

## 7. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding uranium in air, water, and other media are summarized in Table 7-1.

ATSDR has derived an MRL of  $8.0 \times 10^{-3}$  mg U/m<sup>3</sup> for intermediate-duration inhalation exposure to insoluble compounds of uranium based on a NOAEL of 1.1 mg U/m<sup>3</sup> for renal effects in dogs (Rothstein 1949b).

ATSDR has derived an MRL of  $4.0 \times 10^{-4}$  mg U/m<sup>3</sup> for intermediate-duration inhalation exposure to soluble compounds of uranium based on a LOAEL of 0.15 mg U/m<sup>3</sup> for renal effects in dogs (Rothstein 1949a).

ATSDR has derived an MRL of  $3.0 \times 10^{-4}$  mg U/m<sup>3</sup> for chronic-duration inhalation exposure (365 days or more) to soluble compounds of uranium based on a NOAEL of 0.05 mg U/m<sup>3</sup> for renal effects in dogs (Stokinger et al. 1953).

ATSDR has derived an MRL of  $2.0 \times 10^{-3}$  mg/kg/day has been derived for intermediate-duration oral exposure (and is protective for chronic-duration oral exposure) to soluble compounds of uranium based on a LOAEL of 0.05 mg U/kg/day d for renal effects in rabbits (Gilman et al. 1998b).

According to the EPA's Integrated Risk Information System (IRIS), neither a reference dose (RfD) nor a reference concentration (RfC) are available for uranium (IRIS 1997).

The International Agency for Research on Cancer, the U.S. Department of Human and Health Services, and the National Toxicology Program have not classified uranium as to its carcinogenicity. According to the Integrated Risk Information System (IRIS) database, the U.S. Environmental Protection Agency (EPA) withdrew its carcinogenic assessment of uranium in 1993 and has not completed its evaluation and determination of the evidence of uranium's human carcinogenicity potential (IRIS 1997).

Radiation protection recommendations for radiation workers and members of the public are provided by the International Commission on Radiological Protection (ICRP) (ICRP 1977, 1991) and the National Council on Radiation Protection and Measurements (NCRP) (NCRP 1987, 1993). These recommendations are not

## 7. REGULATIONS AND ADVISORIES

regulations, but they provide the scientific basis for the development of regulations by federal agencies, such as EPA, the U.S. Nuclear Regulatory Commission (USNRC), and the U.S. Department of Energy (DOE), as well as by individual states.

The EPA is responsible for federal radiation protection guidance (EPA 1988c), "generally applicable" environmental radiation standards (40 CFR 190), and regulations to implement specific statutory requirements, such as Safe Drinking Water Act (40 CFR 141). The USNRC's regulations apply to source materials and special nuclear material, such as enriched uranium and plutonium; the utilization of special nuclear material, such as the operation of nuclear reactors; and the use of by-product materials, which include wastes produced in the processing of uranium or thorium and materials made radioactive in the utilization of special nuclear material (USNRC 1997a). The DOE has issued regulations applicable to its facilities (DOE 1993a).

States are free to regulate radioactive materials and other sources of radiation that the Atomic Energy Act does not give the USNRC authority to regulate. This includes sources of natural radioactivity, such as, uranium and radium, and radiation producing machines, such as x ray machines. Section 274 of the Atomic Energy Act (AEA) of 1954, as amended provides that states (and U.S. territories) may enter into an agreement with the USNRC to regulate by-product materials, source materials, and special nuclear materials (USNRC 1969). The relinquishes to these "agreement states" the majority of its regulatory authority over source, by-product, and special nuclear material in quantities not sufficient to form a critical mass. However, the USNRC retains its authority to regulate the construction and operation of production facilities (nuclear reactors used for production and separation of plutonium or  $^{233}\text{U}$  or fuel reprocess plants) and utilization facilities (nuclear reactors used for production of power, medical therapy, research and testing); the import of by-product, source, or special nuclear materials; and the disposal of regulated materials into the ocean or otherwise (USNRC 1969). Currently there are 30 "agreements states" and 17 "non-agreement states." The governors of five states (Minnesota, Ohio, Oklahoma, Pennsylvania, and Wisconsin) have submitted letters of intent for their states to become agreement states (ORNL 1998). The regulations established by agreement states must be "compatible" with the USNRC's regulations, which require that the states' regulations be at least as strict as the USNRC's regulations. The responsibilities of agreement states also include the regulation of low-level radioactive wastes, which contain by-product materials. In non-agreement states, the USNRC still handles all of the inspection, enforcement, and licensing responsibilities. Figure 7-1 shows the agreement, non-agreement, and intending states.

## 7. REGULATIONS AND ADVISORIES

Current federal and state regulations limit radiation workers' doses to a total effective dose equivalent (TEDE) of 5 rem/year and a committed dose equivalent to any organ, other than the lens of the eye, of 50 rem/year (EPA 1988c; USNRC 1995a). These limits apply to the sum of external and internal doses. The limits are upper limits, and an important philosophy in radiation protection is to keep radiation doses as low as reasonably achievable (ALARA).

For the control of internal doses, annual limits of intake (ALI) and derived air concentrations (DAC) have been determined. ALIs and DACs in EPA guidance and the USNRC and DOE regulations are based on the recommendations of the ICRP (ICRP 1979). Values of the ALIs and DACs for uranium isotopes are presented in Table 7-1. These values are for soluble, Class D (Days) material, which has a half-time for clearance from the pulmonary region of the lung of less than 10 days. Values of ALIs and DACs for Class W (Weeks) and Class Y (Years) uranium are available in Appendix B to 10 CFR 20 (USNRC 1993f).

The ALI is the activity of a radionuclide that can be taken into the body in a year, by inhalation or ingestion, without exceeding a committed effective dose equivalent (CEDE) of 5 rem/year or a committed dose equivalent to any organ of 50 rem/year, whichever is more limiting. The total effective dose equivalent TEDE is the sum of the CEDE and any penetrating external dose (10 CFR 20). If any external dose is present the ALI must be reduced by a proportional amount to ensure that the dose limits are not exceeded. For example, if a worker received an external dose of 1 rem/year, the ALI would have to be reduced by 20% to ensure that the TEDE did not exceed 5 rem/year.

The DAC is simply the inhalation ALI divided by the volume of air that a worker is assumed to breathe in a year (2,400 m<sup>3</sup>). Thus, if the average air concentration is controlled so as not to exceed the DAC, a worker will not take in more than an ALI, and the worker's dose will not exceed 5 rem CEDE or 50 rem committed dose equivalent to any organ (ICRP 1977).

Uranium is unusual among the elements because it presents both chemical and radiological hazards. For soluble uranium, with an <sup>235</sup>U enrichment no greater than 5%, limits on intakes and air concentrations for radiation workers are based on the chemical toxicity of uranium since it is more limiting than the radiological hazard. For this case, the USNRC's limit for a 40-hour workweek is 0.2 mg uranium per cubic meter of air average (USNRC 1993f).

## 7. REGULATIONS AND ADVISORIES

Between June 27, 1974 and January 18, 1989, the Occupational Safety and Health Administration (OSHA) promulgated protective, permissible exposure limits (PELs) for more than 400 toxic substances (OSHA 1993). The OSHA PELs were established to protect employees against adverse health effects which could result from exposure to hazardous substances found in the workplace. An employer must ensure that an employee's exposure to a toxic substance in any 8-hour work shift of a 40-hour week does not exceed the 8-hour time-weighted average (TWA) established for the substance (OSHA 1993). On January 18, 1989 OSHA promulgated more protective PELs for approximately 376 toxic substances. In July 1992, the 11<sup>th</sup> Circuit Court Appeals rescinded the 1989 promulgation. On March 23, 1993, OSHA resumed enforcing the air contaminant exposure limits that were in effect prior to the issuance of the new 1989 limits (i.e., OSHA 1974 PELs). On June 30, 1993 OSHA published in the Federal Register a final rule announcing the revocation of the 1989 exposure limits. Current OSHA general industry standards specify that an employer must use engineering and work practice controls, if feasible, to reduce exposures to or below an 8-hour TWA of 0.05 mg per cubic meter of soluble uranium and 0.25 mg/m<sup>3</sup> for insoluble uranium (OSHA 1993, 1997c). OSHA standards for construction workers indicate that exposures to uranium in gases, vapors, fumes, dust, and mist, through inhalation, ingestion, skin absorption, or contact at concentrations above those specified in the ACGIH "Threshold Limit Values of Airborne Contaminants for 1970" should be avoided. The "Threshold Limit Values of Airborne Contaminants for Construction" are codified at 29 CFR 1926, and indicate a limit of exposure at 0.2 mg/m<sup>3</sup> for soluble and insoluble uranium (OSHA 1997a). The same limits of exposure are codified at 29 CFR 1915 for shipyard personnel (OSHA 1997b).

Recent reports of the ICRP (ICRP 1991) and the NCRP (NCRP 1993) contain recommendations for lower worker dose limits. The ICRP recommends a limit on total effective dose of 2 rem/year averaged over 5 years, with the additional provision that the dose not exceed 5 rem in any single year. The NCRP's recommendations are that a worker's total accumulated dose should not exceed his or her age in years time 1 rem, and that the dose should not exceed 5 rem in any single year. These recommendations have not yet been incorporated into U.S. regulations.

Regulations for the general public are based on an annual TEDE of 0.1 rem/year, with provisions for a limit of 0.5 rem/year under special circumstances (USNRC 1997b). Considering the lower limit for members of the public and their potential continuous exposure, the limits on air concentrations of radionuclides for the public are two orders of magnitude lower than the DACs for radiation workers. Regulations for specific applications limit the dose to the public to values <0.1 rem/year. Under its responsibility for generally

## 7. REGULATIONS AND ADVISORIES

applicable environmental radiation standards, the EPA has issued regulations for the nuclear fuel cycle that limit the total-body annual dose equivalent for members of the public to 0.025 rem/year. Except for the thyroid, which has a dose equivalent of 0.075 rem/year, the regulations also specify a 0.025 rem/year dose equivalent for a single organ (EPA 1988c). Also, based on the Clean Water Act, EPA proposed, but subsequently withdrew in 1998, a drinking water standard of 30 pCi/L for naturally occurring uranium (EPA 1991, 1995c). Analytical results for uranium are reported in units of activity with radiochemical and alpha spectrometry methods and in mass units with fluorimetric and laser phosphorimetry methods (EPA 1997c). A conversion factor is required when converting the fluorimetric or laser phosphorimetric results from micrograms to picocuries. EPA selected the larger of two proposed values (1.38 pCi/ $\mu$ g and 0.67 pCi/ $\mu$ g) as the conversion factor (EPA 1997c). Using this conversion factor, the proposed drinking water standard would have been converted to 20  $\mu$ g/L.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires that persons in charge of vessels or facilities from which a hazardous substance has been released in a 24-hour period in a quantity equal to or greater than its reportable quantity (RQ) immediately notify the National Response Center of the release. Values of RQs for isotopes of uranium are shown in Table 7-1 (EPA 1989f). These values are estimates, made using conservative assumptions, of the smallest activity of the radionuclides that, if released over a 24-hour period, could result in a person located 30 meters from the release point receiving an effective dose equivalent of 0.5 rem (0.005 Sv). Other regulations, including ones specific to uranium mining and milling, are cited in Table 7-1.

## 7. REGULATIONS AND ADVISORIES

**Table 7-1. Regulations and Guidelines Applicable to Uranium**

Agency	Description	Information	References
<u>INTERNATIONAL</u>			
Guidelines:			
WHO	Listed as an inorganic constituent requiring no action with respect to potential health significance	Yes	WHO 1984
ICRP	Occupational - whole body exposure  Individual - short-term, to critical populations Individual - chronic exposure	5 rem/yr (50 mSv) 0.5 rem/yr (5 mSv) 0.1 rem/yr (1 mSv)	ICRP 1977
<u>NATIONAL</u>			
Regulations:			
a. Air:			
EPA OAR	New Source Performance Standards:		
	General Provisions Priority List	Yes	40 CFR 60, Subpart A EPA 1982a
	Metallic Mineral Processing Plants	Yes	40 CFR 60, Subpart LL EPA 1984a
	National Emission Standards for Hazardous Air Pollutants:		
	Radon from Underground Uranium Mines	Yes	40 CFR 61, Subpart B EPA 1989a
	Radionuclide Emissions from Facilities Licensed by Nuclear Regulatory Commission and federal facilities not covered by Subpart H: Applicability	Yes	40 CFR 61, Subpart I EPA 1989b
	Radon Emissions from DOE Facilities	Yes	40 CFR 61, Subpart Q EPA 1989c
	Radon Emissions from Disposal of Uranium Mill Tailings	Yes	40 CFR 61, Subpart T EPA 1989d
	Radon Emissions from Operating Mill Tailing	Yes	40 CFR 61, Subpart W EPA 1989e
	Environmental Standards for Uranium Fuel Cycle: Standards for Normal Operation Annual dose not to exceed:		40 CFR 190, Subpart B EPA 1977b
	-whole body	≤ 25 mrems	
	-thyroid	≤ 75 mrems	
	-any other organ	≤ 25 mrems	
	Quantity of radioisotopes material entering environment per gigawatt -year	< 50,000 Ci krypton-85 < 5 mCi plutonium 239 and other alpha-emissions with half-lives greater than 1 year	
	Effective Date for Implementation Standards	Yes	40 CFR 190, Subpart B EPA 1977b
	Environmental standards for disposal	Yes	40 CFR 191.12 EPA 1985i

## 7. REGULATIONS AND ADVISORIES

Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
	Standards for Control of Residual Radioactive Material from Inactive Uranium Processing Sites	Yes	40 CFR 192, Subpart A EPA 1995c
	Definitions	Yes	
	Standards (for control of residual radioactive materials and their listed constituents)	Yes	
	Maximum concentration of constituents for ground-water protection	30 pCi/L	
	Standards for Cleanup of Land and building Contaminated with Residual Radioactive Materials from Inactive Uranium Processing Sites	Yes	40 CFR 192, Subpart B EPA 1995a
	Guidance for Implementation	Yes	40 CFR 192, Subpart C EPA 1995b
	Additional Listed Constituents (replacement list of constituents for screening purposes )	Combined uranium-234 and uranium-238	
	Standards for Management of Uranium Byproduct Materials Pursuant to Section 84 of the Atomic Energy Act of 1954, as Amended	Yes	40 CFR 192, Subpart D EPA 1993b
	Standards (for application during processing operations and prior to the end of the closure period— Concentration limits	5 pCi/L	
USNRC and DOE	Occupational Annual Limits on Intake (ALI's) for Inhalation	U-230 $4 \times 10^{-1}$ $\mu$ Ci U-231 $8 \times 10^3$ $\mu$ Ci U-232 $2 \times 10^{-1}$ $\mu$ Ci U-233 1.0 $\mu$ Ci U-234 1.0 $\mu$ Ci U-235 1.0 $\mu$ Ci U-236 1.0 $\mu$ Ci U-237 $3.0 \times 10^3$ $\mu$ Ci U-238 1.0 $\mu$ Ci U-239 $2 \times 10^5$ $\mu$ Ci U-240 $4.0 \times 10^3$ $\mu$ Ci U <sub>natural</sub> $5.0 \times 10^{-10}$ $\mu$ Ci	10 CFR 20 Appendix B USNRC 1993f and 10 CFR 835, Subpart C DOE 1993a
	Occupational Derived Air Concentrations (DACs)	U-230 $2.0 \times 10^{-10}$ $\mu$ Ci/mL U-231 $3.0 \times 10^{-6}$ $\mu$ Ci/mL U-232 $9.0 \times 10^{-11}$ $\mu$ Ci/mL U-233 $5.0 \times 10^{-10}$ $\mu$ Ci/mL U-234 $5.0 \times 10^{-10}$ $\mu$ Ci/mL U-235 $6.0 \times 10^{-10}$ $\mu$ Ci/mL U-236 $5.0 \times 10^{-10}$ $\mu$ Ci/mL U-237 $1.0 \times 10^{-6}$ $\mu$ Ci/mL U-238 $6.0 \times 10^{-10}$ $\mu$ Ci/mL U-239 $8.0 \times 10^{-5}$ $\mu$ Ci/mL U-240 $2.0 \times 10^{-6}$ $\mu$ Ci/mL U <sub>natural</sub> $5.0 \times 10^{-10}$ $\mu$ Ci/mL	10 CFR 20 Appendix B USNRC 1993f and 10 CFR 835, Subpart C DOE 1993a

## 7. REGULATIONS AND ADVISORIES

**Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)**

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
	40-hour workweek average air concentration limit for soluble uranium with <sup>235</sup> U enrichment ≤5%	0.2 mg/m <sup>3</sup>	10 CFR 20 Appendix B USNRC 1993f
	Effluent Concentrations	U-230 4-8x10 <sup>-13</sup> μCi/mL U-231 6x10 <sup>-9</sup> –1x10 <sup>-8</sup> μCi/mL U-232 1x10 <sup>-14</sup> –6x10 <sup>-13</sup> μCi/mL U-233 5x10 <sup>-14</sup> –3x10 <sup>-12</sup> μCi/mL U-234 5x10 <sup>-14</sup> –3x10 <sup>-12</sup> μCi/mL U-235 6x10 <sup>-14</sup> –3x10 <sup>-12</sup> μCi/mL U-236 2-4x10 <sup>-9</sup> μCi/mL U-237 6x10 <sup>-7</sup> –1x10 <sup>-6</sup> μCi/mL U-238 6x10 <sup>-14</sup> –3x10 <sup>-12</sup> μCi/mL U-239 2-3x10 <sup>-7</sup> μgCi/mL U-240 3-5x10 <sup>-9</sup> μCi/mL U-natural 9x10 <sup>-14</sup> –3x10 <sup>-12</sup> μCi/mL	10 CFR 20 Appendix B USNRC 1993f
OSHA	PEL TWA (corrected rule) soluble insoluble	0.05 mg/m <sup>3</sup> 0.25 mg/m <sup>3</sup>	62 FR 42018 (29 CFR 1910) OSHA 1997c
	STEL	0.6 mg/m <sup>3</sup> insoluble	
	Occupational Safety and Health Standards for Shipyard Employment—TWA for Air Contaminants soluble insoluble	0.2 mg/m <sup>3</sup> 0.2 mg/m <sup>3</sup>	29 CFR 1915.1000 OSHA 1997b
	Safety Regulations for Construction —TWA for Air Contaminants soluble insoluble	0.2 mg/m <sup>3</sup> 0.2 mg/m <sup>3</sup>	29 CFR 1926.55, Appendix A OSHA 1997a
b. Water:			
EPA OW	National Primary Drinking Water Regulations Monitoring Analytical Requirements	ASTM D-2907	40 CFR 141.25 EPA 1980a
	Maximum Contaminant Level (proposed)	30 pCi/L (20 μg/L)	62 FR 52194 EPA 1997a
	NPDES Permit Application Requirements: Hazardous Substances	Yes	40 CFR 122, App. D EPA 1983a
	Criteria and standards for NPDES	Yes	40 CFR 125 EPA 1979
	Underground Injection Control Program Classification of Class III Injection Wells for the Underground Injection Control Program	Yes	40 CFR 146.5 EPA 1980c
	Class III Classification of Underground Injection Wells for in-situ Production of Uranium	Yes	40 CFR 146.6 EPA 1987b
	State Underground Injection Control Programs Aquifer Exemptions	Yes	40 CFR 147.3003 EPA 1984d



## 7. REGULATIONS AND ADVISORIES

**Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)**

Agency	Description	Information	References
<u>NATIONAL</u> (cont.)			
	Plugging and Abandonment of Class III Wells	Yes	40 CFR 147.3011 EPA 1984c
	National Oil and Hazardous Substances Pollution Contingency Plan - National Priority List	Yes	40 CFR 300, Appendix B EPA 1994c
	Definition for Designation, Reportable Quantities and Notification of Hazardous Substances	Yes	40 CFR 302.3 EPA 1985a
	Definitions for Reimbursement to Local Government for Emergency Response to Hazardous Substance Release	Yes	40 CFR 310.11 EPA 1993a
	Nonferrous Metals Manufacturing Effluent Guideline and Standards		
	Secondary Uranium Subcategory	Yes	40 CFR 421, Subpart AD EPA 1985b
	Secondary Uranium Subcategory: Effluent Limitations Attainable by Best Practicable Control Technology	Yes	
	Secondary Uranium Subcategory: Effluent Limitations Attainable by Best Available Technology	Yes	
	Secondary Uranium Subcategory: Standards of Performance for New Source	Yes	
	Secondary Uranium Subcategory: Pretreatment Standards for New Sources	Yes	
	Uranium, Radium and Vanadium Ores Effluent Guidelines and Standards		40 CFR 440, Subpart C EPA 1982b
	Description of Uranium Ore Subcategory	Yes	
	Effluent Limits Attainable by Applicability of Best Practicable Control Technology (BPT)	4.0 mg/L (1 day) 2.0 mg/L (30 days)	
	Subpart C - Uranium Effluent Limit Attainable by Applicability of Best Achievable Technology (BAT)	4.0 mg/L - max. for 1 day 2.0 mg/L - avg. for 30 consec. days	
	New Source Performance Standards (NSPS)	Yes	
	Ore Mining and Dressing Effluent Guidelines and Standards		
	Vanadium Ore Subcategory: Effluent Limit Attainable from BPT	Yes	40 CFR 440, Subpart H EPA 1982c
	Nonferrous Metals Forming and Metals Powder Effluent Guidelines and Standards		
	Uranium Forming Subcategory:	Yes	40 CFR 471, Subpart G EPA 1985c
	Effluent Limits by Applicability of BPT	Yes	40 CFR 471.71 EPA 1985d

## 7. REGULATIONS AND ADVISORIES

Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)

Agency	Description	Information	References	
<u>NATIONAL</u> (cont.)				
	Effluent Limits by Applicability of BAT	Yes	40 CFR 471.72 EPA 1985e	
	NSPS	Yes	40 CFR 471.73 EPA 1985f	
	PSNS	Yes	40 CFR 471.75 EPA 1985g	
USNRC	Occupational Annual Limits on Intake (ALI's) for Oral Ingestion	U-230	4.0 $\mu$ Ci	10 CFR 20, App. B USNRC 1993f
		U-231	$5.0 \times 10^3$ $\mu$ Ci	
		U-232	2.0 $\mu$ Ci	
		U-233	1.051 $\mu$ Ci	
		U-234	$1.0 \times 10^1$ $\mu$ Ci	
		U-235	$1.0 \times 10^1$ $\mu$ Ci	
		U-236	$1.0 \times 10^1$ $\mu$ Ci	
		U-237	$2.0 \times 10^3$ $\mu$ Ci	
		U-238	$1.0 \times 10^1$ $\mu$ Ci	
		U-239	7.054 $\mu$ Ci	
	U-240	$1.0 \times 10^3$ $\mu$ Ci		
	$U_{\text{natural}}$	$1.0 \times 10^{+1}$ $\mu$ Ci		
	Effluent Concentrations	U-230	$8 \times 10^{-8}$ $\mu$ Ci/mL	10 CFR 20 Appendix B USNRC 1993f
		U-231	$6 \times 10^{-5}$ $\mu$ Ci/mL	
		U-232	$6 \times 10^{-8}$ $\mu$ Ci/mL	
		U-233	$3 \times 10^{-7}$ $\mu$ Ci/mL	
		U-234	$3 \times 10^{-7}$ $\mu$ Ci/mL	
		U-235	$3 \times 10^{-7}$ $\mu$ Ci/mL	
		U-236	$3 \times 10^{-7}$ $\mu$ Ci/mL	
		U-237	$3 \times 10^{-5}$ $\mu$ Ci/mL	
U-238		$3 \times 10^{-7}$ $\mu$ Ci/mL		
U-239		$9 \times 10^{-4}$ $\mu$ Ci/mL		
U-240	$2 \times 10^{-5}$ $\mu$ Ci/mL			
$U_{\text{natural}}$	$3 \times 10^{-7}$ $\mu$ Ci/mL			
c. Other:				
DOI	Endangered and Threatened Wildlife and Plants: Proposed Rule to Reclassify the Plant <i>Pediocactus sileri</i> from Endangered to Threatened (proposed)	Yes	50 CFR 17 (58 FR 13244) DOI 1993a	
	Endangered and Threatened Wildlife and Plants; Proposal to Determine the Plant <i>Pediocactus winkler</i> to be an Endangered Species (proposed)	Yes	50 CFR 17 (58 FR 52059) DOI 1993b	
DOI Mining Recl. and Enforcement	Exclusion of Certain Non-coal Reclamation Sites	Yes	30 CFR 875.16 DOI 1994	
	Approval of Amendment to State Regulatory Programs - Montana	Yes	30 CFR 926.15 DOI 1984	
EPA OSWER	Exclusion from Identification and Listing of Uranium as a Hazardous Waste	Yes	40 CFR 261.4 EPA 1980d	
	Land Disposal Restriction Phase IV: Final Rule Promulgating Treatment Standards for Metal Wastes and Mineral Processing Wastes	Yes	63 FR 28556 EPA 1998b	

## 7. REGULATIONS AND ADVISORIES

**Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)**

Agency	Description	Information	References
<b>NATIONAL (cont.)</b>			
	Uncontrolled Hazardous Waste Site Ranking System: Def. of Uranium Mill Tailings Radiation Control Act Standards	Benchmark Screening Concentration Corresponding to $10^{-6}$ Individual Cancer Risk for Inhalation Exposure, Oral Exposure, Food Chain Soil Exposure	40 CFR 300 Appendix A EPA 1990a
	Definition for National Oil and Hazardous Substance Pollution Contingency Plan	Yes	40 CFR 300.5 EPA 1990b
	National Priorities List for Uncontrolled Hazardous Waste Sites, Proposed Rule No. 15 (proposed)	Yes	58 FR 34018 (40 CFR 300) EPA 1993c
	National Oil and Hazardous Substances Pollution Contingency Plan (proposed)	Yes	58 FR 54702 (40 CFR 300) EPA 1993d
	Barium Sulfate; Toxic Chemical Release Reporting; Community Right-to-know (proposed)	Yes	59 FR 32622 (40 CFR 372) EPA 1993e
EPA	Timing of Administration Act under Uranium Mill Tailing Radiation Control Act of 1978	Yes	40 CFR 23.8 EPA 1985h
USNRC	Standards for Protection Against Radiation		
	Definitions	Yes	10 CFR 20.1003 USNRC 1997a
	Dose limits for individual members of the public—total effective dose equivalent	<0.1 rem	10 CFR 20.1301 USNRC 1997b
	Maximum limit of operation requiring prior authorization	0.5 rem	
	Occupational dose limits for adults		10 CFR 20, Subpart C USNRC 1995a
	Annual limit	Yes	10 CFR 20.1206 USNRC 1993f
	Total weekly limit	10 mg	
	Radiological criteria for License termination—applicability	10 CFR 40, Appendix A uranium recovery facilities—not applicable	10 CFR 20, Subpart E USNRC 1997c
	Requirements for transfers of low-level radioactive waste intended for disposal at licensed land disposal facilities and manifests	Yes	10 CFR 20, Appendix G USNRC 1995b
Guidelines:			
a. Air:			
ACGIH	Soluble and Insoluble		ACGIH 1998
	TWA	0.2 mg/m <sup>3</sup>	
	STEL	0.6 mg/m <sup>3</sup>	
NIOSH	Insoluble		NIOSH 1997
	REL-TWA (insoluble)	0.2 mg/m <sup>3</sup>	
	REL-STEL	0.6 mg/m <sup>3</sup>	
	Soluble		
	REL-TWA (soluble)	0.05 mg/m <sup>3</sup>	

## 7. REGULATIONS AND ADVISORIES

**Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)**

Agency	Description	Information	References
<b>NATIONAL (cont.)</b>			
b. Water:			
EPA OW	Maximum Contaminant Level Goal (proposed)	Zero	62 FR 52194 EPA 1997a
	Analytical Methods: Radio Chem (EPA Method 908.0), Fluoremetric (EPA Mehtod 980.1); final rule	Yes	62 FR 10168 EPA 1997c
c. Other			
EPA-OSWER	Use of Soil Cleanup Criteria in 40 CFR Part 192 as Remediation goals for CERCLA Cleanup	OSWER Directive 9200.4-25	EPA 1998
	Establishment of Cleanup levels for CERCLA Site with Radioactive Contamination	OSWER Directive 92004.18	EPA 1997b
ACGIH	Cancer classification	A1 <sup>a</sup>	ACGIH 1998
EPA	Cancer classification	Withdrawn	IRIS 1997
NIOSH	Cancer classification	Ca <sup>b</sup>	NIOSH 1997
EPA OSWER	Reportable Quantity for Accidental Release	U-230 1 Ci U-231 1000 Ci U-232 0.01 Ci U-233 0.1 Ci U-234 0.1 Ci U-235 0.1 Ci U-236 0.1 Ci U-237 100 Ci U-238 0.1 Ci U-239 1000 Ci U-240 1000 Ci	40 CFR 302.4, App. B EPA 1989f
<b>STATE</b>			
Guidelines:			
a. Water Quality Standards			EPA 1990c
AZ		35 µg/L	
CA	Standard Guideline	20 µg/L 30 µg/L	
MA		10 µg/L	
	Water Quality Criteria: Human Health		CELDs 1994
AZ	Domestic water source Alpha particle activity	≤15 pCi/L	
	Criteria for domestic water source	35 µm/L	
CA	Average Maximum Contaminant Level	≤20 pCi/L	
	Groundwater Quality Standards		CELDs 1994
NM	Human health standards	5.0 mg/L	

## 7. REGULATIONS AND ADVISORIES

Table 7-1. Regulations and Guidelines Applicable to Uranium (continued)

Agency	Description	Information	References
<b>STATE (cont.)</b>			
WY	For fish and aquatic life in special A1 waters	0.03–1.4 mg/L	
	Underground Injection Wells		CELDs 1994
	Class III well requirements		
GA		Yes	
MO		Yes	
SD		Yes	
	Water Monitoring		CELDs 1994
CA	Average MCL	≤ 20 pCi/L	
b. Air:			NATICH 1992
AZ		1.5 µg/m <sup>3</sup> (1 hr) 4.0x10 <sup>-1</sup> µg/m <sup>3</sup> (24 hr)	
CT		4.0 µg/m <sup>3</sup> (8 hr)	
FL-Pinellas		5.0x10 <sup>-1</sup> µg/m <sup>3</sup> (8 hr) 1.20x10 <sup>-1</sup> µg/m <sup>3</sup> (24 hr)	
ND		2.0x10 <sup>-3</sup> mg/m <sup>3</sup> (8hr) 6.0x10 <sup>-3</sup> mg/m <sup>3</sup> (1 hr)	
NV		5.0x10 <sup>-3</sup> mg/m <sup>3</sup> (8 hr)	
TX		5.0x10 <sup>-1</sup> µg/m <sup>3</sup> (30 min) 5.0x10 <sup>-2</sup> µg/m <sup>3</sup> (Annual) 2.0 µg/m <sup>3</sup> (30 min) 2.0x10 <sup>-1</sup> µg/m <sup>3</sup> (Annual)	
VA		3.3 µg/m <sup>3</sup> (24 hr)	
WA-BFW		2.0x10 <sup>+2</sup> ppm	
WA-SWEST		7.0x10 <sup>-1</sup> µg/m <sup>3</sup> (24 hr)	
c. Other:			
	Hazardous Waste Constituent		CELDs 1994
CA		Yes	
NJ		Yes	
SD		Yes	

<sup>a</sup> A1 cancer classification. ACGIH defers to the NIOSH classification

<sup>b</sup> Ca cancer classification indicates that the agent is a potential occupational carcinogen

ACGIH = American Conference of Governmental Industrial Hygienists; ALI = Annual Limits on Intake; ASTM = American Society for Testing and Materials; BAT = Best Available Technology; BPT = Best Practicable Technology; DAC = Derived Air Concentration; DHHS = Dept. Of Health and Human Services; DOE = Department of Energy; DOI = Department of Interior; EPA = Environmental Protection Agency; HAPs = Hazardous Air Pollutants; IDLH = Immediately Dangerous to Life and Health; IRIS = Integrated Risk Information System; MCL = Maximum Contaminant Level; NATICH = National Air Toxics Information Clearinghouse; NESHAP = National Emission Standards for Hazardous Air Pollutants; NIOSH = National Institute for Occupational Safety and Health; NOAA = National Oceanographic and Atmospheric Association; NPDES = National Pollutant Discharge Elimination System; NSPS = New Source Performance Standard; OAQPS = Office of Air Quality Planning and Standards; OAR = Office of Air and Radiation; OGWDW = Office of Ground Water and Drinking Water; OPPTS = Office of Pollution Prevention and Toxic Substances; OSHA = Occupational Safety and Health Administration; OSWER = Office of Solid Waste and Emergency Response; OW = Office of Water; PEL = Permissible Exposure Limit; PQL = Practical Quantitation Limit; PSNS = Pretreatment Standards for New Sources; REL = Recommended Exposure Limit; STEL = Short-term Exposure Limit; TWA = Time Weighted Average; USNRC = U.S. Nuclear Regulatory Commission; WHO = World Health Organization

