ARCADIS

Health and Safety Plan – Addendum 2
(June 27, 2008)

Potential Exposures to Radiological Wastes

University of North Carolina – Chapel Hill
Airport Road Waste Disposal Area Source Remedy

This document has been prepared to provide general guidance to assist site contractors with implementation of Health and Safety policies and procedures to address requirements as described below. This document shall be incorporated by reference into the existing site Health and Safety Plan. Parties conducting work at the site must develop and implement their own policies and procedures in order to minimize the potential for illness and injury and provide for compliance with applicable regulations. This document assumes that waste containers will not exceed 5 millirems/hour (mR/hr) as measured by a radiation field survey meter at a distance of one foot from the waste container.

The potential hazards associated with radioactive materials that could be encountered at the site are not anticipated to pose a risk to the general public as any material encountered will be properly shielded.

1. Contractor Health and Safety

The objective of the HASP is to provide general health and safety information and procedures regarding conditions and activities at the site in order to promote a safe and healthy work environment. Each contractor will be required to continuously review their operations to verify that the task(s) for which they are responsible are conducted in a safe manner, and that all policies and procedures provided in their site-specific HASP are enforced. The safety procedures and protective equipment presented in the HASP and this Addendum have been established based on an analysis of potential physical, chemical, and biological hazards. Hazard control methodologies have been evaluated and selected to minimize the potential for accidents or injuries to personnel at the site. Air monitoring and site control methods have also been developed to minimize the potential for impacts to the surrounding community.

The potential exists for radiological wastes to be present within the waste disposal area. Radiological materials may possibly be in the form of containers of material, contaminated soil, or source material.

2. Radiation Hazards

The hazards associated with radioactive materials are related to the type of radiation emitted.

Alpha particles travel distances in air are limited to no more than a few centimeters. Alpha particles are easily shielded against and can be stopped by a single sheet of paper. Alpha particles cannot penetrate the dead layer of the skin, therefore they do not present a hazard to

exposure external to the body. Alpha emitters can present a serious hazard when they are in close proximity to cells and tissues such as the lungs. Special precautions must be taken to ensure that alpha emitters are not inhaled, ingested or injected.

Beta particles interact less intensely with atoms in the materials they pass through, giving them a longer range than alpha particles. Thin layers of metal or plastic will shield beta particles. Beta emitters can pose a hazard if inhaled, ingested or absorbed into the body. In addition, energetic beta emitters are capable of presenting an external radiation hazard, especially to the skin.

Gamma radiation loses energy slowly and therefore gamma rays are able to travel significant distances. In the absence of appropriate shielding, gamma rays can travel tens or hundreds of meters in air. Gamma radiation is typically shielded using very dense materials such as lead or other dense metals. Gamma radiation can present a significant hazard from exposures external to the body.

3. Radiation Screening, Evaluation and Removal Procedures

The following sections discuss screening, evaluation, and removal procedures for radiological containers.

3.1 Radiation Screening Activities

During excavation work field personnel shall perform the following activities:

- Radiation surveys shall be performed after every 1 foot when excavating soil and waste containers using a Victoreen Model 190F Radiation Survey Meter (or equivalent) with the appropriate probe, capable of detecting alpha, beta, and gamma radiation.
- If soil, objects, or containers are found to have a radiation level >1 milli-REM per hour (mR/hr), then immediately stop work and move all personnel 25 feet, and re-assess field activities.
- The general area surrounding the excavation, including waste storage bins, also shall be screened at least once per hour. Work at the Site will stop if a reading of >1 mR/hr is measured.
- Immediately call Larry Daw from the Department of Environment, Health & Safety (EHS) at UNC at 919-962-6666 if any field screening results exceed the >1 mR/hr criterion.

Potential Exposures to Radiological Wastes

ACTION LEVELS

Parameter	Reading	Action
Radiation (alpha, beta, gamma)	<1 mR/hr	Continue operations, continue to screen excavation and each container.
	> 1 mR/hr	Stop work. Move all personnel 25 feet away from container or area. Initiate process.
Note: readings > 5 mR/hr at a distance of 1 foot from the source requires posting and personnel monitoring appropriate for a radiation area.		

3.2 Container Evaluation

All containers should be evaluated within the excavation by in-field visual inspection as well as screening using a radiation survey meter. Containers that are breached and have no radiation hazard can be removed and handled as the "mixed soil and waste" classification. Those which appear to be intact have no radiation hazard warning and have survey readings of <1 mR/hr should be inspected, handled, and segregate for HazCat analysis. After any temporary waste storage bin is full, screen the entire bin using a radiation survey meter and record the reading in the field notebook.

The following section specifies the manner in which containers or objects should be handled as a radiation hazard. A container or object should be handled as a radiation hazard if:

- It is labeled as radioactive, but the Radiation Survey Meter reading does not exceed 1 mR/hr.
- It is surveyed and found to emit radiation > 1 mR/hr, regardless of its labeling.

3.3 Removal Procedure

In the event that a container is identified as a potential radiation hazard, the contractor shall immediately call Larry Daw from EHS at UNC 919-962-6666. The contractor will then collect a small sample from the container in an appropriate sample container, and provide it to a representative from EHS. The original container shall then be staged on site within an appropriate bucket or over pack container and stored in the bottom of the excavation. Subsequent handling and disposal of the material will be determined by UNC after radiological screening is complete within the EH&S laboratory.

In the event that the radiation survey meter results exceed 1 mR/hr, which may suggest elevated radiation levels, and/or the potential presence of a radiation source, then the container should be

left in place, adequately shielded with soil or other material, and marked. The radiation survey meter should be used to measure radiation around the container's location. Yellow caution tape should be installed around the perimeter of the area of the container such that the radiation level outside the tape is 1 mR/hr or less. All work at the location should stop until the container has been safely removed by the contractor following specific guidance to be provided by UNC, dependent on the survey meter levels.

Removal techniques may include the following:

- Removal of the container or object by trained personnel using appropriate PPE.
- Place object in a designated appropriately shielded storage area for subsequent handling.
- Move the over-pack container by equipment or remotely to a staging area.

3.4 Personal Protective Equipment (PPE)

The following section describes the personnel protective equipment (PPE) that will be worn during the removal and handling of radioactive containers. The PPE will consist of a minimum of Level B as outlined below.

Level B Protection

Level B protection should, at a minimum, consist of the following:

- Full-face, positive pressure, air-supply respirator;
- Sarenx® suit, with ankles and cuffs taped to boots and gloves
- Nitrile gloves worn over nitrile surgical gloves;
- Steel toe work boots, meeting ANSI Z41;
- Chemical-resistant boots with steel toes or latex/PVC overboots over steel-toe boots
- Hard hat (meeting ANSI Z89)

If there are any changes or modifications to the work plan or site conditions that present additional hazards not covered by this addendum or the HASP, the project manager and health and safety manager must be notified.