breathing apparatus (SCBA).

Level D personal protective equipment offers adequate protection for most field work conditions. Equipment includes protective outwear (i.e. coveralls), safety boots, safety glasses, and gloves.

Optional equipment includes hard hat, and face shield. Wearing contact lenses may increase the likelihood that certain chemicals could harm your eyes.

Level C protective equipment includes chemical resistant coveralls, safety boots and gloves, hard hat (where necessary), and air-purifying respirator with appropriate respirator cartridges.

Safety equipment is available through a variety of vendors. Your supervisor will identify your personal protective equipment requirements. Air purifying respirators are fit-tested and issued only by the respiratory protection program administrator.

Medical monitoring

Ecology field staff may be required to participate in a medical monitoring program aimed at providing regular medical surveillance for anyone whose work involves handling of hazardous chemicals or the potential for exposure to them. The program includes a baseline physical exam

and follow-up exams aimed at early detection of markers that indicate potential occupational exposures that may be related to job duties.
The required frequency of follow-up exams depends upon the individual's potential for on-the-job exposure. Records of medical monitoring are maintained by the medical facility for duration of employment plus 30 years. The contracting medical facility also has the responsibility to notify participants regarding the results of their exams. The Department of Ecology is notified only if the medical examination results indicate a job-related problem. Ecology will only receive preliminary and final clearance letters with a fit for duty determination. All lab results will be mailed to the employee. Contact the agency Safety Officer for additional information.

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Health and Safety Plan Worksheet for Hazardous Waste Site Entry

Contact information:

Name	Role	Phone Number(s)
	Field Lead	
	Field Assistant(s)	
	24-Hour Med Mon Physician consultant in case of staff chemical exposure	*Contact the Ecology Safety Officer for this info.*
	Contractor (if on site)	

Date_____ Arrival time_____

Total anticipated time on site _____

Site name _____

Site location _____

Nearest city_____ Nearest hospital _____

Attach map of site and hospital location and route____ Emergency numbers Statewide - 911

Is the site currently active? Yes___ No___ Will the buddy system be used? Yes_ No

Site description _____
_____
_____
_____
_____

Scope/objective of field work _____
_____
_____

Known contaminants on site _____
_____

Routes of chemical exposure: Inhalation_____ Dermal_____ No exposure

Overall risk of chemical exposure:Serious____ Moderate_____ Low_____ Unknown____

Physical hazards: Confined space_____ Noise_____ Heat/cold stress_____

Describe any area on site that could function as a confined/enclosed space _____
_____

Will air monitoring be conducted? Yes___ No___

Personal protection level required A B C D

Personal protective equipment required _____

Other (specify)_____

Overall risk of physical hazards: Serious_____ Moderate_____ Low_____ Unknown_____

Expected parameters/contaminants to be sampled _____
_____
_____
_____

Sampling matrix: Air_____ Surface water_____ Groundwater_____ Soil_____
Sediment_____ Containers_____ Other_____

Handling Formaldehyde and Formalin

NOTE: This procedure is subject to review and revision as an EAP standard operating procedure. Contact Ecology Quality Assurance Officer Bill Kammin for current status.

Purpose

To provide complete safety information to all staff who may be involved in the handling and use of formaldehyde and formalin in the field.

Application

For EAP staff using formaldehyde or formalin to preserve benthic samples in the field, aboard a ship, or on a boat, and by EAP staff involved in the handling of those samples.

Requirements

- Knowledge of the contents of this standard operating procedure.
- Hazardous materials training for formaldehyde.
- Monitoring for airborne formaldehyde.
- Safety equipment.

Hazards

Formaldehyde is a colorless, highly reactive gas that is composed of hydrogen, carbon, and oxygen. It combines readily with many other materials and can be dissolved in water, alcohol, or ether. Formaldehyde is usually used in a liquid solution with water or methanol. Formalin is a common trade name, and usually refers to the diluted aqueous solution.

Staff responsibilities

Formaldehyde is a strong irritant and can harm workers who use it without proper precautions and adequate controls. Before handling, storing, or using formaldehyde on board the ship or boat, each employee must:

- Read this standard operating procedure and discuss any questions with his/her supervisor or task team leader.
- Read the *Formaldehyde Material Safety Data Sheets* (MSDS) before beginning this procedure. The MSDS is available in the Ecology Headquarters benthic laboratory and shall be posted in a prominent location on the ship or boat.

- Report to supervisor immediately any symptoms or reactions that might be related to formaldehyde exposure.
- Properly use protective clothing and equipment.
- Refrain from wearing contact lenses during this procedure.
- Immediately flush any skin area that comes into contact with formaldehyde. An eyewash facility and deck wash hoses must be available on board the ship or boat.

Protective clothing and equipment

- Eyewear, gloves, and footwear.
- Formaldehyde monitoring badges.
- Portable Eyewash/Safety Station.
- Formaldehyde spill cleanup kits.

Other equipment and information

- Labeled, five-gallon Nalgene carboy with a spigot, marked with fill lines for 5% solution.
- Borax laundry detergent (as a buffering agent).
- Large wooden stick (for mixing in the buffering agent).
- Poly-pac containers of 37% formaldehyde.
- Spill trays or lab "diapers."
- Copy of the Index of Hospitals by County document

Formaldehyde and formalin handling procedures

- The Portable Eyewash/Safety Station must be secured to the deck of the boat or ship in close proximity to the work area where formaldehyde and formalin is in use.
- The formaldehyde and formalin MSDSs must be posted in close proximity and in plain view of the work area where the formaldehyde/formalin is in use.
- Formalin (5%, by volume) must be prepared according to established procedure, from 37% formaldehyde, and stored in a five-gallon Nalgene carboy (which has been fitted with a spigot). This carboy should be securely fastened to the ship deck railing or other fixed structure using ropes and bungee cords. A spill tray or lab "diaper" may be placed under the spigot.
- To fill a sample container with a quantity of 5% formalin, put on gloves and protective eyewear. Place the sample container under the carboy spigot, all the way up to where the spigot stem attaches to the carboy. With your other hand, slowly open the spigot valve (from outside the sample bag). Fill to desired level (volume of liquid at least 1/3 more than volume of sediment) and close the spigot valve. Remove sample container from the spigot and close securely.

- Formalin-preserved samples will be placed in five-gallon, tightly-covered plastic buckets and stored in the ship's hold until removed to the laboratory storage area, at the next opportunity.

Monitoring for airborne formaldehyde

- Representative monitoring for airborne formaldehyde shall be conducted at the inception of a new procedure involving handling of formaldehyde or at the resumption of an established procedure after a long elapsed time.
- The exposure of each employee involved in formaldehyde and formalin handling will be determined, using appropriate short-term exposure or long-term exposure monitoring badges.
- Complete records of the results of airborne formaldehyde monitoring will be kept.

Spills and emergencies

- Secure the spill area using the recommended procedures and products in the Formaldehyde Spill Cleanup Kit. Keep personnel not wearing protective equipment away from areas of spills or leaks until the cleanup process is completed.
- If personal exposure to formaldehyde or formalin occurs, wash all exposed body areas IMMEDIATELY and THOROUGHLY, with large amounts of water.
  (Use the eyewash stand to flush eyes; deck wash hoses can be used for flushing exposed skin).
- If formalin is splashed into the eye, use the eyewash stand or portable eyewash solution to continuously rinse the eye for 15 MINUTES**,** and IMMEDIATELY follow up with an examination by a health-care provider. Refer to the copy of the Index of Hospitals by County document to determine the closest facility.
- Material involved in the spill must be placed in tightly covered plastic buckets and transported back to Ecology for hazardous-waste disposal.
- Contaminated work clothes must be cleaned by authorized facilities or disposed of as hazardous waste.

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Rescreening Marine Benthic Samples Preserved with Formaldehyde

Note: This procedure is subject to review and revision as an EAP standard operating procedure. Contact Ecology Quality Assurance Officer Bill Kammin for current status.

Purpose

To provide EAP staff who are involved in the rescreening procedure with the appropriate information to safely perform this procedure.

Application

For EAP staff when marine benthic samples preserved in formaldehyde are processed and for EAP staff involved in sample processing.

Requirements

- Knowledge of the contents of this standard operating procedure.
- Hazardous material training for formaldehyde.
- Monitoring for airborne formaldehyde.
- Safety equipment.

Hazards

Formaldehyde is a colorless, highly reactive gas that is composed of hydrogen, carbon, and oxygen. It combines readily with many other materials and can be dissolved in water, alcohol, or ether. Formaldehyde is usually used in a liquid solution with water or methanol. Formalin is a common trade name, and usually refers to the diluted aqueous solution. Complete information about formaldehyde is available on the Material Safety Data Sheets which are kept in the Operations Center benthic laboratory on a clipboard and in the EAP safety officer's office on the second floor of Headquarters.

This rescreening procedure is conducted indoors, inside a full-sized fume hood in a properly ventilated closed room. While rescreening is in progress, a warning sign must be displayed on the door to the room, indicating that formaldehyde is in use, and that there is risk of exposure to airborne formaldehyde.

Staff responsibilities

Formaldehyde is a strong irritant and can harm workers who use it without proper precautions and adequate controls. Before handling, storing or using formaldehyde, each employee must:

- Read this standard operating procedure and discuss any questions with his/her supervisor or task team leader.
- Read the Formaldehyde Material Safety Data Sheets (MSDS) before beginning this procedure. The MSDS is available in the Ecology Headquarters benthic laboratory.
- Report to supervisor immediately any symptoms or reactions that might be related to formaldehyde exposure.
- Properly use protective clothing and equipment.
- Refrain from wearing contact lenses during this procedure.
- Immediately flush any skin area that comes into contact with formaldehyde.

Protective clothing

- Fit-tested respirator (optional unless air monitoring indicates required - but recommended if it reduces employee anxiety or if employee experiences breathing difficulties)
- Formaldehyde monitoring badges
- Protective suit, gloves, eyewear, and footwear.

Other equipment

- Eyewash/Safety Shower.
- 5-gallon drum for storage of waste diluted formalin.
- Large Nalgene funnel, funnel stand, and .5 mm mesh sieve.
- Washing basin fitted with hoses for supply and removal of water.
- Hose, adapter, and nozzle for sink faucet.
- Shallow plastic basins or trays.
- Spoons, forceps, sample jars, labels.
- Ethanol (70%, aqueous), in squirt bottles.
- 6-gallon carboy of 70% Ethanol.
- Plastic sheets or flattened plastic garbage bags.
- Formaldehyde spill cleanup kits.
- 0.5 mesh netting.

Rescreening procedure

- Post warning notice on the door to the fume hood room.
- Have the fume hood fan running at all times.
- Work in the fume hood. Place mesh netting into sink basin.
- Place the funnel on the funnel stand over the opening of the five-gallon drum. Set the sieve in the funnel. Select a sample and open it inside the fume hood. Screw appropriately sized 0.5 mm meshed lid onto sample container. Slowly pour the liquid into the five-gallon drum. Rinse the sample container with clean water and pour through sieve into the five-gallon drum. . Rinse several times into the hood sink, to remove residual formalin.
- Fill the jar up to the top with 70% ethanol. Secure the unmeshed lid and invert the jar several times to ensure even distribution of the preservative.
- Monitor the five-gallon waste formalin container, making sure the container is not overfull.

Labels

The rescreening log will be filled out as each sample is completed and placed in a box for removal to a storage area. Keep multiple jars of a sample together.

Monitoring for airborne formaldehyde

- Representative monitoring for airborne formaldehyde shall be conducted at the inception of a new procedure involving handling of formaldehyde or at the resumption of an established procedure after a long elapsed time.
- The exposure of each employee involved in sample rescreening will be determined, using appropriate short-term exposure or long-term exposure monitoring badges.
- Complete records of the results of airborne formaldehyde monitoring will be kept.

End of work shift

- Take a shower at the end of work shift.
- If your clothing has been contaminated by formaldehyde or formalin, you must change into clean clothing immediately.
- Do not take contaminated work clothes home. Contaminated work clothes must be laundered by an authorized individual.
- All protective clothing must be thoroughly rinsed with large amounts of water.
- Respirators must be wiped clean with 70% ethanol and returned to storage boxes.

Spills and emergencies

- Secure the spill area. If the spill cannot immediately be contained and collected or neutralized, call the SWRO Spills Unit for help. Keep personnel not wearing protective equipment away from areas of spills or leaks until the cleanup process is completed.
- If personal exposure to formaldehyde or formalin occurs, wash all body areas IMMEDIATELY and THOROUGHLY, with large amounts of water. Emergency showers and eyewashes are available in all locations where formaldehyde may be handled.
- If formalin is splashed into the eye, use the eyewash stand or portable eyewash solution to continuously rinse the eye for 15 MINUTES**,** and IMMEDIATELY follow up with an examination by a health-care provider. Refer to the copy of the Index of Hospitals by County document to determine the closest facility.
- Material involved in the spill must be placed in tightly covered plastic buckets and transported back to Ecology for hazardous-waste disposal.
- Contaminated work clothes must be cleaned by authorized facilities or disposed of as hazardous waste.
- For large spills and fires, immediately call your fire department (911).

Preparing and Cleaning Compositor Bottles

Purpose

To augment requirements in the *Ecology Headquarters Chemical Hygiene Plan*, this SOP describes safety protocols when preparing compositor bottles for sampling.

Application

For EAP staff preparing compositor sampling bottles, including bottles for wastewater treatment facilities.

Requirements

Handling compositors and glass compositor bottles and placing in van for transport from the Field Operations Center to Ecology Headquarters building

Lift carefully. Keep torso straight, bend the legs, and do not twist your body.

Be careful handling bottles. Support bottles by handle and by placing a hand on a bottom edge. Strap bottles in overhead rack of van using two bungee cords, or place bottles snugly in square boxes so that any shifting of van contents will not cause bottle breakage.

Transporting and setting up compositors and other equipment in Cleaning Room

To avoid breakage of bottles by swinging doors, prop doors open when possible. Make sure passage through doors is clear. Carry only one bottle per trip. Use cart to hold bottles if possible.

Wear protective laboratory gloves to protect hands from bottle residue and hot water. Avoid contact with any residual liquid in bottles. To avoid cutting hands, do not touch edges of bottles. If you find sharp-edged bottles, report them to the safety committee chair, safety officer, or your supervisor, and discard them properly. Mop the floor if it becomes wet. Fill bottles only part way to avoid lifting a full bottle from the sink.

Rinse each bottle with tap water, then fill approximately 1/4 full with tap water and add concentrated Liquinox (phosphate-free) soap. Scrub inside of bottle with the soapy tap water using bottle brush, then empty bottle and fill approximately 1/4 full with tap water. Swish rinse water to wet entire inner bottle surface. Rinse at least three times with tap water to remove soapy water. Fill bottle approximately ¼ full with de-ionized water and rinse. Rinse at least three times with de-ionized water.

Transporting chemicals to cleaning area
When sampling for metals, a 10% nitric acid (HNO_3) solution is pumped through the compositors and used to rinse the strainers and sample bottles. When sampling for organics,

acetone and hexane are used as a rinse. More details are provided in EAP's Equipment Decontamination SOP.

To prevent contact with chemicals, wear impermeable gloves and Tyvek suits while handling chemical containers or cleaning compositors. Examine bottles for loose seal or leakage. Keep chemical bottles and waste chemical bottles in plastic holders to contain leakage. Keep chemicals to be used for cleaning in one designated area near the periphery of the cleaning area, well away from cleaning activities.

When making the 10% nitric acid solution used for cleaning compositors, always pour nitric acid into water, NOT water into nitric acid (remember the three AAAs - Always Add Acid).

Compositor cleaning

Pour chemicals carefully to prevent spills. It is very important to ensure adequate ventilation when using solvents and other volatile substances for cleaning compositors or glassware. When exposure to volatile substances may occur, use the ventilator hood in the Clean Room (Rm OL-14). In case of contact, flush affected area thoroughly and seek medical attention. Inform your supervisor.

Use proper lifting procedures. Avoid cuts from the edges of compositor bottles. Be careful not to break chemical bottles or compositor bottles. Attach hoses securely to compositors to prevent hose disconnections and chemical leakage. Hoses should be inserted into silastic tubing sufficiently, approximately 3/4", to allow for full coverage with a hose clamp. Tighten the hose clamp until secure. When transferring chemicals through compositors, keep hose ends elevated and away from body and face to avoid leakage from hoses and contact with chemicals.

When pouring the contents of a compositor bottle into a beaker, be careful not to knock over the beaker with the bottle. Hold the bottle directly over the beaker so that all liquid is transferred. Be careful not to spill liquid during this step.

Chemicals collected in a stainless steel beaker after rinsing the last compositor of the series are poured into waste chemical bottles. Be sure the waste chemical bottles are clearly marked "WASTE", clearly marked with the chemical name and strength, (e.g., molarity), and have the proper Global Harmonization System label (pic-o-gram).

When cleaning stainless steel sampling strainers, Teflon compositor bottle lids, stainless steel spoons, and stainless steel beakers, avoid contact with gloved hands as much as possible. Use tweezers, when possible, or pour out chemical into another beaker before removing items to avoid immersing gloved hands in chemicals.

In summary

Compositor cleaning need not be a hazardous activity. Plan ahead so that you have sufficient time to carefully and methodically conduct this activity.

Using Pressure Washers

Purpose

To describe hazards and safety guidelines for operating pressure washers.

Application

For EAP staff operating pressure washers.

Requirements

Pressure washers are designed to produce a concentrated high pressure stream of water, so some special safety precautions must be observed to reduce the risk of personal injury. Careless or improper use may result in damage to equipment or serious injury to the operator or personnel nearby. All users should read and follow all instructions included in the user's manual for each specific pressure washer used.

Safety

To reduce the risk of injury, all persons operating a pressure washer required to wear the following safety equipment:

- Eye protection such as safety glasses, vented safety goggles or face shield.
- Ear protection such as ear plugs or ear muffs.
- Foot protection such as leather or rubber boots. At a minimum, footwear should completely cover the feet and provide good traction on wet surfaces. Footwear exposing any part of the foot is not acceptable footwear.
- Arms and legs should be protected by wearing long pants and a long sleeve shirt and then covered by rain gear.
- Gloves should be worn to protect the hands.

Warnings and precautions

- The high pressure stream that this type of equipment produces can cut through skin and its underlying tissue, leading to serious injury and possible amputation. NOTICE: high pressure spray may damage fragile items including glass which can ricochet and strike the user.
    - Do not secure spay gun trigger in the open position.
    - Do not leave spray gun unattended while the machine is running.

- Always point the spray gun in a safe direction and squeeze the trigger to release the pressure every time you stop the engine.
- Never aim the spray gun at people, animals or plants.
- Never repair high-pressure hose. REPLACE IT.
- Always be certain spray gun, nozzles, and accessories are correctly and securely attached.

- A running engine gives off carbon monoxide, an odorless, colorless, poison gas. Breathing carbon monoxide can cause headache, fatigue, dizziness, vomiting, confusion, seizures, nausea, fainting, or even death.

  - Operate pressure washers ONLY outdoors.
  - Keep exhaust gas from entering a confined area through windows, doors, ventilation intakes, or other openings.
  - Do not start or run engine indoors or in an enclosed area, even if windows and doors are open.

- Contact with muffler area can result in serious burns.

  - Do not touch hot parts, and AVOID hot exhaust gases.
  - Allow equipment to cool before touching.
  - Keep at least five feet of clearance on all sides of the pressure washer, including above.

- Using a pressure washer can create puddles and slippery surfaces. Kickback from the spray gun can cause you to fall.

  - Operate the pressure washer on a stable surface.
  - The cleaning area should have adequate slopes and drainage to reduce the possibility of a fall due to a slippery surface.
  - Do not use the pressure washer from a ladder, scaffolding or other similar location where the stability of the work platform is compromised or unstable.
  - Firmly grasp the spay gun with both hands when using a pressure washer to avoid injury when the spray gun kicks back.

- Starter cord kickback (rapid retraction) can result in bodily injury. Kickback will pull hand and arm toward engine faster than you can let go. Broken bones, fractures, bruises, or sprains could result.

  - Never pull starter cord without first relieving spray gun pressure.
  - When starting engine, pull cord slowly until resistance is felt and then pull rapidly to avoid kickback.
  - After each starting attempt, where the engine fails to run, always point spray gun in a safe direction and squeeze the spray gun trigger to release the pressure in the pump.

- Starter and other rotating parts can entangle hands, hair, clothing, or accessories.
    - Never operate pressure washer without protective housing or covers.
    - Do not wear loose clothing, jewelry or anything that may be caught in the starter or other rotating parts.
    - Tie up long hair and remove jewelry.

- Risk of electrocution.
    - Never use the pressure washer near an energized power source. Be aware of power outlets, extension cords or other equipment that is plugged in as the high pressure water can cut through protective insulation allowing the water stream to become a path for the electricity. Electrocution or electrical burns can occur if exposed metal fittings are then touched.

Fuel and Fueling

- Fuel and its vapors are extremely flammable and explosive. Fire or explosion can cause severe burns or death. When adding fuel:
    - Turn pressure washer OFF and let it cool at least two minutes before removing the fuel cap. Loosen cap slowly to relieve pressure in the tank.
    - Fill or drain fuel outdoors.
    - Do not overfill the tank. Allow space for fuel expansion.
    - If fuel spills on the machine, wait for it to evaporate before starting the engine.
    - Keep all fuel away from sparks, open flames (lighters), pilot lights, heat and other ignition sources.

- When operating and transporting the pressure washer:
    - Do not tip the engine or equipment at an angle which causes fuel to spill.
    - Always transport or repair the pressure washer with the fuel tank empty and with the fuel shutoff valve in the OFF position.
    - Do not spray flammable liquids.

Pre use checks

- Check fuel level.
- Check engine oil level.
- Clear the machine of any dirt or debris.
- Check water inlet screen for damage; clear it of any visible debris or replace if damaged.
- Check the high pressure hose for leaks or damage.
- Check the spray gun for leaks or damage.
- Allow water to run through the garden hose to clear it of any debris prior to hookup.

Always stay alert while operating a pressure washer and if someone is approaching your work area halt operations until it is safe to resume.

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Chapter 3. Boating

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EAP Boating Plan

Purpose

To ensure EAP staff safety while operating watercraft.

Application

For EAP staff operating Ecology-owned or leased boats.

Requirements for Vessel Use

EAP staff who desire to become boat operators must:

- Attend a U.S. Coast Guard Auxiliary or U.S. Power Squadron boating safety course or possess a U.S. Coast Guard license. Upon satisfactory completion of an approved boating safety course, the EAP employee will send a copy of the course completion certificate to their immediate supervisor and to the Ecology Safety Officer to be kept on file.
- Attend the following EAP-sponsored class as soon as practical: EAP Boating Course arranged through the Ecology Training Office.
- Act as crew members for on-the-job training before being the boat operator for each Ecology boat. This will allow for training on boat-specific equipment and unique boat handling characteristics.

Responsibilities of the EAP boat operator:

- The boat operator must be accompanied by a crew member, and both must have current First Aid/CPR certification.
- Oversee the safe and proper operation of the boat when trailering and while on the water. As the designated boat operator, you may delegate duties, but the overall responsibility remains with you.
- Select from EAP's boat fleet the proper boat for your purposes, based on size, engine power, engine type, load limits, and standard and unique onboard equipment. Refer to "Boat Information for the EAP" located in this *Safety Manual*.
- Consider the boat's normal and special equipment needs while operating the boat. If the needed equipment is not normally available for the selected boat, contact the Operation Center's technical staff for assistance in fabricating/purchasing the needed equipment or the proper exchange of equipment from another EAP boat. You must not remove equipment from another boat without the knowledge of the Operation Center's technical staff.

- Reserve the selected boat using the EAP's web site for "*Boat Reservations*" If you anticipate heavy use of a vessel for an extended period of time (e.g., every other week for two months), you must notify the other unit supervisors at least two weeks in advance of first use. This will allow everyone time to manage schedule conflicts.
- Select the proper towing vehicle for size, power, and braking ability. While towing, take into consideration the weather, road conditions, and traffic; expect the unexpected. You are responsible for the safe driving of the combined tow vehicle/boat trailer even if a co-driver is behind the wheel.
- File an *EAP Field Plan* and designate a primary contact person to close the plan. If operations are covering multiple days, you must make contact on a daily basis to close the field plan and prevent an unnecessary search operation by the U.S. Coast Guard or other rescue agencies. You must also instruct the primary contact person to contact EAP supervisors when a search for an overdue boat is underway.
- Use the "*Boat Check List*" during pre-use inspections, departure from the Operation Center, at the launch site, and upon return of the boat to the Operation Center, clean and ready for the next person's use. Take every opportunity to inspect (1) trailer wheel bearings for over-heating while towing and (2) trailer suspension/boat support rollers when the boat is off the trailer.
- While on the water, (1) follow established U.S. Coast Guard Navigation Rules for International and Inland boat operations and (2) display good seamanship and courtesy at all times.
- Oversee the well-being of crew members and their actions while aboard an Ecology boat. Brief the crew on emergency procedures and location/operation of emergency equipment prior to getting underway. Require boat crew to wear Personal Flotation Devices (PFDs) at all times when crew could fall into the water, and always during boat operations.
- Be aware of conditions that could affect the health and safety of the crew. Driving too far or spending too long on rough water may lead to fatigue and accidents. Schedule adequate time for each part of the boating operations, including lunch breaks and crew rest breaks. Watch for signs of crew stress, especially during weather extremes. No circumstances justify risking harm to staff or property.
- Decide whether to begin or continue any boating activity. If small craft advisories, gale warnings, or other weather notices have been posted by the U.S. Weather Service, you must exercise additional caution and good judgment in deciding whether to conduct boating activities. If in doubt, do not go.
- Check weather forecasts for the area you will be operating in. The National Weather Service forecasts can be accessed at:

  -- Their website: http://www.weather.gov/forecastmaps

  -- NOAA weather radio at 162.475 MHz (most vessel VHF-FM radios access this weather channel).

-- If operating on lakes or rivers, you may also wish to check local telephone directories for information about local weather forecasts.

- Oversee all staff and equipment when trailering a boat and during boating operations. Do not be persuaded to deviate from known safe boat or vehicle operations at the request of others.
- Report deficiencies or usage of any boating safety equipment as well as problems with engines, electrical systems (lighting, pumps, navigation, radios), or boat trailer components. Reporting will be on a standard EAP *Equipment Problem Report* and left with the Operations Center technical staff. The forms are available in printed form at the Operation Center manager's desk. The Equipment Problem Report will be maintained in the boat's maintenance file located in the Operations Center's office filing cabinet's top drawer.
- Report all water-related or boat trailering-related accidents that require attention beyond first aid, to the Ecology Safety Officer within 24 hours of the incident. If an *Injury/Accident report* is required, provide copies to the Operations Center manager as well as his/her unit, section, and program manager. If the accident involves a recreational vessel then a *Washington Boat Accident Report* should also be filed with the Washington State Department of Parks. If injury or death is involved the filing must occur within 48 hours. If only damage to the vessel is involved then the form must be submitted within 10 days.

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Boat Checklist

Purpose

To describe all steps to be followed in preparing boats for field use, leaving the EAP Operations Center, launching, returning to the launch point, and returning boats to the Operations Center.

Application

For EAP staff using Ecology boats. Each boat has its own checklist; ask the Operations Center technician if you can't locate it.

Requirements

Pre-usage boat inspection

- Visual inspection of hull, engine, trailer, and tires.
- Check for proper operation of steering.
- Battery check, tilt/trim function, lights.
- Safety equipment (check for damage and completeness).
- Fuel (oil mix as required).

Before departure from the Operations Center

- Verify trailer clearance and operation of running, turn signal, and stop lights.
- Properly secure boat to trailer; motor raised and locked.
- Stow all loose gear.
- Check weather forecast.
- Be sure you have:
    - * Serviceable PFD for each member of the crew PLUS one throwable for emergency use (must be Coast Guard-approved Types I-IV).
    - * Signaling device (whistle or horn).
    - * Minimum emergency signaling devices (day and night flares).
    - * Fire extinguisher.
    - * First aid kit.
    - Tool kit and flashlight.
    - Adequate dock lines, anchor and rope, oars.

    ***Mandatory**

At launch point

- Install drain plugs; raise motor.
- Unsecure boat from trailer.
- Load boat; observe load limits and balance.
- Disconnect trailer wiring to prevent stop lamp failure.
- Back trailer.
- Verify freeboard and safety equipment.
- Warm up engine before full use.
- Be aware of wake restrictions (5 mph in launch area).
- Charts of area, safe boating practices, and good seamanship will allow for a good trip.

Return to launch point

- Remove drain plugs after boat is clear of water.
- Properly secure boat to trailer; raise and lock motor.
- If using electric winch, stand clear in case cable breaks.
- Offload and stow all loose gear; check trailer clearances.
- Verify trailer lights again.
- Remove any vegetation or debris from the boat and trailer before leaving the launch area. Transporting invasive species is illegal. For more information, see http://teams/sites/EAP/Pages/FieldTraining.aspx.

Return to the Operations Center

- Clean up your own mess -- brushes, soap, water, and hoses are available.
- Use motor adapter and fresh water wash engine (if used in saltwater).
- Hang up personal flotation device (PFD) in open boat storage areas to dry out.
- Note any discrepancies on equipment problem report sheet.
- For boats parked in the Operations Center, leave the keys on the boat dash or in an "off" position in the ignition switch.
- Remove all items from the boats and return them to the individual equipment storage boxes on the boat equipment shelf.
- Lower engines.
- Turn off battery switch

Warning: You must use a personal flotation device when working in areas where the danger of drowning exists, such as, in the water, on the water, over the water, or alongside the water.

Boat Emergency and Troubleshooting Guide

Purpose

To ensure that EAP boat operators are operating in accordance with the *EAP Boating Plan* and boat manufacturers' specifications, or both, in order to prevent personal injury and loss/damage to expensive field sampling equipment during partial or full boating emergencies.

Application

For EAP staff operating any boat owned or leased by Ecology.

Requirements

The boat operator is fully responsible for accident or incident prevention. During emergency conditions, the boat operator must rely on past training, instincts and common sense to quickly prevent increasing danger and risks to the boat and its crew. Further, the boat operator must safeguard valuable equipment from accidental loss or theft.

EAP boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or boat leased to Ecology.

Boat operators must be prepared for the unexpected:

- Have anchoring system ready to deploy in case of engine failure near shore or in restricted waterways.
- Conduct "person overboard" drills with emphasis on returning quickly and accurately to the person in the water. Train the crew as a backup in case the boat operator is the person overboard.
- During sudden rough water, high winds, or lightning storms, the crew must get lower in the boat. In extreme conditions, lighten the boat load to gain more freeboard.
- Check for propulsion failures before removing the engine cover:
    - Verify the kill switch clip is installed properly.
    - Check for fuel in the selected tank.
    - Check fuel connections and hose connection to the engine
    - Is the fuel tank vent open; is the fuel line pump collapsed?
    - Is the fuel properly mixed at 50:1 ratio? Select another fuel tank if available.

- Check for automatic oil injection problems:
    - Beeping horn in dash means oil level in tank is low.
    - Continuous horn means no oil at engine. Stop engine and troubleshoot oil tank and engine hose connections.
- Engine over heat will automatically lower engine RPM.
- Check for propulsion failures after removing engine cover:
    - Look for obvious loose components or wiring.
    - Know location of engine fuses, spares in tool box.

Whenever the boat is out of the boat operator's sight, safeguard boat equipment, engines, and field sampling equipment by removal from the boat to safe storage or by using locks to prevent theft. Tongue locks are available from the Operations Center technical staff to lock trailer ball receivers to the towing vehicle or to use when the trailer is parked and not under supervision.

If any problems occur during the inspection or operation of an EAP boat, an *Equipment Problem Report* should be filled out and submitted to the EAP Operations Center technician.

Boat Information

See chart, ***Boat Information for the EAP*** (next page in this manual).

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Boat: Make, Model, Length, Year, Informal Name, Location	What it Looks Like	Main Engine Make, Model, HP, Serial #, (State Tag #)	Fuel Type And Capacity	Standard Equipment On-Board	Battery	Trailer License # & (State Tag #)	Trailer Make, Model, Serial #	Maximum Boat Load	Serial # of Boat & (State Tag #)	Trailer Tire Size	Value at time of purchase
Almar "Sounder," 26'x8.5', 2004, (called "Skookum" yet name isn't on boat), OC	aluminum hull, silver w green stripe, A-frame boom on stern, cabin white life raft on top, "RESEARCH" on side	In Board Diesel 200HP	Diesel 90 Gallons	PFDs (8+), fire extinguisher (2), flares, VHF radio (2), cell phone, first aid kit, anchor w/200' rope, drogues (2), compass, depth sounder (2), DGPS (2), AIS, radar, air horns, life raft, fresh water (10g), sink, A- frame boom, hydraulic winch w/1500' cable, electric windlass, AC inverter 1000 watts, spotlights (2), towline (250'), tools, swim ladder, bilge + washdown pumps.	Dual house, single cranking	17668E	EZ Loader EZLDR 25-27 IZEADRVG 12A054503 May, 2002	Not Placarded	AUC28 94EC202 (E125746)	ST 235/80/R16 Spare – Yes	120,000
Smith-Root SR-18, 18', 2007, Electrofishing boat, OC	aluminum hull, silver, forward deck has railings, forward end has many 3' wires hanging down, center console steering station, "RESEARCH" on side	Yamaha 4 cycle Model F115TJRC Serial #68VL1070897J (E133353)	"Unleaded" 4 cycle engine (2) 10-gallon tanks. Extra 2 or 5 gal. tanks available @ OC	First aid kit, flares, tool kit, fire ext., oars, anchor and rope, live well, bilge and wash down pumps, GPS, depth sounder, shocking equip., work platform on bow, spotlight, generator (5 kw).	Dual house, single cranking	21862E (E1335 25)	King (E133525)	1485 lbs.	US-XRP16357E707 (E133524)	ST 215/ 75 R14 Spare--yes	43,100
Boston Whaler "Montauk", 17', 1989, Whaler #2, OC	white hull, center console steering station, "RESEARCH" on side	Evinrude 90 HP serial# 05227247. ModelE-TEC new 2008	"Mixed" Refill with XD100 Auto oiler. (2) 12 gal. above deck tanks	First aid kit, air horn, flares, oars, tool kit, fire ext., anchor and rope, compass, depth sounder.	Dual	03189E	Calkins ICYBK2714KS 903249--Model LR15177675	885 lbs.	BWC 6792F990	ST175/80-13 Spare--yes	28,250
North River "Pursuit", 18', 2011, Jet Sled, ERO	aluminum hull, silver w wide black stipe, walk-thru windshield w canopy enclosure middle part, back deck open	Mercury 110 HP Model OptiMax	"Mixed" Auto oiler 35 gallon built in tank	First aid kit, flares, tool kit, fire ext., anchor and rope, depth sounder, bilge pump, GPS	single	24591E	Caunai 5FMBC9R18A 1000289	1,100 lbs	NBRC0326B909	215/75D14C Spare-yes	35,000
Wooldridge "16Xtra Plus", 16.5', 1996 or 2008?, Jet Sled, OC	aluminum hull, silver, center console steering station, "RESEARCH" on side	Evinrude 115/80 HP Model E-TEC Serial# 05250809 Tag# E135285 New 2008	"Mixed" Refill with XD100 Auto oiler 21 gal. built in tank	First aid kit, flares, oars, depth sounder, tool box, fire extinguisher, anchor and rope, paddle, air horn, compass, running lights, bilge pump, detatchable davit stored against wall near jetsled..	Dual	10469E (E1175 37)	EZ Loader 1Z1RGW12T A025156	5 Person 625 lbs.	WLG16471 C696	205/75 D14 Spare-yes	25,000
McKee Craft, 16', 2009, CRO	light tan hull, fiberglass, center console steering w small windshield, "RESEARCH" on side	Honda 90 HP Serial#BEBOI-1007464 (E135305) new 2009	"unleaded" 4-cycle engine	First aid kit, flares, tool kit, fire ext., anchor and rope, bilge pump, depth sounder	dual	B20220	EZ Loader B20220	1,600 lbs	E124624	205/15R14	8,272 motor
Grumman Model 1237, 12 or 14' ?, 1998?, Little Jon, CRO	aluminum hull, silver	#3 6HP E6RETB BO8967546 (E121292)	TANK MIX Mix with XD30 50:1 (2 cycle) 3 gallons portable	Oars, first aid kit, fire extinguisher.	N/A	05077E (E1212 90)	EZ LOADER EZB12-14 IZEIBBS14NAO 4906 7/90	350lbs OR 3 persons	GBMA2125F 091 (E121291)	480x12b	2,200 Boat & Trailer
Livingston, car topper, 9', year?, OC	white hull	Electric Motor Minn Kota, model 65MX	N/A	Oars, car top, carrier.	N/A	N/A	N/A	550 lbs.	LBC19729 M800 (39921)	N/A	1,900 Boat Only
Aire, 143 R, 14', 2008, Shock Raft, OC	Inflatable hull, blue and grey, "RESEARCH" on side	None for raft Shock generator is Honda GX120 01833-GPP	Non-ethanol Unleaded (for generator)	Oar frame, oars, 2 live wells (coolers), pump, throw bags, first aid kit, tool kit, repair kit, whistle	None	23222E (E1350 91)	PJ Utility Trailer, U8141 3CVU81416821220 25	1,600 lbs.	us-air01792J707	205/75SR15	3,842 Boat Only

Boat: Make, Model, Length, Year, Informal Name, Location	What it Looks Like	Main Engine Make, Model, HP, Serial #, (State Tag #)	Fuel Type And Capacity	Standard Equipment On-Board	Battery	Trailer License # & (State Tag #)	Trailer Make, Model, Serial #	Maximum Boat Load	Serial # of Boat & (State Tag #)	Trailer Tire Size	Value at time of purchase
Aire, 130 R, 13', 2008, OC	Inflatable hull, blue and grey	N/A	N/A	Oar frame, oars, 2 dry boxes, pump, throw bags, first aid kit, tool kit, repair kit, whistle	None	23221E (E135090)	PJ Utility Trailer, U8141 3CVU8141682122024	1,320 lbs.	us-AIR02075L606	205/75SR15	3,649 Boat Only
Avon Roll-Up 2.85, 9'x 4', 1991, AVON 1, CRO	inflatable hull, off-white w gray stripe	White (1) Evinrude 1=E6R Serial #.B8984343 Tag # E 114122	TANK MIX Mix with XD30 50:1 (2 cycle)	Oars, seat, carry bag, (tool box available), launch wheels, electric motor, 6HP motor requires fire extinguisher when gasoline driven.	As needed	N/A	N/A	550 lbs.	AVB 15241C191 (E112093)	N/A	2,922 Boat Only
Avon Roll-Up 2.85, 9'x 4', 1991, OC, AVON 2	inflatable hull, color?	Red (2) OMC 8HP 1997 (4 cycle) Type E8REVR Serial #H09363061 (E119579)	"unleaded" 4-cycle engine	Oars, seat, carry bag, launch wheels, electric motor, 6HP motor requires fire extinguisher when gasoline driven.	N/A	N/A	N/A	550 lbs.	AVB 6BV27D393 (E115513)	N/A	2,922 Boat Only
Achilles LT3DX, 8', year?, OC or CRO?	inflatable hull, color?	up to 3.5 HP	N/A	Oars, floor boards, pump, case.	N/A	N/A	N/A	700 lbs.		N/A	2,922 Boat Only
Bronco Morel, 6', year?, #FT101PK, OC	inflatable pontoons, color??	N/A	N/A	Pontoon Boat for ADCP use.	N/A	N/A	N/A	350 lbs	#12 (E124624)	N/A	1,112
Valco P-14, 14', 1993?, Jon Boat, OC	aluminum hull, light green	Red (1) OMC 8HP 1997 Type E8REV Serial#G04323535 Tag # E118561 OR white 2= E6RERE Serial #B09048443 Tag #E115547 (6-94)	TANK MIX Mix with XD30 50:1 (2 cycle) 3 gallons portables	First aid kit, fire ext., whistle, tool kit, oars, anchor, rode, boat measuring set.	None	05886E	Model EZ 12-14 1ZE1RBS	600 lbs.	HUL 021-2J990 (E109346)	4.80X 12 Spare--yes	2,500 Boat & Trailer

NOTES

- Outboard engines 6HP #1 and #2 can be used for auxiliary engines or on Livingston, if needed, with Operations Center manager's permission.
- Additional flares, anchors, anchor ropes, line, fuel tanks, and work lights can be arranged for any boat through Operations Center manager.
- 8HP, Red 2 is a 4 cycle engine and requires operational checks prior to use. See Operations Center manager before use.
- OC = EAP's Operations Center

Mechanical Boat Movers

Purpose

To train staff who are moving boats into and out of the Operations Center using the mechanical boat mover. The training is required to prevent injuries due to pushing and pulling heavy boat trailers.

Application

For EAP staff when moving boats into and out of the Operations Center.

Requirements

Although the mover has built-in safety devices, training is required before use to prevent possible damage to the boat or facilities and injuries to operators.

The mechanical boat mover used in the EAP Operations Center is a modified pallet jack with a detachable raised ball. The unit is comprised of three parts:

Battery

The battery that supplies the power to operate the mechanical boat mover must be recharged several hours before use. This battery is the lead acid type and is maintained by the Operations Center technical staff. The battery is in a heavy metal case to prevent mechanical damage and provide weather protection. The only access needed by the operator is the battery plug when switching from charging to operating modes.

Battery charger

The Operations Center technical staff will recharge the battery after use and requires the charger's lid to be lifted and the battery plug to be switched from the motor, lift jack and control mode to the charging circuit. Plug in to Battery Tender after each use. There is a two prong plug coming from the Battery Tender that is attached to the wall next to pallet jack.

Motor, lift jack, and control assembly

The motor, lift jack and control circuit is the major point of concern to the operator since this is how the mechanical boat mover is controlled.
Operation of the boat mover:

- The key is located in the key door at the electronics shop.
- Turn key on and pull red button out to power.
- Pull down handle to operate.

- Direct control:
    - Rotate hand throttle for speed and direction.
    - WARNING: THERE IS LOTS OF POWER.
    - Pull forward to go forward.
    - Pull aft to go reverse.

- Return handle to vertical position to stop. For quick stops, let go of handle. Handle will return to vertical position and stop.

Operating 17’ Boston Whaler Boat

Purpose

To ensure that the EAP 17’ Boston Whaler Boat is operated according to the *EAP Boating Plan* and/or boat manufacturer specifications, in order to prevent personal injury and loss/damage to expensive field sampling equipment.

Application

For EAP staff operating the 17’ Boston Whaler Boat, or similar type boat, owned or leased by Ecology.

Requirements

EAP 17’ Boston Whaler boat operators must comply with all provisions in the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or boat leased to Ecology.

Propulsion options include: (1) 90 HP main gasoline-powered engine with automatic two-cycle oiling system or (2) up to eight-horsepower auxiliary gasoline engines for backup propulsion using a 50:1 fuel mixture in portable fuel tanks. Oars are supplied as emergency backup. Since the boats have gasoline engines installed, a certified fire extinguisher must be on board.

The detachable auxiliary gasoline engine must be properly installed on the centerline of the auxiliary engine mount with the mounting screws tight and the engine safety chain attached to prevent accidental loss if the engine mountings loosen. The main engine requires the kill switch clip to be installed on the switch in front of the engine throttle quadrant before the engine will start or operate. The auxiliary gasoline engine weighs 75 lbs. To prevent injuries, proper body mechanics must be employed when lifting the engine out of vehicles or onto the boat.

The maximum boat load is 850 lbs including the crew, propulsion devices, and field sampling equipment with proper load distribution. 17’ Boston Whaler Boats have design limits that dictate use in limited weather conditions. The design limits require that boats not be used when small craft advisories are posted by the U.S. Coast Guard or weather services.

Prior to departing the EAP Operations Center, the trailer must be inspected for (1) condition of the hitch, hitch safety chains, tire inflation/wear, and (2) proper function of the running/stop/turn lights. The boat must be properly secured to the trailer by tie-down straps.

Prior to use, the boat hull must be inspected for damage, and the drain plug installed in the transom and anchor storage compartment. A bucket for emergency bailing must be taken in the boat along with the assigned tool box, first aid kit, and required emergency signaling devices (flares for day or night use). Care must be taken to prevent sharp objects such as rocks or tree branches from piercing the hull or breaking the engine propeller when operating near the shore.

A VHF Marine Band radio is installed on the OC Whaler Boat, and operators must be familiar with proper operation procedures for their use. Depth sounders are provided to prevent accidental grounding, and depth alarms of the units must be set to minimum safe operation water depths.

Any problems incurred during the inspection or operation of the OC 17' Boston Whaler requires that an *Equipment Problem Report* be filled out properly and submitted to the EAP Operations Center technical staff.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating McKee Craft Boat

Located at Central Regional Office

Purpose

To ensure that the EAP 16' McKee Craft Boat is operated according to the *EAP Boating Plan* and/or boat manufacturer specifications, in order to prevent personal injury and loss/damage to expensive field sampling equipment.

Application

For EAP staff operating the 16' McKee Craft Boat, or similar type boat, owned or leased by Ecology.

Requirements

EAP 16' McKee Craft boat operators must comply with all provisions in the *EAP Boating Plan* and brief the crew on all safety-related items on board the McKee Craft.

Propulsion options include: (1) 90 HP Honda main gasoline-powered engine. This is a 4-cycle engine, no oil should be added to the fuel. (2) a 55T Minn Kota Maxxum electric motor. Oars are supplied as emergency backup. Since the boat has a gasoline engine installed, a certified fire extinguisher must be on board.

The detachable auxiliary electric motor is kept in the van assigned to Jenifer Parsons, along with the extra battery. It is installed on the transom on an as-needed basis. Care must be taken when using this motor, as it tends to loosen and can twist off the transom.

The gas engine requires the kill switch clip to be installed on the switch below the engine throttle before the engine will start or operate. The boat keys are kept with Jenifer Parsons. The spare tire is not locked, but is bolted to the trailer. The tongue lock key is with the boat key.

The maximum boat load is 900 lbs with a maximum of six people (1,600 lbs including the motor(s)). Be sure to distribute the load so the boat does not list unduly. The boat should not be used during extreme wind or thunderstorms.

The inboard fuel tank fills from the top of the console, and holds about 14 gallons. Use regular gas. There is also a spare tank at the rear of the boat. Prior to starting the engine for the first time pump the bulb on the fuel line a few times. Only start the motor if the propeller is in water; a stream of water should always pour from the lower rear of the motor shaft. This is cooling water for the engine. If this water stops, either the motor is raised too high or the intake has become clogged. Fix these problems before additional operation or the motor will overheat.

Prior to departing, the trailer must be inspected for (1) condition of the hitch, hitch safety chains, tire inflation/wear, and (2) proper function of the running/stop/turn lights. The boat must be properly secured to the trailer by tie-down straps. Always transport the engine in the tilt-up position so the skeg will not drag when going through a dip in the road. Make sure that the engine-up support (the lever on the engine shaft) is flipped down and then the hydraulic tilt (up and down buttons are on the console shift lever and on the motor itself) is snugged down for transporting. That keeps the motor from bouncing against the hydraulic system and wearing it out. When removing boat from the water, lower the motor to drain all water out before raising for transport.

Stored on the boat are a boat ladder and detachable safety light mast. Fenders are in the front live wells. A depth sounder is provided to prevent accidental grounding, and is located under the seat. Also under the seat are jumper cables, the fire extinguisher, and an extra prop. Under the console are other safety items such as first aid kit, flashlight, flares and an air horn.

Prior to use, the boat hull must be inspected for damage, and the drain plugs installed in the transom and two live wells on either side of the anchor storage compartment (foreward). A bucket for emergency bailing must be taken in the boat along with the assigned tool box, first aid kit, and required emergency signaling devices (flares for day or night use). Care must be taken to prevent sharp objects such as rocks or tree branches from piercing the hull or breaking the engine propeller when operating near the shore.

Any problems incurred during inspection or operation of the CRO McKee Craft Boat requires reporting to Jenifer Parsons, who will make arrangements for needed repairs.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating North River Jet Boat

Located at Eastern Regional Office

Purpose

To ensure that EAP Jet Boats are operated according to the EAP Boating Plan and/or boat manufacturer's specifications, in order to prevent personal injury and loss or damage to expensive field sampling equipment.

Application

For EAP staff operating a Jet Boat, or any similar boat, owned or leased by Ecology.

Requirements

EAP Jet boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or boat leased to Ecology.

The Jet Boat has a 110-horsepower gasoline engine with an automatic oil injection system. Fuel and oil levels should be checked prior to every use. Since a gasoline engine is installed on the boat, a certified fire extinguisher must be on board. The fire extinguisher should always remain in the gunwale on the side by the driver's seat. The presence of the extinguisher and its current condition and charge level should be checked prior to every outing with the boat.

While the stability and size of this boat makes it a good choice for bigger water bodies and inclement weather, extra caution should be made when operating in shallow water. The Jet type boat engines are very susceptible to fouling with weeds or rocks when operated in shallow waters. If the impeller in the jet pump does foul, under no circumstances try to remove the obstructions without first shutting off the engine and turning off the master power shut off in the rear of the boat. Due to the location of the intake grate and the need to lean over the back of the boat, it is recommended that clearing the fouled motor be done from the dock or shore whenever possible.

This boat is also equipped with a 15hp prop motor that can be used to maneuver if the jet motor should foul or for slow-speed motoring. The kicker motor, like the main jet motor, must have its oil reservoir checked before operation or damage to the motor will occur. Unlike a prop boat, a jet motor will not provide steering when not under way. Take care docking and loading the boat as it will not respond as quickly to steering commands as a regular prop engine under low speed conditions.

The hull design allows the Jet Boat to handle a heavy load, but proper load distribution is essential for proper performance. While it can handle rough waters if necessary, under no circumstances should the Jet Boat be launched when small craft advisories are posted by the

U.S. Coast Guard or weather services.

Before departing the ERO Operations Center, the trailer must be inspected for (1) condition of the hitch, hitch safety chains, and tire inflation/wear, and (2) proper function of the running/stop/turn lights. The boat must be properly secured to the trailer by tie-down straps.

Before use, the boat hull must be inspected for damage and the drain plug installed in the transom. A bucket for emergency bailing must be taken in the boat, along with the assigned tool box. Care must be taken to prevent sharp objects such as rocks or branches from piercing the hull or breaking the engine impeller when operating near the shore or in shallow waters. In rough water the flat bottom of the Jet Boat will cause the boat to "pound," exercise care not to damage the hull or break loose equipment inside the boat, and also be sure the crew is in a secure position.

Any problems incurred during inspection or operation of the ERO Jet Boat requires reporting to Jim Ross. Jim or his delegate will make arrangements for needed repairs.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating 26’ Almar Boat–Boat Master Program

Purpose

To assure that operators receive appropriate training, testing, and ongoing familiarity with towing and operation of the 26’ Almar boat, R.V. Skookum. Three program staff who meet the minimum qualifications specified in Section A below are currently serving as operators, one in a lead capacity. The number of qualified operators can be changed if deemed necessary by the EAP program manager.

Definitions

1. *Boat Master:* Individual certified under this program to serve independently as a primary operator of the Skookum.

2. *Lead Boat Master:* Individual designated to oversee the Boat Master Certification program and provide initial proficiency training and testing in the safe operation of the Skookum. This individual is also a certified operator of the vessel.

3. *Operations Center Technician:* Individual designated to be responsible for routine maintenance and repair of the vessel and trailer.

Requirements

Section A. Minimum qualifications for boat master

To become a Boat Master and primary operator of the Skookum, candidates must provide documentation showing that they meet the following minimum requirements:

- Be a permanent employee of the EAP.
- Be able to perform the essential functions of a Boat Master outlined in Section B.
- Satisfactorily complete a safe boating course conducted by the U.S. Power Squadron of the American Red Cross, or a United States Coast Guard (USCG) Auxiliary-approved course.
- Be qualified by the Operations Center technician as a primary operator of Ecology boats 20' and less per the EAP Boating Plan, and have demonstrated competence and proficiency in the safe operation of these boats.
- Have a minimum of 100 hours of boat operator experience as a primary operator of Ecology boats and a minimum of 50 hours of trailering experience with Ecology boats 17' and longer. Professional experience obtained outside of Ecology may be substituted if deemed equivalent by the EAP program manager.
- Be current in mandatory EAP training, including certification in First Aid/CPR.

Section B. CQs and essential functions for boat masters

Classification questionnaires (CQs) of Boat Masters will reflect that approximately 10% of position duties are assigned to operation of the Skookum for the benefit of EAP monitoring programs. In addition, Essential Function Analyses for Boat Masters will include the following elements:

Tools and Equipment

- Operate 26’ aluminum boat in rivers, lakes, and marine waters.
- Operate shipboard communication and navigation systems during day and night conditions.
- Operate hydraulic winch system for retrieval and deployment of sampling equipment under various weather conditions.
- Operate hand and power tools to install or repair equipment in the field.
- Operate towing vehicles in various weather conditions and after dark.

Physical Requirements

- Read documents for accurate comprehension and action.
- Travel long distances statewide towing a 26’ boat.
- Launch and retrieve a 26' boat under various ramp conditions, including climbing into and out of the boat while on the trailer and from docks.
- Traverse and access all passageways and compartments on the Skookum.
- Work on the water for consecutive days under adverse weather conditions.
- Lift objects weighing up to 50 lbs.

Mental Requirements

- Speak and write fluently and professionally in English.
- Have working knowledge of the inland rules of boat navigation.
- Make appropriate decisions based on available information.
- Organize and prioritize daily workload for self and other members of field teams.
- Be receptive to new ideas and adaptable to new situations.

Performance Requirements

- Establish and maintain professional working relationships with co-workers, peers, stakeholders, and the public that are inclusive, collaborative, and respectful.
- Be dependable, flexible, and willing to accept responsibilities.

- Accept supervisory authority.
- Support teamwork and cooperation in the work environment.
- Manage vessel operations and crew under a variety of environmental conditions.

Health and Safety

- Must not be a significant risk of harm to the health and safety of oneself or others when in the office or field.
- Must complete and maintain currency in safety training required by program policy.

Work Place Conduct

- Must comply with internal policies and procedures governing conduct.
- Must maintain professional demeanor (calm, composed, and respectful) in stressful situations, both in the office and field.

Section C. Boat master certification process

Qualification Procedure

To become a certified Boat Master, candidates must complete a two-step certification process.

- Boat Master In-Training: Before acting as primary operator of the Skookum, individuals must complete initial operations training and testing under the Lead Boat Master, and demonstrate proficiency in the safe operation of the vessel including trailering, launching, docking, casting off, anchoring, navigation, use of on-board electronics, winch operation, and emergency procedures. Each candidate has six months from the time of entering the program to satisfactorily complete the *Boat Master Initial Proficiency Training Record* outlined later in this manual. Upon completion of initial proficiency training, candidates may serve as primary vessel operators while preparing for full certification.
- Certified Boat Master: Within one year of completing initial proficiency training, each individual must satisfactorily complete testing under the Lead Boat Master in the subject areas listed under the *Certified Boat Master Testing Requirements* of this manual. Customized testing for this portion of the program will be developed based on the USCG Auxiliary boat crew manual. A passing score of 70% must be obtained on each section of the test. Re-testing of failed sections is allowed but the candidate must achieve a passing score on all sections of the test within one year of completing initial proficiency training. Once the candidate has satisfactorily completed this testing they will become a "Certified Boat Master." Candidates who do not successfully complete testing within one year will be removed from the Boat Master Program.

Disqualification Procedure

A Certified Boat Master will be disqualified from being a primary operator of the Skookum if he or she fails to:

- Maintain the minimum qualifications of a Boat Master as outlined in Section A.
- Pilot the Skookum on the water for a minimum of 20 hours every year (a log of hours accumulated will be maintained by each operator and kept on the vessel).

At the discretion of the EAP program manager, an operator may be removed from the Boat Master Program for cause.

Re-qualification Procedure

If the requirements listed in Section C-2 above are not met, the disqualified boat operator may not serve as a primary operator of the Skookum until he or she has met the requirements which have lapsed. If the minimum-hours-of-operation requirement has lapsed, the individual must repeat the Boat Master In-Training program described under Section C-1 above.

Section D. Selection process for boat masters

As the need arises, the EAP program manager will issue a call for applications for the Boat Master certification program. Applicants will submit documentation describing how they meet the minimum qualifications listed under Section A of this program. A panel comprised of the EAP program manager and WOS-EOS-SCS section managers will:

- Review the applications.
- Consult with candidates' supervisors regarding potential job duty reassignments.
- Interview qualified candidates (optional).
- Select one or more candidates to enter the certification program.

In selecting candidates, the panel will not only consider whether candidates meet the minimum qualifications, but also whether they can make sound and safe decisions and manage a diverse group of people under long and stressful field conditions. Candidates must have a demonstrated record of adhering to program and agency policies as well as a record of exercising good judgment and strong leadership.

As the need arises, the panel will also designate one of the Certified Boat Masters to serve as Lead Boat Master.

Section E. Individual responsibilities

Boat Master

The Boat Master is the individual certified to serve independently as a primary operator of the Skookum. The Boat Master is considered the captain of the boat and thus has the ultimate responsibility and decision-making authority for all boat-related operations. These responsibilities include but are not limited to: safe trailering, launching, loading, equipment operation, securing the boat, and crew safety. The Boat Master shall be familiar with the rules of operation, navigation, and local regulations, as well as how to coordinate emergency procedures. Specific duties of the Boat Master include:

- Ensuring a minimum crew of two for all on-water operations; this includes one deckhand and the Boat Master.
- Ensuring that the EAP Field Plan has been completed and properly filed and confirming that the on-shore contact has a duplicate copy; ensuring that the on-shore contact is notified upon return to shore or if the boat will be late in returning, or if any major deviation to the planned trip will occur; and conveying to the crew the name and phone number of the on-shore contact before departure.
- Acquiring and studying applicable charts, current and tide tables, or other documentation for the planned operation area.
- Monitoring the current weather forecast and conditions.
- Ensuring the boat is fueled, seaworthy, and equipped with the necessary equipment and supplies to perform the field activity at hand and to meet U.S. Coast Guard requirements and safety standards.
- Ensuring that the total weight of passengers and equipment does not exceed the capacities of the boats and trailers.
- Ensuring that all loaded or portable equipment is secure before getting underway.
- Briefing the crew on the location of first aid supplies, fire extinguishers, flares, and personal floatation devices.
- Describing emergency procedures, including how to use the VHF, cellular phone, or other means of communication.
- Briefing the crew on person-overboard procedures before departure.
- Ensuring that an adequate number of personnel floatation devices are on-board for all persons and that they are used in accordance with established procedures.
- Contacting the U.S. Coast Guard in case of emergency.
- Ensuring that medical attention is secured for any emergencies which occur beyond basic first aid; reporting any injuries to the affected party’s supervisor and to Ecology's safety officer within 24 hours.

- Reporting any defective equipment or other items which need to be repaired or purchased to the Operations Center technician.
- Maintaining the boat's log book (date, hours of operation, passengers, problems, etc.) at the completion of each day's work.
- Maintaining a personal log of official boat operations and boat training completed, and submitting the log to the Lead Boat Master annually at the end of each fiscal year.

Lead Boat Master

The Lead Boat Master is the individual designated to oversee the Boat Master certification program and provide initial proficiency training and testing in the safe operation of the Skookum. This individual is also a certified operator of the vessel. Specific duties include:

- Providing initial proficiency training and testing of new Boat Masters.
- Coordinating maintenance and repair of the Skookum and its trailer with the Operations Center technician.
- Maintaining an annual record of each Boat Master's qualification requirements and piloting logs.
- Prepare and submit an annual report the EAP Program Management Team that summarizes operations for the past year.
- Coordinating trip scheduling of Boat Masters to ensure an equitable distribution of workload (to the extent possible, piloting duties will be assigned within the unit or section of operator origin; piloting work outside of the unit of origin will be charged to the unit chartering the Skookum).
- Developing and administering the certified Boat Master test to operators who have completed initial proficiency training. The Lead Boat Master must be an experienced boat operator with demonstrated capabilities in the material being tested. He or she is responsible for developing a Certified Boat Master test based on appropriate sections of the USCG Auxiliary Boat Crew Manual, and for administering the Certified Boat Master test to operators who have completed initial proficiency training.

Operations Center Technician

The Operations Center Technician is the individual designated to be responsible for routine maintenance and repair of EAP boats. Specific duties of this position related to the Skookum include:

- Assuring that the boat and trailer are equipped to meet U.S. Coast Guard requirements and safety standards and are in a ready state for field use. The final responsibility for boat seaworthiness rests with the actual boat operator for each field activity.
- Annually maintaining and repairing the boat and trailer according to the schedule outlined in Recommended Maintenance Schedule for 26' Almar and Trailer.

Boat Master Initial Proficiency Training Record

Trainee: _____

Lead Boat Master: _____

I. Vessel Components and Systems

A: Locate/describe cabin controls and equipment

- engine and trim controls (both outdrive and trim tabs)
- AC/DC breakers
- VHF radio and use of primary channels
- intercom
- depth sounder
- GPS
- radar
- weather station
- inverter
- laptop navigation computer

B. Show familiarity with propulsion and auxiliary equipment

- main engine components (fuel tanks, water tank, raw water filtration, etc.)
- hydraulic system (A-frame and winch)
- windlass (12-volt)
- wash down pump system
- bilge pumping systems

Comments:

Successfully demonstrated skills on _____

Instructor initials: _____

II. Initial Preparations

A. Describe log book purpose and details.

B. Describe all daily engine check-off items and initial startup procedures

- identify engine fluid check points and different fluid types for each
- identify hoses and belts to be checked

C. Identify all onboard safety equipment

- life preservers (1/person)
- fire extinguishers
- flares
- first aid kit
- anchor
- flashlight
- horn
- VHF radio and cell phone
- six-person life raft

Comments:

Successfully demonstrated skills on _____

Instructor initials: _____

III. Trailering, Launching, and Retrieving

A. Demonstrate vehicle hook up

B. Departure inspection

C. Towing proficiency

D. Launching

E. Retrieving and securing for travel

Comments:

Successfully demonstrated skills on _____

Instructor initials: _____

IV. Navigation and Station Acquisition

A. Describe/demonstrate GPS usage

- Demonstrate familiarity with buttons and menu items
- Entering and editing waypoints
- Creating quick points and navigating to waypoints
- Changing datums
- Trouble shooting the system (loss of signal beacon or sat)

B. Demonstrate use of laptop navigation system

- Adding/deleting marks and routes
- Navigating to marks and along routes
- Searching charts
- Locating points

C. Describe/demonstrate other navigation equipment

- Radar
- Depth sounder
- Using navigational charts
  - direction of movement based on lat/long increasing/decreasing increments
  - lat increases in northerly direction
  - long increases in westerly direction
  - lat/long minutes and seconds = specific distances
  - lat min. = 6000 ft = 1 nm
  - lat sec. = 100 ft
  - long min. = 4000 ft
  - long sec. = 70 ft
- Using dead reckoning
  - 1 kt = 100 f.p.m. (feet per minute)
- Using line of sight

Comments:

Successfully demonstrated skills on _____

Instructor initials: _____

V. Boat Handling

A. Demonstrate departure and docking capabilities

- single-handed
- cross winds and currents
- restricted maneuvering situations

B. Describe local navigation aids and proper “Rules of the Road” where applicable

C. Demonstrate proper trimming of the boat while cruising

D. Demonstrate handling during equipment deployment and retrieval

E. Demonstrate boat maneuvering capabilities to acquire and hold on station

F. Demonstrate handling under high wind, wave, and cross-wake conditions

G. Demonstrate response to limited visibility (fog) conditions

H. Describe/demonstrate radar capabilities and usage

I. Demonstrate collision avoidance

J. Describe alternatives if radar is lost

K. Avoiding deadheads: demonstrate at high speed

L. Demonstrate beaching procedures

Comments:

Successfully demonstrated skills on _____

Instructor initials: _____

VI. Managing Emergencies

A. Identify normal engine gauge readings

B. Describe response to engine overheat

C. Describe response to personal injury

D. Describe response to fire

E. Describe response to flooding

F. Describe response to other boats in distress

- Towing procedures: astern and alongside

G. Demonstrate personnel recovery procedures

H. Demonstrate radio usage under different situations

I. Electronic equipment failure: describe alternatives to each

J. Describe appropriate responses if deployed gear cannot be retrieved or is lost

K. Describe responses to loss of prop or dead engine

Comments:

Successfully demonstrated skills on _____

Instructor initials: _____

Boat Master Operational Proficiency

The Lead Boat Master will schedule annual classroom refresher session(s) to review selected chapters from the U.S. Coast Guard (USCG) Auxiliary Boat Crew Seamanship Manual. The review will include other safety operations as determined and agreed upon by the Boat Master crew.

At a minimum the following topics will be covered:

- Status of qualifications specified in Boat Master Program (hours of operation, first aid/CPR/AED)
- A review of boat trailer towing safety operations and checklist
- An onboard review of RV Skookum equipment and operations (navigation systems, electronics, electrical system, winch operations, engine and maintenance and lifeboat operation).
- Review pre and post departure checklist
- Navigation Rules Test shortened to include Right of Way, signals (lights & whistles).
- The following chapters from the USCG Crew Seamanship Manual:

  4 - Team Coordination & Risk Management

  5 - First Aid

  6 - Survival Equipment and Pyrotechnics

  7 - Marlinspike

  9 - Stability

  10- Boat Handling

  11- Communications

  12 - Weather and Oceanography

  13 - Aids to Navigation

  14 - Navigation

  15 - Search & Rescue

  16 - Person in Water Recovery

  17 - Towing

  18 - Firefighting & Rescue Assistance

Certified Boat Master Testing Requirements

Note: To obtain Certified Boat Master status, candidates must complete testing areas within one year of completing initial proficiency training.

A customized test will be developed by the Lead Boat Master based on appropriate sections of the USCG Auxiliary Boat Crew Manual. A task signoff sheet will be maintained documenting completion of each section with a passing score of 70%. Subject areas to be covered in testing are listed below.

Combination of oral and written testing

- Boat crew duties
- Watch stand responsibilities
- Crew efficiency factors
- Survival and signaling
- Marlinspike seamanship
- Boat characteristics
- Stability
- Boat handling
- Communications
  - Radio frequencies (VHF)
  - Prowords and common abbreviations
  - Verbal communications
  - Phonetic alphabet
  - Radio operation procedures
  - Standard voice radio urgency calls
  - Distress signals
  - Radio checks
- Weather
- Aids to navigation
- Navigation rules
- Search planning
- Person in the water
- Emergency procedures (firefighting and dewatering)
- Heavy weather skills
- Safe Boat Trailer Towing Skills

Recommended Maintenance Schedule for 26’ Almar and Trailer

Skookum

- Service engine according to manufacturer’s specifications (Volvo).
- Change outdrive lower unit oil every six months.
- Check belts and hoses for condition monthly.
- Check main battery conditions every six months.
- Change hydraulic filter annually.
- Inspect hydraulic lines, connections, and engine compartment during each use.
- Inspect winch cable for wear monthly.
- Inspect exhaust hose connection to outdrive during each use.
- Inspect thru hull fittings during each use.
- Inspect safety gear (first aid, flares, fire extinguishers- recertify annually).
- Inspect sacrificial zinc anodes every six months.

Trailer

- Flush with freshwater after each use.
- Repack and inspect wheel bearings at a minimum of twice annually.
- Inspect and repair brake system as needed annually.
- Inspect tire wear and inflation monthly (including the spare tire).
- Inspect winch cable for wear monthly.
- Inspect winch battery/water level every six months.

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Operating 16' Wooldridge Jet Boat

Purpose

To ensure that EAP Jet sleds are operated according to the EAP Boating Plan and/or boat manufacturer's specifications, in order to prevent personal injury and loss or damage to expensive field sampling equipment.

Application

For EAP staff operating a Jet Boat, or any similar boat, owned or leased by Ecology.

Requirements

EAP Jet boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or boat leased to Ecology.

The Jet Boat has a 115-horsepower gasoline engine with an automatic oil injection system. Since a gasoline engine is installed on the boat, a certified fire extinguisher must be on board. The engine on the Jet Boat requires the kill switch clip to be installed on the key switch before the engine will start or operate. The Jet type boat engines are very susceptible to fouling with weeds or rocks when operated in shallow waters. If the impeller in the jet pump does foul, under no circumstances try to remove the obstructions without first pulling the spark plug wires from the spark plugs and allowing the engine to cool. Even though the engine is switched off, without the above precautions, the engine could *cook off*, spinning the engine, and cause great bodily harm.

The maximum Jet Boat load is 625 lbs. for the crew, engines, and field sampling equipment with proper load distribution. The maximum fuel capacity for this vessel is 21.6 gallons. Do not top off the fuel tank when returning to the OC as expanding fuel will come out the vent while stored inside. A Jet Boat of this design limits the boat use to calm waters and low wind conditions. Under no circumstances should the Jet Boat be operated when small craft advisories are posted by the U.S. Coast Guard or weather services.

Before departing the EAP Operations Center, the trailer must be inspected for (1) condition of the hitch, hitch safety chains, tire inflation/wear, and (2) proper function of the running/stop/turn lights. The boat must be properly secured to the trailer by tie-down straps.

Before use, the boat hull must be inspected for damage and the drain plug installed in the transom. A bucket for emergency bailing must be taken in the boat, along with the assigned tool box. Care must be taken to prevent sharp objects such as rocks or branches from piercing the hull or breaking the engine impeller when operating near the shore or in shallow waters. In rough water the flat bottom of the Jet Boat will cause the boat to "pound"; exercise care not to damage the hull or break loose equipment inside the boat, and also be sure the crew is in a secure position.

Any problems incurred during the inspection or operation of the Jet Boat require that an *Equipment Problem Report* be filled out properly and submitted to the EAP Operations Center technician.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating Electrofishing Boats

Purpose

These safety procedures apply to use of EAP's 16-foot Smith-Root Inc. SR-16 electrofishing boat in rivers and lakes. The shocking boat cannot be used in saltwater. The procedures tell how to avoid electrical shock and other hazards specific to operation of this or similar boats. These procedures also include guidance for electrofishing from a raft. SOPs for backpack shocking and general boat operation are covered elsewhere in this Safety Plan.

Application

For EAP staff using electrofishing boats.

Operator Requirements

To become a "Qualified Operator" please see the Electrofishing Boat Requirements and Hours Log.

Operators must be able to lead all aspects of field outing:

- Ability to trailer boat.
- Operate trailer winch.
- Maneuver boat.
- Operate and setup onboard equipment as well as set shock settings.
- Troubleshoot problems and replace basic equipment as needed (e.g., pump impellers, fuses, oil changes, work lights).
- Be familiar with critical boat items and locations (batteries, battery selectors, pumps, fuel lines, generator strainer, and other commonly used items).
- Ability to complete field notes properly.
- Recognize when problems are occurring with onboard systems and take corrective action and detailed notes of problem.
- Perform current boat decontamination procedures.

Safety procedures before sampling

Minimum number of crew for the electrofishing boat is two with at least one being a certified and experienced operator. Two experienced operators are recommended.

Follow boat load limits of 1,485 lbs (includes crew, gear, motor, and fish tank filled with 12" of water).

The operator must brief the crew on electrofishing guidelines and important safety concerns. All hands must have current training in first aid and CPR.

Ensure proper equipment is onboard before leaving OC. See safety manual boat checklist, and the Electrofishing Boat Checklist. Ensure other equipment is also onboard: spare parts box, first aid box, dip nets/poles, anodes, tool box, anchor, stand pipes for fish tank, boat plug, spare keys, personal gear, and other items as needed.

Check outboard and generator oil levels before leaving OC (insert dipstick all the way); add oil as needed. Also check outboard motor mounts and look for stern cracks; inspect bilge area for fuel and hydraulic fluid leaks; check trailer tire pressure (including spare tire), proper trailer connection to truck (ball/coupler, safety chains, emergency brake actuator), secured bow and stern ratchet straps, and working truck/trailer lights. Ensure all equipment is properly secured.

Also check fuel levels before departure. When filling up tanks, watch the boat's onboard fuel gauge. Stop filling tank when the fuel gauge needle reads just below "F" (full), this leaves room for gas to expand. Topping off fuel tanks will cause gas to leak out of tanks. Also, be aware of fuel levels while operating. The electrofishing boat uses fuel quickly when traveling long distances at high RPMs. Electrofishing boat has two internal 10 gallon tanks (located inside port and starboard gunwales).

All crew members must wear Coast Guard-approved personal flotation devices (PFDs). A Coast Guard-approved type IV throwable cushion must also be onboard while operating.

Safety procedures while shocking

Smith-Root describes the electrical shock hazard as follows:

"The operator of an electrofisher must always keep in mind that chances of receiving an electrical shock are multiplied when dealing with electric currents in or near water more than any other place. Using an electrofisher is like using a firearm; if used properly and with good judgment, it is perfectly safe. Have respect for electricity and it is easily controlled; lose respect and you could lose your life."

Smith-Root electrofishers have a HIGH VOLTAGE output, and certain safety precautions must be observed to provide safe operation and prevent possible ELECTRIC SHOCK.

> "Electricity needs to have a complete electrical circuit in order for current to flow. The only way that you can get shocked is if you become the electrical conductor to complete the circuit. In the output circuit, the current flows from the cathode (boat hull) to the anode (boom) through the water. The water is the electrical conductor. If you were to grab both the anode and the cathode you would become an electrical conductor and complete the circuit path and get a severe electrical shock. If you were to touch only one of the electrodes, you would not complete the electrical circuit and not get shocked."

Safety procedures for the operator

- Ensure anode safety lines are attached and anodes are properly attached to booms. Then deploy boom anodes before starting the generator.
- Lead operator must announce when the power is being turned on. Be certain the crew is clear of anodes and no bare hands are in the water.
- Communicate safety concerns and direct crew as needed while conducting field work.
- Operate the electrofishing system at the lowest effective power. See how fish react to settings and adjust as needed.
- Be alert and ready to flip the "kill switch" off if a safety issue arises. Avoid throwing the crew off balance by sudden changes in speed or direction; striking rocks or other objects; sweeping the deck with overhanging branches.
- Do not electrofish when waders, swimmers, or pets are in the area.
- Do not electrofish in heavy rain, or unsafe conditions. Use good judgment.

Safety procedures for the netters

- Wear rubber gloves and shoes with insulating soles.
- Be aware when power is on. Ensure that enunciator can be heard during operations.
- Never touch the water when power is on (when the shockboat foot pedal is engaged, current is flowing through water).
- Only use dip nets with insulated handles.
- Be careful of hitting others when wielding long-handled dip nets.
- Stay within the bow work deck and do not over-reach for fish.
- Do not continue to electrofish if your boots or gloves get wet inside.
- Keep an eye out for underwater hazards (stumps, logs, rocks, etc) – communicate safety concerns with operator. Also observe how fish are reacting to shock settings.
- Do not electrofish if you have had a prior heart ailment.

Hazards in addition to shock

The electrofishing boat is not especially seaworthy under some conditions, due to its box-like shape. Avoid situations where the stern is presented to large waves or strong current. Keep an eye to the weather when operating on big water. Long runs to windward in rough water will be very slow, wet, and uncomfortable.

Electrofishing from a raft

The preceding paragraphs describe how to safely electrofish from a motorized boat. What follows is a set of safety standards particular to electrofishing from an inflatable self-bailing raft. Many of the same rules and recommendations apply to both motorized and raft fishing, so please

follow the rules from the proceeding paragraphs unless different rules are specifically spelled out below. You must also follow safety procedures spelled out under *Using Inflatable Rafts or Inflatable Kayaks for Field Work*.

- Minimum size of crew on shockboat is two; maximum is four.
- Before launching on the river, a raft and fishing safety talk should be given by the lead rower.
- Make sure the generator is filled with gas.
- Make sure that in addition to the two oars you will use to row, you also have a spare oar.
- Make sure you have a patch kit, first aid kit, and drinking water before launching.
- Make sure helmets and PFDs are worn by everyone in the fishing boat.
- The wearing of waders is forbidden in rafts.
- Make sure everyone is aware of the location of the kill switch for the GPP box and generator.

Procedure

Generally speaking, a netter will be in the front of the raft. The raft is more unstable than the motorized boat, and it's important for the netter to keep his/her balance. To do this, the netter/rower/crew must be aware of the type of water they're in and the hazards that are around them. People must point out oncoming rapids, rocks, logs, or other river conditions that might make balance difficult. For example, if the rower is about to head into a rapid, the rower must tell everyone that a rapid is coming and allow them to make sure they're balanced. A rope must be secured to the bow to allow the netter to hold on for balance. Some areas of the river will be deemed too dangerous to shock, and the project lead or lead rower will make that call.

Sometimes there will be two netters at the bow. When this is the case two ropes must be attached to the bow so that each netter can hold on for safety. Also, both the netter running the foot pedal and the rower must be aware of the second netter in case he/she falls overboard. If that happens, release the foot pedal, hit the kill switch on the GPP box and on the generator, and commence rescue operations.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating Jon Boats (Valco or Grumman)

Purpose

To ensure that the EAP Jon Boats are operated according to the EAP Boating Plan and/or boat manufacturers' specifications, in order to prevent personal injury and loss/damage to expensive field sampling equipment.

Application

For EAP staff operating a Jon Boat, or similar type boat, owned or leased by Ecology.

Requirements

EAP Jon Boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or boat leased to Ecology.

Propulsion options include (1) oars for primary or backup operations or (2) up to eight-horsepower gasoline engines with a 50:1 fuel mixture in portable fuel tanks. If gasoline engines are installed, a certified fire extinguisher must be on board.

The gasoline engine must be properly installed on the centerline of the transom with the mounting screws tight and the engine safety chain attached to prevent accidental loss if the engine mountings loosen. Since the engine is easily removable, the engine must be safeguarded with a lock to the hull or removal to storage in the towing vehicle whenever the threat of theft is present. The engine requires the kill switch clip to be installed on the switch on the front of the engine before the engine will start or operate. The gasoline engine weighs 75 lbs. To prevent injuries, proper body mechanics must be employed when lifting the engine out of vehicles or onto the boat.

The maximum boat load is 600 pounds for the Valco Jon Boat and 350 pounds for the Grumman Jon Boat including the crew, propulsion devices, and field sampling equipment with proper load distribution. The Jon Boat design limits the use of this type of boat to calm waters and low wind conditions.

Before leaving the EAP Operations Center, the trailer must be inspected for (1) condition of the hitch, hitch safety chains, tire inflation/wear, and (2) proper function of the running/stop/turn lights. The boat must be properly secured to the trailer by tie-down straps.

Prior to use, the boat hull must be inspected for damage and the drain plug installed in the transom. A bucket for emergency bailing must be taken in the boat, along with the assigned tool box. Care must be taken to prevent sharp objects such as rocks or branches from piercing the hull or breaking the engine propeller when operating near the shore.

Any problems incurred during the inspection or operation of an EAP Jon Boat require that an *Equipment Problem Report* be filled out properly and submitted to the EAP Operations Center technician.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating the Livingston Boat

Purpose

To ensure that the EAP Livingston boat is operated according to the *EAP Boating Plan* and/or boat manufacturers' specifications in order to prevent personal injury and loss or damage to expensive field sampling equipment.

Application

For EAP staff operating the Livingston boat or similar boat owned or leased by Ecology.

Requirements

EAP Livingston boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or a boat leased to Ecology.

Propulsion options include (1) oars for primary or backup operations or (2) up to a six-horsepower gasoline engine with a 50:1 fuel mixture in a three- gallon portable tank. If a gasoline engine is installed, a certified fire extinguisher must be onboard.

The gasoline engine must be properly installed on the centerline of the transom with the mounting screws tight and the engine safety chain attached to prevent accidental loss if the engine mountings loosen. Since the engine is easily removable, the engine must be safeguarded with a lock to the hull or removal to the towing vehicle whenever the threat of theft is present. The engine requires the kill switch to be installed on the switch at the front of the engine before the engine will start or operate. The gasoline engine weighs 75 pounds. To prevent injuries, proper body mechanics must be employed when lifting the engine out of the vehicle or onto the boat.

The maximum boat load capacity is 550 pounds including the crew, propulsion devices, and field sampling equipment with proper load distribution. The Livingston boat's design limits the use of this type of boat to calm waters and low wind conditions.

The Livingston boat is stored in the Operation Center parking lot upside-down on top of one of the Jon boats. The Livingston boat can be transported inside of a long wheel base van or in a pickup truck. Care must be taken to properly lift the 125-pound boat, using proper body mechanics to prevent injuries. Be sure the Livingston Boat is properly secured to the vehicle to prevent the boat from shifting inside the vehicle or being ejected from an open vehicle.

Before use, the boat hull must be inspected for damage, and the boat's equipment must be retrieved from its respective container on the Operation Center's "Skookum" boat bay equipment shelf. A boat bailer is part of this equipment, along with a tool box with safety equipment and a fire extinguisher if an outboard engine is to be used. Oars are stored at the end of the boat equipment shelf marked "Livingston."

Upon completion of the Livingston boat use, it must be returned to storage in the Operation Center's parking lot upside-down on top of one of the Jon boats to prevent rain water from filling the boat. All of the Livingston's boat equipment must be returned to the proper container on the boat storage shelf in the Operation Center's "Skookum" boat bay.

Any problems incurred during the inspection or operation of the Livingston boat requires that an *Equipment Problem Report* be filled out properly and submitted to the EAP's Operation Center technician.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Using Kayaks for Field Work

Purpose

To ensure that kayaks owned or leased by Ecology are operated according to the *EAP Boating Plan* and/or boat manufacturer's specification, in order to prevent personal injury and loss or damage to expensive field sampling equipment.

Application

For EAP staff operating kayaks leased by Ecology. Kayaks will only be used if all other sampling options have been exhausted and supervisor and safety committee permission has been obtained.

Requirements

EAP kayak operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board the boat.

Check weather and tidal conditions or stream flow conditions before launching. Do not use kayaks if wind or flow conditions pose a danger.

Life jackets must be worn at all times when staff are in the kayak.

A minimum of two staff are needed for field work when using kayaks.

The type of kayak used for sampling must be very stable, with good primary stability.

Each kayak must be equipped with the following safety items: bailing device such as a manually operated bilge bump, flotation bags, a paddle float, and a dry bag containing a cell phone or radio, flares, and a first aid kit.

If stability is a concern while sampling, two kayaks must raft side-by-side with a paddle placed over the fore deck of both boats; one kayaker holds both boats in the side-by-side position using the paddle while the other kayaker conducts the sampling.

Personnel operating kayaks must have a minimum of 100 hours experience in kayaking.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

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Operating Inflatable Boats (Avon or Achilles)

Purpose

To ensure that EAP inflatable boats are operated according to the *EAP Boating Plan* and/or boat manufacturers' specifications, in order to prevent personal injury and loss/damage to expensive field sampling equipment.

Application

For EAP staff operating an Avon, Achilles, or other similar inflatable boat owned or leased by Ecology.

Requirements

EAP inflatable boat operators must comply with all provisions of the *EAP Boating Plan* by briefing the crew on all safety-related items on board an Ecology boat or boat leased to Ecology.

Propulsion options include (1) oars, (2) electric motors with accompanying sealed lead acid battery or (3) up to eight-horsepower gasoline engines with a 50:1 fuel mixture in portable fuel tanks. If gasoline engines are installed, a certified fire extinguisher must be on board.

The maximum boat load is 550 lbs for the Avon and 700 lbs for the Achilles including the crew, propulsion devices, and field sampling equipment. The empty weight of the boat is 100 lbs, and proper body mechanics must be employed when lifting the boat out of vehicles or from the storage bag. Wheels are supplied to assist in moving the boat over distances and obstacles.

Prior to use, the boat must be inspected for leaks, and the inflation-deflation valves must be checked for proper air retention. A boat fabric repair patching kit is supplied for each boat. The boat must not be over-inflated with the inflation pump. Boat inflation must be balanced to support internal loads along with water and air temperatures to prevent over-inflation damage. Leaving an inflated boat of this type in the hot sun, even though the boat is in the water, can cause damage due to over-inflation.

To store, the boat must be dry and fully deflated before it is rolled up and placed in the storage bag. Care must be taken to prevent sharp objects from piercing the storage bag during transit in vehicles or during boat operations with submerged rocks or branches along shorelines. All crew members must wear personal flotation devices (PFDs) at all times.

Any problems incurred during the inspection or operation of the EAP inflatable boats require that an *Equipment Problem Report* be filled out properly and submitted to the EAP Operations Center technician.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

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Operating Bronco Pontoon Raft

Purpose

To ensure that the EAP Bronco Pontoon Raft (inflatable boat) is operated according to the *EAP Boating Plan* and boat manufacturers' specifications, in order to prevent personal injury and loss/damage to expensive field sampling equipment.

Application

The Bronco Pontoon Raft is used by the Stream Hydrology Unit for deployment of the Acoustic Doppler Current Profiler (ADCP).

Requirements

The Bronco Pontoon Raft is designed for only one person to operate. Although this conflicts with EAP standard procedure that operators must be accompanied by a crew member, all other provisions of the *EAP Boating Plan* must be met.

The only propulsion option is oars.

The maximum load is 350 lbs for the operator and field sampling equipment. Proper body mechanics must be employed when lifting the raft out of vehicles or from the storage bag. Two people must lift and move the raft. PFDs must be worn.

Prior to use, the raft and inflatable pontoons must be inspected for leaks, and the inflation-deflation valves must be checked for proper air retention. The raft must not be over-inflated with the inflation pump. Raft inflation must be balanced to support internal loads along with water and air temperatures to prevent over-inflation damage. Leaving an inflated boat of this type in the hot sun, even in the water, can cause damage due to over-inflation.

To store, the raft must be dry and fully deflated prior to crew rolling it up and placing it in the storage bag. Care must be taken to prevent sharp objects from piercing the storage bag during transit in vehicles or during raft operations with submerged rocks or branches along shorelines. Operators must wear personal flotation devises (PFDs) at all times.

Any problems incurred during the inspection or operation of the raft requires that an *Equipment Problem Report* be filled out properly and submitted to the EAP Operations Center technician.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

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Using Inflatable Rafts or Inflatable Kayaks for Field Work

Purpose

To ensure that inflatable rafts/kayaks owned or leased by Ecology are operated according to the *EAP Boating Plan* in order to prevent personal injury and loss/damage to field sampling equipment.

Application

For EAP staff operating inflatable rafts or inflatable kayaks in rivers or streams. Rafts and kayaks will only be used if all other sampling options have been exhausted and supervisor permission has been obtained.

Requirements

Inflatable raft or inflatable kayak operators must comply with all provisions of the *EAP Boating Plan*, and any boat manufacturer's specifications.

Check wind and flow/tidal conditions before launching. Do not use inflatable rafts or inflatable kayaks if minimum flows designate the stream/river as being a class 4 or higher run, or if flow conditions are over the minimum suggested recreational white water flows, which can be found at: www.americanwhitewater.org/content/River/state-summary/state/WA/

A minimum of two staff are needed to operate inflatable rafts or inflatable two-person kayaks. For class 1 or 2 waters, one of the two operators must have at least 40 hours of rafting or kayaking experience in rivers or streams. For class 3 waters, one of the two operators must have at least 120 hours of rafting or kayaking experience in rivers or streams.

Personnel operating inflatable rafts/kayaks must have taken a whitewater safety training class, and be familiar with the use of all safety-related items on board the boat.

Life jackets and helmets must be worn at all times.

Each raft or two-person kayak must be equipped with the following safety items: throw bags with line, a dry bag containing a cell phone or radio, flares, a patch/repair kit, and a first aid kit.

Procedure

Inflatable rafts and inflatable two-person kayaks may be used in non-wadable streams, or in streams that require a float to access the sampling site. Before rafting or kayaking, the following procedures must be followed:

- The flow of that section will be checked using the closest flow gage to the site.
- The recommended river running flows will be checked on the American White Water River Tools (link provided above) page or using the guide book *Guide to the Whitewater Rivers of Washington*. Staff will only float the river if it is at or below recommended low-flow levels established for recreational boating.
- Before launching, put-in and take-out locations will be defined and scouted.
- Rapids encountered will be scouted from shore or from boat to ensure that the whole run can be seen and any potential dangers identified.
- A safety contact that will not be floating that day will be designated per the Float Plan.

Do not risk personal injury by rafting or kayaking in areas where you feel unsafe.

In the event of an accident, all whitewater safety procedures will be followed as per required safety training.

Per the *EAP Boating Plan*, only Ecology-owned or -leased boats will be used. No privately owned boats will be employed for this type of sampling effort.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.

Operating from Non-Ecology Boats

Purpose

To describe safety precautions for non-Ecology Boats.

Application

For EAP staff conducting field operations from non-Ecology ships, boats, hovercraft, chartered, or rented vessels.

Requirements

Field sampling notification

An *EAP Field Plan* must be completed by staff prior to departure. Forms must be posted to the EAP SharePoint site.

Lifting hazards

Staff must be aware of the lifting hazards involved in loading and unloading equipment. They must follow the lifting safety procedures recommended in the *Ecology Safety Program Manual.*

Safety

Staff must have the vessel operator conduct a safety briefing to point out the location and use of the emergency equipment (life preservers, life raft, first aid kit, radio, exits, etc). The vessel operator must provide this information to all staff and observers prior to departure. Life vests or float suits must be worn while on the exposed decks of the vessel. In addition, hard hats must be worn whenever overhead hazards exist.

Winch operation

See section on *operating winches on small boats.*

Chemical use

Powdered or liquid chemicals for fixing dissolved oxygen as well as chemicals for decontaminating sampling equipment and fixing/preserving biological samples may be used during the voyage. Staff must be familiar with the applicable Material Safety Data Sheets, wear appropriate protective gear (eye protection, gloves, etc), and follow safety guidelines in the *Ecology Headquarters Chemical Hygiene Plan* and regional chemical hygiene plans.

The boat operator and crew must be made aware of the chemical hazards and how they are going to be used during the voyage. The MSDS sheets must be made available to the crew for review.

Chemical hazards

- Be familiar with the hazardous characteristics of all chemicals that may be used during the voyage and know the proper response to exposures. Check MSDS documentation if necessary.
- Be particularly careful about exposure to air containing treatment process compounds such as chlorine and methane.
- Wear appropriate protective clothing and equipment.
- Ongoing medical monitoring for the symptoms of chemical exposure is also advised.

Lifting hazards

- Follow the lifting safety procedures recommended in the *Ecology Safety Program Manual.*
- Pay particular attention to lifting objects onto elevated surfaces and spaces with limited maneuverability.
- Avoid overloading and take care with objects that have shifting or awkward centers of gravity.

Falling, slipping, and tripping hazards

- Be aware of wet or slick surfaces and use designated walkways or catwalks if possible. Watch for tripping hazards such as hoses, pipes, equipment, and uneven surfaces.
- Be particularly cautious when working near the edge of the boat, deck railing, or open hold.

Overhead hazards

Staff must wear hard hats when overhead pipes, beams, sampling equipment, and other overhead objects are within the work area.

Cut, puncture, drop, and pinch hazards

- Avoid potential hazards from equipment and facility structures. Pay attention to the use of knives, hose clamps, wire cutters, pliers, and extension poles. Identify hinged, sliding, or converging structures that may trap extremities. Watch for sharply pointed objects.
- Wear gloves, steel-toed boots, and other protective clothing where necessary.

Physical/climatic hazards

- Use caution around mechanically-actuated devices.
- Take precautions to protect against physical hazards such as extremes in noise, light, electrical power sources and cabling, temperature/humidity, pressure, and atmospheric particulate. Also of high priority is awareness of combustible material and flammable atmospheres.

- Avoid high frequency sound sources, ultraviolet light sources, high temperature processes, live steam vents, pressurized systems, flammable liquids (floating oil), explosive gases (methane), and submicron particulates in the air.
- Wear safety equipment such as protective earplugs, goggles/glasses, clothing, gloves, boots, hard hats, masks, and respirators as needed.
- Be conscious of extremes in ambient temperature and wear proper clothing. For low temperatures, watch for hypothermia and frostbite. For high temperatures, watch for hyperthermia, dehydration, and heatstroke. Restrict the duration of exposure to extremes of temperature and monitor your body's reaction to thermal stress.

Warning: You must use a personal flotation device (PFD) when working in areas where the danger of drowning exists, such as in the water, on the water, over the water, or alongside the water.