DUPLICATION OF REGULATORY BURDEN FOR THE MONITORED RETRIEVABLE STORAGE (MRS) FACILITY: A CASE FOR INCLUDING MRS IN THE PROPOSED RESCISSION OF 40 CFR 61, SUBPART I - NESHAPS*

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ABSTRACT

This paper examines the Clean Air Act Amendments of 1990, Environmental Protection Agency (EPA) requirements in 40 CFR 61, Subpart I, National Emission Standards for Hazardous Pollutants (NESHAPs), Nuclear Regulatory Commission (NRC) regulatory program in 10 CFR 20, and existing radiological data from some of the currently NRC licensed Independent Spent Fuel Storage Installation(s) (ISFSI), which should serve as a basis for the EPA to include the MRS in the proposed rescission of 40 CFR 61, Subpart I, as it applies to facilities licensed by the NRC. This paper concludes that 40 CFR 61, Subpart I, is duplicative of the NRC regulatory program for the NRC licensed Monitored Retrievable Storage (MRS) facility and imposes an additional and undue burden without providing any additional protection of the public health. EPA should, therefore, include an MRS facility in the list of NRC licensed facilities that are not subject to 40 CFR 61, Subpart I.

INTRODUCTION

Environmental Protection Agency (EPA) requirements in 40 CFR 61, Subpart I, National Emission Standards for Hazardous Pollutants (NESHAPs) apply to Nuclear Regulatory Commission (NRC) licensed facilities and to facilities owned or operated by any Federal agency other than the Department of Energy (DOE). NRC licensed facilities are those facilities that have been licensed by NRC to receive title to, receive, possess, use, transfer, or deliver any source, byproduct, or special nuclear material. The existing EPA NESHAPs standard provides for regulating emissions (during normal operations) of radionuclides to the ambient air not to exceed amounts that would cause any member of the public to receive in any year an effective dose equivalent (ede) of 10 mrem/year and with no more than 3 mrem/year ede from radioiodine.

EPA published a proposed rule(1) that would rescind Subpart I of 40 CFR 61 as it applies to nuclear power plants due to the fact that NRC's regulatory program sufficiently protects public health with an ample margin of safety and sufficient information was available for EPA to conclude that nuclear power reactors should be exempted from Subpart I. Independent Spent Fuel Storage Installations (ISFSI) located on the site of nuclear power reactors were *included in the evaluation of power reactors*.

More recently EPA has published another proposed rule(2) that would rescind subpart I of 40 CFR 61 as it applies to facilities that are licensed by the NRC or NRC Agreement States and are not engaged in the generation of nuclear power. The proposed rule is based on an extensive survey undertaken by EPA of NRC licensed facilities involved in the uranium fuel cycle as well as other type of facilities licensed to possess or use nuclear materials such as hospitals, medical research facilities, radiopharmaceutical manufacturers, laboratories and industrial facilities. A Background Information Document (BID)(3) has been prepared by EPA in support of the most recent rulemaking proceedings to support this action. The surveys undertaken by EPA in support of the proposed rule, however, did not include General Electric (GE) Morris ISFSI or the proposed Monitored Retrievable Storage (MRS) facility.

The MRS is a NRC licensed stand-alone away-from-reactor facility designed, constructed, and operated by DOE for the receipt, transfer, handling, packaging, possession, safeguarding, and storage of spent nuclear fuel (SNF) aged for at least one year and solidified high-level radioactive waste resulting from civilian nuclear activities pending shipment to a repository. ISFSI is a facility which is designed, constructed, and operated for the interim storage of SNF and other radioactive materials associated with the storage of SNF. The MRS, like existing ISFSIs, will use technologies that are licensed by the NRC or technologies that can be demonstrated as licensable. The storage capacity of ISFSI at existing nuclear power plant sites is significantly less than at the proposed MRS facility.

This paper provides support for inclusion of an MRS in the list of NRC facilities not subject to 40 CFR 61, Subpart I, by examining: a) new legislation passed by Congress in November, 1990 that addresses directly the issue of dual regulation of NRC licensees by EPA and NRC; b) the memorandum of understanding (MOU) between NRC and EPA that sets forth principles and procedures for avoiding unnecessary duplication of regulatory requirements; c) EPA's existing regulatory program in requirements in 40 CFR 61, Subpart I; d) the proposed EPA rule for rescission of applicability of 40 CFR 61, Subpart I, to NRC licensed facilities such as nuclear power reactors; e) the proposed EPA rule for rescission of applicability of 40 CFR 61, Subpart I, to NRC licensed facilities other than nuclear power reactors; f) NRC regulatory program in 10 CFR 20 and 10 CFR 72; and g) existing

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radiological data from licensed ISFSIs that could support a recision of Subpart I.

CLEAN AIR ACT AMENDMENTS OF 1990

In October, 1990, the Congress passed new legislation which amended the Clean Air Act(4). Section 112(d)(9) of the amendments provides:

> No standard for radionuclide emissions from any category or subcategory of facilities licensed by the Nuclear Regulatory Commission (or an Agreement State) is required to be promulgated under this section if the Administrator determines, by rule, and after consultation with the Nuclear Regulatory Commission, that the regulatory program established by the Nuclear Regulatory Commission pursuant to the Atomic Energy Act for such category or subcategory provides *an ample margin of safety to protect the public health*. (Emphasis supplied.)

This section permits the EPA to rescind its NESHAP regulations for NRC licensed facilities if the EPA determines by rule after consultations with the NRC, that the *NRC regulatory program is adequate* and that it provides an *ample margin of safety to protect the public health*. This reflects the intention of the Congress to relieve NRC licensees from the burden of dual regulation by NRC and EPA as long as a showing can be made that the public health will be protected by an ample margin of safety.

MOU BETWEEN NRC AND EPA

On March 16, 1992, EPA and NRC(5) signed an MOU that provides the basis to avoid unnecessarily duplicative and over-lapping regulation for NRC licensed facilities or activities for releases into the environment of source, by-product, and special nuclear material under the Clean Air Act, as amended. The MOU leaves to the EPA the decision to impose or not to impose a regulation related to a NRC licensed facility based on the adequacy of the NRC's regulatory program that achieves a sufficient level of protection for the public health and environment. The MOU also "applies to the issuance of regulations under the Atomic Energy Act and other provisions of law which may give rise to duplication of effort and overlapping regulation of NRC regulated facilities or activities, but only to the extent issuance of such *standards is authorized but not legally mandated.*" The NRC will develop guidance to ensure that doses from licensed facilities will remain as low as is reasonably achievable (ALARA).

EPA NESHAPS STANDARD - 40 CFR 61, SUBPART I

The current NESHAPs is anchored in the *Vinyl Chloride* decision of the U.S. Court of Appeals for the District of Columbia(6), in which the Court concluded that the EPA improperly considered cost and technological feasibility without first making an exclusive determination on the issue of a "safe" or "acceptable" risk level, based on a judgement of "what risks are acceptable in the world in which we live". The Court required the Administrator of the EPA to exercise his judgment under Section 112 of the Clean Air Act by using a two-step approach in setting standards: a) to decide what constitutes a safe or acceptable level of risk *considering only health factors,* and b) to set a standard that provides an *ample margin of safety* in which costs, feasibility, and other relevant factors in addition to health factors could be considered.

In light of the *Vinyl Chloride* decision, the Administrator of EPA, under Section 112 of the Clean Air Act, promulgated the NESHAPs on October 31, 1989(7), for regulating radionuclide emissions to the ambient (outdoor) air from several source categories including emissions from NRC licensees. The source categories are: a) DOE facilities, b) NRC licensees and non-DOE facilities, c) elemental phosphorus plants, d) underground uranium mines, e) operating uranium mill tailings piles, f) disposal of uranium mill tailings piles, g) phosphogypsum stacks, and h) DOE facilities that release radon. 40 CFR 61, Subpart I, standard governs two groups of facilities: a) NRC licensed or NRC Agreement State licensed facilities, and b) federal facilities other than NRC licensed facilities not owned or operated by the Department of Energy. NRC licensed facilities include: fuel cycle facilities such as uranium mills and tailings, uranium hexafloride conversion plants, uranium fuel fabrication plants, commercial light-water nuclear power plants, and fuel reprocessing plants; test and research reactors; radiopharmaceutical and radiolabeled compound manufacturers; hospitals and medical research facilities; manufacturers of sealed sources; depleted uranium munitions test sites; rare earth and thorium processors; and commercial low-level radioactive waste disposal and incineration.

The EPA developed a methodology in response to the two-step approach of the *Vinyl Chloride* decision. The methodology(3) focuses on the following three measures of risk:

- Maximum Individual Risk (MIR) - an estimate of the risk incurred by the individuals most exposed to the effluent from a given facility. For radionuclide NESHAPs, the EPA estimated the lifetime fatal cancer risk that would result from continuous exposure over the individual's entire lifetime. A lifetime MIR of 1 in 10,000 is presumed to be acceptable.
- Incidence - an estimate of the total number of health effects in the population residing within 80 Km of the facilities in the source category. Incidence is considered with other health risk information in judging acceptability.
- Risk Distribution - an estimate of the number of persons at a given level of MIR and the estimated fraction of the total number of health effects expected to be incurred in the population within each range of risks. As a goal, the EPA seeks to assure that as many individuals as possible are at an MIR of 1 in 1 million or less.

40 CFR 61, Subpart I, provides that any member of the public shall not receive from emissions of radionuclides to ambient air, in any year, an ede in excess of 10 mrem/year; there is a 3 mrem/year limit for radioiodine. The 10 mrem limit was arrived at by limiting the MIR of cancer to 1×10^{-4} from DOE facilities (the basis for the risk were annual reports of emissions from DOE facilities). Although EPA does not license facilities, it does require licensees to submit annual reports showing that doses from emissions at its facilities have not exceeded the limit. To demonstrate compliance with the standard, EPA has developed an air-dispersion computer code called COMPLY(8). COMPLY calculates radiation doses resulting from immersion, inhalation, ingestion, and exposure to ground contamination due to deposition of airborne radioactivity.

The annual 10 mrem limit, for emissions to air, is significantly lower than the annual 100 mrem dose limit, for all exposure pathways, recommended for members of the public by organizations such as the National Council on Radiation Protection and Measurements (NCRP)(9) and the International Commission on Radiological Protection (ICRP)(10). The 10 mrem limit is also lower than the existing EPA limit of 25 mrem in 40 CFR 191, Subpart A(11), and NRC limit of 25 mrem to the whole body in 10 CFR part 72(12). The NCRP estimates that an average person in the United States receives a dose of 360 mrem annually from all sources of radiation including background radiation, medical x-rays, etc(13).

EPA PROPOSED RULE TO EXEMPT NUCLEAR POWER REACTORS FROM 40 CFR 61, SUBPART I

EPA issued a proposed rule(1) on exempting nuclear power reactors from being subject to Subpart I of 40 CFR part 61. In order to determine if the NRC regulatory program was adequate, EPA utilized a two-part test: a) does the objective evidence demonstrate that the NRC regulatory program in practice results in sufficiently low doses to protect the public health with an ample margin of safety, and b) is the NRC program sufficiently comprehensive and thorough and administered in a manner which will detect and prevent future increases radionuclide emissions? EPA surveyed the applicable regulations in 10 CFR 20, 10 CFR 50, Appendix I, and 40 CFR 190 and reviewed recent radionuclide emission data from nuclear power reactors(14). EPA technical staff believes that most NRC licensees are in compliance with the quantitative emission requirements in Subpart I, since emissions from nuclear power reactors result in doses of less than 1 mrem/year ede to the most exposed individual, which is ten times less than the 10 mrem/year ede standard. EPA concluded that NRC regulatory program was adequate in protecting the public health with an ample margin of safety and that it intended to delete commercial nuclear power plants from the category of facilities subject to 40 CFR 61, Subpart I.

EPA PROPOSED RULE TO EXEMPT NUCLEAR LICENSEES OTHER THAN NUCLEAR POWER REACTORS FROM 40 CFR 61, SUBPART I

The proposed rule(2) would exempt nuclear licensees other than nuclear power reactors from being subject to 40 CFR 61, Subpart I. EPA, in the BID(3), evaluated three subgroups of facilities: a) facilities that have potential for large emissions and not fully characterized in previous evaluations such as research reactors, rare earth producers, waste incinerators, low-level waste facilities, and large university hospitals; b) facilities with potential for large emissions which were more adequately characterized in previous assessment such as uranium mills, fuel fabrication facilities, UF_6 conversion plants; c) atypical activities for which no formal evaluations had been made such as depleted uranium weapons testing. The EPA concluded that the highest estimated dose received by any member of the public from airborne radionuclides from any of the randomly surveyed facilities was 8.0 mrem/year ede. Thus none of the surveyed facilities caused a dose in excess of the 10 mrem/year ede limit set in 40 CFR 61, Subpart I. The facilities that were evaluated did not include GE Morris ISFSI or the proposed MRS facility licensed under 10 CFR 72. ISFSIs, since they are located on the site of nuclear power reactors, were included in the evaluation for power reactors and were not evaluated separately. EPA concluded that overall emissions from nuclear power reactors, of which spent fuel storage was one of the sources, was well within the regulatory limits. Another EPA study(14) found that total airborne emissions from reactor sites are very low, resulting in doses less than 1 mrem/year ede to the most exposed individual. EPA has concluded in the proposed rule that in spite of the fact that NRC's regulatory program embodied in 10 CFR 20 contains higher dose limits than those in 40 CFR 61, Subpart I, operational experience indicates that actual doses due to the NRC regulatory program are lower than otherwise permitted under Subpart I.

NRC REGULATORY PROGRAM

NRC regulations in 10 CFR 20(15) establish standards for protection against ionizing radiation resulting from activities conducted under licenses issued by NRC. These regulations are issued under the authority of the Atomic Energy Act, as amended,(16) and the Energy Reorganization Act of 1974, as amended(17). Regulations covering radionuclide emissions from licensed facilities are set out in Section 20.105, which sets forth the permissible levels of radiation in unrestricted areas and in Section 20.106, which establishes limits on radioactivity in effluents to unrestricted areas. Section 20.105 provides that the Commission will approve the proposed limits if the applicant demonstrates that the proposed limits are not likely to cause any individual to receive a dose to the whole body in any period of one calendar year in excess or 0.5 rem (500 mrem).

Section 20.106 limits the release of radioactive material in unrestricted areas to levels that will not cause the average annual radionuclide concentration in air and water to exceed the limits set out in Table II of Appendix B, 10 CFR 20. This secondary standard acts to ensure that the primary standard of 500 mrem to the whole body or any organ will not be exceeded. Licensees are encouraged to keep the radiation exposures ALARA.

NRC has recently revised 10 CFR 20 (effective January 1, 1994) to make it compatible with the recommendations of the ICRP on risk-based methodology(10)(18). Revised 10 CFR 20 provides for the following significant changes: a) the total ede from all pathways to individual members of the public shall not exceed 100 mrem/year; b) only 50 mrem/year ede is allowed for the air pathway in accordance with the effluent air concentration limits in Appendix B; c) dose to individual members of the public is not to exceed 2 mrem in any 1 hour from external exposure; d) licensee can apply to NRC for permission to operate up to an annual limit for an individual member of the public of 500 mrem; e) doses resulting from direct radiation and radionuclides released in gaseous and liquid effluents must be evaluated in determining compliance; f) codification of the ALARA principle, which requires licensees to conduct their operations in a manner that keeps doses to members of the public and the workers ALARA.

NRC, in 10 CFR 72, provides the criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS. The criteria in 72.104 are identical to the standards for fuel cycle facilities in 40 CFR 190(19). The criteria require that the doses to individuals, located beyond the controlled area, from direct radiation and gaseous and liquid effluent pathways shall not exceed 25 mrem/year to the whole body or any

organ, except the thyroid, for which the limit is set at 75 mrem/year.

RADIOLOGICAL DATA

The majority of licensed ISFSIs located at nuclear power plant sites use dry storage of SNF in storage systems such as metals casks, vertical storage concrete casks, modular vault dry storage or NUHOMS system. ISFSI cask loading, decontamination, and transfer operations take place in the reactor building, and are conducted under the 10 CFR 50 operating license. Radiological impacts due to gaseous and liquid effluents resulting from these operations are considered in the Final Environmental Statement for the respective nuclear power plants, and are not included in the calculation of off-site doses due to direct radiation at an ISFSI. Due to the confinement features of the storage system (redundant seals together with an extremely rugged body design), no significant radioactive gaseous and liquid effluents result during normal storage operations. The issue of whether there will or will not be any gaseous or liquid effluents from an MRS facility is dependent upon the design and the types of waste operations envisaged for the MRS facility.

The environmental assessments (EA) which DOE prepared in 1986 for a conceptual MRS facility for the potential three MRS sites indicated that doses from normal operations to the nearest resident would be 0.4 mrem/year(20). Assessment of the following off-site doses are limited to the *direct and reflected radiation* to the *nearest resident,* and *do not* include doses due to *gaseous and liquid effluents*. NRC staff evaluations in the Safety Evaluation Reports (SER) for ISFSIs located at the H.B. Robinson site in North Carolina(21), the Surry site in Virginia(22), and the Oconee site(23) in South Carolina indicate that the annual off-site doses are 0.4 mrem, 0.00006 mrem, and 0.03 mrem respectively. For the ISFSIs located at Palisades Nuclear Power Plant site(24) and Calvert Cliffs Nuclear Power Plant(25), the annual off-site doses are 0.0013 mrem and less than 2 mrem. NRC's EA for the ISFSI located at the Prairie Island Nuclear Generating Plant(26) calculated the annual off-site dose from the ISFSI to be less the 0.08 mrem and the maximum annual dose to the nearest resident from the Prairie Island Nuclear Generating Plant to be 0.0027 mrem due to liquid effluents and 0.334 mrem due to gaseous effluents. The recent EPA BID(3) for NRC licensed facilities other than nuclear power reactors indicates that the estimated doses from the vast majority of facilities in the designated survey, (more than 95%) are less than 1 mrem/year ede.

CONCLUSION

Radiological data for ISFSIs indicates that emissions result in very low doses to public and they are a fraction of limits in 40 CFR 61, Subpart I, 10 CFR 20, and 10 CFR 72. Although the NRC regulatory program contains higher dose limits than *those set in Subpart I, actual operation of NRC program for licensed facilities has resulted in lower doses to the public than what is allowed under Subpart I.* ALARA requirement in 10 CFR 20 will also restrain increases in radionuclide emissions from licensed facilities. A summary comparison of NRC and EPA regulatory requirements(27) for various regulatory activities, in attached Table I, demonstrates that the NRC regulatory program adequately controls radioactive emissions in a manner sufficient to protect public health by an ample margin of safety. EPA should include the proposed MRS facility in NRC licensed facilities that are not subject to 40 CFR 61, Subpart I.

REFERENCES

1. 56 *Fed. Reg.* 37196 (March 13, 1991).
2. 57 *Fed. Reg.* 56877 (December 1, 1992).
3. U.S. Environmental Protection Agency, "Background Information Document to Support NESHAPS Rulemaking on Nuclear Regulatory Commission and Agreement State Licensees Other than Nuclear Power Reactors," EPA 430-R-92-011, Washington, D.C., November 1992.
4. 42 U.S.C. 7412
5. 57 *Fed. Reg.* 54127 (November 16, 1992).
6. *Natural Resources Defense Council, Inc.* v. *EPA,* 824 F.2d 1146 (1987).
7. 54 *Fed. Reg.* 51654 (December 15, 1989).
8. EPA 520/1-89-002, "A Guide for Determining Compliance with the Clean Air Act Standards for Radionuclide Emissions from NRC-Licensed and Non-DOE Federal Facilities."
9. NCRP Report No. 91 (1987), "Recommendations on Limits for exposure to Ionizing Radiation."
10. ICRP, Recommendations of the International Commission on Radiological Protection, Publication No. 26 (1977).
11. EPA, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes, 1985.
12. NRC, Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, revised July 1990.
13. NCRP Report No. 93 (1987), "Ionizing Radiation Exposure of the Population of the United States."
14. U.S. Environmental Protection Agency , "Background Information Document to Support NESHAPs Rulemaking on Nuclear Power Reactors," EPA 520/1-91-019, Washington D.C., August 1991.
15. NRC, Standards for Protection Against Radiation, May 1991.
16. 42 U.S.C. 2011 *et seq*
17. 42 U.S.C. 5814
18. ICRP, Limits for Intakes of Radionuclides by Workers, Publication No. 30 (1982).
19. EPA, Environmental Radiation Protection Standards for Nuclear Power Operations.
20. DOE/RW-0035/1, Volume II, "Environmental Assessment for a Monitored Retrievable Storage Facility." February 1986.
21. NRC Docket Nos. 72-3; 50-261
22. NRC Docket Nos. 72-2; 50-280/281
23. NRC Docket Nos. 72-4; 50-269/270/287
24. NRC Docket Nos. 72-7; 50-255
25. NRC Docket Nos. 72-8; 50-317/318
26. NRC Docket Nos. 72-10; 50-282/306
27. EPA 430-R-92-011, Table 2-1, Page 2-8, Washington, D.C., November 1992.

TABLE I
Summary of Regulatory Requirements

Regulatory Activity	NRC Requirements for Large NRC Licensees	NRC Current Part 20 for Other Licensees	EPA's NESHAP	NRC Revised Part 20
Licensing or Approval	Environmental report, safety analysis report, ALARA design review, technical specifications	Facility design handling/use procedures, possession limits.	Facility design, effluent controls, quantities of material by chemical & physical form, dose estimate, but only if ≥ 10 percent of limits	No change.
Dose Limit	Per technical specifications. For fuel cycle facilities 25 mrem/y whole body or any organ (75 mrem/y thyroid).	Per license condition or limits in 20.105 & MPCs in 20.106.	10 mrem/y, not more than 3 mrem/y due to radioiodines.	100 mrem/y total ede to any member of the public. Doses from direct radiation, liquid and gaseous effluents must be counted. Dose rate must be less than 2 mrem/hr. Licensees subject to 40 CFR 190 must comply with that standard in addition to NRC limits.
Records	Results of surveys, effluent monitoring, environmental measurements, dose calculations for 40 CFR 190 compliance.	Results of surveys, material receipts, ventilation rates.	Effluent monitoring data or annual possession of materials data used to determine compliance.	All licensees must retain records needed to demonstrate compliance with dose limits until license is terminated.
Reports	Quarterly or semi-annual source terms, and environmental monitoring results, annual dose report for 40 CFR 190 compliance.	Exposures or releases greater than 10 times 20.105 or 20.106.	Annual dose calculations if greater than 10 percent of limits.	As before, except any exceedence of dose limits must be reported within 30 days.
Inspections	Annual or resident inspectors, follow-up on previous violations.	Once every 1 to 7 years depending on type of license and activities conducted.	Under development, subject of possible MOU between the EPA and the NRC.	No change.
Enforcement	Five violation levels based on safety implications, corrective actions, fines, orders, license revocations; citizens may petition the NRC to enforce, but if the EDO does not agree, no action is taken.	Same as for large facilities.	Monthly reports for facilities not in compliance; citizens may take legal actions (CAA, Section 304) to compel compliance.	No change.