STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Isotopes Extension Files

DATE: April 8, 1957

FROM : Cecil R. Buchanan and C. M. Ferrell

SUBJECT: VISIT TO U. S. RADIUM CORPORATION, BLOOMSBURG, PENNSYLVANIA, ON APRIL 3, 1957

The purpose of this trip was to get information to complete the sealed source catalog on U. S. Radium, and to discuss the licensing of 500,000 curies of tritium.

We met with Dr. Wallhausen and Mr. Dooley to discuss these items. We were first shown quite a number of different type light sources which they are planning to offer for sale if they obtain the necessary supply of Krypton 85 and tritium. They have orders for large numbers of sources for military applications, such as range setting scales for mortor shells, exit or hatch markers for Naval vessels or aircraft, and markers for use on military bridges and through mine fields.

The different type sources appeared to be very well constructed. The sources shown included a prototype railroad switch lantern, exit markers, arrow markers, personnel markers, bridge markers, large flash light type sources, mortor fuse scales and scales for radiation instruments for Canadian Army night use. (Scale went from 0 to 500 R.)

Mr. Dooley was given a list of all U. S. Radium drawings we had on file and a list of the ones which we need to complete our sealed source file. The drawings will be sent in the near future.

The licensing of 5×10^5 curies of tritium was discussed. Dr. Wallhausen said he got the figure from Ray Jones, Research Division, AEC, Washington. Dr. Wallhausen stated that they would like to have 9,000 curies of krypton, but would settle for 2,000 curies for Army and Navy orders. He indicated they had a great need for krypton and if necessary would provide the proper storage facilities for large amounts. Dr. Wallhausen stated he had discussed krypton and tritium supply with Dr. Libby.

Markers used in aircraft are sold in numbers of 20,000 at a time. They presently have a great need for both krypton and tritium to complete military orders. The Canadian Army has ordered 20,000 scales (tritium foil type).

Dr. Wallhausen felt that 1,000 curies of tritium would be a reasonable possession limit for them. He pointed out that with such a limit, he

would have to know the regular shipping intervals from ORNL. Oak Ridge National Laboratory ships 50 curies of krypton or tritium in a single container as approximately 20 cc of gas. A separate storage vault with a forced air vent is used for the storage of tritium. In the fabrication of Krypton 85, a maximum of 50 curies is kept in the hood behind a lead barricade. The present maximum amount of tritium gas in a source is about 190 millicuries. Tritium foil seems to be the best source and they figure roughly on 1 curie/square inch of foil. The mortor fuse, for example, has 1/2 square inch of surface. Krypton light sources vary from 500 millicuries to 1 curie per source.

They have tritium bioassays run on personnel on a quarterly basis and have found no detectable amounts of radioactive material. They stated that this was due to good air flow systems of their hoods. CRB indicated the tests on personnel for possible ingestion of tritium should be made more frequently than every 3 months. Dr. Wallhausen asked just how many times the tests should be made. CRB stated that for the quantities of material which would be involved, the tests should be made on at least a weekly basis and this was recommended. Dr. Wallhausen said that it took four hours to make the tests at a cost of $15.00 per hour.

They can observe leaks in the radioactive gas filling systems by means of mercury manometers which would indicate a loss of gas. The source capsule is evacuated and then filled to a pressure which is less than atmospheric. They ran a number of operations in November where 3 people were involved.

The matter of waste disposal was discussed. Dr. Wallhausen stated that liquid waste was evaporated and the residue shipped to ORNL in 55 gallon drums which were packaged to meet ICC specifications.

We were conducted on a tour of the laboratory facilities. To prevent the possible contamination of our clothes, we were given paper lab coats and rubbers for our shoes. The entrances to the lab are posted with approved radiation warning signs. It was stated that 200 cubic feet of air is drawn through the hoods. One item noticed was that the blower was located inside of the building on several of the hoods. If a leak was to develop on the side of the blower where a positive pressure existed, this could contaminate the whole room and possibly the building. This point was mentioned to Mr. Dooley.

In the lab where the hood was located for filling of krypton sources, we were given a description of the methods of handling the radioactive gas. The entire filling operation is done in the hood behind plastic shields with clay bricks used as additional shielding for the gas containers. The filling system is constructed of light copper tubing which is soldered at the joints. A hypodermic needle is used to inject the gas into the source. This needle is fixed onto the system and the source is punctured through a small rubber seal. The source container is evacuated and then filled with the gas. The seal closes on pulling the source from the needle and is then permanently sealed with a hard

plastic material. Prior to filling the sources, they are tested with pressures as high as 300 psi as a test against leakage. They place finished sources in a bell jar with 1 mm vacuum over night and measure either radiation or brightness of the source to see if leakage has occurred. The instrument used for external radiation measurement on sources is a Juno mounted on a movable source measuring stand.

Carbon 14 is handled in a dry box as is Thallium. Radiation signs were placed on the doors. We were shown a new type of dry box for use with strontium which could be disposed of in case of high contamination. The box was equipped with manually controlled remote handling rods. It contained 1/4 inch lead sheet on the front and 1/4 inch x 12 inch x 18 inch lead glass ports.

They have one room limited to the use of strontium 90. Personnel within the room wear respirators, gloves and protective clothing. This room contained 3 dry boxes and 2 Berkeley type hoods, a Vitro Corporation ion exchange unit, and an electric furnace in a hood. A Juno type meter was mounted on a wagon for measuring floor contamination. We were shown a wipe test plan of the room similar to those for making smears in certain locations in the labs at ORNL. The equipment is smeared daily. At one time, finger type film badges were used but were discontinued once the working exposure to the personnel was determined. We did not enter this room, but observed operation through a viewing window. It was noted that they did not have a constant air monitor in this room. The only equipment along this line which was used was a Staplex type portable air sampler. It was stated that they try to maintain 50 linear feet per minute air flow through the hoods. The large blower used to force the air from several hoods was located inside of the room. A leak in this system would force a high level of contamination back into the room.

We were shown the equipment for electro plating wires with radioactive nickel to be used in electron tubes. A slow rotating device is used to momentarily dip the wire into the nickel solution. This is done in a 3/8 inch thick plastic box evacuated by a small blower.

We were introducted to Mr. E. M. Burtsavage, the health physicist. He is a physicist who is being trained in health physics by U. S. Radium and performs all surveys. The writer was asked if he thought it would be desirable for U. S. Radium to send him to Vanderbilt for the training program. They were informed that the training received would be extremely valuable in giving him a better background for the work in which they were planning to engage. Mr. Dooley indicated they had several scalers and some neutron counters located at another building which we didn't see due to a lack of time. They have neutron film badges for personnel monitoring since they make Po-Be and Ra-Be sources.

We were driven around the isotope storage building but didn't enter. The building was properly posted and locked. They have an underground storage bin (grain type). About 100 millicuries in waste is also stored.

Mr. Dooley told us that the strip type sources used in the cigarette gauges are leak tested 3 times. They have a 1,000 cpm maximum manufacturer

test. He mentioned they make no medical radium needles or radon sources. They used a brass shell with a stainless steel window for their sources, but went later to monel with a silver window. They have had no trouble with any thallium source in 4 years.

The problem of a tritium detection instrument was discussed but with no decisions made on what would be a reliable device. Mr. Dooley was given several references concerning tritium hazards and monitoring.

The Strontium 90 sources are made by using the sulfate with a barium carrier for insolubility. It was stated that the damage to the plastic by radiation from tritium was very slight and faulty light sources should be scarce.

RECOMMENDATIONS:

The writer recommends (1) that in the future construction and expansion of their source manufacturing areas that the blowers for hoods be locate outside of the building; (2) that a constant air monitor be placed in the room used for fabricating; (3) that this company's facilities be inspected prior to large scale production of sources. Their present set up is not designed for anything but research or development. (4) that they increase the frequency of the urine tests of workers handl g radioisotopes.