FS-6700-7 (2/98)

U.S. Department of Agriculture	1. WORK PROJECT/ACTIVITY	2. LOCATION	3. UNIT
Forest Service	**General Trail Maintnenance**	**Zigzag, OR**	**Zigzag RD**
JOB HAZARD ANALYSIS (JHA)	4. NAME OF ANALYST	5. JOB TITLE	6. DATE PREPARED
References-FSH 6709.11 and -12 (Instructions on Reverse)	**Kathleen Walker**	**Recreation Assistant**	**June 9, 2009**

7. TASKS/PROCEDURES	8. HAZARDS	
CROSSING GLACIAL STREAMS WHILE HIKING TO JOB SITE	**Dunking, Injuries or Drowning**	

9. ABATEMENT ACTIONS
Engineering Controls * Substitution * Administrative Controls * PPE

✓ **Avoid hiking alone when crossing glacial streams.**

✓ **Check the weather before your trip. Avoid these trails if storms are predicted.**

✓ **Plan crossings for early morning, when glacial rivers are lower.**

✓ **Be willing to turn back if conditions appear unsafe. Red flags include:**

- **Fast water**
- **Very cold temperatures**
- **Downstream hazards like waterfalls**
- **Difficulty determining depth**
- **Water higher than your knees**
- **The sound of boulders rolling along bottom.**

✓**Scout up and down for the safest crossing, which may not be the trail crossing. Look for gradual banks, shallow water free of obstructions, and similar conditions downstream.**

✓**Keep your pack on, but undo the hip and chest strap. Remove the pack if you lose footing.**

✓**Wear boots, sneakers, or water sandals for foot protection and ankle support.**

✓**Use a hiking stick as a 3rd leg, especially on the upstream side and to scout for drop offs.**

✓**Cross together. Face upstream and get in a line perpendicular to the stream's flow. Grab the person's shirt in front of you and move sideways one foot at a time, feeling for a stable surface before transferring your weight. Two people can also face each other holding arms and move side ways. (see pictures below.)**

Most glacial stream crossings in the Mt. Hood Wilderness do not have bridges. **These crossings can be VERY dangerous without preparation, patience, and planning.** Hikers must be familiar with safe techniques for crossing rivers and streams. They can change quickly from trickling creeks to raging torrents, so be especially cautious.

The water volume, clarity and velocity may vary drastically according to season, time of day and upstream weather conditions. On warm days, melting snow and glacial ice can swell streams that were easily crossed in the morning to flood stage by mid-afternoon. In glaciated areas, hotter, sunny days cause higher volume in the streams due to the ice melt (geologists call this diurnal flux). Voluminous, warm rain is also a contributing factor. Safe footing is difficult to obtain: silty water obscures channel bottoms while clear water allows for slippery algal growth. Icy water numbs feet quickly and even shallow streams are surprisingly swift when flowing down steep inclines. This combination of factors makes stream crossings one of the most hazardous parts of any backcountry experience.

Keep these points in mind when crossing water channels:

Choose the safest time to cross:

- Cross early in the day whenever possible;
- Be aware of storms in the area, cross before storms whenever possible.
- If you cannot walk at the speed of a stick thrown into the river, or if the river is swift and above knee height, then it could be hazardous to cross.

Choose the safest place and method to cross:

- Avoid crossing alone if possible. Scout the river from above and below. Stay back from the banks while scouting as stream banks are usually unstable and your focus will be on the river rather than on your footing. Identify the shallowest and smoothest points of the river, avoiding submerged snags, boulders etc.
- The widest or most braided portion of the channel is usually the most shallow. Straight channels usually exhibit uniform flow while bends often reveal deep cut banks and swift water on the outside edge. If the river takes many turns the section between turns (middle part of the S) is often shallower.

- Do not attempt a crossing if large pieces of debris (logs, branches, etc.) are being carried downstream. Water has less momentum on level ground than when flowing down an incline.

Prepare to cross:

- NEVER cross in bare feet. Wear boots or bring extra shoes for crossings. Wet boots are preferable to damaged ankles or feet.
- Do not cross wearing long pants or pull pant legs up; these will increase resistance to the current.
- Release the waist and chest strap on your pack before crossing. This way you will be able to free yourself quickly if you lose your footing or find yourself in a position where your pack is snagged and holding you down. It's also well to remember that your pack has a certain amount of buoyancy and can serve as a flotation device if necessary.
- Ensure that important sleeping bag and extra clothing are stowed in waterproof areas of your pack. Plastic trash bags make good pack liners.

Cross Safely:

- If hiking solo, use a 5-6 ft. hiking staff or stick, held upstream, so the current forces it to the bottom to create a more stable, three point stance. Move only one contact point at a time. Always keep two points of contact on the river bed at all times and cross diagonally downstream, resisting the current much like you would a strong wind.
- Try not to look down at the flowing water as this may upset your equilibrium, look ahead for the best possible route. Resist the temptation to grab at submerged or semi submerged rocks in transit, as this may upset your balance. Take shuffling footsteps, one foot at a time, feeling for the bottom.
- Two or more hikers should cross parallel to the current with the strongest and heaviest member upstream to lessen the force on the other hikers. Walk across by either grasping with arms linked, or face upstream and sidestep across.
- In deep water, the triangle method is safest. Facing each other, three people grip each others shoulders or packs and work their way across one person, one leg, at a time.
- If a member of the party should break away during the crossing, the remaining members should maintain formation and either back out, or complete the crossing before attempting a rescue if necessary.
- If you lose your footing and are carried away, release your pack but hold onto it. Float with your head upstream, this will allow you to fend off from any obstacles with your feet. Remember, flowing water is deceptively strong.

Remember! If a crossing seems too risky...*it probably is!*

ALWAYS BE WILLING TO TURN BACK OR WAIT FOR A MORE SUITABLE TIME IF A CROSSING APPEARS TOO DANGEROUS!

Line Officer's Signature	Title	Date
Bill Westbrook	**District Ranger**	

JHA Instructions (References-FSH 6709.11 and .12)

The JHA shall identify the location of the work project or activity, the name of employee(s) writing the JHA, the date(s) of development,and the name of the appropriate line officer approving it. The supervisor acknowledges that employees have read and understand the contents, have received the required training, and are qualified to perform the work project or activity.

Blocks 1, 2, 3, 4, 5, and 6: Self-explanatory.

Block 7: Identify all tasks and procedures associated with the work project or activity that have potential to cause injury or illness to personnel and damage to property or material. Include emergency evacuation procedures (EEP).

Block 8: Identify all known or suspect hazards associated with each respective task/procedure listed in block 7. For example:

a. Research past accidents/incidents
b. Research the Health and Safety Code, FSH 6709.11 or other appropriate literature.
c. Discuss the work project/activity with participants
d. Observe the work project/activity
e. A combination of the above

Block 9: Identify appropriate actions to reduce or eliminate the hazards identified in block 8. Abatement measures listed below are in the order of the preferred abatement method:

a. Engineering Controls (the most desireable method of abatement). For example, ergonomically designed tools, equipment, and furniture.

b. Substitution. For example, switching to high flash point, non-toxic solvents.

c. Administrative Controls. For example, limiting exposure by reducting the work schedule; establishing appropriate procedures and practices.

d. PPE (least desirable method of abatement). For example, using hearing protection when working with or close to portable machines (chain saws, rock drills portable water pumps)

e. A combination of the above.

Block 10: The JHA must be reviewed and approved by a line officer. Attach a copy of the JHA as justification for purchase orders when procuring PPE.

Blocks 11 and 12: Self-explanatory.

Emergency Evacuation Instructions (Reference FSH 6709.11)

Work supervisors and crew members are responsible for developing and discussing field emergency evacuation procedures (EEP) and alternatives in the event a person(s) becomes seriously ill or injured at the worksite.

Be prepared to provide the following information:

a. Nature of the accident or injury (avoid using victim's name).
b. Type of assistance needed, if any (ground, air, or water evacuation)
c. Location of accident or injury, best access route into the worksite (road name/number), identifiable ground/air landmarks.
d. Radio frequency(s).
e. Contact person.
f. Local hazards to ground vehicles or aviation.
g. Weather conditions (wind speed & direction, visibility, temp).
h. Topography.
i. Number of person(s) to be transported
j. Estimated weight of passengers for air/water evacuation.

The items listed above serve only as guidelines for the development of emergency evacuation procedures.

JHA and Emergency Evacuation Procedures Acknowledgement

We, the undersigned work leader and crew members, acknowledge participation in the development of this JHA (as applicable) and accompanying emergency evacuation procedures. We have thoroughly discussed and understand the provisions of each of these documents:

SIGNATURE	DATE	SIGNATURE	DATE