1995

Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement, Volume 1, Appendix L

United States Department of Energy

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Department of Energy Programmatic
Spent Nuclear Fuel Management
and
Idaho National Engineering Laboratory
Environmental Restoration and
Waste Management Programs
Final Environmental Impact Statement

Volume 1
Appendix L

Environmental Justice

April 1995

U.S. Department of Energy
Office of Environmental Management
Idaho Operations Office
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Appendix L

Environmental Justice

L-1 INTRODUCTION

In February 1994, Executive Order 12898, titled Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (FR 1994), was released to Federal agencies. This order directs Federal agencies to incorporate environmental justice as part of their missions. As such, Federal agencies are specifically directed to identify and address as appropriate disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. In addition to describing environmental justice goals, Executive Order 12898 directs the Administrator of the Environmental Protection Agency to convene an interagency Federal Working Group on Environmental Justice (referred to below as the Working Group). The Working Group is directed to provide guidance to Federal agencies on criteria for identifying disproportionately high and adverse human health or environmental effects on minority populations and low-income populations. The Working Group is also directed to coordinate with each Federal agency to develop an environmental justice strategy, if a strategy is required by the proposed activities. At the time of this analysis, the Working Group had not issued final guidance on the approach to be used in analyzing environmental justice, as directed by the Executive Order. The Working Group has issued draft definitions of terms in the Draft Guidance for Federal Agencies on Terms in Executive Order 12898, dated November 28, 1994. These definitions, with slight modifications, were used in the following analysis. Further, in coordination with the Working Group, DOE is developing internal guidance for the implementation of the Executive Order, which has not yet been adopted. Because both DOE and the Working Group are still in the process of developing guidance, the approach used in this analysis might depart somewhat from whatever guidance is eventually issued.

This section provides an assessment of the areas surrounding the 10 sites under consideration for the management of SNF under all programmatic alternatives considered in this volume. It is divided into two sections: (a) the five sites considered for the management of DOE naval SNF only (under the No Action and Decentralization alternatives, and (b) the five DOE sites being considered for the management of all types of DOE SNF under all alternatives. The five sites considered for the management of naval SNF only are the Norfolk Naval Shipyard, Portsmouth, Virginia; Portsmouth Naval Shipyard, Kittery, Maine; Pearl Harbor Naval Shipyard, Honolulu, Hawaii; Puget Sound Naval Shipyard, Bremerton, Washington; and Kesselring Site, West Milton, New York. The five DOE sites considered for the management of some portion or all DOE SNF are the Savannah River Site, Aiken, South Carolina; Oak Ridge Reservation, Oak Ridge, Tennessee; Idaho National Engineering Laboratory, Idaho Falls, Idaho; Hanford Site, Richland, Washington; and Nevada Test Site, Mercury, Nevada.
This assessment includes potential adverse impacts resulting from both onsite activities and associated transportation of materials. Based on this assessment, it is concluded that none of the alternatives analyzed results in disproportionately high and adverse effects on minority populations or low-income communities surrounding any of the sites under consideration for the management of SNF or associated offsite transportation routes.

Public comment received on the Draft EIS is addressed in Volume 3, "Response to Public Comment," of this Final EIS. Overall comment indicated a widespread concern about past and present DOE activities on human health and the environment. A small number of comments were received related to environmental justice; these indicated the need for an expanded analysis in the Final EIS, which was previously committed to in the Draft EIS. The most specific comments were received from the U.S. Environmental Protection Agency’s Office of Enforcement and Compliance Assurance and the Shoshone-Bannock Tribes on the Fort Hall Indian Reservation. Environmental justice comments pertaining to Volume 1 of this EIS were in essence:

- Although the Draft EIS includes discussions on socioeconomic impacts, it does not state whether the alternatives would affect minority communities and low-income communities (Sanderson 1994).

- The DOE should pay particular attention to any environmental impacts that may affect the Cattaraugus Reservation of the Seneca Nation of Indians, located downstream on Cattaraugus Creek from the DOE's West Valley Site in New York State. Tribal residents engage in subsistence fishing on the river and should be given a full opportunity to participate in the National Environmental Protection Agency process (Sanderson 1994).

- The DOE must meet the requirements of Executive Order 12898 on environmental justice and fully consider the comments of the Shoshone-Bannock Tribes on the Draft EIS and consider the impacts of its proposed actions on the Tribes, the Fort Hall Indian Reservation, and on other disadvantaged populations living in proximity to the Idaho National Engineering Laboratory. It was stated that the Indian Tribes are not just another "minority population," but are governments that have a special relationship to the Federal Government and its agencies and have certain authorities to regulate others including the United States Government (Tinno 1994, Wolfley 1994).

Pertinent public comments on the topic of environmental justice have been considered in this assessment, which has been expanded over the discussions in the Draft EIS. Consultations have taken place with the Shoshone-Bannock Tribes on the Fort Hall Indian Reservation and the Seneca Nation of Indians on the Cattaraugus Reservation. As a result of consultations with the Seneca Nation of Indians, DOE and the Navy have received a request by this tribe for notification of impending SNF shipments across the Cattaraugus Reservation. Consultations with the Shoshone-Bannock Tribes on the Fort Hall Indian Reservation are specifically addressed in Section 5.20, Volume 2 of this EIS.
Distance are

Volume I, Appendix L

L-3 COMMUNITY CHARACTERISTICS

Demographic information obtained from the U.S. Bureau of Census was used to identify minority populations and low-income communities in the zone of potential impact surrounding each of the sites under consideration. This zone is within a circle that has an 80-kilometer (50-mile) radius. This 80-kilometer (50-mile) radius was selected because it was judged to encompass all of the impacts that may occur. This radius also is based on air impact modeling and socioeconomic impact analysis used throughout this EIS. Transportation impacts are assessed within 800 meters (0.5 miles) of transportation routes for incident-free transportation because impacts beyond this distance are negligible. For transportation accidents, an 80-kilometer (50-mile) radius was used.

L-3.1 Methodology

Demographic maps were prepared using 1990 census data available from the U.S. Bureau of the Census. Figures L-1 through L-10 and Figures L-11 through L-20 illustrate census tract distributions for both minority populations and low-income populations for areas surrounding the five naval SNF-specific and five DOE sites being considered for the management of all or some portion of all DOE SNF respectively. These maps are based on an analysis of 1990 United States Bureau of the Census Tiger Line files, which contain political boundaries and geographical features, and Summary Tape Files 3A (as processed by the U.S. Environmental Protection Agency), which contain demographic information (USBC 1992). Data were resolved to the census tract (see definition in Section 3.2) group level.

An 80-kilometer (50-mile) radius circle appears on each map, defining a zone of potential impact. As discussed above, this zone of potential impact for low-income and minority communities is the same as that used for analysis performed in the EIS. The circle has been indexed to the center location of hypothetical or existing major SNF management facilities at each site or a conservative location to identify the maximum number of minority populations and low-income populations.

L-3.2 Definitions

Definitions used to develop community characteristics are as follows:

Census tract: An area defined for the purpose of monitoring census data that is usually comprised of between 2,500 and 8,000 persons, with 4000 persons being ideal. When first delineated, census tracts are designed to be homogenous with respect to population characteristics, economic status, and living conditions. Census tracts do not cross county boundaries. The spatial size of census tracts varies widely depending on the density of settlement. Census tract boundaries are delineated with the intention of being maintained over a long period of time so that statistical comparisons can be made from census to census.

Minority population: A group of people and/or community experiencing common conditions of exposure or impact that consists of persons of the United States classified by the U.S. Bureau of the Census as Negro/Black/African-American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other nonwhite persons, based on self-classification by the people according to the race with which they most closely identify. For the purposes of analysis, minority populations are defined as those census tracts within the zone of impact for which the percent minority population exceeds the average of all census tracts within the zone of impact or where the percent minority population exceeds 50 percent of the spatial area for any given census tract. In the case of migrant or dispersed populations, a minority population consists of a group that is greater than 50 percent minority.

Low-income population: A group of people and/or community experiencing common conditions of exposure or impact in which 25 percent or more of the population is characterized as living in poverty (FR 1993) The U.S. Bureau of Census characterizes persons in poverty as those whose income is less than a "statistical poverty threshold." Table L-1 presents the U.S. Census poverty thresholds (USBC 1992) used in this analysis. This threshold is a weighted average based on family size and the age of the persons in the family. For instance, the 1990 census threshold for a family of four was a 1989 income of $12,674.

Population Base: For the purpose of this analysis, census tracts were included in the analysis if 50 percent of the tract fell within the 80-kilometer (50-mile) radius.

Table L-1. Poverty thresholds in 1989 by size of family and number of related children under 18 years.

<table>
<thead>
<tr>
<th>Size of family unit</th>
<th>Two persons</th>
<th>Household under 65 years</th>
<th>Household 65 years and over</th>
<th>Three persons</th>
<th>Four persons</th>
<th>Five persons</th>
<th>Six persons</th>
<th>Seven persons</th>
<th>Eight persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1. _ _ _ _ _ _ _ _ _</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One person (unrelated individual)</td>
<td>6,210 ($)</td>
<td>6,451 ($)</td>
<td>7,991 ($)</td>
<td>8,076 ($)</td>
<td>9,885 ($)</td>
<td>12,674 ($)</td>
<td>14,990 ($)</td>
<td>16,921 ($)</td>
<td>18,102 ($)</td>
</tr>
<tr>
<td>Under 65 years</td>
<td>6,451 ($)</td>
<td>6,451 ($)</td>
<td>8,242 ($)</td>
<td>9,254 ($)</td>
<td>9,885 ($)</td>
<td>12,674 ($)</td>
<td>14,990 ($)</td>
<td>16,921 ($)</td>
<td>18,102 ($)</td>
</tr>
<tr>
<td>65 years and over</td>
<td>7,501 ($)</td>
<td>9,491 ($)</td>
<td>11,153 ($)</td>
<td>12,141 ($)</td>
<td>9,885 ($)</td>
<td>12,674 ($)</td>
<td>14,990 ($)</td>
<td>16,921 ($)</td>
<td>18,102 ($)</td>
</tr>
<tr>
<td>Two persons</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
</tr>
<tr>
<td>Household under 65 years</td>
<td>9,254 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
<td>8,242 ($)</td>
</tr>
<tr>
<td>Household 65 years and over</td>
<td>10,153 ($)</td>
<td>11,153 ($)</td>
<td>12,141 ($)</td>
<td>13,141 ($)</td>
<td>14,141 ($)</td>
<td>15,141 ($)</td>
<td>16,141 ($)</td>
<td>17,141 ($)</td>
<td>18,141 ($)</td>
</tr>
<tr>
<td>Three persons</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
<td>9,885 ($)</td>
</tr>
<tr>
<td>Four persons</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
<td>11,674 ($)</td>
</tr>
<tr>
<td>Five persons</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
<td>13,999 ($)</td>
</tr>
<tr>
<td>Six persons</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
<td>14,384 ($)</td>
</tr>
<tr>
<td>Seven persons</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
<td>16,921 ($)</td>
</tr>
<tr>
<td>Eight persons</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
<td>23,218 ($)</td>
</tr>
<tr>
<td>Nine or more persons</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
<td>23,480 ($)</td>
</tr>
</tbody>
</table>
L-3.3 Distribution of Minority Populations Near Candidate Sites

The minority population characteristics within the 80-kilometer (50-mile) radius of candidate sites for the SNF and INEL EIS are presented in Tables L-2 and L-3. Table L-2 lists the number of minority individuals residing near the candidate sites for the management of DOE naval SNF. Table L-3 lists the number of minority individuals residing near the candidate sites for the management of all or some portion of DOE SNF.

The racial and ethnic composition of the minority population residing near the candidate sites for the management of all or some portion of DOE SNF is predominantly African-American, with the exception of Pearl Harbor where the main ethnic population is Asian and Native Hawaiian.

The racial and ethnic composition of the minority population residing near the candidate sites for the management of all or some portion of DOE SNF is predominantly African-American at the Nevada Test Site. The racial and ethnic composition of the minority population residing near the candidate sites for the management of all or some portion of DOE SNF is predominantly Asian and Native Hawaiian.

Table L-2. Minority individuals residing near the candidate sites for the management of DOE naval spent nuclear fuel only per the 1990 census.

<table>
<thead>
<tr>
<th>Candidate Site</th>
<th>Number of census tracts considered</th>
<th>Number of individuals residing within 80 km of site</th>
<th>Number of minority individuals within 80 km of site</th>
<th>Percent of individuals that are minority</th>
<th>See figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kesselring Site</td>
<td>304</td>
<td>1,149,924</td>
<td>65,590</td>
<td>6</td>
<td>L-1</td>
</tr>
<tr>
<td>Norfolk Naval Shipyard</td>
<td>386</td>
<td>1,631,671</td>
<td>534,585</td>
<td>33</td>
<td>L-2</td>
</tr>
<tr>
<td>Puget Sound Naval Shipyard</td>
<td>643</td>
<td>2,900,229</td>
<td>379,461</td>
<td>13</td>
<td>L-3</td>
</tr>
<tr>
<td>Portsmouth Naval Shipyard</td>
<td>522</td>
<td>2,412,691</td>
<td>121,516</td>
<td>5</td>
<td>L-4</td>
</tr>
<tr>
<td>Pearl Harbor Naval Shipyard</td>
<td>200</td>
<td>836,465</td>
<td>571,482</td>
<td>68</td>
<td>L-5</td>
</tr>
</tbody>
</table>

Table L-3. Minority individuals residing near the candidate sites for the management of all or some portion of DOE spent nuclear fuel only per the 1990 census.

<table>
<thead>
<tr>
<th>Candidate Site</th>
<th>Number of census tracts considered</th>
<th>Number of individuals residing within 80 km of site</th>
<th>Number of minority individuals within 80 km of site</th>
<th>Percent of individuals that are minority</th>
<th>See figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savannah River Site</td>
<td>147</td>
<td>619,959</td>
<td>233,955</td>
<td>38</td>
<td>L-6</td>
</tr>
<tr>
<td>Oak Ridge Reservation</td>
<td>211</td>
<td>867,231</td>
<td>49,742</td>
<td>6</td>
<td>L-7</td>
</tr>
<tr>
<td>Idaho National Engineering Laboratory</td>
<td>37</td>
<td>172,366</td>
<td>11,722</td>
<td>7</td>
<td>L-8</td>
</tr>
<tr>
<td>Hanford Site</td>
<td>79</td>
<td>370,807</td>
<td>75,381</td>
<td>20</td>
<td>L-9</td>
</tr>
<tr>
<td>Nevada Test Site</td>
<td>4</td>
<td>11,918</td>
<td>759</td>
<td>6</td>
<td>L-10</td>
</tr>
</tbody>
</table>

The spatial distribution by census tract of the minority population within 80 kilometers (50 miles) of each candidate site is shown in Figures L-1 through L-10. As indicated in the legend of each figure, census tracts have been shaded according to the percentage of minority individuals within each. It should be noted that Bureau of Census tracts often extend into oceans, bays, and lakes to allow for the inclusion of individuals who reside on boats or offshore houses. This is especially noticeable in locations considered only for the management of DOE naval SNF, with the exception of the inland Kesselring Site. Census tract lines have been removed from Puget Sound proper in Figures L-3 and L-13 to improve clarity.

L-3.4 Distribution of Low-Income Individuals Near the Candidate Sites

The low-income population characteristics within the 80-kilometer (50-mile) radius of candidate sites for the SNF and Idaho National Engineering Laboratory EIS are presented in Tables L-4 and L-5. Table L-4 lists the number of low-income individuals residing near the candidate sites.

Table L-4. Low-income individuals residing near the candidate sites for the management of naval spent nuclear fuel only per the 1990 census.

<table>
<thead>
<tr>
<th>Candidate site</th>
<th>Number of census tracts considered</th>
<th>Number of individuals within 80 km of site</th>
<th>Number of low-income individuals within 80 km of site</th>
<th>Percent of individuals that are low-income</th>
<th>See figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kesselring Site</td>
<td>304</td>
<td>1,149,924</td>
<td>101,454</td>
<td>9</td>
<td>L-11</td>
</tr>
<tr>
<td>Norfolk Naval Shipyard</td>
<td>386</td>
<td>1,631,671</td>
<td>179,336</td>
<td>11</td>
<td>L-12</td>
</tr>
<tr>
<td>Puget Sound Naval Shipyard</td>
<td>643</td>
<td>2,900,229</td>
<td>250,452</td>
<td>8</td>
<td>L-13</td>
</tr>
<tr>
<td>Portsmouth Naval Shipyard</td>
<td>522</td>
<td>2,412,691</td>
<td>171,830</td>
<td>7</td>
<td>L-14</td>
</tr>
<tr>
<td>Pearl Harbor Naval Shipyard</td>
<td>200</td>
<td>836,465</td>
<td>60,093</td>
<td>7</td>
<td>L-15</td>
</tr>
</tbody>
</table>

Table L-5. Low-income individuals residing near the candidate sites for the management of all or some portion of DOE spent nuclear fuel per the 1990 census.

<table>
<thead>
<tr>
<th>Candidate site</th>
<th>Number of census tracts considered</th>
<th>Number of individuals within 80 km of site</th>
<th>Number of low-income individuals within 80 km of site</th>
<th>Percent of individuals that are low-income</th>
<th>See figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Savannah River Site</td>
<td>147</td>
<td>619,959</td>
<td>107,764</td>
<td>17</td>
<td>L-16</td>
</tr>
<tr>
<td>Oak Ridge Reservation</td>
<td>211</td>
<td>867,231</td>
<td>134,661</td>
<td>16</td>
<td>L-17</td>
</tr>
<tr>
<td>Idaho National Engineering Laboratory</td>
<td>37</td>
<td>172,366</td>
<td>23,416</td>
<td>14</td>
<td>L-18</td>
</tr>
<tr>
<td>Hanford Site</td>
<td>79</td>
<td>370,807</td>
<td>65,584</td>
<td>18</td>
<td>L-19</td>
</tr>
<tr>
<td>Nevada Test Site</td>
<td>4</td>
<td>11,918</td>
<td>1,474</td>
<td>12</td>
<td>L-20</td>
</tr>
</tbody>
</table>
Figure L-1. Minority population distribution within 80 kilometers (50 miles) of the Kesselring Site.

Figure L-2. Minority population distribution within 80 kilometers (50 miles) of the Norfolk Naval Shipyard.
Figure L-3. Minority population distribution within 80 kilometers (50 miles) of the Puget Sound Naval Shipyard.

Figure L-4. Minority population distribution within 80 kilometers (50 miles) of the Portsmouth Naval Shipyard.
Figure L-5. Minority population distribution within 80 kilometers (50 miles) of the Pearl Harbor Naval Shipyard.

Figure L-6. Minority population distribution within 80 kilometers (50 miles) of the Savannah River Site.
Figure L-7. Minority population distribution within 80 kilometers (50 miles) of the Oak Ridge Reservation.

Figure L-8. Minority population distribution within 80 kilometers (50 miles) of the Idaho National Engineering Laboratory.
Figure L-9. Minority population distribution within 80 kilometers (50 miles) of the Hanford Site.

Figure L-10. Minority population distribution within 80 kilometers (50 miles) of the Nevada Test Site.
Site for the management of naval SNF. Table L-5 lists the number of low-income individuals residing near the candidate sites for the management of all or some portion of DOE SNF.

The spatial distribution by census tract of low-income individuals residing within 80-kilometers (50 miles) of each candidate site are shown in Figures L-11 to L-20. As indicated in the legend of each figure, census tracts have been shaded according to the percentage of low-income population within the area.

L-3.5 Limitations of Demographic Data

As discussed in Section 5.8 of Volume I of this EIS, characterization of minority and low-income populations residing within a geographical area is sensitive to the basic definitions and assumptions used in conducting the analysis to identify them. Both the Interagency Working Group and DOE are in the process of preparing final guidelines for use in the evaluation of environmental justice. In the absence of final guidance, the definitions and approaches being used by and within Federal agencies could vary. For example, this EIS and the Draft Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor SNF (Draft FRR SNF EIS) present demographic characterizations obtained from the same U.S. Census Bureau database, but use different definitions and assumptions.

The differences in the definitions and assumptions between this EIS and the Draft FRR SNF EIS are as follows:

1. Although both these EISs use the same 1990 U.S. Census Bureau database, this EIS uses data aggregated at the census tract level (2,500 to 8,000 persons), while the Draft FRR SNF EIS uses data aggregated at the block group level (250 to 550 housing units).

2. In some cases, census blocks or tracts lie partly within the area being analyzed; that is, within the 80-kilometer (50-mile) radius around a potential SNF management site. Because the exact distribution of the populations within such blocks or tracts is not available, the data are insufficient to allow a precise count. To address this situation, this EIS includes a low-income or minority population in its analyses if 50 percent or more of the tract falls within an 80 kilometer (50 mile) radius around the site being considered. In similar situations, the Draft FRR SNF EIS assumes that the general population and the minority population are distributed uniformly throughout a block group, and includes the fraction of the low-income or minority population that corresponds to the fraction of the census block group area that falls within the 80-kilometer (50-mile) radius.

Figure L-11. Low-income population distribution within 80 kilometers (50 miles) of the Kesselring Site.
Figure L-12. Low-income population distribution within 80 kilometers (50 miles) of the Norfolk Naval Shipyard.

Figure L-13. Low-income population distribution within 80 kilometers (50 miles) of the Puget Sound Naval Shipyard.
Figure L-14. Low-income population distribution within 80 kilometers (50 miles) of the Portsmouth Naval Shipyard.

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Figure L-15. Low-income population distribution within 80 kilometers (50 miles) of the Pearl Harbor Naval Shipyard.

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Figure L-16. Low-income population distribution within 80 kilometers (50 miles) of the Savannah River Site.

Figure L-17. Low-income population distribution within 80 kilometers (50 miles) of the Ctk Ridge Reservation.
Figure L-18. Low-income population distribution within 80 kilometers (50 miles) of the Idaho National Engineering Laboratory.

Figure L-19. Low-income population distribution within 80 kilometers (50 miles) of the Hanford Site.
This EIS defines low-income populations as those in a poverty status as determined annually by the U.S. Census Bureau, based on the Consumer Price Index, and aggregated by the thresholds set forth by the U.S. Census Bureau (that is, a group of people and/or a community experiencing common conditions of exposure or impact, in which 25 percent or more of the population is characterized as living in poverty), a method used by the U.S. Environmental Protection Agency. The Draft FRR SNF EIS uses the definition of low-income community, established by the U.S. Department of Housing and Urban Development, as an area for which the median household income is 80 percent or below the median household income for the metropolitan statistical area (urban) or county (rural). Both definitions are permitted under the draft guidance developed by the Interagency Working Group.

These different definitions and assumptions have resulted in differences in the characterization of low-income and minority populations. The two sets of data are summarized in Tables L-6 and L-7, and the most significant differences are discussed below.

The minority populations identified are reasonably consistent between this EIS and the Draft FRR SNF EIS, except for results obtained at the Nevada Test Site (the largest proportional difference) and the Hanford Site (the largest difference in numbers of individuals), as shown in Table L-6. The range in results for both locations is due to the different aggregations of the demographic data used (census tracts vs. blocks), and the differences in the methods used to account for the populations of tracts or groups lying only partly within the area being analyzed, as discussed above. For example, both sites are located in rural or sparsely populated regions so that census tracts surrounding the sites are relatively large in geographical area. In addition, the outskirts of Las Vegas, Nevada, begin approximately 80 kilometers (50 miles) from the Nevada Test Site, making the analysis particularly sensitive to differences in treatment of census tracts or block groups that lie partly within a circle of 80-kilometer (50-mile) radius centered at that site. Most areas within the zone of impact of the Nevada Test Site are restricted access and unpopulated lands.

As a result of the different definitions used for the identification of low-income populations, the results of these analyses are markedly different, as shown in Table L-7. Both sets of data are correct. They reflect the fact that different definitions and assumptions can result in different characterizations of low-income populations.

Figure L-20. Low-income population distribution within 80 kilometers (50 meters) of the Nevada Test Site.

<table>
<thead>
<tr>
<th>Candidate interim storage site</th>
<th>Total individuals residing within 80 kilometers (50 miles)</th>
<th>Minority individuals residing within 80 kilometers (50 miles)</th>
<th>Percentage of minority individuals residing within 80 kilometers (50 miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SNF &amp; INEL EIS (individuals)</td>
<td>Draft FRR SNF EIS (individuals)</td>
<td>SNF &amp; INEL EIS (individuals)</td>
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<tr>
<td>Hanford Site</td>
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<td>75,381</td>
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<td>Idaho National Engineering Laboratory</td>
<td>172,366</td>
<td>176,311</td>
<td>11,722</td>
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<td>Savannah River Site</td>
<td>619,959</td>
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<td>233,955</td>
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<tr>
<td>Nevada Test Site</td>
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<tr>
<td>Oak Ridge Reservation</td>
<td>867,231</td>
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</table>


<table>
<thead>
<tr>
<th>Candidate interim storage site</th>
<th>Total population residing within 80 kilometers (50 miles)</th>
<th>Low-income group residing within 80 kilometers (50 miles)</th>
<th>Percentage of low-income group residing within 80 kilometers (50 miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SNF &amp; INEL EIS (individuals)</td>
<td>Draft FRR SNF EIS (individuals)</td>
<td>SNF &amp; INEL EIS (households)</td>
</tr>
<tr>
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<td>Oak Ridge Reservation</td>
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<td>134,661</td>
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</table>

### L-4 ENVIRONMENTAL JUSTICE ASSESSMENT

This assessment of potential environmental justice impacts addresses activities associated with the programmatic management of DOE SNF discussed in this EIS.

#### L-4.1 Methodology and Definitions

Analysis of environmental justice concerns was based on a qualitative assessment of the impacts reported in Section 5 of Volume 1 of the EIS regarding the proposed action and its alternatives. This analysis was performed to identify any disproportionately high and adverse human health or environmental impacts on minority populations or low-income populations surrounding each of the 10 candidate sites.

For this assessment, the following definitions were used:

- Disproportionately high and adverse human health effects: Adverse health effects are measured in risks and rates that could result in latent cancer fatalities, as well as other fatal or nonfatal adverse impacts to human health. Disproportionately high and adverse human health effects occur when the risk or rate for a minority population or low-income population from exposure to an environmental hazard significantly exceeds the risk or rate to the general population and, where available, to another appropriate comparison group.

- Disproportionately high and adverse environmental impacts: An adverse environmental impact is a deleterious environmental impact determined to be unacceptable or above generally accepted norms. A disproportionately high impact refers to an impact (or risk of an impact) in a low-income or minority community that significantly exceeds that on the larger community. In assessing cultural and aesthetic environmental impacts, account shall be taken of impacts that uniquely affect geographically dislocated or dispersed low-income or minority populations.

In this assessment, DOE reviewed the human health effects and environmental impacts associated with the siting of the alternatives analyzed in Volume 1 of this EIS. This review included potential impacts arising under each of the major disciplines evaluated for the alternatives, including land use, socioeconomic, water resources, air resources, ecology, health and safety, facility operations, cultural resources, and transportation, which are the sciences pertinent to the identification of environmental impacts in the EIS. Regarding health effects, both normal facility operations and accident conditions were examined, with accident scenarios evaluated in terms of the risk to the public. Likewise, the examination of transportation included both normal and potential accident conditions for both truck and rail transportation of DOE SNF. Special exposure pathways were evaluated with respect to subsistence consumption of fish, game, or native plants.
L-4.2 Results

Potential radiological impacts because of both facility operations and reasonably foreseeable accident conditions are small for all management alternatives and potential sites considered in this EIS. Likewise, the number of potential fatalities due to both radiological and nonradiological exposures to truck or rail transportation are small. There is also little probability of adverse impacts because of subsistence consumption of fish, game, or native plants.

L-4.2.1 Results of Environmental Justice Assessment Near the Alternative Sites Considered for the Management of Naval Spent Nuclear Fuel Only

The five sites evaluated for the management of naval SNF only are specifically addressed in Appendix D to Volume I of the EIS. Additional environmental justice matters pertaining to the naval sites are included in Appendix D. It should be noted, with one exception, these five alternative sites are only considered for storage of naval SNF under the No Action and Decentralization alternatives. The one exception is the partial examination of naval SNF at the Puget Sound Naval Shipyard under Decentralization alternative 2B. Under all other alternatives, these five sites would transport naval SNF to one or several of the larger five DOE sites analyzed in this EIS, and evaluated from an environmental justice perspective in Section L-4.2.2.

L-4.2.1.1 Incident-Free Human Health Effects and Environmental Impacts. As discussed in Appendix D to Volume I of this EIS, the impacts on human health or the environment resulting from operations associated with the management of naval SNF at any of the five locations limited to the storage of naval SNF would be small under any of the alternatives considered. This includes the impacts of incident-free transportation. For example, it is unlikely that a single fatal cancer would occur as a result of naval SNF management activities under any alternative at any one of the five sites. Also, it is unlikely that a single fatal cancer would occur as a result of activities associated with naval SNF examination under any alternative considered in the EIS. In fact, naval SNF could be managed at any of the five sites for between 7,100 and 43,500 years (depending on the site) before a single fatal cancer would be expected. Because the impacts as a result of incident-free operations present no significant risk and do not constitute a reasonably foreseeable adverse impact to the surrounding population, no disproportionately high and adverse effects would be expected for any particular segment of the population, minority populations and low-income populations included (see Tables L-2 and L-4).

L-4.2.1.2 Human Health Effects and Environmental Impacts Because of Accidents. As discussed in Appendix D, the impacts on human health and the environment resulting from the risk of facility or transportation accidents at any of the five locations limited to the storage of naval SNF would be small under any of the alternatives considered. As explained in the EIS, the risk to the public is defined as the potential consequence of an accident multiplied by its probability of occurrence. This risk calculation represents the expected impact to members of the public. Based on this risk calculation, it is unlikely that a single fatal cancer would occur from reasonably foreseeable facility or transportation accidents related to naval SNF management activities under any of the alternatives. Because the potential impacts as a result of an accident for any of the alternatives considered would present no significant risk and do not constitute a reasonably foreseeable adverse impact to the surrounding population, no disproportionately high and adverse effects would be expected for any particular segment of the population, minority populations and low-income populations included (see Tables L-2 and L-4).

L-4.2.1.3 Effects of Natural Motive Forces. Impact analysis indicates that there would not be disproportionately high and adverse impacts on human health and the environment resulting from the prevailing winds or the direction of surface or subsurface water flow. This is true for site operations because the effects of routine operations on air and water quality are so small. It is also true for accident conditions because the consequences of any accident, however unlikely its chance of occurrence, would depend on the random conditions at the time it occurred. The wind conditions at the Pearl Harbor Naval Shipyard are variable, but the predominant wind direction is toward the southwest, away from land and residential areas. The wind directions at the other four sites are highly variable with no strongly dominant direction.

L-4.2.1.4 Effects on Subsistence Consumption of Fish and Wildlife. Available data do not show potential for disproportionately high and adverse impacts to minority and low-income communities related to subsistence consumption of fish and wildlife in the vicinity of these five sites under any alternative. Environmental monitoring in the vicinity of these relatively small and restricted sites has shown no detectable difference in the amounts of radionuclides present in the environment from levels in similar parts of their respective regions.

L-4.2.2 Results of Environmental Justice Assessment Near the Alternative Sites Considered for the Management of All or Some Portion of DOE Spent Nuclear Fuel

The five sites evaluated for the management of all or some portion of DOE SNF are specifically addressed in Appendices A (Hanford Site), B (Idaho National Engineering Laboratory), C (Savannah River Site), and F (Nevada Test Site and the Oak Ridge Reservation) to Volume I of the EIS. It should be noted that these five alternative sites are considered for the management of DOE SNF under all alternatives analyzed in this EIS. The one exception is the Nevada Test Site, which is currently managed at that site.

L-4.2.2.1 Facility Operations. This EIS considers the impacts from the operations of both existing and new facilities on a site-by-site basis as appropriate for programmatic decisionmaking. Site-specific implementation of the programmatic strategy for the management of SNF for the 40-year interim period between 1995 and 2035 will be subject to additional National Environmental Policy Act review, as appropriate on a case-by-case basis. Both incident-free operations and reasonably
foreseeable accidents were analyzed in terms of risk to both workers and the public. The potential impacts calculated for both incident-free operations and the risk of reasonably foreseeable accidents present no significant risk and do not constitute a reasonably foreseeable adverse impact to the surrounding population as discussed below. Therefore, no disproportionately high and adverse effects would be expected for any particular segment of the population, minority populations and low-income populations included.

L-4.2.2.1.1 Incident-Free Operations—In Table K-2 of Volume I of this EIS, it is shown that under all the alternatives, the estimated number of latent cancer fatalities from the normal operation of DOE SNF management facilities would range from approximately zero to about two latent cancer fatalities over the 40 year period, or about 0.05 latent cancer fatalities per year. Therefore, no disproportionately high and adverse effects would be expected for any particular segment of the population, minority populations and low-income populations included (see Tables L-3 and L-5).

L-4.2.2.1.2 Reasonably Foreseeable Accidents—As explained in Section 5.1.1.4 of this EIS, the risk to the public is defined as the potential consequence multiplied by the probability of occurrence. This risk calculation represents the expected impact to members of the public. The calculated risk of latent cancer fatalities associated with reasonably foreseeable facility accidents is small for all alternatives. The evaluated facility accident with the highest risk (breach of a fuel assembly for the Centralization alternative at the Savannah River Site) would result in an estimated 0.0072 latent cancer fatality per year, which equates to one fatal cancer in 140 years of operation. Impacts from high-consequence, low-probability accident scenarios would be adverse should they occur; however, the impacts to specific population locations would be subject to meteorological conditions on the day of the accident. Whether or not such impacts would have disproportionately high and adverse effects with respect to any particular segment of the population, minority and low-income populations included, would be subject to natural motive forces, including random meteorological factors (see Tables L-3 and L-5).

L-4.2.2.1.3 Natural Motive Forces—Offsite health effect impacts from operations and reasonably foreseeable accidents are propagated by natural motive forces such as meteorological conditions and water pathways, both surface and subsurface. Impacts because of incident-free operations are dominated by prevailing patterns in these natural motive forces, whereas the impacts of an accident, should one occur, would be random based on the meteorological conditions at the time of and following occurrence. The following conditions are prevalent at each of the five large DOE sites under consideration:

- Prevailing winds for the Idaho National Engineering Laboratory are primarily from the southwest, although winds at the Test Area North are frequently from the north and west-northeast. Local rivers and streams drain mountain watersheds to the north and west of the Idaho National Engineering Laboratory, but most surface water is diverted for irrigation before it reaches the site boundaries. Groundwater in the underlying Snake River Plain Aquifer generally flows to the south and southwest (see Figures L-8 and L-18).

- Prevailing wind conditions at the Savannah River Site are from the northeast and west-southwest. Both onsite surface streams and groundwater aquifers generally drain in a southwesterly direction, toward the Savannah River, which flows southeast to Savannah, Georgia (see Figures L-6 and L-16).

- The prevailing wind direction at the Oak Ridge Reservation is from the southwest, with a secondary pattern from the northeast during the winter, spring, and summer months. The situation is reversed in the fall. Surface and shallow subsurface water in an area susceptible to the potential siting of SNF management facilities would flow south into Grassy Creek and then to the Clinch River. The Clinch River flows southwest and west around the reservation and subsequently to the Tennessee River. Deeper groundwater tends to remain relatively stationary because of high retention times (see Figures L-7 and L-17).

- Prevailing winds at the Nevada Test Site are from the south during the summer and the north during the winter. Surface topography usually results in a wind reversal from the south in the day to the north during the night. Almost all surface water is transient and short-lived in nature. In an area susceptible to the siting of SNF management facilities, surface water would flow east towards Frenchman Lake, where it would be lost by evaporation or recharge to the local groundwater system which discharges to the southwest. Water discharged beneath the site would likely either evaporate or remain indefinitely because of the great depth of the groundwater at the site (see Figures L-10 and L-20).

- Prevailing winds at the area of interest on the Hanford Site are from the northeast in all months of the year, with the second predominant pattern occurring from the southwest, primarily during the spring and fall. Roughly two-thirds of any surface water runoff would drain to the Columbia River, with the rest draining to the Yakima River and joining the Colombia River below the Hanford Site. Groundwater systems underlying the Hanford Site tend to flow toward the Columbia River in a southeast and northeast direction (see Figures L-9 and L-19).

As indicated in Appendix K of this EIS, the risk of impacts from incident-free routine operations and from reasonably foreseeable accidents is so small that the propagation by motive forces is essentially of no consequence.
L-4.2.2.2 Transportation. Transportation corridors associated with shipment of SNF management by either truck or rail can be classified as roughly 80 percent rural, 17 percent suburban, and 3 percent urban. Specific details of mileage and percentages by route are contained in Table I-1 of Appendix I to Volume 1 of the EIS.

L-4.2.2.2.1 Incident-Free Transportation—For incident-free transportation, the total number of potential fatalities would be the sum of the health effects because of exposure to radiation and vehicular emissions. The total number of shipments over the 40-year period would vary from about 200 during the transition period for naval SNF under the No Action alternative to about 7,400 shipments if all of DOE’s SNF were managed at the Nevada Test Site under the Centralization alternative. The DOE’s preferred alternative would result in a total of approximately 3,700 shipments among the sites. The estimated total latent cancer fatalities resulting from incident-free transportation is less than two under the maximum shipment (Centralization) alternative, while the preferred alternative results in less than one fatality.

L-4.2.2.2.2 Transportation Accidents—It is worth noting that the risk of fatalities associated with vehicular accidents during the transport of SNF is higher than the risk of cancer caused by radiation exposure because of such accidents, although both are very small. Also, the risks associated with radiation because of transportation accidents is even less than the small risk associated with facility accidents. The reasonably foreseeable transportation accident scenario with the largest consequences (SNF rail shipment accident occurring in an urban area) would lead to 55 latent cancer fatalities; however, the probability of this scenario occurring is about 1 in 10 million. The overall risk (probability multiplied by consequence) of all accidents analyzed, including the above scenario, over the total 40-year timeframe analyzed is much less than one fatality. Over this 40-year timeframe, up to two fatalities could result from vehicular traffic accidents themselves without any radiological releases. When and where an accident occurred, if one in fact occurred, would be completely random with respect to the immediate and surrounding population, as well as the motive forces that could propagate the impacts during the timeframe of occurrence. Although adverse impacts could occur in the unlikely event of a high-consequence accident, any potential disproportionality with respect to any population, minority and low-income populations included, is subject to the randomness of the combination of factors that can produce such impacts.

L-4.2.2.3 Subsistence Consumption of Fish, Wildlife, or Native Plants. The calculations in this EIS estimate dose and risk from ingestion of radioactive materials based on site-specific agricultural data and assume a typical dietary pattern. Subsistence consumption of fish, wildlife, and native plant species is not explicitly addressed in these analyses. However, the calculations in this EIS include several conservative assumptions that bound the potential for ingestion of radioactivity through these special exposure pathways. In particular, these calculations assume that a very high proportion of the diet is based on locally grown produce and locally grazed livestock, both of which are produced at locations representing the highest calculated concentrations of radioactivity. Nevertheless, there may be some differences between the uptakes of grazed livestock and free-ranging game. No human populations in the immediate vicinity of the any of the five DOE sites are known to subsist entirely on locally harvested fish or wildlife. Fishing is not usually allowed on DOE sites, but some hunting is allowed under controlled conditions.

Game species, locally grazed livestock, fish, locally grown foodstuffs, and native plants around DOE sites are routinely sampled for radionuclides. Concentrations of radionuclides in samples have generally been small, and are seldom elevated above those observed at locations dista from these sites where the principal source of non-natural radionuclides is very small amounts of residual global fallout from past nuclear weapons tests. Data from monitoring programs are reported annually in site-specific environmental reports.

If SNF management activities were to increase wildlife losses because of vehicle collisions with game, there might be a disproportionate impact to minority or low-income communities that rely primarily on hunted game. However, the maximum potential increases in shipments of SNF would be small additions to current rail and highway traffic, so the overall impact to wildlife would be small. Potential mitigation measures for any resulting adverse impact to low-income or minority populations include distributing the deceased animals to hunters in the vicinity known to partially subsist on game, controlling subsequent hunts, or relocating game if necessary.

L-4.2.2.4 Other Considerations. In addition to the above, reviews of other technical disciplines pursuant to the methodology in Section 4.1 did not indicate any significant adverse impacts because of land use, socioeconomics, water and air resources, ecology, cultural resources, or cumulative impacts. Therefore, no disproportionately high and adverse impacts were identified for any segment of the population. Of particular interest are the following:

L-4.2.2.4.1 Socioeconomics—Depending upon the various alternative evaluated, the total labor force involved in SNF management could decrease by up to 180 jobs or increase by more than 2,100 jobs averaged over the 10-year implementation period between 1995 and 2005. Affirmative action programs would distribute such effects proportionately among workers, whereas coordination of planning activities with local communities would be intended to avoid placing undue burdens on local community resources. DOE may also provide support to local agencies if necessary to mitigate localized impacts.

L-4.2.2.4.2 Land Use, Ecology, and Cultural Resources—None of the alternatives would have a significant adverse impact on land use, ecology, and cultural resources because of the limited amount of previously undisturbed land which would be needed for use onsite (no offsite lands are involved) and mitigative programs already in place. These programs include working closely under agreements with State Historical Preservation Officers and Tribal governments regarding preservation of historic and cultural resources. Consultations with Tribal governments have expanded the DOE’s awareness of Tribal interests and values with respect to nature, religion, and the land, and are designed to avoid or relocate these resources as possible. If avoidance were not
possible, data recovery (such as archiving artifacts) or other mitigation measures may be developed in consultation with affected Tribes and the respective State Historical Preservation Officer, as appropriate. Similarly, the DOE is aware of sensitive ecological resources, and avoids wetlands and endangered plant or animal species habitats. Disturbance of certain ecological resources (which are not federally listed as threatened or endangered) is possible, but not likely. The reasonably foreseeable environmental impacts, if any, to land use, ecological resources, or cultural resources are expected to be small under any of the alternatives.

**L-4.2.4.3 Cumulative Impacts**—Based on the analysis of the impacts for each of the disciplines analyzed in this EIS, along with the impact of other past, present, and reasonably foreseeable future activities at each of the alternative sites, no reasonably foreseeable cumulative adverse impacts are expected to the surrounding populations, minority populations and low-income populations included (see Tables L-2 through L-5).

**L-4.2.5 Impacts Because of Perception.** Potential adverse impacts may result from the public's perception of risk associated with nuclear industry activities in general and DOE's activities in particular. For example, a SNF management facility has the potential to increase awareness of the nuclear industry, leading to concerns of potential adverse effects to the conduct of local commerce, whether it be tourism, agriculture, or the like. From both a National Environmental Policy Act and an environmental justice perspective, both the character and substance of these potential impacts is not discernable. Therefore, it is not possible to identify any quantifiably adverse or disproportionately high distribution of any impacts of such perceived risk.

In order to better understand and help mitigate unfounded perceptions, the DOE is working to enhance the general population's understanding of the potential impacts of DOE programs in general and the proposed action in particular, with emphasis on minority populations, low-income groups, and Tribal governments.

**L-4.2.3 Perspective**

To place the impacts in perspective with respect to risks encountered in everyday life, in 1990, there were approximately 510,000 cancer deaths in the United States population, of which about 64,000 were among the nonwhite population. This equates to an average of roughly 1,132 cancer fatalities (of which 142 would affect minority populations) in an area comparable to that included in the 80 kilometer (50 mile) radius around any of the sites considered in this EIS. Additionally, in 1992, there were about 40,000 traffic fatalities in the United States, of which about 7,400 were among the non-white population. This equates to an average of roughly 89 traffic fatalities (of which 16 would affect minority populations) in an area comparable to that included in the 80-kilometer (50-mile) radius around any of these sites. Based on the risk of additional fatalities provided in Sections L-4.2.1, L-4.2.2.1.2, and L-4.2.2.2.2, the risk to the surrounding population
L-5 CONCLUSIONS

The overall review indicated that the potential impacts calculated for each discipline under each of the alternative sites considered for the management of all or some portion of DOE SNF (or naval SNF only) present no significant risk and do not constitute a reasonably foreseeable adverse impact to the surrounding population. Therefore, the impacts of the programmatic management of DOE SNF under all alternatives evaluated in this EIS do not constitute a disproportionately high and adverse impact on any particular segment of the population, minorities or low-income communities included, and thus do not present an environmental justice concern.

The approach to evaluating environmental justice used in this EIS may differ from future guidance issued by the Interagency Working Group or the DOE. Nevertheless, as demonstrated by the different approaches discussed in Section L-3.5, the conclusions are not expected to change because the impacts resulting from the proposed action under all alternatives present no significant risk to the potentially affected populations. As a result, no disproportionately high and adverse effects would be expected for any particular segment of the populations, including minority populations and low-income populations.

L-6 REFERENCES


