Appendix I

DOE Surface Contamination Release Levels

From DOE Internal Order 5400.5 change 2, consistent with Atomic Energy Commission Regulatory Guide 1.86 (1974), and pg. 12 of November 17, 1995 Department of Energy, Office of the Assistant Secretary for Environment, Safety and Health, Office of Environment Memo, "Response to Questions and Clarification of Requirements and Processes: DOE 5400.5, Section II.5 and Chapter IV Implementation (Requirements Relating to Residual Radioactive Material)"

Table 1. Surface Activity Guidelines Allowable Total Residual Surface Activity (dpm/100 cm^2)[4]

Radionuclides[5]	**Average**[6/7]	**Maximum**[9/8]	**Removable**[9/9]
Group 1 - Transuranics, I-125, I-129, Ac-227,Ra -226, Ra-228, Th-228, Th-230, Pa-231	100	300	20
Group 2 - Th-natural, Sr-90, I-126, I-131, I-133, Ra-223,Ra-224, U-232, Th-232	1000	3000	200
Group 3 - U-natural, U-235, U-238, and associated decay products, alpha emitters	5000	15000	1000
Group 4 - Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous[10] fission) except Sr-90 and others noted above	5000	15000	1000
Tritium (applicable to surface and subsurface)[11]	N/A	N/A	10000

[4] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[5] Where surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides should apply independently.

[6] Measurements of average contamination should not be averaged over an area of more than 1 m2 . For objects of smaller surface area, the average should be derived for each such object.

[7] The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively, at 1 cm.

[8] The maximum contamination level applies to an area of not more than 100 cm^2 .

[9] The amount of removable material per 100 cm2 of surface area should be determined by wiping an area of that size with dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm2 is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

[10] This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

[11] Property recently exposed or decontaminated, should have measurements (smears) at regular time intervals to ensure that there is not a build-up of contamination over time. Because tritium typically penetrates material it contacts, the surface guidelines in group 4 are not applicable to tritium. The Department has reviewed the analysis conducted by the DOE Tritium Surface Contamination Limits Committee ("Recommended Tritium Surface Contamination Release Guides," February 1991), and has assessed potential doses associated with the release of property containing residual tritium. The Department recommends the use of the stated guideline as an interim value for removable tritium. Measurements demonstrating compliance of the removable fraction of tritium on surfaces with this guideline are acceptable to ensure that non-removable fractions and residual tritium in mass will not cause exposures that exceed DOE dose limits and constraints.