YALE-NEW HAVEN HOSPITAL
RADIATION SAFETY OFFICE

April 7, 2006

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Radiation Control Unit
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Gentlemen,

The purpose of this report is to inform you of the circumstances surrounding the waste shipment that was rejected by the Bridgeport RESCO plant on April 5, 2006.

The waste container arrived, approximately at 11 AM, at Yale-New Haven Hospital. The contents of the compacted waste container were dumped at the Grace Building parking lot so they could be surveyed. A survey of the dumped trash was conducted using Ludlum Model 3 survey meters with Model 44-3 Low Energy Gamma (Sodium Iodide) probes. The initial survey of the waste did not detect any radioactive materials. It was determined that the waste must be surveyed bag-by-bag because of the poor survey geometry and shielding by the non-radioactive overburden. An open commercial waste container was positioned next to the dumped load and the bag-by-bag survey commenced.

At the end of the survey process, three bags with radiation levels, detectable above background, were discovered in the dumped load. The bags were returned to the waste disposal dock and placed under the Ludlum Model 3530 waste monitor system to see if the alarms would detect the materials in the bags. The alarms for both systems initially did not detect the activity contained in the bags when they were placed at the normal survey point (approximately 6 ft from the detectors). The alarms could only be activated when the bags were physically lifted so they were less that two feet from the detectors. The bags were then transported to the Radiation Safety Office hot lab so they could be examined further.

Two of the bags were examined and it was determined that they came from patient care floors and most probably were contaminated with patient excreta. The wastes contained within the bags were typical of the wastes generated on a patient care floor. A gamma spectrum survey, with a BNC SAM 935 MCA, was performed on the two bags and the survey revealed that the bags contained Iodine-131. A radiation exposure rate reading was performed for both bags using a Victoreen 451P pressurized ion chamber at a distance of 1 foot from the bags. This survey determined that the true exposure rate was approximately 10 microroentgen/hour over ambient background. Using this data and the exposure rate constant for Iodine-131 (2.2 R-cm^2/mCi-hr), the approximate activity contained was estimated to be 4 uCi in each bag.

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The third bag appeared to have come from the operating room environment. It contained surgical suture materials, gauze and other surgical wastes typical of the operating room environment. Initial thin end window GM pancake probe surveys with open window and reversed probe surveys, indicated that the radioactive source was emitting a very low energy gamma ray typical of either Iodine-125 (principle photon energy 30 keV) or Palladium-103 (principle photon energy 20 keV). The waste bag was opened and a single Palladium-103 seed was discovered. The true exposure rate was measured at a distance of 1 foot using a Victoreen 451B un-pressurized ion chamber and determined to be 0.4 mR/hr (0.04 mR/hr at 1 meter). The seed was assayed in a Capintec CRC-7 well ionization chamber (dose calibrator) and found to contain 0.853 mCi of Palladium-103. A review of the YNHH inventory records revealed that 30 seeds were implanted in a patient on March 30, 2006 that, when corrected for decay, contained 0.857 mCi on April 6, 2006. Consequently, the seed discovered in the waste is believed to have come from the batch of seeds implanted into the base of the tongue of a patient on March 30.

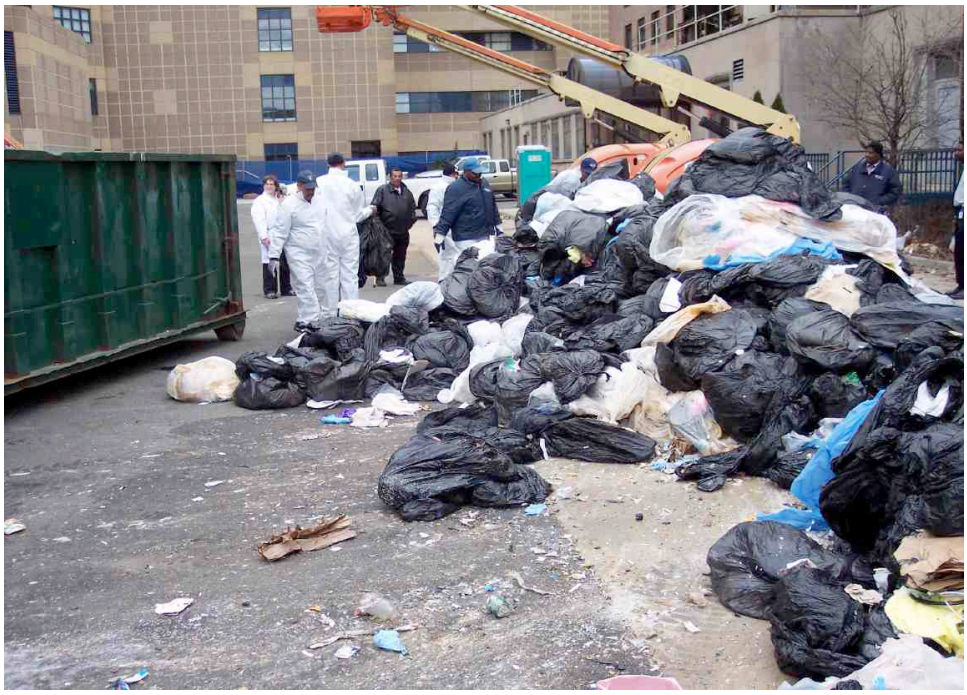
The two bags containing Iodine-131, are believed to have been contaminated with excreta from a patient who was treated with 52.7 mCi for hyperthyroidism on March 30, 2006 at 3 PM. This patient would have normally been released from the hospital on that day. However, due to other medical complications (a broken back and multiple rib fractures), she was initially placed in isolation for a period of 48 hours and then transferred back to a regular surgical floor on the afternoon of April 1, 2006 after most of the freely (non-bound) circulating radioactivity had been cleared from the bloodstream. The residual Iodine-131, fixed in the thyroid tissue, was estimated to be 19.6 mCi at the time of release from isolation. The isolation room was surveyed and released by RSO personnel on April 3 and all contaminated wastes were removed from the room and stored for decay by RSO personnel. It is believed that the wastes containing the trace levels of I-131 came from this patient after their release from isolation.

It should be noted that this patient was releasable under NRC regulation 10 CFR 37.75, immediately after the administration of the treatment. The patient was placed in isolation for ALARA purposes, not because it was required by regulation. The estimated dose to other individuals, if the patient was immediately released, was calculated to be 180 mRem, assuming an occupancy factor of 6 hours per day at a distance of 1 meter. The dose when released with 19.6 mCi was estimated to be 66 mRem.

The bag containing the Palladium-103 seed is believed to have been excreted by the patient after the final survey was performed in the Operating Room (OR) environment. The OR was surveyed at the completion of the implant process and no displaced sources were discovered at the time. However, the patient may have subsequently coughed up a seed, after the implant and survey process was completed, into a gauze pad that was disposed into the normal waste system. The maximum dose rate at 1 meter from this patient was measured and found to be 0.4 mR/hr at 1 meter.

Some pictures are attached below to illustrate the waste monitoring system and the incident response surveys.

Sodium Iodide Waste Monitors at YNHH (located inside grey boxes over compactor doors.



Waste survey process by hand

Waste survey process by bucket