UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

OFFICE OF THE
CHAIRMAN

COMM
CORR

October 22, 1979

The Honorable Morris K. Udall, Chairman
Committee on Interior and Insular Affairs
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

This is in response to your letter of September 13, 1979, requesting assistance for an informal study of the University of Arizona's low-level waste burial site near the town of Oracle, Arizona, being conducted by members of the Arizona State Legislature's House of Representatives, headed by Representative Marjory Ollson.

The information requested is as follows:

1. "A description of the regulatory responsibilities for this site of the State and the Federal government, and of the regulatory relationship between those bodies."

   The State of Arizona became an Agreement State May 15, 1967. Under the agreement, the former Atomic Energy Commission, now the Nuclear Regulatory Commission, relinquished and Arizona assumed regulatory authority over source material, by-product material and special nuclear material in quantities not sufficient to form a critical mass. The State presently administers about 300 radioactive materials licenses pursuant to this Agreement. Their administrative functions include issuance of regulations and licenses, inspection of their licensees' activities, and the handling of enforcement actions. The University of Arizona was a licensee of the AEC until 1967, at which time licensing authority for that institution was transferred to the State of Arizona, whose regulatory program is reviewed annually by the NRC to ensure both compatibility with NRC's regulatory program and adequate protection of public health and safety.

2. "A copy of regulations and guidelines enforced by the NRC for licensing of similar types of waste disposal, and a comparison of these with the regulations enforced by the State for the Oracle facility."

1322 533

Enclosed is a copy of 10 CFR 20.304, Disposal by Burial in Soil (Enclosure A). There are no special guidelines for licensing similar types of waste sites because each such site is restricted to waste produced by a single facility only; hence waste disposal pursuant to 10 CFR 20.304 is not separately licensed. Enclosed is a copy of the State of Arizona's regulations R-12-1-419, Disposal by Burial in Soil (Enclosure B) which is identical to the NRC regulation.

NRC staff is presently preparing for public comment a proposal to delete 10 CFR 20.304, which allows a licensee to bury small quantities of radionuclides without Commission permission; this would mean that the licensee would have to obtain permission to perform such burials in the future. If approved, the proposed rule change would become effective in June, 1980. Assuming that the Arizona AEC changed its regulations in a similar fashion, the University would be required to seek permission from the Arizona AEC before disposing of its low-level wastes.

For detailed information on current license conditions and burial rates concerning the Oracle site, Representative Ollson may contact Mr. Ken Geiser of the Arizona Atomic Energy Commission in Phoenix at 602/255-4845.

3. "Information regarding the extent to which the NRC has made on-site inspections of the Oracle facility, including the dates of inspections over the past several years, if any, and any inspection reports which may exist."

A review of retired AEC inspection reports shows that four inspections were made at the University of Arizona, License No. 2-756-16, during the period February, 1963 to February, 1967. As a result of an AEC inspection at the University in 1967, an item of noncompliance was noted regarding excess burial at the site on one occasion. Copies of the AEC's enforcement correspondence and the University's response are contained in Enclosure C. There have been no further AEC or NRC inspections since May, 1967, when Arizona assumed regulatory authority.

4. "Any correspondence which may exist concerning the site or related University of Arizona activities between the University and the Commission."

In addition to the aforementioned enforcement-related correspondence, we have included as Enclosure D copies of the correspondence between the University and the AEC relating to the licensing of the Oracle site.

I hope this information will be helpful to Representative Ollson's study group. Mr. Geiser can assist with obtaining information on the post-1967 activities of the University at the Oracle site.

Sincerely,

Joseph M. Hendrie
Chairman

Enclosures:
As stated

§ 20.207 Storage and control of licensed materials in unrestricted areas.

(a) Licensed materials stored in an unrestricted area shall be secured from unauthorized removal from the place of storage.

(b) Licensed materials in an unrestricted area and not in storage shall be tended under the constant surveillance and immediate control of the licensee.

40 FR 26679

WASTE DISPOSAL

§ 20.301 General requirement.

No licensee shall dispose of licensed material except:

(a) By transfer to an authorized recipient as provided in the regulations in Part 30, 40, or 70 of this chapter, whichever may be applicable; or

(b) As authorized pursuant to § 20.302; or

(c) As provided in § 20.303 or § 20.304, applicable respectively to the disposal of licensed material by release into sanitary sewerage systems or burial in soil, or in § 20.106 (Radioactivity in Effluents to Unrestricted Areas).

§ 20.302 Method for obtaining approval of proposed disposal procedures.

(a) Any licensee or applicant for a license may apply to the Commission for approval of proposed procedures to dispose of licensed material in a manner not otherwise authorized in the regulations in this chapter. Each application should include a description of the licensed material and any other radioactive material involved, including the quantities and kinds of such material and the levels of radioactivity involved, and the proposed manner and conditions of disposal. The application should also include an analysis and evaluation of pertinent information as to the nature of the environment, including topographical, geological, meteorological, and hydrological characteristics; usage of ground and surface waters in the general area; the nature and location of other potentially affected facilities; and procedures to be observed to minimize the risk of unexpected or hazardous exposures.

25 FR 10914

(b) The Commission will not approve any application for a license to receive licensed material from other persons for disposal on land not owned by the Federal government or by a State government.

26 FR 227*

(c) The Commission will not approve any application for a license for disposal of licensed material at sea unless the applicant shows that sea disposal offers less harm to man or the environment than other practical alternative methods of disposal.

36 FR 23138

§ 20.303 Disposal by release into sanitary sewerage systems.

No licensee shall discharge licensed material into a sanitary sewerage system unless:

(a) It is readily soluble or dispersible in water; and

(b) The quantity of any licensed or other radioactive material released into the system by the licensee in any one day does not exceed the larger of subparagraphs (1) or (2) of this paragraph:

(1) The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the licensee, will result in an average concentration equal to the limits specified in Appendix B, Table I, Column 2 of this part; or

(2) Ten times the quantity of such material specified in Appendix C of this part; and

(c) The quantity of any licensed or other radioactive material released in any one month, if diluted by the average monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Appendix B, Table I, Column 2 of this part; and

(d) The gross quantity of licensed and other radioactive material released into the sewerage system by the licensee does not exceed one curie per year.

Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in this section.

39 FR 1772

§ 20.304 Disposal by burial in soil.

No licensee shall dispose of licensed material by burial in soil unless:

(a) The total quantity of licensed and other radioactive materials buried at any one location and time does not exceed, at the time of burial, 1,000 times the amount specified in Appendix C of this part; and

(b) Burial is at a minimum depth of four feet; and

(c) Successive burials are separated by distances of at least six feet and not more than 12 burials are made in any year.

25 FR 10914

§ 20.305 Treatment or disposal by incineration.

No licensee shall treat or dispose of licensed material by incineration except as specifically approved by the Commission pursuant to §§ 20.106(b) and 20.302.

RECORDS, REPORTS, AND NOTIFICATION

§ 20.401 Records of surveys, radiation monitoring, and disposal.

(a) Each licensee shall maintain records showing the radiation exposures of all individuals for whom personnel monitoring is required under § 20.202 of the regulations in this part. Such records shall be kept on Form NRC-5, in accordance with the instructions contained in that form or on clear and legible records containing all the information required by Form NRC-5. The doses entered on the forms or records shall be for periods of time not exceeding one calendar quarter.

(b) Each licensee shall maintain records in the same units used in this part, showing the results of surveys required by § 20.201(b), monitoring required by §§ 20.205(b) and 20.205(c), and disposals made under §§ 20.302, 20.303, and 20.304.

(c) (1) Records of individual exposure to radiation and to radioactive material which must be maintained pursuant to the provisions of paragraph (a) of this section and records of bioassays, including results of whole body counting examinations, made pursuant to § 20.101, shall be preserved until the Commission authorizes disposition.

(2) Records of the results of surveys and monitoring which must be maintained pursuant to paragraph (b) of this section shall be preserved for two years after completion of the survey except that the following records shall be maintained until the Commission authorizes their disposition: (i) records of the results of surveys to determine compliance with § 20.103(a); (ii) in the absence of personnel monitoring data, records of the results of surveys to determine external radiation dose; and (iii) records of the results of surveys used to evaluate the release of radioactive effluents to the environment.

41 FR 10300

(3) Records of disposal of licensed material made pursuant to §§ 20.302, 20.303, or 20.304 shall be maintained until the Commission authorizes their disposition.

(4) Records which must be maintained pursuant to this part may be the original or a reproduced copy or microform if such reproduced copy or microform is duly authenticated by authorized personnel and the microform is capable of producing a clear and legible copy after storage for the period specified by Commission regulations.

(5) If there is a conflict between the Commission's regulations in this part, license condition, or technical specification, or other written Commission approval or authorization pertaining to the retention period for the same type of record, the retention period specified in the regulations in this part for such records shall apply unless the Commission pursuant to § 20.501, has granted a specific exemption from the record retention requirements specified in the regulations in this part.

§ 20.402 Reports of theft or loss of licensed material.

(a) Each licensee shall report by telephone to the Director of the appropriate Nuclear Regulatory Commission Inspection and Enforcement Regional Office listed in Appendix D, immediately after its occurrence becomes known to the licensee, any loss or theft of licensed material in such quantities and under such circumstances that it appears to the licensee that a substantial hazard may result to persons in unrestricted areas.

34 FR 7500

(b) Each licensee who is required to make a report pursuant to paragraph (a) of this section shall, within thirty (30) days after he learns of the loss or theft, make a report in writing to the appropriate NRC Regional Office listed in Appendix D with copies to the Director of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, setting forth the following information:

41 FR 16445

1322 336

*Redesignated 36 FR 23138.

†Amended 42 FR 43-65.

Encl. A

APPENDIX C

Material	Microcuries
Americium-241	.01
Antimony-122	100
Antimony-124	10
Antimony-125	10
Arsenic-73	100
Arsenic-74	10
Arsenic-76	10
Arsenic-77	100
Barium-131	10
Barium-133	10
Barium-140	10
Bismuth-210	1
Bromine-82	10
Cadmium-109	10
Cadmium-115m	10
Cadmium-115	100
Calcium-45	10
Calcium-47	10
Carbon-14	100
Cerium-141	100
Cerium-143	100
Cerium-144	1
Cesium-131	1,000
Cesium-134m	100
Cesium-134	1
Cesium-135	10
Cesium-136	10
Cesium-137	10
Chlorine-36	10
Chlorine-38	10
Chromium-51	1,000
Cobalt-58m	10
Cobalt-58	10
Cobalt-60	1
Copper-64	100
Dysprosium-165	10
Dysprosium-166	100
Erbium-169	100
Erbium-171	100
Europium-152 9.2 h	100
Europium-152 13 yr	1
Europium-154	1
Europium-155	10
Fluorine-18	1,000
Gadolinium-153	10
Gadolinium-159	100
Gallium-72	10
Germanium-71	100
Gold-196	100
Gold-199	100
Hafnium-181	10
Holmium-166	100
Hydrogen-3	1,000
Indium-113m	100
Indium-114m	10
Indium-115m	100
Indium-115	10
Iodine-125	1
Iodine-126	1
Iodine-129	0.1
Iodine-131	1
Iodine-132	10
Iodine-133	1
Iodine-134	10
Iodine-135	10
Iridium-192	10
Iridium-194	100
Iron-55	100
Iron-59	10
Krypton-85	100
Krypton-87	10
Lanthanum-140	10
Lutetium-177	100
Manganese-52	10
Manganese-54	10
Manganese-56	10
Mercury-197m	100
Mercury-197	100
Mercury-203	10
Molybdenum-99	100
Neodymium-147	100
Neodymium-149	100
Neptunium-237	100
Nickel-59	10
Nickel-65	100
Niobium-93m	10
Niobium-95	10
Niobium-97	10
Osmium-185	10

Material	Microcuries
Osmium-191m	100
Osmium-191	100
Osmium-193	100
Palladium-103	100
Palladium-109	100
Phosphorus-32	10
Platinum-191	100
Platinum-193m	100
Platinum-193	100
Platinum-197m	100
Platinum-197	100
Plutonium-239	.01
Polonium-210	0.1
Potassium-42	10
Praseodymium-142	100
Praseodymium-143	100
Promethium-147	10
Promethium-149	10
Radium-226	.01
Rhenium-186	100
Rhenium-188	100
Rhodium-103m	100
Rhodium-105	100
Rubidium-86	10
Rubidium-87	10
Ruthenium-97	100
Ruthenium-103	10
Ruthenium-105	10
Ruthenium-106	1
Samarium-151	10
Samarium-153	100
Scandium-46	10
Scandium-47	100
Scandium-48	10
Selenium-75	10
Silicon-31	100
Silver-105	10
Silver-110m	1
Silver-111	100
Sodium-24	10
Strontium-85	10
Strontium-89	1
Strontium-90	0.1
Strontium-91	10
Strontium-92	10
Sulphur-35	100
Tantalum-182	10
Technetium-96	10
Technetium-97m	100
Technetium-97	100
Technetium-99m	100
Technetium-99	10
Tellurium-125m	10
Tellurium-127m	10
Tellurium-127	100
Tellurium-129m	10
Tellurium-129	100
Tellurium-131m	10
Tellurium-132	10
Terbium-160	10
Thallium-200	100
Thallium-201	100
Thallium-202	100
Thallium-204	10
** Thorium (natural)[1]	100
Thulium-170	10
Thulium-171	10
Tin-113	10
Tin-125	10
Tungsten-181	10
Tungsten-185	10
Tungsten-187	100
** Uranium (natural)[2]	100
Uranium-233	.01
Uranium-234—Uranium-235	.01
Vanadium-48	10
Xenon-131m	1,000
Xenon-133	100
Xenon-135	100
Ytterbium-175	100
Yttrium-90	10
Yttrium-91	10
Yttrium-92	100
Yttrium-93	100
Zinc-65	10
Zinc-69m	100
Zinc-69	1,000
Zirconium-93	10
Zirconium-95	10
Zirconium-97	10

Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition ..... .01

Any radionuclide other than alpha emitting radionuclides, not listed above or mixtures of beta emitters of unknown composition 1

NOTE: For purposes of §§ 20.203 and 20.304, where there is involved a combination of isotopes in known amounts the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" (i.e., "unity"). Example: For purposes of § 20.304, if a particular batch contains 20,000 μCi† of Au^{198} and 50,000 μCi† of C^{14}, it may also include not more than 300 μCi† of I^{131}. This limit was determined as follows:

† $\frac{20{,}000\ \mu Ci\ Au^{198}}{100{,}000\ \mu Ci} + \frac{50{,}000\ \mu Ci\ C^{14}}{100{,}000\ \mu Ci} + \frac{300\ \mu Ci\ I^{131}}{1{,}000\ \mu Ci} \leq 1$

The denominator in each of the above ratios was obtained by multiplying the figure in the table by 1,000 as provided in § 20.304.

[1] Based on alpha disintegration rate of Th-232, Th-230 and their daughter products.

[2] Based on alpha disintegration rate of U-238, U-234, and U-235.

* Amended 36 FR 16898

** Amended 39 FR 23990

† Amended 38 FR 29312

35 FR 6425

1322 537

ENCL. A

G. Each licensee or registrant shall establish and maintain procedures for safely opening packages in which radioactive material is received, and shall assure that such procedures are followed and that due consideration is given to special instructions for the type of package being opened.

R12-1-416. General requirement - waste disposal

No licensee shall dispose of any radioactive material except:
1. By transfer to an authorized recipient as provided in Article 3, or
2. As authorized pursuant to R12-1-407, 417, 418, or 419.

R12-1-417. Method of obtaining approval of proposed disposal procedures

Any person may apply to the AAEC for approval of proposed procedures to dispose of radioactive material in a manner not otherwise authorized in this Article. Each application shall include a description of the radioactive material, including the quantities and kinds of radioactive material and the levels of radioactivity involved, and the proposed manner and conditions of disposal. The application, where appropriate, should also include an analysis and evaluation of pertinent information as to the nature of the environment, including topographical, geological, meterological, and hydrological characteristics; usage of ground and surface waters in the general area; the nature and location of other potentially affected facilities; and procedures to be observed to minimize the risk of unexpected or hazardous exposures.

The AAEC will not approve any application for a license to receive radioactive material from other persons for disposal on land not owned by the State of Arizona or the Federal Government.

R12-1-418. Disposal by release into sanitary sewerage systems

A. No licensee shall discharge radioactive material into a sanitary sewerage system unless:
1. It is readily soluble or dispersible in water; and,
2. The quantity of any radioactive material released into the system by the licensee in any one day does not exceed the larger of a. or b. of this item:
a. The quantity which, if diluted by the average daily quantity of sewage released into the sewer by the licensee, will result in an average concentration not greater than the limits specified in Appendix A, Table 1, Column 2, of this Article; or
b. Ten times the quantity of such material specified in Appendix B of this Article; and,
3. The quantity of any radioactive material released in any one month, if diluted by the average monthly quantity of water released by the licensee, will not result in an average concentration exceeding the limits specified in Appendix A, Table I, Column 2, of this Article, and,
4. The gross quantity of radioactive material released into the sewerage system by the licensee does not exceed one curie per year.
B. Excreta from individuals undergoing medical diagnosis or therapy with radioactive material shall be exempt from any limitations contained in R12-1-418.

Encl.B

R12-1-419. Disposal by burial in soil

No licensee shall dispose of radioactive material by burial in soil unless:
1. The total quantity of radioactive materials buried at any one location and time does not exceed, at the time of burial, 1,000 times the amount specified in Appendix B of this Article; and,
2. Burial is at a minimum depth of four feet; and,
3. Successive burials are separated by distances of at least six feet and not more than 12 burials are made in any year.

R12-1-420. Disposal by incineration

No licensee shall incinerate radioactive material for the purpose of disposal or preparation for disposal except as specifically approved by the AAEC pursuant to R12-1-407 and R12-1-417.

R12-1-421. Records of surveys, radiation monitoring, and disposal

A. Each licensee or registrant shall maintain records showing the radiation exposures of all individuals for whom personnel monitoring is required under R12-1-410 of this Article. Such records shall be kept on Form AAEC-8, in accordance with the instructions contained in that form or on clear and legible records containing all the information required by Form AAEC-8. The doses entered on the forms or records shall be for periods of time not exceeding one calendar quarter.
B. Each licensee or registrant shall maintain records in the same units used in this Article, showing the results of surveys required by R12-1-409 and disposals made under R12-1-417, 418 and 419.
C. Records of individual exposure to radiation and to radioactive material which must be maintained pursuant to the provisions of A. immediately above and records of bio-assays, including results of whole body counting examinations, made pursuant to R12-1-403 shall be preserved indefinitely or until the AAEC authorizes their disposal. Records which must be maintained pursuant to this subsection may be maintained in the form of microfilms.
D. This discontinuance of or curtailment of activities, does not relieve the licensee or registrant of responsibility for retaining all records required by R12-1-421. A licensee or registrant may, however, request the AAEC to accept such records. The acceptance of the records by the AAEC relieves the licensee or registrant of subsequent responsibility only in respect to their preservation as required by R12-1-421.

R12-1-422. Reports of theft or loss of sources of radiation

Each licensee or registrant shall report by telephone and telegraph to the AAEC the theft or loss of any source of radiation immediately after such occurence becomes known.

R12-1-423. Notification of incidents

A. Immediate Notification. Each licensee or registrant shall immediately notify the AAEC by telephone and telegraph of any incident involving any source of radiation possessed by him and which may have caused or threatens to cause:

APPENDIX B

(For use in R12-1-411, R12-1-418, and R12-1-419)

Material	Microcuries
Americium-241	0.01
Antimony-122	100
Antimony-124	10
Antimony-125	10
Arsenic-73	100
Arsenic-74	10
Arsenic-76	10
Arsenic-77	100
Barium-131	10
Barium-133	10
Barium-140	10
Bismuth-210	1
Bromine-82	10
Cadmium-109	10
Cadmium-115m	10
Cadmium-115	100
Calcium-45	10
Calcium-47	10
Carbon-14	100
Cerium-141	100
Cerium-143	100
Cerium-144	1
Cesium-131	1,000
Cesium-134m	100
Cesium-134	1
Cesium-135	10
Cesium-136	10
Cesium-137	10
Chlorine-36	10
Chlorine-38	10
Chromium-51	1,000
Cobalt-58m	10
Cobalt-58	10
Cobalt-60	1
Copper-64	100
Dysprsium-165	10
Dysprosium-166	100
Erbium-169	100
Erbium-171	100
Europium-152 (9.2 h)	100
Europium-152 (13 yr)	1

Material	Microcuries
Europium-154	1
Europium-155	10
Fluorine-18	1,000
Gadolinium-153	10
Gadolinium-159	100
Gallium-72	10
Germanium-71	100
Gold-198	100
Gold-199	100
Hafnium-181	10
Holmium-166	100
Hydrogen-3	1,000
Indium-113m	100
Indium-114m	10
Indium-115m	100
Indium-115	10
Iodine-125	1
Iodine-126	1
Iodine-129	0.1
Iodine-131	1
Iodine-132	10
Iodine-133	1
Iodine-134	10
Iodine-135	10
Iridium-192	10
Iridium-194	100
Iron-55	100
Iron-59	10
Krypton-85	100
Krypton-87	10
Lanthanum-140	10
Lutetium-177	100
Manganese-52	10
Manganese-54	10
Manganese-56	10
Mercury-197m	100
Mercury-197	100
Mercury-203	10
Molybdenum-99	100
Neodymium-147	100
Neodymium-149	100
Nickel-59	100
Nickel-63	10
Nickel-65	100
Niobium-93m	10
Niobium-95	10
Niobium-97	10
Osmium-185	10

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Material	Microcuries
Osmium-191m	100
Osmium-191	100
Osmium-193	100
Palladium-103	100
Palladium-109	100
Phosphorus-32	10
Platinum-191	100
Platinum-193m	100
Platinum-193	100
Platinum-197m	100
Platinum-197	100
Plutonium-239	0.01
Polonium-210	0.1
Potassium-42	10
Praseodymium-142	100
Praseodymium-143	100
Promethium-147	10
Promethium-149	10
Radium-226	0.01
Rhenium-186	100
Rhenium-188	100
Rhodium-103m	100
Rhodium-105	100
Rubidium-86	10
Rubidium-87	10
Ruthenium-97	100
Ruthenium-103	10
Ruthenium-105	10
Ruthenium-106	1
Samarium-151	10
Samarium-153	100
Scandium-46	10
Scandium-47	100
Scandium-48	10
Selenium-75	10
Silicon-31	100
Silver-105	10
Silver-110m	1
Silver-111	100
Sodium-24	10
Strontium-85	10
Strontium-89	1
Strontium-90	0.1
Strontium-91	10
Strontium-92	10
Sulphur-35	100
Tantalum-182	10
Technetium-96	10

Material	Microcuries
Technetium-97m	100
Technetium-97	100
Technetium-99m	100
Technetium-99	10
Tellurium-125m	10
Tellurium-127m	10
Tellurium-127	100
Tellurium-129m	10
Tellurium-129	100
Tellurium-131m	10
Tellurium-132	10
Terbium-160	10
Thallium-200	100
Thallium-201	100
Thallium-202	100
Thallium-204	10
Thorium (natural)[1/]	100
Thulium-170	10
Thulium-171	10
Tin-113	10
Tin-125	10
Tungsten-181	10
Tungsten-185	10
Tungsten-187	100
Uranium (natural)[2/]	100
Uranium-233	0.01
Uranium-234 - Uranium-235	0.01
Vanadium-48	10
Xenon-131m	1,000
Xenon-133	100
Xenon-135	100
Ytterbium-175	100
Yttrium-90	10
Yttrium-91	10
Yttrium-92	100
Yttrium-93	100
Zinc-65	10
Zinc-69m	100
Zinc-69	1,000
Zirconium-93	10
Zirconium-95	10
Zirconium-97	10

1/ Based on alpha disintegration rate of Th-232, Th-230 and their daughter products.

2/ Based on alpha disintegration rate of U-238, U-234, and U-235.

Material	Microcuries
Any alpha emitting radionuclide not listed above or mixtures of alpha emitters of unknown composition	0.01
Any radionuclide other than alpha emitting radionuclides, not listed above or mixtures of beta emitters of unknown composition	0.1

NOTE: For purposes of R12-1-411, R12-1-418, and R12-1-419, where there is involved a combination of isotopes in known amounts, the limit for the combination should be derived as follows: Determine, for each isotope in the combination, the ratio between the quantity present in the combination and the limit otherwise established for the specific isotope when not in combination. The sum of such ratios for all the isotopes in the combination may not exceed "1" (i.e., "unity").
Example: For purposes of R12-1-419, if a particular batch contains 20,000 uCi of Au-198 and 50,000 uCi of C-14, it may also include not more than 300 uCi of I-131. This limit was determined as follows:

20,000 uCi Au-198/1000,000 uCi + 50,000 uCi C-14/100,000 uCi
+ 300 uCi I-131/1,000 uCi = 1

The denominator in each of the above ratios was obtained by multiplying the figure in the table by 1,000 as provided in R12-1-419.