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U.S. Nuclear Regulatory Commission
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Washington, DC 20555

Reference: U.S. Geological Survey TRIGA Reactor (GSTR), Docket 50-274, License R-113
Request for Additional Information (RAI) dated January 22, 2014

Subject: Response to GSTR Emergency Plan Question

Mr. Wertz:

The attached page provides additional information for our response to the RAI question dated January 22, 2014 and follow-up phone conference on 4/17/14. Please contact me if further details, or corrections, are needed.

Sincerely,

Tim DeBey

USGS Reactor Supervisor

**I declare under penalty of perjury that the foregoing is true and correct.**
**Executed on 5/15/14**

Attachment

Copy to:
Vito Nuccio, Reactor Administrator, MS 911
USGS Reactor Operations Committee

AX45
NRR

**Proposed changes to the GSTR Emergency Plan and Emergency Procedures.**

In Section 4.2.1, criteria that constitute an Unusual Event are defined, including Item 4.2.1.5 which specifies that a Continuous Air Monitor (CAM) reading exceeding 10K cpm above background, from the reactor, would constitute an Unusual Event.

A phone conference was held with the NRC on 4/17/14 regarding the GSTR relicensing effort, and specifically the GSTR Emergency Plan. As a result of that meeting, it was proposed to revise item 4.2.1.5 to make it related more to the actual radiological threat instead of a reading from an integrating detector that is very poorly related to an actual radiological threat. The CAM is an integrating detector since the filters are fixed and normally changed only once a week. This means that a very low concentration of airborne radionuclides (<<1 DAC) can cause a CAM alarm of 10 K cpm as the particles build up on the filters.

The proposed change specifies that an airborne radioactivity level in the reactor bay of >100 DAC would be an Unusual Event, using the unity rule for calculating the total DAC value. A person staying in an area with a DAC value of 100 for one hour would receive a TEDE of 250 mRem from the airborne radionuclides. This is 8% of a radiological worker's annual limit and it is very conservative because the reactor bay would not actually be occupied for more than a minute or two during a high airborne release into the room. A two minute occupation at 100 DAC would give a TEDE of 8.3 mRem. This DAC limit is reasonable for an emergency declaration based on airborne contamination in a controlled access area.

There was concern about our ability to assess the DAC level in a reasonable time frame, but the staff has a reasonable and quick sampling method, along with multiple, calibrated gamma spectrometers available to perform the DAC calculations quickly (~10 minutes). This time frame is actually less than required for other emergency declaration criteria.

In addition to the change in the Emergency Plan, we are proposing a change to the Emergency Procedures that specify that a DAC determination be performed if a CAM high alarm is actuated. So the CAM high alarm will still be the initiating event, but now it will initiate a DAC determination instead of initiating the declaration of a facility emergency.

The changes proposed in the Emergency Plan and Emergency Procedures are shown in the following two pages.

# EMERGENCY PLAN

4.2.1 Unusual Event

4.2.1.1 Sustained fire at the facility that does not involve reactor controls or radioactive materials.

4.2.1.2 Report or observation of severe natural phenomenon that are imminent or existing, e.g., (1) earthquakes that could adversely affect reactor safety systems, (2) flooding of Room 149, or (3) tornado winds that could strike the facility.

4.2.1.3 Security breaches or threats, like bomb threats or civil disturbances aimed toward the reactor facility.

4.2.1.4 Actual or projected radiological effluent at the site boundary calculated to produce a dose of 15 mrem whole body accumulated in 24 hours. The following guideline should be used to calculate the effluent dose:

24 hr dose (mrem) = $\Sigma_{t=0 \text{ to } 24}(C_t/EC)t$ / 160 for non-noble gas nuclides,

and

24 hr dose (mrem) = $\Sigma_{t=0 \text{ to } 24}(C_t/EC)t$ / 80 for noble gas nuclides.

where $C_t$ is the isotope concentration at time t,
EC is the value from 10 CFR 20 Appx B, Table 2, and
t is the time in hours that the concentration exists.

4.2.1.5 DAC level in the reactor bay from radionuclides being released from the reactor exceeds 100 (using the sum of DAC levels of all identified radionuclides).

# EMERGENCY PROCEDURES

7.5.2 Radioactivity Releases - Airborne Radioactivity

The following information applies when there has been a release of airborne radioactive particles. The Continuous Air Particulate Monitor (CAM) will alarm should there be a serious release of radioactive particulates. The high alarm of the CAM (bell in reactor room, buzzer and red light on CAM, warning at console) will be the initial indication to the staff of airborne radioactivity in the reactor bay. The following steps will be initiated. Steps 1-4 are automatic because they are initiated from the CAM high alarm circuitry.

1. Closure of the two supply dampers. Supply electrical power to emergency exhaust fan.
2. Remove electrical power from main exhaust system 1 to 15 seconds after the high alarm signal.
3. [redacted]
4. Begin collecting air sample of exhaust effluent on roof.
5. All personnel will immediately evacuate the reactor bay (Room 149). Procedures outlined in Section 7.5.1 will apply.
6. Verify that reactor is shutdown.
7. Secure door into the reactor room (lock) and post signs on doorway reading "CAUTION, Airborne Radioactivity Area" and "-Authorized Personnel Only".
8. Replace the air filters (both particulate and activated charcoal) on the emergency exhaust effluent sampler and analyze them for radioisotope composition and concentration. Repeat this periodically during the duration of the release. This will allow determination of the actual or projected site boundary dose from the effluent.
9. Surveillance of the reactor bay's airborne radionuclide status will be performed by monitoring the CAM instrument readouts and, upon high alarm, by replacing the air filters (both particulate and activated charcoal) periodically. The air filters will be analyzed for radioisotope composition and concentration, with a total DAC value being determined. This filter change and analysis will be repeated periodically as long as a CAM alarm continues to be actuated. This will allow tracking of the DAC level in the reactor bay.

7.5.3 Re-entry Into the Reactor Bay

1. Re-entry will not be attempted until radiation levels and/or airborne radioactivity levels are reduced to within permissible levels outlined in 10 CFR 20. However, should a short-duration entry be deemed necessary, appropriate monitoring instruments (film badges, dosimeter and portable survey instruments), protective clothing, will be worn and entry time will be controlled to limit exposure.
2. Contamination levels will be determined by appropriate survey instruments and wipe tests.
3. Determination of specific decontamination procedures will depend on existing contamination levels and locations.
4. Maximum tactile contamination levels that may be tolerated without further decontamination efforts will be 450 pCi/100 $cm^2$ beta and 200 pCi/100 $cm^2$ alpha activity.