

DEPARTMENT OF NUCLEAR SAFETY

1035 OUTER PARK DRIVE • SPRINGFIELD, ILLINOIS 62704
217-785-9900 • 217-782-0123 (TDD)

George H. Ryan
Governor

Thomas W. Ortziger
Director



November 21, 2001

Radioactive Material License
STA-583

Mark S. Krippel
Project Manager
Kerr-McGee Environmental Management Corp.
800 Weyrauch St.
West Chicago, IL 60185

Dear Mr. Krippel:

Enclosed is amendment number 57 to your License Number STA-583. For your convenience, the changes are boldfaced on this license amendment.

This amendment revises Condition 6 to incorporate new groundwater protection requirements. Condition 6A specifies the frequency of groundwater quality monitoring and the constituents for which samples must be analyzed. Condition 6B sets forth requirements for notification and corrective action program submissions. The final groundwater protection standards for West Chicago REF groundwater remediation are established in Condition 6C. The storm sewer and surface water sampling requirements, previously contained in Condition 6B, are now in Condition 6D.

In a July 2, 1996 letter to Kerr-McGee, the Department stated its intent to amend your license to establish a groundwater protection and compliance program. The letter described proposed enforcement procedures, sampling protocols and radiological and nonradiological groundwater protection standards (GWPS). Certain elements of the proposed procedures were subsequently revised in a letter dated May 19, 1997. The proposed GWPS were developed by the Department in accordance with the provisions of 10 CFR Part 40, Appendix A, Criteria 5B(1), 5B(2) and 5B(5). The detailed methodology and regulatory bases for developing the proposed GWPS are described in *Groundwater Protection Standards for the West Chicago Rare Earths Facility*, a report prepared by Duke Engineering & Service for the Department. Proposed standards were set for twenty groundwater constituents.

As provided for in 10 CFR Part 40, Appendix A, Criterion 5B(6), Kerr-McGee submitted to the Department on December 11, 1997 an Alternate Concentration Limit (ACL) Demonstration (LKI-391) for four of the twenty constituents for which proposed GWPS had been developed.



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The four constituents for which ACLs were sought were molybdenum, selenium, thorium-230 and total uranium. In response to Department comments, Kerr-McGee submitted a revised ACL Demonstration (LKI-461) dated January 15, 1999. A second revision (LKI-564) was submitted on April 17, 2000; a third revision (LKI-564) was submitted on January 16, 2001; and a final ACL Demonstration, Revision 4, (LKI-629) was submitted on May 24, 2001.

The Department has determined that the proposed ACLs for molybdenum, selenium, thorium-230 and total uranium are as low as reasonably achievable after considering practical corrective actions, and that the constituents will not pose a substantial present or potential hazard to human health or the environment as long as the ACLs are not exceeded. Consequently, the Department establishes the four ACLs as groundwater protection standards for the West Chicago REF.

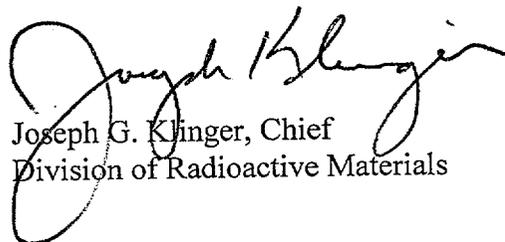
Please review the enclosed document carefully and be sure that you understand all conditions. You must conduct your program involving radioactive material in accordance with the conditions of the Illinois license, representations made in your license application, and Illinois regulations.

You must request and obtain an appropriate amendment if you plan to make any changes in your facility or program. Certain amendments require that a fee be assessed and paid to the Department. If applicable, you will be billed in accordance with the requirements of 32 Ill. Adm. Code Part 331.120.

You will be periodically inspected by the this agency. Failure to conduct your program in accordance with IDNS regulations and your license will result in enforcement action.

Thank you for your cooperation in this matter. When corresponding with this office, please refer to your license number and ensure that all items are submitted in duplicate. If you have any questions, please contact the Division of Radioactive Materials, LLRW Licensing & Site Decommissioning Section, at (217) 785-9947.

Sincerely yours,



Joseph G. Klinger, Chief
Division of Radioactive Materials

JGK:CRH
Enclosure

STATE OF ILLINOIS
DEPARTMENT OF NUCLEAR SAFETY

RADIOACTIVE MATERIAL LICENSE

DIVISION OF RADIOACTIVE MATERIALS
1035 OUTER PARK DRIVE
SPRINGFIELD, ILLINOIS 62704

Pursuant to the Illinois Radiation Protection Act and the rules and regulations in 32 Illinois Administrative Code promulgated thereunder, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, own, possess and transfer radioactive material(s) listed herein; and to use such radioactive material(s) for the purpose(s) and at the place(s) designated below. This license is subject to all applicable rules, regulations and orders of the Illinois Department of Nuclear Safety now or hereafter in effect and to any conditions specified in the license. This document confirms that the licensee has registered the sources of radiation listed below in accordance with Section 2 of the Radiation Installations Act.

<u>LICENSEE</u> Kerr-McGee Chemical LLC Kerr-McGee Center Oklahoma City, OK	<u>LICENSE NUMBER</u> STA-583	<u>EXPIRATION DATE</u> February 28, 2002 for Amendment Number 57 only
	<u>AMENDMENT NUMBER</u> 57	

Attention: Mr. Mark Krippel
KMEMC Vice President

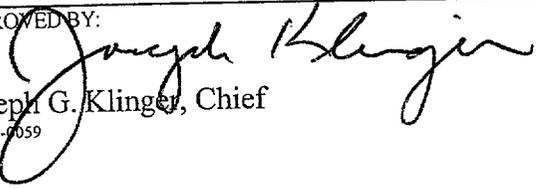
In accordance with letter dated May 24, 2001 (LKI-629), License Number STA-583 is amended in its entirety. Amendment 56 is void.

ITEM	RADIONUCLIDE	CHEMICAL and/or PHYSICAL FORM	MAXIMUM ACTIVITY* PER SOURCE	MAXIMUM POSSESSION LIMIT
A.	Thorium and Uranium and their daughters	As contamination from previous operations		Only the quantity present at the site identified in Condition 1. of this license.
B.	Radium-226	Epoxy/sand composite blocks	20 µCi	300 µCi
C.	Atomic Numbers 3 through 92	Any form	10 µCi	100 µCi
D.	Americium-241	Any form	1 µCi	10 µCi

AUTHORIZED USE:

- A. Except as specifically provided otherwise by the license, the licensee shall possess and use radioactive material described in all schedules of this license in accordance with statements, representations and procedures contained in, referenced in, or enclosed with the documents listed below for Phase I, IA, IB, II, IIA, III, and IV activities.
- B. Calibration standards for laboratory and portable gamma spectroscopy systems.
- C. Calibration standards for laboratory and portable gamma spectroscopy systems.
- D. Calibration standards for laboratory and spectroscopy systems.

* µCi-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; µg-microgram; kg-kilogram

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RADIOACTIVE MATERIAL LICENSE

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CONDITIONS

1. Radioactive material shall be stored only at the licensee's property located at 800 Weyrauch Street, West Chicago, Illinois.
2. Radioactive material shall be used only by or under the supervision of individuals designated by the Radiation Safety Officer (RSO).
3. The individual designated to perform the functions of RSO for activities covered by this license is Mark S. Krippel. Any change in the designation of the RSO shall require approval by the IDNS by license amendment. The RSO shall have, as a minimum, a bachelor's degree in engineering or science and one year of professional experience in radiation safety and applied health physics. The RSO shall have, in addition to or concurrent with the academic degree, at least four weeks of specialized training in health physics applicable to thorium and radium contaminated waste management.
4. The licensee shall also control entry to contaminated areas until the areas are released for unrestricted use. Items and surface contamination shall be decontaminated in accordance with 32 Ill. Adm. Code 340. Appendix A. Failure to meet the stipulations of this Condition may result in termination of this authorization.
5. The Air Monitoring Program sample collection and analysis shall be performed as follows.
 - A. Particulate sampling shall be performed as follows: 13 samples shall be collected as described in the Environmental Air Monitoring Plan for Kerr-McGee West Chicago Rare Earths Facility, August 1993, and as depicted on Drawing 225-EL-002, Revision 3 (LKI-114). The method of collection shall be continuous. The frequency of collection shall be filter changes on each work day. The frequency of sample analysis shall be on each work day by location and shall be analyzed for natural thorium and lead-212. Quarterly composites of the samples from each location shall also be analyzed for natural uranium, an isotopic analysis of Th-228 and Th-232, radium-226, radium-228 and Lead-210 concentrations. These shall be reported in units of microcurie per milliliter ($\mu\text{Ci/ml}$).
 - B. Radon sampling shall be performed as follows: 9 samples shall be collected as described in the Environmental Air Monitoring Plan for Kerr-McGee West Chicago Rare Earths Facility, August 1993, and as depicted on Drawing 225-EL-002, Revision 3 (LKI-114). The method of collection shall be continuous. The frequency of collection shall be quarterly. Sample analysis shall be quarterly by location. The samples shall be analyzed for radon-222.

* μCi -microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μg -microgram; kg-kilogram

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6. The Water Monitoring Program sample collection and analysis shall be performed as follows:
- A. **Groundwater sampling frequency and analysis.**

- (1) **Groundwater samples shall be collected quarterly at all corrective action monitoring wells, point-of-compliance wells and water supply wells completed in the glacial or Silurian aquifers and analyzed for the following nine constituents: fluoride, adjusted gross alpha activity, iron, manganese, nickel, combined radium-226 & radium-228, sulfate, total dissolved solids (TDS), and total uranium. However, if for three consecutive sampling events no constituent exceeds its groundwater protection standard (GWPS), then the well may be sampled annually. Quarterly sampling and analysis for all nine constituents shall be reinstated if any GWPS is exceeded and shall continue until all constituents are less than their respective GWPS for at least three consecutive quarters. If TDS is the only constituent that exceeds its GWPS, the well may be sampled annually with the approval of the Department.**

Background monitoring wells shall be sampled at least annually and analyzed for the nine constituents listed above.

- (2) **Whenever a new well is installed, it shall be sampled for four consecutive quarters for the constituents listed in Condition 6A(1). After the well has been sampled for four quarters, the frequency of sampling shall be in accordance with Condition 6A(1).**
- (3) **All wells shall be analyzed for the twenty constituents listed in Condition 6C at least once every three years. If any constituent is found to exceed its GWPS, the well shall be sampled for that constituent for the following two quarters, in addition to any other sampling and analysis that may be required under Condition 6A(1) or 6A(2). If the constituent is found to exceed its GWPS for the three consecutive quarters, the well shall be sampled for that constituent and those listed in Condition 6A(1) at a frequency in accordance with Condition 6A(1). In addition, the requirements of Condition 6B shall be complied with.**

Groundwater samples shall be collected consistent with the West Chicago Ground Water Monitoring Procedure found in Appendix H of the Summary of Ground Water Compliance Program dated October 3, 1995 (LKI-191).

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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- B. The licensee shall determine on a quarterly basis whether there is statistically significant evidence that a GWPS has been exceeded at any point-of-compliance well. Statistically significant evidence that a GWPS has been exceeded occurs when three (3) consecutive samples are found to have concentrations of a constituent that are greater than the GWPS listed in Condition 6C. Within ninety days of collecting the groundwater samples, the licensee shall notify the Department in writing of those constituents for which there is statistically significant evidence that a GWPS has been exceeded at one or more point-of-compliance wells. Within 120 days of the notification, the licensee shall submit an appropriate corrective action program for Departmental approval. The program must include a monitoring plan capable of demonstrating the effectiveness of the corrective action program. The corrective action program must be implemented as soon as is practicable, and in no event later than eighteen months after the licensee has notified the Department that there is statistically significant evidence that a GWPS has been exceeded.**

The licensee may, at the same time it notifies the Department that there is statistically significant evidence that a GWPS has been exceeded, also notify the Department that it will submit, within thirty days, data that indicate that a GWPS was exceeded because of contamination from another source; an error in sampling, analysis or statistical evaluation; or natural variation in the groundwater. If, after reviewing the data, the Department determines that corrective action is required, the licensee shall submit and implement a corrective action program as specified in the preceding paragraph.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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- C. Concentrations of the following constituents must not exceed their respective groundwater protection standards at or beyond the point of compliance. The point of compliance while decommissioning activities are ongoing at the site is the site boundary on all sides:

Constituent	Groundwater Protection Standard
arsenic	0.05 mg/L
boron	2 mg/L
chromium	0.05 mg/L
cobalt	1 mg/L
copper	0.65 mg/L
fluoride	4 mg/L
iron	5 mg/L
manganese	0.61 mg/L
molybdenum	0.1 mg/L
nickel	0.1 mg/L
nitrate	10 mg/L
selenium	0.05 mg/L
silver	0.05 mg/L
sulfate	400 mg/L
total dissolved solids	1200 mg/L
zinc	5 mg/L
adjusted gross alpha activity	15 pCi/L
total uranium	30 pCi/L
combined radium-226 & 228	5 pCi/L
thorium-230	1 pCi/L

Note: adjusted gross alpha activity is total alpha particle activity excluding radon, uranium and thorium.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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- D. Storm sewer and surface water sampling shall be performed as follows: 7 samples shall be collected as described in the Environmental Analysis Report – Phase III issued April 1996 except that sample location number 9 is relocated as authorized in Field Change Notice (FCN) 96-004 dated May 14, 1996 and sample location number 13 is deleted (LKI-630). The method of collection shall be grab samples. The frequency of collection and sample analysis shall be quarterly. **The samples shall be analyzed for gross alpha.** If gross alpha exceeds 10 picocuries per liter (10 pCi/L), the analysis shall include dissolved and suspended natural uranium, isotopic analysis for Th-228 and Th-232, radium-226, and radium-228.
7. The Soil and Sediment Monitoring Program sample collection and analysis shall be performed as follows.
- A. Depositional (Soil) sampling shall be performed as follows and as depicted on Drawing 225-EL-002, Revision 3 (LKI-114): 7 samples, one sample from each location, shall be obtained from EMS-8, EMS-14, EMS-17, EMS-22 north of EMS-9 on the north side of Ann Street, east of EMS-15 at the corner of Lester and the gravel road, and south of EMS-5 (if there is any soil available). The method of collection shall be grab samples. The frequency of collection shall be annual. The frequency of sample analysis shall be annual. The samples shall be analyzed for natural uranium, isotopic analysis for Th-228 and Th-232, radium-226, radium-228 and lead-210.
- B. Sediment sampling shall be performed as follows: 1 sample shall be obtained in accordance with the December 22, 1993, First Round Interrogatory Responses, Attachment C; surface water location number 9 (storm water outfall east of EJ&E railroad at Kress Creek). The method of collection shall be grab sample. The frequency of collection shall be annual. The frequency of sample analysis shall be annual. The samples shall be analyzed for natural uranium, isotopic analysis for Th-228 and Th-232, radium-226, radium-228 and lead-210.
- C. Radiological data, statistical calculations, and proposed analytical ranges derived from baseline sampling shall be submitted to the Department for evaluation. The respective baseline ranges must be approved by the Department prior to the collection of the first sample in accordance with Conditions 7A and 7B. Any sample exceeding the maximum derived, Department-approved baseline value for a designated location shall be considered contaminated.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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8. The Direct Gamma Monitoring Program sample collection and analysis shall be performed as follows.
- Direct radiation monitoring shall be performed as follows: 9 locations as depicted on Drawing 225-EL-002, Revision 3 (LKI-114) shall be monitored: EMS-4, EMS-5, EMS-7, EMS-8, EMS-9, EMS-11, EMS-15, EMS-17 and radon location M. A continuous passive integrating device shall be installed at each location. The frequency of collection shall be quarterly change of passive dosimeters. The frequency of sample analysis of the passive dosimeters shall be quarterly. The samples shall be analyzed to determine the gamma exposure rate.
9. For the purpose of radionuclide determinations in air samples from the Kerr-McGee West Chicago Facility, only laboratories with the capability to analyze Byproduct Material as defined in 32 Ill. Adm. Code 332 in the samples for environmental monitoring shall be employed. Any laboratory employed for this purpose shall use instrumentation and methodologies with lower limits of detection at or below 10% of the regulatory limits for the radiological parameters for which environmental air particulate samples are analyzed. Results indicating that a parameter is not detected shall be reported as "less than" the value of the corresponding lower limit of detection.
10. The installation, initiation and implementation of the Environmental Monitoring Program shall comply with the Kerr-McGee Quality Assurance Manual for Kerr-McGee Chemical Corporation West Chicago Project for the activities authorized by Condition 64.
11. The licensee shall perform a background count and check the counting efficiency for the G5000 proportional counter, Genie gamma spectroscopy system, and other laboratory based counting systems. The background count and counting efficiency shall be performed daily or, if not used daily, prior to each use. The licensee shall calibrate the systems initially, at intervals not to exceed 12 months, and after each repair of the instrument. Counting efficiencies shall be determined using appropriate standards which are traceable to the National Institute of Standards and Technology (NIST). Records shall be maintained to document the system calibration, background determinations, and counting efficiency determinations. Each record shall indicate the date of the procedure, person performing the procedure, identity of the standards used, and results of the procedures, including calculations and graphs if used.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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12. Each epoxy composite block calibration standard (such as Th, U, K, Ra, etc.) shall bear a label which includes, or contains the information called for in the following statement:

The receipt, possession, use and transfer of this source are subject to specific license and regulations of a Licensing State. Do not remove this label.

CAUTION - RADIOACTIVE MATERIAL
THIS SOURCE CONTAINS (*specific nuclide*)
___microcuries ___ date

13. The licensee may not commence any activities involving Byproduct Material other than that specified as an "Authorized Use" in this license without specific written approval from the Illinois Department of Nuclear Safety.
14. The Field Verification System (FVS) is approved for use in accordance with the commitments made in Letter dated November 10, 1995 (LKI-202) and subject to the following conditions:
- A. For each 10 meter square grid in which FVS measurements on average exceed 85 percent of the soil decontamination criterion for total radium or total uranium, Kerr-McGee will conduct standard soil sampling of the grid and laboratory analysis of the composited samples for total radium and total uranium. Soil samples shall be collected from the surface to a depth of 6 inches at each of the four locations that the FVS measurements were made.
- B. After each of 15 such grids have been so sampled, Kerr-McGee shall submit a report to the Department comparing the results of the laboratory analyses with the corresponding FVS measurements. If the results of the comparison demonstrate that at the 95% confidence level there is no statistically significant difference between FVS and laboratory measurements, the requirement for sampling under this program will be reconsidered.
15. A correlation/verification data report for each FVS shall be repeated for at least one grid (e.g., can validate several FVSs using the same grid) every three months, during the periods when the FVS is being used to certify land for unrestricted release. If the correlation parameter from the verification test is outside of the range of values for previous tests, a second test shall be performed. If the average of two tests is outside of the range of previous tests by more than 10 percent (without known changes in the operations of the system), use of the FVS shall be suspended, and the reasons for changes shall be fully explained to and approved by IDNS or the full correlation procedure repeated.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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(Condition 15. continued)

The correlation developed for the FVS shall be reverified and the FVS shall be recalibrated after any repairs that could potentially impact the calibration of the unit. A complete correlation, using three grids, shall be performed at intervals not to exceed 12 months.

After successful completion of a full calibration, ten or more spectrum readings shall be taken using a check source. This check source shall contain Th-232 and its decay products. A 2-sigma experimental error term at each of two different energy peaks shall be derived from the ten measurements of the check source. The average of the ten readings of the check source and the associated 2-sigma error for each energy peak shall be used in evaluating daily check source measurements. The FVS shall be checked each day before use for verification purposes, as follows:

- A. Measure the gamma spectrum from the above check source.
 - B. The results of the daily check source, at two different energy peaks, shall be plotted on a control-chart graph, prior to taking measurements to validate areas for unrestricted release.
 - C. The daily source check results for the two energy peaks shall deviate less than 2-sigma (calculated from the initial 10 source check readings) from the average of the 10 readings of the check source.
 - D. If the measurements of the check source deviate from the specifications of Item C., the calibration controls of the FVS shall either be adjusted to provide a response to meet the specifications of Item C. or a second check-source measurement can be taken and averaged with the first measurement for comparison with Item C.
 - E. Verification measurements for unrestricted release of areas shall not be made unless the FVS meets the specifications of Item C. or the instrument has been calibrated the same day.
16. The licensee shall use appropriately calibrated survey instruments for performing exposure rate surveys in accordance with 32 Illinois 332.150b2). The gamma radiation shall be measured at a distance of 100 cm from the surface. For purposes of the survey, the background gamma radiation level is defined as $10 \mu\text{R/hr} \pm 4 \mu\text{R/hr}$.

* μCi -microcurie; mCi -millicurie; Ci -Curie; MBq -Megabecquerel; GBq -Gigabecquerel; TBq -Terabecquerel; g -gram; μg -microgram; kg -kilogram

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17. The RSO shall order all outdoor contaminated waste handling operations (e.g., excavation or loading of trucks) to cease in the event of adverse weather (e.g., sustained winds exceeding 20 miles/hour averaged over a 10 minute period or rainfall exceeding 0.25 inch/hour). In addition, any time visible dust is observed at the Facility, the RSO shall take actions within 20 minutes to stop the generation of visible dust. As provided in Field Change Notice 96-003 dated 4/26/96, the Department's on-site Health Physicist and/or Contract Engineer may, at the request of the RSO, allow continuation of operations above the 20 mph limit specified above, based on their personal assessment of on-site conditions and operations. At no time may operations continue when sustained winds exceed 25 mph averaged over a 10 minute period.

If the rolling average concentration at an air sampling station exceeds 50 percent of the annual airborne radionuclide limits in 32 IAC 340.320 (10 CFR 20 Appendix B, Table 2, Column 1), the RSO shall convene a management review team including himself, the Quality Assurance Supervisor, the Construction Specialist and the Project Manager. The review team shall decide how to modify site operations to maintain airborne releases ALARA and in compliance with the 32 IAC 340.320 limits. The review team shall provide a written report of their recommendations to IDNS within 14 days.

Kerr-McGee shall obtain written approval from IDNS prior to any revisions to Specification 01420 (Dust Control, dated 3/8/94.

18. The licensee shall ensure, for the purposes of dust control, that each truck hauling contaminated soil has either: a soil moisture content that is sufficient to prevent visible dust generation; the soil on the top of the load is wet before transporting it; or the contents are covered. In addition, all outdoor, stockpiled, contaminated material at the West Chicago Facility shall be covered with geomembranes or remediation cover.
19. The licensee may use the dose conversion factors and internal dosimetry models described in ICRP Publication 68, for the purpose of determining dose to workers and the public. The licensee may use ALI, DAC, effluent concentration and release values listed in the licensee's submittal dated February 23, 2000 (LKI-549), notwithstanding the requirements and provisions contained in the following sections of 32 Ill. Adm. Code, which refer to Appendix B to 10 CFR 20.1001-20.2401:

Section 340.210(e)	Section 340.320(c)
Section 340.240(e)	Section 340.520(b)
Section 340.240(h)	Section 340.730(b)
Section 340.320(b)	Section 340.1220(c)

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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20. The licensee shall perform occupational air monitoring in the following locations: when digging in contaminated soil that is of low moisture content (potentially dust-generating); when excavating and decontaminating concrete; at the Stabilization/Neutralization area; at the Railcar Loading Facility; at the Simplified Physical Separation Facility, at the Water Treatment Plant and at the Stabilized Material Storage Building complex.
21. The licensee shall perform bioassays (lung counting) of all personnel using respiratory protection equipment for the purpose of protection against airborne radioactive material, specifically Th-232, on at least a quarterly basis. Due to the inherent difficulty in bioassay analysis for Th-232, the licensee may substitute monthly urine sampling for U-238 as a screening technique with the above bioassay required only for persons with actual uptakes of U-238.
22. The licensee's management, in association with the Radiation Safety Officer, shall review/audit the following areas of the radiation safety program at intervals not to exceed 12 months:
- A. Health physics authority and responsibility, including stop work authority;
 - B. Operating procedures involving the excavation, handling, stabilization, separation, loading, shipment, and/or transfer of radioactive material, and any changes in procedures;
 - C. Records of audits, inspections, and surveys conducted by the Health Physics Supervisor (for timeliness and the resolution of any problems);
 - D. Personnel radiation protection program, including employee exposure record, bioassay procedures and results, and the ALARA program;
 - E. Radiation safety training program and records;
 - F. Respiratory protection program;
 - G. Records and results of all required radiological surveys, sampling, tests for removable contamination, inspections, and environmental monitoring;
 - H. Facility and equipment design;
 - I. Control of airborne radioactive material, specifically Th-232 and U-238, and their progeny;

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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(Condition 22. continued)

- J. Compliance with applicable regulations and the conditions of this license; and
 - K. Safety meeting minutes.
23. A retention pond shall be constructed in the southwest corner of the Disposal Site and shall have a liner composed of high density polyethylene (HDPE) or at least two feet of compacted clay. The licensee is authorized to construct the emergency spillway portion of the retention pond. Emergency release of any water from the retention pond to offsite areas is subject to any necessary permits from other State and local authorities.
24. Interfaces between clean backfill and contaminated material (which is to be excavated at a later date) shall be identified and synthetic or natural barriers shall be placed at these interfaces to prevent contamination of clean backfill material.
25. The RSO shall review and approve all dose commitment calculations and dose evaluation reports.
26. (Reserved)
27. The licensee shall maintain the following records in a legible condition, at the Facility for inspection by IDNS:
- A. Radiation surveys and facility safety inspection;
 - B. Sampling programs and analysis results;
 - C. Transfers of radioactive material;
 - D. Inspections;
 - E. Annual program reviews;

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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(Condition 27. continued)

- F. All records pertaining to radiation safety training and respiratory protection training for both employees and contractors, including signed acknowledgements of training and classroom instruction materials.
- G. Any other records required by this license or Chapter 32 of the Illinois Administrative Code.
28. A. Radiation dose rate and exposure rate instruments shall be calibrated at intervals not to exceed 12 months and after repairs by persons licensed by IDNS, another Agreement State, or the U.S. Nuclear Regulatory Commission.
- B. Records of each calibration of radiation dose rate and exposure rate instruments shall be maintained at the site for inspection by IDNS.
- C. The licensee is authorized to perform radiation survey instrument calibrations in accordance with procedures provided by letter dated December 2, 1997 (LKI-388). The licensee is not authorized to perform radiation survey instrument calibrations as a service for other licensees.
29. (Reserved)
30. The licensee shall conduct an instrumentation quality assurance program which shall consist, as a minimum, of the following:
- A. Use of calibration log books which accurately indicate the calibration status of each radiological survey or measurement instrument, each low-volume and high-volume air sampler, and each other monitoring or measurement instrument, specifying the date of calibration and person performing the calibration;
- B. Use of sources/standards which are traceable to the NIST;
- C. Affixing a dated label on each instrument which indicates the last date of calibration;

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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(Condition 30. continued)

- D. Performance of operability checks on instruments daily or before each use on instruments used less frequently than daily; and
- E. Availability of backup instruments for use when other instruments are being calibrated or repaired or become inoperable or unavailable.
31. The Licensee shall decontaminate all concrete material that will remain on-site to levels of less than or equal to 5 pCi/g total radium and 20 pCi/g total uranium above background per LKI-380.
32. A. The licensee is authorized to store contaminated water or use it for dust control purposes. The use of untreated water for dust control shall be limited to contaminated areas of the site. The standards for determining if water is acceptable for dust control are the numerical criteria set forth in Table 3 of Appendix B of 10 CFR 20 as committed to by the licensee in FMKI-068 dated July 21, 1995. The licensee shall pump as much water as feasible from the retention pond to maximize storm runoff capacity before using other sources of water for dust control. If water from ponds 2 and 4 are to be used, the water levels should not be drawn down lower than nominally 1 foot above the pond's bottom to minimize obtaining water impacted from contaminated pond sludge. Enough water shall remain in the ponds to completely cover the bottom of the ponds.

The licensee shall notify the on-site IDNS representative anytime extraction well water is being collected for dust control. The specific source of the extraction well water will be identified as part of the notification. Sampling and analysis of the extraction well water shall be conducted as detailed in the Extraction Water Use Plan (LKI-308) to verify that the groundwater meets the criteria specified in 10 CFR 20, Appendix B, Table 3. In addition to analytical sampling requirements, a grab sample may be collected daily for visual observation as directed by the on-site IDNS representative.

- B. The licensee is authorized to operate the Water Treatment Plant (WTP) to treat contaminated water. The licensee must maintain the testing requirements in the startup plan (LKI-383) for water obtained from the site for indicator sampling for pH, fluoride, total suspended solids (TSS), and natural uranium (U-nat) on a daily basis during the first 30 days of discharge to the west branch of the DuPage River. Analytical results of the start-up samples shall be provided to the Department within 48 hours of sample procurement.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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(Condition 32.B continued)

Discharge of treated water off site from the WTP shall comply with requirements for non-radiological analysis specified in the NPDES Permit No. IL0063495 issued June 5, 1996 by IEPA.

Radiological analysis of water discharged off site from the WTP shall be performed as follows: On a daily basis a flow-proportional, 24-hour composite sample of the treatment facilities' effluent shall be collected. Two portions of the daily composite sample shall be filtered and properly preserved immediately after collection. A portion of each daily composite shall be reserved. One portion from each daily composite sample, along with filter residues shall be composited on a monthly basis to obtain a volumetrically representative sample for the month. The monthly composites shall be analyzed for soluble and insoluble Pb-210, Ra-226, Ra-228, Th-228, Th-230, Th-232, and U-nat. In addition, the other portion of the daily composite sample shall be composited on a weekly basis and analyzed for soluble radium and uranium to aid in control of the facilities' effluent quality. REF Lab analytical results from monthly composites shall be forwarded to the Department no later than 14 days after the end of the month. The analytical results from monthly composites shall include the sum of the soluble and insoluble activities to demonstrate compliance with effluent quality criteria.

33. A. For the purpose of the activities authorized by this amendment, the concentration of total residual radium (radium 226 plus radium 228) in dry soil, after removal of soil or other materials that are being relocated, shall not exceed 5 picocuries per gram (5 pCi/g) above background concentrations of those radionuclides. The background concentration of total radium shall be assumed to be 2.2 pCi/g. Concentrations of radium in such residual soils shall be averaged over areas of 100 square meters and averaged over layers of 15 centimeters thickness. The soil concentration of 5 pCi/g is deemed necessary to ensure that the licensee will meet the requirements of 32 Ill. Adm. Code, sections 340.110(b) and 332.170(b) to maintain doses to the public and releases to the general environment as low as is reasonably achievable (ALARA). A case by case demonstration that particular circumstances do not require cleanup to the above-stated goal will be considered.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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- B. For the purpose of the activities authorized by this amendment, the concentration of total residual uranium in dry soil, after removal of soil or other materials that are being relocated, shall not exceed 20 picocuries per gram (20 pCi/g) above background concentrations of those radionuclides to a depth of 5 meters and 50 picocuries per gram (50 pCi/g) for all other depths. The background concentration of total uranium shall be assumed to be 2 pCi/g. Concentrations of uranium in such residual soils shall be averaged over areas of 100 square meters and averaged over layers of 15 centimeters thickness. The soil concentration of 20 pCi/g to a depth of 5 meters and 50 pCi/g for all other depths is deemed necessary to ensure that the licensee will meet the requirements of 32 Ill. Adm. Code, sections 340.110(b) and 332.170(b) to maintain doses to the public and releases to the general environment as low as is reasonably achievable (ALARA).
34. The RSO is responsible for all radiation protection activities, including radiation safety training and respiratory protection training. The RSO may delegate certain duties provided that:
- A. Delegation of duties is limited to conducting training and radiation protection activities in accordance with the Quality Assurance Manual and its implementing procedures.
- B. The persons conducting the training or radiation protection activities have been trained to perform the activities in accordance with the quality system training requirements.
- C. Documentation of training will be maintained for a period of 5 years. RSO duties not covered by specific quality system procedures or training courses can only be delegated in writing. The record of the delegation must include:
1. The name of the individual;
 2. The duty or duties the RSO designee is authorized to perform;
 3. The date upon which the designation became effective;
 4. The period of time the designation is authorized;
 5. The frequency of RSO reviews of records generated by the designee;
 6. The signature of the RSO's designee; and

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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(Condition 34. continued)

7. The signature of the RSO.

35. (Reserved)

36. The licensee shall provide the Department with procedures that establish control of field issuance of design document revisions. In addition, the Department's on-site inspectors shall be supplied controlled copies of all field changes and drawing updates including, but not limited to, construction of the WTP, SPSF, CF, and the force main. This includes any dispositions as the result of field change requests or non-conformances. Updates shall be supplied within 24 hours of the approved change for construction.
37. The licensee shall provide two (2) copies of the dust control plan and QA/QC plan required for each contractor in the contract specifications to IDNS prior to commencement of phase IV activities.
38. The licensee shall provide IDNS with an approved, detailed work activities schedule for construction and testing program activities prior to the commencement of phase IV activities.
39. The licensee is authorized to operate the Simplified Physical Separation Facility (SPSF). The only material allowed to be used for backfill from the SPSF is material that has been processed through the SPSF sensor system or has been sampled and found to meet the requirements in Condition 33.
40. Any deviations from the scope of decommissioning activities described in the "Environmental Assessment - Phase I" issued April 1994, "Addendum to the Environmental Assessment - Phase I" issued July 1994, "Environmental Analysis Report - Phase IB" issued July 1994; "Environmental Analysis Report - Phase II" issued February 1995, "Addendum to the Environmental Analysis-Phase II" issued June 1995, "Environmental Analysis Report - Phase III" issued April 1996 and "Environmental Analysis Report - Phase IV" issued January 1998, including plan drawings and contract documents shall not be implemented until formal approval is received from IDNS.
41. All above grade, outdoor, stockpiles and associated exposed faces of contaminated materials shall be fully covered with geomembranes or remediation cover as specified in Part 2 of specification 02073 dated February 16, 1999, when activities using the materials are finished for the day.
42. The licensee is authorized to excavate a maximum of 5,000 bank cubic yards of sediment from the Disposal Site during 2001.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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43. All accessible areas of the Support Zone shall be surveyed for contamination on at least a weekly frequency. If contamination in excess of the limits specified in 32 IAC 340 Appendix A is detected, the licensee shall decontaminate the area to the specified limits.
44. The licensee shall provide radiation exposure reports to occupationally exposed individuals in accordance with 32 IAC 400.130.
45. The licensee is authorized to conduct stabilization/neutralization operations on a mixing pad with an active area of 3,720 square meters. Active area is defined as the actual area of the pad upon which mixing of contaminated materials is performed. The licensee may construct a larger pad, however, the active area upon which stabilization/neutralization operations are conducted shall not exceed 3,720 square meters.
46. The Licensee shall not commence backfilling until verification by IDNS is performed and filling of an excavation is authorized.
47. The licensee shall perform verification radiation surveys/sampling for all areas after completion of excavation of contaminated material.
- A. The verification radiation survey/sampling shall be performed as specified by a Radiological Verification Plan approved by the Department.
- B. When excavations extend below the water table, if it is not viable to use the proposed FVS, appropriate samples shall be taken, after the excavation work is completed, and analyzed to verify decontamination to the cleanup standard for unrestricted use. The samples shall be prepared so that the degree of saturation is less than 90 percent.
48. The licensee shall perform radiation level surveys on a weekly basis in all accessible areas of the Exclusion Zone.
49. If skin contamination is found in excess of 10,000 counts per minute beta and/or gamma or 1,000 counts per minute alpha, a Health Physics Technician shall be notified to supervise the decontamination.
50. The licensee shall assign a self-reading dosimeter to all temporary employees, visitors, and inspectors prior to entering the Exclusion Zone. Dosimeters must be worn while in the Exclusion Zone and surrendered before leaving the Facility.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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51. The licensee is authorized to ship for disposal up to 125,000 bank cubic yards of contaminated material and debris to the Envirocare disposal site through February 28, 2002.
52. The licensee is authorized during 2001 to receive a maximum of 15,000 bank cubic yards of off-site contaminated soil and other related contaminated material as described in letter dated January 20, 1995 (LKI-096).
53. If ALARA program goals are exceeded as determined by the quarterly review of the Health Physics Program, proposed corrective action shall be reported to the Facility Safety Committee. Records of corrective action and any resulting changes to the ALARA program shall be maintained for inspection by IDNS.
54. A. Below-grade excavation above the water table is authorized subject to the Department approved water management plan for these excavations to handle water collection included in the 1995 Activities Plan document (LKI-155) dated June 12, 1995.
- B. Where excavations occur below the water table, the licensee shall dewater the area to be excavated prior to excavation. The dewatering system shall be capable of (1) prior to excavation, lowering the water table in the area of the excavation to an elevation lower than the base of the excavation, and (2) during excavation, and while the excavation is open, immediately removing any water which accumulates in the excavation. Where excavations occur above the water table, the licensee shall maintain a dewatering system, during the excavation and while the excavation is open, capable of immediately removing any water which accumulates in the excavation.
- C. The licensee is authorized to implement the Excavation Dewatering System described in letter with attachments dated May 2, 1997 (LKI-326). Prior to any installation, the licensee shall submit to IDNS for review the final depths and locations of slurry walls and sheetpiling resulting from the adoption of established soil cleanup standards for release of the site for unrestricted use.
55. (Reserved)
56. (Reserved)
57. (Reserved)

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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58. A. Each sealed source shall be tested for leakage and/or contamination as specified in 32 Ill. Adm. Code 340.410. For purposes of this license, epoxy blocks shall be considered sealed sources.
- B. Tests for leakage and/or contamination performed by the licensee shall be performed in accordance with the contamination survey and sample counting procedures approved through the Licensee's Quality Assurance Program. This license does not authorize this licensee to provide leakage and/or contamination tests as a customer service for other licensees.
- C. The records of tests for leakage and/or contamination shall contain the manufacturer, model and serial number, if assigned, of each source tested, the identity of each source radionuclide and its calculated activity as of the date of the test or the activity and activity assay date, the measured activity of each test sample expressed in Bq or μCi , the date the sample was collected, the date the sample was analyzed, the identity of the individual who collected the sample(s) and the identity of the individual who analyzed the sample(s).
59. (Reserved)
60. The licensee shall maintain financial surety arrangements as provided in Order No. DIR 94-2. The term of the surety arrangement shall be for the period from issuance of the license until termination of the license by the Department in accordance with 32 Ill. Adm. Code 330.320.
61. The licensee must comply with all requirements, permits, and licenses required by federal, state, and local authorities.
62. The licensee shall conduct a physical inventory at intervals not to exceed six (6) months to account for each radioactive calibration standard received and possessed under the license and shall maintain a record of such inventories. The inventory records shall include the radionuclide, activity, activity assay date, manufacturer, model and serial number, the location of the source, date of the inventory and the identity of the individual(s) who performed the inventory. Records of inventories shall be maintained for 5 years from the date of each inventory.
63. (Reserved)

* μCi -microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μg -microgram; kg-kilogram

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64. Except as specifically provided otherwise by the license, the licensee shall possess and use radioactive material described in all schedules of this license in accordance with statements, representations and procedures contained in, referenced in, or enclosed with the documents listed below for Phase I, IA, IB, II, IIA, III, and IV activities. The regulations contained in 32 Ill. Adm. Code: Chapter II, Subchapters b and d shall govern unless the statements, representations and procedures in the licensee's application and correspondence are more restrictive than the regulations. The most recent statements, representations and procedures listed below shall govern if they conflict with previously submitted documents.
- A. The Department approved Quality Assurance Manual for Kerr-McGee Chemical Corporation West Chicago Project West Chicago IL.
- B. Letters with attachments dated October 27, 1993; December 22, 1993; January 26, 1994, February 7, 1994, February 17, 1994, March 14, 1994 (Phase 1), April 24, 1994, April 25, 1994 (dust control), June 13, 1994, June 17, 1994 (sheetpiling), July 8, 1994, July 25, 1994 (Phase 1A), August 26, 1994 (Phase 1B, LKI-029).
- C. Letter dated September 3, 1993, transmitting the Closure Plan with appendices and the Environmental Analysis.
- D. Letter dated March 14, 1994, with attachments responding to interrogatory numbers 3-1, 16-1, 39-1, 50-1, 51-1, 52-1, 73-1, 178-1, 182-1, 184-1, 185-1, 187-1, 245, 284, 286, 297, 298, 299, and 300.
- E. (Reserved)
- F. Letters dated June 20, 1994, July 7, 1994, and July 8, 1994 relating to responses to interrogatories specific to phase I, IA and IB decommissioning activities.
- G. (Reserved)
- H. Letter dated July 28, 1994 (LKI-004), describing calibration standards.
- I. Letter with attachments dated September 15, 1994 (LKI-044), updated Specification 02800 included in Appendix B (Technical Specification Update) of the Site Excavation Plan dated September 30, 1994 (LKI-051), the Site Excavation Plan dated December 8, 1995 (LKI-209), and November 5, 1997 (LKI-380) regarding Concrete Demolition and Decontamination activities.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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- J. Letter dated October 13, 1994 (LKI-062) responding to third round interrogatories 504 through 544 and letter dated November 1, 1994 (LKI-069) responding to fourth round interrogatories.
- K. (Reserved)
- L. Letters with attachments dated December 8, 1995 (LKI-209), March 6, 1996 (LKI-231), and April 11, 1996 (LKI-243) regarding the Site Excavation and other Closure Plan Activities planned for Phase III.
- M. (Reserved)
- N. Letter with attachments dated April 18, 1995 (LKI-130) responding to fifth round interrogatories, letter with attachments dated May 26, 1995 (LKI-148) responding to sixth round interrogatories, and letter with attachments dated November 13, 1995 (LKI-203) responding to seventh round interrogatories.
- O. Letter with attachments dated June 12, 1995 (LKI-155) outlining the 1995 Closure Plan Activities accompanied by letters LKI-161, LKI-174 and LKI-177 incorporating specific revisions and corrections.
- P. (Reserved)
- Q. Letters with attachments dated April 5, 1996 (LKI-242), June 28, 1996 (LKI-262), June 29, 1996 (LKI-263), July 16, 1996 (LKI-266), October 1, 1996 (LKI-279), October 17, 1996 (LKI-285), November 15, 1996 (LKI-292) and April 15, 1997 (LKI-319) regarding the Simplified Physical Separation Facility (SPSF).
- R. (Reserved)
- S. Letters with attachments dated March 22, 1996, (LKI-236), June 18, 1996 (LKI-258), June 26, 1996 (LKI-261), October 1, 1996 (LKI-279), October 17, 1996 (LKI-285), March 27, 1997 (LKI-316), April 3, 1997 (LKI-317) and November 14, 1997 (LKI-383) regarding the Water Treatment Plant (WTP) and Common Facilities (CF).
- T. Letter with attachments dated August 3, 1995 (LKI-178), November 22, 1995 (LKI-206) and January 29, 1998 (LKI-407) regarding the Force Main Installation.

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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- U. Letters dated November 14, 1995 (LKI-204) and January 8, 1996 (LKI-218) regarding radionuclide discharge limits.
- V. Letters with attachments dated October 3, 1995 (LKI-191), regarding the Groundwater Compliance Plan.
- W. Letter with attachments dated February 2, 2001 (LKI-610) regarding the Final Grading Specification.
- X. Letters with attachments dated November 25, 1996 (LKI-293), February 19, 1997 (LKI-306) and March 20, 1997 (LKI-314) regarding construction of the Stabilized Material Storage Building.
- Y. Letter with attachments dated October 9, 1997 (LKI-371) regarding Sheet Pile Modifications.
- Z. Letters with attachments dated June 20, 1997 (LKI-339), August 14, 1997 (LKI-352), August 25, 1997 (LKI-358), February 17, 1999 (LKI-466) and February 23, 2001 (LKI-618) regarding the Site Excavation Plan.
- AA. Letters with attachments dated January 25, 2000 (LKI-535) and February 23, 2000 (LKI-549) regarding the use of ICRP 68.

JGK:CRH:lab

* μ Ci-microcurie; mCi-millicurie; Ci-Curie; MBq-Megabecquerel; GBq-Gigabecquerel; TBq-Terabecquerel; g-gram; μ g-microgram; kg-kilogram

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