7.7 Effects on the Environment

Upgrading to SPEAR3 entails the removal of the present magnets and vacuum chambers, replacing the electrical distribution system, minor modifications to the Low Conductivity Water (LCW) system, and replacement of the accelerator ring floor to allow for support of new steel girders. Removal of these materials and the subsequent upgrade activities will produce small quantities of hazardous, non-hazardous and radioactive materials that need to be managed through defined channels. Past history indicates that normal operation of the accelerator does not typically produce waste, however, some hardware may have induced radioactivity associated with it from its proximity and time close to the beam. Other components may contain hazardous materials as part of their design, for example, mineral oil in electrical components, or have radioactive contamination from the LCW system. Core samples of the asphalt, concrete and soil in and around the accelerator housing have shown no signs of radioactivity; however, detectable levels of PCBs and lead have been found. Contaminated excavation debris is sent off-site for disposal in an appropriately classed landfill. This particular task will be handled through SLAC's Hazardous Waste Management Group.

All material removed from within the accelerator housing will be surveyed for residual radioactivity or contamination. If none is detected, items will be salvaged for re-use as recyclable scrap material or disposed of as non-hazardous waste in an approved off-site landfill. Items that show residual radioactivity or contamination would be stored on site in the Radioactive Material Storage Yard (RAMSY) for future reuse or ultimate disposal. Any hazardous waste would be disposed of in accordance with SLAC procedures and ultimately to a permitted Treatment, Storage and Disposal Facility, under regulations set forth in the Resource, Conservation and Recovery Act (RCRA).

It should be noted that at present there is a DOE mandated moratorium on the release off-site of recyclable materials that came from within a known Radiologically Controlled Area (RCA). All material coming out of the SPEAR accelerator ring will be surveyed (from the radiological aspect) and stored at a predetermined location within the SLAC Accelerator Area. Material known or surveyed and found to have induced radioactivity will be separated from material that has been surveyed and found to be non-radioactive. All material will be stored in this manner until the moratorium is lifted.

All activities will be managed to prevent adverse impact on ground water, storm water and air quality as well as to minimize any ground disturbing activities.

The UTR or Project Engineer have added responsibilities with respect to the management of sub-contractors will perform most, if not all of the construction activities. The primary method of hazard identification will be completing the pre-work hazards analysis required to be submitted under the contract with the SLAC contract administrator. ES&H staff then will review this pre-work hazards analysis and once all parties are in agreement, it becomes part of the contract. Observation by personnel in the affected area, daily meetings with sub-contractors and a strong

"Stop Work/Stop Activity Program" are also used as tools to identify and correct hazards.

SLAC through the ES&H Division has comprehensive programs that address the actions necessary to both prevent and mitigate issues that could affect the environment. They include but are not limited to the situations described below.

7.7.1 Spills

Initiating Event

A hazardous material leak or spill occurs during operations.

Method of Detection

Observation by personnel performing work.

Preventive/Mitigating Features

Training (as guided by the Employee Training Assessment) on the selection and use of hazardous materials as well as the proper procedures for the disposal of hazardous waste is provided by SLAC to all employees. Appropriate flammable storage cabinets are available at SSRL to house hazardous materials not in daily use.

Consequences

A spill or leak of these materials out of their primary container will not result in a significant injury of illness and will have little or no effect on the environment. The consequences would be extremely low.

Likelihood

The probability of a spill or leak occurring during the installation or operation of the accelerator is unlikely.

Risk

The risk from this operation is acceptable.

7.7.2 Water Discharges To Sanitary Sewer Or Storm Drain

Initiating Event

Water discharges from SPEAR3 removal or installation activities (such as diamond saw coolant, hose pipe activities, draining LCW or other water carrying systems) that might lead to a discharge of water as a point source into either the sanitary sewer or storm drain.

Method of Detection

Observation by personnel performing work.

Preventive/Mitigating Features

Complete the pre-work hazard analysis to determine those activities that might involve water and the subsequent need to discharge it somewhere. Training for staff (as guided by the Employee Training Assessment) on environmental awareness.

Consequences

A discharge to the sanitary sewer or storm drain will not result in a significant injury of illness and will have little or no effect on the environment. The consequences would be low.

Likelihood

The probability of a spill or leak occurring during the installation or operation of the accelerator is unlikely.

Risk

The risk from this operation is acceptable.

7.7.3 Noise

Initiating Event

Demolition or installation activities using power activated tools, compressors, and generators; hoisting activities relating to the use of large cranes, *etc.*; and, the use of excavating equipment inside the accelerator to remove the floor.

Method of Detection

Observation by personnel performing work.

Preventive/Mitigating Features

Performance of ongoing noise monitoring by the SLAC industrial hygienists. Training for staff on noise awareness and the use of PPE if required.

Consequences

The effects of noise will not result in a significant injury or illness and will have little or no effect on the environment. The consequences would be low.

Likelihood

The probability of a noise event above the threshold limit (85db) during the installation or operation of the accelerator is unlikely.

Risk

The risk from this operation is acceptable.

7.7.4 Air Emissions

Initiating Event

Dust may occur when the accelerator floor is being excavated.

Method of Detection

Observation by personnel performing work.

Preventive/Mitigating Features

Pre-work hazard analysis is done to determine those activities that might cause dust emission. Training for staff on air emissions awareness. The effective use of water control (fine spray) is done to keep dust at a minimum during operations that may cause dust to become airborne, such as diamond sawing, jack hammering, or digging with a bobcat.

Core samples of the SPEAR2 floor have been analyzed from a radiological aspect and no detectable radiation was found. Radiological surveys of material leaving the site will continue until this phase of the project is complete.

Consequences

Airborne dust might result in a minor injury of illness, but would have little or no effect on the environment. The consequences would be low.

Likelihood

The probability of a dust causing event occurring during the installation or operation of the accelerator is unlikley.

Risk

The risk from this operation is acceptable.

7.7.5 Soil Contamination

Initiating Event

Some areas of asphalt and concrete under the accelerator have become contaminated with oil over the history of its operation.

Method of Detection

Analytical testing of core samples is done.

Preventive/Mitigating Features

A comprehensive study of all material to be removed during the accelerator upgrade was performed. It was determined that all asphalt and concrete shall be disposed off in a Class-II landfill and that any underlying soil or rock is clean and can be reused on-site. The sub-contractor used to remove the accelerator floor will be advised of how material needs to be handled and the SLAC Hazardous Waste Management Group will be responsible for disposing of the contaminated asphalt and concrete.

Consequences

Not applicable.

Probability

Not applicable.

Risk

The risk from this operation is acceptable.

7.7.6 Transformer Oil

Initiating Event

There only is one oil filled transformer that will be used with SPEAR3 operations. Conceivably it could spring a leak during its lifetime, perhaps from maintenance activities or after an earthquake.

Method of Detection

Observation by personnel performing work.

Preventive/Mitigating Features

The transformer has a capacity of 2,600 gallons and is situated within a secondary containment that has a capacity of 110% of that of the transformer. (The transformer is

housed in a building with a roof to keep the secondary containment dry during rainy weather periods.)

Consequences

Leaking oil will be contained within the secondary containment and will not result in a significant injury of illness and will have little or no effect on the environment. The consequences would be low.

Likelihood

The probability of a spill or leak occurring during the installation or operation of the accelerator is extremely unlikely.

Risk

The risk from this operation is acceptable.

7.7.7 Saw Cutting Slurry

Initiating Event

During saw cutting operations water is used to cool and lubricate the diamond-cutting blade. This water combines with the material being cut and forms a watery slurry mix. If the saw cutting operation is performed on material that is known to be contaminated (as it is for SPEAR ring and Building 118) then the slurry needs to captured and tested for the applicable contamination and disposed off through the SLAC process.

Method of Detection

Observation by personnel, pre-work hazards analysis for sub-contractor work.

Preventive/Mitigating Features

Slurry mix is vacuumed up as it is produced and placed in a 55-gallon drum for testing.

Consequences

Uncontrolled slurry mix from saw cutting operations would not produce a significant injury of illness and will have little or no effect on the environment. The consequences would be low.

Likelihood

The probability of this event occurring during the demolition or installation phases of this project is extremely unlikely.

Risk

The risk from this operation is acceptable.

7.7.8 Ozone Production from Accelerator Operations

Initiating Event

During normal operations Ozone is produced in the SPEAR enclosure from the interaction of ionizing radiation with air.

Method of Detection

Observation by personnel.

Preventive/Mitigating Features

Ozone can be produced during either stored or injected beam operations. The analysis has calculated that under either of these conditions, Ozone production (even during constant injection) will be below the limits for air contaminants set forth under adopted regulations.

Consequences

None. Permissible exposure level can not be reached.

Likelihood

Although Ozone will be produced during normal operations, levels will remain below the 8 hour time weighted Permissible Exposure Limit, thus the event would be classed as extremely unlikely.

Risk

The risk from this operation is acceptable.