1. Department of the Army
Fitzsimons General Hospital and
U.S. Army Medical Research
and Nutrition Laboratory
Denver, Colorado

2. April 26, 27, and 28, 1965

3. Initial

4. 10 CFR 20, 30

5. License No. 5-46-13

6. The following items of noncompliance were observed or otherwise noted:

License Item No. 8

8.F. in that, during the period May 1, 1964, to April 26, 1965, 5 mc quantities of I-131 in the physical form of cholografin were procured on sixteen separate occasions, contrary to the provisions of this item which limit the possession of I-131 as cholografin to 2 mc (see par. 18, page 5).

8.J. in that, during the period June 1, 1964, to April 26, 1965, 2 mc quantitiss of I-125 in the physical form of iodinated human serum albumin were procured on seven separate occasions contrary to the provisions of this item which limit the possession of I-125 in the form of IHSA to 1 mc (see par. 18, page 5).

8.S. in that, during the period January 1, 1965, to April 26, 1965, 5 mc quantities of Cr-51 in the physical form of sodium chromate were procured on eleven separate occasions, contrary to the provisions of this item which limit the possession of Cr-51 ~~of~~ 25 sodium chromate to 4 mc (see par. 18, page 5).

Condition No. 10 in that, on September 22, 1964, 128 uc of Rb-86 and 110 uc of C-14 were used at the summit of Pikes Peak contrary to the provisions of License Condition No. 10 which limits the place where these materials may be used to the Fitzsimons General Hospital and U.S. Army Medical Research and Nutrition Laboratory, Denver, Colorado (see par. 22, page 6).

JHS
Initials

ORIGINAL SIGNED BY
GEORGE H. SMITH
Inspector

5/11/65
Date

Initials

Original signed by
Roger T. Wesley
Reviewer

MAY 11 1965
Date

A/18

HISTORY

License Status

9. Byproduct Material License No. 5-46-13 was issued on February 3, 1964. This license superseded Byproduct Material License Nos. 5-46-9, -10, -11, and -12. License No. 5-46-8 was incorporated into License No. 5-46-11 prior to the incorporation of the aforementioned licenses into 5-46-13.

Previous Inspections

10. Reinspections of the programs conducted under the auspices of Byproduct Material License Nos. 5-46-8, -9, -10, -11 and -12 were conducted on February 14 and 15, 1963. As a result of these inspections, Form AEC 591's were issued to the holders of Byproduct Material License Nos. 5-46-8, -9, -11, and -12; with the exception of License No. 5-46-9, these Form AEC 591's stated that there were no items of noncompliance. The Form AEC 591 issued to Byproduct Material License No. 5-46-9 stated that records of disposals were not properly maintained contrary to the provisions of 10 CFR 20.401(b). In a letter dated May 9, 1963, AEC informed the Commanding Officer at Fitzsimons Army Hospital of the following discrepancies which were observed in conjunction with the program conducted under the auspices of Byproduct Material License No. 5-46-10.

> "It appears that certain of your activities were not conducted in full compliance with a license condition in that the Strontium-90 sealed medical applicator was not tested for leakage and/or contamination at intervals of six (6) months or less from February 28, 1962, to October 9, 1962, as required by License Condition No. 14(A). Also records of the results of leak tests conducted on February 28, 1962, were not kept in units of microcuries as required by License Condition No. 14(B)."

INITIAL INSPECTION

11. An unannounced, initial inspection of the subject licensed facility was conducted on April 26 through 28, 1965. The following persons were contacted during the course of the subject inspection:

Maj. Gen. Clinton S. Lyter, M.D., MC, Commanding Officer, Fitzsimons General Hospital (FGH)

Col. E.L. Overholt, M.D., MC, Chief, Dept. of Medicine, FGH

Col. J.E. Canham, M.D., MC, Commanding Officer, U.S. Army Medical Research & Nutrition Laboratory (USAMRNL)

Maj. P.E. Siebert, M.D., MC, Chief, Radiology Service, FGH

Maj. G.L. DeNardo, M.D., MC, Chief, Radioisotope Laboratory, FGH

Maj. M. Pearce, R.N., Nurse Corp., Radioisotope Laboratory, FGH

Capt. K.E. Kinnamon, D.V.M., VC, Chief, Radioisotope Laboratory, USAMRNL

Master Sgt. J.E. Abernathy, Radioisotope Laboratory, USAMRNL

Isotopes Committee

12. According to Capt. Kinnamon, an Isotope Committee was established for the Fitzsimons General Hospital complex in December, 1963; at the time of the subject inspection, the membership of the Isotope Committee was as follows:

Col. E. L. Overholt, M.D., MC, Chief, Dept. of Medicine, FGH, Chairman

Col. A. Steer, M.D., MC, Chief, Pathology Service, FGH

Col. D.E. Thomas, M.D., MC, Chief, Dept. of Surgery, FGH

Col. J.E. Canham, M.D., MC, Commanding Officer, USAMRNL

Maj. P.E. Siebert, M.D., MC, Chief, Radiology Service, FGH

Maj. G.L. DeNardo, M.D., MC, Chief, Radioisotope Laboratory, FGH

Maj. H.F. Johnson, M.D., MC, Chief, Radiation Therapy Service, FGH Radiological Safety Officer and Recording Secretary

Capt. K. E. Kinnamon, D.V.M., VC, Chief, Radioisotope Laboratory USAMRNL

Samuel Nethery, USA, (Civ.), representing the Chief, Purchasing and Contracting Service, FGH

Capt. Kinnamon stated that of the aforementioned individuals, Mr. Nethery is the only non-voting member of the Committee. Capt. Kinnamon said that all decisions of the Isotope Committee must be reviewed and approved by Maj. General Lyter. It should be noted that Maj. Johnson, the Radiological Safety Officer, was on annual leave at the time of the inspection and, therefore, was not contacted.

13. Capt. Kinnamon stated that the Isotope Committee routinely meets the first Tuesday of each calendar quarter; according to their charter they must meet at least once each calendar quarter. However, Capt. Kinnamon said that if it is necessary, the

Isotope Committee can be convened at any time. Capt. Kinnamon stated that the Isotope Committee reviews all proposed uses and users of radioactive material and either approves or disapproves the proposed use or user. A review of the minutes of the Isotope Committee meetings showed that the Committee met on March 10, April 7, July 7, October 6, 1964, and January 5, 1965.

Facility Organization

14. According to Maj. DeNardo and Capt. Kinnamon, licensed radioactive materials are used exclusively by three departments at the Fitzsimons General Hospital complex. These departments are the Radioisotope Laboratory, FGH, of which Maj. DeNardo is the Chief; the Radiation Therapy Service, FGH, of which Maj Johnson is the Chief; and the Radioisotope Laboratory, USAMRNL of which Capt. Kinnamon is the Chief. The only licensed material used by the Radiation Therapy Service is the Sr-90 eye applicator. All other clinical use of licensed material is at the Radioisotope Laboratory, FGH, and all research use of licensed material is conducted at the Radioisotope Laboratory, USAMRNL. Maj. DeNardo and Capt. Kinnamon are directly responsible for the uses of radioisotopes in their respective sections and they maintain complete records of isotope procurement, use, transfer, disposal, personnel monitoring, and all surveys which are conducted. Additionally, these records are compiled quarterly and are maintained in a central file by Maj. Johnson. Capt. Kinnamon stated that the Fitzsimons General Hospital and the USAMRNL are separate entities but that both of them are under the administrative command of Maj. General Lyter.

FACILITIES

15. It was observed that the facilities at the Radioisotope Laboratory, FGH, the Radiology Laboratory, USAMRNL, and the Radiation Therapy Section, FGH, are as described in the report of the February 14 and 15, 1963, inspection and in the licensee's applications for license.

PROCUREMENT

Summary

16. The licensee has procured quantities of I-125 as iodinated human serum albumin, I-131 as Cholografin and Cr-51 as sodium chromate ~~chloride~~ in excess of the quantities authorized by the subject license. With the exception of the three aforementioned procurements, the licensee has not procured byproduct material in quantities in excess of those authorized by the license.

General

17. Capt. Kinnamon and Maj. DeNardo stated that all procurements of licensed materials for use in specific departments must be approved by the Isotope Committee; that they (Kinnamon and DeNardo) must approve each specific order for an isotope; and that Maj. Johnson must also approve each specific order for an isotope. Capt. Kinnamon stated that the reason that Mr. Nethery is listed on and attends all Isotope Committee meetings is that he is then able to assure that isotopes are procured in the prescribed manner.

Radioisotope Laboratory, FGH

18. A review of the isotope procurement records for the Radioisotope Laboratory revealed the following:

Isotope	Physical Form	Quantity Procured	No. of Procurements	Time Interval of Procurements
I-131	Cholografin	5mc	16	5/1/64 - 4/26/65
I-125	Iodinated human serum albumin	2 mc	7	6/1/64 - 4/26/65
Cr-51	Rachromate (Sodium Chromate)	5 mc	11	1/1/65 - 4/26/65

With the exception of the aforementioned receipts, the review of the procurement records for the Radioisotope Laboratory, FGH, revealed that there were no procurements of licensed material in excess of the limits specified in the subject license. Maj. DeNardo stated that the aforementioned isotopes were procured soley for clinical use in human patients. It should be noted that license Item 8.F. limits the quantity of I-131 as Cholografin which the licensee may possess at any one time to 2 mc; license Item 8.J. limits the quantity of I-125 as iodinated human serum albumin which the licensee may possess at any one time to 1 mc; and license Item 8.S. limits the quantity of Cr-51 as sodium chromate which the licensee may possess at any one time to 4 mc. Maj. General Lyter was informed that the aforementioned procurements of licensed materials constituted violations of license Items 8.F., 8.J., and 8.S. of Byproduct Material License No. 5-40-1. Maj. General Lyter stated that procurements of licensed material in excess of the quantities authorized by the subject license would be immediately terminated until such time as an amendment authorizing procurement of greater quantities was received from AEC. A compilation of the licensed materials procured by the Radioisotopes Laboratory, FGH, is being retained by this office. It was observed that radio-pharmaceuticals for chemical use in humans at

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the Radioisotopes Laboratory, FGH, are procured from Abbott Laboratories and E. R. Squibb & Sons; Maj. DeNardo stated that all of the isotopes received at this laboratory were certified as to pharmaceutical quality and assay by the supplier.

Radioisotope Laboratory, USAMRNL

19. A review of the procurement records for the Radioisotope Laboratory, USAMRNL revealed that there have been no procurement of isotopes in quantities in excess of the limits specified in the subject license. A compilation of the quantities of the materials procured for use in this laboratory by the subject licensee is being retained by this office. It was observed that the majority of the materials procured by this laboratory were C-14 labeled compounds, various forms of I-131, Rb-86, or Fe-59.

Radiation Therapy, FGH

20. Maj. Siebert stated that the Radiation Therapy section has not procured licensed material since the last previous inspection of the facility. The Radiation Therapy section possesses a Sr-90 sealed source contained in a Tracerlab, Model RA-1 medical applicator; this is the only sealed source containing licensed material which is possessed by the subject licensee.

USE

Summary

21. On September 22, 1964, 110 uc of C-14 and 128 uc of Rb-86 were injected into rats on the summit of Pikes Peak, Colorado, contrary to the provisions of License Condition No. 10 which limits the use of this material to Denver, Colorado. With the exception of the aforementioned use of licensed material, all licensed materials have been used in the manner specified in the subject license.

Radioisotope Laboratory, USAMRNL

22. On September 22, 1964, the following quantities of licensed materials were injected into rats on the summit of Pikes Peak, Colorado:

Isotope	Physical Form	No. of Rats	Quantity of Isotope Injected per Rat	Total Quantity Injected
C-14	Alanine-U-C-14	6	5 uc	30 uc
C-14	Glutamic Acid-U-C-14	6	5 uc	30 uc
C-14	Lysine-U-C-14	5	5 uc	25 uc
C-14	Methionine-U-C-14	5	5 uc	25 uc
Rb-86	Rb Cl	16	8 uc	128 uc

The aforementioned study was performed by J. P. Hannon, Ph.D., USA (Ret.), Radiation Section, USAMRNL. Capt. Kinnamon stated that he was on medical leave at the time the aforementioned study was conducted; that Dr. Hannon is authorized by the Isotope Committee to utilize the aforementioned isotopes; and that Dr. Hannon was not aware that he was not authorized to use these isotopes on Pikes Peak. Capt. Kinnamon stated that all persons are required to check isotopes out of the USAMRNL central isotope storage area and that prior to September 22, it was only necessary for the individual checking out the isotope to be authorized for the specific isotope and the use for which he stated he was going to use the isotope. Capt. Kinnamon stated that Maj. Johnson had checked the isotopes out to Dr. Hannon and he had assumed that Dr. Hannon was going to use the isotopes in the Radioisotope Laboratory, USAMRNL. As a result of this unauthorized use of isotopes, it is now necessary for the person checking out the isotopes to also state where he intends to use the isotopes. Capt. Kinnamon stated that Dr. Hannon was severely reprimanded by Maj. General Lyter and was informed that continued unauthorized use would result in his termination. Maj. General Lyter was informed that the aforementioned use of licensed material was a violation of license Condition No. 10 which states that unless otherwise specifically authorized, isotopes will be used at either the Fitzsimons General Hospital or the USAMRNL, Denver, Colorado. Maj. General Lyter stated that unauthorized use of isotopes would be precluded in the future by the expanded isotope check-out criteria and by increased communication of the limitations on the authorized uses of isotopes.

23. Amendment No. 2 of the subject license which was issued on September 8, 1964, authorized the use of C-14 as ascorbic acid at Fort Devens, Massachusetts, and on the summit of Pikes Peak, Colorado, for nutrition and metabolism studies in human volunteers. Capt. Kinnamon said that this study was conducted during the period September 14 to October [illegible], 1964. The program involved eleven volunteers, five at Pikes Peak and six at Fort Devens, Massachusetts. According to the experimentor's records, each volunteer was given two 5-mc oral doses of l-ascorbic acid-1-C-14; the first dose was given on the first day of the experiment and the second dose on the last day of the experiment. A review of each volunteer's history showed that the volunteers ranged from 21 to 35 years of age. Capt. Kinnamon stated that all excreta and materials involved in the program were collected and transported to the USAMRNL laboratories for evaluation and/or disposal. In addition to the aforementioned program, the injection of Iodine

into rats at the summit of Pikes Peak was also permitted by authority of License Amendment No. 5. Capt. Kinnamon stated that all materials associated with this program and the rat's excreta and carcasses were returned to the laboratory for analysis and/or disposal.

24. Capt. Kinnamon said that at the time of the inspection, only one program involving radioactive materials was being conducted at the USAMRNL. This program involves approximately 20 rats with each rat receiving daily injection of 0.2 uc of Fe-59. The rats were housed in the high-level laboratory at the facility and it was observed that their cages were inside of a large cardboard box which was fully-lined with absorbant paper. Capt. Kinnamon stated that all excreta, etc., from the rats were collected and either analyzed or retained for disposal.

Radioisotopes Laboratory, FGH

25. A compilation of the clinical uses of licensed material at Fitzsimons General Hospital follows:

Isotope	Physical Form	Diagnostic or Therapeutic Procedure	Avg. No. of Procedures/Yr.	Avg. Dose Per Procedure
Sr-85	Strontium nitrate	Bone scans	60	50-100 uc
Se-75	Selenomethionine	Pancreatic scans	Total of 10	250-300 uc
I-125	IHSA	Plasma volume	100	10-100 uc
I-125	Hippuran	Renal function	120-180	50 uc
I-131	IHSA	Brain tumor localization	75-100	200-300 uc
I-131	p-Toluidine polyvinylpyrrolidone	Determination of protein loss	15-20	50-100 uc
Cr-51	Sodium chromate	RBC mass	10	25 uc
		RBC survival	15	50-100 uc
		Spleen scans	40	500-800 uc
		Gastrointestinal bleeding	5	100 uc
Fe-59	Ferrous citrate	Determination of iron turnover	15	10-20 uc
Au-198	Colloidal	Liver scans	40	150-200 uc
I-131	Hippuran	Renal function	120-180	25-35 uc
I-131	Rose bengal	Liver function		
I-131	Iodide	Thyroid function (uptake)	1,000-1,500	8-15 uc
		Thyroid scans	300-500	80-100 uc
		Treatment of hyperthyroidism	30-40	5-10 mc
		Treatment of thyroid carcinoma	2-3	20-40 mc
Hg-203	Chlormerodrine	Brain scans	120	700-800 uc
		Kidney scans	90-100	150 uc
P-32	Soluble phosphate	Treatment of bone metastases	10	8-15 mc
		Treatment of chronic leukemia	2(4 yrs.)	1-5 mc
		Treatment of Polycythemia vera	1(4 yrs.)	3 mc/6 mos.
I-131	Rose bengal	Liver function	10	25-50 uc
		Liver scans	10	250 uc
Xe-133	Gas	Pulmonary function	120	1-5 mc

A total of ten patients received pancreatic scans, a procedure in which [illegible] this procedure was found to be unsuccessful because of the localization of selenium in the liver and was, therefore, discontinued in October, 1966.

Radiation Therapy

26. Maj. Siebert stated that the only licensed material which Maj. Johnson uses in his department is the Sr-90 eye applicator. Maj. Seibert stated that his instrument is used exclusively for treatment of diseases of the eye; that approximately 30 patients are treated per year; and, that each patient receives three 30-second treatments.

DISPOSAL

Summary

27. The licensee disposes of licensed material by either release to the sanitary sewage system or by shipment to an authorized disposal agency. A review of the disposal records revealed that all quantities of licensed material released to the sanitary sewage system were below the maximum quantities listed in 10 CFR 20.303.

Sanitary Sewage System

28. Capt. Kinnamon stated that the Fitzsimons General Hospital complex maintains its own sewage treatment plant. According to Capt. Kinnamon, the minimum recorded flow through this treatment plant is 475,000 gallons per twenty-four hours. Capt. Kinnamon and Maj. DeNardo stated that the daily quantity of a specific isotope released to the sanitary sewage system is less than the quantity listed in 10 CFR 20, Appendix C; a review of the disposal records confirmed this. (It should be noted that 10 CFR 20.303(b)(2) limits the quantity which may be released to the sanitary system to 10 times the quantity listed in 10 CFR 20, Appendix C). Capt. Kinnamon and Maj. DeNardo stated that all licensed material released to the sanitary sewage system was either readily soluble or easily dispersible in water; that the sink was allowed to run for eight hours during the disposal; and, that the material being disposed of was fed slowly into the running steam of water. Capt. Kinnamon and Maj. DeNardo stated that the USAMRNL is allowed to dispose of licensed materials to the sanitary sewage system on Mondays, Wednesdays, and Thursdays of each week and that the Radioisotope Laboratory, FGH, disposes of material to the sanitary sewage system on Tuesdays and Fridays. A review of the disposal records revealed that Maj. DeNardo allows the majority of his licensed materials to decay a minimum of ten half-lives, surveys the material to determine that there is no detectable

radioactivity and then releases it to the sink: Maj. DeNardo considers that material is no longer licensed material. A review of the disposal records indicates that during the period February 15, 1963 to April 26, 1965, the subject licensee has released less than 1 curie of licensed material to the sanitary sewage system.

Solid Disposal

29. It was observed that each laboratory where licensed materials are used or stored is equipped with a stainless steel, plastic-lined waste can. Capt. Kinnamon and Maj. DeNardo stated that all materials which come in contact with licensed materials are placed in these cans. These materials include syringes, bench top covering papers, mops, rubber gloves, etc. Capt. Kinnamon stated that all solid radioactive waste generated is transferred to him in sealed plastic bags and that these wastes are stored in a locked, walk-in freezer which is located behind the U. MDNL; Capt. Kinnamon stated that he possesses the only key to this freezer. Capt. Kinnamon said that all animal carcasses, excreta, etc. are also placed in plastic bags and placed in the freezer. Capt. Kinnamon said that once each quarter he contacts Edgewood Arsenal and informs them of the exact quantity of radioactive material which he possesses and wishes to dispose of. Capt. Kinnamon stated that Edgewood Arsenal ships him the 55-gallon drums for packaging the material and gives him detailed instructions as to the method of disposal. Capt. Kinnamon stated that Edgewood Arsenal instructs him to ship the barrels in refrigerated common-carriers to either the Edgewood Arsenal for further shipment to an authorized land disposal agency or directly to NRTS, Idaho Falls, Idaho, for land burial by Phillips Petroleum Company. It was observed that the records of solid licensed material disposal list the quantity of each isotope disposed of, the date of shipment (four per year), and the number of barrels per shipment (10 to 12).

LEAK TESTS

30. The licensee's inventory records revealed that the subject licensee possesses one [redacted]

Siebert stated that the sealed source is leak tested by Maj. Johnson who uses a Tracerlab leak test kit and follows the instructions contained in this kit. Maj. Siebert stated that after wiping the source, the leak test kit is transmitted to Tracerlab for evaluation. A review of the leak test records showed that the sealed source had been wiped and the wipe transmitted to Tracerlab for evaluation

on April 11 and October 5, 1963, April 2 and October 1, 1964. The results of the evaluation of these wipe tests were reported by Tracerlab as showing <0.001 uc of removable contamination. The leak test records stated that Maj. Johnson performed the last leak test on the source on April 1, 1965, and transmitted the wipe to Tracerlab for evaluation; Maj. Siebert said that the results of this leak test had not been received as of April 28, 1965.

SURVEYS

Summary

31. External radiation and contamination surveys are conducted in all rooms and areas where licensed materials are used or stored weekly. Records of these surveys are maintained.

External Radiation

32. Maj. DeNardo and Capt. Kinnamon stated that all rooms or areas where licensed materials are used or stored are surveyed for external radiation weekly or whenever new quantities of material are received. It was observed that records of these surveys are maintained; a review of these records revealed that all external radiation levels in unrestricted areas were less than 0.6 mr/hr. Maj. DeNardo and Capt. Kinnamon stated that these surveys are routinely conducted with a Spinco "Beta-Gamma meter", range 0-20 mr/hr. It was observed that this instrument is an Army-issue, Geiger-Mueller counter. It was observed that the licensee possessed numerous other portable radiation survey instruments. Capt. Kinnamon stated that the instruments are maintained and repaired by Electronic Consultants, Denver Research Institute, Denver, Colorado. Capt. Kinnamon said that he uses radium sources to calibrate the instruments.

Contamination

33. All rooms or areas where licensed materials are used or stored are surveyed for removable contamination weekly and immediately following the use of licensed material. In rooms or areas where C-14 or tritium labeled compounds are used or stored, the smears are evaluated in a Packard Tri-Carb liquid scintillation counter. Capt. Kinnamon stated that he has experimented with this counting method by placing known quantities of C-14 or tritium on smears, and then placing the smear directly in the counting fluid and has found that the counting sensitivity for tritium is approximately 2 percent and the counting sensitivity for C-14 is approximately 12 percent. The smears from areas where isotopes other than C-14 or

tritium are utilized, are counted in a gas-flow proportional counter. Capt. Kinnamon stated that they do not have a maximum level of acceptable contamination but that any area where removable contamination in excess of background is noted is decontaminated. A review of the contamination survey records revealed that an area is resmeared after decontamination and that each area is decontaminated until such time as the follow-up smears are background.

Airborne

34. Capt. Kinnamon and Maj. DeNardo stated that all licensed materials are remotely pipetted in vented hoods. It was observed that these hoods are equipped with absolute filters. Capt. Kinnamon and Maj. DeNardo stated that an air sample is collected immediately above the vent from the hood once every six months during the use of materials in the hood. The results of these air samples showed no concentration in excess of background. Maj. DeNardo stated that air samples have not been taken in the room where Xenon-133 is used for pulmonary function studies. Maj. DeNardo said that the sperometer in which the Xenon-133 is contained is a closed system and that the chance of leakage is minimal. Maj. DeNardo said that frequent external radiation surveys are taken of the sperometer to assure that the radiation levels are decreasing in a manner consistent with the normal half-life of Xenon-133 and that he assumes that any more rapid decrease would indicate a leak in the system. Maj. DeNardo stated that his surveys have demonstrated that the system is not leaking.

PERSONNEL MONITORING

Film Badges and Dosimeters

36. According to Capt. Kinnamon and Maj. DeNardo, each person who works in rooms or areas where licensed material or radiation-producing machines are used or stored is issued a film badge and a self-reading dosimeter. Film badges are supplied and processed by Lexington Signal Depot, Lexington, Kentucky, on a monthly basis. Dosimeters are read and recorded daily and are recharged weekly. It was observed that film badge readings are maintained on the processors report, Form AEC-[illegible] and Form DD 1141. Form AEC-4 has been completed on all individuals who have been issued film badges. Dosimeter readings are maintained. A review of the film badge records showed that during the period February 1, 1963, to April 1, 1964, the maximum

recorded monthly exposure was 120 mr gamma or X plus zero beta. Approximately 95 percent of all badges were reported as zero. The Lexington Signal Depot apparently does not have a minimum level of sensitivity because it was observed that readings of 1 and 2 mr were reported.

Bioassay

37. Capt. Kinnamon stated that bioassays are performed only when personnel are working with significant (greater than 1 mc) quantities of tritium. Capt. Kinnamon stated that significant quantities of tritium had not been utilized since the summer of 1963. During the summer of 1963, approximately 50-75 volunteers each received 2 mc of tritium under the auspices of Byproduct Material License No. 5-46-12. The persons administering and working with this tritium were subjected to weekly urinalyses; the results of these bioassays were all reported as negative for tritium. Maj. DeNardo stated that he frequently scans the thyroids of his employees and that all of his employees have been counted in the Colorado State Health Department whole-body counter at least three times. Maj. DeNardo stated that no radioactive materials have been noted in any of his employees.

POSTING AND LABELING

38. It was observed that all rooms and areas where licensed materials were used or stored were posted in accordance with the provisions of 10 CFR 20.203(e)(1). It was observed that all containers in which licensed materials were stored were labeled in accordance with the provisions of 10 CFR 20.203(f)(1) and (f)(4). A review of the external radiation survey records (par. 32) revealed that there were no rooms or areas which required the posting specified in 10 CFR 20.203(b) or (c).

PERSONNEL INSTRUCTIONS

39. It was observed that Form AEC-3 and the standard operating procedures for use of radioactive materials were posted at the entrance to each room or area where licensed materials were used or stored. The procedures [illegible] each person working in areas where licensed materials are used or stored [illegible] signed statement to the effect, that the individual had received instructions in 10 CFR 20 and the procedures for working with radioactive materials. Capt. Kinnamon and Maj. DeNardo stated that janitorial personnel are not allowed in areas where licensed materials are used or stored but that these areas are cleaned by the personnel routinely working in the area.

40. Maj. DeNardo stated, and it was observed from the use records, that there has been only one therapeutic dosage of radioactive materials in excess of 30 mc since February, 1963. This dosage was 40 mc of I-131 which was administered to a patient who was suffering from carcinoma of the thyroid. Maj. DeNardo stated that all patients who receive therapeutic doses of radioactive materials are housed in private rooms. Maj. DeNardo stated that special instructions are written for each of these patients; that Maj. Pearce also gives detailed verbal instructions to the ward nurses in the proper care of patients receiving therapeutic quantities of radioactive materials, and that Maj. Pearce visits the patients at least once per day. Maj. DeNardo stated that the patient receiving the 40 mc of I-131 was surveyed after the administration of the material and a 2 mr/hr perimeter was established around the patient. Maj. DeNardo stated that any patient receiving a therapeutic quantity of radioactive materials, regardless of the quantity, is allowed to receive visitors for only 15 minutes during the first 48 hours after administration of the isotope and that the visitor is not allowed to approach closer than 4 feet from the patient. Maj. DeNardo stated that contamination surveys are conducted of the rooms, lavatory facilities and bed clothes of all patients receiving therapeutic quantities of radioactive materials and if any contamination is noted the rooms are cleaned and the contaminated bed linen is treated as solid radioactive waste. Maj. DeNardo stated that records of the aforementioned surveys are maintained in the individual patient files. Maj. DeNardo stated that the urine from patients receiving therapeutic quantities of I-131 is collected for the first 48 hours after administration of the isotope and the I-131 is allowed to decay to background levels prior to disposal of the urine.

DISCUSSION WITH MANAGEMENT

41. The discrepancies noted during the course of the inspection were discussed with [redacted]

[redacted] discrepancies are contained in paragraphs 18 and 22 of this report. The discrepancies were also discussed with Col. Overholt, Col. Canham, Maj. Siebert, Maj. DeNardo, and Capt. Kinnamon.