

OCT 5 1992

MEMORANDUM FOR: John H. Austin, Chief
Decommissioning and Regulatory
Issues Branch
Division of Low-Level Waste Management
and Decommissioning, NMSS

FROM: John E. Glenn, Chief
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: TECHNICAL ASSISTANCE REQUEST: MERCK & CO.,
INC.; RELEASE OF INCINERATOR ASH AS NORMAL
WASTE PURSUANT TO 10 CFR 20.302.

This is in reference to a Technical Assistance Request, dated May 14, 1992, but received only recently from Region I. Merck & Co., Inc. has requested authorization to dispose of incinerator ash as normal waste pursuant to 10 CFR 20.302. We have completed a review of the information submitted and recommend approving the request. We would appreciate your performing ground water dose calculations to ensure the potential dose to an individual is within regulatory guidelines.

If you have any questions, please contact Torre Taylor at 504-2611.

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John E. Glenn, Chief
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

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REQUEST FOR TECHNICAL ASSISTANCE

DATE: 5/14/92

TO: John E. Glenn, Chief, Medical, Academic, and Commercial
Use Safety Branch, NMSS

FROM: Ronald R. Bellamy *R. Bellamy* 6/14/91, Chief, Nuclear Materials Safety and
Safeguards Branch, Region I

LICENSEE: MERCK & CO., INC. LICENSE NO. 29-00117-06

 Control No. 114240 (enclosed)

X • Letter dated 6/14/91 (enclosed)

 Suggested change in licensing procedure (enclosed)

 Other (see remarks)

Problem/Issue: Release of incinerator ash as normal waste pursuant to
20.302.

Action Required: Review information submitted in 6/14/91 letter. Items 5 and 7
provide guidance if additional information is needed to approve release of the ash.

Alternatives Considered 1) Allow disposal of ash to normal landfill.
2) Allow ash to be disposed of as radioactive waste.

Recommended Alternative: Allow disposal of ash to normal landfill.

Remarks Licensee's evaluation appears to be adequate.

Regional Reviewer: E. Ulrick
Reviewer Code: JS
Reviewer Phone No.: FTS 346-3040

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MERCK SHARP & DOHME RESEARCH LABORATORIES

DIVISION OF MERCK & CO. INC.

P. O. BOX 2000 RANNEY NEW JERSEY 07065

June 14, 1991

John D. Kinneman
US Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

RE: License No. 29-00117-06
Docket No. 030-14680
Control No. 114240

Dear Mr. Kinneman:

This letter is in response to your letter dated May 17, 1991. For clarity, the NRC questions are presented in bold type and our responses follow in normal type.

1. The NRC normally considers the licensee to be in compliance with the ALARA philosophy as stated in 10 CFR 20.1(c), without further justification when the gaseous effluent from the incinerator stack is a fraction (less than 10%) of the limits specified in Appendix B, Table II 10 CFR 20, when averaged over a period of one year. Since you incorporated a release rate of 2.2 microcuries per second in the calculations submitted with the amendment, please confirm that you will maintain a total release rate of 2.2 microcuries per second or less for all radionuclides discharged. If you desire a higher release rate, either demonstrate that the maximum concentration will be less than 10% of the applicable limit or provide other justification that the concentration is ALARA.

The release rate used in the CRSTER dispersion modeling program was 2.2 microcuries per minute, the 2.2 microcuries per second release rate was a typographical error. From the data presented in our amendment request (February 25, 1991), the maximum annually averaged ground level concentration associated with a 2.2 microcuries per minute release rate would be 2.1×10^{-13} microcurie per milliliter. Merck & Co., Inc. will use annually averaged release rates no greater than 2×10^4 and 1×10^5 microcuries per minute for H-3 (as H₂O) and C-14 (as CO₂) respectively. These release rates produce maximum ground level concentrations that are no greater than 1% of the Appendix B, Table II, 10 CFR 20 values when averaged over a period of one year.

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2. Submit a simple scaled drawing showing the location of the incinerator and the distance to the nearest occupied area, structure or air intake.

Please see attached drawing.

3. Provide a description of any scrubbers or air cleaning equipment present and describe how waste water or other waste from these scrubbers will be handled.

There are no scrubbers or other supplementary air cleaning equipment on the incinerator.

4. Describe the type of stack monitoring, if any, to be performed including the frequency, counting instruments and calculations showing applicable counter efficiencies and minimum detectable activities.

No stack monitoring is planned for the incinerator. A material balance approach, assuming the release of all activity incinerated, will be used to evaluate the effluent concentrations.

5. State the maximum number of burns to be performed in any one week and the maximum number of burns per year. State the maximum quantity of radioactive material in each burn and describe your procedures for assuring that these frequencies and amounts will not be exceeded.

Branchburg Farm is part of the Merck & Co., Inc. research organization. The nature of research makes it impossible to forecast the number or timeframe for studies during the year. It is possible that a radioactive burn would be performed every day the incinerator isn't off-line for maintenance (7 burns per week, approximately 250 burns per year).

The quantity of radioactive material in each burn will be limited to maintain the annually averaged air concentration in unrestricted areas to the values discussed in Question 1.

The radioactive waste disposal procedure for each study will be evaluated by the Health Physics office. This evaluation will include any limitation necessary on the quantity of radioactive material loaded into the incinerator.

6. Describe your procedures to prevent or limit exposure of personnel to radiation and/or radioactive material during all phases of operation, including instruction given to personnel handling the combustibles and ash.

The researchers package all contaminated dry waste in radioactive waste containers. The radioactive waste containers are sealed prior to delivery to the incinerator, this minimizes the potential for the operator to be directly exposed to the radioactive material. The container provides adequate shielding for the beta particles involved.

All contaminated carcasses are wrapped in plastic prior to delivery to the incinerator. The carcasses are transported by a permanent hoist directly from the necropsy room into the incinerator loading bin.

Ash removal after radioactive burns will require the operator to wear personnel protective equipment:

- 1) the appropriate respiratory protection;
- 2) anti-contamination clothing and gloves.

All personnel at Branchburg Farm involved with radioactive material work have attended a radiation safety course presented by the Health Physics office.

7. NRC has concluded that there is insufficient technical basis to support the routine disposal of incinerator ash as normal waste as presently permitted by Condition 19 of your license. All requests to approve disposal of ash as normal waste will be reviewed in accordance with 10 CFR 20.302. Therefore, if you desire to have this condition apply to the new incinerator, please submit the information described in 10 CFR 20.302. If you do not submit this information, the condition will be changed to only to your existing incinerator. When you next apply for renewal of your license, you should submit similar information to support the condition for the existing incinerator.

The metabolism building (Building 91) incinerator generates 3000-5000 pounds of ash per year. The addition of waste above the 10 CFR 20.306 limitations and low-level laboratory trash to the loading volume will not significantly increase the ash volume. All incinerator ash is boxed and sent to a landfill for disposal.

Merck & Co., Inc. would like to dispose of the incinerator ash as an effluent to unrestricted areas. Ash with a radionuclide concentration above natural background that is below the new Appendix B, Table 2, 10 CFR 20 water values (with units of microcurie per gram) will be disposed of as routine ash. The values for H-3 and C-14 are 1×10^{-3} microcuries per gram and 1×10^{-5} microcuries per gram, with a higher concentration will be

handled as radioactive waste. For the disposal of a mixture of radionuclides, the sum of the fractions rule will be used.

Ingestion of 730 liters of water contaminated at the Appendix B, Table 2, 10 CFR 20 value will deliver a total effective dose equivalent (TEDE) of 50 mrem. Therefore, the ingestion of 730 kilograms (1600 pounds) of similarly contaminated ash would deliver a TEDE of 50 mrem. An individual consuming all the ash generated annually in the metabolism building incinerator, assuming contamination at the Appendix B, Table 2 concentration, would receive a TEDE of approximately 150 mrem. The disposal of ash by this procedure is not likely to deliver a TEDE to any individual in excess of 50 mrem per year.

In an accident that spreads the contaminated ash on the ground, the hazard due to inhalation can be estimated from atmospheric loading due to resuspension. Values for atmospheric loading range from 10^{-9} to 10^{-11} gram per milliliter. The airborne radioactivity concentration around the distributed ash can be evaluated against the Appendix B, Table 2 air value using the relationship:

$$(A_1 \times C_{\text{ash}}) / C_{\text{air}} = \text{Fraction of } C_{\text{air}}$$

where, A_1 = Atmospheric loading (gram per milliliter)
 C_{ash} = Ash concentration (microcurie per gram)
 C_{air} = Air concentration (microcurie per milliliter)

Assuming that the ash concentration of H-3 or C-14 is equal to the Appendix B, Table 2 water value and that there is maximum atmospheric loading, the fraction of the Appendix B, Table 2 air value will be 10^{-5} .

The analysis of ash samples will be performed by Teledyne Isotopes or another laboratory capable of meeting our detection limit requirements. Teledyne states a minimum detectable activity in ash of 3×10^{-6} and 1×10^{-6} microcurie per gram for H-3 and C-14 respectively.

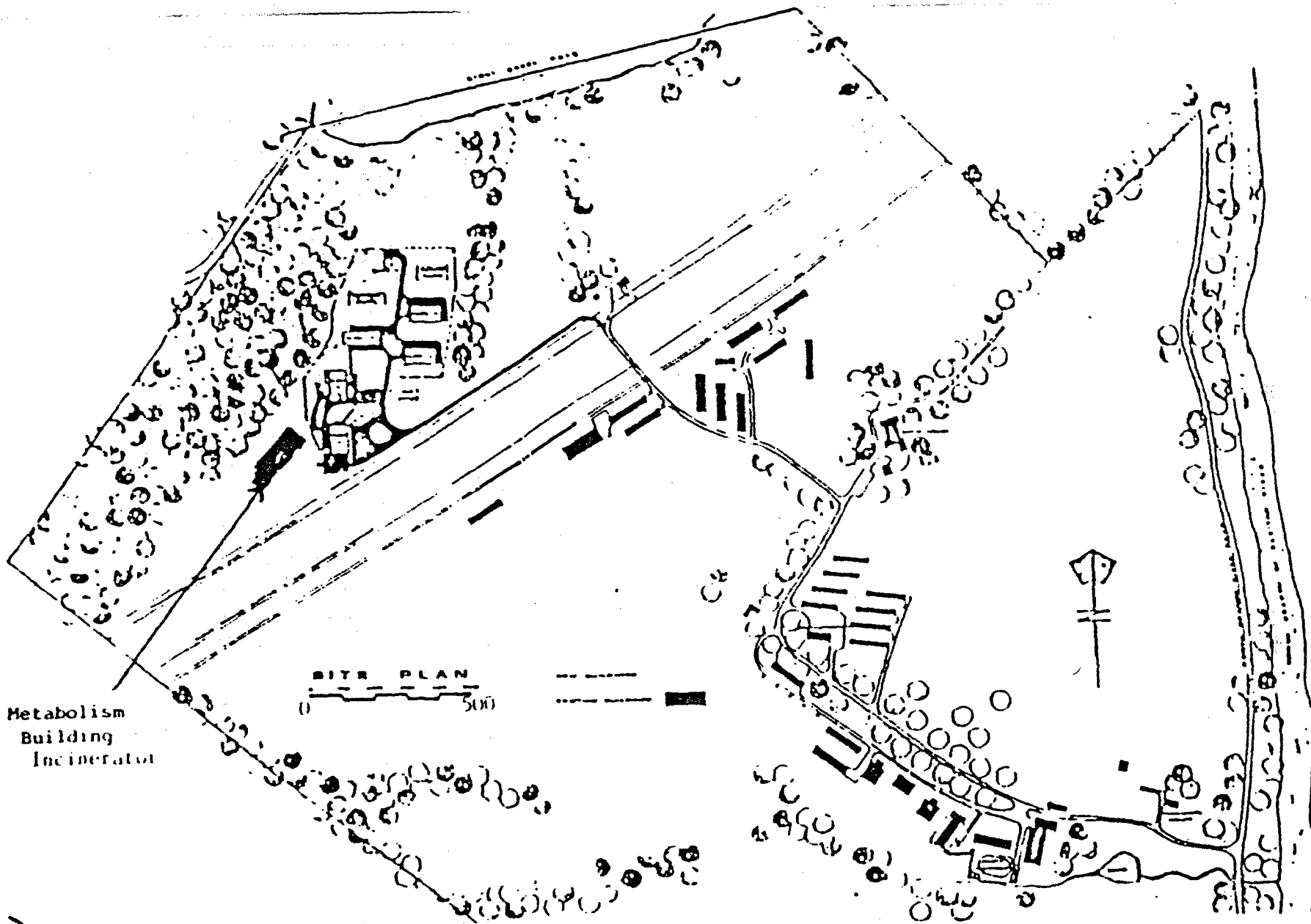
Please contact me at 908-594-6267, if you require any additional information regarding this amendment request.

Sincerely yours,


Glenn M. Sturchio, CHP
Radiation Safety Officer

Attachment

cc: Fry, Kastello, McKamey, Miller, Rosenberger, Wurtz



Metabolism
Building
Incinerator

SITE PLAN
0 500

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MERCK & CO., INC. **BRANCBURG FARM**
BASIC ANIMAL SCIENCE RESEARCH FACILITIES

KEITH & WESTENLAW
ARCHITECT
717 CHESTNUT STREET
COLUMBIA, MISSOURI