TRIP REPORT

DATE OF TRIP: August 18, 2011

MEMORANDUM TO: Taylor University File

LOCATION: Taylor University
236 W. Reade Avenue
Upland, IN 46989

LICENSE NO.: 13-04004-02
DOCKET NO.: 030-14763

PARTICIPANTS:

Taylor University
Gene Habecker, President

Steve Bedi, Ph.D., Provost

Mark Bierman, Ph.D., Dean, School of Natural and Applied Sciences

Dan G. Hammond, Ph.D.
Chemistry and Biochemistry Chair, Radiation Safety Officer (RSO)
Telephone: 765-998-5273

U.S. Nuclear Regulatory Commission (NRC)
Michael LaFranzo, Senior Health Physicist 9/7/11
NRC Region III, Division of Nuclear Material Safety, Material Control, ISFSI, and Decommissioning Branch (MCIDB)
michael.lafranzo@nrc.gov, (630) 829-9865

George M. McCann, Senior Health Physicist, MCIDB,
mike.mccann@nrc.gov, (630) 829-9655

PURPOSE: TO DISCUSS TAYLOR UNIVERSITY MAY 23, 2011, LICENSE TERMINATION (ML111440347) - LICENSE MAIL CONTROL NUMBER 575230

BACKGROUND: Taylor University notified the NRC on May 23, 2011 that they ceased all licensed activities, disposed of all remaining licensed materials on May 6, 2011 and that they were seeking to terminate their NRC license. Taylor's license was first issued on October 4, 1978, replacing its 13-04004-01 license (issued during 1958), which had expired. These licenses authorized the possession of specific NRC licensed materials in unsealed forms in millicurie quantities and sealed forms in curie quantities. The license authorized these materials primarily for "Laboratory Research and teaching and training of students."

The NRC staff reviewed the licensee's termination request, and contacted the licensee's RSO Dr. Dan G. Hammond by telephone on July 26, 2011. The NRC staff informed the licensee's RSO that the May 23, 2011 information was not sufficient to demonstrate that the University's facilities, where licensed materials had been formerly stored and used, could be released for unrestricted use. The NRC's termination and unrestricted use criteria is specified in 10 CFR

Part 20, Subpart E "Radiological Criteria for License Termination," Section 20.1402 "Radiological Criteria for Unrestricted Use." The staff transmitted a copy of the July 26 Telephone Conversation Record to the licensee's RSO (ML112092147). During the call the NRC staff scheduled an on-site visit for August 18, 2011. The purpose of the visit was to discuss with University senior management and RSO the type and detail of information that will be needed to satisfy NRC license termination requirements, and allow the NRC staff to tour and perform limited scoping surveys in the former use areas.

Discussion: The NRC staff met with the RSO and Senior Management, and discussed the following:

1. The RSO informed the NRC staff that he had started collecting background information needed to develop the historical site assessment that had been discussed during the July 26, 2011 NRC Telephone Conference Call. He had also started interviewing past staff and employees, and collecting records of material receipt, disposal, periodic radiation laboratory surveys, use and user authorizations. As part of the licensee's historical site assessment review, in a document dated August 8, 2011, Dr. Hammond provided to the NRC staff a draft timeline of the licensee's radioactive material use under the NRC license.

2. The NRC staff toured the following student classrooms/laboratories 014, 014B, 207, and 212 located in the current science building. The current science building is where licensed materials were used and stored under License No. 13-04004-02. The NRC staff performed radiation scoping surveys using a calibrated Geiger Mueller (GM) survey instrument on laboratory and classroom work benches and counter tops. The staff measured small spots approximately (2-3 inches in diameter) of radiological contamination slightly above ambient background levels (2-3 times greater than background) on a counter top and a piece of lead in the licensee's former licensed materials storage area. All other areas surveyed during this limited scoping survey were consistent with ambient radiological background levels noted by NRC staff. The staff were also shown the area where the former Steam Plant was where licensed materials authorized under the 13-04004-01 license were used and stored in a small laboratory area attached to the Steam Plant. The Steam Plant was recently demolished and is now a paved parking lot. As part of the historical site assessment, the RSO indicated that the licensee will further evaluate and determine what licensed activities were conducted, under which license, and in which building.

During the meeting, NRC staff outlined NRC decommissioning and license termination requirements. The NRC staff discussed the need to receive from the University a letter indicating the steps, actions and schedule that will be implemented to satisfactorily terminate the University's license. The University's Senior Management expressed their sincere desire to work with the NRC, and provide the information in a timely manner.

Conclusion: The University Management committed to submitting a letter to the NRC 60 days from the date of the site visit outlining the steps and timeframes discussed during the meeting.

Contact: Michael LaFranzo, 630-829-9865

Timeline Radioactivity Use at Taylor University

Prepared by DG Hammond

August 8, 2011

1. Elmer Nussbaum did studies of Diffusion of Radon and Tritium through semi-permeable membranes – indicated by publications from 1961 to 1964 (list of publications). No further work on this project is indicated after 1964. This work was done in a stainless steel hood in a back room of the steam generator building. That building was torn down in 2010.

   Dr. Nussbaum was the Radiation Protection Officer.

   Dr. Nussbaum was very fastidious in everything he did, including his work with radioactive materials. He did routine wipe tests (personal communication from Roger Roth) of the area and equipment where radionuclides were used. A gas flow proportional counter or multi-channel analyzer sensitive to alpha, beta, and gamma radiation (communication from Roger Roth, photo in Chronicle-Tribune from March 6, 1977, 1979 NRC license) was routinely used in these tests.

   Short-lived materials were allowed to decay before disposal and long-lived materials were disposed via Atomic Disposal Co., Kinley Park, IL. (1979 NRC license)

2. From 1957 to 1967 student labs and projects were conducted in the facility in the steam generating building. These involved exempt levels of radioactive materials. Labs that were conducted included (as determined by student lab write-ups from the period):

   - Geiger Mueller Counting
   - Proportional Counting
   - Decay of Ag-110 and Ag-110m
   - Determination of Thermal Neutron Flux (used Pu-Be source stored in 55 gal drum with paraffin shielding).
   - Alpha spectroscopy lab: ^{241}Am, ^{210}Po
   - Beta spectroscopy lab: ^{204}Tl
   - Gamma ray spectroscopy lab: ^{137}Cs, ^{60}Co, ^{51}Cr, ^{131}I

   It is difficult to determine if all these labs were done on campus or some were done at Oak Ridge Labs. Dr. Nussbaum frequently took students to Oak Ridge during January Interterm or in the summer.

3. In 1967 the work with radioactive materials moved to the new Science Center (Later renamed Nussbaum Science Center). No research using radioactive materials has been conducted in the building. The same hood that was used in the old building was used in the Science Center. This was housed in NS 014 which was isolated from the rest of the building. The hood was never connected to an exhaust system.

According to Roger Roth, previous RSO, Dr. Nussbaum did wipe tests of the hood and bench before it was moved to the newer facility. He also did wipe tests on the surfaces of the room. All these were negative for radioactivity.

4. Students in the Nuclear and Modern Physics course (PHY 311) only used exempt quantities of materials in their labs which were set-up in NS 212. This typically involved counting cards. No research was conducted after moving into the Science Center.

5. Students were frequently taken to Oak Ridge Labs for more extensive projects using materials designed by Oak Ridge Associated Universities (ORAU). Dr. Nussbaum was often an instructor at the Institute of Nuclear Studies at Oak Ridge.

6. We obtained some radioactive materials from the RCA lab in Marion as it was being phased out (late 1960s - 1970s?). These were stored in NS 014 but never used. Dr. Nussbaum may have felt obligated to take them as a gift from Dr. James Lee who was a researcher at the Marion RCA lab and also taught Physical Chemistry at Taylor University in the 1960s.

7. By 1994 there were no labs using radioactivity being taught according to a lab syllabus for the Nuclear and Modern Physics course (PHY 311) from 1994. All radioactive materials were moved to a locked closet in a modified NS 014 and contained in a shield made of lead bricks.

8. In 1998 the Pu-Be source was transported to Los Alamos National Lab (DOE & NRC Nuclear Material Transaction Report, 5/27/98). This had been used to activate foils for short half-life experiments (typically Indium or Silver). The neutron source was leak tested routinely by Dr. Nussbaum or Roger Roth using filter paper and a gas flow proportional counter.

9. All radioactive materials (except for a few items of exempt quantities) were stored in the locked closet in NS 014 and not disturbed except for routine inventories until 2010. Official notification of cessation of the use of licensed radioactive materials was sent 7/21/2010. Most materials were removed by Bionomics, Inc. on 11/4/10 (waste manifest). The remaining materials could not be taken because there was no licensed waste depot at that time. The remaining materials were taken on 5/6/11.