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# THE REGULATION OF LOW-LEVEL NUCLEAR WASTE

Dean Hansell\*

## I. INTRODUCTION

Recent events have focused this nation's attention on the issues and problems related to the safe disposal of low-level nuclear waste. Though a matter of great importance, this is an area which heretofore has received little attention. At present, there is no coordinated program for the regulation of low-level nuclear waste. What exists instead is a collection of piecemeal regulations of low-level nuclear waste which establish standards on an ad hoc basis. This article concerns the regulatory requirements which do exist and the legal issues related to the disposal of low-level radioactive waste materials.

Low-level nuclear waste includes radioactive by-products, source, and special nuclear material; but informally the United States Nuclear Regulatory Commission (NRC) defines low-level nuclear waste by excluding transuranic elements, which are those with an atomic number greater than ninety-two.<sup>1</sup> Low-level nuclear waste is found in many forms and remains radioactive for hundreds of years. Although most generators of low-level radioactive materials are medical and research facilities,<sup>2</sup> most of the total nuclear waste is generated by the nuclear fuel cycle. Approximately sixty percent of the inventory on low-level nuclear waste sites derives from the fuel cycle.<sup>3</sup> Of the non-fuel cycle

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The views expressed in this article are those of the author and do not reflect the views of the Illinois Attorney General or the State of Illinois.

1. See proposed NRC regulation 39 Fed. Reg. 32,921 (1974) (to be codified in 10 C.R.F. § 20.306). In 1975 the Atomic Energy Commission proposed regulations to terminate all licenses authorizing disposal of transuranic waste. These regulations have never been finalized. See 40 Fed. Reg. 799 (1975).

2. Institutional Radioactive Waste-1977, University of Maryland at Baltimore, Radiation Safety Office 1 (Nureg-CR-1137, Oct., 1979) [hereinafter cited as Nureg-CR-1137].

3. Summary of Technologies, Safety and Cost of Decommissioning a Reference Low-Level

waste, the largest volume is created by research rather than the use of radiopharmaceuticals.<sup>4</sup> Sealed sources used in an analytical instrument or irradiator do not contribute much to the radioactive waste problem.<sup>5</sup> Rather, most low-level nuclear waste consists of solidified liquids, resins, and sludges from nuclear reactors.<sup>6</sup>

## II. COMMERCIAL LOW-LEVEL WASTE SITES

The NRC, in an attempt to provide some guidance, has issued an Advance Notice of Proposed Rulemaking for Management and Disposal of Low-Level Wastes by Shallow Land Burial and Alternative Disposal Methods.<sup>7</sup> Currently, however, low-level nuclear material may be disposed of only by:<sup>8</sup> transfer to a recipient licensed by the NRC;<sup>9</sup> burial by the possessor of that material pursuant to an NRC license;<sup>10</sup> disposal at sea;<sup>11</sup> disposal by incineration;<sup>12</sup> or disposal by discharge into a sanitary sewer system.<sup>13</sup>

### A. *Transfer to an Authorized Recipient*

No licensed nuclear material may be transferred to another party unless that party has been licensed to receive the type and quantity of material to be transferred.<sup>14</sup> Such transfer may take place only upon the written verification to the NRC or the state agreeing to accept the

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Waste Burial Ground Battelle Memorial Institute-Pacific Northwest Laboratory, 8 (draft) (Nureg-CR-0570, August, 1979) [hereinafter cited as Nureg-CR-0570]. This study is being done at the request of the Nuclear Regulatory Commission to analyze the technology, safety considerations, and the potential costs for the decommissioning of low-level waste burial sites after they have ceased burial operations.

4. Maryland Study, *supra* note 2, at 2.

5. *Id.* at 1.

6. Almost ninety-eight percent of the fuel cycle waste comes from nuclear reactors.

7. 43 Fed. Reg. 49,811 (1978).

8. 10 C.F.R. § 20.301 (1979).

9. *Id.* at Parts 30, 40, 70 (1979).

10. *Id.* at §§ 20.302, 30.304.

11. *Id.* at § 20.302(c).

12. *Id.* at §§ 20.305, 20.106(b), 20.302.

13. *Id.* at §§ 20.303, 20.306.

14. *Id.* at § 20.301(a). *See also id.* at §§ 30.3, 30.41, 40.3, 40.51, 70.3, 70.42. The process by which a party applies for a license is described in 10 C.F.R. Part 2 (1979). All applications for licenses or license renewal under these sections must contain the information specified in 10 C.F.R. §§ 30.32 and 40.31 (1979). An application for a license will be approved upon an NRC determination that the license is for a purpose authorized by the Atomic Energy Act of 1954, ch. 1073, 68 Stat. 919, that the grant of a license will only create a minimal danger to life or property, and that the licensee is trained and qualified to possess such material. 10 C.F.R. §§ 30.33, 40.32 (1979).

material (agreement state)<sup>15</sup> that the transferee's license authorizes receipt of the type, form, and quantity of material to be transferred. The NRC may grant exceptions from the requirement that radioactive material be possessed, used, or transferred pursuant to an NRC license. These exceptions will be allowed only upon an affirmative finding by the NRC that the exemption is authorized by the Atomic Energy Act of 1954 (the Act),<sup>16</sup> is in the public interest, and will not be a threat to health, safety, or national security.<sup>17</sup> Further, transfer of licenses must be in accord with NRC regulations that control the possession or disposition of by-product, source, or special nuclear material.<sup>18</sup>

### B. *Disposal by Burial in Shallow Soil*

Licensed low-level nuclear material may be buried in soil pursuant to an NRC license. There have been six commercial low-level burial grounds in the United States, three of which are still operating: Hanford (Richland), Washington; Beatty, Nevada; and Barnwell, South Carolina. The other commercial sites—West Valley, New York; Maxey Flats, Kentucky; and Sheffield, Illinois—are now closed. In addition, an application has been submitted for the operation of a low-level waste site in Kansas.

All commercial low-level waste sites, with the exception of Sheffield, are located in agreement states and are regulated by those states. At Hanford, Beatty, and Barnwell, the NRC licenses the burial of special nuclear material because the quantities authorized for possession exceed those which the agreement states may license under their agreements. The Sheffield site is regulated by the NRC, although the state licenses and controls activities on the site involving naturally occurring and accelerator produced radioisotopes not subject to NRC control. In a nonagreement state, an applicant for a low-level nuclear waste disposal site applies directly to the NRC for a license. The applicant must

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15. The Atomic Energy Act of 1954 provides that a state may enter into an agreement with the NRC under which it would assume certain regulatory functions. Among the responsibilities the state may assume is the licensing and inspection of low-level nuclear waste sites. To become an agreement state, a state must enter into a formal contract with the NRC in which it agrees to undertake the licensing and inspection of certain nuclear facilities. Guidelines for such agreements are spelled out in 10 C.F.R. Part 105 (1979).

16. 10 C.F.R. §§ 30.11-20, 40.11-14, 70.11-14 (1979).

17. *Id.* at §§ 30.34, 40.41, 70.32. A license may only be transferred to another licensee authorized to receive the type and quantity of material sought to be transferred or to the federal government or an agreement state. *Id.* at §§ 30.41, 40.51.

18. *Id.* at § 20.302.

provide environmental, hydrologic, and other relevant data.<sup>19</sup> Burial in soil is restricted to a certain depth and to a certain quantity of material.<sup>20</sup> An environmental impact statement must be prepared by the NRC<sup>21</sup> prior to consideration of a license application for disposal of by-product, source, and special nuclear material.<sup>22</sup> An applicant for a license to dispose of licensed material is subject to the NRC fee schedule.<sup>23</sup>

No license for burial of licensed material may be approved for land not owned by either the federal government or a state.<sup>24</sup> The Atomic Energy Commission (AEC) adopted this requirement apparently to ensure long-term maintenance and control of the burial site.<sup>25</sup> Private individuals operate the burial sites after obtaining licenses. In each state where a commercial low-level waste site has operated, a long-term perpetual care fund has been established.<sup>26</sup> The money for this fund is paid to the state by the site operator based upon an assessment per unit of material buried.

The cost of stabilizing and then managing a site over a long period of time varies significantly. The more care with which the material has been buried, the lower the site stabilization cost will be. A recent study by Battelle Laboratories has estimated the cost of stabilization (in 1978 dollars) to range from \$400 thousand to almost \$8 million, depending upon the amount of work necessary and whether such a site was located in the eastern or western portion of the United States. The same study has estimated the cost of long-term care,<sup>27</sup> in addition to the cost of stabilization, following site stabilization.

The Battelle study also has considered the possibility that some materials may have to be exhumed and relocated. Such relocation might be necessary if the material were buried in an area characterized

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19. *Id.* at § 20.304. Burial must be at a minimum depth of four feet with adjoining burial trenches separated by at least six feet. The quantity of material is restricted to 1,000 times the quantity specified in 10 C.F.R. Part 20, App. C (1979).

20. *Id.* at pt. 51.

21. *Id.* at §§ 30.33(a), 40.41(e), 70.21(f).

22. 10 C.F.R. § 170.31 (1979) lists the NRC fees incurred in the licensing of a low-level nuclear waste site.

23. *Id.* at § 20.302.

24. See Report to the General Manager of the AEC by the Directors of Reactor Development and Licensing and Regulation (AEC 180/12) (Dec. 3, 1959).

25. A perpetual care fund is a fund established to defray the costs to the government authority responsible for the long-term care and maintenance of a low-level nuclear waste site. Normally, the money is held in a special account to be used for the long-term maintenance of the site.

26. Nureg-CR-0570, *supra* note 3, at 26-27.

27. *Id.* at 27-28.

as having high water table or unsuitable geology.<sup>28</sup> In addition, the Battelle researchers conclude that exhumation may be necessary for transuranic waste buried at certain sites.<sup>29</sup> The cost of relocation ranges from \$400 thousand for exhumation of transuranic waste to \$43 million for complete exhumation.<sup>30</sup> The Department of Energy (DOE) estimates a significantly higher sum, with total costs of \$570 million (in 1978 dollars), for exhumation of the waste from the West Valley, New York, low-level burial ground.<sup>31</sup>

A recent study by a member of the NRC staff has suggested that current perpetual care arrangements are inadequate because of the potentially insecure financial condition of many licensees and the difficulties of touching the assets of parent corporations.<sup>32</sup> In addition, the existing perpetual care schemes assume a certain life for each low-level waste facility. A premature shutdown could reduce the amount of money available for long-term care significantly because the perpetual care schemes assume that a low-level waste site will be in existence until it reaches its licensed capacity. The study has suggested that five criteria be employed in evaluating the relative merits of alternative financial assurance mechanisms for perpetual care: (1) the degree of assurance provided by the alternative selected that the funds needed will be there when decommissioning is necessary; (2) the cost of providing that assurance, including the administrative cost; (3) the adequacy of the alternative, whether the costs are borne by those who would benefit from the facility; (4) the degree of responsiveness of the alternative to inflation and interest and technological changes that will increase or decrease the ultimate decommissioning costs; and (5) the ability of the alternative to handle different ownership and jurisdictional arrangements and compatibility with different state laws.

This study concludes that having some method of funding upon establishment of the site would provide the greatest assurance of the availability of funds.<sup>33</sup> Such monies could be made available through a fund established at the outset or by a surety bond. To ensure the equity of the alternative selected, the fund could be financed through bonds

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28. The geologic suitability of a low-level nuclear waste site is a function of the hydrology, topography, and geology of an area and its proximity to population centers.

29. Nureg-CR-0570, *supra* note 3, at 29-30.

30. *Id.*

31. Department of Energy, 2 Western New York Nuclear Service Center Study 4-83 (1978).

32. Assuring the Availability of Funds for Decommissioning Nuclear Facilities Office of Nuclear Reactor Regulation, Nuclear Regulatory Commission 39-40 (Nureg-0584, Dec., 1979).

33. *Id.* at 45.

which could be capitalized throughout the life of the facility. If the sinking fund alternative is used, it should be coupled with decommissioning insurance against premature closure of the waste facility. The third option is an unfunded reserve, an accounting method which uses negative net salvage depreciation<sup>34</sup> and permits perpetual care costs to be depreciated over the life of the site. The study asserts, however, that this would provide the least assurance and, in view of the long time required, may invite companies to default on their obligations.<sup>35</sup> Whichever method of funding is used, it must provide for periodic re-adjustment to take into consideration such factors as inflation.

A certain amount of low-level nuclear waste is buried annually in municipal dumps and other private burial grounds not licensed by the NRC.<sup>36</sup> Approximately one percent of the waste generated by large medical institutions and universities is shipped to such burial grounds.<sup>37</sup> Further, most consumer products and many industrial materials containing radiation sources, such as luminous dials, gas chromatographs, X-ray fluorescent analyzers, and smoke detectors, are ultimately buried in private and municipal landfills. The cumulative quantity of radioactive material disposed of in this way can be substantial. For example, the NRC estimates that approximately twenty-four million smoke detectors are in use in this country, each containing a small quantity of americium 241 or radium 226.<sup>38</sup> Each smoke detector has an average useful life of ten years. Thus, approximately two and one-half million smoke detectors are disposed of annually, each having an average content of radiation source of two microcuries.

Each manufacturer of smoke detectors recommends that when the smoke detector has outlived its usefulness, the customer mail it back to the manufacturer for disposal,<sup>39</sup> however, probably few people do so. The NRC believes that the inconvenience and expense involved in re-

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34. Negative net salvage depreciation is a method of providing funds for decommissioning by depreciating the costs of decommissioning a facility throughout its life. These funds are obtained as a cost of doing business. Rather than being held in a segregated fund, they are invested by the facility operator in its own operations; and at the time the money is needed, both the money and interest are available for use in decommissioning the facility.

35. Assuring the Availability, *supra* note 33, at 45.

36. Nureg-CR-1137, *supra* note 2, at 50, 53.

37. *Id.*

38. By-product and source material which does not exceed a certain amount need not be licensed and therefore does not need to be buried in a licensed low-level nuclear waste burial ground. 10 C.F.R. §§ 30.11-20, 30.70, 40.13, 40.14 (1979).

39. Nuclear Regulatory Commission. An Interim Staff Analysis of the Environmental Effects of Ionization Type Smoke Detectors V-21 (Aug. 1978).

turning these detectors will result in most household detectors being discarded along with other household waste. (The NRC staff opinion, however, is that some industrial units may be returned.) Instead, smoke detectors are either incinerated or disposed of in local landfills, with no control over the disposal. Indeed, as the NRC staff suspects, even if there were regulations governing such disposal, they would be impractical or impossible to enforce.<sup>40</sup>

The NRC burial regulations apply only to material which must be licensed.<sup>41</sup> Low-level nuclear waste may be disposed of lawfully in private and municipal burial grounds so long as it is not in quantities large enough to necessitate a license. The rules governing source and by-product materials establish quantities below which no person need possess a specific license.<sup>42</sup> Further, the Act does not even regulate naturally occurring materials such as radium 226 and radioactive waste produced by linear accelerators.<sup>43</sup> Yet, low-level radioactive material that is exempt from licensing by the NRC may be "hazardous waste" under the Resource Conservation and Recovery Act.<sup>44</sup> Such material may only be generated, transported, and disposed of pursuant to United States Environmental Protection Agency regulation.

At present, there are few regulations for closing or decommissioning low-level nuclear waste sites. The NRC maintains that an operator of a low-level waste site licensed by the NRC must comply with certain criteria regarding closure and stabilization of the site. The NRC requires that a low-level nuclear waste burial ground licensee develop a site closure and stabilization plan which guarantees certain performance objectives. All material must be buried in accordance with license requirements. Suitable arrangements must be made to ensure that there is a competent governmental agency to assume long-term control of the site and that a fund adequate to carry out site closure and stabilization has been established. Also, gamma radiation must be kept at

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40. *Id.* at I-V.

41. *Id.* at V-32.

42. 10 C.F.R. § 20.304 (1979).

43. *Id.* at §§ 30.18, 40.14. The quantities below which low-level nuclear material may lawfully be disposed in private burial grounds are identified in 10 C.F.R. §§ 30.11-20, 30.70, 401.3, 40.14 (1979).

44. *See* 42 U.S.C. § 2014 (1978). 42 U.S.C. § 6903(27) (1977). The Resource Conservation and Recovery Act of 1976, 90 Stat. 2795 (codified in scattered sections 42 U.S.C.) provides that by April, 1977 the United States Environmental Protection Agency was to develop criteria for identifying what is or is not a hazardous waste. 42 U.S.C. § 6921 (1977). As of this writing, those criteria have not been issued, although by court order the Environmental Protection Agency must promulgate them by April, 1980. *See Illinois v. Costle*, No. 78-1689 (D.D.C. 1979) (order).

background levels; release of radionuclides through air, ground, and surface below acceptable levels; and adequate arrangements made to ensure that migration does not occur.<sup>45</sup> The NRC has published an Advance Notice of Proposed Rulemaking,<sup>46</sup> announcing its intent to develop additional regulations on the management and disposal of low-level waste by shallow land burial and alternative disposal methods.

The responsibility for the stabilization and the long-term care of low-level nuclear waste has been thrown into question by one low-level waste site operator, the Nuclear Engineering Company at its Sheffield site.<sup>47</sup> The company contends any further responsibility, including the cost of decommissioning and long-term care of the site, belongs to Illinois.<sup>48</sup> By burying the low-level nuclear waste in the ground, consistent with its license and NRC regulation,<sup>49</sup> the Nuclear Engineering Company argues, it has fulfilled its obligation and no longer possesses any low-level nuclear waste material. Because it no longer possesses any low-level nuclear waste, the company asserts that its obligations have ceased and it can unilaterally terminate its license.<sup>50</sup>

The NRC staff and state officials, on the other hand, claim that assuming *arguendo* the material has been buried pursuant to NRC regulations, the Nuclear Engineering Company's obligations terminate only when it has transferred the material to another eligible licensee.<sup>51</sup> The regulation provides that licensed nuclear material such as low-level nuclear waste may only be transferred to a licensee (including a state) eligible under the terms of an NRC license to accept the type and quantity of material proposed for transfer.<sup>52</sup> Similarly, no state or other person may receive or possess licensed material without NRC

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45. Low-Level Waste Burial Ground Site Closure and Stabilization (Nuclear Regulatory Commission Low-Level Waste Branch Position, Revision 1, May 17, 1979).

46. 43 Fed. Reg. 49,811 (1978).

47. Letter from Troy B. Conner, Jr., Esq., Conner, Moore and Corber, to William J. Dircks, Director, Office of Nuclear Material Safety and Safeguards, Nuclear Regulatory Commission (March 8, 1979).

48. See Motion for Emergency Action by the Commission and To Stay the Immediate Effectiveness of the Order to Show Cause, In the matter of Nuclear Engineering Company (Sheffield Low Level Radioactive Waste Site), No. 27-39 (NRC, filed March 22, 1979).

49. 10 C.F.R. § 20.304 (1979).

50. See NECO Motion, *supra* note 48.

51. 10 C.F.R. § 20.301 (1979). See, e.g., NRC Staff Reply to Applicant's Motion to Dismiss the Proceedings, In the matter of Nuclear Engineering Company (Sheffield Low Level Radioactive Waste Site), No. 27-39 (NRC, filed March 20, 1979); and Illinois Memorandum Regarding Conditions Precedent to NECO Withdrawal of Application, Nuclear Engineering Company, No. 27-39 (NRC, filed April 12, 1979).

52. 10 C.F.R. §§ 30.41(c), 40.51(c), 70.42(c) (1979).

authorization.<sup>53</sup> The NRC and Illinois argue that because there is no such licensee to whom the company has transferred the material, it maintains responsibility for the site and hence for stabilization and care.<sup>54</sup>

Nor may anyone terminate a license or obligation or responsibility under a license without prior NRC approval.<sup>55</sup> The only exception to this provision, Illinois suggests,<sup>56</sup> is available from NRC criteria whereby a site may be released to unrestricted use upon an affirmative finding that such release would not be inimical to the public health and safety. Presumably such a finding could not be made until after such a site had been thoroughly stabilized and a substantial period of time had elapsed.

### C. *Disposal at Sea*

Disposal of radioactive waste at sea is theoretically permitted.<sup>57</sup> Until the mid-1960's, sea disposal was the primary method of disposing of nuclear material. In 1960, the Atomic Energy Commission began phasing out sea disposal by placing a moratorium on the issuance of new sea disposal licenses. The last sea disposal took place in June, 1970. The rule does not ban sea disposal outright, but requires a showing that sea disposal represents less harm to man than other methods of disposal.<sup>58</sup> The NRC, however, in adopting this regulation, indicated both that the rule was a codification of its moratorium of new sea disposal licensing and that it was in compliance with the recommendation of the Council on Environmental Quality that the sea disposal ban continue.<sup>59</sup>

### D. *Disposal by Incineration, Evaporation, and Distillation*

Incineration, evaporation, and distillation of nuclear material do not represent methods of disposal so much as techniques of volume reduction, for these techniques leave a contaminated residue. Incineration must be carried out pursuant to an NRC license and is subject to limitations.<sup>60</sup> Airborne release of radionuclides from incineration may

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53. *Id.* at §§ 30.3, 40.3, 70.3.

54. *See* note 51 *supra*.

55. 42 U.S.C. §§ 2233, 2234 (1970); 10 C.F.R. §§ 30.34(b), 40.46, 70.36 (1979).

56. *See* note 51 *supra*.

57. 10 C.F.R. § 20.302 (1979).

58. *Id.* at § 20.302(c).

59. 36 Fed. Reg. 23,138 (1971).

60. 10 C.F.R. §§ 20.301, 30.302, 20.304, 20.106 (1979).

be regulated under the Clean Air Act Amendments of 1977 by the United States Environmental Protection Agency and the states.<sup>61</sup> The nonradioactive airborne particulates generated by incineration of radioactive waste may be regulated by the states already. The Atomic Energy Act provides that it shall in no way affect the traditional authority of the states to regulate nonradioactive hazards.<sup>62</sup>

About one fourth of all major hospitals and universities dispose of radioactive waste through incineration. The other airborne source of low-level nuclear waste is the release of xenon 133 and 127 into the atmosphere during the course of ventilation studies.<sup>63</sup>

A related method of volume reduction is compaction and evaporation. This is not done on a wide scale at the present time. One commercial site, Tod's Shipyard in Galveston, Texas, however, uses a combination of compaction and evaporation to achieve a reduction of almost ninety percent in the low-level nuclear waste material they handle.<sup>64</sup>

#### E. *Discharge into Sanitary Sewer Systems*

Finally, small amounts of radioactive material may be discharged into sanitary sewer systems under certain circumstances.<sup>65</sup> Thirty-four percent of all major hospitals and universities dispose of liquid scintillation waste used in biology research by dumping it into sanitary sewer systems.<sup>66</sup> All hospitals which administer radiopharmaceuticals to patients release contaminated patient excreta into the sewer system.

### III. FEDERAL LOW-LEVEL WASTE SITES

There are at the present time fourteen government owned waste burial grounds for low-level nuclear waste. Commercial waste is not accepted at federal burial grounds. At NRC request, DOE is reviewing this policy because there is growing concern that commercial low-level nuclear waste burial ground will soon be inadequate to accommodate all commercially generated nuclear waste.<sup>67</sup> The Idaho National Engi-

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61. 42 U.S.C. §§ 1857-1858 (1977) (current version at 42 U.S.C. §§ 7401-7642 (1978)).

62. 42 U.S.C. § 2021(k) (1970).

63. Nureg-CR-1137, *supra* note 2, at 37.

64. Chicago Sun-Times, Nov. 9, 1979, at 40, col. 1.

65. 10 C.F.R. § 20.303 (1979). This material is also subject to 10 C.F.R. § 20.106 (1979).

66. Nureg-CR-1137, *supra* note 2, at 36.

67. Letter from John B. Martin, Director, Division of Nuclear Waste Management, Nuclear Regulatory Commission, to Sheldon Meyers, Department of Energy (April 5, 1979).

neering Laboratory, the Hanford (Washington) Reservation, and the Nevada Test Site for Atomic Weapons are being considered by DOE as possible sites for commercial nuclear waste storage.<sup>68</sup>

Pursuant to the 1979 NRC Authorization Bill,<sup>69</sup> Congress mandated that the NRC study the issue of the extension of NRC authority to include existing and future federal radioactive waste disposal facilities. Under an NRC plan submitted to Congress, new low-level DOE nuclear waste disposal sites or expansions of existing sites would be subject to NRC licensing in the same way commercial low-level sites are licensed today by the NRC.<sup>70</sup> DOE would submit an application to NRC<sup>71</sup> and an Environmental Report<sup>72</sup> from which the NRC would prepare either an environmental impact statement or an environmental assessment and a finding of no significant effect. A formal licensing proceeding would be instituted and interested parties given the opportunity to participate. A hearing would be held; and in the event of a favorable finding by the License Board, a license would be issued. Existing DOE disposal facilities would be subject to NRC regulation in some way.<sup>73</sup> It is not clear from the proposal whether an existing facility would have to apply for a license or merely be required to meet NRC standards.

Expansion of NRC authority to cover regulation of DOE low-level nuclear waste sites is consistent with the recommendation of the Interagency Review Group on Nuclear Waste Management (IRG),<sup>74</sup> which favors expansion to provide assurance that the public would receive protection from government radioactive waste equivalent to that from nongovernmental radioactive waste, and to assure independent regulation.

The NRC favors extension of its authority over DOE low-level wastes sites for three reasons. Like the IRG, the NRC takes the position that the public interest would be served best by an independent technical review of DOE's plans. The NRC also perceives a need for

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68. This information is based on conversations between the author and Department of Energy officials.

69. Act of November 6, 1978, Pub. L. No. 95-601, 9 Stat. 2947.

70. U.S. Nuclear Regulatory Commission, Regulation of Federal Radioactive Waste Activities D-7 (Nureg-0527, 1979) [hereinafter cited as Nureg-0527].

71. Pursuant to 10 C.F.R. Parts 30, 40 and 70 (1979).

72. Pursuant to 10 C.F.R. Part 51 (1979).

73. Nureg-0527, *supra* note 70.

74. Report to the President by the Interagency Review Group on Nuclear Waste Management 29-31 (1979).

uniformity of standards. In addition, the opportunity for public participation in the review process would increase both the caliber of decisions made and the degree of public acceptance.<sup>75</sup>

#### IV. ABANDONED NUCLEAR WASTE SITES

There are more than 125 abandoned radioactive waste sites in the United States, most of which contain material that is considered to be low-level nuclear waste.<sup>76</sup> These sites house the remnants of industrial activities employing radioactive products. Who bears the responsibility for the stabilization and care of these sites depends, in part, upon whether the material was generated by defense related activity, such as material from the Manhattan Project during World War II, or whether it may be traced to an NRC licensee. DOE has agreed to accept some responsibility for the stabilization of material generated pursuant to defense related activity. It has begun efforts to identify and monitor such sites and to develop a plan for stabilizing and caring for them.<sup>77</sup>

The NRC has taken the position that an NRC licensee's responsibility is limited to only licensed material actually buried or stored by that NRC licensee. Thus, even if radioactive waste on an abandoned site may be traced to an NRC licensee, unless it is shown that the licensee actually buried and stored the material in question, the NRC has opted not to hold that licensee responsible.<sup>78</sup> Under current law, therefore, citizens threatened by abandoned radioactive waste may be deprived of any remedy. In fact, at least one private nuisance action brought by a citizen against the owner of an inactive nuclear waste site has been dismissed on the ground that the NRC alone has authority to regulate such radioactive hazards.<sup>79</sup>

#### V. RECOMMENDED REFORMS

This article has attempted to identify sources of low-level nuclear waste and its regulation. Problems in its disposal, decommissioning, and maintenance of low-level nuclear waste burial sites, as well as special problems created by federal and abandoned low-level nuclear waste sites have been noted, also. The regulation of such waste is

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75. Nureg-0527, *supra* note 70, at vii.

76. Department of Energy, Press Release, June 29, 1978.

77. *Id.*

78. Letter from William A. Nixon, Division of Fuel Cycle and Material Safety, NRC, to Harold J. Spelman, Attorney for the City of West Chicago, Ill. (June 4, 1979).

79. *Coyne v. Kerr McGee*, No. 76 C 2472 (N.D. Ill., dismissed Feb. 11, 1977).

clearly inadequate. It reflects an attitude, several decades old, that the problems related to the disposal of low-level nuclear waste are insignificant. This traditional neglect of the regulation of low-level nuclear waste has contributed to the erosion of public confidence in this nation's ability to handle and dispose of radioactive waste safely. It may also have resulted in needless exposure of people in and around low-level nuclear waste sites to low-level ionizing radiation.

Forceful steps are necessary to ensure that regulation of low-level waste is adequate to protect the public health and safety. Among those which should be taken are the following: (1) NRC authority to license low-level nuclear waste sites should be extended to all federal sites, existing and planned. (2) Detailed regulations regarding geology, hydrology, and siting must be developed. (3) A determination should be made regarding the suitability of shallow land burial as opposed to other means of disposal of low-level nuclear waste. (4) NRC regulations should state more explicitly that responsibility for the decommissioning and near-term, post-closure care of a site is that of the licensed operator. (5) NRC regulations should require that decommissioning funds be adequate and available early enough in the life of a facility to cover such contingencies as premature shutdown. (6) A federal cause of action should be created to enforce responsibility for abandoned and inactive nuclear waste sites. (7) Finally, disposal of nuclear waste into a sanitary sewer system or at sea should be banned permanently.