

ALASKA RAILROAD CORPORATION

Corporate: P.O. Box 107500, Anchorage, AK 99510 • 327 Ship Creek Avenue, Anchorage, AK 99501



September 9, 2004

Jacques Gusmano, Project Coordinator
Alaska Operations Office
U.S. Environmental Protection Agency
222 West 7th Avenue, #19
Anchorage, Alaska 99513-7588

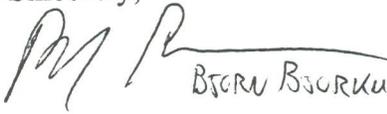
Re: Alaska Railroad Corporation, Anchorage Terminal Reserve RI/FS
Administrative Order on Consent EPA Docket No. CERCLA-10-2004-0065
Ship Creek Habitat Assessment Work Plan

Dear Mr. Gusmano:

The Alaska Railroad Corporation (ARRC) recommended in the 2004 Ship Creek Literature Review prepared under Section 2.2.2.1 of the Statement of Work (SOW) under the subject consent order to develop a work plan for a habitat assessment of Ship Creek. A proposed work plan for this habitat assessment is enclosed. This work plan meets all the relevant requirements listed at Paragraph 42.b. of the consent order, including elements such as an interim action description and a sampling and analysis plan. The construction-related requirements listed in that paragraph such as providing a construction quality assurance plan are not relevant to a study such as this, and public involvement requirements have been and are being met through the public notice EPA provided in connection with the consent order issuance and through EPA/ ARRC development and implementation of a Community Involvement Plan for the overall consent order project.

We look forward to EPA review and approval of this proposed work plan. We will commence this study the week of September 14. Please do not hesitate to contact me if you have any questions. My telephone number is (907) 265-2410.

Sincerely,



ERNEST W. PIPER, FOR

Ernest W. Piper
Project Coordinator

cc: Howard Orlean
bcc: Johnson, Morrisey, Schrader et al



Ship Creek Initial Habitat Assessment Interim Action Work Plan

**Alaska Railroad Corporation
Anchorage Terminal Reserve
U.S. EPA Docket No. CERCLA 10-2004-0065**

Prepared by:

**The RETEC Group, Inc.
2409 Research Blvd., Suite 106
Fort Collins, CO 80526**

Prepared for:

**Alaska Railroad Corporation
327 Ship Creek Avenue
Anchorage, Alaska 99501**

September 10, 2004

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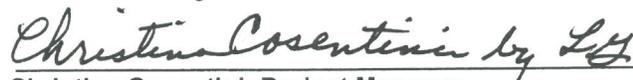
Alaska Railroad Corporation
327 Ship Creek Avenue
Anchorage, Alaska 99501

Prepared by:



Bjorn Bjorkman, Senior Risk Assessor

Reviewed by:



Christina Cosentini, Project Manager

September 10, 2004

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1 Introduction

This document is an interim action work plan developed under a CERCLA Administrative Order on Consent (AOC) No. 10-2004-0065 between the U.S. Environmental Protection Agency (EPA), Region 10 and the Alaska Railroad Corporation (ARRC), under which ARRC has agreed to conduct a CERCLA/RCRA Remedial Investigation and Feasibility Study (RI/FS) at its Anchorage Terminal Reserve in Anchorage, Alaska (the Site). The AOC incorporates a Statement of Work (SOW) that includes an ARRC commitment to develop a work plan for field studies that can be implemented in 2004. Specifically, Section 2.2.2.1 of the SOW states as follows: “*The studies specified in the proposal may include Ship Creek sediment and detritus sampling, bioassays of benthic macroinvertebrate organisms, and/or other field work. Respondent will prepare an Interim Action work plan in accordance with the AOC and submit that to EPA following EPA’s approval of the proposed field study*”. This interim action work plan was proposed in Section 5.1 of the Ship Creek Literature Review (Hart Crowser, 2004a) and includes a preliminary habitat assessment of Ship Creek, a survey of Ship Creek from 0.5 miles upstream to the intertidal mixing at the mouth and a survey of point sources to Ship Creek. EPA approved the proposed field study covered by this work plan in its letter dated August 31, 2004 commenting on the Ship Creek Literature Review.

In accordance with Section IX 42(a) of the AOC, this Interim Action Work Plan presents a Field Sampling and Analysis Plan and a Quality Assurance Project Plan (QAPP) for field data collection to address data gaps identified in the Ship Creek Literature Review completed in July 2004 (Hart Crowser, 2004a) in partial fulfillment of requirements in Section 2.2.2.1 of the June 29, 2004 Statement of Work (SOW) for the AOC.

This Interim Action Work Plan focuses on qualitative field evaluation of Ship Creek to provide data that can be incorporated into the overall RI/FS that ARRC will conduct for the Site as a whole. The following sections present the Field Sampling and Analysis Plan and the QAPP in accordance with Section XII of the AOC.

2 Field Sampling and Analysis Plan

2.1 Rationale

Section 2.2.2.1 of the June 29, 2004 SOW for the AOC required a literature survey to summarize existing data on contamination and biological impacts to Ship Creek, identify data gaps, and propose field studies to be completed in 2004 to address the data gaps.

The Ship Creek Literature Review was completed in July 2004 (Hart Crowser, 2004a). It concluded that a substantial body of data was available for Ship Creek. When this data was considered jointly with the interim sediment sampling conducted in early 2004 (Hart Crowser, 2004b) it was concluded that no evidence for extensive contamination or imminent risk to human health or the environment is present in Ship Creek. Localized or temporary impacts could not be excluded. A conclusion of the Literature Review was that additional water, sediment, or biota sampling was not recommended at this time. Current data gaps identified were related to sources, transport pathways, and overall current conditions in Ship Creek.

In view of this, the literature survey proposed several tasks to be conducted in 2004 in accordance with Section 2.2.2.1 of the SOW. The objective of those tasks is to further evaluate sources, transport pathways, and overall habitat conditions in order to focus the ecological Site Conceptual Model under development for Ship Creek.

Concurrently with the above tasks, ARRC deemed it practical to include two additional and related tasks that will be required for the Remedial Investigation and Feasibility Study (RI/FS): (1) conduct an upland habitat survey in support of the upcoming area wide risk assessment, and (2) locate and identify the ultimate source of any point sources discharging to Ship Creek and, where possible, tie them to permits and existing monitoring or sampling programs.

2.2 Scope and Objectives

The objectives of the Ship Creek Preliminary Assessment Work Plan are the following:

- Collect data on sources and transport pathways of potential contamination to Ship Creek, including the origin of point sources identified previously.
- Collect basic data on Ship Creek in the project area to allow development of a Site Conceptual Model and evaluation of potential receptors and critical habitats.
- Collect information on the overall ecological habitat at the Anchorage Reserve to allow development of a Site Conceptual Model for the upcoming ARRC-wide RI/FS risk assessment.

The following field studies will be conducted in September 2004:

1. Conduct a preliminary habitat assessment of Ship Creek. This task should be conducted prior to the onset of freezing conditions, preferably by mid-September. The preliminary habitat assessment will be conducted concurrently with a larger preliminary habitat assessment

to be conducted site-wide (i.e., including upland areas). A trained biologist will conduct the preliminary habitat assessment. The findings of this assessment will also be incorporated into the site-wide ecological site assessment conducted concurrently in support of the ecological risk assessment

2. Conduct a follow-up study to identify the nature, source, and responsibility for point source features identified in the Point Source Reconnaissance Survey.
3. In addition, a site-wide qualitative ecological site assessment will be conducted. The site-wide survey will identify and evaluate on-site upland ecological habitat (primarily along the northern site boundary). The upland survey results will form part of the upcoming ecological risk assessment for the railyard, but will not be specifically reported in the Interim Report for the previously discussed tasks.

Figure 1 shows the approximate area covered by the habitat survey.

2.3 Methodology

2.3.1 Task 1: Preliminary Habitat Survey of Ship Creek

The habitat survey of the Ship Creek area will be qualitative and confined to visual inspection and basic measurements, and consist of:

- Survey of Ship Creek from approximately ½ mile upstream of site boundary to the intertidal mixing area at the mouth

The survey will identify basic channel characteristics, stream bed conditions, frequency of riffles and pools, bank stability, presence of backwaters, wetlands or other valuable sub-habitats, as well as qualitative riparian conditions. Data from the aquatic habitat will be entered into a *Physical Characterization/Water Quality Data Sheet* (Form 1) of the *Rapid Bioassessment Protocols* (USEPA, 2001). An example is provided as Appendix A. The survey includes:

- Basic water quality parameters (temperature, specific conductance, pH) will be recorded with a field multi-meter at key locations.
- Identification of obvious anthropogenic influence (debris, garbage, inflows of visibly impacted water, etc.) that may affect aquatic life conditions in the creek.
- Description of riparian habitat. Consists of identification of key riparian zone features, such as percent ground cover, type of

ground cover and trees, and presence of signs of wildlife and birds. Areas where development has largely eliminated riparian habitat will be called out. Data from the riparian survey will be entered into an *EPA Ecological Checklist* applicable to Superfund sites (USEPA, 1997). An example is included as Appendix B.

Key features for all subtasks will be photographed. A field notebook will be maintained with key observations.

2.3.2 Task 2: Habitat Survey, Upland Areas

The habitat survey will be qualitative and consist of a site inspection by a RETEC ecologist. The site inspection will focus on identifying areas of the property where the presence of natural vegetation and landscape allow the presence of ecological receptors. It is anticipated that such habitat occurs along the North Bluffs area of the property, in addition to the riparian area of Ship Creek evaluated in Task 1.

The areas identified as potential habitat will be visited, preferably in the morning hours, to identify key features, such as percent cover, type of ground cover and trees, presence of burrows and other signs of mammals or reptiles, and presence of bird life. It is recognized that many smaller song birds already may have started fall migration at the time of the survey.

Key features will be photographed. A field notebook will be maintained with key observations. Data from the survey will be entered into an *EPA Ecological Checklist* applicable to Superfund sites (USEPA, 1997). An example is included as Appendix A.

2.3.3 Task 3: Investigation of Point Sources

In a separate task, ARRC has conducted an inventory of discharges and other key features in Ship Creek. This information has not yet been finalized in report form, but was used as background to this task.

The inventory identified 25 separate features along Ship Creek in the stretch from ½ mile upstream of Reeve Boulevard to the mouth of the creek. These features included seeps, discharging pipes, crossing pipes, weirs, and miscellaneous structures. No attempt was made to identify the owners or sources of the features.

This task will attempt to identify the nature, source, and ownership of the features. This will be accomplished by:

1. Review of ADEC, City of Anchorage, and ARRC utility maps and information on outfalls authorized under specific or general permits. Additional document surveys may be conducted as needed to find available information on the features.

2. Review of documents related to Elmendorf Air Force Base discharge points and Alaska Department of Fish and Game operations associated with Ship Creek.
3. An inspection of each of the identified features. If the nature and source of the feature is not obvious and cannot be confirmed from utility maps, an attempt to trace the feature back to a potential source will be conducted. This will be done visually only, locating manholes or other surface signs of the feature. To allow access, ARRC will notify leaseholders of the work to be conducted in accordance with the lease agreements.
4. A field multi-meter will be used to record basic water quality characteristics of any discharge (electrical conductance, temperature, pH)

Data will be recorded in a field notebook. Global Positioning System (GPS) coordinates will be taken as appropriate. Locations will be photographed as appropriate.

2.4 Analysis and Reporting

2.4.1 Analysis of Data

No sample collection will be conducted in this survey. Data (including basic water quality data) will be presented in a survey format. The data will be evaluated qualitatively by RETEC staff to develop a best professional judgment of the interpretation of the data. It is recognized that the interpretation may be subjective and may need confirmation and follow-up.

2.4.2 Reporting of Data

The results of the preliminary habitat assessment will be presented as a report. The report will include the following:

- Summary of the Ship Creek habitat assessment, including a description of the baseline habitat conditions, identification of areas or features of particular concern due to evidence or likelihood of impact, and recommendations for additional evaluation, if any. Data will include annotated maps, photographs, field logs, and results of in-situ water quality monitoring.
- Summary of the on-site habitat survey, including descriptions of baseline habitat or features of particular concern due to evidence or likelihood of impact, and recommendations for additional evaluation, if any. Data will include annotated maps, photographs, and the Ecological Habitat Checklist.

- Presentation of results of the discharge survey. This section will report on observations in the field, and results of verification of field results with data derived from City of Anchorage, ADEC, and ARRC.

The data will otherwise be incorporated into the Site Conceptual Model for the ecological risk assessment required under Section IX (C) of the AOC.

2.5 Schedule

The preliminary habitat survey needs to be conducted before cold weather arrives and is, therefore, schedule driven. The field survey will be planned for no later than mid-September to avoid the possibility of extensive leaf fall and freezing weather.

The field survey is estimated to take 3 days as follows:

- Day one: Habitat survey, Ship Creek
- Day two: Complete Habitat Survey of Ship Creek, conduct Habitat Survey of upland areas
- Day three: Conduct point source survey

In association with the field survey, relevant documents will be procured from appropriate sources in Anchorage and/or Seattle.

The draft interim report will be submitted in memo form to EPA not later than 60 days following completion of the habitat survey.

3 Quality Assurance Project Plan

3.1 Task Management

3.1.1 Task Organization

The preliminary habitat assessment will be conducted and managed by Mr. Bjorn Bjorkman of The RETEC Group, Inc. Mr. Bjorkman is a trained ecologist and a senior risk assessor. Mr. Bjorkman has the experience and training to conduct all phases of these tasks. Mr. Bjorkman will operate under the supervision of the RETEC Project Manager (Christina Cosentini) and the ARRC Project Manager (Ernie Piper).

3.1.2 Data Quality Objectives

The habitat survey is qualitative and intended to provide background information useful for the Site Conceptual Model. As such, specific Data Quality Objectives (DQO) have not been set up, as no quantitative data

analysis is planned. The following table summarizes the DQO process (per USEPA, 2000):

	DQO Element	
1	State the Problem	Qualitatively identify and describe key Ship Creek and upland features relevant to the upcoming ecological risk assessment.
2	Identify Decision	Identify key habitat features in Ship Creek and upland habitat affecting the design of the upcoming site-wide risk assessment.
3	Inputs to Decision	Qualitative observations and limited <i>in-situ</i> water quality measurements.
4	Define Boundaries	(1) Ship Creek riparian corridor from ½ mile upstream of site to tidal area at mouth of creek, and (2) ecologically relevant upland habitats on railyard area.
5	Decision Rules	This is a qualitative survey. The survey will endeavor to visit all key habitat features. Aerial photos and prior reports will be used to focus on key areas.
6	Tolerance Limits for Decision	No quantitative data will be collected.
7	Optimize Design	The outcome of the survey will determine if follow-up confirmation or investigation is necessary.

3.2 Data Management

Data collected for this task is primarily qualitative, based on site observations by a trained ecologist, and on data derived from literature sources or government agencies. Evaluation of data will be based on professional judgment.

Field data will be recorded in the field notebook. The field notebook will contain records of:

- Observations and site drawings
- GPS coordinates
- Water quality parameters
- Photographic log

No environmental samples will be collected as part of this survey.

Data collected in the field for the habitat surveys will be transferred to *EPA Habitat Checklist* forms or *Rapid Bioassessment Physical Characterization/Water Quality Field Data Sheets*, as appropriate, upon return from the field. Photographs will be in electronic format and will be stored in the ARRC project files and also as a backup copy on a CD-R.

Quality control measures will be limited to the calibration of the GPS unit and the aquatic multi-meter. Standard procedures will be used to calibrate and

maintain these instruments, in accordance with the instrument operation manuals.

3.3 Assessment and Oversight

The habitat survey is a one-time event. No specific field assessment or oversight activities are planned, beyond the standard oversight described in the Health and Safety Plan. The report resulting from the survey will be reviewed prior to finalization by a senior RETEC manager familiar with the goals and procedures of habitat surveys.

3.4 Data Validation and Usability

The only quantitative data that will be collected will be GPS coordinates and some basic water quality data recorded *in-situ* with a calibrated multi-meter at point discharges or seeps. The data will not be submitted for validation and usability review, but will be considered qualitatively only for determining potential sources for the tested water.

4 Health and Safety Plan

The field survey will be conducted in accordance with the guidelines outlined in the *Site-Specific Health and Safety Plan* (HSP) (RETEC, 2004, in preparation). The potential health and safety hazards associated with the field activities proposed in this work plan, and the respective precautionary health and safety guidelines, are addressed in the HSP. All personnel involved in the investigation will be required to review and comply with the HSP.

To perform field activities on site, all field personnel must wear a hard hat, safety glasses, and steel-toed boots, and must have completed Occupational Safety and Health Administration (OSHA) 40-hour training and provide a copy of their current OSHA 8-hour refresher-training certificate. All field investigation personnel will be required to attend a preliminary site safety orientation to identify the hazards specific to working on site. In addition, all field personnel will attend daily safety meetings or project-specific tailgate safety meetings to discuss safety topics specific to the fieldwork being performed that day. All health and safety topics, including daily meetings, will be documented and compiled in a project field notebook.

A Job Hazard Analysis (JHA) has been completed to address the specific or unique health and safety issues related to the habitat survey (Appendix C). The habitat survey does not involve contact with contaminants, sampling equipment, or machinery. However, unique risks covered in the JHA include hypothermia, risks associated with water, and risks associated with biota (e.g., bees).

5 References

Hart-Crowser, 2004a. *Ship Creek Literature Review, Alaska Railroad Corporation*, April 2004. Document 8877, prepared July 2004.

Hart-Crowser, 2004b. *Ship Creek Water and Sediment Assessment Report*, Anchorage, Alaska. May 2004.

RETEC, 2004. *Site-Specific Health and Safety Plan*, Alaska Railroad Corporation, Anchorage.

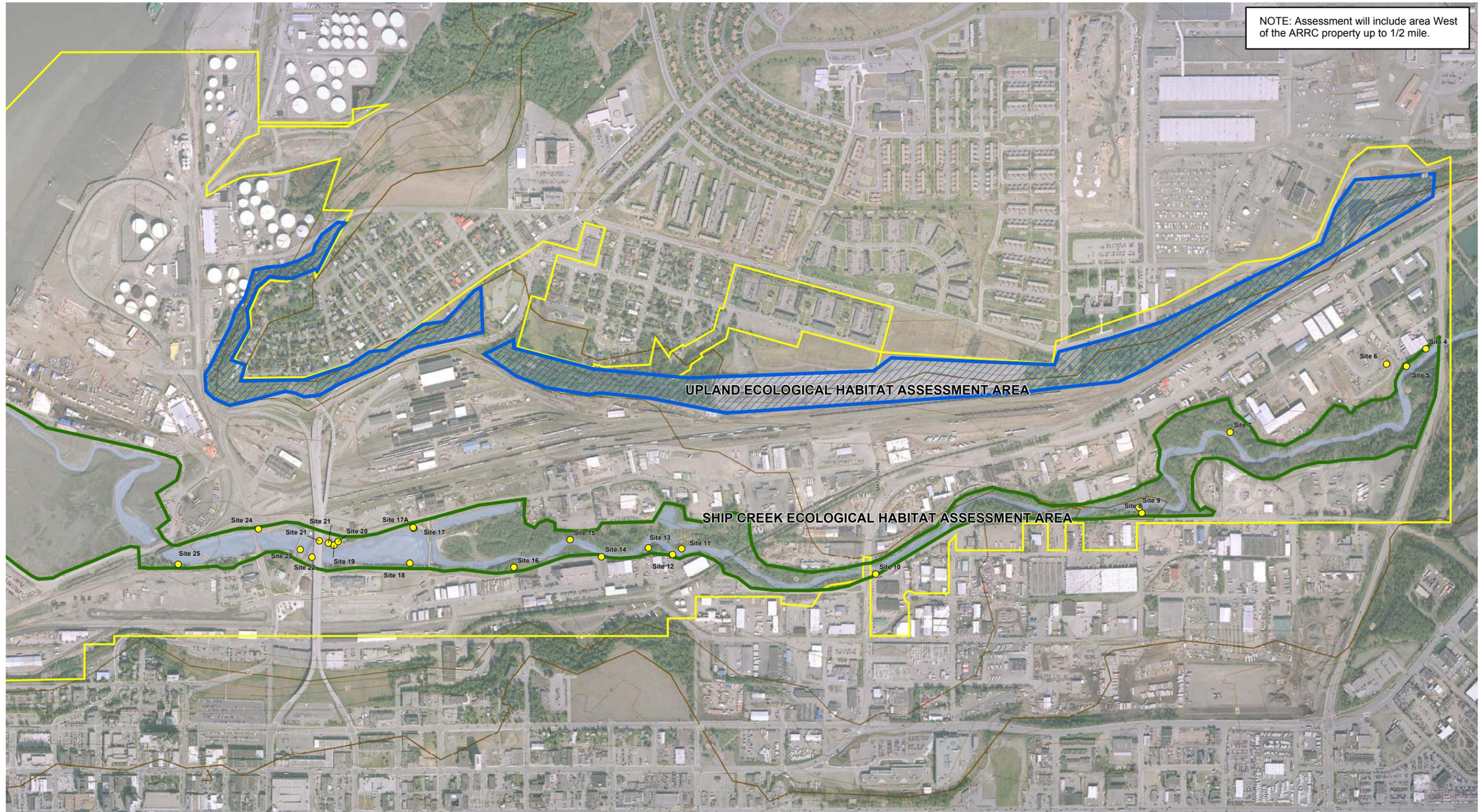
USEPA, 2001. *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition*.

USEPA, 1997. *Ecological Risk Assessment Guidelines for Superfund*.

USEPA, 2000. *Guidance for the Data Quality Objectives Process*. EPA QA/G-4.

Figures

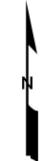
NOTE: Assessment will include area West of the ARRC property up to 1/2 mile.



LEGEND

- ARRC PROPERTY BOUNDARY
- 10 FOOT CONTOUR INTERVAL (USGS)
- PROPOSED SHIP CREEK ECOLOGICAL HABITAT ASSESSMENT AREA
- SUSPECTED DISCHARGE LOCATIONS TO SHIP CREEK
- UPLAND ECOLOGICAL HABITAT ASSESSMENT AREA

NOTES:
 1. AERIAL PHOTO BASE TAKEN MAY 22, 2003, PROVIDED BY ARRC.
 2. PROPERTY BOUNDARY DIGITIZED FROM ARRC CAD BASEMAP AUGUST 12, 2004.



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SHIP CREEK HABITAT ASSESSMENT WORK PLAN
 ARRC, ANCHORAGE TERMINAL RESERVE

SHIP CREEK PRELIMINARY HABITAT ASSESSMENT EVALUATION AREA

DATE: 08/30/04

DWN. BY: KBL/ftc

FIGURE: 1



Appendix A
Physical Habitat Characterization Forms



Rapid Bioassessment Protocol Form 1:
 Habitat Assessment and Physicochemical Characterization Field Data Sheets

**PHYSICAL CHARACTERIZATION/WATER QUALITY
 FIELD DATA SHEET (FRONT)**

970.493. 3700 Phone
 970.493. 2328 Fax
 www.retec.com

STREAM NAME		LOCATION	
STATION # _____ RIVERMILE _____		STREAM CLASS	
LAT _____	LONG _____	RIVER BASIN	
STORET #		AGENCY	
INVESTIGATORS			
FORM COMPLETED BY		DATE _____ TIME _____ AM PM	REASON FOR SURVEY

WEATHER CONDITIONS	Now	Past 24 hours	Has there been a heavy rain in the last 7 days?
	storm (heavy rain) rain (steady rain) showers (intermittent) %cloud cover _____% clear/sunny	_____%	Yes No Air Temperature _____ °C Other _____

SITE LOCATION/MAP	Draw a map of the site and indicate the areas sampled (or attach a photograph)
-------------------	---

STREAM CHARACTERIZATION	Stream Subsystem Perennial Intermittent Tidal	Stream Type Coldwater Warmwater
	Stream Origin Glacial Spring-fed Non-glacial montane Mixture of origins Swamp and bog Other _____	Catchment Area _____ km ²



Rapid Bioassessment Protocol Form 1:
Habitat Assessment and Physicochemical Characterization Field Data Sheets

**PHYSICAL CHARACTERIZATION/WATER QUALITY
FIELD DATA SHEET (BACK)**

WATERSHED FEATURES	Predominant Surrounding Landuse Forest Field/Pasture Agricultural Residential	Commercial Industrial Other _____	Local Watershed NPS Pollution No evidence Some potential sources Obvious sources
			Local Watershed Erosion None Moderate Heavy
RIPARIAN VEGETATION (18 meter buffer)	Indicate the dominant type and record the dominant species present Trees Shrubs Grasses Herbaceous dominant species present _____		
INSTREAM FEATURES	Estimated Reach Length _____ m	Canopy Cover Partly open Partly shaded Shaded	
	Estimated Stream Width _____ m	High Water Mark _____ m	
	Sampling Reach Area _____ m ²	Proportion of Reach Represented by Stream Morphology Types Riffle _____% Run _____% Pool _____%	
	Area in km² (m²x1000) _____ km ²		
	Estimated Stream Depth _____ m	Channelized Yes No	
	Surface Velocity (at thalweg) _____ m/sec	Dam Present Yes No	
LARGE WOODY DEBRIS	LWD _____ m ²		
	Density of LWD _____ m ² /km ² (LWD/ reach area)		
AQUATIC VEGETATION	Indicate the dominant type and record the dominant species present Rotted emergent Rotted submergent Rotted floating Free floating Floating Algae Attached Algae dominant species present _____ Portion of the reach with aquatic vegetation _____%		
WATER QUALITY	Temperature _____ °C	Water Odors Normal/None Sewage Petroleum Chemical Fishy Other _____	
	Specific Conductance _____	Water Surface Oils Slick Sheen Globbs Flecks None Other _____	
	Dissolved Oxygen _____	Turbidity (if not measured) Clear Slightly turbid Turbid Opaque Stained Other _____	
	pH _____		
	Turbidity _____		
	WQ Instrument Used _____		
SEDIMENT/ SUBSTRATE	Odors Normal Sewage Petroleum Chemical Anaerobic None Other _____	Deposits Sludge Sawdust Paper fiber Sand Relict shells Other _____	
	Oils Absent Slight Moderate Profuse	Looking at stones which are not deeply embedded, are the undersides black in color? Yes No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	
Boulder	> 256 mm (10")				
Cobble	64-256 mm (2.5"-10")		Muck-Mud	black, very fine organic (FPOM)	
Gravel	2-64 mm (0.1"-2.5")				
Sand	0.06-2mm (gritty)		Marl	grey, shell fragments	
Silt	0.004-0.06 mm				
Clay	< 0.004 mm (slick)				

Appendix B
Ecological Habitat Assessment Checklist

CHECKLIST FOR ECOLOGICAL ASSESSMENT/SAMPLING

I - SITE DESCRIPTION			
1	Site Name		
	Location		
	County		
	City		
	State		
2	Latitude		
	Longitude		
3	Approximate Area		
4	Is this the First Site Visit?	<input type="checkbox"/>	
	Dates of Previous Visits		
	(attach trip reports)		
5	USGS Topographic map attached?	<input type="checkbox"/>	
6	Are aerial or site photos available	<input type="checkbox"/>	
	Please attach		
7	Land use of Site, in %		
	<i>Urban</i>		
	<i>Rural</i>		
	<i>Residential</i>		
	<i>Industrial (light or heavy?)</i>		
	<i>Agricultural (indicate crops)</i>		
	<i>Recreational (describe)</i>		
	<i>Undisturbed</i>		
	<i>Other (describe)</i>		
	Surrounding Land Use, in %		
	<i>Urban</i>		
	<i>Rural</i>		
	<i>Residential</i>		
	<i>Industrial (light or heavy)</i>		
<i>Agricultural (indicate crops)</i>			
<i>Recreational (describe)</i>			
<i>Undisturbed</i>			
<i>Other (describe)</i>			
8	Has any soil movement taken place at the site?	<input type="checkbox"/>	
	Identify likely cause		
9	Do any "sensitive areas" exist adjacent or proximate to site?	<input type="checkbox"/>	
	Sources of information for sensitive areas		
10	Type of facility		
11	Suspected or known contaminants?		

I - SITE DESCRIPTION			
11	Approximate Maximum concentrations?		
12	Potential Routes of off-site migration		
	Swales		
	Depressions		
	Runoff		
	Drainage ditches		
	Particulates (wind)		
	Vehicular Traffic		
	Other (specify)		
13	Depth to water table (if known)		
14	Is surface runoff apparent?		
	If yes, where does discharge go:		
	Surface water		
	Groundwater		
	Sewer		
	Impoundment		
15	Is there a navigable waterbody or tributary?		
16	Is there a waterbody in vicinity?		
	Distance?		
	If yes complete Section III or IV		
17	Evidence of flooding?		
	If yes, complete Section V (note: wetlands may not be obvious!)		
18	References, guidebooks and time spent identifying fauna		
19	Are there T&E species known in area?		
	Has this been verified with USFWS and State resource agency?		
20	Weather conditions at time of visit		
	Date:		
	Temperature:		
	Wind:		
	Cloud cover:		
	Normal daily high:		
	Precipitation:		
21	Summary		

Appendix C
Job Hazard Analysis

Job Hazard Analysis Form

Job/Operation Surface water/sediment sampling		JSHA No.	JSHA Status	Page <u>1</u> of <u>6</u>	<input type="checkbox"/> New - YES Revision No.: _____
Analysis by: Bjorn Bjorkman		Reviewed & Approved by:		Process/Machine Equipment:	
Employee Position Title: Senior Risk Assessor		Approval Date:		Recommended/Required PPE: Level D	
Department/Division:		Annual Review Date:		Special Hazards: Biological (plants and animals), flowing water	
Sequence of Basic Job Steps		Potential Hazards/Accidents		Recommended Safe Job Procedures	
Step #		Step #		Step #	
1	Collection of Biological Data, Water Quality Measurements, and Visual Inspection	1	Creek/river (drowning)	1	<ul style="list-style-type: none"> • Safe wading depth will be considered to be 3.0 feet. Additionally, the safe wading depth will be adjusted (decreased) based upon the depth, location and flow/force of the water. • Have life preserver or flotation device available for person in the river and sentinels for areas greater than 3 feet in depth. • Be aware of flow conditions; leave the area if flash flooding or inclement weather conditions present hazards to personnel. • Use buddy system, have sentinel(s) to watch person in creek. • Ensure that personnel working in/around water do not have a fear of water and that they can swim. • Be aware of changing river conditions
1	1		Creek/River (Flow Rate/force)		<ul style="list-style-type: none"> • Use of Personal flotation devices (PFDs) when depth is greater than 3.0 feet or when determined to be necessary based on flow conditions. • Be aware of changing creek/river conditions.

Job/Operation Surface water/sediment sampling		JSHA No.	JSHA Status	Page <u>2</u> of <u>6</u>	<input type="checkbox"/> New - YES Revision No.:
Analysis by: Bjorn Bjorkman		Reviewed & Approved by:		Process/Machine Equipment:	
Employee Position Title: Senior Risk Assessor		Approval Date:		Recommended/Required PPE: Level D	
Department/Division:		Annual Review Date:		Special Hazards: Biological (plants and animals), flowing water	
Sequence of Basic Job Steps		Potential Hazards/Accidents		Recommended Safe Job Procedures	
Step #		Step #		Step #	
1		1	Caving banks	1	<ul style="list-style-type: none"> • Inspection of vertical banks for caving potential. Be aware of unstable creek banks. • Avoid those areas deemed unsafe and negotiate banks in only those areas where caving potential is minimal and non-hazardous. • Daily safety meetings/reminders
1		1	Communication	1	<ul style="list-style-type: none"> • Contact with sentinel(s) on the banks of creek. • File daily itinerary of proposed sampling locations with project manager • Use radio/cell phone to maintain contact with project manager/supervisor and safety officer • Note all areas of cell phone coverage/non-coverage
1		1	Slip, Trip, and Fall		<ul style="list-style-type: none"> • Maintain clean work area. • Work as a team (buddy system). • When working in the creek wear appropriate footwear (e.g., waders) and gloves. • Be aware of the presence/potential of underwater debris (sharp edges, rocks, etc.).

Job/Operation Surface water/sediment sampling		JSHA No.	JSHA Status	Page <u>3</u> of <u>6</u>	<input type="checkbox"/> New - YES Revision No.:
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Employee Position Title: Senior Risk Assessor		Approval Date:		Recommended/Required PPE: Level D	
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Step #		Step #		Step #	
1		1	Adverse Weather Conditions	1	<ul style="list-style-type: none"> • Be aware of wind chill potential. • Be aware of high wind conditions. • Be aware of cold temperature in air and water and the potential for hypothermia. • Stop work if weather conditions become too severe. • If lightning is observed work will be stopped until conditions are safe (one-half hour after last lightning/thunder observed).
1		1	Hypothermia	1	<ul style="list-style-type: none"> • Be aware of high winds and wind chill potential. • Stop work if wind and rain could induce hypothermic conditions. • Wear insulated clothing; person in river will be required to wear insulated waders or appropriate insulation under clothing to maintain body temperature • Change clothing if it becomes wet • Monitor yourself and co-workers for signs of cold stress • Take shelter to warm-up if feeling signs of cold stress.

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Sequence of Basic Job Steps		Potential Hazards/Accidents		Recommended Safe Job Procedures	
Step #		Step #		Step #	
1		1	Biological	1	<ul style="list-style-type: none"> • Watch for, ticks, chiggers, badgers, and mosquitoes (wear insect-repellant when necessary). • Be aware of, careful of and protective of wildlife. Reduce vehicle speed to 15 mph. • If on foot, wildlife; maintain safe distance.
1		1	Hunting		<ul style="list-style-type: none"> • Wear bright orange visibility vest while away from truck during hunting season in rural areas
2	Driving	2	Fire	2	<ul style="list-style-type: none"> • When off-road, avoid idling in dry grass/brush areas • Equip vehicle with fire extinguisher
2		2	Driving Surface	2	<ul style="list-style-type: none"> • Be aware of changing road/off-road conditions due to precipitation • Have access to cell phone • Avoid parking too close to creek • Check condition of vehicle tires after being off-road. • Use four-wheel drive while off-road, as appropriate • Follow/obey all signs, lights and signalmen while on and off-site. • Be aware of nearby traffic and activities

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Employee Position Title: Senior Risk Assessor		Approval Date:		Recommended/Required PPE: Level D	
Department/Division:		Annual Review Date:		Special Hazards: Hunting, biological (plants and animals), flowing water	
Sequence of Basic Job Steps		Potential Hazards/Accidents		Recommended Safe Job Procedures	
Step #		Step #		Step #	
2		2	Driving/Vehicles (General)	2	<ul style="list-style-type: none"> Inspect vehicle daily - tire pressure, fluids, and fuel levels. Are vehicle accessories operational (e.g., lights, wipers). Confirm spare tire presence (rental vehicles) and check spare tire pressure Have all important documentation in vehicle/possession (registration, insurance card, RETEC incident report form) Ensure appropriate following distance Have appropriate area road maps Observe posted traffic signs and signals Be aware of wildlife both on and off-road
3	General Hazards	3	Noise	3	<ul style="list-style-type: none"> Wear appropriate hearing protection as indicated while on-site
3		3	Dehydration	3	<ul style="list-style-type: none"> Drink plenty of water
3		3	Minor cuts and bruises/Hand Safety	3	<ul style="list-style-type: none"> Use proper PPE while working Use leather gloves to protect hands Use first aid as necessary Identify and avoid pinch points

Job/Operation Surface water/sediment sampling		JSHA No.	JSHA Status	Page <u>6</u> of <u>6</u>	<input type="checkbox"/> New - YES Revision No.:
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Step #		Step #		Step #	
3		3	Use of decontamination/preservative chemicals	3	<ul style="list-style-type: none"> • Use and maintain proper PPE • Keep portable eyewash kit nearby • Remove contaminated clothing • If splashed or otherwise exposed, review causes and remedy future contact situations before resuming work.
3	3	3	Use of tools	3	<ul style="list-style-type: none"> • Use correct tool for job • Inspect tools for damage • Use leather gloves when using hand tools.