

MATERIALS LICENSE

rsuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 40 and 70. and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

<p>Licensee</p> <p>1. Battelle Columbus Laboratories</p> <p>505 King Avenue</p> <p>2. Columbus, Ohio 43201</p>	<p>3. License number SNM-7, Amendment No, 2</p> <p style="text-align: center;">JUN 02 1987</p> <p>4. Expiration date April 30, 1988</p> <p>5. Docket or Reference No. 70-8</p>
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6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
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Special Nuclear Material

West Jefferson Site

- | | | |
|---|------------------|---|
| A. Uranium enriched in the U-235 isotope --irradiated. | A. Any | A. 125 kilograms of contained U-235 plus the associated and unseparated plutonium |
| B. Uranium enriched in the U-235 isotope --unirradiated | B. Any | B. 1900 grams of contained U-235 |
| C. Plutonium (Pu-238 principal isotope) | C. Sealed source | C. 13 grams |
| D. Plutonium (Pu-239 principal isotope) | D. Oxide | D. 17 grams |

King Avenue Laboratories

- | | | |
|---|--------|---------------------------------|
| E. Uranium enriched in the U-235 isotope --unirradiated | E. Any | E. 500 grams of contained U-235 |
|---|--------|---------------------------------|

Source Material

West Jefferson and King Avenue Sites

- | | | |
|---|--------|------------------|
| F. Uranium (natural and depleted) and thorium | F. Any | F. 500 kilograms |
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(Note: Licensee is also authorized to possess any source material that may be contained in the irradiated uranium of Item A above.)

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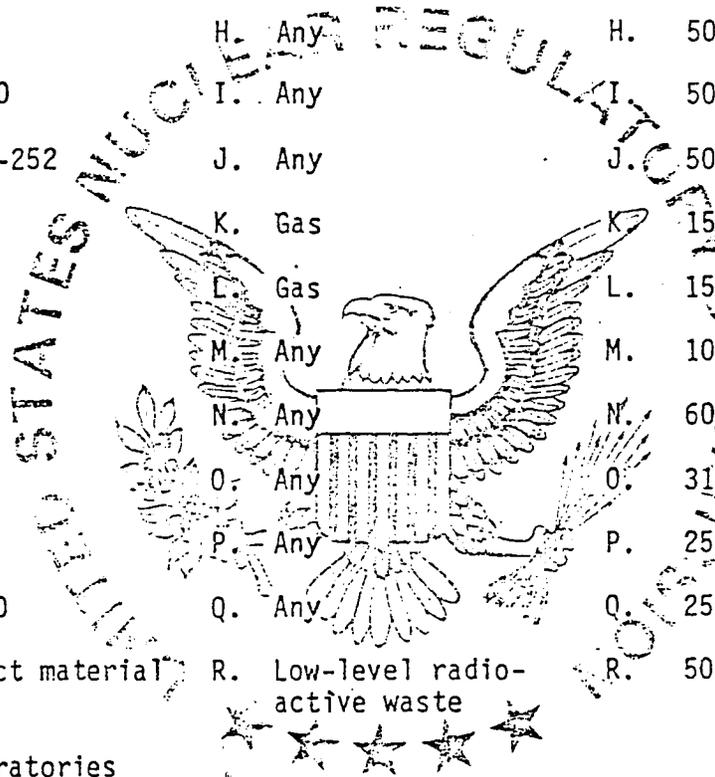
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Byproduct Material

West Jefferson Site

- | | | |
|---------------------------|---|--|
| G. Any byproduct material | G. Irradiated fuel material, activated reactor materials and components | G. 22,000,000 Ci total, not more than 100,000 Ci of any one radioisotope (excluding Items H through Q below) |
| H. Hydrogen-3 | H. Any | H. 500 Ci |
| I. Polonium-210 | I. Any | I. 500 Ci |
| J. Californium-252 | J. Any | J. 500 Ci |
| K. Sulfur-35 | K. Gas | K. 15,000 Ci |
| L. Chlorine-36 | L. Gas | L. 15,000 Ci |
| M. Iodine-131 | M. Any | M. 1000 Ci |
| N. Iodine-129 | N. Any | N. 60 Ci |
| O. Cobalt-60 | O. Any | O. 315,000 Ci |
| P. Cesium-137 | P. Any | P. 250,000 Ci |
| Q. Strontium-90 | Q. Any | Q. 250,000 Ci |
| R. Any byproduct material | R. Low-level radioactive waste | R. 50 Ci total |



King Avenue Laboratories

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|---------------------------|--------|--|
| S. Any byproduct material | S. Any | S. 500 Ci total, not more than 35 Ci of any one radioisotope |
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9. Authorized Use:

a. For use in accordance with statements, representations and conditions contained in the following portions of the licensee's application for renewal (BCL Document 1081) submitted by letter dated October 23, 1981, except as may be modified by the conditions of this license:

1. Pages vi through xi, Introduction
2. Part I, License Conditions
3. Appendix A, Radiological Safety Committee Charter

The effective pages of these portions of the application shall be those identified in Annex A that is attached to this license.

b. Operation of the Volume Reduction Demonstration Facility in accordance with Condition 26 of this license.

10. Authorized Places of Use:

The licensee's West Jefferson Site and King Avenue Laboratories located as described in pages vii through xi and pages 2.1 through 2.5, Part II, of the licensee's application for renewal submitted by letter dated October 23, 1981.

11. The licensee shall comply with the provisions of Annex B (attached), "License Condition for Leak Testing Sealed Byproduct Material Sources," for byproduct sealed sources in its possession. These leak test procedures shall also be used for the Pu-238 sealed source (Item 6.C above) at such time as it is removed from its storage package in the JN-2 Vault for use or transfer.

12. Notwithstanding Table III and Table IV presented in Part I, Sections 3.4 and 3.5, for the release of materials, equipment and facilities for unrestricted use the licensee shall adhere to the provisions of Annex C attached to this license, "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use" dated July 1982.

13. Item 9 above incorporates Appendix A (Radiological Safety Committee Charter) of the licensee's renewal application (BCL-1081) as a condition of the license to clarify and define more fully administrative procedures for review, approval and audit of activities covered by the license, as described in Section 1.3 and Section 2.0 of Part I. The licensee may make revisions to the provisions of Appendix A, based upon written evaluation of the changes, without NRC approval if it is determined that

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such changes will not decrease the effectiveness of the Committee in carrying out its functions. Revisions to the Charter and supporting evaluations shall be submitted to the Director, Division of Fuel Cycle and Material Safety, NRC, with a copy to the Administrator, Region III Office, NRC, within 60 days following such changes.

14. In addition to the subjects identified in Section 5.1.1, Appendix A, the annual review and appraisal of facilities shall include an assessment of occupational radiation exposures and releases of radioactive material over the past year with regard to maintaining such exposures and releases as low as is reasonably achievable, as stated in Section 20.1(c), 10 CFR Part 20.

15. Part I, Section 2.1 of the licensee's application specifies when mandatory criticality reviews for new operations are required by the Nuclear Safety Subcommittee. The reviews by the Nuclear Safety Subcommittee shall include (1) an initial analysis by an individual qualified in accordance with provisions of Section 1.2.2 and Section 2.2, Part I; (2) an independent review by a second qualified individual to determine that the methods used in the analysis are appropriate and that the results are correct; and (3) as appropriate, physical inspection by the individual performing the original analysis to assure that the physical environment and parameters assumed in the analysis are valid.

16. Part I, Section 2.4 of the application for renewal provides for use of KENO as an acceptable criticality analysis method. Prior to use of this analytical method for nuclear safety evaluations under this renewed license, the licensee shall submit a demonstration (as an addition to Part II or a new Appendix) of its use to NRC for approval.

17. Notwithstanding the formula in Section 4.3.1(1)(c) of the Radiation Safety Committee Charter (Appendix A of the application for renewal), the licensee shall use the formula:

$$\frac{\text{Grams U-235}}{L_{235}} + \frac{\text{Grams Pu}}{220 \text{ grams}} \leq 1$$

where L_{235} is the mass limit from Table 1, Appendix A of the application, for the appropriate U-235 enrichment.

18. The licensee is hereby exempted from the provisions of Section 70.24, 10 CFR Part 70, insofar as this section applies to special nuclear material authorized under this license for possession and use at the licensee's King Avenue Laboratories.

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19. The licensee shall provide three copies each year of its annual environmental report to the Director, Division of Fuel Cycle and Material Safety, NRC, and a copy to the Administrator, Region III Office, NRC.
20. Sections 2.1 and 3.10, Part I refer to provisions for training and periodic retraining of employees, as appropriate and related to employee work assignments with radioactive and fissionable materials. Such training shall be conducted, as appropriate, for new employees and prior to initiating new operations approved by the Radiological Safety Committee and retraining shall be conducted on topics appropriate to employee work assignments at least annually. Documentation of such training and retraining shall be maintained.
21. Section 4.0, Part I of the licensee's renewal application incorporates the text of previous amendments issued by the NRC to Special Nuclear Material License No. SNM-7 and Byproduct Material License No. 34-6854-5. For clarification, the licensee's authority to permit increases in the radioactivity in the Hot Cell Laboratory pool water to levels above the limits for routine operations, as specified in Section 4.0 is hereby affirmed, subject to the following provisions:
 - a. The period that non-routine levels of radioactivity exist in the pool shall not exceed 45 days before they are reduced to routine levels or below;
 - b. Work requests, as approved by the Laboratory Operations Manager and the resident Health-Physicist, shall be utilized during the non-routine operations to assure that personnel are aware of the specific radiological safety considerations for the operations;
 - c. The pool lid cover shall be in place during down time and after hours;
 - d. Radiation monitoring will be performed at least twice weekly around the perimeter of the pool and radiation levels with the cover in place and the cover removed will be posted;
 - e. Pool water samples will be collected and analyzed at least weekly; and
 - f. The resin bags of ion columns will be replaced when readings of 300mR/hour at one foot are reached.

The above provisions, extracted from the licensee's letter to the NRC of October 31, 1980 eliminate the need for reference in this license to this letter, which requested the non-routine operational levels to accommodate such activities as pool cleaning and maintenance, examination and maintenance of storage racks, and the handling of additional fuel assemblies.

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22. The licensee shall implement, maintain, and execute the response measures of his Radiological Contingency Plan submitted to the Commission on March 5, 1982. The licensee shall also maintain implementing procedures for his Radiological Contingency Plan as necessary to implement Plan. This Radiological Contingency Plan and associated implementing procedures incorporate the emergency planning requirements of 10 CFR 70.22(i) as they refer to onsite planning and notification procedures. The licensee shall make no change in his Radiological Contingency Plan that would decrease the response effectiveness of the Plan without prior Commission approval as evidenced by a license amendment. The licensee may make changes to his Radiological Contingency Plan without prior Commission approval if the changes do not decrease the response effectiveness of the Plan. The licensee shall maintain records of changes that are made to the Plan without prior approval for a period of two years from the date of the change and shall furnish the Chief, Advanced Fuel and Spent Fuel Licensing Branch, Division of Fuel Cycle and Material Safety, NMSS, U.S. Nuclear Regulatory Commission, Washington, DC 20555, and the Region III NRC Regional Office at the address specified in Appendix D of 10 CFR Part 20, a report containing a description of each change within six months after the change is made.
23. Section 5.0, Part I, of the licensee's renewal application incorporates the text of previous amendments issued by NRC to Special Nuclear Material License No. SNM-7 and Byproduct Material License No. 34-6854-5 covering decontamination and decommissioning plans applicable to the Battelle Hot Cell Laboratory. It is hereby affirmed that the provisions of these decontamination and decommissioning plans, including financial arrangements, continue in effect under this renewed license, and also apply to the retired Battelle Research Reactor.
24. At such time that facilities covered by this license are decontaminated for proposed unrestricted release (in accordance with Annex C), the licensee shall submit a report that identifies the facilities where radioactive materials were used and stored, or disposed on the site. The report shall briefly describe used and stored, or disposed on the site. The report shall briefly describe operations conducted and radioactive materials used in the facilities and shall assess the results of the decontamination activities. The report shall provide the basis for unrestricted release of the facilities and the site, including a description of sampling and survey methods and instrumentation used, and shall include final contamination survey data for the facilities and grounds. The licensee may segment the report to obtain release of certain areas of facilities of individual structures if it is demonstrated that ongoing activities in other areas will not lead to recontamination of the area or structure proposed for release.
25. The licensee is authorized to backfill the retired filter bed area on the West Jefferson site where contaminated soil was removed as described in the licensee's letter of May 13, 1981. The homogenized bed containing low levels of residual contamination shall be covered with approximately three feet of soil as stated in the letter of May 13, 1981.

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26. In addition to other applicable conditions of this license, operation of the Volume Reduction Demonstration Facility (VRDF) shall be in accordance with the following conditions:
- a. Operation of the VRDF shall not commence without a valid permit or permits issued therefor by the State of Ohio Environmental Protection Agency and other permits or authorizations required by federal statutes.
 - b. Operation of the VRDF shall be conducted by the licensee in accordance with the conditions, statements and representations contained in the application for license amendment dated August 15, 1983, and revisions dated September 28, 1984, January 4, 1985, January 3, 1986, and March 10, 1986, except as modified by conditions of this license. The licensee may make changes in the VRDF, its equipment and procedures described in the application without license amendment provided that any proposed change does not involve (i) a modification to the provisions of Conditions 8, 9, or 10 of this license (ii) a significant increase in radiation exposure of employees; (iii) an unreviewed safety question; or (iv) a decrease in effectiveness of VRDF effluent treatment systems. An evaluation shall be required to validate a change to the VRDF not requiring amendment to the license. Such evaluation shall be reviewed and approved by the Health and Physics Supervisor and the Radiological Safety Committee, and shall provide the basis for determining that the change will not involve a modification to the provisions of Conditions 8, 9, or 10 of this license, a significant increase in radiation exposure of employees, an unreviewed safety question, or a decrease in effectiveness of VRDF effluent treatment systems. A change shall be deemed to involve an unreviewed safety question if an accident analysis for the change, (i) results in consequence values exceeding the values of the accident analyses described in Section 6 of the licensee's Appendix G, or the probability of occurrence for the types of events there evaluated is judged to increase; or (ii) reveals a possibility for an accident of a different type than previously evaluated. Records of evaluations and approvals of changes shall be maintained by the licensee.
 - c. The licensee shall not retain low-level radioactive waste in physical inventory in the VRDF, either in the form of incoming waste or end-product, on behalf of customers, freight forwarders, carriers, brokers or the licensee, for a period of time in excess of one year from the time of receipt.
 - d. The licensee shall limit release of iodine-125 in effluents from the VRDF to not more than 0.010 curies per year. The licensee shall maintain administrative control procedures and records to achieve and demonstrate that such limits have not been exceeded.

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- e. The licensee shall use appropriate methods for the continuous collection of gaseous hydrogen-3, carbon-14 and iodine-125 samples in VRDF airborne effluents and shall analyze such samples on a daily basis when industrial and institutional waste containing these radionuclides is being processed, and on a weekly basis when other waste, including waste from nuclear utilities, is being processed. If only nuclear reactor waste is being processed, no sampling or analysis for I-125 is required.
- f. The licensee shall install and operate a real-time continuous monitor for particulate radionuclides in the VRDF incinerator off-gas discharge stack whenever the incinerator is operating. The monitor shall annunciate in the control room and shall alarm if concentrations of expected mixtures of particulate radionuclides should exceed 24 MPC-hours, or equivalent, using Appendix B, Table II values of 10 CFR Part 20. The control room shall be continuously manned during periods when the incinerator is operating.
- g. The licensee shall prepare and submit to the NRC Regional Administrator semiannually a report that provides an evaluation of VRDF operations performance, including the licensee's experience with correlating and managing the receipt, processing, shipment and release of radioactive material as the result of VRDF operations. The first report shall be submitted 6 months after initial operation and at 6 month intervals thereafter.
- h. The licensee shall have available onsite a technical representative from the incinerator vendor for the first six months of VRDF incinerator operation to assist with operations, training and trouble-shooting.
- i. The licensee shall install a fence or other means of access control around the VRDF or portions thereof for radiation protection of individuals in unrestricted areas.
- j. The licensee shall test installed HEPA filters used in the VRDF after initial installation, at intervals not to exceed six months, and after filter change. Testing shall comply with ANSI N101.1, "Efficiency Testing of Air-Cleaning Systems Containing Devices for Removal of Particles," using a "cold DOP" test with acceptance based on an efficiency of 99.95 percent or better.
- k. The licensee shall monitor the environment surrounding the VRDF for radionuclides processed therein, including hydrogen-3, carbon-14, and iodine-125 in air, water, soil and vegetation.

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- 27. The licensee shall perform quarterly surveys, not to exceed 4 months, for radiation, contamination and integrity of physical barriers at the retired Battelle Research Reactor. Records of such surveys shall be maintained by the licensee.



FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Date: JUN 02 1987

By: Leland C. Rouse

Leland C. Rouse, Chief
Fuel Cycle Safety Branch
Division of Fuel Cycle, Medical,
Academic, and Commercial Use Safety, NMSS
Washington, DC 20555

ANNEX A
 LIST OF EFFECTIVE PAGES
 BATTELLE COLUMBUS LABORATORIES APPLICATION
 AS REFERENCED BY ITEM 9
 OF
 LICENSE NO. SNM-7, DOCKET NO. 70-8

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vii	03/06/87*	1.27	10/05/81
viii	08/15/83	1.28	10/05/81
ix	09/15/84	1.29	10/05/81
x	10/05/81	1.30	10/05/81
xi	10/05/81	1.31	10/05/81
		1.32	09/15/84
		1.33	09/15/84
		1.34	09/15/84
		1.35	08/15/83
Part License Conditions		1.36	08/15/83
1.1	08/15/83		
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1.10	08/15/83		
1.11	10/05/81		
1.12	10/05/81		
1.13	10/05/81		
1.14	08/15/83		
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Part II, Appendix A, as submitted with
 renewal application by letter dated
 10/23/81.

*Amendment No. 2 dated JUN 02 1987