



Research Safety Summary - View

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Status	Authorized									
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Notice	This information is current as of 1/23/2014 9:43:32 AM . The official copy of this Research Safety Summary is the online version. Before using a printed copy, you must verify that it is the most recent version. Any printed copies provided to individuals for the purpose of controlling work must be controlled in accordance with the Document Control subject area.									
Title	ESD)-Environmental Remediation Sciences Program (ERSP) Field Research Center (FRC) Operations									
Approvals/Authorizations	<table border="1"> <thead> <tr> <th>Date/Time</th> <th>Name</th> <th>Role</th> </tr> </thead> <tbody> <tr> <td>12/5/2013 8:22:14 AM</td> <td>Brooks, Scott C (36427)</td> <td>Group Leader</td> </tr> <tr> <td>12/5/2013 12:45:16 PM</td> <td>Fowler, David E (27217)</td> <td>Division Work Authority</td> </tr> </tbody> </table>	Date/Time	Name	Role	12/5/2013 8:22:14 AM	Brooks, Scott C (36427)	Group Leader	12/5/2013 12:45:16 PM	Fowler, David E (27217)	Division Work Authority
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Description Text	<p>The FRC provides a site for investigators to conduct research and obtain a variety of environmental samples related to subsurface environmental studies and contaminant fate, transport and remediation. ORNL is the operator of the FRC facility. Both lab and field activities are included in this RSS.</p> <p>The FRC lies within the Y-12 area of responsibility on the Oak Ridge Reservation (ORR). It includes a 243-acre previously disturbed contaminated area used for conducting experiments and on a plume of contaminated groundwater and surface water, and a 404-acre uncontaminated background area for comparison studies. Environmental samples and field data are collected at both these areas.</p> <p>In addition, some projects (e.g., ENIGMA) require the collection of environmental samples (e.g., groundwater, surface water, sediment, microbial) outside of the formal FRC boundaries. This sampling will be conducted following the procedures outlined in this RSS. However, intrusive active manipulations and experiments conducted outside the boundary of the FRC would require additional review and possibly a separate RSS prior to implementation, depending on the nature of the activities.</p> <p>Some samples are processed in the FRC field trailers and laboratories at ORNL's Environmental Sciences Division (ESD); some are packaged and sent to other laboratories for processing.</p> <p>Safely conducting research on the FRC and ancillary areas receives the highest priority. Many of the task specific hazards and controls are documented in the Site-Specific Health and Safety Plan (HASP). The HASP individually describes many of the routine tasks associated with the FRC, the equipment and materials, hazards and controls, and personal protective equipment. As such, the HASP is the primary document addressing the concerns which are the subject of this RSS; the HASP contains a level of detail specific to the FRC which often exceeds that captured by this RSS. Therefore, many responses/controls here may reference the HASP.</p> <p>In addition to the HASP, other details and information about the FRC operations are contained in the following documents:</p> <ul style="list-style-type: none"> • FRC and IF Project Management Plan • IFRC Implementation Plan • ERSD Management Plan for the IFRC Projects <p>All of these documents can be found at: http://public.ornl.gov/orific/orfrc7_documents.cfm</p> <p>MOUs exist with the EM and Y12 contractors to clarify contractor responsibilities on this project.</p> <p>Primary Field sites include two trailers: 9983-FX and XD0701 and a large tent structure 998T-07. There are research activities going on in these trailers and they are authorized research areas with Lab Space Managers assigned to each.</p>									
Description File	None.									
Division	X042: Environmental Sciences Division									
Start Date	4/1/1999									
End Date	None.									
Account	None.									
General Notes	<p>Please note that RSSs related to the FRC and the referenced HASP are the only FRC documents where ES&H controls shall be defined.</p> <p>Participants should also be advised that non-radiological controls established in the HASP (e.g. drilling work, groundwater sampling, etc.) shall be implemented at ALL FRC field locations including the "background site", 0800 area, etc.</p> <p>When working alone at off-site or remote locations (e.g. 0855) participant(s) will have access to (and know how to operate) some means (ie., operable phone or radio and contact #) for getting timely emergency help. (2) When an individual must perform field work alone, he or she will have created the situation that someone will</p> <p>(a) know where the field worker is;</p> <p>(b) know when the fieldworker should return from the field; and</p> <p>(c) take appropriate search actions if the fieldworker does not return in a timely fashion.</p>									
General Attachments	MOU-01-051 document which includes MOA-UTB-201 Amendment 1 Extension for MOA between UTB and BJC and email transferring from BJC to UCOR dated August 1 2011.pdf ; RSS 824 QEA FINAL - November 2013.pdf									
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Division Work Authority	Fowler, David E (27217)									
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PI Delegates	Mehlhorn, Tonia L (33447);									
Group Leaders	Brooks, Scott C (36427);									
Participants	Bailey, Kathryn L (3009110); Brooks, Scott C (36427); Chen, Zhaobo (3017352); Earles, Jennifer E (960802); Elias, Dwayne A (966720); Fortney, Julian L (3007647); Hazen, Terry (906936); Joyner, Dominique C (3005563); Lester, Brian P (978820); Li, Pengsong (3020578); Lowe, Kenneth Alan (34120); Mehlhorn, Tonia L (33447); Paradis, Charles J (3016890); Patton, R Alex (35285); Phillips, Debra Helen (656747); Phillips, Jana Randolph (746669); Rocha, Andrea M (947216); Schadt, Christopher Warren (902616); Techtmann, Stephen (3010125); Watson, David B (35348); Wu, Weimin (691470);									
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Lab Space Managers	Mehlhorn, Tonia L (33447); Lowe, Kenneth Alan (34120); Phillips, Jana Randolph (746669)									
Locations	▲ Building 0855, Room 01 ~ Building 1505, Room 138 ~ Lowe' Building 1505, Room 144A ~ Lowe' Building 1505, Room 144B ~ Lowe' Building 1505, Room									

165A ~ Mehlhorn; Building 1505, Room 169 ~ Mehlhorn; Building 1505, Room 267 ~ Phillips;  Building 7042, Room 001 ~ Core barn for storage only, no lab activity.; Building 9983-FX, Room 01 - Mehlhorn; Building 9983-FX, Room 02 - Mehlhorn; Building 998T-07, Room 01 - Mehlhorn; Field Work; Off-Site Work; Building XD0701, Room 01 - Background Site Shed

Nepe Documentation

The activities conducted at the FRC are covered in an Environmental Assessment: DOE/EA-1196 and subsequent Finding of No Significant Impact. As new projects are evaluated for the FRC the FRC Manager reviews project tasks to ensure that all are covered in the activities approved in the Environmental Assessment. If not, the activities are reviewed by the ORNL NEPA Environmental Compliance Representative, and proper clearance is gained before proceeding.

For activities occurring in 1505 labs, it has been determined that they fall within scope of ESD's Division Categorical Exclusion (CX) for Small Scale R&D projects (2657X), specifically bullet 6.

This Categorical Exclusion (CX) is currently available online at the NEPA Homepage: <http://www-ep.ornl.gov/nepa/PDFDocs/2657X.pdf>

Hazards

2.1 This operation involves the generation, handling, processing, use, or storage of **radioactive materials** (including sealed sources and waste).

Potential Training:

Please refer to the SBMS [Radiation Safety Training](#) exhibit for training requirements.
Source Control Custodian - Radioactive
Source users shall receive source-specific training provided by the Source Custodian.

Requirements:

[Facility Hazard Categorization](#)
[Facility Use Agreements](#)
[Radiological Area Controls](#)
[Radiological Design Requirements](#)
[Radiological Dosimetry](#)
[Radiological Work](#)
[Safety and Security Regulatory \(SSR\) Program](#)
[Sealed Radioactive Source Control](#)

Hazard Notes:

See HASP for task specific hazards. Some portions of the Field Research Center (FRC) includes Underground Radioactive Materials Areas (i.e., subsurface contamination). Soil cores and cuttings and groundwater samples collected from these areas may contain low levels of radioactive contamination. Some of the contaminated samples are taken to labs for further processing and analysis.

When needed, samples are handled anaerobically in the glove bag in lab 144 of Bldg 1505. The contaminants include depleted uranium and Tc99.

Low-level radioactive soil cuttings are generated as project wastes from well drilling operations.

FRC groundwater and soils samples will be used in laboratory experiments and analyzed in ESD laboratories.

Uranyl Nitrate will be used to make solutions to apply to sediments.

Control Notes:

All personnel directly involved with drilling/soil coring operations (Reference the authorized version of [RSS 8532](#)) and groundwater collections within the posted Radiological Areas must be Radiological Worker trained for ORNL and will work according to the FRC HASP, this RSS and associated Radiological Work Permit (RWP) requirements, if any for their particular tasks.

The Radiological Control Technician (RCT) or Site Safety Health Officer (SSHO) will provide a briefing to subcontractors and guest users of the facility who do not perform the above activities and who do not have Radiological Worker training in order to communicate radiological hazards at the site so all staff have some training/familiarization with radiological protection information.

Field work areas where radioactive soil cuttings are generated, and radioactive soil cores collected, are marked as Underground Radioactive Materials Areas. Note: Underground Radioactive Material Areas may be changed to a radiological area posting (e.g. Contamination Area) based on survey results. Processing of core material is conducted within posted radiological areas at the FRC and 1500 area laboratories unless they have been confirmed to be below free release limits (Reference: release limits exhibit [Surface Contamination Values](#)) by an RCT. Control of these activities will be by RWP and/or RSS documents. A RCT will monitor when soil cores or cuttings are brought to the surface. Core/sediment samples are surveyed and appropriately labeled, or tagged for storage, analysis, or shipping.

Groundwater samples based on historical data have been found to be below free release limits and would not require a radiological label. However, a label will be affixed to samples stating that the "Material will NOT meet the 'No-Radioactivity Added' (NRA) Criteria for Waste Disposal."

If a sample exceeds 1.5 microcurie (3.330000E+006 dpm) contact [Radioactive Material Inventory Custodian \(RMIC\)](#) prior to bringing the sample to a Facility (Needs to be prescreened for RMIS).

Methodology for Removing Samples from the FRC Site when a Radiological Control Technician (RCT) is NOT at the site:

1. Personnel must be trained and signed off on the Instrument Training for BSD and ESD to use the Bircron PGM (Ref attached training) **PRIOR** to using it to scan samples. Training documentation is to be sent to the Division Training Officer for documentation in the LRN system.
2. Groundwater, filters, pelcaps and gas sampler will be checked by the trained personnel. If the sample indicates counts greater than 100 counts per minute above background on a Bircron Meter/G-M pancake contact the RCT to survey the sample, issue a Radioactive Material(s) tag, and help determine proper approach for shipment of the sample back to the 1500 area.
3. If the sample being checked indicates counts less than 100 counts per minute above background, the sample may be put in a clean sample container, attach a "Caution-Radioactive Material" sticker to the sample or sample container, and the sample transported to the 1500 area (with the exception of groundwater which will be labeled as "NRA").
4. Note: This Methodology only applies to transporting samples (i.e. groundwater, gas samplers, filters and pelcaps) back to the 1500 area. All samples leaving ESD control to other institutions both at ORNL and outside ORNL control must be surveyed and appropriately tagged by an RCT.
5. Samples must be surveyed by an RCT when received at the 1500 area labs if work is not performed within a posted radiological area (with the exception of groundwater samples).

Release & Decontamination of equipment from posted radiological areas:

1. Any equipment placed down wells in a posted radiological area cannot leave the IFRC site without a radiological survey. These items (and any other items suspected to be contaminated) are to be placed in a Radiological Area for survey by an RCT. (Reference: SBMS [Radiological Labeling and Control of Materials](#)) Note: Equipment exposed to groundwater will be left onsite until RCT has surveyed and tagged.
2. If RCT determines an Item(s) is within free release limits, RCT will issue a material clearance certification ("green tag") (Reference: release limits exhibit for [Surface Contamination Values](#))
3. If RCT determines an item(s) exceeds surface contamination values for free release, then appropriate contamination control measures will be applied. (Reference: SBMS subject area [Identifying and Labeling Radioactive Materials](#))
4. RSS participants may have contaminated item(s) removed from the Radiological Area with assistance from the RCT. However, RSS participants must ensure all radioactive materials meets transportation limits prior to transport from the FRC site (contact Transportation Organization if help is needed) and can only transport the item(s) to another Radiation Materials Area (RMA) (Reference: exhibit for [Conditional Release of Material to a Controlled Area](#))
5. If RSS participant desires to de-con a contaminated item(s), this activity must be performed with a RWP and/or direct guidance from an RCT. Acceptable de-con methods include use of wipes (cloth, paper towels etc.) using moderate pressure, use of a cleaning liquid (water, formula 409, etc.) while adhering to PPE requirements stipulated in RWP.

Note: Any de-conned item(s) must NOT be removed from radiological area without RCT approval.

Note: This does not apply to the more aggressive decon required for drilling equipment. Decontamination of equipment beyond those methods described in Bullet 5 will require further evaluation by the RCT and the Division Ops Group since the RSS or RWP may need to be modified if a more aggressive decontamination approach is needed. The RCT has the flexibility to make decisions in the field pertaining to decontamination work and job coverage requirements in accordance with the RWP requirements.

6. If the equipment cannot be decontaminated to free release limits, RCT will tag the item(s) as radioactive material as described in Bullet 3 and Bullet 4. Drilling equipment with fixed contamination will be stored in building 855 with appropriate tags and identification.

7. Contact the RCT if you have questions.

Use of Uranyl Nitrate and Uranyl Acetate:

Staff must contact the RCT to request uranyl nitrate/acetate to be brought to their working area to make uranium containing stock solutions. The RCT will remain in the area while the working solution(s) are being made. A survey will be performed by the RCT of the working area, equipment, and diluted solution containers before returning the stock material to storage.

- If RCT determines the uranyl solution is below surface contamination limits an "NRA" label may be applied.
- If RCT determines an item(s) exceeds surface contamination values for free release, then appropriate contamination control measures will be applied; RCT will issue a restricted material clearance certification ("Rad Tag") (Reference: SBMS subject area [Identifying and Labeling Radioactive Materials](#)) if required prior to the item/sample being placed into research use. **Work with uranyl solutions that are "Rad Tagged" will be performed in a radiological area following requirements specified in the RWP.**

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 7042, Room 001
 Building 9983-FX, Room 01
 Building 9983-FX, Room 02
 Building 998T-07, Room 01
 Field Work

Attachments:

[Radiological Safety Training-Screen Samples for Radioactivity approved 1-15-13.pdf](#)
[Information distributed in the Instrument Training for BSD and ESD to use the Bircron PGM approved 1-15-13.pdf](#)

4.3 This operation involves a [class 1](#) laser system with embedded [Class 3b](#) or [4 lasers](#).

Potential Training:

Electrical Work Practices Training

Requirements:

[Lasers](#)

Hazard Notes:

Uranium will be analyzed using a Kinetic Phosphorescence Analyzer (KPA) which is classified as a class 1 laser system with an embedded class 3b laser.

Control Notes:

Use of the KPA instrument is controlled by a Standard Operating Procedure LSOP-1505-169-CI at the following url: [https://portal05.ornl.gov/sites/eesd/ops_west/RSSDocuments/Lasers/ESD/LSOP-1505-169-KPA-C1\(3b\)current.pdf](https://portal05.ornl.gov/sites/eesd/ops_west/RSSDocuments/Lasers/ESD/LSOP-1505-169-KPA-C1(3b)current.pdf). This procedure is reviewed by the Division Laser Safety Officer (DLSO) and approved by line management. All KPA users shall sign and abide by the KPA Laser procedure, which includes a routine interlock check requirement. The laser procedure is available near the instrument.

NOTE: The laser must not be opened or serviced on-site. The instrument will be shipped back to the manufacturer for laser repair.

All KPA waste will be neutralized prior to disposal (see 8.2 for details).

Locations:

Building 1505, Room 169

Attachments:

None.

5.0 This operation involves the potential for electrical shock or the release of other hazardous energy (mechanical, pressure, steam, etc.)

Hazard Notes:

Various field and laboratory equipment is used that uses 120/240 volts AC current.

Control Notes:

All instrumentation and equipment using 120/240 volt AC current are properly grounded with 3-wire receptacles and extension cords. Ground fault circuit interrupters (GFCIs) will be used for all work outdoors, on construction sites, and in wet or damp locations where portable electric tools or equipment are used. All outdoor equipment that stays outdoors unattended will be Nationally Recognized Testing Laboratory (NRTL) listed for outdoor use.

Flexible cords must be used in accordance with applicable sections of OSHA 29 CFR 1910 Subpart S-Electrical ([1910.305](#)).

Flexible cords and cables shall be approved for conditions and locations of use (e.g. outdoors, in potentially wet or damp locations, etc.). Although some cords are listed for wet locations, their design does not permit a watertight plug connection. Extension cords and/or power strips will not be daisy-chained; permanent wiring should be installed instead. Flexible cords may be used only in continuous lengths without splice.

Flexible cords must be of sufficient gauge (AWG) and design to support the amperage and voltage of the equipment being connected.

Ensure that flexible cords and cables are adequately protected if run through doorways, windows, or other pinch points. This can be achieved by using wood blocks to prevent windows or doors closing, schedule 80 UV-resistant PVC to run extension cords through, or protective ramps with cord compartments.

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01
 Field Work
 Building XD0701, Room 01

Attachments:

None.

6.3 This operation involves exposure to, or handling of, [Risk Group 1](#) microorganisms, dead or alive.

Requirements:

[Biohazards](#)

Hazard Notes:

Non-pathogenic bacteria found naturally in soil, sediment, and groundwater is used in this research. The groundwater at this site has undergone extensive microbial community structure analysis and no pathogenic organisms have been identified to date. There is limited work with lab based microcosm activities in which nutrients are added to enrich microbial population above background levels.

Control Notes:

Good hygiene and sanitation practices are to be followed when working with non-pathogenic soil and groundwater. When performing lab work with enriched microbiota Biosafety Level 1 (<https://sbms.ornl.gov/sbms/SBMSearch/SubjArea/Biohaz/Exhibit1.cfm>) controls are to be followed.

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01
 Building 9983-FX, Room 02
 Field Work
 Building XD0701, Room 01

Attachments:

[E-mail response from - B. Davison relating to Questions 6.3 and 8.4 pertaining to FRC groundwater and soil samples dated 11-15-13.pdf.pdf](#)

- 7.1 This operation involves work conducted under the [OSHA Laboratory Standard](#).

Potential Training:

General Hazard Communication
 ORNL Chemical Hygiene Plan
 ORNL Hazard Communication Job Specific Training
 OSHA Lab Standard Training - Includes site-specific

Requirements:

[Chemical Safety](#)

Hazard Notes:

Some FRC work areas are defined as Laboratories under the OSHA Laboratory Standard, including the small lab in the west end of the FRC trailer 9983-FX and Bldg. 1505 Labs. Small quantities of concentrated acids are used to preserve samples there.

Control Notes:

All participants working in these labs must be trained to the [ORNL Chemical Hygiene Plan \(CHP\)](#) and have site specific training to the space(s).

Unless otherwise specified in this RSS, the minimum PPE for work in on these particular spaces include safety glasses with side shields, unless official LSM signage (approved by POC/DSO) provides waivers to this requirement. Lab coats are also recommended as one means to meet the CHP requirement to cover unprotected skin when working with hazardous chemicals. Gloves shall be worn when working with chemicals. Nitrile gloves will be used with all chemicals unless another glove type is specified or designated as acceptable within other RSS hazard questions. If gloves are exposed to any chemicals in liquid form check them for signs of degradation or permeation. If observed immediately remove and discard the glove. Hands shall be thoroughly washed and new gloves donned if continuing work with the chemical.

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01
 Building 9983-FX, Room 02
 Building XD0701, Room 01

Attachments:

None.

- 7.2 This operation involves work conducted under the [OSHA Hazard Communication Program \(HAZCOM\)](#).

Potential Training:

General Hazard Communication
 ORNL Hazard Communication Job-Specific Training

Hazard Notes:

The work areas associated with this RSS question are controlled via HAZWOPER and HAZCOM standards. Only small quantities of chemicals, such as those for HACH kits are used, and acids for Preservation of water samples. Larger quantities of non-toxic materials are used for tracer tests. Larger quantities of bicarbonate are also used in some tracer tests.

Control Notes:

Follow HASP for task specific controls including use of protective clothing.

All participants working with chemicals in the field must be ORNL HAZCOM trained and be familiar with the materials (i.e., have access to and be aware of the product MSDSs).

To meet HAZCOM labeling requirements, secondary chemical containers (not used/stored in "labs") must be labeled with the identity of the hazardous chemical(s) and appropriate hazard warnings (via words or symbols) which provide at least general information regarding the physical and health hazards. This labeling requirement applies unless: the hazardous chemical(s) is only used by the person transferring the chemical from the primary container; the person that performed the transfer has constant control of the container; AND, the chemical is completely used within the work shift.

Chemical-specific PPE and safety precautions will be followed as prescribed in the MSDS unless discussion(s) with ES&H POC or Division Safety Officer (DSO).

Locations:

Building 0855, Room 01
 Building 7042, Room 001
 Building 998T-07, Room 01
 Field Work

Attachments:

None.

- 7.3 This operation involves chemicals or wastes that are known or suspected human [carcinogens](#).

Requirements:

[Chemical Safety](#)
[Exposure Assessments](#)
[Personal Protective Equipment](#)

Hazard Notes:

Uranyl nitrate and uranyl acetate will be used

Control Notes:

Concentrations and volumes are determined by scientific needs, but will be minimized at all times. Controls for handling these carcinogens are specified in the Chemical Hygiene Plan and/or in site-specific training. Nitrile gloves are required and lab coats are also recommended as one means to meet the [CHP](#) requirement to cover unprotected skin when working with hazardous chemicals

Locations:

Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01

Attachments:

None.

- 7.4 This operation involves chemicals or wastes that are chemical [reproductive hazards](#).

Requirements:

[Chemical Safety](#)
[Exposure Assessments](#)
[Personal Protective Equipment](#)
[Radiological Monitoring of Individuals and Areas](#)

Hazard Notes:

Uranyl nitrate and uranyl acetate will be used

Control Notes:

Reference controls in Questions 7.1 & 7.3

Locations:

Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01

Attachments:

None.

- 7.7 This operation involves chemicals or wastes that are [flammable](#) or [combustible](#).

Requirements:

[Chemical Safety](#)
[Exposure Assessments](#)
[Personal Protective Equipment](#)
[Storing and Handling Flammable and Combustible Liquids](#)

Hazard Notes:

Gasoline or diesel fuel are used for powering some field equipment including drill rigs, pumping, and washing equipment, etc. Propane or butane gas may be used as sources of fuel for flame sterilization.

Ethanol is used as a tracer in groundwater and in small quantities as a sterilizing agent.

Hydrogen used in 1505/144B

Control Notes:

All fuel carried to field locations is transported in containers approved for the purpose (see Transportation Question). For **1505 Labs** small amounts of flammable and combustible liquid storage (including waste) outside of approved storage devices is permitted in each lab (i.e., up to 4 liters in general lab area/benchtops and up to 4L in a hood can be stored outside of a cabinet or refrigeration unit approved for such flammable/combustible liquid storage). More information and requirements for combustible and flammable storage and handling can be found in SBMS at: <https://sbms.ornl.gov/sbms/sbmsearch/subjarea/chemsafe/chemsafepro4.cfm> All flammable cylinders directly connected to a piping system/instrumentation must be grounded. See Question 11.5 for further info on grounding flammable compressed gas cylinders.

For **9983-FX**, a previously conducted Fire Protection Engineering assessment prohibits the use/storage of class 1A flammable liquids and restricts use/storage of Class 1B and 1C flammable liquids to a total of 5 gallons. Flammable gases are prohibited and only 2.5 lbs of flammable liquefied gas (in use only) e.g. butane is permitted.

Flameboys (for sterilization) are used according to manufacturers instructions. Users shall also contact the Lab Space Manager (LSM) for further guidance and equipment-specific training if unfamiliar with their use.

Note: flammable gases and flammable liquefied gases shall not be stored in FLSCs.

Ethanol is diluted by groundwater well below flammable concentrations during injections. In case of a spill, notify the Y-12 PSS or ORNL LSS.

Locations:

Building 0855, Room 01
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 9983-FX, Room 01
 Building 9983-FX, Room 02
 Field Work
 Building XD0701, Room 01

Attachments:

None.

- 7.8 This operation involves chemicals or wastes that are [caustic](#) or [corrosive](#) (e.g. acids or bases).

Requirements:

[Chemical Safety](#)
[Personal Protective Equipment](#)

Hazard Notes:

Concentrated acids and bases are used in small quantity in laboratories and in the field. Some samples may be prepared for analysis in dilute acid solutions (e.g., 1% Nitric Acid solution or 2% Hydrochloric Acid solution) on the benchtop. A battery charging station is located in 9983-FX.

The Geoprobe battery may be charged while on the equipment and inside the Geoprobe trailer.

Control Notes:

See HASP for detailed listing of hazards and controls for field tasks. If a certain task involving corrosives is not specified in the HASP, use of safety glasses with side shields is required and goggles shall be worn where there is a potential for splash of corrosive liquids. Nitrile gloves shall be worn when using corrosives.

Additionally: note that the concentrated solution will be added to water.

Procedure to separate and measure technetium-99 in water is attached.

Samples for technetium (Tc) analysis are first processed using an ion exchange resin to remove interferences and to concentrate low Tc levels making quantitation easier. Reference attached procedure to separate and measure technetium-99 in water. In Section 6 (of attachment) is a comprehensive list of reagents for all options/ variants of the method. Only Option #2 For samples containing high levels of Th-234 calls for the use of hydrofluoric acid. Because our samples do not fall into that category, we will not be using Option #2 and do not

anticipate the need to use HF in the procedure. Procedure options that require the use of hydrofluoric acid will be used only after consultation with appropriate SME.

Where ever concentrated acids/bases or other significantly corrosive materials are handled and more than a few drops of the material could spatter or splash onto a participant (e.g., a container tipped over on the benchtop or in the hood where a larger volume of material could contact someone) an acid apron or equivalent (e.g., Tyvek CPF3) will be used in addition to a lab coat. Where smaller volume containers of concentrated corrosive materials are used and the only potential exposure is a few drops of material a lab coat will suffice. Always use a conservative approach when handling significantly corrosive materials. 998T-07 has an eyewash located in the SW corner.

Participants follow PPE and other requirements for battery charging posted in the area which are also provided here:
https://portal05.ornl.gov/sites/eesd/ops_west/RSSDocuments/FinalPDFs/Marine-Auto-ATV-BatteryCharging.pdf

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01
 Building 9983-FX, Room 02
 Field Work
 Building XD0701, Room 01

Attachments:

[Technetium-99 in Water Analytical Procedure date 4-2-2002.pdf](#)

8.2 This operation generates [hazardous waste](#).

Potential Training:

RCRA 90 Day or 180 Day Accumulation Area
 RCRA HAZARDOUS WASTE CHARACTERIZATION AT
 RCRA LAND DISPOSAL RESTRICTIONS FOR GENE
 RCRA SATELLITE ACCUMULATION AREA AT ORNL
 Waste Generator Awareness Training

Requirements:

[Managing Environmental Impacts of Research and Operations](#)
[Managing Waste and Excess Materials](#)

Hazard Notes:

Small quantities of hazardous wastes are generated from field and laboratory testing of samples.

Acidified sample/leachates/effluent will be generated.
 There is an SAA in the FRC trailer 9983-FX as well as other ESD laboratories.

Control Notes:

Any hazardous or mixed waste will be properly stored in a Satellite Accumulation Area (SAA) at or near the point of generation. Each bottle/container will be labeled with the contents and the words "Hazardous Waste" or if there is a radioactive component "Mixed Waste". Each bottle/container will be also logged into the SAA logbook. The directorate EPO/ECR or WSR will be contacted for help as needed.

For waste solutions that are RCRA solely due to pH (initial pH of 2 or less or 12.5 or higher), persons performing elementary neutralization for liquid disposal shall maintain documentation of waste description and volume treated for year-end generator treatment records. (NOTE: Such corrosive solutions declared as waste are to be managed in the SAA if they are accumulated or stored prior to neutralization treatment.)
 Acidified sample/leachates/effluent, (which may include some Ultima Gold), used for the Tc-99 work will be containerized and managed as a hazardous waste until it is neutralized. It will then be transported to Y-12 for treatment at the West End Treatment Facility.

The SAA at the FRC is registered with ORNL Environmental Protection as well as with Y-12. The custodians for all of these mentioned SAAs should be consulted before adding any new waste streams to the SAAs.

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 9983-FX, Room 01

Attachments:

None.

8.3 This operation generates [radioactive waste](#) (including mixed hazardous, solid low level, liquid low level, or transuranic).

Potential Training:

Liquid Waste Generator at ORNL
 RCRA 90 Day or 180 Day Accumulation Area
 RCRA HAZARDOUS WASTE CHARACTERIZATION AT
 RCRA LAND DISPOSAL RESTRICTIONS FOR GENE
 RCRA SATELLITE ACCUMULATION AREA AT ORNL
 Waste Generator Awareness Training

Requirements:

[Clean Water Act](#)
[Managing Environmental Impacts of Research and Operations](#)
[Managing Waste and Excess Materials](#)

Hazard Notes:

Soil cuttings and water wastes from drilling operations in the subsurface contamination areas of the FRC contain low-level radioactive contamination and are handled as radioactive waste. In addition, purged groundwater from groundwater sampling operations in these areas may have low-level radioactive contamination and is collected for later analysis and disposal. (see Question 8.9)

Very low concentrations of uranyl nitrate solutions are used which must eventually be disposed of.

Some samples analyzed by the LSC will be collected and handled as mixed waste due to their acidity. Non-acidified samples will be managed as rad liquid waste. See question 8.9

Laboratory analysis will also generate wastewaters and waste soils.

Control Notes:

Radioactive solid and liquid wastes (including field and laboratory generated wastes, some PPE,etc) are handled, stored, and disposed of under the direction of a RCT, Laboratory Waste Services and Y-12 waste management personnel in accordance with approved procedures.
 Any hazardous or mixed waste will be properly stored in a Satellite Accumulation Area (SAA) at or near the point of generation. Each bottle/container will be labeled with the contents and the words "Hazardous Waste" if there is a radioactive component "Mixed Waste". Each bottle/container will be also logged into the SAA logbook. The directorate EPO/ECR or WSR will be contacted for help as needed.

The spent resin, Teva Spec, is non-regulated and will be managed as solid low level waste.
 See discussion/controls in the wastewater questions for more info regarding how some of this low level contaminated waste is processed.

Participants must ensure such soil, groundwater, and other contaminated materials are appropriately labeled and segregated from non-contaminated material.

A Technical Position Paper is also attached here that details the rationale to free release by process knowledge selected "empty" sample vials and containers (liquid scintillation vials, culture tubes, centrifuge tubes, and other solution storage containers) used to process samples from the ORFRC and other similar environmental investigation projects. All assumptions and criteria, including Tc99 and uranium sample activities, set forth in the attachment must be met.

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 9983-FX, Room 01
 Field Work

Attachments:

[NRPD-TPP-6005 for Release of Environmental Samples Vials and Container - approved by NRPD 2008.pdf.pdf](#)

8.4 This operation generates medical or **biohazardous waste**.

Requirements:

[Biohazards](#)
[Managing Environmental Impacts of Research and Operations](#)
[Managing Waste and Excess Materials](#)

Hazard Notes:

Microbial waste may be generated in concentration above natural abundance.

Control Notes:

The following controls apply to any wastes generated from work involving microbiota in concentrations above natural abundance as described in question 6.3:
 Biological waste such as PPE, empty pipette tips, etc. will be autoclaved in normal manner with heat sensitive autoclave tape visible on the bag. The outer container will be labeled with "TREATED (sterilized) BIOLOGICAL WASTE", the generator's name, the building number, and the generator's telephone number.

Any liquid waste will be deactivated by autoclaving or chemical sterilization. The treated waste will then be managed according to other radiological or chemical properties.

Locations:

Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 165A
 Building 1505, Room 169
 Building 1505, Room 267

Attachments:

None.

8.9 This operation generates wastewater.

Potential Training:

Liquid Waste Generator at ORNL
 RCRA HAZARDOUS WASTE CHARACTERIZATION AT
 Waste Generator Awareness Training

Requirements:

[Clean Water Act](#)
[Managing Environmental Impacts of Research and Operations](#)

Hazard Notes:

Liquid wastes from drilling and sampling operations and general lab functions will be generated. Most wastewaters will be slightly radioactive, primarily U and Tc-99, due to their origins and are handled as radioactive wastes.

Control Notes:

Radioactive wastes are handled under the guidance of Radiological Protection Operations and Laboratory Waste Services personnel.
 Wastewaters from areas of the FRC with subsurface contamination are collected in drums or polyethylene tanks. ORNL waste water operators pump and transfer these waters for treatment at ORNL process waste treatment plant 3608 as needed.
 Unless a variance is in place, wastewater disposal via the process drains must be in accordance with the UTB wastewater discharge criteria (<http://www-ep.ornl.gov/water/wdc/process%20wdc.htm>) and the Process Waste Treatment Complex at 3608 (PWTC-3608)

For Process wastewater discharges, a general description of wastewater should be maintained in the EESD process drain discharge database found here: https://portal05.ornl.gov/sites/eesd/ops_west/Lists/WWProcessDrainDischarges/CurrentItems.aspx

The current WAC for this facility can be found at: <https://sbms.ornl.gov/sbms/SBMSearch/subjarea/ManEnvImp/processWAC.r9.pdf>

Note: The WDC discharge limit for uranium is 0.0338 ppm and that of Tc-99 is 0.000235 ppm.

For waste solutions that are RCRA solely due to pH (initial pH of 2 or less or 12.5 or higher), persons performing elementary neutralization for liquid disposal shall maintain documentation of waste description and volume treated for year-end generator treatment records. (NOTE: Such corrosive solutions declared as waste are to be managed in the SAA if they are accumulated or stored prior to neutralization treatment.)

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01
 Building 998T-07, Room 01
 Field Work

Attachments:

None.

8.11 This operation involves the use of quarantined soils, plants, or pests.

Requirements:

[Managing Environmental Impacts of Research and Operations](#)
[Movement of Soils, Plants or Plant Products, or Other Contaminated Equipment](#)

Hazard Notes:

Soil cuttings are generated in well drilling. Soil samples are sent to investigators at various off-site laboratories.

Control Notes:

The entire Oak Ridge Reservation is now quarantined for fire ants and Japanese beetles. Any surface soils down to a 3-ft depth should be considered quarantined. Soils below this depth are not regulated. Those soils from the FRC that are shipped offsite are collected well below the 3-ft regulated depth and therefore are not subject to the USDA quarantine rules. In the event that we decide to ship off soils collected from

depths of less than three feet, we will ensure that the receiving facility has a soils agreement in place before the shipment is made.

Reference ORNL USDA Permits/Compliance Agreement at
<https://portal06.ornl.gov/sites/epws/ep/shwc/usdahome/Lists/ornludapermits/AllItems.aspx>

Locations:

Building 7042, Room 001
 Field Work
 Off-Site Work

Attachments:

None.

8.12 This operation generates excavated soils.

Requirements:

[Excavated Soil, Radiological Management of Excavation/Penetration](#)
[Managing Environmental Impacts of Research and Operations](#)

Hazard Notes:

Drilling wells requires excavation/penetration permits.

Control Notes:

Excavation/penetration permits are obtained from Y-12 in advance of all drilling and other ground penetrating activities at the contaminated area.

Excavation/penetration permits are obtained from ORNL in advance of all drilling and other ground penetrating activities at the Background Area or other areas controlled by ORNL. For ORNL-permitted excavations, any prevailing interim procedures must also be adhered to. (Example: procedure <https://sbms.ornl.gov/sbms/sbmsearch/subjarea/ExcPenInterim/interimprocedure.cfm> is in effect as the time of this RSS review)

For clearance of utilities TN ONE-CALL is called at 800-351-1111 as specified on the Excavation/penetration permit.

Locations:

Field Work

Attachments:

None.

8.13 This operation involves the injection of material into the ground.

Requirements:

[Managing Environmental Impacts of Research and Operations](#)
[Pollution Prevention](#)

Hazard Notes:

Tracers and nutrient additions are added to groundwater through research wells.

Control Notes:

Non-toxic tracers and nutrients are used. Appropriate notification and approval of tracer and nutrient injections is made through ORNL Office of Environmental Compliance.

NOTE: In the past individual dye trace forms for each experiment or group of experiments were submitted. However when the IFRC project began we and ORNL Environmental Protection received a 5/5/2006 guidance from the State (Robert Benfield) that states, basically, as long as we are doing similar things to what was approved in the past we could proceed.

The S-3 Ponds RCRA permit requires submittal of FRC work plans to the State for review after **UCOR** compliance review.

Locations:

Field Work

Attachments:

None.

9.2 This operation involves exposure to moving or rotating parts, such as motors, shafts, pulleys, belts, or any other potential mechanical energy.

Requirements:

[Occupational Hazard Controls](#)

Hazard Notes:

Drilling equipment is used that contains unguarded rotating augers and shafts. There are some pieces of shop equipment/power tools at 0855 that may be used by project participants.

Mechanical shakers will be used in Bldg 1505 laboratories.

Control Notes:

For drilling equipment: Please see authorized version of [RSS 8532](#) for specific controls and requirements. For shop equipment at 0855: All Equipment users must be trained and documented as authorized users of the equipment and sign usage logbook(s). Participants must contact space custodian for questions and/or Briefing.

A pinch point hazards is present when the mechanical shaker stage is moving.

Keep hands and face away from moving parts when operating. Users should have badge lanyards securely fastened to keep from getting caught in moving parts. A safe working distance for the rest of the body shall be maintained from the moving parts of the equipment to prevent loose fitting clothing from contacting and being drawn into the moving parts. Use shielding from moving parts where available.

Users will follow all labeling, warnings and postings applicable to the equipment.

Locations:

Building 0855, Room 01
 Building 1505, Room 169
 Field Work

Attachments:

None.

11.4 This operation involves exposure to [vacuum systems](#) that could implode and injure personnel.

Requirements:

[Design](#)
[Pressure System Safety](#)

Hazard Notes:

The procedure for preparing samples for Tc analysis requires use of gentle vacuum to draw samples through the container (Eichrom's Vacuum Box System). House vacuum is used for this.

Control Notes:

The vacuum box has been tested and is safe to operate up to 30 inches of Hg. For most applications, the box need not exceed 10 inches Hg. Because of sample variables, it is recommended that the actual observed flow rate of your sample be used to adjust the vacuum, not the gauge reading (Reference attached Eichrom's Vacuum Box System instructions).

Locations:

Building 1505, Room 144A
Building 1505, Room 144B

Attachments:

[Setup and Operation Instructions for Eichrom's Vacuum box System \) VBS dated 9-30-2004.pdf](#)

11.5 This operation involves compressed gases at greater than 100 psi.

Requirements:

[Compressed Gas Cylinders and Related Systems](#)

Hazard Notes:

A variety of compressed gases are used in the laboratory and field to operate instrumentation, pumps, purge samples, sparge injection solutions and as groundwater tracers.

The glovebag in 1505/144 is also used to process samples.

Control Notes:

Cylinder user verifies the identity of the compressed gas by reading the cylinder label and to ensure the proper type and concentration of gas is used; the cylinders are secured and stored in an appropriate area until needed. Flammable gas cylinders are not stored with oxidizers. Users will determine to the best of their ability that cylinders are not defective or leaking. Regulators will be placed by personnel in accordance with the Exhibit: Requirements for Using Compressed Gas Regulators and must have a formal re-inspection if their integrity is questioned.

NOTE: All requirements and guidance on compressed gas cylinder use can be found at:

https://sbms.ornl.gov/sbms/SBMSearch/subjarea/cgc/cgc_sa.cfm

Compressed Gas Safety is a topic included in the documented equipment-specific training.

When transporting compressed gas cylinders a minimum of 2 people are required if a loading dock is not being utilized unless an engineering solution is applied to the truck liftgate that allows the task to be performed safely by 1 individual.

Use of the glove bag located in Lab 144B is controlled by the authorized version of [RSS 6832](#).

Locations:

Building 0855, Room 01
Building 1505, Room 138
Building 1505, Room 144A
Building 1505, Room 144B
Building 1505, Room 165A
Building 1505, Room 267
Building 9983-FX, Room 01
Building 9983-FX, Room 02
Field Work
Building XD0701, Room 01

Attachments:

None.

12.0 This operation involves sources of [thermal hazards](#), such as heaters, ovens, [cryogenics](#), or uninsulated steam lines.

Requirements:

[Exposure Assessments](#)

Hazard Notes:

Regular laboratory ovens may be used in labs for drying or ashing samples. Autoclaves are used for sterilizing sample containers and small utensils for sampling.

A -80C freezer is used for preservation of samples, especially microbial samples. Multiple freezers located in the Bldg 1505/ 150A Cage Area are also used.

Dry ice or liquid nitrogen is occasionally used in field operations for quick freezing of samples.

Control Notes:

Ovens and autoclaves are used according to posted instructions.

All ultra-freezers, autoclaves, and flameboys are used according to manufacturers instructions.

Direct skin contact with objects stored in the ultra cold (-80c) freezers or the inside structure of the freezers should be avoided. Cryo/thermal gloves are available for use when extended handling time is required while inside the freezers or while removing items from the freezers. Gloves (cotton, leather or other material) that eliminate the direct contact and minimize temperature transfer between the objects being handled and the skin may be used when more dexterity is needed and handling time is minimal.

If liquid nitrogen is to be used in the lab, a face shield and safety glasses are to be worn when transferring liquid nitrogen into a dewar. When working with liquid nitrogen in the field researchers use tongs to handle sample tubes, and shall wear safety glasses with side shields.

A dry ice station is located outside 1506 on the west side. There is a posting with instructions on how to use the device and the needed PPE is available in the cabinet below the units. Here is a link to the posting itself:

https://portal05.ornl.gov/sites/eesd/ops_west/RSSDocuments/FinalPDFs/Bldg1506_Dry_Ice_Maker_Work-Aid.pdf, which includes PPE making and handling dry ice and other safety precautions for the dry ice station.

Locations:

Building 0855, Room 01
Building 1505, Room 138
Building 1505, Room 144A
Building 1505, Room 144B
Building 1505, Room 169
Building 1505, Room 267
Building 9983-FX, Room 01
Field Work

Attachments:

None.

13.1 This operation involves sources of [excessive noise](#). (E.g., such that you would have to shout at a distance of 3 feet to communicate to a co-worker, or louder than busy traffic.)

Requirements:

[Exposure Assessments](#)
[Hearing Conservation](#)

Hazard Notes:

High noise levels are associated with drilling and seismic source operations.

Control Notes:

Drill rig activities have been reviewed by SSD and requirements specific to hearing protection are included in the authorized version of [RSS 8532](#) for this activity. Seismic source operations controls are found in the HASP.

Participants of this RSS that use hearing protection devices (ear plugs and/or muffs), either on a mandatory or voluntary basis, must understand why the PPE is required and review the proper use and fit of hearing protection devices document attached to this section of the RSS.

Personnel identified as having known or potential noise exposures exceeding the OEL must be enrolled in the Hearing Conservation Program (HCP) and receive HCP training. It is the supervisor's responsibility to enroll the worker in the HCP using the *ORNL Medical Services Division Mandatory Enrollment Form* (<https://portal06.ornl.gov/sites/hsd/Documents/pdfs/mandprog.pdf>). Consult your DSO for assistance.

Locations:

Field Work

Attachments:

[Ear Plug Fitting Instructions and NIOSH Information.pdf.pdf](#)

13.2 This operation involves [confined spaces](#).

Potential Training:

ORNL Confined Space Training

Requirements:

[Confined Space](#)

Hazard Notes:

Large polyethylene tanks are used in field tracer tests. These large tanks are considered confined spaces. The hazards are potential for engulfment because of the water in the tanks and the mixer which has a rotating shaft and an impeller in the lower portion of the tank. Under current conditions of this research, atmospheric hazards do not exist in these confined spaces.

Control Notes:

The tanks will be non-permit-required confined spaces under the following, normal operating conditions:

A line drawn on the tanks requiring entry indicates 40 inches below the top of the tank, which is equivalent to an OSHA compliant safety rail.

Workers shall not allow their feet to be above that line when access to the open tank is required.

Prior to accessing the tank the stirrer shall be deactivated.

Other workers in the vicinity shall be notified of the activity.

The control switch shall be within visual sight of the worker needing access to the tank to ensure another worker does not accidentally turn the impeller on during access.

Ladder used for access shall be positioned such that the worker needing access does not accidentally bump the switch with their knee or foot, etc. while accessing the tank.

Deviations from normal operations will require a reevaluation of the non-permit-required status of these confined spaces. Examples of deviations would include activities where access requires < 40 inch delimiter or for maintenance activities where lock out/tag out of equipment is required.

Locations:

Building 998T-07, Room 01

Field Work

Attachments:

None.

13.3 This operation involves [ergonomic hazards](#).

Requirements:

[Occupational Hazard Controls](#)

Hazard Notes:

Movement associated with drilling, sampling operations, cylinder handling and lab activities could present ergonomic hazards.

Control Notes:

Participants must be cognizant of the need for proper ergonomic layout of equipment and operations. Adjustments are made as appropriate.

Personnel should avoid awkward positions when possible during field work and should follow proper lifting and carrying techniques, so as to minimize risk of injury.

Under extended field sampling situations, crews should be rotated to limit continuous actions or take breaks as needed.

Tips for Lifting Heavy Items: Lifting is strenuous, and proper bending and lifting techniques are strongly encouraged in order to perform it safely. By bending at the knees instead of at the waist and lifting with the large, strong muscles of the legs instead of the small muscles of the back, back injuries can be prevented and may reduce the potential for lower back pain.

For most workers, lifting loads over 20 kgs. (44 lbs.) results in an increased number and severity of back injuries.

Personnel should be very cautious and use proper lifting techniques when lifting any load, especially those loads approaching 40 lbs. A team lift is recommended for all loads with weights at or above 40 lbs. Individuals should seek assistance, even for lesser weights depending on their personal capabilities and the bulkiness of the item.

Protective footwear (e.g. steel toe boots & safety toe shoes) will be worn when handling and moving standard sized compressed gas cylinders.

Locations:

Building 1505, Room 138

Building 1505, Room 144A

Building 1505, Room 144B

Building 1505, Room 165A

Building 1505, Room 169

Building 1505, Room 267

Building 7042, Room 001

Field Work

Building XD0701, Room 01

Attachments:

None.

13.5 This operation involves work in [extreme climates](#) or temperatures.

Potential Training:

Heat Stress Training

Requirements:

[Occupational Hazard Controls](#)

Hazard Notes:

Outdoor drilling and sampling operations have potential to be conducted in extreme temperatures and climatic conditions.

Control Notes:

See HASP for detailed discussion of all project hazards, requirements, and controls, including specific sections on heat stress and cold exposure and appropriate controls. All participants are trained to the HASP for access to work at the site.

Consult the Division Safety Officer for assistance in determining the appropriate controls for thermal stress. OSHA has developed two work aids addressing heat and cold exposures.

The work aids may be accessed using the following links:

Heat Stress: <http://www.osha.gov/Publications/OSHA3154.pdf>

Cold Stress: <https://www.osha.gov/SLTC/emergencypreparedness/guides/cold.html>

Supervisors must ensure that participants complete heat stress training prior to performing work under this RSS involving elevated temperatures. Line management may conduct and document heat stress training or have participants complete the web-based [Heat Stress Training course](#).

During inclement weather, if you can hear thunder or see lightning you are within the strike distance of the lightning. Stop your activities, evacuate the site and seek safe shelter immediately. Safe shelter may be obtained in a permanent structure or in a vehicle with windows closed. If there is not time to get to such protected areas, find a low-lying, open place that is a safe distance from trees, poles, or metal objects, or standing water that can conduct electricity. Get into and stay in a tucked position. Wait thirty minutes after the last strike before resuming field activities.

Participants may voluntarily sign-up to be notified by e-mail, pager, cell phone or phone concerning severe weather advisories and other emergency notifications at <http://portal07.ornl.gov/sites/lp/lss/Pages/warn.aspx>.

For cold stress guidance, please refer to the following sources.

Consider the following controls for cold stress:

- Engineering controls that provide an increase in clothing insulation, reduce air velocities with wind breaks, provide sources of radiant heat, provide opportunities for changes into dry clothing, among others.
- Administrative controls that set acceptable exposure times, reschedule work in warmer temperatures, allow sufficient recovery in warm environments, establish stations for warm fluids, among others.
- Personal protective equipment such as clothing that increases insulation, outer clothing that minimizes airflow across the skin, head covering, and additional protection for extremities, anti-contact gloves, among others.

Additional information on cold stress can be found at the following link: <http://www.cdc.gov/niosh/topics/coldstress/>

Locations:

Field Work

Attachments:

None.

14.1 This operation requires special attention if left unattended.

Hazard Notes:

FRC experiments may require attention outside regular working hours.

Control Notes:

Project personnel at the FRC Site are advised of emergency telephone numbers including that of the Y-12 Plant Shift Superintendent (865-574-7172); cell phones are used as appropriate.

Personnel inform other project related personnel when working outside usual hours.

Emergency Response instructions are included in the HASP that staff are trained to.

Locations:

Field Work

Attachments:

None.

14.2 This operation involves work performed outside normal working hours (6am to 7pm).

Hazard Notes:

FRC experiments may require working outside regular working hours.

Control Notes:

Emergency response instructions are included in the HASP

Areas are posted with the name and phone number of emergency contacts. In addition, most, if not all, active FRC personnel have a card listing emergency contact numbers clipped to their badge.

If working at the FRC site after hours, the Y-12 Plant Shift Superintendent (PSS) (865-574-7172) should be informed upon arrival and, if requested by the PSS, upon departure.

Should ORNL LSS or Y-12 PSS not be available contact ETPP/K-25 PSS at 865-574-3282.

Laboratory personnel working alone outside of normal business hours (approximately 6:00 pm to 7:00 am Monday through Friday, all day Saturday, Sunday, and holidays) with hazardous chemicals or in a hazardous environment are strongly encouraged to notify the Laboratory Shift Superintendent (LSS) at 574-6606 or submit the [on-line form](#). Employees not working with a hazardous substance or in a hazardous environment are encouraged to submit notification using the on-line form. ORNL prefers that laboratory workers do not perform potentially hazardous duties by themselves after regular business hours.

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 9983-FX, Room 01
 Field Work
 Building XD0701, Room 01

Attachments:

None.

15.1 This operation involves packaging or transporting chemicals, [hazardous materials](#), or [radiological materials](#) off-site.

Potential Training:

Contact [Division Training Officer](#) for assistance in determining training needs.

Requirements:

[Commercial Motor Vehicle](#)

[Off-Site Transportation](#)

[Off-Site Transportation of Nonhazardous, Hazardous, and Radioactive Materials Shipments](#)

Hazard Notes:

Hazardous materials e.g., compressed gas cylinders, caustics, etc) are often transported by government vehicle (e.g. between Y-12, ORNL and 0855).

As mentioned previously, low-level radioactively contaminated samples (groundwater and/or sediment samples) are often transported back to 1500 area laboratories and then shipped via private vendor off-site to other collaborators, etc.

Control Notes:

Participants must follow applicable radiological controls discussed in Question 2.1 and the controls established in the various MOUs in place for the FRC with ORNL Transportation Management Organization (TMO). In addition, all samples to be shipped offsite to another institution, university, national lab, etc. must be appropriately green or rad tagged by the RCT prior to shipment. Current Transportation MOU(s) is attached here for review/use. Included in this MOU(s) are transportation controls for offsite shipments. The MOU includes a checklist to guide the shipment of FRC material to other entities and defines when RSS participants cannot ship to other entities without TMO involvement. Use of the checklist addresses all transportation issues, including proper authorization of receiving laboratories.

Regarding non-rad, hazardous materials transport falling under materials of trade (MOT): This too is covered by the MOU; In addition, only RSS participants who have completed MOT training are permitted to transport hazardous chemicals by vehicle. The controlling subject area and MOU require that such transport shall only occur in government vehicles and if material(s) being transported meet the MOT exception (applicable Packing group, volume limits, etc.). See [Subject Area for Off-site Transportation at url: https://sbms.ornl.gov/sbms/SBMSearch/SubjArea/OffSiteTrans/pro1.cfm](https://sbms.ornl.gov/sbms/SBMSearch/SubjArea/OffSiteTrans/pro1.cfm) for restrictions on the use of other types of vehicles (e.g. rental or personal vehicles)

Note: Personal car insurance often will not pay for damages if a personal car is used for work related tasks.

Specific Note Regarding Gasoline Transport: The volume limits per container for Gasoline (DOT Class 3 flammable liquid, Packing Group II) is further reduced by other OSHA requirements such that gasoline must be transported in approved safety cans having capacities of 5 gallons or less.

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 7042, Room 001
 Building 9983-FX, Room 01
 Field Work
 Off-Site Work
 Building XD0701, Room 01

Attachments:

[Transportation MOU for FRC - TMOU-003 - updated May 2013.pdf](#)

15.2 This operation involves packaging or transporting chemicals, [hazardous materials](#), or [radiological materials](#) on-site.

Potential Training:

Contact [Division Training Officer](#) for assistance in determining training needs.

Requirements:

[Commercial Motor Vehicle On-Site Transportation of Hazardous Material Transporting Chemicals](#)

Hazard Notes:

Some of the transportation activities for the project are performed on-site as well.

Control Notes:

See Controls in Questions 2.1 and 15.1.

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 7042, Room 001
 Building 9983-FX, Room 01
 Field Work
 Off-Site Work
 Building XD0701, Room 01

Attachments:

None.

15.4 This operation involves packaging, transporting, or shipping of samples containing [hazardous](#), [radioactive](#), or [biological materials](#).

Hazard Notes:

Samples are shipped from Y-12 or ORNL to other research laboratories in and out of state.

Control Notes:

See Controls in Questions 2.1 and 15.1

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 7042, Room 001
 Building 9983-FX, Room 01
 Field Work
 Off-Site Work
 Building XD0701, Room 01

Attachments:

None.

15.5 This operation involves shipping something out of the country.

Requirements:

[Export Control Compliance](#)

Hazard Notes:

Samples are shipped to foreign countries for research purposes.

Control Notes:

Researchers in foreign countries requesting material from the FRC are required to have agreements, permits, and/or licenses in place at their university / research lab in order to receive material from the FRC. The documentation of this, provided by the researcher(s), is reviewed by staff in the Isotope Development Office prior to shipping any material to a researcher overseas. In addition, the Export Control Office is contacted and must approve any international shipments of material. Once all relevant paperwork is in place and approved by the Isotope Development staff and Export Control Office, material may be shipped to foreign countries through the ORNL Transportation Management Organization.

Locations:

Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 7042, Room 001
 Building 9983-FX, Room 01
 Field Work
 Off-Site Work
 Building XD0701, Room 01

Attachments:

None.

- 15.6 This operation involves the use of a vehicle that has a gross vehicle weight greater than 10,000 pounds, alone or in combination with a trailer, including the need to rent such a vehicle.

Requirements:

[Commercial Motor Vehicle](#)
[Off-Site Transportation](#)

Hazard Notes:

Trucks or truck/trailer combination exceeding 10,001 pounds are sometimes used in field support functions.

Control Notes:

The Commercial Motor Vehicle Subject Area now reflects an exemption of CMV regulations for INTRASTATE transport when the truck/trailer gross combination weight rating (GCWR) is <26,000 lbs. However, additional DOT requirements for the vehicles and drivers will still be required for vehicles with GWR or GCWRs > 10,001 lbs involved in INTERSTATE transport.

Locations:

Building 0855, Room 01
 Field Work
 Off-Site Work

Attachments:

None.

- 16.0 This operation involves offsite work other than travel, office environments, and conferences

Requirements:

[Export Control Compliance](#)
[Foreign Travel](#)

Hazard Notes:

A majority of the activities for this RSS occur within the boundaries of Y12 which by definition is "offsite" work even though in very close proximity to ORNL. This presents challenges in many areas such as sample transportation, radiological coverage, etc.

Control Notes:

Attempts have been made to integrate the special case controls needed when working at Y12 into the RSS. Participants need to be mindful of the situation and consult the PI or ops support group if they have questions.

Locations:

Field Work
 Off-Site Work

Attachments:

None.

- 18.5 This operation requires special controls on procurement, such as PAAA or critical item review.

Requirements:

[Purchasing Supplies and Services](#)
[Safety and Security Regulatory \(SSR\) Program](#)

Hazard Notes:

Safety and Security Regulatory (SSR) screening: This work involves the use, storage, and disposal of slightly radioactive samples and associated wastes as well as the potential use of radiation generating devices.

Control Notes:

SSR requirements applicable to this project are covered by implementing SBMS.
 SSR requirements must be included in applicable subcontract work.

Locations:

Building 0855, Room 01
 Building 1505, Room 138
 Building 1505, Room 144A
 Building 1505, Room 144B
 Building 1505, Room 169
 Building 1505, Room 267
 Building 7042, Room 001
 Building 9983-FX, Room 01
 Building 9983-FX, Room 02
 Building 998T-07, Room 01
 Field Work

Attachments:

None.

- Last **Does this operation involve any hazards or risks not previously identified above?** Questions to consider:

- What can go wrong (what keeps you up at night?)
- What measures or controls are in place to prevent that from happening?
- Consider how do (or which of) the most important controls depend on human actions or behavior. Where might an error or omission impair the effectiveness of an important control?
- Consider any change that has been made (process, equipment, etc) which could inadvertently increase risk in another area.

- Error precursors are conditions or attitudes that increase the chances of an error during the performance of a specific task by a particular individual. Are there precursors that, if reduced or eliminated, would make the controls more likely to be effective?

Hazard Notes:

Sharps/cutting tools (i.e. knife, needles etc...) will be used.

Control Notes:

Staff will be trained in the proper use and disposal of sharps. Needles shall not be directly recapped using two-handed operations. Instead use safer alternative methods (i.e. foam block technique, etc.) to avoid the potential for puncture/ needle sticks. All sharps will be disposed of in appropriate sharps biohazard containers.

Controls for Cutting Tool Usage:

When using cutting tools with open blades participants must use these tools in a manner that keeps the cutting blade moving in a direction away from fingers, hands, and the body during cuts. A user should not walk with or transport a cutting tool, that is not being actively used, unless the blade is concealed (cut resistant container or blade cover, etc.). Use of ORNL approved "safer" cutting tools (as found within the hyperlink below) are strongly recommended.

Cut resistant gloves should be considered for all activities where cutting tools of any type are used.

- For detailed information on cutting tool ratings see, <http://safetyfirst.ornl.gov/cpp/tools.cfm>
- For detailed information on cut resistant gloves see, <http://safetyfirst.ornl.gov/cpp/gloves.cfm>

Razor blades, scalpels and other fixed blade or manually retractable blade knives will be disposed of in an approved sharps container. Extreme caution must be employed when changing blades on fixed or manually retractable blade knives.

Locations:

Building 0855, Room 01
Building 1505, Room 138
Building 1505, Room 144A
Building 1505, Room 144B
Building 1505, Room 165A
Building 1505, Room 169
Building 1505, Room 267
Building 7042, Room 001
Building 9983-FX, Room 01
Building 9983-FX, Room 02
Building 998T-07, Room 01
Field Work
Off-Site Work
Building XD0701, Room 01

Attachments:

None.

Close