ENCLOSURE 2
ATTACHMENT 1

SHINE MEDICAL TECHNOLOGIES, INC.

SHINE MEDICAL TECHNOLOGIES, INC. APPLICATION FOR CONSTRUCTION PERMIT RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

PRELIMINARY SAFETY ANALYSIS REPORT CHANGES (MARK-UP)

3 pages follow

Table 3.1-1 Systems List
(Sheet 3 of 3)

System Name	System Code	Section Reference[a]
Facility Ventilation Zone 4	FVZ4	**9a2.1.2**
Facility Integrated Control System	FICS	**7b.2.3.2.1**
Facility Potable Water System	FPWS	**9b.7.8**
Facility Compressed Air System	FCAS	**9b.7.10**
Facility Breathing Air System	FBAS	**9b.7.11**
Facility Inert Gas System	FIGS	**9b.7.12**
Facility Welding System	FWS	Table 3.5-1
Facility Roof Drains System	FRDS	**9b.7.13**
Facility Sanitary Drains System	FSDS	**9b.7.14**
Facility Data and Communications System	FDCS	**9a2.4**
Facility Lighting Protections System	FLPS	**8a2.1.7**
Facility Demineralized Water System	FDWS	Table 3.5-1
Facility Chilled Water Supply and Distribution System	FCHS	**9a2.1.3**
Facility Heating Water System	FHWS	**9a2.1.4**
Facility Acid Reagent Storage and Distribution System	FARS	**9b.7.15**
Facility Alkaline Reagent Storage and Distribution System	FLRS	**9b.7.16**
Facility Salt Reagent Storage and Distribution System	FSRS	**9b.7.17**
Facility Organic Reagent Storage and Distribution System	FORS	**9b.7.18**
Cathodic Protection System	CPS	**8a2.1.8**
Emergency Lighting System	ELTG	Table 3.5-1
Facility Grounding System	FGND	**8a2.1.6**
Lighting System	LTG	Table 3.5-1
Standby Diesel Generator System	SDGS	**8a2.1.3**, 8a2.1.4

a) Bolded section numbers indicate the location of the most detailed system description.

- The NCS analyses are performed in accordance with the methods specified and incorporated in the configuration management program.
- Nuclear criticality safety controls and controlled parameters ensure that under normal and credible abnormal conditions, all nuclear processes are subcritical, including use of an approved margin of subcriticality for safety that is used.
- Process specifications incorporate margins to protect against uncertainties in process variables and against a limit being accidentally exceeded (ANSI/ANS, 2007a).
- Use of ANSI/ANS-8.7-1998 (R2007) (ANSI/ANS, 2007b), as it relates to the requirements for subcriticality of operations, the margin of subcriticality for safety, and the selection of controls.
- ANSI/ANS-8.10-1983 (R2005) (ANSI/ANS, 2005a), as modified by Regulatory Guide 3.71, as it relates to the determination of consequences of NCS accident sequences, is used.
- If administrative k_{eff} margins for normal and credible accident scenarios are used, NRC pre-approval of the administrative margins will be sought.
- Subcritical limits for k_{eff} calculations such that the margin is large compared to the uncertainty in the calculated values, and includes adequate allowance for uncertainty in the methodology, data, and bias to ensure subcriticality are used.
- Studies to correlate the change in a value of a controlled parameter and k_{eff} value are performed. The studies include changing the value of one controlled parameter and determining its effect on another controlled parameter and k_{eff}.
- The calculation of k_{eff} is based on a set of variables within the method's validated area of applicability.
- Trends in the bias support the extension of the methodology to areas outside the area or areas of applicability.

The NSCE procedure addresses requirements for:

- Normal case operating conditions.
- Nuclear criticality hazard identification.
- Hazard identification method.
- Hazard identification results.
- Nuclear criticality hazard evaluation.
- Nuclear criticality parameter discussions.
- Nuclear criticality safety controls (passive design features, active engineered features and administrative controls).
- Nuclear criticality safety peer review requirements.

Geometry Tanks

Each of the tanks within the scope of this section features criticality safety controls that meet the double-contingency principle, i.e., ~~an inadvertent criticality is not credible unless two independent and unlikely events occur simultaneously~~processes incorporate sufficient safety factors so that at least two unlikely, independent, and concurrent changes in process conditions are required before a nuclear criticality accident is possible. The first criticality safety control is that each tank, with the exception of the tanks associated with liquid waste processing, is criticality safe by geometry or by the combination of geometry and a layer of neutron absorbing material integral to the tank construction. The second, independent criticality-safety control is that the most reactive concentration of uranium in any tank results in $k_{eff} \leq 0.95$, based on MCNP analyses. MCNP is a tank that is not designed to be criticality-safe. Both scenarios may lead to an inadvertent criticality. Cell waste and shipping containers will have criticality-safe containers.

- Target solution clean-up via UREX process, uranium storage, and transfer.

  Leaks in the piping or UREX process resulting in target solution collecting in the sump, trenches and/or drains that could lead to criticality-unsafe accumulation of fissile material. Changes to spacing of uranium oxide containers in the uranium container storage racks that may result in a criticality-unsafe condition. Not following procedures and use of container transfer carts when transferring uranium oxide containers to the target solution preparation area. These scenarios may lead to an inadvertent criticality.

- Fission product waste stream.

  Improper monitoring of the raffinate for unacceptable amounts of uranium prior to transfer of the raffinate to criticality unsafe vessels in the waste processing storage area. Failure to hold transfer of raffinate until the unacceptable amount of uranium is removed. Transfer of waste with an unacceptable amount of uranium to criticality unsafe geometry vessels in the waste storage area may result in an inadvertent criticality.

- Uranium metal or uranium oxide dissolution.

  Improper residence time or acid concentration in the uranium metal dissolution tank (1-TSPS-02T) or the uranyl sulfate preparation tank (1-TSPS-01T) could lead to carry-over of this material further into the process system. This scenario is prevented by the presence of filters downstream of these tanks. A differential pressure monitor is also installed at each filter to alert personnel of a build-up of uranium metal particles or other fissile particles on the filter.

13b.2.5.3 Sequence of Events

An inadvertent criticality in the RPF is ~~not credible~~highly unlikely as it is prevented by the facility design using multiple passive safety-related engineered SSCs and administrative controls in the RPF. The SHINE definition for Safety-related SSCs, described in PSAR Section 3.5.1.1.1, assures that required SSCs remain functional during normal conditions and during and following design basis events such that ~~the potential for an inadvertent criticality accident is not credible~~all nuclear processes are subcritical, including use of an approved margin of subcriticality. Therefore, a radiological consequence analysis for a criticality accident was not performed.

13b.2.5.4 Safety Controls

As stated before, the credible accident scenarios that could cause an inadvertent criticality are highly unlikely. This is accomplished by specifying safety controls that reduce the likelihood of such scenarios. A list of safety controls is provided in Table 13b.2.5-1.