

**Clearance Status -- International Comparison
May 2001 Snapshot**

Country	Clearance Level(s) Surface Bq/cm²	Clearance Level(s) Volumetric Bq/g	Based on	Situation	Remarks
Belgium	Case-by-case	Case-by-case	IAEA TECDOC-855 levels used as reference levels	General regulations are under review for update to Directive 96/29/Euratom	TECDOC-855 dose criteria are 10 μSv to a person in a year + optimization or 1 man-Sv
France	Nuclear power industry moratorium on generic levels Case-by-case allowed	Nuclear power industry moratorium on generic levels Case-by-case allowed	Waste stream analysis, QA, impact study, presentation to public, specific authorization	Incorporation of Directive 96/29/Euratom is in preparation Incorporation planned mid-2001	Ministerial order issued Dec 31, 1999, requesting the nuclear industry to implement waste stream analysis
	Non-nuclear power industry: case-by-case	Non-nuclear power industry: case-by-case			Generic clearance levels may be required for non-nuclear power very low level waste Authorized release is possible, though rarely used
Germany	Nuclide specific based on 10 μSv to a person in a year	Nuclide specific based on 10 μSv to a person in a year	SSK [Commission on Radiological Protection]	Incorporation of Directive 96/29/Euratom are	Updated regulations targeted for Fall

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Country	Clearance Level(s) Surface Bq/cm ²	Clearance Level(s) Volumetric Bq/g	Based on	Situation	Remarks
		e.g., 0.1 Bq/g ⁶⁰ Co	recommendations	in preparation Some debate on whether to replace SSK recommended levels with EC RP 122 clearance levels	2001 Authorized release is possible, e.g., 4 Bq/g ⁶⁰ Co for landfill or incineration; 0.6 Bq/g ⁶⁰ Co for metals to be melted Clearance of sites based on 10 μSV
Japan	No general criteria	No general criteria	Ongoing discussions among government organizations	Legislation targeted for 2001	Nuclear Safety Commission based clearance calculations on 10 μSv criterion; these agree well with TECDOC-855 with a few exceptions
U.K.	Case-by-case basis	0.4 Bq/g for non-naturally occurring radionuclides Naturally occurring	Implementation of Directive 96/29/Euratom by incorporation of existing	<i>Status quo</i> , except disposal of waste regulation is expected in a few months	Basis for clearance is 10 μSv criterion Exemption Orders exist that allow less

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Country	Clearance Level(s) Surface Bq/cm ²	Clearance Level(s) Volumetric Bq/g	Based on	Situation	Remarks
		radionuclides range from 0.37 to 11.1 Bq/g depending on the element	regulations, except disposal of waste is expected in a few months		restrictive clearance levels for naturally occurring radionuclides
U.S.	DOE suspension of scrap metals for recycling	DOE moratorium on metals	January 19, 2001 memorandum from DOE Secretary: a) metals recycle only within DOE b) moratorium and suspension remain c) EIS needed before regulations are revised d) reuse of lead and lead products	Pending the improved release criteria and information management recycle of scrap metals Pending NRC decision to establish national volumetric standards	Other materials and equipment are released under DOE Order 5400.5 which bases case-by-case approval on criteria of a small fraction of 1 mSv in a year and ALARA (optimization)
	NRC: Consistent with average of 0.017 Bq/cm ² for transuranics, Ra-226, and others to 0.83 Bq/cm ² for most β-γ emitters	NRC: No general criteria	Table I. of Regulatory Guide 1.86 for surficial radioactivity	Ongoing NRC study	Authorized release for disposal is possible on case-by-case basis

Current Status of Clearance in Other Countries: May 2001 Snapshot

This update is based on responses to an inquiry to representatives from Belgium, France, Germany, Japan, and the United Kingdom. The current status of clearance in the United States is included for comparison and for the information of the aforementioned representatives. Generally, each of these countries is continuing to clear materials and equipment in the same manner as it had before the May 13, 2000, deadline for implementing the European Commission's (EC) Euratom Directive to adopt their Basic Safety Standards [not to be confused with the IAEA Basic Safety Standards], which includes criteria for clearance. Specifics follow:

Belgium—The Belgian regulations on radiological protection are based on the European Union Directive laying down the Basic Safety Standards for the health protection of the general public and workers against the dangers of ionizing radiation (80/836/Euratom, as amended by 84/467/Euratom). Radioactive waste is subject to a series of specific provisions if the radiation level exceeds the natural radiation background.

No generic clearance levels are set for solid waste. In practice, clearance is granted on a case-by-case basis by the health physics control department of the facility and the recognized body for health physics control. The clearance levels that were derived in IAEA-TECDOC-855 are used as reference levels. The dose criteria used in TECDOC-855 are 10 μ Sv in a year to any member of the public and a collective effective dose in a year of less than 1 man-Sv (or an assessment demonstrating optimization). Special attention is paid to the assurance of compliance with those levels. In general, the safety authorities are informed about such clearance.

The general regulations mentioned above are currently under review to bring them in line with the most recent European Basic Safety Standards (Directive 96/29/Euratom). The draft revision has been approved by the Belgian Government to be sent for advice to the European Commission and the State Council. The State Council is expected to provide its legal advice by May 2001. The draft will then have to be adapted to take the advice into account, and then it will be forwarded to the Council of Ministers for final approval. It is foreseen that generic clearance levels will be set in the revised regulations, but it is not clear yet whether the European Commission's Radiation Protection No. 122 (EC RP 122) values will be taken. Possibly a mixture of the lower of the EC RP 122 values and the values recommended by the German Strahlenschutzkommission (SSK) [German Commission on Radiation Protection] will be used.

France—France has not yet transcribed into its regulations the Euratom Directive 96/29 on Basic Radiation Protection Standards. Incorporation of the Directive is planned for mid-2001. Nevertheless, due to heavy public pressure, the nuclear power industry decided to put a moratorium on generic clearance until the regulatory framework becomes clear. Case-by-case clearance is possible.

Since 1994, the French Nuclear Safety Authority (DSIN) has led a working group to rationalize management of very low-level radioactive waste (VLLW). The nuclear power industry is a participant. This group prepared an inter-ministerial order that was signed on December 31, 1999. Among other things, this order requires waste producers to prepare a waste management plan for approval by the DSIN. The plan requires that each facility be zoned to identify the parts of the plant that generate conventional wastes and the parts that generate radioactive waste. Zoning takes into account plant design, operations, and history. Other requirements include descriptions of waste production, character, and quantity, monitoring methods for all waste categories, management practices and procedures, and interim storage facilities. Another achievement of the working group is a dedicated surface repository designed by the nuclear power industry to receive VLLW. It is planned to be operational in 2002 or 2003.

DSIN emphasizes its belief that proper management of VLLW cannot rely only on clearance levels. There must be an integrated system that includes: 1) a full description of each waste stream; 2) quality assurance, including some traceability until the waste is actually released; 3) a case-by-case impact study; 4) presentation to the public; 5) specific authorizations for the facilities involved in the processing of the waste.

For non-nuclear-power industries, such as hospitals and industrial plants, whose main purpose is not to handle or process materials generated by the nuclear power industry (e.g., fertilizer plants) generic clearance levels may be required in the overall system of VLLW management. This system may include regulatory control of the waste producer, quality assurance, installation of detection devices at plant exits and at the entrances of repositories, incinerators, and melting plants as an additional protection against possible mismanagement. Prevention of waste is promoted. Clear contracts among waste producers and repositories, incinerators, melters, etc., should be established to set responsibilities and expected specifications of the waste.

Germany—Finalization of the Radiation Protection Ordinance [regulation] (RPO) was expected by Fall 2000, but is still undergoing regulatory processes. It may enter into force by the Fall of 2001. In the interim, for general clearance levels, the competent authorities follow the recommendations of the legislators' advisory organization, the SSK [Commission on Radiological Protection]. The dose criterion is 10 μ Sv in a year. In Germany most materials and equipment are cleared using the general clearance levels. These levels apply to any and all materials without pretreatment and without specified disposition imposed on the materials. There is some debate in Germany that the clearance levels should be updated with the newer EC RP 122 values.

The RPO addresses: General clearance of

- a. All solid materials for reuse, recycling or disposal including building rubble of less than 1000 Mg per year,
- b. Building rubble and soil of more than 1000 Mg per year,
- c. Buildings for reuse or demolition, and

d. Nuclear sites (after removal of the buildings).

Less frequently, clearance is authorized under conditions that limit to a few reasonable scenarios the fate of the materials or equipment. These less frequent cases fit into the concept of "authorized release." A pair of examples follow: When the generator of the material to be cleared can certify that the nature and form of the material is suitable only for landfill disposal or incineration, then specific clearance levels may be used for these limited scenarios. Similarly for metals, when the generator can guarantee that the metal will be melted by contract or pretreatment, such as removing all reusable parts and segmenting the scrap, the clearance levels for metal recycle may be used. To illustrate specifically: the general clearance level of ^{60}Co in any material is 0.1 Bq/g; any material for disposal at a landfill or an incinerator, 4 Bq/g; and metal to be melted for recycle, 0.6 Bq/g. In each case, there is no further radiological control after the specified process, thus, by definition, under "authorized release," the materials are cleared by the processor rather than the generator.

The current surface specific clearance levels are lower than what the EC recommends (for metals in Radiation Protection 89), but Germany has developed new surface specific clearance levels that have been incorporated into the draft Ordinance. Clearance of nuclear sites also has a 10 μSv dose criterion and the clearance levels are based on an analysis performed by Brenk Systemplanung.

The RPO also addresses "authorized release" of:

- a. Solid materials for disposal on landfills or for incineration, and
- b. Buildings for demolition only.

Clearance levels exist for the approximately 300 radionuclides listed in the Basic Safety Standards. The harsh criticism of clearance from a year ago, with the aim of abolishing or postponing clearance, has generally died down. The SSK work group has done a good job of bringing the discussion back to a scientific basis.

Japan--The Japanese use the following surface contamination levels to remove goods from radiation controlled areas: alpha radiation emitters: 0.4 Bq/cm², and beta and gamma radiation emitters: 4 Bq/cm². However, these levels are used to remove the goods from radiation-controlled areas that are temporally used in radiological areas. Currently, the Japanese do not have general criteria to release slightly contaminated goods for disposal or recycle. The Japanese Government is discussing how to stipulate the clearance levels in nuclear regulation law. The government planned to initiate the bill for legislation by the end of 2000. There has been a delay because of the unification and rearrangement of regulatory bodies in January 2001. The Science and Technology Agency (STA) and Ministry of International Trade and Industry (MITI) had the responsibility to draft the bill. The Ministry of Health and Welfare (MHA) is also involved in the working party because it has the responsibility to regulate industrial waste, i.e. waste that is not contaminated with radioactive substances. The MHA is very concerned about the introduction of

clearance levels. Thus, it seems likely that consensus will be difficult to achieve. The Nuclear Safety Commission has calculated clearance concentrations that would correspond to 10 $\mu\text{Sv/a}$, and these agree well with the IAEA TECDOC-855 values, with a few exceptions. There is reason to believe that, in the end, the Nuclear Safety Commission will base the clearance levels on the calculational results.

United Kingdom—The U.K. has implemented most of the EC Basic Safety Standards by means of the Ionising Radiations Regulations 1999. The disposal of radioactive waste is covered by the Radioactive Substances Act 1993. Analyses of the existing provisions for exemption and clearance led to the conclusion that they generally met the 10 μSv criterion. Therefore the Radioactive Substances Act 1993 will not change. Two additional items will complete the implementation of the BSS: a Regulation to cover use and disposal of radioactive clocks and watches and a Direction to the Environment Agency to implement the BSS requirements. These are currently being approved.

For all industries, including the nuclear power industry, the clearance level for solid materials is 0.4 Bq/g for non-naturally occurring radionuclides. Clearance levels for solids with naturally occurring radionuclides are expressed in terms of the element and are 11.1 Bq/g for uranium, 2.59 Bq/g for thorium, 0.74 Bq/g for lead, and 0.37 Bq/g for the other naturally occurring elements Ra, Pa, Ac and Po. These can be used by nuclear power or non-nuclear power industries.

There are also so called 'exemption orders' which allow clearance of solid material containing naturally occurring radionuclides: below 14.8 Bq/g for each element listed above and below 37 Bq/g for rare earth elements and specific elements, e.g., Ce, Gd, Zr. Again these can be used by any industry but are commonly used by NORM industries.

It is noted that liquids and gases are also cleared using the Substances of Low Activity Exemption Order and the Radioactive Substances Act, Schedule 1.

Surface contamination levels are determined on a case-by-case basis.

United States—The Department of Energy (DOE) placed a moratorium on the DOE's release of volumetrically contaminated metals on January 12, 2000, pending a decision by the NRC whether to establish national standards. This moratorium remains in effect. On July 13, 2000, the DOE additionally suspended the unrestricted release for recycling of scrap metals from radiation areas within DOE facilities. This suspension will remain in effect until improvements in DOE's release criteria and information management have been developed and implemented. Revision of directives and guidance was expected by December 31, 2000. However, on January 19, 2001, the Secretary issued several memoranda. These continued the moratoriums and established a policy of precedence for reuse of lead metal and lead products over the purchase of new lead metal and lead products, among other things.

The NRC currently permits clearance of solid materials using existing guidance and regulatory provisions as summarized below.

At reactors, guidance for clearing solid materials with radioactivity only on the surfaces requires reactor licensees to survey equipment and material before its release from regulatory control. If no licensable radioactivity above natural background levels is detected, the solid material in question does not have to be treated as radioactive waste. The sensitivity of detection for the surveys is typically consistent with the levels listed in Table I. of Regulatory Guide 1.86, e.g., average concentrations of 0.017 Bq/cm² for transuranics, Ra-226 and other specified nuclides to 0.83 Bq/cm² for most beta or gamma emitters. At non-reactor facilities, solid materials may be released even if there is detectable surficial radioactivity provided it is below the levels consistent with Table I. of Regulatory Guide 1.86. In addition to application of the levels in Table I., the licensee should make a reasonable effort to eliminate residual radioactivity.

At reactors, solid materials with radioactivity throughout its volume may be cleared on a case-by-case basis following a survey with a much more sensitive lower limit of detection than the Table I., levels mentioned above. No licensed radioactivity above background may be cleared. At non-reactor facilities, solid material with volumetrically distributed radioactivity may be cleared on a case-by-case basis following a dose assessment and NRC approval. The dose assessment must ensure that the maximum potential dose to a member of the public is a small fraction of 1 mSv in a year. In special cases, for either reactor or non-reactor facilities, authorized releases of solid material for disposal may be approved by the NRC provided, among other things, that the maximum potential dose to a member of the public is a small fraction of 1mSv in a year.