

MATERIALS LICENSE

Pursuant 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 1, Parts 30, 31, 32, 33, 34, 35, 39, 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.

Licensee

1. South Dakota State University
2. P.O. Box 2202
Brookings, South Dakota 57007-0896

In accordance with application dated
January 12, 1989

3. License number 40-02194-17 is amended in its entirety to read as follows:

4. Expiration date March 31, 2001

5. Docket or
Reference No 030-13079

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

- A. Any byproduct
material with Atomic
Numbers 1 through 83,
inclusive

- A. Any, except sealed
sources, plated
sources, or foils

- A. Not to exceed 50
millicuries per
radionuclide
except:

Sulfur-35 100 millicuries
Carbon-14 500 millicuries
Hydrogen-3 100 millicuries

- B. Any byproduct
material with Atomic
Numbers 3 through 83,
inclusive

- B. Sealed sources,
plated sources, or
foils

- B. Not to exceed 20
millicuries per
sealed sources,
plated sources, or
foils, except:

Hydrogen-3 1 curie
Cobalt-60 5 curies

- C. Americium-241

- C. Sealed sources
(Troxler or
Campbell Pacific
Nuclear)

- C. Not to exceed 110
millicuries per
source

9. Authorized use

- A. through C. Research and development as defined in Section 30.4 of 10 CFR Part 30, academic instruction, and calibration of licensee's instruments.

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C PDR

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**MATERIALS LICENSE
SUPPLEMENTARY SHEET**

License Number

40-02194-17

Doc'tet or Reference Number

030-13079

Amendment No. 13

CONDITIONS

10. A. Licensed material specified in Items 7.A. and 7.B. shall be used only at South Dakota State University, Brookings, South Dakota, and at locations identified in letter dated February 7, 1991.
- B. Licensed material specified in Item 7.C. may be used at temporary job sites of the licensee anywhere in the United States where the U.S. Nuclear Regulatory Commission maintains jurisdiction for regulating the use of licensed material.
- C. Carbon-14 may be used at the Shadehill Reservoir located in Sections 29 and 30 of Township 21N, Range 15E in Perkins County, South Dakota, in accordance with procedures dated April 22, 1994.
11. A. Licensed material shall only be used by, or under the supervision of, individuals designated by the Radiation Safety Committee, Leo H. Spinar, Ph.D., Chairperson.
- B. The Radiation Safety Officer for this license is Leo H. Spinar, Ph.D.
12. A. Sealed sources and detector cells shall be tested for leakage and/or contamination at intervals not to exceed 6 months or at such other intervals as specified by the certificate of registration referred to in 10 CFR 32.210.
- B. Notwithstanding Paragraph A of this Condition, sealed sources designed to emit alpha particles shall be tested for leakage and/or contamination at intervals not to exceed 3 months.
- C. In the absence of a certificate from a transferor indicating that a leak test has been made within 6 months prior to the transfer, a sealed source or detector cell received from another person shall not be put into use until tested.
- D. Sealed sources need not be leak tested if:
 - (i) they contain only hydrogen-3; or
 - (ii) they contain only a radioactive gas; or
 - (iii) the half-life of the isotope is 30 days or less; or
 - (iv) they contain not more than 100 microcuries of beta and/or gamma emitting material or not more than 10 microcuries of alpha emitting material; or

MATERIALS LICENSE
SUPPLEMENTARY SHEET

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40-02194-17

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Amendment No. 13

- (v) they are not designed to emit alpha particles, are in storage, and are not being used. However, when they are removed from storage for use or transferred to another person, and have not been tested within the required leak test interval, they shall be tested before use or transfer. No sealed source or detector cell shall be stored for a period of more than 10 years without being tested for leakage and/or contamination.
- E. The leak test shall be capable of detecting the presence of 0.005 microcurie of radioactive material on the test sample. If the test reveals the presence of 0.005 microcurie or more of removable contamination, a report shall be filed with the U.S. Nuclear Regulatory Commission in accordance with 10 CFR 30.50(b)(2), and the source shall be removed immediately from service and decontaminated, repaired, or disposed of in accordance with Commission regulations. The report shall be filed within 5 days of the date the leak test result is known with the U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011, ATTN: Director, Division of Nuclear Materials Safety. The report shall specify the source involved, the test results, and corrective action taken.
- F. Tests for leakage and/or contamination shall be performed by the licensee or by other persons specifically licensed by the Commission or an Agreement State to perform such services.
13. Sealed sources or detector cells containing licensed material shall not be opened or sources removed from source holders by the licensee.
14. Maintenance, repair, cleaning, replacement, and disposal of foils contained in detector cells shall be performed only by the device manufacturer or other persons specifically authorized by the Commission or an Agreement State to perform such services.
15. A. Detector cells containing a titanium tritide foil or a scandium tritide foil shall only be used in conjunction with a properly operating temperature control mechanism which prevents the foil temperature from exceeding that specified by the manufacturer and approved by U.S. Nuclear Regulatory Commission.
- B. When in use, detector cells containing a titanium tritide foil or a scandium tritide foil shall be vented to the outside.
16. Experimental animals, or the products from experimental animals, that have been administered licensed materials shall not be used for human consumption.
17. Licensed material shall not be used in or on human beings.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number

40-02194-17

Docket or Reference Number

030-13079

Amendment No. 13

18. Pursuant to 10 CFR 20.1302(c) and 10 CFR 20.2002, the licensee is authorized to dispose of licensed material by incineration provided the gaseous effluent from incineration does not exceed the limits specified for air in Appendix B, Table II, 10 CFR Part 20.
19. The licensee is authorized to hold radioactive material with a physical half-life of less than or equal to 120 days for decay-in-storage before disposal in ordinary trash provided:
- A. Radioactive waste to be disposed of in this manner shall be held for decay a minimum of 10 half-lives.
 - B. Before disposal as ordinary trash, byproduct material shall be surveyed at the container surface with the appropriate meter set on its most sensitive scale and with no interposed shielding to determine that its radioactivity cannot be distinguished from background. All radiation labels shall be removed or obliterated.
 - C. A record of each disposal permitted under this License Condition shall be retained for 3 years. The record must include the date of disposal, the date on which the byproduct material was placed in storage, the radionuclides disposed, the survey instrument used, the background dose rate, the dose rate measured at the surface of each waste container, and the name of the individual who performed the disposal.
20. The licensee is authorized to transport licensed material only in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."
21. The licensee shall conduct a physical inventory every 6 months to account for all sources and/or devices received and possessed under the license.

MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number

40-02194-17

Docket or Reference Number

030-13079

Amendment No. 13

22. Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The U.S. Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

- A. Application dated January 12, 1989
- P. Letter dated February 4, 1991
- Letter dated February 7, 1991
- Letter dated March 13, 1991
- Letter dated July 31, 1991
- Letter dated March 30, 1994
- G. Letter dated April 22, 1994
- H. Letter dated July 11, 1995

FOR THE U.S. NUCLEAR REGULATORY COMMISSION

Original Signed By
Jacqueline D. Burks

Date JUN 26 1996

By

Nuclear Materials Licensing Branch
Region IV
Arlington, Texas 76011



UNITED STATES
NUCLEAR REGULATORY COMMISSION

REGION IV

611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

June 26, 1996

South Dakota State University
ATTN: Leo H. Spinar, Ph.D.
Radiation Safety Officer
P.O. Box 2202
Brookings, South Dakota 57007-0896

SUBJECT: LICENSE AMENDMENT

Please find enclosed License No. 40-02194-17. You should review this license carefully and be sure that you understand all conditions. If you have any questions, you may contact the reviewer who signed your license at 817-860-8132.

This amendment authorizes your request to decommission a radioisotope burial site for unrestricted use.

The Division of Waste Management's (DWM) radiological screening assessment provides the health and safety basis for the recommendation. In summary, the basis includes: (1) the comparisons of current total site radioisotope inventories (specifically for ^3H , ^{14}C , ^{36}Cl , ^{60}Co , and ^{137}Cs) with 10 CFR Part 20 annual limits on intakes for the purpose of calculating worst-case, lifetime dose estimates; (2) the comparison of estimated ^{14}C and ^3H concentrations over the container volume (mass) with the concentrations in 10 CFR 20.2005 that may be disposed of as if they were not radioactive; and (3) the maximum hypothetical one-time annual dose that could be received if all the activity was dissolved in the typical minimum volume of water needed to supply a single family well.

Given that the radioactive waste was to be disposed of in 43 steel containers and recycled CaOH drums, we recommend that you consider attaching a notice to the site deed describing the nature of the disposals and referencing NRC's decommissioning action. These recommendations are based on the potential radiological hazards of the disposed material and does not in any way preclude you from additional actions that may be necessary to address any non-radiological hazards.

NRC recently revised the regulations governing the transportation of radioactive material - 10 CFR Part 71, "Packaging and Transportation of Radioactive Material". The final rule which became effective April 1, 1996, conforms NRC regulations with those of the International Atomic Energy Agency (IAEA), and codifies criteria for packages used to transport plutonium by air. If you have not implemented the revised Part 71, you must do so immediately. As of April 1, 1996, NRC began to inspect and enforce these regulations for all licensees.

NRC expects licensees to conduct their programs with meticulous attention to detail and a high standard of compliance. Because of the serious consequences to employees and the public which can result from failure to comply with NRC requirements, you must conduct your program involving radioactive materials in accordance with the conditions of your NRC license, representations made in your license application, and NRC regulations. In particular, note that you must:

1. Operate in accordance with NRC regulations 10 CFR Part 19, "Notices, Instructions and Reports to Workers: Inspection and Investigations," 10 CFR Part 20, "Standards for Protection Against Radiation," and other applicable regulations.
2. Possess radioactive material only in the quantity and form indicated in your license.
3. Use radioactive material only for the purpose(s) indicated in your license.
4. Notify NRC in writing of any change in mailing address (no fee required if the location of radioactive material remains the same).
5. Request and obtain written NRC consent before transferring your license or any right thereunder, either voluntarily or involuntarily, directly or indirectly, through transfer of control of your license to any person or entity. A transfer of control of your license includes not only a total change of ownership, but also a change in the controlling interest in your company whether it is a corporation, partnership, or other entity. In addition, appropriate license amendments must be requested and obtained for any other planned changes in your facility or program that are contrary to your license or contrary to representations made in your license application, as well as supplemental correspondence thereto, which are incorporated into your license. A license fee may be charged for the amendments if you are not in a fee-exempt category.
6. Maintain in a single document decommissioning records that have been certified for completeness and accuracy listing all the following items applicable to the license:
 - Onsite areas designated or formerly designated as restricted areas as defined in 10 CFR 20.3(a)(14) or 20.1003.
 - Onsite areas, other than restricted areas, where radioactive materials in quantities greater than amounts listed in Appendix C to 10 CFR 20.1001-20.2401 have been used, possessed, or stored.

- Onsite areas, other than restricted areas, where spills or other unusual occurrences involving the spread of contamination in and around the facility, equipment, or site have occurred that required reporting pursuant to 10 CFR 30.50(b)(1) or (b)(4), including areas where subsequent cleanup procedures have removed the contamination.
 - Specific locations and radionuclide contents of previous and current burial areas within the site, excluding radioactive material with half-lives of 10 days or less, depleted uranium used only for shielding or as penetrators in unused munitions, or sealed sources authorized for use at temporary job sites.
 - Location and description of all contaminated equipment involved in licensed operations that is to remain onsite after license termination.
7. Submit a complete renewal application with proper fee, or termination request at least 30 days before the expiration date on your license. You will receive a reminder notice approximately 90 days before the expiration date. Possession of radioactive material after your license expires is a violation of NRC regulations.
8. Request termination of your license if you plan to permanently discontinue activities involving radioactive material.

You will be periodically inspected by NRC. Failure to conduct your program in accordance with NRC regulations, license conditions, and representations made in your license application and supplemental correspondence with NRC will result in enforcement action against you. This could include issuance of a notice of violation; imposition of a civil penalty; or an order suspending, modifying, or revoking your license as specified in the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), 60 FR 34381, June 30, 1995.

Thank you for your cooperation.

Sincerely,

Original Signed By
Jacqueline D. Burks

Jacqueline D. Burks
Health Physicist
Nuclear Materials Licensing Branch

Docket: 030-13079
License: 40-02194-17
Control: 464818

Enclosures: As stated

JUN 26 1996

South Dakota State University

-5-

DOCUMENT NAME: P:\MLCOVER\LETTER\SDSU.MLC

To receive a copy of this document, indicate in the box "C" - Copy without attachment/enclosure "E" - Copy with attachment/enclosure "N" - No Copy

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JDBurks	<i>JDBurks</i>						
06/26/96							

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UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

June 18, 1996

MEMORANDUM TO: Ross A. Scarano, Director
Division of Nuclear Material Safety
Region IV

FROM: Robert A. Nelson, Acting Chief *Robert A. Nelson*
Low-Level Waste and Decommissioning
Projects Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards

SUBJECT: SOUTH DAKOTA STATE UNIVERSITY--RESPONSE TO TECHNICAL
ASSISTANCE REQUEST

As a part of a technical assistance request from A. B. Beach, dated January 10, 1991, the Division of Waste Management, NMSS, was asked to provide assistance regarding the licensee's request to decommission a radioisotope burial site for unrestricted use. To date, our response has been delayed because of higher priority resource commitments, the lack of a defined Nuclear Regulatory Commission policy on the unrestricted release of such sites, problems with contractor support, and a change in project manager.

We have now reviewed the licensee's information supporting its request and believe that the burial site can be released for unrestricted use. The attachment includes our radiological screening assessment that, when taken as a whole, provides the health and safety basis for our recommendation. In summary, the basis includes: (1) the comparisons of current total site radioisotope inventories (specifically for ^3H , ^{14}C , ^{36}Cl , ^{60}Co , and ^{137}Cs) with 10 CFR Part 20 annual limits on intakes for the purpose of calculating worst-case, lifetime dose estimates; (2) the comparison of estimated ^{14}C and ^3H concentrations over the container volume (mass) with the concentrations in 10 CFR 20.2005 that may be disposed of as if they were not radioactive; and (3) the maximum hypothetical one-time annual dose that could be received if all the activity was dissolved in the typical minimum volume of water needed to supply a single family well. Furthermore, although not directly relevant from a regulatory dose assessment perspective, comparisons of total radioisotopic inventories can be made with the exempt quantity values in 10 CFR 30.71.

Contact: W. LaHS, NMSS
415-6756

R. Scarano

-2-

Given that the radioactive waste was to be disposed of in 43 steel containers and recycled CaOH drums, we would recommend that the licensee consider attaching a notice to the site deed describing the nature of the disposals and referencing NRC's decommissioning action. These recommendations are based on the potential radiological hazards of the disposed material. Additional actions may be necessary to address any non-radiological hazards. If you have any questions, please call me at (301) 415-7298, or W. LaHS at (301) 415-6756.

Attachment: As stated

RADIOLOGICAL DOSE ASSESSMENT
SOUTH DAKOTA STATE UNIVERSITY
RADIOACTIVE WASTE BURIAL SITE

Introduction

The South Dakota State University (SDSU) burial site is located in Brookings County, in eastern South Dakota. The site is about 2.4 kilometers (km) or 1.5 miles north of the SDSU campus and is on land owned and used by the university as part of the Agricultural Experiment Station research farm. During the period between May 7, 1964, and September 17, 1975, forty-three containers (mainly 3.8- to 7.6-liter (10- to 20-gallon) steel drums) containing research waste were buried in separate pits approximately 0.9- to 1.5 meters (m) (3- to 5-feet) below the surface. Most of the radioactivity disposed of, that has not decayed to current negligible levels, involves carbon-14 (^{14}C) with lesser activities of tritium (^3H). Very small activities (i.e., less than 1.3 Megabecquerel (MBq) or 35 microcuries (μCi) total) of chlorine-36 (^{36}Cl), cesium-137 (^{137}Cs) and cobalt-60 (^{60}Co) have been conservatively estimated to remain in the waste at the site.

The dimensions of the site are approximately 30.5 m (100 ft) by 12.2 m (40 ft) with the burial area occupying about 150 m² (1600 ft²). The site is properly fenced, controlled, and marked; and the disposal records have been well-maintained.

Because of the minimal total quantities of radioactivity remaining at the site, the approach taken in the following assessment is to make bounding estimates of hypothetical doses and comparisons to quantities or concentrations of radioactive material, the release of which is allowed by current regulations.

Inventory and Source Term Assessment

The SDSU burial site was used to dispose of university research waste consisting of animals (parts), plant material, laboratory waste, soil, etc. The radioactivity inventories at the time of disposal and relative burial locations are shown in Table 1 and Figure 1, taken from the licensee's submitted material. As indicated, the disposals included several short-lived radioisotopes that, because of radioactive decay, are no longer pertinent to this assessment. The bounding current inventory (rounded) of radionuclides includes: 92 MBq (2.5 mCi) of ^{14}C ; 2.4 MBq (0.65 mCi) of ^3H ; 1 MBq (30 μCi) of ^{36}Cl ; 0.04 MBq (1.2 μCi) of ^{137}Cs ; and 0.02 MBq (0.5 μCi) of ^{60}Co . These radionuclides are contained in about one-half of the 43 buried containers.

Radiological Assessment

The first approach, to portray the bounding significance [insignificance] of the burial site inventories, was to compare the inventories of the individual radioisotopes to their respective annual limits on intake (ALI) documented in 10 CFR Part 20, Appendix B, Table 1, column 1, to obtain bounding dose estimates. For the radioisotopes of interest, these values represent the

ATTACHMENT

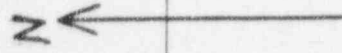
-2-
RADIOISOTOPE DISPOSAL SITE
South Dakota State University

Note: Activity values for the
radioisotopes listed below
are given as microcuries

North Research Farm

DATE	LOCA- TION	⁷⁵ Se	³⁵ S	⁶⁰ Co	³² P	³ H	¹⁴ C	³⁶ Cl	⁴⁵ Ca	⁵⁹ Fe	⁶⁵ Zn	⁷⁴⁺⁷³ As	¹²⁵ I	¹³⁷ Cs
5-7-64	#1	500	500											
"	#2	4070	2020	30										
"	#3	4600	500		2									
0-3-64	#4					1000	810	30						
0-27-65	#5	1510	80						180	570				
"	#6	240	110							180				
1-22-66	#7	450			1000				20	20				
"	#8	10	1							10				
3-29-68	#9	250			5		100			1				
"	#10	80					1090		1090	1	see p/8 disposal for connection LPH 6-4-84			
"	#11	790			5					100				
"	#12	1000								1				
2-3-68	#13						30							
"	#14						100							
"	#15	30					80							
6-13-69	#16	1200												
"	#17	2300												
"	#18	800												
"	#19						380							
"	#20				200		60							
"	#21													
"	#22													
"	#23													
											Total for locations 80			

FIGURE 1



x 39 x 40 x 41 x 42 x 43

x 1 x 2 x 3 x 4 x 5 x 6

x 7 x 8 x 9 x 10 x 11 x 12

x 13 x 14 x 15 x 16 x 17 x 18

x 19 x 20 x 21 x 22 x 23 x 24

x 25 x 26 x 27 x 28 x 29 x 30

x 31 x 32 x 33 x 34 x 35 x 36 x 37 x 38

Fence

Highway # 77 1/2 mile east

Shelterbelt
N. Farm

Location No.

Date of Burial

1, 2, 3

4

5, 6

7, 8

9, 10, 11, 12

13, 14, 15

16, 17, 18, 19, 20, 21, 22, 23, 24, 25

26, 27, 28

29, 30, 31, 32

33, 34, 35, 36, 37, 38

39, 40, 41, 42, 43

5-7-64

10-3-64

10-27-65

10-22-66

3-29-68

10-3-68

6-16-69

10-20-70

11-8-71

11-6-73

9-17-75

annual intake through ingestion that would result in a committed effective dose equivalent of 0.05 sievert (Sv) or 5 rem. (Note, with the exception of ^{60}Co , the ingestion pathway is most limiting.) These values are shown in Table 2 together with the site inventory, and the one-time hypothesized lifetime dose that would be calculated if one individual's intake involved the entire site inventory of the particular radioisotope.

TABLE 2

Radioisotope	ALI (μCi)	Site Inventory (μCi)	Hypothesized Dose (mrem)
^{14}C	2000	<2460	6150
^3H	80,000	< 645	40
^{36}Cl	2000	< 30	75
^{137}Cs	100	< 1.2	60
^{60}Co	200	< 0.5	13

With the possible exception of the calculation as it applies to ^{14}C , Division of Waste Management (DWM) staff believes the results provide a prima facie demonstration that any radiological impacts associated with the burial site's inventory would be insignificant.

As a second approach to portray the significance of the burial site's inventory, the concentrations of ^{14}C and ^3H were estimated on a container basis, so that they could be compared to the $0.05 \mu\text{Ci/gram (g)}$ ($1.85 \times 10^{-3} \text{ MBq/g}$) concentration values in 10 CFR 20.2005, under which a licensee would be permitted to dispose of licensed material as if it were not radioactive. Although this provision in Part 20 applies to liquid scintillation medium and animal tissue, the comparison to the concentrations in the typical plant material disposed of by SDSU is illustrative. The largest calculated concentration of ^{14}C (laboratory residues) is in the one smallest container that contains about one-third of the total ^{14}C site inventory. The calculated concentration in this case would be about 70 percent of the aforementioned 10 CFR Part 20 value. For ^3H , the value would be less than 20 percent of this value.

The third approach attempts to quantify a minimal dilution factor that would apply to any dose received through the drinking water pathway. Following the general screening model approach described in National Council on Radiation Protection and Measurements Report No. 123 I, dated January 22, 1996, a Level I screening involves dividing a radioactive release by an effluent discharge (here estimated at the point of exposure). If one assumes that the container with the greatest inventory of ^{14}C (just under one-third of the site inventory) releases all its activity into the minimum amount of water needed to meet average per capita use in a single year ($91 \text{ m}^3/\text{yr}$), an individual's calculated dose from the drinking water pathway (2 liters/day intake) would be about 0.16 mSv (16 mrem). This calculation takes no credit for retardation

effects, the likely release of the ^{14}C to the air, or the exchange of ^{14}C with nonradioactive carbon as it passes through the environment.

Finally, as a further point of comparison only, it should be noted that the individual total site activities for ^3H , ^{137}Cs , and ^{60}Co are less than the exempt quantity values listed in 10 CFR 30.71 and that ^{14}C and ^{36}Cl exceed the tabulated values by factors of 25 and 3, respectively.

Based on these bounding analyses, DWM staff believes the SDSU burial site does not pose a public health and safety threat and can be released for unrestricted use. As a point of good practice, we believe the licensee should be encouraged to provide a notice in the property's deed, describing the burials and describing NRC's action for future reference.



South Dakota State University
Box 2202
Brookings, SD 57007-0806

Chemistry Department
Shepard Hall 121
Phone: (605) 688-5151

July 31, 1991

FIVE

United States Nuclear Regulatory Commission
Region IV
Attention: Mr. Jack E. Whitten
Senior Health Physicist
Nuclear Materials Licensing Section
611 Ryan Plaza Drive, Suite 1000
Arlington, Texas 76011

REFERENCE: License 40-02194-17

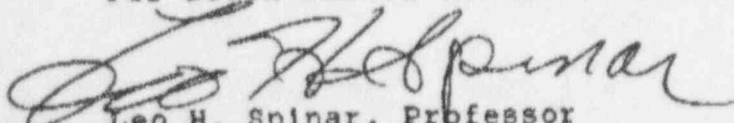
Gentlemen:

The attached material has been prepared in response to your request for a description of the hydrological and geological conditions surrounding the burial site proposed for abandonment by South Dakota State University.

As Dr. Carlson worked on this report, he became aware of a drill hole within 100 feet of the site. The drill hole was made by the Geological Survey late this Spring and has not been entered into the Survey's data bank. Dr. Carlson has requested a copy of the field log for this drill hole. As soon as it arrives I will send you a copy.

If there are further questions, please contact me (605-688-4264) or Dr. Carlson (605-688-4761).

For South Dakota State University,


Leo H. Spinar, Professor
Radiation Safety Officer

Sent by FAX to 817-860-8210



South Dakota State University
Brookings, South Dakota 57007

Department of Plant Science
Field Crops—Plant Pathology—Soils—Weeds
Main Office, 219 Agricultural Hall, Box 2207-A
605/688-5121
Plant Science Building, Box 2109
605/688-5156
College of Agriculture and Biological
Sciences

July 31, 1991

To whom it may concern;

The exact location of the site in question is in the SW corner of the NE 1/4 of section 11, T.110N, R.50W.. This location is marked on the map that is attached.

As described in the attached letter from the South Dakota Geological Survey and shown on the attached map, this area is centrally located in the middle of a finger of pre Wisconsin age till. The majority of drill holes in the area show that there are no continuous surficial sand and/or gravel aquifers within 1/2 to 3/4 of a mile of the site. There is no useable ground water within the top 200-400 ft profile. The unweathered till (which have saturated Darcy K's of less than .0001 to .00001 ft./day) that underlies the top 20 or so ft. of weathered material holds up perched, (localized) water tables that are frequently found in the area. It is probable that the threshold gradient for the movement of water within the unweathered till is never met, thus there is little or no convective transport within the unweathered material. The localized water table (within the weathered part of the profile, the top 20 ft.) rises and falls with the precipitation and evaporation in the area. There is limited vertical topographic relief in the area and thus there is little gradient to drive water in the horizontal direction within the permeable weathered material.

My conclusion is that the site in question is a relatively hydrologically isolated profile that poses little risk of being connected with the area's valued ground water resources.

If there are any questions regarding this site please contact me at the plant Science Department

Sincerely

A handwritten signature in dark ink, appearing to read 'C. Gregg Carlson', is written over the typed name.

C. Gregg Carlson

Associate Professor, Extension Ground Water Specialist

Plant Science Department

South Dakota State University

South Dakota Department of
Environment and Natural Resources
DIVISION OF GEOLOGICAL SURVEY

SCIENCE CENTER, USD
VERMILLION, SD 57069-2390
(605) 677-5227
FAX (605) 677-5895

July 18, 1991

Leo Spinar
Chemistry Department
Shepard Hall
South Dakota State University
Brookings, SD 57007

Dear Mr. Spinar:

In reference to your inquiry concerning the geological and hydrological setting of sec. 11, T. 110 N., R. 50 W., we have the following information available. The section in question lies on one of a series of linear, low relief hills that together make up the "Brookings till plain." These NE-SW trending hills are dissected by late Wisconsin outwash (part of the Big Sioux aquifer).

This ground moraine deposit is probably pre-Wisconsin in age (>100,000 yr. b.p.), and is characterized by a compact, silt and clay rich, unstratified till. This deposit often exhibits deep weathering to as much as 50 feet, though drill-hole data in the immediate vicinity indicate more moderate weathering of less than 20 feet. This area has been mapped by Lee (1957) and is also the subject of an ongoing investigation by myself.

Unweathered till characteristically has a hydraulic conductivity ranging between 0.000096 to 0.00028 feet/day, whereas weathered till has a hydraulic conductivity ranging between 0.00057 to 0.144 feet/day (Hendry, M. J., 1982, Hydraulic conductivity of a glacial till in Alberta: Ground Water, V. 20, no. 2, p. 162-169).

Although we have no drill data in section 11, considerable data exist within one mile. Directly to the northwest of section 11, many shallow test holes were drilled in the search for a new city landfill site (Frykman, L. J., 1986, Sanitary landfill investigation for the city of Brookings, South Dakota: South Dakota Geological Survey Open-File Report 42-UR).

Data from many of these test holes can be extrapolated and used as a guide to probable conditions in section 11. Generally, at the landfill site, those areas of higher elevation had water levels greater than 10 feet from land surface, while those along natural drainages and of lower elevation had depths to water in the till of less than 10 feet. However, it must be remembered that apart from a few test holes encountering alluvial or outwash material, all other tests were drilled into non-aquifer material.

For better stratigraphic control, a deeper South Dakota Geological Survey test hole drilled in the SE¼ sec. 12, T. 110 N., R. 50 W. can be used. This test exhibited 13 feet of oxidized till overlying 100+ feet unoxidized till before the next oxidized zone was encountered. The first significant aquifer material was encountered at 222 feet below land surface where two zones constituting the Howard

Leo Spinar
July 18, 1991
Page 2

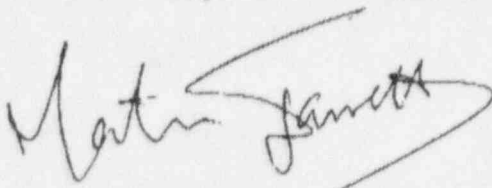

aquifer were penetrated (Hamilton, L. J., 1989, Water Resources of Brookings and Kingsbury Counties: U.S. Geological Survey Water Resources Report 88-4185).

Sand encountered at 302 and 320 feet below land surface probably represent part of the Altamont aquifer. Directly below this lower sand unit, Cretaceous shales were penetrated.

I have enclosed copies of representative test holes in the area around section 11, as well as a copy of the surface geology map used in the landfill investigation mentioned above. Obviously since no information exists within section 11, additional drilling and sampling will be needed if greater accuracy is required.

If I can be of any further assistance, please do not hesitate to contact me at the above address.

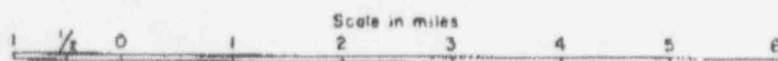
Sincerely,

Martin J. Jarrett
Geologist

For the State Geologist

MJJ:co
Enclosures



• 72 Test hole, number shows thickness of saturated sand and gravel; a plus (+) indicates that full thickness of sand and gravel was not penetrated.

53 feet of saturated sand
10 feet of clay
17 feet of sand

by Assad Barari, 1967
drafted by D. W. Johnson



Figure 5. Map showing thickness of saturated sand and gravel in the Brookings area.

SOUTH DAKOTA STATE UNIVERSITY

OFFICE OF FINANCE & BUDGET

Telecopier Cover Letter

PLEASE DELIVER THE FOLLOWING PAGES:

TO: NAME JACK WHITTEN
ADDRESS NRC - Arlington, TX
FAX NUMBER 817-860-8210
PHONE NUMBER _____

FROM: NAME LEO H. SPINAR
ADDRESS SOUTH DAKOTA STATE UNIV.
TELEPHONE 605-688-4264
FAX NUMBER (605) 688-5822

DATE: 7-31-91 TIME: 2:47pm

SPECIAL INSTRUCTIONS: _____

TOTAL NUMBER OF PAGES (Including this cover letter): _____

IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL OUR OFFICE AT
(605) 688-4920 AS SOON AS POSSIBLE.

THANK YOU!

LICENSE FEE TRANSMITTAL

A. REGION IV

1. APPLICATION ATTACHED
 APPLICANT/LICENSEE: SOUTH DAKOTA STATE UNIVERSITY
 RECEIVED DATE: 930720
 DOCKET NO.: 3013079
 CONTROL NO.: 464818
 LICENSE NO.: 40-02194-17
 ACTION TYPE: AMENDMENT

2. FEE ATTACHED
 AMOUNT: 4
 CHECK NO.: 4

3. COMMENTS

*See below

SIGNED
 DATE

Billy Guszczynski
7/20/93

B. LICENSE FEE MANAGEMENT BRANCH (CHECK WHEN MILESTONE 03 IS ENTERED Y)

1. FEE CATEGORY AND AMOUNT: EX 3L

FEE NOT REQUIRED

2. CORRECT FEE PAID. APPLICATION MAY BE PROCESSED FOR:

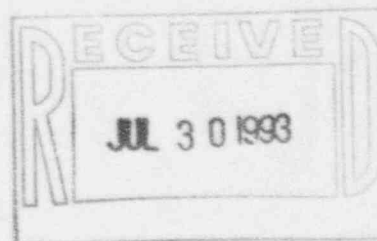
Cont. 462362

AMENDMENT
 RENEWAL
 LICENSE

3. OTHER

SIGNED
 DATE

Pat Messier
7/27/93



* Continuation of M/C # 462362.

REQUEST FOR TECHNICAL ASSISTANCE

DATE: January 10, 1991

COPY

TO: John E. Glenn, Chief, Medical, Academic, and Commercial Use Safety Branch, NMSS JAN 10 1991

FROM: A. B. Beach, Director, Division of Radiation Safety and Safeguards, Region IV

LICENSEE: South Dakota State University

LICENSE NO.: 42-27018-01

X Control No.

Cont. 46
462362 (excerpts enclosed)
464818 (7/20/93)

*Alternate waste disposal procedure request in accordance with Section 20.302 of 10 CFR Part 20. Disposal of ash residue remaining after the incineration of radioactive materials.

*Request by licensee to decommission and abandon a radioisotope burial site and release it to unrestricted use.

RECEIVED BY LFMS	
Date	7/23/93
Log	Jul 4 IV
By	Am
Date Completed	7/27/93

FEE NOT REQUIRED

Cont. 462362

Letter dated _____ (enclosed)

Suggested change in licensing procedure (enclosed)

Other (see remark)

Problem/Issue:

1. Request by licensee to dispose of ash residue remaining after the incineration of radioactive waste. Region IV was instructed, based on the January 9, 1991, telephone conversation between Jack E. Whitten and Michael Lamastra of NMSS, that this disposal issue be forwarded to Headquarters for review as a Section 20.302 alternative disposal request.
2. Request of the licensee to decommission, abandon, and return to unrestricted use a radioactive burial site that is located west of the University Cattle and Sheep Nutrition Research Unit and is a part of the South Dakota State University (SDSU) Agricultural Experiment Station Research farms.

Burials were made from May 7, 1964, to September 17, 1975, in 43 plots consisting of an area approximately 40 feet by 100 feet (0.09 acre). Materials buried during the lifetime of the facility consisted of small animals, plant materials, and scintillation fluid containing tritium.

Action Required:

Request that this Technical Assistance Request, consisting of 2 parts, be reviewed by NMSS and forwarded to the Division of Low Level Waste Management and Decommissioning as appropriate.

464818

Alternatives Considered:

Recommended Alternative:

Remarks:

The licensee was notified in letter dated January 10, 1991, that the request for disposal procedures other than those approved by 10 CFR Part 20 is being forwarded to NRC Headquarters for review. SDSU was made aware in the above letter that these disposal and decommissioning issues could require that additional information be submitted to Region IV or to Headquarters.

Regional Review: Nuclear Materials Licensing Section
Jack E. Whitten, Senior Health Physicist
Reviewer Code: T1
Reviewer Phone No.: FTS:728-8197

8. Decommissioning of A Burial Site.

Authority is requested to decommission and abandon the following radioisotope burial site and release it for general use on July 1, 1989. All fencing, signage and markers will be removed and no further monitoring or maintenance of the area will be made. The materials will be removed from the Inventory records.

The burial site is located in Brookings County, South Dakota, approximately 1.4 miles north of the U.S. Highway 14 Bypass (or 2.2 miles north of the Coughlin Campanile on the South Dakota State University campus) on Brookings County Highway 77 and 0.5 miles west on a University maintained roadway. The site, which is owned by the University, is west of the University Cattle and Sheep Nutrition Research Unit and is part of the Agricultural Experiment Station Research farms.

Burials were made in 43 plots in the area, which is approximately 40 feet by 100 feet (0.09 acre), from May 7, 1964, to September 17, 1975. No further burials are planned. Most of the material consists of small animals (primarily chickens), plant material and scintillation fluid containing tritium.

As of July 1, 1989, the calculated levels of activity remaining in the site are:

Tritium	0.90	mCi
Carbon-14	1.20	mCi
Chlorine-36	0.030	mCi
Cobalt-60	0.0011	mCi
Cesium-137	0.0015	mCi
Zinc-65	10 ⁻¹⁰	mCi
Calcium-45	10 ⁻¹⁵	mCi
Selenium-75	10 ⁻¹⁵	mCi
Arsenic-73/arsenic-74	10 ⁻²⁶	mCi
Iodine-125	10 ⁻²⁸	mCi
Sulfur-35	10 ⁻³¹	mCi
Iron-59	10 ⁻⁵³	mCi
Phosphorus-32	10 ⁻¹⁵⁴	mCi

462362

3. Disposal by release into air or water

Release of radioactive waste into the air or water (other than the sanitary sewer) shall be in conformity with the requirements of 10 CFR 20.106.

4. Disposal by incineration

The present procedures for incineration of waste shall be continued. All incineration of waste material is performed by the Radiation Safety Officer. Before incineration, the maximum concentration of the radioisotope in the gaseous effluent is calculated to ascertain that this concentration does not exceed the limits specified for air in Appendix B, Table II, 10 CFR 20. The ash is recovered and surveyed for its activity level. The ash residues are disposed of as ordinary waste if the concentration of licensed material appearing in the ash residue does not exceed the concentrations (in terms of microcuries per gram) specified for water in Appendix B, Table II 10 CFR 20. Ash residues with concentrations in excess of these limits are stored as radioactive waste by the Radiation Safety Officer until the activity levels have decayed to these limits. The ash residues are then disposed of as ordinary trash.

5. Disposal of tritium and carbon-14 waste by incineration

The disposal by incineration of tritium and carbon-14 contained in scintillation fluid and in animal tissue shall be in conformity with the requirements of 10 CFR 20.306 and subject to the restrictions of the Environmental Protection Agency with regard to disposal of the chemical components of the scintillation fluid.

6. Disposal by other methods

No methods other than those described in this item are being used for disposal of wastes.

7. Storage of Waste

One of the methods of "disposal" of waste material by a user is to transfer the material to the Radiation Safety Officer. If it is not possible to dispose of the material by one of the methods described above, the Radiation Safety Officer seals and stores the material in a limited access area until the activity decays to a level suitable for disposal. The original shipment is removed from the inventory records and is replaced by a Waste Storage record.

Incineration ash residues with activity levels in excess of the disposal limits are included in this storage area and inventory procedures.