Form AEC-441
37 (4-58)

UNITED STATES ATOMIC ENERGY COMMISSION

# COMPLIANCE INSPECTION REPORT

C(.)

1. Name and address of licensee

Department of the Navy
U. S. Naval Hospital
Radioisotope Laboratory
St. Albans, New York

2. Date of inspection

12/29/65 and 1/28/66

3. Type of inspection

Reinspection

4. 10 CFR Part(s) applicable

20 and 30

5. License number(s), issue and expiration dates, scope and conditions (including amendments)

| License Number | Type | Date of Issue | Date of Expiration |
|---|---|---|---|
| 32-76-6 | Reinspection | 8/4/64 | 8/31/66 |

Amend. 1 (Amends license in its entirety)

6. Inspection findings (and items of noncompliance)

The inspection of the U. S. Naval Hospital at St. Albans, New York on 12/29/65 was a routine re-inspection, where the current status regarding the items of noncompliance resulting from the previous inspection in December 1963 was reviewed. On 1/28/66, the inspector re-visited the naval hospital for the specific purpose of examining the film badge program conducted there in conjunction with the Bureau of Medicine and Surgery of the Department of the Navy.

The only items of noncompliance noted or observed during the course of the inspection on 12/29/65 are as set out below:

1. License Condition 13D

- The Sr-90 eye applicator and two Co-60 sources were not always leak tested at intervals of six months or less. (See paragraph 27 of report details)

2. 10 CFR 20.301

- Disposal of waste materials contaminated with readily detectable amounts of radioactive materials has been made to the general trash handling system. (See paragraphs 26 and 40 of report details.)

7. Date of last previous inspection

12/24/63

8. Is "Company Confidential" information contained in this report? Yes ☐ No ☒
(Specify page(s) and paragraph(s))

DISTRIBUTION:

Orig. - CO:HQS
1 cy. - SLR
1 cy. - DHL
2 cys - CO:I

Charles F. Stearns
(Inspector)

Approved by: Richard C. Gilbert, Radiation Specialist, Region I, Division of Compliance
(Operations office)

February 24, 1966
(Date report prepared)

If additional space is required for any numbered item above, the continuation may be extended to the reverse of this form using foot to head format, leaving sufficient margin at top for binding, identifying each item by number and noting "Continued" on the face of form under appropriate item.

16—75914-2 U. S. GOVERNMENT PRINTING OFFICE

RECOMMENDATIONS SHOULD BE SET FORTH IN A SEPARATE COVERING MEMORANDUM



D/2

PART 30 INSPECTION

DEPARTMENT OF THE NAVY
U. S. Naval Hospital
Radioisotope Laboratory
St. Albans, New York

Dates of Inspection: December 29, 1965, January 28, 1966, Announced

Persons Accompanying Inspector:

None

Persons Contacted:

Dr. Walter F. Hansen, Captain, USN, Chief of Radiology (12/29/65, 1/28/66)
Dr. Mario Rosa-Garcia, RSO (12/29/65, 1/28/66)
David Shaw, Chief HMC (12/29/65 only)
James Gatewood, HM-3 (12/29/65 only)
Captain Ralph Faucett, Executive Officer of the Naval Hospital (12/29/65 only)
William Penman, HM-2 (1/28/66 only)
Norman Olsen, HM-3 (1/28/66 only)

DETAILS

Background

9. An inspection of this license on 12/24/63 resulted in a 417. None of the items of noncompliance resulting from that inspection were found to be recurring or uncorrected in the current inspection, except for the citation for failure to leak test sealed sources at intervals of 6 months or less which was found to be recurring (See paragraph 20). In regard to items 1a and 2a of the enforcement letter resulting from the last inspection, the licensee currently performs surveys of radioactive material before releasing to the sanitary sewerage system, and maintains records of these disposals. All of the other items in this letter (viz. 1b, 1c, 2b, 3a, and 3b) refer to a spill of Strontium-90-Ytterium-90 which occurred prior to the last inspection. The licensee has repeatedly cleaned the area where the spill occurred, has performed periodic direct reading surveys of the area, and maintains records of the results of these surveys. (See paragraph 16) (The licensee no longer possesses any Strontium-90-Ytterium-90; the contaminated waste accumulated from this area has been transferred to Radiological Services, Inc.).

10. In addition to the items of noncompliance for which the licensee was cited, the enforcement letter criticized the film badge program at this hospital and requested clarifying information on this

program. In particular, the letter questioned whether film badges and calibration films were always of the same emulsion lot, and whether the same procedures were used in developing the film worn by personnel and calibration films. The licensee's response stated that calibration curves are made from the same type film and emulsion lot number, but the inspector's examination of the film badge program on 1/28/66 did not indicate that new calibration curves actually have been provided for each new emulsion lot of film. (The most recent calibration curves available on 1/28/66 were dated July 1965, and the emulsion lot number was not specified on these curves.) For more details on the U. S. Navy film badge program, see the "Personnel Monitoring" ~~and "Inspector's Evalnation~~" sections of the report details.

11. At the time of the last inspection, the RSO was Commander Pischnotte, but he was replaced less than 6 months prior to the current inspection, by Dr. Rosa-Garcia. Also, most of the other individuals involved in the use of isotopes at the time of the last inspection had been replaced prior to the current inspection. However, an exception to this is Captain Walter F. Hansen, Chief of Radiology, and head of the Radioisotope Laboratory who was transferred to St. Albans Hospital a few months prior to the last inspection, and is still at St. Albans at the present time. The chain of command for the current staff of personnel involved with isotopes is as follows: Technicians report to David Shaw, Chief HMC. Chief Shaw, as well as doctors at the hospital are responsible to Dr. Rosa-Garcia, as far as the use of isotopes goes. Rosa-Garcia reports to Captain Hansen, who in turn is responsible to the head of the Hospital, Captain John Albrittin, and his executive officer, Captain Ralph Faucett. In addition to being responsible for radiation safety, Dr. Rosa-Garcia actively participates in the use of isotopes. Captain Hansen stated that he had no longer directly participated in the use of isotopes since Rosa-Garcia arrived at the hospital.

Facilities and Uses

12. The rather extensive and completely equipped laboratory facilities for the use of isotopes are the same as those described in previous reports.

13. In general, the extent to which isotopes are currently being used at St. Albans Naval Hospital is appreciably less than at the time of the previous inspection. One reason for this diminished use of isotopes, according to Rosa-Garcia, is the current tendency at this hospital to discourage the choice of an isotope technique for a given application, whenever an acceptable alternative method is available which does not involve the use of isotopes. For example, Rosa-Garcia stated that the written request for authorization to use isotope therapy, which he is required to submit to the radioisotope committee, must include an explanation of why alternative techniques would not be satisfactory for this particular patient. Also the isotopes may be used only by or under the supervision of individuals designated by the radioisotope committee, as required.

by License Condition 12.

14. From review of use records by the inspector and statements by Shaw, Rosa-Garcia, and Hansen, the scope of the current isotope program is indicated by the following. Since Rosa Garcia arrived in 8/65, I-131 has been used in the treatment of carcinoma twice, for cardiac condition once, and only five times for the treatment of hyperthyroid conditions, even though the frequency of hyperthyroid treatments have previously been on the order of several per month. Similarly, Rosa-Garcia stated that he has had no request for therapy using colloidal gold, colloidal P-32, or soluble P-32 (or any other therapy), even though each of these had been performed on one or more occasions in the year 1964 prior to his arrival. The current frequency of uses other than therapeutic is indicated by the list below for the month of November 1965, from the licensee's records.

| Radiomedicine | Application | Total number of Patients in November of 1965 |
|---|---|---|
| T-3 | Thyroid diagnosis (in vitro) | 59 |
| I-131 as NaI | Thyroid diagnosis (in vivo)* | |
| " | 2 hour uptake | 52 |
| " | 4 hour uptake | 50 |
| " | 24 hour uptake | 52 |
| " | Scinti & Photo scans ** | 102 |
| " | Polaroid Scans ** | 51 |
| " | Conversion Ratio | 48 |
| " | Saliva PBI | 47 |
| I-131 as IHSA | Blood Volume | 13 |
| I-131 as Hipputope | Renograms | 4 |
| Hg-203 | Renoscans | 5 |
| Au-198 | Liver Scans | 14 |
| Hg-203 | Brain Scans | 16 |
| I-131 | Lung Scans | 2 |
| Co-60 as Vit. B-12 | Schilling Test | 4 |
| I-131 as Triolein | Fat Studies | 3 |
| I-131 as Oleic Acid | Fat Studies | 2 |

* All the invivo thyroid tests are run following a single administration of 50 uc I-131 as NaI, according to Rosa-Garcia.

**"Photo Scans" and "Polaroid Scans" do not represent actual additional scans run on the patient, but instead merely photographic records of the scan on X-ray film and polaroid film respectively.

15. As indicated above, there are several technicians who handle isotopes under the supervision of Chief Shaw. James Gatewood, HM-3 has been at the St. Albans Naval Hospital since June 6, 1964. The handling of isotopes by Gatewood consists primarily of the performance of blood volume determinations and renograms. He is also responsible for the routine duties connected with radiological safety, such as carrying out direct reading surveys, and the processing of film badges. Joseph Carney specializes in thyroid work, which includes thyroid scanning and assisting Dr. Rosa-Garcia in thyroid therapy. Norman Olsen does the routine work connected with all scanning, except for thyroid scanning. William Penman, who

recently arrived at this hospital, carries out special diagnostic tests, such as fat absorption studies, etc. Chief Shaw and all the technicians under him had completed the six month training in isotopes given by the Navy at Bethesda, except for Olsen who took the course at San Diego, which is patterned after the one at Bethesda, according to Gatewood.

Radiological Safety Precautions and Procedures

16. A "Radiation Safety Guide" was drawn up by Captain Hansen and M. C. Posipanka, HMC in April 1964. (Posipanka, who is no longer stationed at this Naval Hospital, had been the counterpart of Chief Shaw; she was also directly responsible to the RSO.) A copy of this "Radiation Safety Guide" is included in the license folder. Inspector review of this guide and license application dated 5/5/64 indicated that byproduct material is possessed and used in accordance with these documents, as required by License Condition 18.

17. Separate written instructions have also been drawn up for each treatment involving the administration of Au-198, P-32, I-131, and so on. These include instructions regarding the hazard from radiation levels near the patient, precautions necessary in handling excretions, and so on. Copies of these instructions have been attached to the inspection notes. Some of the general precautions taken were stated by Rosa-Garcia to be as follows: No one is allowed in the patient's room, except personnel necessary for care of the patient. Linen is monitored, and held for decay if necessary. The 2 mr/hr line is marked on the floor of the patient's room with tape, as determined by direct reading surveys using a GM survey meter. (Records of such surveys were reviewed by the inspector.) Personnel required to be in the patient's room, such as nurses, wear self-reading pocket dosimeters. Specific instructions pertaining to an individual case are written on the patient's chart.

18. Rosa-Garcia stated that he follows a rule requiring that each patient to whom 30 mc or more have been administered will remain hospitalized until only 10 mc or less remain in the patient, even though the official requirements, according to the Radiation Safety Committee and according to License Condition 16, is that the patient remain hospitalized until 30 mc or less remain. License Condition 15 states that patients containing Co-60 and/or Ir-192 shall remain hospitalized until the implants are removed. Captain Hansen stated that neither Co-60 or Ir-192 implants have been used since before the last inspection, and he knows of no case when Co-60 implants have ever been used. License Condition 17 requires that sealed sources containing byproduct material shall not be opened. Hansen and Rosa-Garcia stated that sealed calibration sources are never tampered with in any way, and sealed Co-60 sources for therapy are not used at all.

19. Rosa-Garcia stated that the policy at St. Albans Hospital is to keep the activity of doses administered to patients as low as

practicable. He stated that the dose for treatment of hyperthyroid conditions has usually been 4 - 6 mc, with a maximum of 8 mc. The dose of I-131 administered to each of the two patients treated by Rosa-Garcia for carcinoma of the thyroid was 100 mc. In the case of Au-198, a dose of 100 mc was administered to a patient on 3/17/64 and 80 mc was given to another patient on 4/13/64. In a case where P-32 as sodium phospate was used in the treatment of bone metastases, 1.5 mc was administered intravenously each day for six consecutive days. In a case where P-32 as colloidal chromic phospate was introduced into the pleural cavity of a patient, the dose was 10 mc. The largest dose of by-product material noted by the inspector to be used for diagnostic purposes was 700 uc Hg-203 for brain scans. (For renal scans, 100 - 150 uc Hg-203 is used.) According to Rosa-Garcia, Hg-197 will henceforth be used instead of Hg-203 for brain and renal scans.

20. Rosa-Garcia stated that Hg-203 is injected into the patient using a disposable syringe. He stated that the process requires only 10 seconds or less, and no exposure has been noted on a self-reading dosimeter (or film badges) worn on the chest pocket following this procedure. Rosa-Garcia stated that this technique is in line with the instructions give to him at the Bethesda Naval Training School, and since leaving this school he has not given any further consideration to an estimation of the dose to which the hand might be exposed in such an administration. The evaluation of the Naval Training School of this technique as being permissible is supported by the inspector's approximate calculation of the exposure to the hands, at least to the extent that it indicates the exposure per calendar quarter should be much less than the limit for the hands in part 20. (This calculation was made using assumptions for time and frequency which are more conservative than the figures for these two parameters obtained from the licensee's records and statements by Rosa-Garcia, as follows: Assuming more than twice the number of injections per quarter than would be derived from the table in paragraph 14, where 16 injections are listed for November 1965; at 30 seconds per injection, compared to Rosa-Garcia's estimate of 10 seconds or less (v.s.); and source-to-hand distance of ½ cm, the total exposure for a calendar quarter would be approximately 3 R.) After discussing this question of exposure to the hand from injecting Hg-203 with the inspector, Rosa-Garcia stated that he would give serious consideration to the use of a wrist badge to estimate the exposure in a future administration such as this.

21. Rosa-Garcia stated that colloidal P-32 and colloidal gold are introduced into cavities of patients by the standard technique whereby a saline solution forces the colloidal isotope by a gravitational feed through a tubing connected to a syringe which had previously been placed properly into the patient. Therapeutic doses of I-131 in the liquid form are administered orally by means of a straw placed in the original bottle in which the radiomedicine was shipped to the licensee.

Instrumentation and Surveys

22. According to Gatewood, a GM survey meter with the Navy designation

ANPDR-27F is used for direct reading surveys. The licensee also possesses many other instruments for surveying and laboratory counting. These are listed on sheets no. 1 and 2 attached to the license application dated 5/5/64. Rosa-Garcia stated that most of these counting instruments are not used; often an instrument would be procured by some predecessor, and then never used after that individual left the hospital. Several calibration sources are available for checking these instruments.

23. Gatewood, Isotope Technician, conducts direct reading surveys, around areas where isotopes are stored and used on a weekly basis. These surveys include readings taken at many specified points, and the results of these readings are recorded on data sheets with diagrams on which these points are designated by numbers. The inspector reviewed records of the results of some of these surveys. For the survey dated 12/27/65, for example, the inspector noted that for most of the readings other than those taken near stored radioactive material or waste were between 0.02 and 0.06 mr/hr, including all readings in unrestricted areas. An exception to this was the hood where a spill of Sr-90-Y-90 had occurred prior to the last inspection, for which 3 - 5 mr/hr beta was recorded. These reports of routine surveys also include results of swipes taken at some of the points where direct reading surveys are made. In the case of the report of one of the surveys conducted in October 1965, the order of magnitude of all swipe results recorded was $10^{-4}$ or $10^{-5}$ uc; the areas swiped included the hood where the readings of 3 - 5 mr/hr beta was obtained.

24. The inspector conducted a direct reading survey of the isotope lab and the area where waste is stored. According to Rosa-Garcia, these areas are restricted to personnel authorized to handle isotopes, and are kept locked at night. In most areas, no significant reading above background (i.e. less than 0.05 mr/hr) was obtained with AEC No. 5573 GM survey meter, with the following exceptions: (All readings obtained with this AEC #5573 GM meter (end window) with shield off unless otherwise noted) -

Approximately 1 mr/hr maximum at the surface of lead bricks behind which byproduct material is stored in a refrigerator.

Approximately 0.7 mr/hr maximum at the closed door of the refrigerator.

0.2 - 0.3 mr/hr at the table next to the refrigerator.

Approximately 20 mr/hr near a large plastic bottle containing urine being held for decay.

Less than 0.5 mr/hr at the top of the garbage can containing solid waste, with the top removed, and approximately 1 mr/hr at the open top of another such can.

Approximately 0.3 mr/hr at the surface of the lead brick wall in front of these cans (this lead brick wall was approximately 7 bricks high.)

0.2 - 0.3 mr/hr maximum at surface at floor in front of hood where Strontium-90-Ytterium-90 spill had occurred prior to the last inspection.

More than 20 mr/hr at one spot on bottom surface of this hood. (Reading taken with shield off.) Using AEC #5655 June survey meter, the radiation level at this spot was found to be approximately 14 mr/hr beta reading, and 1 mr/hr gamma reading.

Waste Disposal

25. Liquid waste is poured into sinks in the hot lab, which are connected to a large metal hold-up tank. Since the licensee was cited following the last inspection for failure to conduct surveys before releasing liquid from this tank to the sanitary sewer, the licensee has been following a practice of counting 1 ml samples from this liquid waste to determine the value of concentrations in uc/ml and maintaining a written record of the results along with the date the determination was made. Rosa-Garcia stated that the value of concentrations for I-131 listed in Table I, Appendix B, of Part 20 ($6 \times 10^{-5}$ uc/ml) has been used as the criterion for release, since this figure is lower than the values of concentrations listed in Table I for all other isotopes that are ever disposed into the sinks at this hospital. Gatewood stated that he measures these concentrations by counting a representative 1 ml sample in a laboratory counter with a GM tube detector. He briefly explained the calculations involved in this determination. The inspector reviewed written records of these results. These records showed, for example, the most recent release from this tank, on October 25, 1965, when it contained 450 gallons of liquid at a concentration of $2.75 \times 10^{-5}$ uc/ml.

26. Solid waste is stored for decay in two large covered metal trash cans in a room at one end of the isotope labs complex. The stored waste is labeled with kind, quantity, and date. According to Rosa-Garcia and Hansen, direct reading surveys are conducted periodically on this waste held for decay until it is finally disposed along with other hospital trash after the radiation level has decreased to what they consider an acceptable value. (v.i. and paragraph 34) Written records of these surveys include the date of survey, the isotopes included in the waste, the instruments used for surveying, the maximum radiation level found at the surface, and the average radiation level found at the surface. The most recent transfer of solid waste to general hospital trash was on November 30, 1965. The inspector's review of the survey records indicated that the maximum radiation level at the surface of this waste was 3.0 mr/hr, and the average radiation level at the surface was 1.62 mr/hr, using a GM survey meter with the U. S. Navy designation ANPDR-27F.

Leak Tests

27. License Condition 13C states that each sealed source containing

byproduct material, other than tritium, with a half-life greater than 30 days, in any form other than gas, shall be tested for leakage at intervals not to exceed six months. Following the last inspection, the licensee was cited for failure to leak test either the Strontium-90 eye applicator or the two sealed Co-60 sources at intervals of six months or less. At the time of the current inspection, the licensee still possessed the same Sr-90 eye applicator, and the same two sealed Co-60 sources, which are in the form of wires. (Rosa-Garcia stated that the Sr-90 eye applicator is used at a frequency much lower than once a month. He and Captain Hansen concurred in a statement that the sealed Co-60 sources have not been used since the last inspection, and Captain Hansen further stated that he had no knowledge of them ever being used.) Both the Sr-90 source and the Co-60 sources were tested for leakage on the date of the last inspection (12/24/63). Since the last inspection, the Sr-90 source has been leak tested at approximately 6 month intervals except that the most recent test was 6/9/65. In the case of the Co-60 sources, the first leak test subsequent to the last inspection was dated 2/17/64; and the next one more than nine months later on 11/30/64; and finally the most recent test was conducted less than six months later on 5/21/65. Before the inspector left the hospital on the date of inspection, he was shown paper work on which had just been drawn up by Chief Davis for leak tests to be conducted on both the Co-60 sources and the Sr-90 sources. Leak tests have been performed by the Radium Chemical Company, except for leak tests of the Sr-90 sources by Tracerlab. The inspector's review of records of leak tests showed that all results were background $\pm$ less than 2 sigma.

Posting and Labeling

28. Rosa-Garcia stated that he knew of no additional signs posted since the last inspection. Signs noted by the inspector to be posted in the Isotope Lab area were noted to include "Caution - Radioactive Material", "Caution - Radiation Area", and "Caution - High Radiation Area" signs. Stored byproduct material was noted to be labeled with "Caution - Radioactive Material" and the kind, quantity, and date of assay. All signs had the standard symbol and colors. A Form AEC-3 is posted near the entrance to the radioisotope section of the hospital.

Procurement

29. Rosa-Garcia stated that byproduct material is procured from Squibb and Abbott, as per License Condition 14. Orders for byproduct material must be signed by Rosa-Garcia and then counter-signed by Captain Hansen; they are the only two individuals authorized to order radioactive material. When isotopes are received, they are delivered to the receiving station first; they are monitored outside, and then brought directly to the refrigerator in the Isotope Lab where they are stored behind leak bricks. The inspector reviewed records of receipt. These records included notations of the dates when residual quantities were transferred to the "cave" where waste is held for decay.

Personnel Monitoring

30. Film badges are processed at this hospital for the use of all personnel at the hospital who are considered likely to be exposed to radiation, as well as for personnel of many other military facilities. The processing of these film badges, including maintaining records of results, is one of the responsibilities of James Gatewood, Isotope Technician. Exposure results are recorded on forms equivalent to Form AEC-5. Exposures are reported on a monthly basis. The inspector reviewed exposure records for the period subsequent to the last inspection. No quarterly exposures greater than 300 mrem were noted for any personnel using isotopes. The highest exposure for any one month noted by the inspector was 110 mrem for [(b)(6)] [(b)(6)]

31. Bendix direct readings pocket dosimeters are available for use. Rosa-Garcia stated that these are worn by the personnel likely to receive an exposure in the course of the therapeutic use of isotopes.

32. On 1/28/66, the inspector returned to the St. Albans Naval Hospital to obtain additional information regarding the film monitoring program carried on there in conjunction with Bu Med. Shortly after the inspector's original visit there, James Gatewood was transferred and William Penman, HM-2, was selected to replace him. (See paragraph 15)

33. Penman stated that he attempts to run this film badge program according to instructions given by Bu Med in NAVMED P-5055, as supplemented by "Instructions for the Interpretation of Calibrated Curves", which is attached as Exhibit A. According to Penman, he knows of no deviation from these instructions other than the fact that film developing is not done at the specified temperature of 68°F. Instead, an attempt is made to cool the processing solutions to as near 68°F as possible by running tap water in the sink in which the processing tanks are used. He stated that processing is usually carried out at a temperature in the range of 70° - 75°F, and to compensate for this higher temperature, the developing time is decreased below the specified 5 minutes (Item 6, Exhibit A) by an amount indicated by a correction chart furnished by one of his predecessors. (The arrangement for cooling is such that the level of the cooling water in the sink is permitted to rise to a level only 5 inches above the bottom of the processing tanks, whereas the walls of the tanks are approximately 21" high and they are filled with solutions to within less than 1 inch from the top.) Penman stated his intention of trying several measures to increase efficiency of cooling, after discussing this problem with inspector.

34. Penman stated that fresh solutions are made up for the batch of films processed each month. Approximately 100 films are processed each month (over the course of a week), of which a little more than half are films from badges worn by hospital personnel. Penman stated that a control film of the same type and emulsion number

Ex. 6

is processed on each rack along with 7 films from film badges. Continuous gentle agitation is provided using large paddles during development. An average of 5 density readings under the shielded portion of the film and 5 readings under the open area are taken relative to the control developed on the same rack. One Weston Model 273 densitometer is used, re-zeroing the instrument immediately before reading each film. The densitometer is checked using density wedges supplied by Bu Med; Penman stated that the agreement is "very good". The exposures corresponding to the density readings obtained are estimated as per instructions on Exhibit A, using calibration curves attached as Exhibits B, C, D, & E. These curves are dated July 1965, and Penman stated that they are the most recent ones supplied to him. As indicated on these curves, Type 556 film is now being used.

35. According to both Penman and Hansen, Bu Med has never provided any exposed calibration films to be developed along with films worn by personnel as a check on the validity of the results obtained when density readings from personnel films are applied to the calibration curves supplied by Bu Med. (Although Penman concurred with the desirability of such checks, Captain Hansen could not understand, at first, why the density wedges supplied by Bu Med did not serve the same purpose.)

36. Penman stated that he was not aware of any check by Bu Med on the manner in which the film badge program was being conducted at the St. Albans Naval Hospital. Neither Penman nor Hansen could give any information on possible improvements in the Navy's procedures for storage and distribution of film designed to ensure that the film delivered to field installations is of the correct emulsion number and fresh. At St. Albans, the "Oak Ridge type" film badges, with one filter, (1 gm cadmium) is still being used.

37. In regard to the reporting of exposures, Hansen stated that the current procedure is to notify the Commission, as well as Bu Med, of film badge exposures exceeding limits specified in Part 20. Also according to Penman, the current procedure for distribution of records of routine film badge exposures is as follows: Annual reports are transmitted to Bu Med, with a copy kept on file at the field installation. In addition, when an individual is transferred to a new duty station, a completed copy of DD-1141 (Exhibit F) is sent to the new duty station with the individual.

Management Discussion

38. The items of noncompliance were discussed with Captain Hansen and Captain Ralph Faucett, Executive Officer. (Captain Faucett is second in Command in the U. S. Naval Hospital under Captain J. Albrittin, who was not available.) Both Hansen and Faucett indicated willingness to comply with the regulations and to take appropriate corrective action.

39. As stated above in the section on leak tests, paper work for the overdue leak tests on Sr-90 and Co-60 sources had already been

drawn up before the end of the inspection, and both Hansen and Faucett stated their intention to ensure that leak tests be conducted henceforth at intervals of not more than six months.

40. In regard to the unauthorized transfers of waste to hospital trash after a direct reading survey revealed a radiation level of many times background near the surface of the waste, Captain Hansen stated that he had considered the radiation levels that had been measured to be low enough to warrant disposal to trash, especially since it was suspected that radium stored in another part of the same room might have contributed to the survey meter readings. However, he stated that no attempt was made to confirm this by taking another reading on the waste after moving it away from the radium before disposing of it. (Actually, the inspector's interpretation of remarks by both Hansen and Rosa-Garcia during the inspection was that both of them judged a reading of 2 mr/hr or so to be low enough to justify the disposal to general trash.) Hansen stated during the management discussion that henceforth waste will either be held until a survey meter gives essentially a background reading, or else transfer it to an authorized waste disposal service.

# INSTRUCTIONS FOR THE INTERPRETATION OF CALIBRATION CURVES

1. The gamma calibration curve for Type 556 film was made with Cobalt-60. It will be noted that there is no open window effect as occurs with radium calibration. In the case of mixed beta and gamma exposures, beta exposure is obtained by the difference between the CW and the CW after entering this difference in the beta curve supplied. Beta dose is recorded following the instructions of Item # 9 on the back of DD Form 1141 (Feb 1964).

2. Cobalt-60 calibration curves made with a single film packet in the film badge holder show a 15 to 20 percent increase in density compared to calibrations made with two packets in the holder such as when neutron film is the rear packet. This is caused by the rear film absorption of backscattering from the rear cadmium shield. All film packets are about 150 mgm/cm$^2$ and hence have the same backscatter absorption. The new Type 556 calibration curves are made with the double loaded packet. The front film packet is used for gamma exposure evaluation. All film badges should contain a rear "back-up" film packet. This can be either a neutron or any film packet. If other than neutron film, it should be given a distinctive mark and left in the badge for re-use. Exposure dose will be over-estimated by 15 to 20 percent without the rear "back-up" film packet. A rear "back-up" film is desirable, but not necessary for beta and x-ray interpretation.

3. The beta calibration was made placing the Type 556 packet on a Uranium-238 plaque separated by 17 mgm/cm$^2$ of plastic.

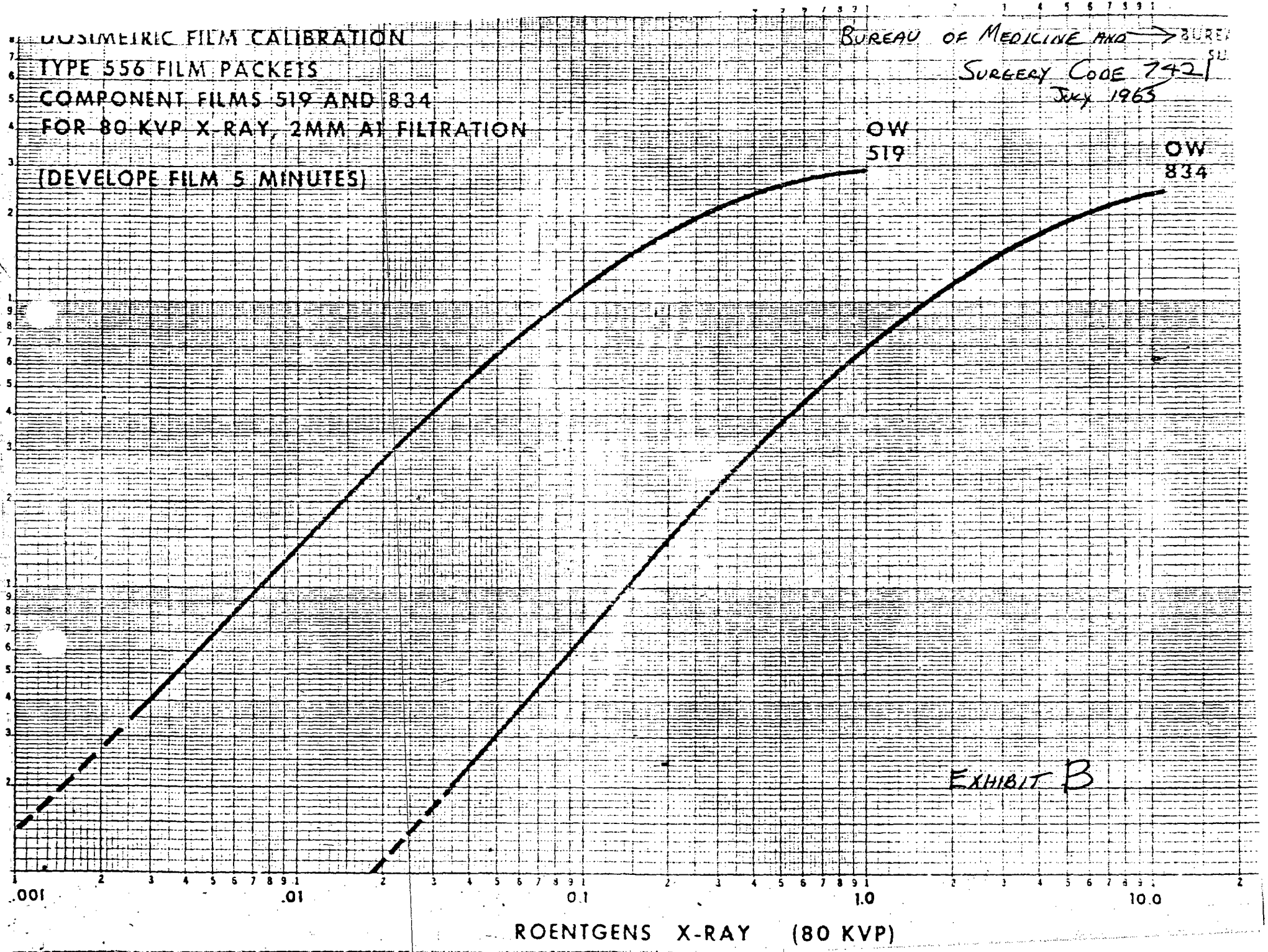
4. The x-ray curves were made by exposure to an 80 KVP machine with 2 mm Al added filtration and to a 250 KVP machine with 3 mm Cu added filtration.

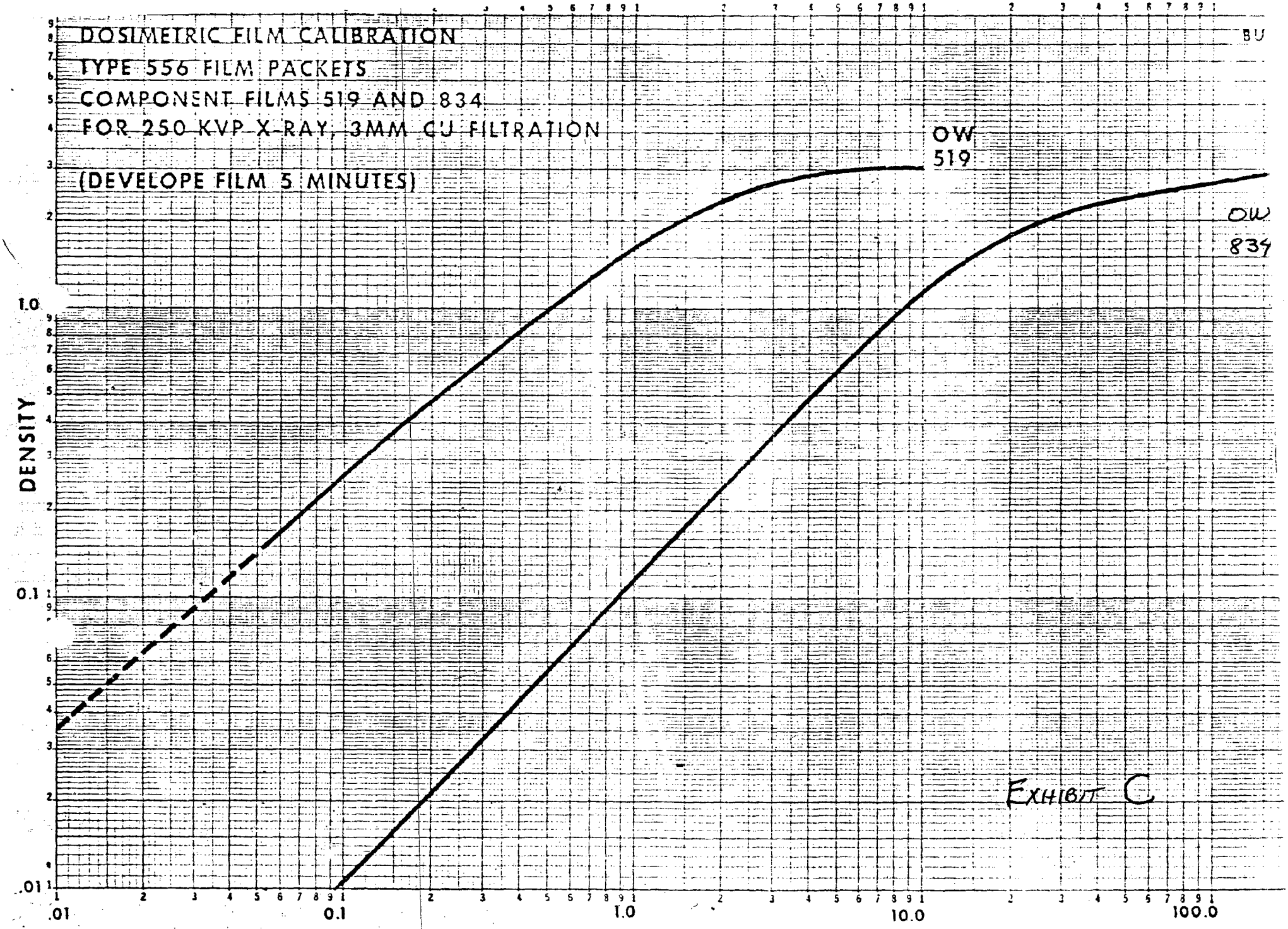
5. The enclosed curves are based on absolute net density and may be used with any densitometer that has been properly "zeroed" and adjusted with a standard density wedge.

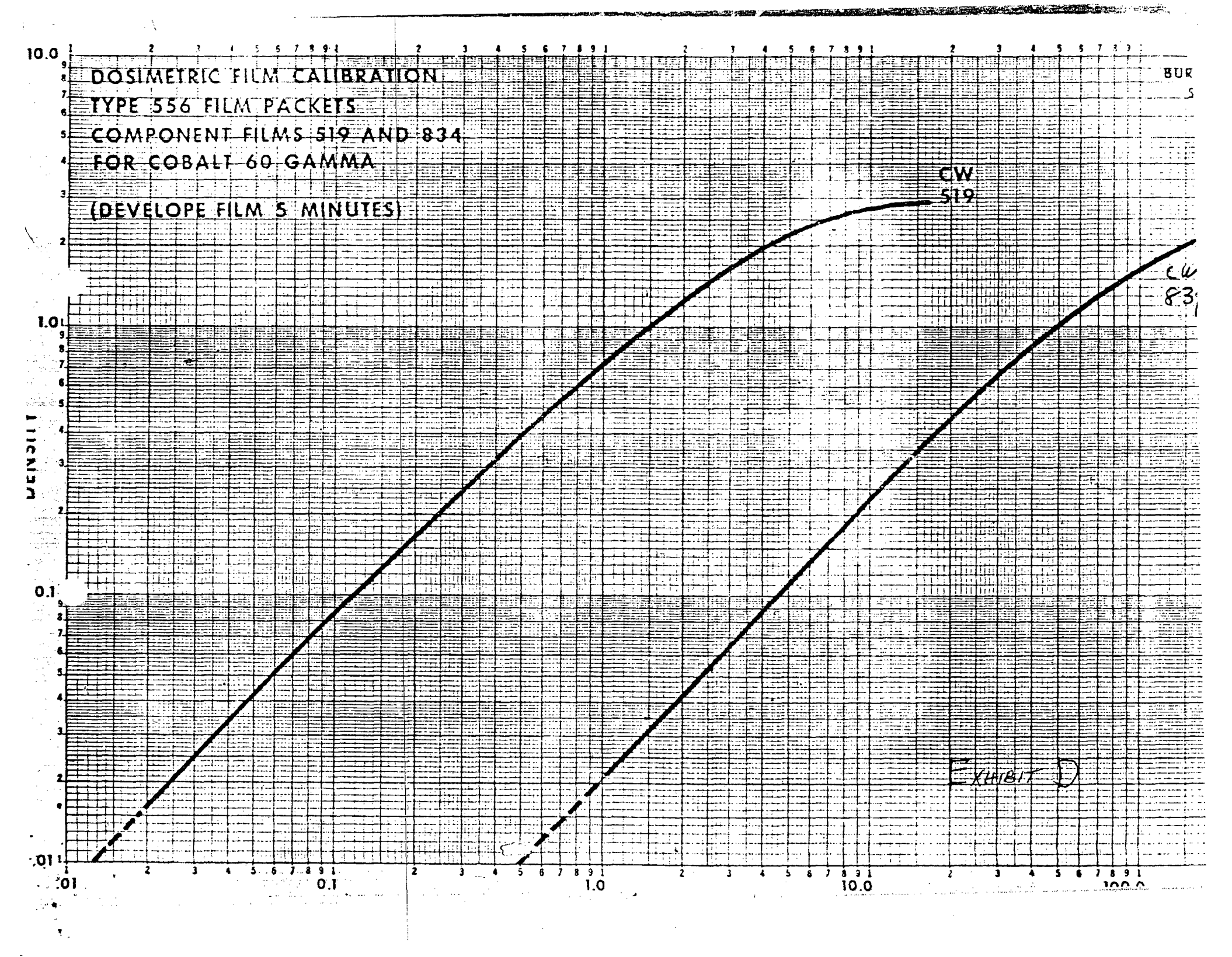
6. Type 556 film must be in the developing solution for five (5) minutes to agree with the new calibration curves.

BUREAU OF MEDICINE AND
SURGERY CODE 7421
JULY 1965

EXHIBIT A


DOSIMETRIC FILM CALIBRATION
TYPE 556 FILM PACKETS
COMPONENT FILMS 519 AND 834
FOR 80 KVP X-RAY, 2MM AL FILTRATION
(DEVELOPE FILM 5 MINUTES)
BUREAU OF MEDICINE AND SURGERY CODE 7421
JULY 1963
OW 519
OW 834
EXHIBIT B
.001
.01
0.1
1.0
10.0
ROENTGENS X-RAY (80 KVP)


DOSIMETRIC FILM CALIBRATION
TYPE 556 FILM PACKETS
COMPONENT FILMS 519 AND 834
FOR 250 KVP X-RAY, 3MM Cu FILTRATION
(DEVELOPE FILM 5 MINUTES)
BU
OW
519
OW
834
DENSITY
1.0
0.1
.01
.01
0.1
1.0
10.0
100.0
ROENTGENS X-RAY (250 KVP)
EXHIBIT C


DOSIMETRIC FILM CALIBRATION
TYPE 556 FILM PACKETS
COMPONENT FILMS 519 AND 834
FOR COBALT 60 GAMMA
(DEVELOPE FILM 5 MINUTES)
CW
519
CW
834
EXHIBIT D
10.0
1.0
0.1
.01
.01
0.1
1.0
10.0
BUR
S

IIA 0101 804 6001

# RECORD OF OCCUPATIONAL EXPOSURE TO IONIZING RADIATION

*FOR INSTRUCTIONS, SEE REVERSE OF SHEET.*

| 1. IDENTIFICATION NUMBER | 2. NAME *(Last, first, middle initial)* | 3. SOCIAL SECURITY NUMBER | 4. RANK/RATE TITLE OF POSITION | 5. DATE OF BIRTH *(Day, month, year)* |
|---|---|---|---|---|
| | | | | |

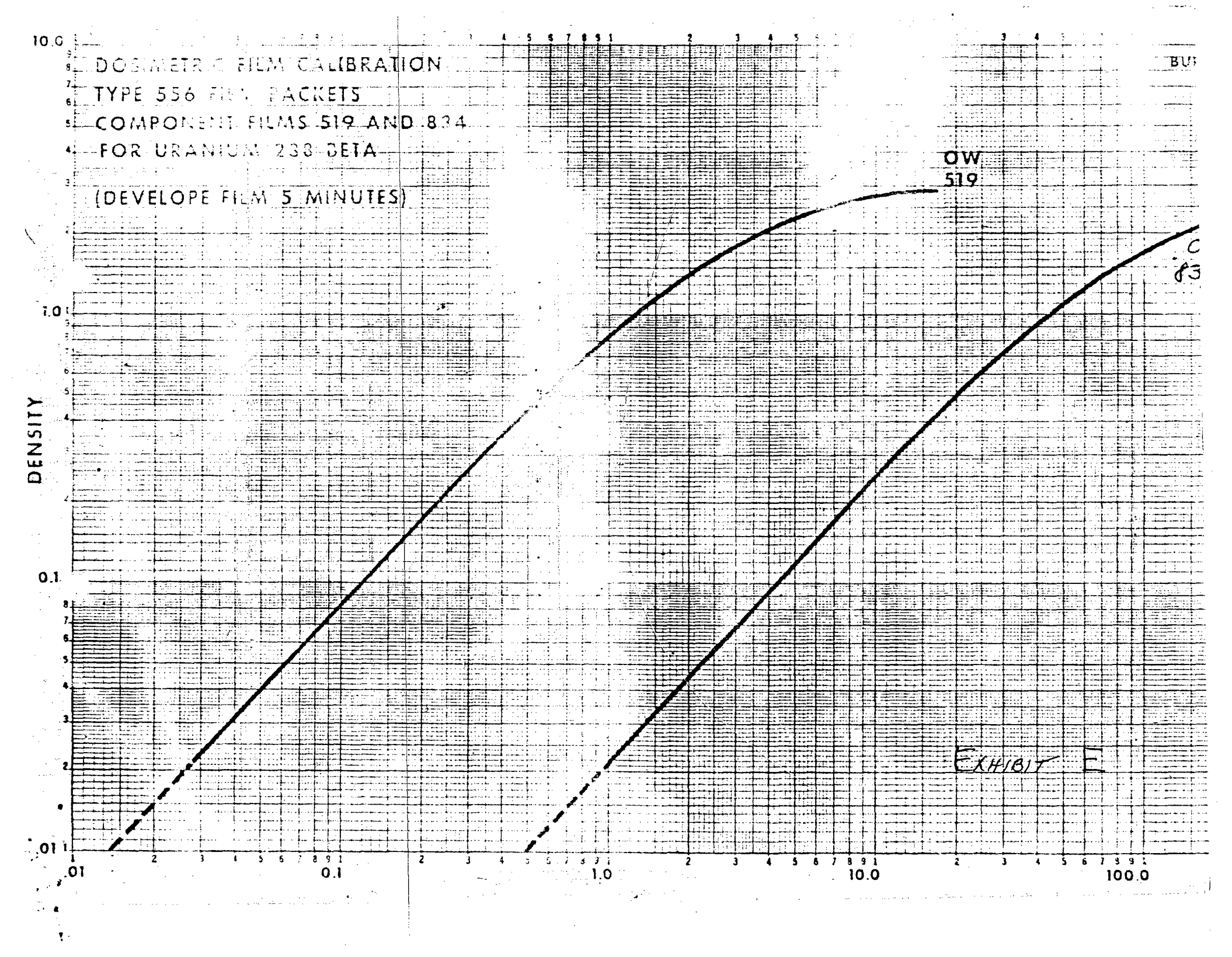
| PLACE WHERE EXPOSURE OCCURRED | PERIOD OF EXPOSURE | | DOSE THIS PERIOD *1. Method of monitoring is presumed to be film badge reading unless otherwise specified under Item 16, "REMARKS."* | | | | ACCUMULATED DOSE *(rem)* | | INITIAL |
|---|---|---|---|---|---|---|---|---|---|
| ACTIVITY | FROM *(Day-Mo-Yr)* | TO *(Day-Mo-Yr)* | BETA *(rem)* | GAMMA AND X-RAY *(rem)* | NEUTRON *(rem)* | TOTAL THIS PERIOD | TOTAL LIFETIME | PERMISSIBLE LIFETIME *5(N-18)* | PERSON MAKING ENTRY |
| 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

16. REMARKS *(Continue on additional sheet if necessary)*

EXHIBIT F

**TO BE RETAINED PERMANENTLY IN INDIVIDUAL'S MEDICAL RECORD**

DD FORM 1 OCT 64 1141 REPLACES EDITION OF 1 JUN 56, WHICH IS OBSOLETE. 3ND GPSO 11939


DOSIMETRIC FILM CALIBRATION
TYPE 556 FILM PACKETS
COMPONENT FILMS 519 AND 834
FOR URANIUM 238 BETA
(DEVELOPE FILM 5 MINUTES)
OW
519
DENSITY
10.0
1.0
0.1
.01
.01
0.1
1.0
10.0
100.0
EXHIBIT E