



DEPARTMENT OF THE ARMY
U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NEW JERSEY 07806-5000

70-627

April 6, 1994

REPLY TO
ATTENTION OF

Safety, Surety, and Environmental Office
Installation Safety Division
Health Physics Branch

SUBJECT: Application for Amendment to Source Material License No. SUB-348; Broad Scope License No. 29-00047-02; and Special Nuclear Material License No. SNM-561

U.S. Nuclear Regulatory Commission-Region I
Attention: Mr. Francis M. Costello
Nuclear Materials Safety Branch
Division of Radiation Safety and Safeguards
475 Allendale Road
King of Prussia, Pennsylvania 19406

Chief, Licensing Branch
Attention: Ms. Elaine Keegan
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Sir and Madam:

This letter formally requests an amendment to three of ARDEC's licenses: Source Material License, SUB-348; Broad Scope License, 29-00047-02; and Special Nuclear Material License, SNM-251. It is requested that the allowable removable surface contamination limits for unrestricted release, presently contained in the respective renewal applications on page 70 (SUB-348); page 56 (29-00047-02); and page 64 (SNM-561) (copies of which are enclosed), be modified to agree with the maximum removable surface contamination levels depicted in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses For Byproduct, Source, or Special Nuclear Material", U.S. NRC, May 1987. Approving this amendment could save American taxpayers thousands of dollars, for instance, during the decommissioning of a facility, which might otherwise be spent to comply with removable contamination limits listed in the present referenced licenses which, upon reassessment, appear to be overly excessive.

The radioactive material of primary concern in the SUB-348 license is depleted uranium (DU). Following the manufacture of DU metal, the Uranium-238 isotope (uranium isotope in DU of greatest abundance) reaches secular equilibrium with its first two daughter products, Thorium-234 and Protactinium-234, in approximately six months. These two daughter products are beta emitters. Based on that fact, it is further requested that the utilization of the

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unrestricted fixed and removable surface contamination limits listed for Beta-gamma emitters, as depicted in the May 1987 NRC Guidelines, be authorized for use in detecting/documenting the presence and activity of DU alpha emitting contaminants on surfaces. This request is believed to be reasonable for the following reasons:

a. Analytically it will be easier to detect the beta emissions from DU contaminants either fixed on surfaces or present on swipe material, since alpha emission, though occurring, will most likely be stopped by non-radioactive contaminants present (i.e., dirt, grime, etc.), and therefore, not reach the detector.

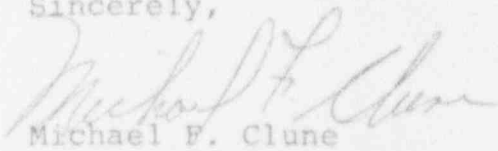
b. Since in DU secular equilibrium there is more than one beta emitted per alpha emission application of a 1000 dpm β /100 cm² removable limit is equivalent to an alpha removable limit which is less than 1000 dpm α /100 cm², thus being more conservative than the May 1987 NRC Guidelines.

Request you incorporate the enclosed pages, all dated Apr 06 1994, to the appropriate license renewal applications: page 70.a. (SUB-348, 13 Sep 1990); page 56.a. (29-00047-02, 30 Jun 1989); and page 64.a. (SNM-561, 28 Aug 1992).

This office also asks that this amendment request be processed as expeditiously as possible, as ARDEC is making arrangements to start the decommissioning of one of its facilities, building 316, a DU R&D facility, toward the end of May 1994.

Any questions regarding these amendment requests may be directed to Mr. Richard W. Fliszar, ARDEC RPO at (201)724-3126.

Sincerely,



Michael F. Clune
Acting Chief, Safety, Surety,
and Environmental Office

Enclosures

Copies Furnished:

Commander:

U.S. Army Materiel Command, ATTN: AMCSF-P (Mr. John Manfre),
Alexandria, VA 22333-0001

U.S. Army Tank-Automotive and Armaments Command, ATTN: AMSTZ-CZ
(Ms. Karen Lapajenko McGuire), Warren, MI 48397-5000

U.S. Army Armament Munitions and Chemical Command, ATTN: AMSMC-SFS
(Ms. Betty Peterson)/AMSMC-RW (Mr. Michael Styvaert), Rock
Island, IL 61299-6000

10.5.d. Contamination Limits: The following table provides removable surface contamination limits that will not be exceeded:

Removable Surface Contamination Limits

	Type of Radioactive Material ^a			
	Alpha Emitters		Beta or X-Ray Emitters (uCi/cm ²)	Low-Risk Beta or X-Ray Emitters (uCi/cm ²)
	High Toxicity (uCi/cm ²)	Lower Toxicity (uCi/cm ²)		
1. Unrestricted areas ^b	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
2. Restricted areas ^c	10 ⁻⁶	10 ⁻³	10 ⁻³	10 ⁻²
3. Personal clothing worn outside of restricted areas	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
4. Protective clothing worn only in restricted areas	10 ⁻³	10 ⁻³	10 ⁻⁴	10 ⁻⁶

^aHigh toxicity alpha emitters include Am-243, Am-241, Np-237, Ac-227, Th-230, Pu-242, Pu-238, Pu-240, Pu-239, Th-232, and Cf-252. Lower toxicity alpha emitters include those having permissible concentrations in air greater than that for Ra-226(s) in 10 CFR Part 20, Appendix B, Table I, Column 1. Beta or x-ray emitter values are applicable for all beta or x-ray emitters other than those considered low risk. Low-risk nuclides include those whose beta energies are less than 0.2 MeV, whose gamma or x-ray emission is less than 0.1 R/h at 1 meter per curie and whose permissible concentration in air in 10 CFR Part 20, Appendix B, Table I, is greater than 10⁻⁶ uCi/ml.

^bContamination limits for unrestricted (non-contamination-controlled) areas in this table are considered to be compatible in level of safety with those for release of facilities and equipment for unrestricted use, as given in Regulatory Guide 1.36, "Termination of Operating Licenses for Nuclear Reactors," and in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct, Source, or Special Nuclear Material," which is available from the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

^c~~Contamination limits for restricted areas~~ Averaging is acceptable over immediate areas of up to 300 cm² or, for floors, walls, and ceiling, 100 cm². These limits are allowed only in those restricted areas where appropriate protective clothing is worn.

(11) Contamination Limits: The following table provides removable surface contamination limits that will not be exceeded:

Removable Surface Contamination Limits

Type of Radioactive Material^a

	Alpha Emitters			
	High Toxicity (uCi/cm ²)	Lower Toxicity (uCi/cm ²)	Beta or X-Ray Emitters (uCi/cm ²)	Low-Risk Beta or X-Ray Emitters (uCi/cm ²)
1. Unrestricted areas ^b	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
2. Restricted areas ^c	10 ⁻⁴	10 ⁻³	10 ⁻³	10 ⁻²
3. Personal clothing worn outside of restricted areas	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
4. Protective clothing worn only in restricted areas	10 ⁻³	10 ⁻³	10 ⁻⁴	10 ⁻⁴

^aHigh toxicity alpha emitters include Am-243, Am-241, Np-237, Ac-227, Th-230, Pu-242, Pu-238, Pu-240, Pu-239, Th-228, and Cf-252. Lower toxicity alpha emitters include those having permissible concentrations in air greater than that for Ra-226(s) in 10 CFR Part 20, Appendix B, Table I, Column 1. Beta or x-ray emitter values are applicable for all beta or x-ray emitters other than those considered low risk. Low-risk nuclides include those whose beta energies are less than 0.2 MeV, whose gamma or x-ray emission is less than 0.1 R/h at 1 meter per curie and whose permissible concentration in air in 10 CFR Part 20, Appendix B, Table I, is greater than 10⁻⁶ uCi/ul.

^bContamination limits for unrestricted (non-contamination-controlled) areas in this table are considered to be compatible in level of safety with those for release of facilities and equipment for unrestricted use, as given in Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct, Source, or Special Nuclear Material," which is available from the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

^c~~Contamination limits for restricted areas in this table are considered to be compatible in level of safety with those for release of facilities and equipment for restricted use, as given in Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct, Source, or Special Nuclear Material," which is available from the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555.~~ Averaging is acceptable over infinite areas of up to 300 cm² or, for floors, walls, and ceiling, 100 cm². These limits are allowed only in those restricted areas where appropriate protective clothing is worn.

10.5.d. Contamination Limits: The following table provides removable surface contamination limits that will not be exceeded.

Removable Surface Contamination Limits

Type of Radioactive Material^a

	Alpha Emitters		Beta or X-ray Emitters (uCi/cm ²)	Low-Risk Beta or X-Ray Emitters (uCi/cm ²)
	High Toxicity (uCi/cm ²)	Lower Toxicity (uCi/cm ²)		
1. Unrestricted areas ^b	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
2. Restricted areas ^c	10 ⁻⁴	10 ⁻³	10 ⁻³	10 ⁻²
3. Personal clothing worn outside of restricted areas	10 ⁻⁷	10 ⁻⁷	10 ⁻⁶	10 ⁻⁶
4. Protective clothing worn only in restricted areas	10 ⁻⁵	10 ⁻⁵	10 ⁻⁴	10 ⁻⁴

^aHigh toxicity alpha emitters include Am-243, Am-241, Np-237, Ac-227, Th-230, Pu-242, Pu-238, Pu-240, Pu-239, Th-228, and Cf-252. Lower toxicity alpha emitters include those having permissible concentrations in air greater than that for Ra-226(s) in 10 CFR Part 20, Appendix B, Table I, Column 1. Beta or x-ray emitter values are applicable for all beta or x-ray emitters other than those considered low risk. Low-risk nuclides include those whose beta energies are less than 0.2 MeV, whose gamma or x-ray emission is less than 0.1 R/h at 1 meter per curie and whose permissible concentration in air in 10 CFR Part 20, Appendix B, Table I, is greater than 10⁻⁶ uCi/ml.

^bContamination limits for unrestricted (non-contamination-controlled) areas in this table are considered to be compatible in level of safety with those for release of facilities and equipment for unrestricted use, as given in Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," and in "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct, Source, or Special Nuclear Material," which is available from the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

TABLE 1
ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES ^a	AVERAGE ^{b c f}	MAXIMUM ^{b d f}	REMOVABLE ^{b e f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α /100 cm ²	15,000 dpm α /100 cm ²	1,000 dpm α /100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm ²	3000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm $\beta\gamma$ /100 cm ²	15,000 dpm $\beta\gamma$ /100 cm ²	1000 dpm $\beta\gamma$ /100 cm ²

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cMeasurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

^dThe maximum contamination level applies to an area of not more than 100 cm².

^eThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

^fThe average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

TABLE 1
ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES ^a	AVERAGED ^{c f}	MAXIMUM ^{b d f}	REMOVABLE ^{b e f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α /100 cm ²	15,000 dpm α /100 cm ²	1,000 dpm α /100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm ²	3000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm $\beta\gamma$ /100 cm ²	15,000 dpm $\beta\gamma$ /100 cm ²	1000 dpm $\beta\gamma$ /100 cm ²

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cMeasurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

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^fThe average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

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TABLE 1
ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES ^a	AVERAGE ^{b c f}	MAXIMUM ^{b d f}	REMOVABLE ^{b e f}
U-nat, U-235, U-238, and associated decay products	5,000 dpm α /100 cm ²	15,000 dpm α /100 cm ²	1,000 dpm α /100 cm ²
Transuranics, Ra-226, Ra-228, Th-230, Th-232, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm ²	300 dpm/100 cm ²	20 dpm/100 cm ²
Th-nat, Th-232, Sr-90, Ra-226, U-232, I-126, I-131, I-133	1000 dpm/100 cm ²	3000 dpm/100 cm ²	200 dpm/100 cm ²
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm $\beta\gamma$ /100 cm ²	15,000 dpm $\beta\gamma$ /100 cm ²	1000 dpm $\beta\gamma$ /100 cm ²

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

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