UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BLVD.
KING OF PRUSSIA, PA 19406-2713

March 17, 2020

Kert F. Anzilotti, M.D., MBA
Chief Medical Officer Acute Care
Christiana Care Health Services, Inc.
CH Management Suite 1218
4755 Ogletown-Stanton Road
Newark, DE 19718

SUBJECT: CHRISTIANA CARE HEALTH SERVICES, INC. - NRC INSPECTION NO. 03001303/2020001

Dear Dr. Anzilotti:

This letter refers to the inspection conducted on February 5, 2020 at your Newark, Delaware location. This inspection examined activities surrounding a fetal exposure following a Lutetium-177 Dotatate therapy treatment reported on January 29, 2020. The inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. Additional information collected on February 6, 7, 19 and 21, and March 5, 2020, was also examined during the inspection. A final exit briefing was conducted (telephonically) with you and other members of your staff on March 10, 2020. A medical consultant reviewed the event and concurs with your dose assessment and corrective and preventative actions. The enclosed report documents the results of the inspection and the medical consultant's report.

Within the scope of this inspection, no violations were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

If you have any questions regarding this matter, please contact Penny Lanzisera of my staff at 610-337-5169 or via electronic mail at penny.lanzisera@nrc.gov.

Thank you for your cooperation.

Sincerely,

Donna M. Janda, Chief
Medical and Licensing Assistance Branch
Division of Nuclear Materials Safety
Region I

Docket No. 03001303
License No. 07-12153-02

cc w/ enclosure
Xiaoqian (Carol) Wen, Radiation Safety Officer
State of Delaware

CHRISTIANA CARE HEALTH SERVICES, INC. - NRC INSPECTION NO. 03001303/2020001
DATED MARCH 17, 2020

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U.S. NUCLEAR REGULATORY COMMISSION
REGION I

INSPECTION REPORT

Inspection No.	03001303/2020001
Docket No.	03001303
License No.	07-12153-02
NMED Item No.	200051
Licensee:	Christiana Care Health Services, Inc.
Location:	4755 Ogletown-Stanton Road Newark, DE 19718
Inspection Dates:	February 5, 2020 March 10, 2020 (telephonic exit)
Date Follow-up Information Received:	February 6, 7, 19 and 21, March 5, 2020

Inspectors:

3-10-20
date

Penny Lanzisera
Senior Health Physicist
Medical and Licensing Assistance Branch
Division of Nuclear Materials Safety

3/10/2020
date

Elizabeth Engelmann
Health Physicist
Medical and Licensing Assistance Branch
Division of Nuclear Materials Safety

Approved By:

3/17/2020
date

Donna M. Janda, Chief
Medical and Licensing Assistance Branch
Division of Nuclear Materials Safety

Document Name: G:\WBL Documents\WBL Inspection Reports\R07-12153-02.2020001.docx

EXECUTIVE SUMMARY

Christiana Care Health Services, Inc.
NRC Inspection Report No. 03001303/2020001

An announced, special inspection was conducted on February 5, 2020, at Christiana Care Health Services, Inc. (CCHS) in Newark, Delaware, to review the circumstances surrounding a medical event reported on January 29, 2020 (NMED Item Number 200051) in accordance with 10 CFR 35.3047. The medical event involved an exposure to an embryo/fetus greater than 50 mSv (5 rem) on January 9, 2020, from an administration of byproduct material or radiation from byproduct material to a pregnant individual. Specifically, a patient received approximately 7.53 gigabecquerel (GBq) (203.5 millicuries) of Lutetium-177 (Lu-177) Dotatate for therapy and subsequently discovered that she was pregnant; the pregnancy was reported to CCHS on January 28, 2020. The estimated embryo/fetal dose was 0.143 Gray (14.3 rem). The inspection consisted of a review of licensed activities associated with the use of Lu-177 Dotatate at CCHS. Additional information was provided by CCHS on February 6 and 19, 2020, and a written report was submitted on February 7, 2020. The Lu-177 Dotatate manufacturer described the proper calibration of the dose calibrator on March 5, 2020, and concurred with the method used by CCHS to calibrate their dose calibrator and measure the dosage of Lu-177 Dotatate. A medical consultant reviewed the licensee's evaluation of the event and provided a written report on February 21, 2020. The medical consultant concurred with CCHS's evaluation, including their dose calculation.

Based on the results of this inspection, no violations or safety concerns were identified.

REPORT DETAILS

I. Event Description

a. Inspection Scope

An announced, special inspection was conducted on February 5, 2020, at CCHS in Newark, Delaware to review the circumstances surrounding a medical event reported on January 29, 2020 (NMED Item Number 200051). The inspection was conducted in accordance with Inspection Procedure 87103 and Management Directive 8.10. The medical event was identified by CCHS on January 28, 2020. The inspectors conducted interviews with licensee personnel, toured the facility, and reviewed records applicable to the event. The inspectors also reviewed CCHS's procedures related to Lu-177 Dotatate therapy and preparation of dosage within the Nuclear Medicine department.

b. Observations and Findings

Lu-177 Dotatate Therapy Program

License No. 07-12153-02 authorizes CCHS to provide Lu-177 Dotatate treatments at its facility in Newark, Delaware. The licensee began its Lu-177 Dotatate therapy program in 2018. The licensee maintains written procedures pertaining to safe handling and use of Lu-177 Dotatate. The licensee also maintains a training program for personnel that are involved in the program.

Per CCHS procedure all dosages are assayed using a dose calibrator prior to administration. During the inspection it was noted that the licensee determines the calibration factor setting with a patient dosage of Lu-177 Dotatate. It was also noted that the setting had varied from 480 to 467 over the last two years; with a current value of 467 being used. All dosage determinations were found to be within a percent of the manufacturer decay-corrected value. The manufacturer, Advanced Accelerator Applications (AAA), provides instructions to end users on this process and directs the end user to determine the dose calibrator setting with a reference standard source of Lu-177 Dotatate (not for human use) annually. AAA was contacted on March 5, 2020, to discuss the variation of CCHS' process versus the manufacturer suggested procedure. AAA staff confirmed that a patient dosage in place of a reference standard could be used by the end user since the patient dosage and reference standard: (i) are the same activity; and (ii) measured using the same procedure and instrument at AAA. AAA staff suggested that the variation in the dose calibrator setting for Lu-177 could be due to an older model dose calibrator being used and suggested that the licensee ensure that they complete their annual calibrations to identify any concerns. AAA staff also confirmed that their dose calibrator is verified as operational with two National Institute of Standards and Technology (NIST) traceable sources and that they send a reference standard to National Physical Laboratory of the U.K. periodically for a confirmatory measurement that is required to be within +/- 1 percent.

Nuclear Medicine Pregnancy Policy

The license maintains a written policy entitled "Pregnancy and Breast Feeding Policy"; this policy applies to all patients within the Nuclear Medicine, PET, and PET/CT departments. The policy requires that all female patients between the ages of 10 and 55 complete and sign a pregnancy/breast feeding questionnaire and, if receiving a therapeutic procedure, to have a negative serum pregnancy test within 7 days of the procedure unless surgically sterile. The policy also requires fetal dose determinations to be completed if a patient unintentionally receives a radioactive dose while pregnant.

Event Chronology, Reporting, On-Site Inspection, and Corrective/Preventative Actions

November 1, 2019 – A female patient completed a complete blood count (CBC) and comprehensive metabolic panel (CMP); the results were found acceptable, and the patient was scheduled for Lu-177 Dotatate therapy. The treating physician met with the patient to explain Lu-177 Dotatate therapy, the possible side effects, and to obtain her consent for the treatment. The physician counseled the patient that a serum pregnancy test would be required to confirm she was not pregnant and counseled the patient to use contraception for several months following the therapy. The instructions were signed by the patient and a copy was provided to the patient before the therapy.

November 12, 2019 – The patient's serum pregnancy test was negative.

November 13, 2019 – The patient signed a Pregnancy and Breast-Feeding Questionnaire confirming not pregnant or breast-feeding. The patient received the first Lu-177 Dotatate treatment. No complications were noted.

January 3, 2020 – The patient repeated a CBC and CMP to confirm eligibility for Lu-177 Dotatate therapy as well as serum pregnancy. The patient was still eligible for treatment and the serum pregnancy test was negative.

January 9, 2020 – The patient signed another Pregnancy and Breast-Feeding Questionnaire which stated her last period was on December 15, 2019 and responded "No" to the question "Is there any chance that you are pregnant?". The same treating physician reviewed the patient instructions, the patient signed the instructions, and a copy was provided to the patient. The patient received the second Lu-177 Dotatate treatment. Specifically, approximately 7.53 gigabecquerel (GBq) (203.5 millicuries) of Lu-177 Dotatate was administered. No complications were noted.

January 28, 2020 – The patient contacted her medical oncologist and informed him that she was pregnant. The medical oncologist informed the treating physician the same day. The treating physician notified the radiation safety officer (RSO).

January 29, 2020 – The treating physician contacted the patient and determined that two positive home pregnancy tests had been collected. Through discussion he learned that the possible conception date was January 3, 4, or 5, 2020. The RSO performed a preliminary calculation of the fetal exposure of 0.143 Gray (14.3 rem), using NCRP Report No. 174 and reported the fetal exposure to the NRC in accordance with 10 CFR

35.3047.

January 31, 2020 – The treating physician reviewed the radiation effects with the referring physician and met with the patient. The treating physician informed the patient that there was no expected increased risk above background levels of fetal death from the radiation exposure and no increased risk for anatomical malformations at delivery due to a protracted exposure.

January 31, 2020 – Region I coordinated with NRC's Headquarters Office to determine whether a medical consultant was necessary to review the event as outlined in Management Directive 8.10. It was determined that a medical consultant was necessary since the event resulted in an exposure greater than 50 mSv to an embryo/fetus.

February 3, 2020 – The treating physician ordered a serum pregnancy test for the patient, the result was positive for pregnancy. The patient was counseled on the possibility of deferring the next treatment one month to allow additional time to determine the path forward regarding her pregnancy status.

February 5, 2020 – Region I conducted an on-site inspection. The inspectors conducted interviews with licensee personnel, toured the facility, and reviewed records applicable to the event.

February 7, 2020 – CCHS submitted a 15-day report in accordance with 10 CFR 35.3047. In the report, CCHS described the event, the potential effects, the notifications, and the actions taken to prevent recurrence. Corrective and preventative actions included: (1) revising the "Pregnancy and Breast Feeding Policy" to decrease the requirement of a negative serum pregnancy test for therapeutic procedures from 7 days to 48 hours; and (2) requiring that nuclear medicine physicians re-emphasize the need to avoid pregnancy and to use contraception, particularly between the pregnancy test and therapy date.

February 18, 2020 – The patient terminated the pregnancy and was scheduled for her next treatment preliminarily scheduled for March 12, 2020.

February 21, 2020 – The NRC medical consultant reviewed the CCHS's evaluation of the event and provided a written report. The medical consultant concurred with CCHS's evaluation, including their dose calculation. In summary, the medical consultant concluded that: (i) prompt and effective correction actions were taken; (ii) the notification to the patient was appropriate and acceptable; (iii) the description of the event and follow-up with the patient regarding pregnancy risk was appropriate; (iv) the reported 14.3 rem fetal exposure is an estimate and close to the 15 rem value referred to in NCRP Report 54 for a possible risk of radiation-induced fetal exposure; (v) the first therapy dose may have had an effect on the ovaries and the health of the ovum that was released prior to the second treatment; and (vi) the completion of the remaining 2 cycles of therapy is acceptable provided that a negative pregnancy is confirmed and effective contraceptive measures are followed by the patient.

March 5, 2020 – Region I contacted the Lu-177 Dotatate manufacturer who described

the proper calibration of the dose calibrator and concurred with the method used by CCHS to calibrate their dose calibrator and measure the dosage of Lu-177 Dotatate.

March 10, 2020 – A final exit meeting was conducted via telephone with CCHS staff. During the exit, the inspector summarized the event, the event reporting, and CCHS's corrective and preventative actions.

c. Conclusions

CCHS reported the medical event as required by 10 CFR 35.3047 and took appropriate corrective and preventative actions.

II. Exit Meeting

A preliminary exit meeting was conducted on February 5, 2020, to discuss the scope of the inspection and the inspector's initial observations. On March 10, 2020, an exit meeting was held by telephone with Dr. Kert Anzilotti, Chief Medical Officer, to discuss the results of this inspection.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

*+ Hung Dam, M.D. – Section Chief, Nuclear Medicine
*+ Xiaoqian (Carol) Wen – RSO
* Katherine Wood – RT(N)(CT)
* Theresa Riggle – CNMT(N) Manager
* Tony Gialloreto – Director, Non-Invasive Services
*+ Kert Anzilotti, M.D. – Chief Medical Officer

Various interventional radiology staff involved in the microsphere program.
Various manufacturer representatives.

* Present at preliminary exit meeting on February 5, 2020
+ Participated in telephonic exit meeting conducted on March 10, 2020