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Q-5
MS-16

November 22, 2005

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RECEIVED

Ms. Betsy Ullrich
Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, PA 19406

RE: Control Numbers 137788 and 137789

Dear Ms. Ullrich:

This letter is in response to your letter of October 26, 2005 regarding the termination of licenses 20-30342-01 and 20-30342-02G. I will address each issue by the paragraph numbers which require response: 03034246 03034247

- Paragraph 1. This is to confirm that all of the sources possessed and used at the Ewing facility were sealed sources. No unsealed sources were ever possessed at that facility.
- Paragraph 2. The only units which were used at the Ewing facility were ones described in the Registry of Sealed Sources and Devices. I believe that an X-MET 2000 brochure was attached to the original letter as an example of the types of devices used at the facility.
- Paragraph 5. Attached you will find a letter from Edward A. Christman, PhD, CHP, who did the surveys, explaining the levels to which he tested.
- Paragraph 7. The total square footage of the Ewing facility is 8,541 sq. ft. of which approximately 900 sq. ft. was used for the licensed activity. This space was commercial office and warehouse space.
- Paragraph 8. Due to changes in the management structure in the fall of 2004, it appears that the report for the last quarter of 2004 and the first quarter of 2005 were not submitted. The number of reportable distributions during that period was very low. These quarterly reports are being prepared and will be submitted shortly.

137788/137789
NMSS/RGNI MATERIALS-002

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If you have any further questions or need additional information please feel free to contact me at 609-510-4648 or Ms. Laura Zigler at 847-439-4404 x227. Please make sure that any correspondence regarding this matter is also sent to Ms. Zigler at this address.

Sincerely,

A handwritten signature in black ink, appearing to read "John I.H. Patterson", is written over a horizontal line. The signature is stylized and cursive.

John I.H. Patterson , PhD
Radiation Safety Officer

Edward A Christman, Ph.D., CHP
443 Sayre Drive Princeton, NJ 08540
Consultant in Radiation and Occupational Safety

November 15, 2005

John Patterson, Ph.D.
Oxford Instruments Analytical
c/o Oxford Instruments
945 Busse Road
Elk Grove, IL, 6007

RE: Response to Item 5. in NRC letter dated 10/26/05

Dear John:

The 25 mrem annual effective dose (TEDE) of 10 CFR 20 subpart E can be exceeded only from an intake of the radioactive material involved in the spills – ⁵⁵Fe or from a sustained exposure from an external source or a combination of the two modalities. There is a negligible chance that the TEDE to an average member of a critical group will exceed 25 mrem annually. All the sources involved in this site are essentially point sources of low energy photons and therefore it is quite unlikely a dose from any source left behind – none were found - and undetected and would result in a TEDE of more than a few mrem. In any case, the dose distribution from an orphaned source would be quite localized unless the source was damaged and the radioactive material released. A careful survey of the facility with a pressurized ionization chamber and a low energy NaI(Tl) based scintillation probe resulted in no measurements that differed significantly from background levels. The ion chamber (MDL is estimated at 0.010 mR/hr. for this energy range) was used to measure ambient exposure rates. An annual TEDE resulting from undetected photon exposures would exceed 25 mrem only after an accumulated exposure period much greater than 2500 hours.

An oral intake of 45 microcuries of ⁵⁵Fe or an inhaled intake of a minimum of 10 microcuries in a year would result in the 25 mrem limit¹. The scan Minimum Detectable Concentration (MDC) for the instrument used is calculated² as 0.70 μ Ci/100 sq.cm with reasonably conservative parameters. A localized external exposure rate MDL is

¹ The activities are scaled from the ALIs listed in 10 CFR 20, Appendix B.

² Reference NUREG 1575, page 6-41, equation 6.10. The background count rate is 2.2 Kcpm; the MDCR = 1942 cpm for a 2 second dwell time, 95% true positive detection rate with a 60% false positive rate tolerated. A detector efficiency of 5%, an exposure conversion factor of 0.000073 mR/hr/cpm; a surface efficiency of 0.5 and a surveyor efficiency of 0.5. The instrument was a Ludlum 44-9 probe connected to a Model 2 meter.

calculated from calibration data for this instrument as approximately 0.142 mR/hr. All of the surface areas involved in the reported contamination incidents were surveyed 100 percent and there were no measurements exceeding the MDC. A localized skin dose of 25 mrem (not the TEDE) would result if an individual were in contact with an undetected exposure rate for an accumulated exposure period greater than 176 hours in a year.

I took a few wipes in the areas likely to have been involved with the reported spills to confirm the survey instrument readings and check for removable contamination. These wipes were analyzed by liquid scintillation counting. The MDL for this process was estimated at 100 dpm/100 sq. cm ($4.5 \times 10^{-5} \mu\text{Ci}/100 \text{ sq. cm.}$). So the TEDE would be exceeded only in the unlikely event that more than 222,000 sq.cm. of the facility surface area were contaminated with undetectable levels of ^{55}Fe and all of this material were somehow inhaled.

If you need any additional information please let me know.

Sincerely yours,



eac

Edward A Christman