APPENDIX J
ENVIRONMENTAL JUSTICE

This appendix provides an assessment of the potential for disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from implementation of the alternatives described in Chapter 2 of this *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington*.

J.1 INTRODUCTION

Environmental justice is defined as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group[s,] should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies" (EPA 1998).

The purpose of this appendix is to identify the various populations that could be affected by U.S. Department of Energy (DOE)–proposed actions at the Hanford Site (Hanford) and Idaho National Laboratory (INL), and to present a comparison of the impacts on subpopulations with potential for environmental justice concerns to the impacts on the remainder of the population to identify any disproportionately high and adverse impacts under the alternatives evaluated in this *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington (TC & WM EIS)*.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority populations and low-income populations.

The Council on Environmental Quality (CEQ) has oversight responsibility for documentation prepared in compliance with the National Environmental Policy Act (NEPA). In December 1997, the CEQ released its guidance for analyzing environmental justice issues under NEPA (CEQ 1997). The CEQ guidance was adopted as the basis for analysis of environmental justice in this environmental impact statement (EIS).

J.2 DEFINITIONS

J.2.1 Minority Individuals and Populations

The following definitions of minority individuals and populations were used in this analysis of environmental justice:

Minority individuals. Individuals who are members of the following population groups: Hispanic or Latino, American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, Some Other Race, or two or more races. This definition is similar to that given in the CEQ environmental justice guidance (CEQ 1997), except that it has been modified to reflect "Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity" (62 FR 58782) and recent guidance published by the Office of Management and Budget. These revisions were adopted and used by the U.S. Census Bureau (Census Bureau) in collecting data for the 2000 census (OMB 2000). When data from the 1990 census are used, a minority individual is defined as someone self-identified as: Hispanic; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; or Black. As discussed below, racial and ethnic data from the 1990 census cannot be directly compared with that from the 2000 census.

The Office of Management and Budget also recommends counting a person self-identified as multiracial as a minority individual if at least one of the races is a minority race (OMB 2000). During the 2010 census, approximately 3 percent of the population identified themselves as members of more than one race, and 92 percent of that population reported exactly two races. The largest multiple-race combination was the White and Black or African American population, accounting for approximately 20 percent of the population reporting two or more races (Humes, Jones, and Ramirez 2011).

Minority populations. Minority populations should be identified where either (1) the minority population of the affected area exceeds 50 percent of the total population or (2) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. For analysis purposes, "meaningfully greater" is defined in this *TC & WM EIS* as 20 percentage points greater than the comparable population in the general population. In identifying minority populations, agencies may consider a population as either a group of individuals living in geographic proximity to one another or a geographically dispersed and transient set of individuals (such as migrant workers or American Indians/Alaska Natives), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction or a neighborhood, census tract, or other similar unit that is chosen to avoid artificially diluting or inflating the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds.

Data for the analysis of minority populations in this *TC & WM EIS* were extracted from the *2010 Decennial Census, Summary File 1*, Table P5, Hispanic or Latino Origin by Race (Census 2011a). The CEQ guidance recommends that impacts on the minority population be examined, as well as impacts specific to American Indian tribes (CEQ 1997). Because the area has a large Hispanic population, this EIS also examines impacts on that specific population.

In the discussions of environmental justice in this *TC & WM EIS*, people who designated themselves as Hispanic or Latino are included in the total Hispanic population, regardless of race. For example, the Asian population is composed of people self-designated as Asian regardless of whether they indicated Hispanic or Latino origin. Asians who designated themselves as having Hispanic or Latino origins are also included in the total Hispanic population.

J.2.2 Low-Income Populations and Individuals

Executive Order 12898 specifically addresses disproportionately high and adverse effects on low-income populations. The CEQ recommends that poverty thresholds be used to identify low-income individuals (CEQ 1997).

The following definition of low-income population was used in this analysis:

"Low-income population: Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another or a set of individuals (such as migrant workers or American Indians), where either type of group experiences common conditions of environmental exposure or effect" (CEQ 1997).

Thresholds used by the Census Bureau to identify low-income individuals during the 2010 census are published in the Census Bureau's Current Population Reports, Consumer Income, Series P60-239, *Income, Poverty, and Health Insurance Coverage in the United States: 2010* (DeNavas-Walt, Proctor, and

Smith 2011). Low-income population estimates generated from the American Community Survey (ACS) period estimates (multiyear samples) use annual poverty thresholds adjusted for increases in costs of living as reflected in the Consumer Price Index (CPI) for all urban consumers published by the Bureau of Labor Statistics (Census 2011b).

Data for the analysis of low-income populations were extracted from *2006–2010 American Community Survey 5-Year Estimates*, Table C17002, Ratio of Income to Poverty in the Past 12 Months (Census 2011c). The ACS 5-year estimates are the only data sets currently published by the Census Bureau that provide current population data relative to income and poverty at the block-group level of geography. The geographic boundaries used in the 2006–2010 ACS 5-year estimates are the same as those used during the 2010 census (Census 2011d). Unlike the data from the analysis of minority populations, data relative to income are generated from a smaller sample universe (i.e., the population for whom poverty status is determined).

J.2.3 Disproportionately High and Adverse Human Health Effects

Adverse health effects are measured in risks and rates that could result in latent cancer fatalities (LCFs), as well as other fatal or nonfatal adverse impacts on human health. Adverse health effects may include bodily impairment, infirmity, illness, or death. Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority or low-income population is significant (as defined by NEPA) and appreciably exceeds the risk or exposure rate for the general population or another appropriate comparison group (CEQ 1997).

J.2.4 Disproportionately High and Adverse Environmental Effects

A "disproportionately high environmental impact" refers to an impact or the risk of an impact on the natural or physical environment in a low-income or minority population that is significant (as defined by NEPA) or appreciably exceeds the environmental impact on the larger population. Such effects may include ecological, cultural, human health, economic, or social impacts. An adverse environmental impact is an impact that is determined to be both harmful and significant (as defined by NEPA). In assessing cultural and aesthetic environmental impacts, impacts that uniquely affect geographically dislocated or dispersed minority or low-income populations, including American Indian tribes, are also considered (CEQ 1997).

J.3 SPATIAL RESOLUTION

For the purposes of enumeration and analysis, the Census Bureau has defined a variety of areal units. Areal units of concern in this document include (in order of increasing spatial resolution) states, counties, census tracts, block groups, and blocks. The block is the smallest geographic entity for which the Census Bureau collects and tabulates data and, therefore, offers the finest spatial resolution. This term refers to a relatively small geographical area bounded on all sides by visible features such as streets or streams or by invisible boundaries such as city limits and property lines. During the 2010 census, the Census Bureau subdivided the United States and its territories into 11,078,297 blocks (Census 2011e). For comparison, the number of counties, census tracts, and block groups used in the 2010 census were 3,143; 73,057; and 217,740; respectively. While blocks offer the finest spatial resolution, economic data required for the identification of low-income populations are not available at the block level of spatial resolution. In the analysis discussed in the following paragraphs, block-group-level resolution was used to identify minority and low-income populations. The Census Bureau's ACS 5-year estimates are the only data sets currently published that provide current data relative to income at the block-group level of spatial resolution. This data set is a replacement for the Census Bureau's Summary File 3, which has historically provided sample data from the decennial census long form. The 2010 census questionnaire contained no long form and no

sample data, as all sample data have been transitioned to the ACS. The geographic boundaries used in the 2006–2010 ACS 5-year estimates are the same as those used during the 2010 census (Census 2011d).

During preparation of this *TC & WM EIS*, consequences and risks from normal operations and accidents were evaluated for the following potential release locations at Hanford: the Supplemental Treatment Technology Sites in the 200-East and 200-West Areas (STTS-East and STTS-West), the Waste Treatment Plant (WTP) in the 200-East Area, and the Fast Flux Test Facility (FFTF) in the 400 Area. The location of the WTP is approximately 600 meters (1,979 feet) northeast of STTS-East. Potential release locations at INL, including the Materials and Fuels Complex (MFC) and the Idaho Nuclear Technology and Engineering Center (INTEC), were also evaluated. In the analysis of health impacts of normal operations and accidents, all persons living within 80 kilometers (50 miles) of these facilities were assumed to be potentially affected. The same 80-kilometer (50-mile) regions of influence were used in this analysis of environmental justice to identify potentially affected minority and low-income populations.

In general, the boundary of a circle with an 80-kilometer (50-mile) radius centered on a facility site would not coincide with boundaries used by the Census Bureau for enumeration of the population in the potentially affected area. Some block groups lie completely inside or outside of the radius used for health effects calculation, while others are only partially included. As a result of these partial inclusions, uncertainties were introduced into the estimate of the potentially affected population.

To estimate the populations in the partially included block groups, it was assumed that populations are uniformly distributed throughout the area of each block group. For example, if 30 percent of the area of a block group lies within 80 kilometers (50 miles) of the facility site, it was assumed that 30 percent of the population residing in that block group would be potentially affected.

J.4 MAP DEVELOPMENT

The geographic information system (GIS) statistics maps and diagrams provided in Chapter 3 of this *TC & WM EIS* and Section J.5 were developed using ArcMap 9.3.1 and ArcMap 10. These programs allow standard base maps to be projected in a variety of projection systems. In this document, maps and diagrams were developed using the North American Standard 1983 projection. Standard GIS geospatially attributed data sets, known as shapefiles, were downloaded from two public access websites: the Census Bureau, http://www.census.gov,[1] and the Environmental Systems Research Institute, http://www.esri.com/data/download/census2000_tigerline/index.html.[2]

The downloaded shapefiles were reprojected to the North American Standard 1983 projection to prevent potential data misalignment. Additional shapefiles either were developed as necessary using the above-referenced ArcMap software and actual geographic coordinates (e.g., the facility sites) or were provided by Hanford personnel to show specific site landmarks (e.g., the fence lines of limited-access areas).

Each shapefile stores nontopological geometry and tabular attribute information for spatial features (point, line, or polygon) in a data set. The geometry for a feature is stored as a shape comprising a set of vector coordinates; the attributes, as tabular files in dBASE® format. Each feature in the shapefile represents a single geographic feature and its attributes; that is, each shape record has a one-to-one relationship with an attribute record. Maps and diagrams were developed by importing all shapefiles into the Hanford GIS project. The development of each map involved different combinations of the shapefiles to visually display data on a standard base map of Idaho, Oregon, and Washington.

[1] Block Data, Block Group Data, Key Geographical Locations, Landmark Locations, Hydrography, Railroads, County Roads, Federal Lands.

[2] Data for Washington and Oregon.

J.5 ENVIRONMENTAL JUSTICE ANALYSIS

This analysis of environmental justice is based on assessment of the impacts reported in Chapter 4. This analysis was performed to identify any disproportionately high and adverse human health or environmental impacts on minority or low-income populations surrounding the facility sites. Demographic information obtained from the Census Bureau was used to identify the minority and low-income populations surrounding these sites (Census 2011a, 2011c). Consistent with CEQ guidance, minority and low-income populations were identified where the percentage of either of those populations in the impacted areas was "meaningfully greater" than those percentages in other reasonable geographic areas of comparison, defined here as the potentially affected counties and states in which the impacted areas are located. While this analysis is based on CEQ guidance, CEQ does not provide numerical (percentage point) guidance; however, the U.S. Nuclear Regulatory Commission, when identifying minority and low-income populations, defines "significantly," similar to "meaningfully greater," as 20 percentage points and that percentage point guidance definition is used in this *TC & WM EIS* (69 FR 52040), as discussed in Section J.2.1. Therefore, minority and low-income populations are identified where the total minority or low-income population in the impacted area exceeds that population county- or statewide percentage by 20 percentage points, or where either the minority or low-income population is more than 50 percent of the general population in the impacted area. Table J–1 displays the thresholds used to determine meaningfully greater minority and low-income populations.

Table J–1. Thresholds for Identifying Meaningfully Greater Minority and Low-Income Populations

Site	Minority (percentage of the general population)	Low-Income (percentage of the general population)
Hanford Site	45.3	32.8
Idaho National Laboratory	36.0	33.6

Chapter 3, Sections 3.2.11 and 3.3.11, discusses the affected environment to be included in the environmental justice analysis. Potentially affected minority and low-income populations are shown graphically within each facility site's 80-kilometer (50-mile) region of influence (see Section J.3). Tables show the potentially affected populations by county, as well as the percentage of the minority or low-income population considered to be potentially affected. In addition, figures are presented that identify minority and low-income populations by block group, and graphs showing cumulative populations by distance are used to visually locate concentrations of minority and low-income populations.

J.5.1 Minority and Low-Income Populations Surrounding the 200-West Area Supplemental Treatment Technology Site

Figure J–1 shows minority and nonminority populations living in block groups surrounding STTS-West. There are 406 block groups within the 80-kilometer (50-mile) potentially affected radius. Out of these block groups, 145 were determined to contain meaningfully greater minority populations. The potentially affected counties include eight counties in the state of Washington (Adams, Benton, Franklin, Grant, Kittitas, Klickitat, Walla Walla, and Yakima) and two counties in Oregon (Morrow and Umatilla). As indicated in Table J–2, approximately 46 percent of the potentially affected minority population resides in Yakima County, and about 92 percent of the potentially affected minority population lives in four Washington counties: Benton, Franklin, Grant, and the city of Yakima.

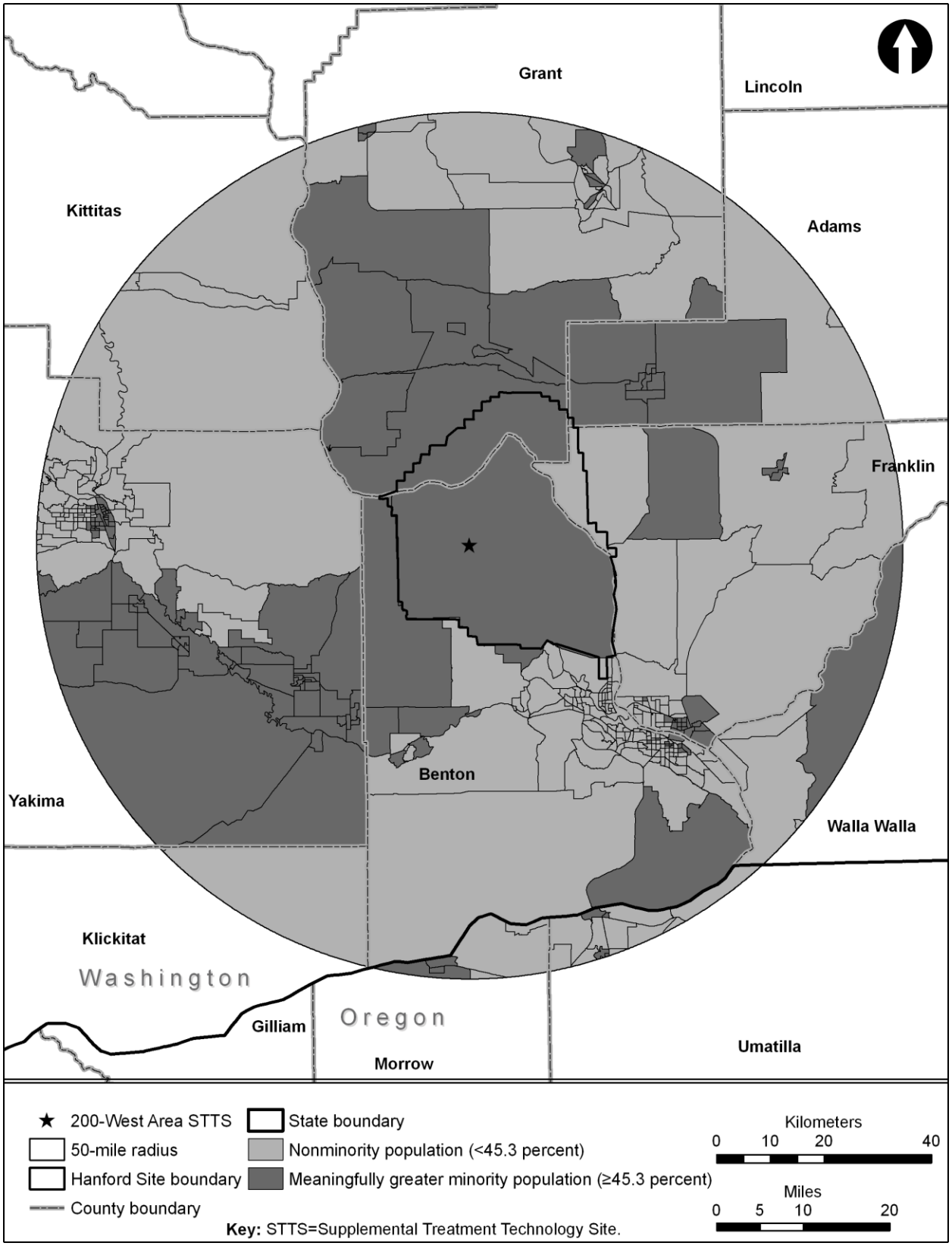

Figure J–1. Meaningfully Greater Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the 200-West Area Supplemental Treatment Technology Site

Table J–2. Minority Populations Living in Potentially Affected Counties Surrounding the 200-West Area Supplemental Treatment Technology Site

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population[b]	Potentially Affected Minority Population[b]	Percentage of the Potentially Affected Minority Population Total
Adams (Washington)	18,728	11,466	14,849	11,086	4.2
Benton (Washington)	175,177	44,740	175,177	44,740	16.9
Franklin (Washington)	78,163	44,359	77,906	44,334	16.8
Grant (Washington)	89,120	38,054	67,967	33,424	12.6
Kittitas (Washington)	40,915	5,701	4,568	493	0.2
Klickitat (Washington)	20,318	3,296	281	86	0.0
Walla Walla (Washington)	58,781	15,177	4,153	939	0.4
Yakima (Washington)	243,231	127,207	223,657	120,502	45.6
Morrow (Oregon)	11,173	3,955	6,306	2,737	1.0
Umatilla (Oregon)	75,889	23,198	14,811	6,147	2.3
Total	**811,495**	**317,153**	**589,674**	**264,489**	**100.0**

[a] Census 2011a.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.2.11.1.2, due to rounding.

Figures J–2 and J–3 show cumulative minority populations as a function of distance from STTS-West. Values along the vertical axes of these figures show minority populations living within a given distance from STTS-West. Moving outward from the facilities, the cumulative minority populations increase sharply starting at the outskirts of the population centers of Richland, Kennewick/Pasco, and the city of Yakima. Approximately 18 percent of the potentially affected minority population lives within about 40 kilometers (25 miles) of the facility, and 57 percent resides within about 56 kilometers (35 miles). The potentially affected total minority population surrounding STTS-West is approximately 264,000 persons, accounting for approximately 45 percent of the total potentially affected population of approximately 590,000 persons. Approximately 86 percent of the minority population surrounding STTS-West is Hispanic or Latino.

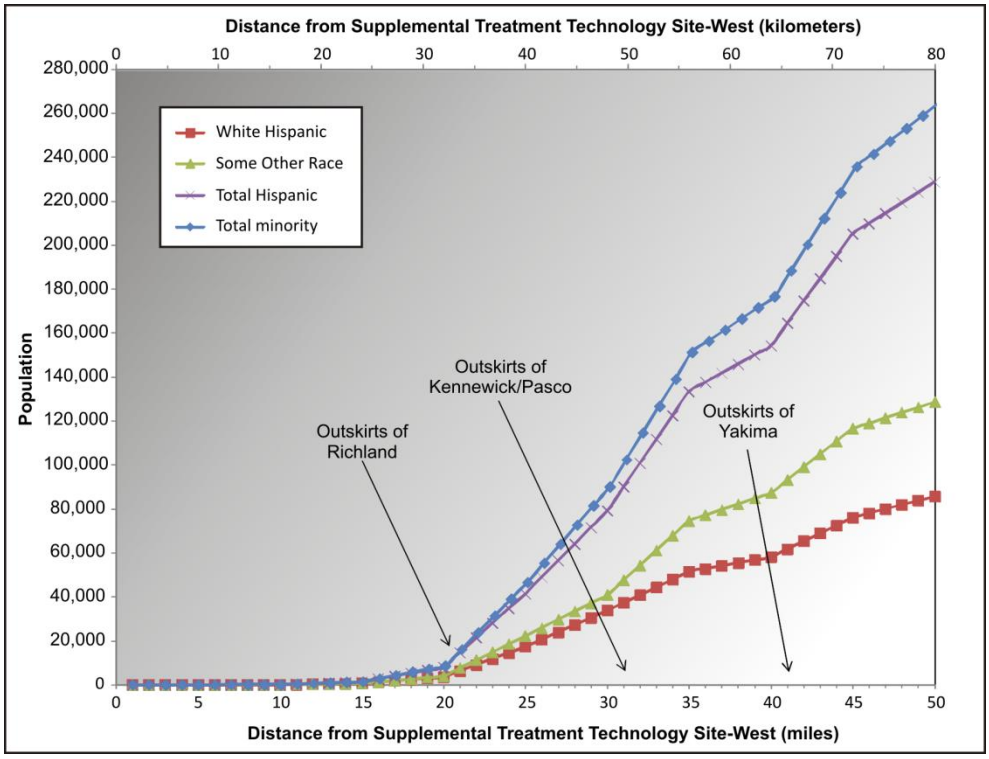

Figure J–2. Cumulative Larger-Scale Minority Populations as a Function of Distance from the 200-West Area Supplemental Treatment Technology Site

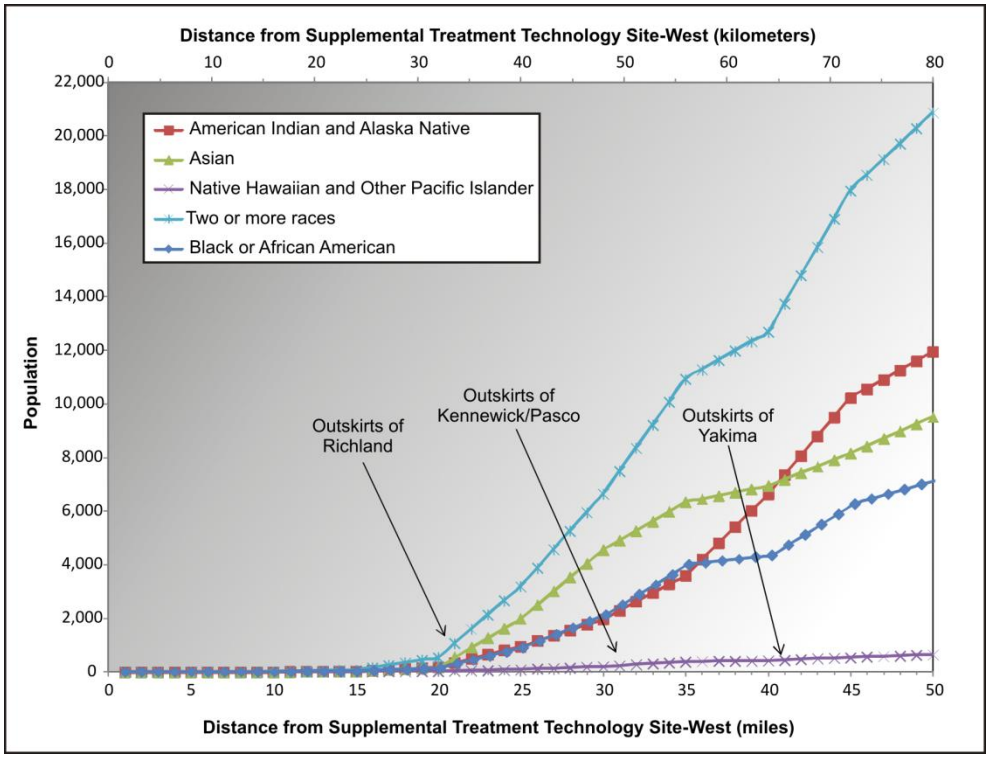

Figure J–3. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the 200-West Area Supplemental Treatment Technology Site

Figure J–4 shows block groups surrounding STTS-West and low-income and non-low-income populations living in the potentially affected area. Of the 406 block groups surrounding STTS-West, an estimated 69 block groups contain meaningfully greater low-income populations. As indicated in Table J–3, approximately 46 percent of the potentially affected low-income population lives in Yakima County, and over 92 percent of the potentially affected low-income population lives in the counties of Benton, Franklin, Grant, and Yakima. Low-income persons constitute approximately 19 percent of the total population living in the potentially affected area.

Table J–3. Low-Income Populations Living in Potentially Affected Counties Surrounding the 200-West Area Supplemental Treatment Technology Site

County (State)	Total County Population[a]	Total Low-Income Population[a]	Potentially Affected Total Population[b]	Potentially Affected Low-Income Population[b]	Percentage of the Potentially Affected Low-Income Population Total
Adams (Washington)	17,537	4,395	13,664	3,685	3.5
Benton (Washington)	165,026	20,962	165,026	20,962	20.0
Franklin (Washington)	70,208	14,000	69,967	13,952	13.3
Grant (Washington)	83,907	17,120	64,582	13,707	13.1
Kittitas (Washington)	37,409	7,942	4,550	532	0.5
Klickitat (Washington)	19,861	3,865	365	79	0.1
Walla Walla (Washington)	53,173	9,314	4,364	475	0.5
Yakima (Washington)	232,438	50,608	213,145	47,895	45.7
Morrow (Oregon)	11,089	1,700	6,066	1,064	1.0
Umatilla (Oregon)	69,838	11,000	12,418	2,402	2.3
Total	**760,486**	**140,906**	**554,148**	**104,753**	**100.0**

[a] Census 2011c.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.2.11.2.2, due to rounding.

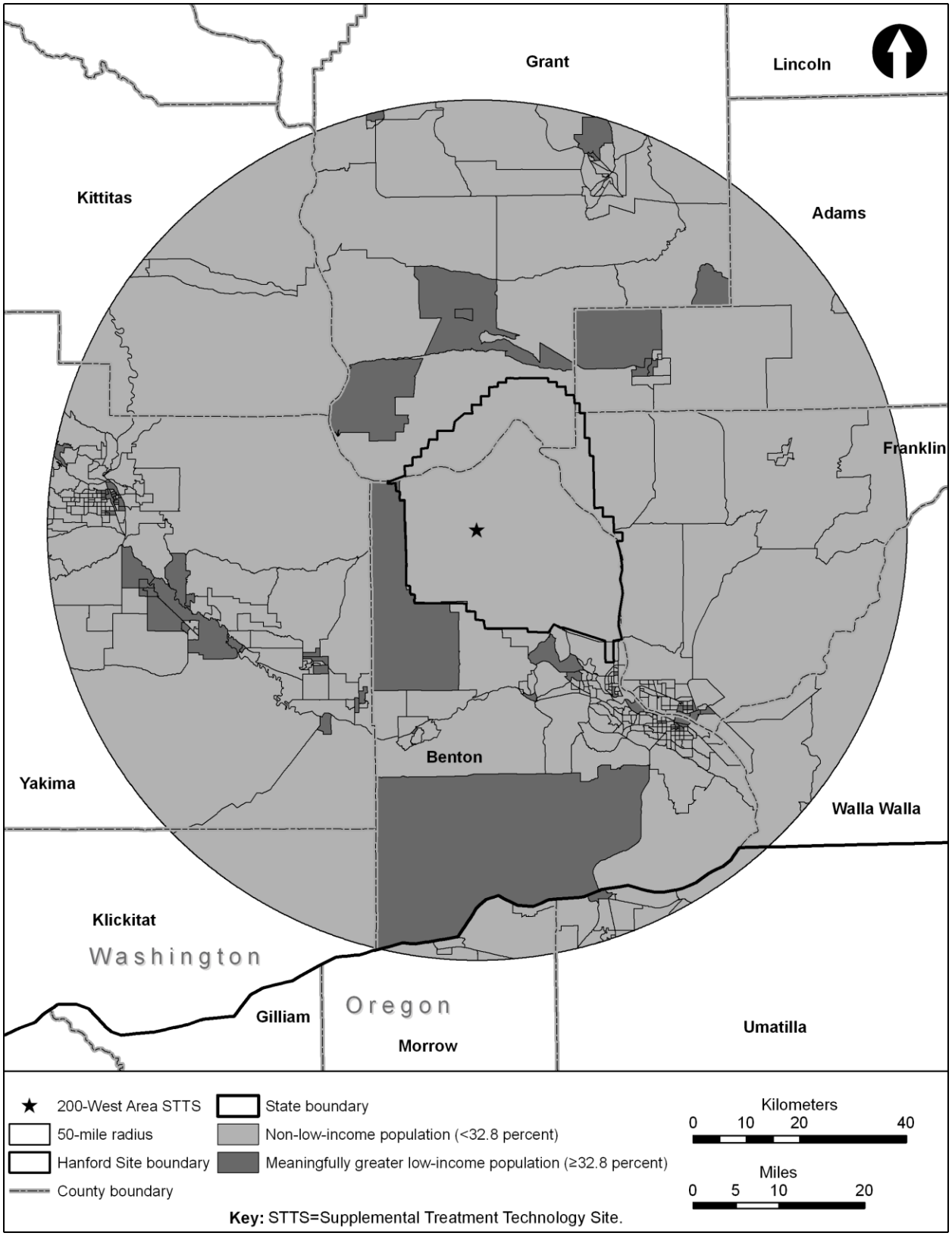

Figure J–4. Meaningfully Greater Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the 200-West Area Supplemental Treatment Technology Site

Figure J–5 shows cumulative low-income populations as a function of distance from STTS-West. Low-income populations surrounding STTS-West show patterns of growth similar to those reflected in Figures J–2 and J–3, increasing near the outskirts of the population centers of Richland, Kennewick/Pasco, and the city of Yakima.

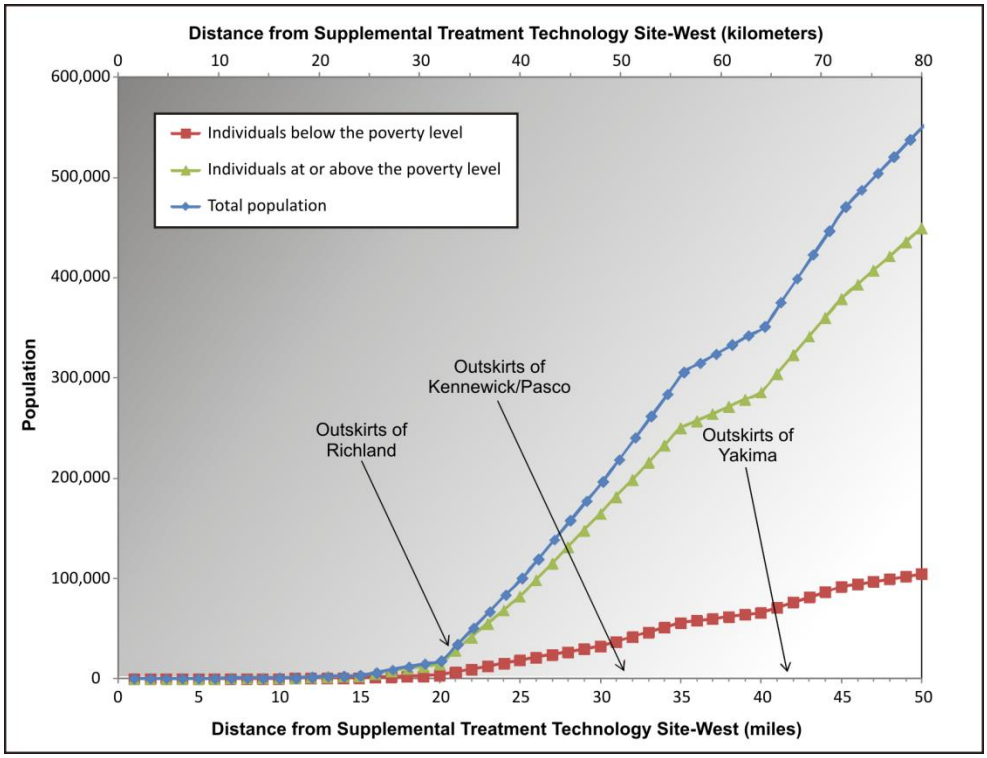

Figure J–5. Cumulative Low-Income Populations as a Function of Distance from the 200-West Area Supplemental Treatment Technology Site

J.5.2 Minority and Low-Income Populations Surrounding the Waste Treatment Plant

Figure J–6 shows minority and nonminority populations living in block groups surrounding the WTP. Of the 388 block groups that surround the WTP, an estimated 148 contain meaningfully greater minority populations. Potentially affected counties include eight counties in Washington (Adams, Benton, Franklin, Grant, Kittitas, Klickitat, Walla Walla, and Yakima) and two counties in Oregon (Morrow and Umatilla).

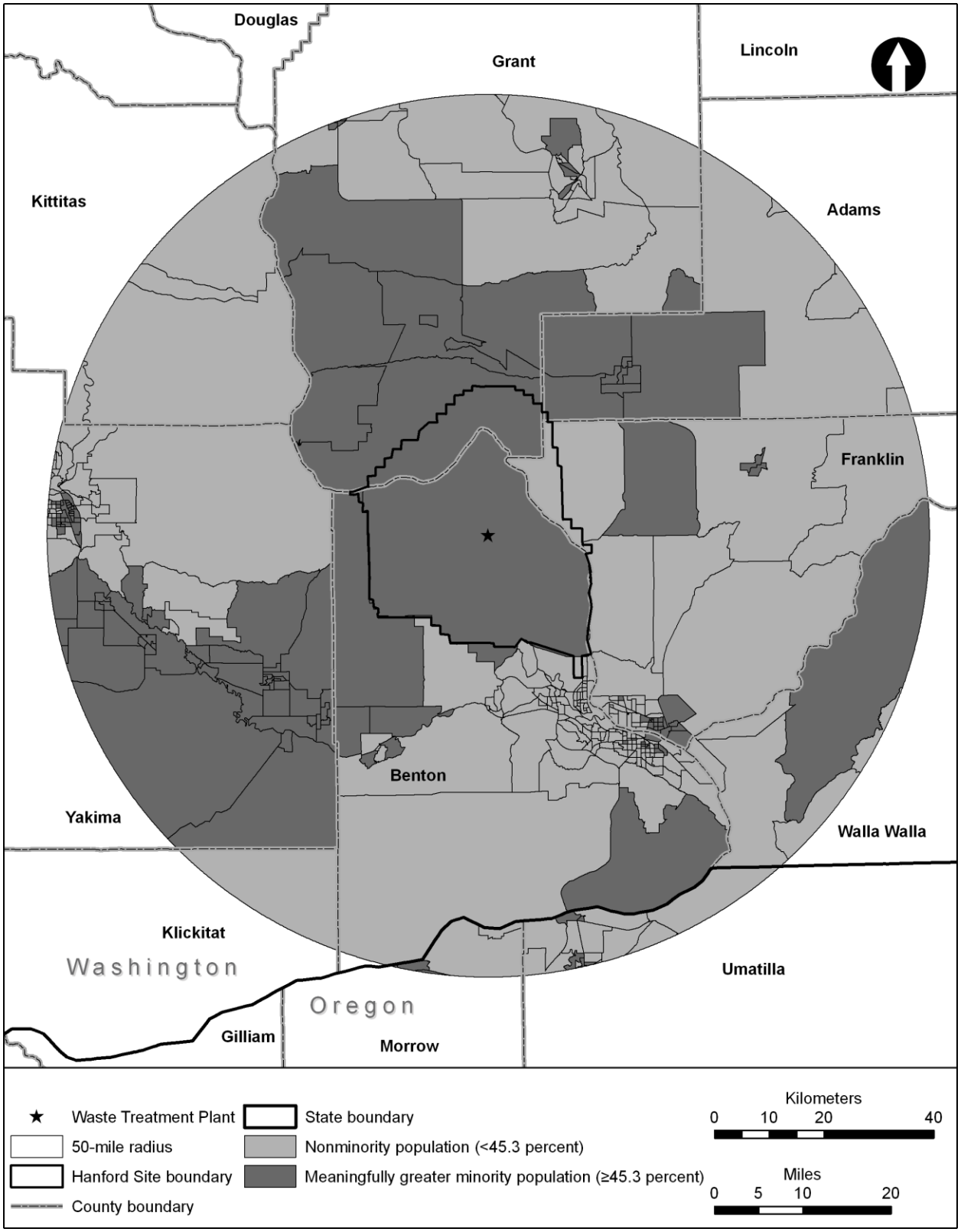

Figure J–6. Meaningfully Greater Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Waste Treatment Plant

As indicated in Table J–4, approximately 43 percent of the potentially affected minority population resides in Yakima County, and approximately 91 percent of the potentially affected minority population lives in four Washington counties: Benton, Franklin, Grant, and Yakima.

Table J–4. Minority Populations Living in Potentially Affected Counties Surrounding the Waste Treatment Plant

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Minority Population Total
Adams (Washington)	18,728	11,466	15,127	11,143	4.4
Benton (Washington)	175,177	44,740	175,167	44,736	17.7
Franklin (Washington)	78,163	44,359	77,991	44,343	17.6
Grant (Washington)	89,120	38,054	65,570	31,160	12.4
Kittitas (Washington)	40,915	5,701	3,208	347	0.1
Klickitat (Washington)	20,318	3,296	173	53	0.0
Walla Walla (Washington)	58,781	15,177	4,953	1,246	0.5
Yakima (Washington)	243,231	127,207	173,887	108,580	43.1
Morrow (Oregon)	11,173	3,955	4,525	1,544	0.6
Umatilla (Oregon)	75,889	23,198	21,727	8,986	3.6
Total	**811,495**	**317,153**	**542,327**	**252,136**	**100.0**

[a] Census 2011a.

Figures J–7 and J–8 show cumulative minority populations as a function of distance from the WTP. Values along the vertical axes of these figures show minority populations living within a given distance from the WTP. Moving outward from the facilities, the cumulative minority populations increase sharply near the outskirts of the population centers of Richland, Kennewick/Pasco, and the city of Yakima. Approximately 25 percent of the potentially affected minority population lives within about 40 kilometers (25 miles) of the facility, and 50 percent resides within about 51 kilometers (32 miles). The potentially affected total minority population surrounding the WTP is approximately 252,000 persons, accounting for approximately 46 percent of the total potentially affected population of approximately 542,000 persons. Approximately 87 percent of the minority population surrounding the WTP is Hispanic or Latino.

Figure J–9 shows block groups surrounding the WTP, as well as low-income and non-low-income populations living in the potentially affected area. Of the 388 block groups that surround the WTP, an estimated 69 contain meaningfully greater low-income populations.

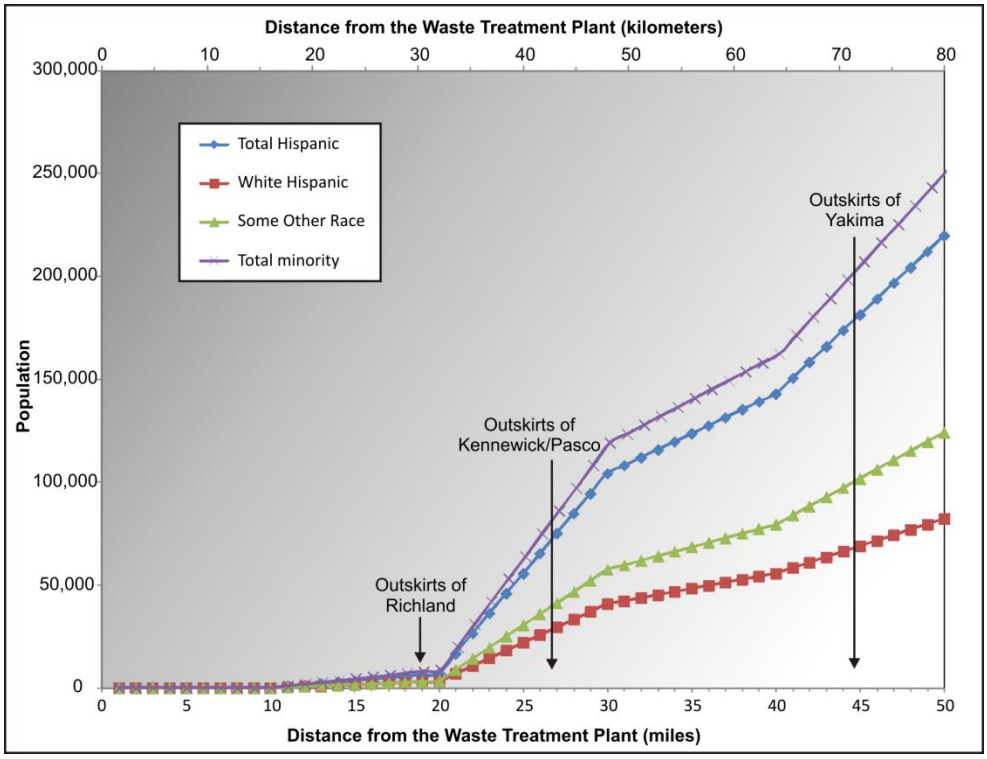

Figure J–7. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Waste Treatment Plant

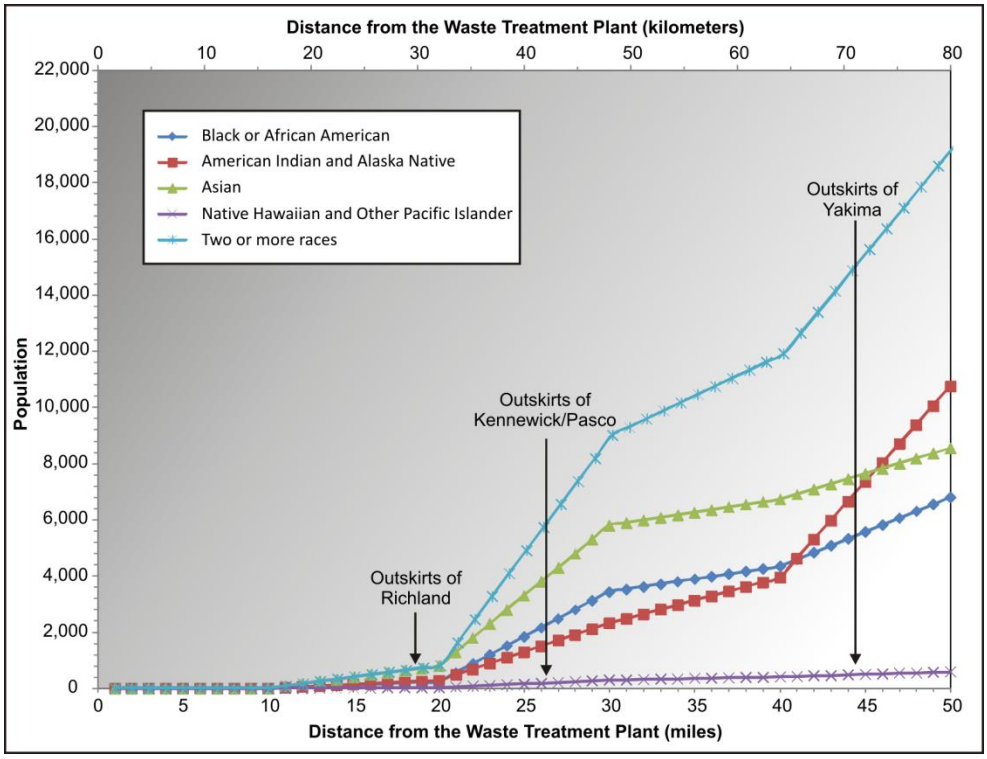

Figure J–8. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Waste Treatment Plant

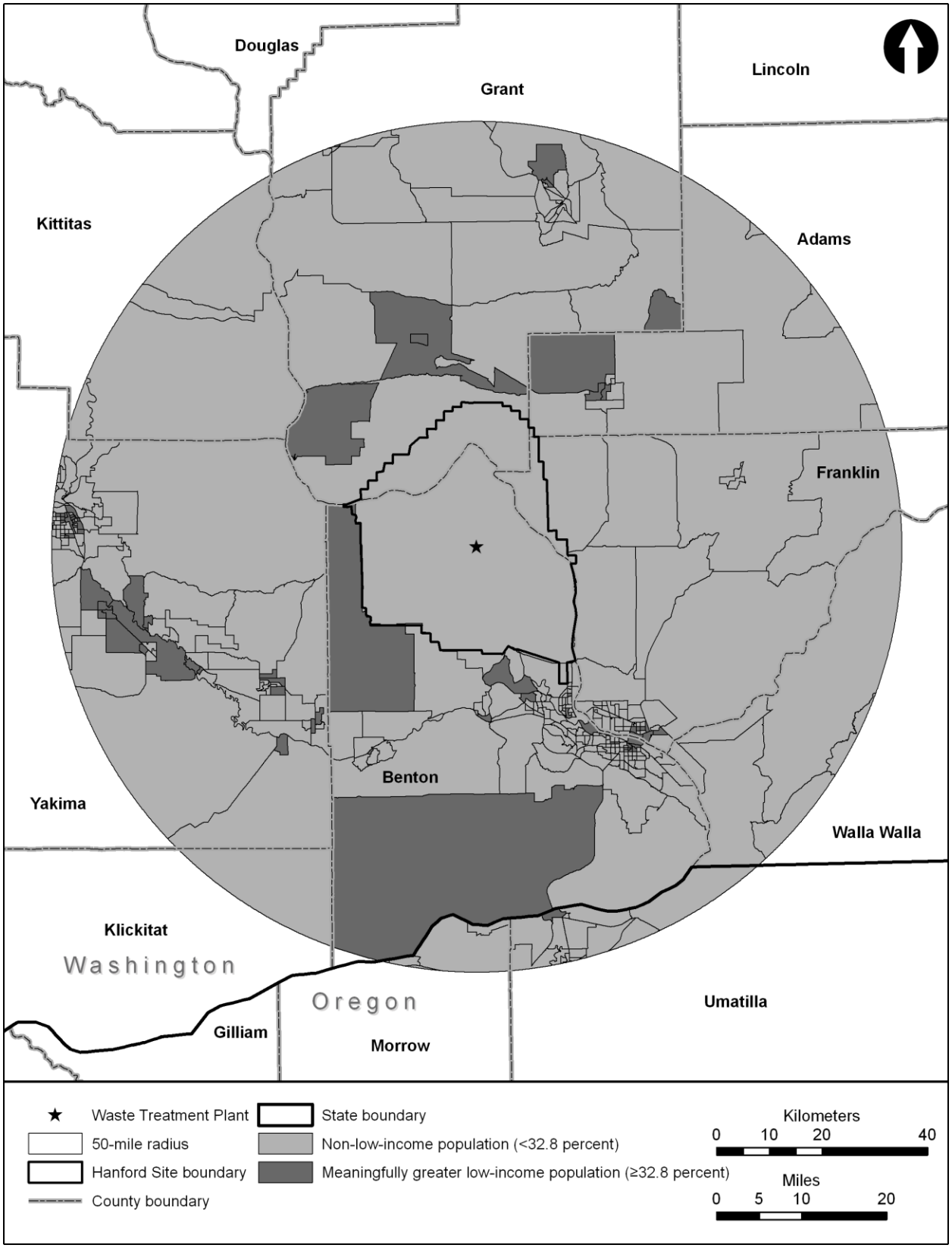

Figure J–9. Meaningfully Greater Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Waste Treatment Plant

As indicated in Table J–5, approximately 43 percent of the potentially affected low-income population lives in Yakima County, and over 90 percent of the potentially affected low-income population lives in the counties of Benton, Franklin, Grant, and Yakima. Low-income persons constitute approximately 20 percent of the total population living in the potentially affected area.

Table J–5. Low-Income Populations Living in Potentially Affected Counties Surrounding the Waste Treatment Plant

County (State)	Total County Population[a]	Total Low-Income Population[a]	Potentially Affected Total Population	Potentially Affected Low-Income Population	Percentage of the Potentially Affected Low-Income Population Total
Adams (Washington)	17,537	4,395	13,938	3,747	3.7
Benton (Washington)	165,026	20,962	165,018	20,959	21.0
Franklin (Washington)	70,208	14,000	70,047	13,968	14.0
Grant (Washington)	83,907	17,120	62,487	12,782	12.8
Kittitas (Washington)	37,409	7,942	3,179	381	0.4
Klickitat (Washington)	19,861	3,865	225	48	0.0
Walla Walla (Washington)	53,173	9,314	5,311	674	0.7
Yakima (Washington)	232,438	50,608	165,859	43,032	43.1
Morrow (Oregon)	11,089	1,700	4,543	913	0.9
Umatilla (Oregon)	69,838	11,000	19,374	3,450	3.5
Total	**760,486**	**140,906**	**509,980**	**99,953**	**100.0**

[a] Census 2011c.

Figure J–10 shows cumulative low-income populations as a function of distance from the WTP. Low-income populations surrounding the WTP show patterns of growth similar to those reflected in Figures J–7 and J–8, increasing near the outskirts of the population centers of Richland, Kennewick/Pasco, and the city of Yakima.

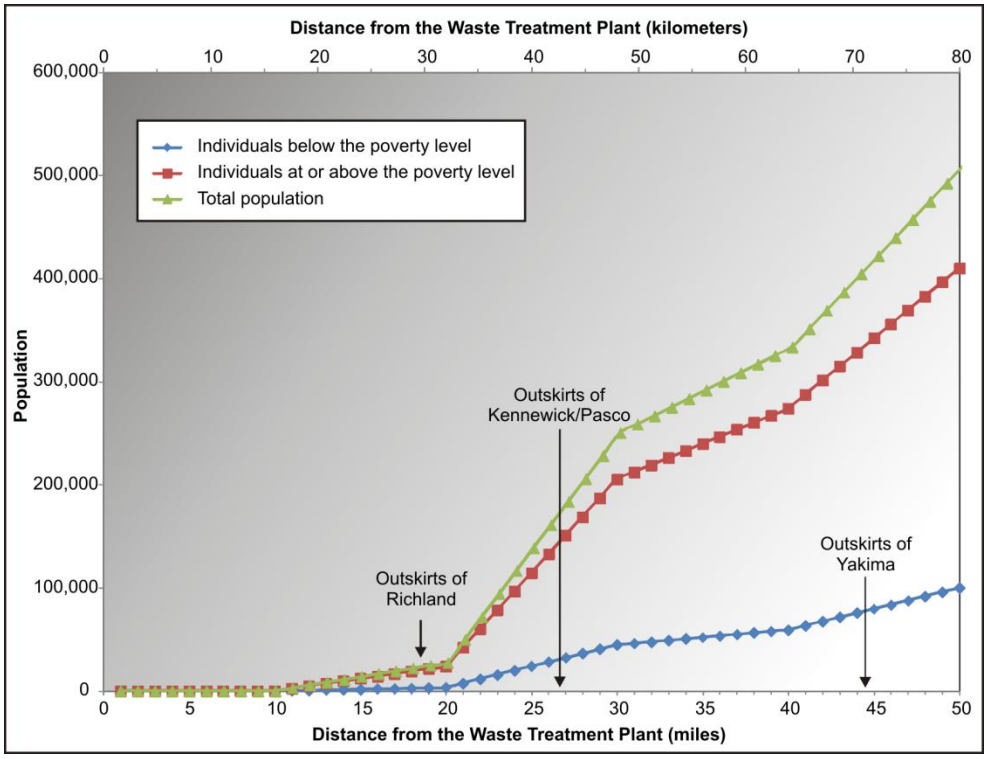

Figure J–10. Cumulative Low-Income Populations as a Function of Distance from the Waste Treatment Plant

J.5.3 Minority and Low-Income Populations Surrounding the 200-East Area Supplemental Treatment Technology Site

Figure J–11 shows minority and nonminority populations living in block groups surrounding STTS-East. Of the 392 block groups that surround STTS-East, an estimated 148 contain meaningfully greater minority populations. STTS-East is located within approximately 600 meters (1,969 feet) of the WTP, and the populations surrounding STTS-East are nearly the same as those surrounding the WTP. Counties that would be potentially affected by activities at STTS-East include eight counties in Washington (Adams, Benton, Franklin, Grant, Kittitas, Klickitat, Walla Walla, and Yakima) and two counties in Oregon (Morrow and Umatilla).

As indicated in Table J–6, approximately 43 percent of the potentially affected minority population resides in Yakima County, and approximately 90 percent of the potentially affected minority population lives in four Washington counties: Benton, Franklin, Grant, and Yakima. Due to the close proximity of the WTP and STTS-East, data for minority populations surrounding STTS-East are nearly identical to those shown for WTP minority populations in Figures J–7 and J–8 in Section J.5.2.

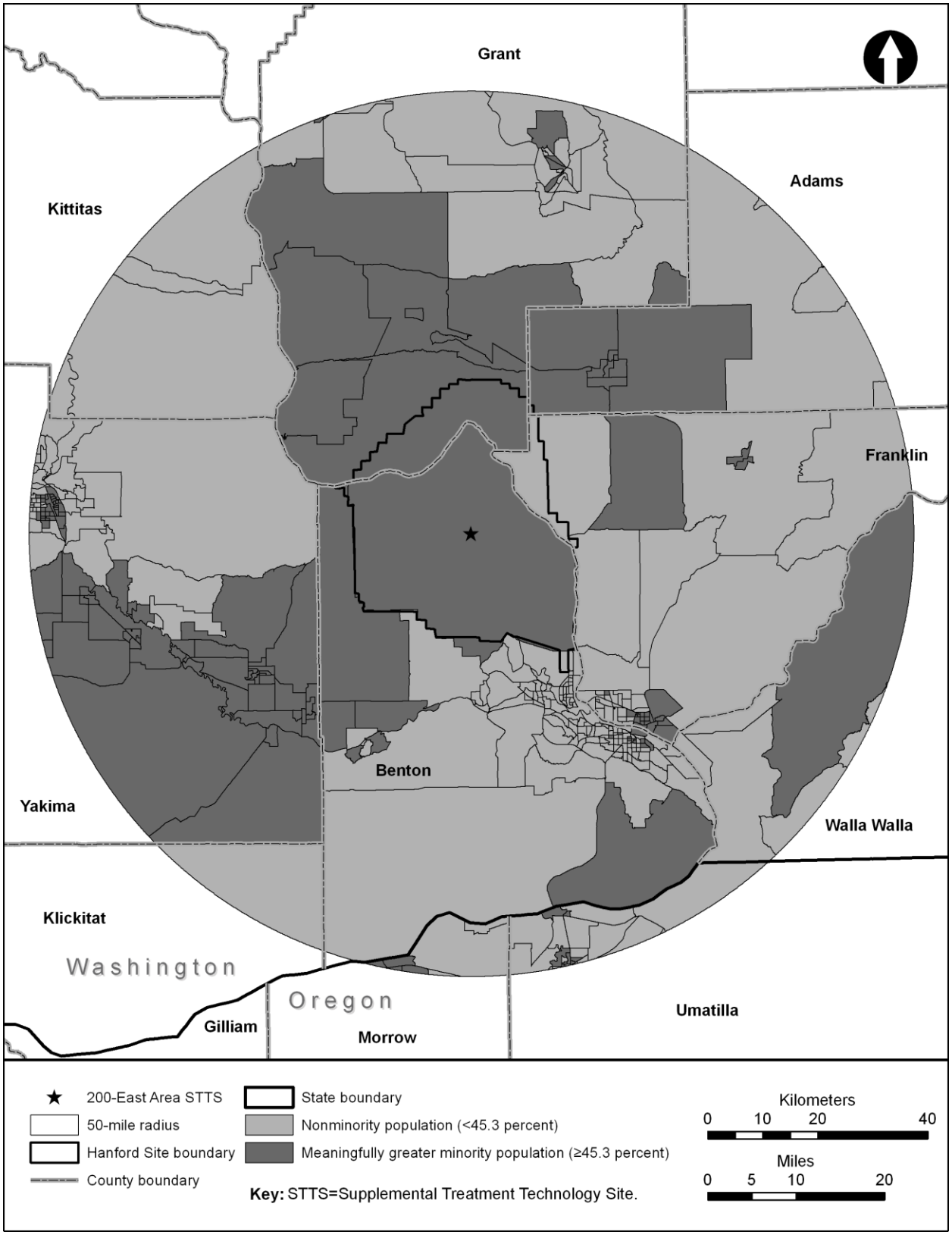

Figure J–11. Meaningfully Greater Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the 200-East Area Supplemental Treatment Technology Site

Table J–6. Minority Populations Living in Potentially Affected Counties Surrounding the 200-East Area Supplemental Treatment Technology Site

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Minority Population Total
Adams (Washington)	18,728	11,466	15,104	11,139	4.4
Benton (Washington)	175,177	44,740	175,171	44,737	17.7
Franklin (Washington)	78,163	44,359	77,989	44,342	17.5
Grant (Washington)	89,120	38,054	63,453	29,713	11.7
Kittitas (Washington)	40,915	5,701	3,166	343	0.1
Klickitat (Washington)	20,318	3,296	185	56	0.0
Walla Walla (Washington)	58,781	15,177	4,981	1,252	0.5
Yakima (Washington)	243,231	127,207	175,231	108,990	43.0
Morrow (Oregon)	11,173	3,955	5,374	2,092	0.8
Umatilla (Oregon)	75,889	23,198	26,095	10,673	4.2
Total	**811,495**	**317,153**	**546,748**	**253,337**	**100.0**

[a] Census 2011a.

Figure J–12 shows block groups surrounding STTS-East and low-income and non-low-income populations living in the potentially affected area. Of the 392 block groups that surround STTS-East, an estimated 69 contain meaningfully greater low-income populations.

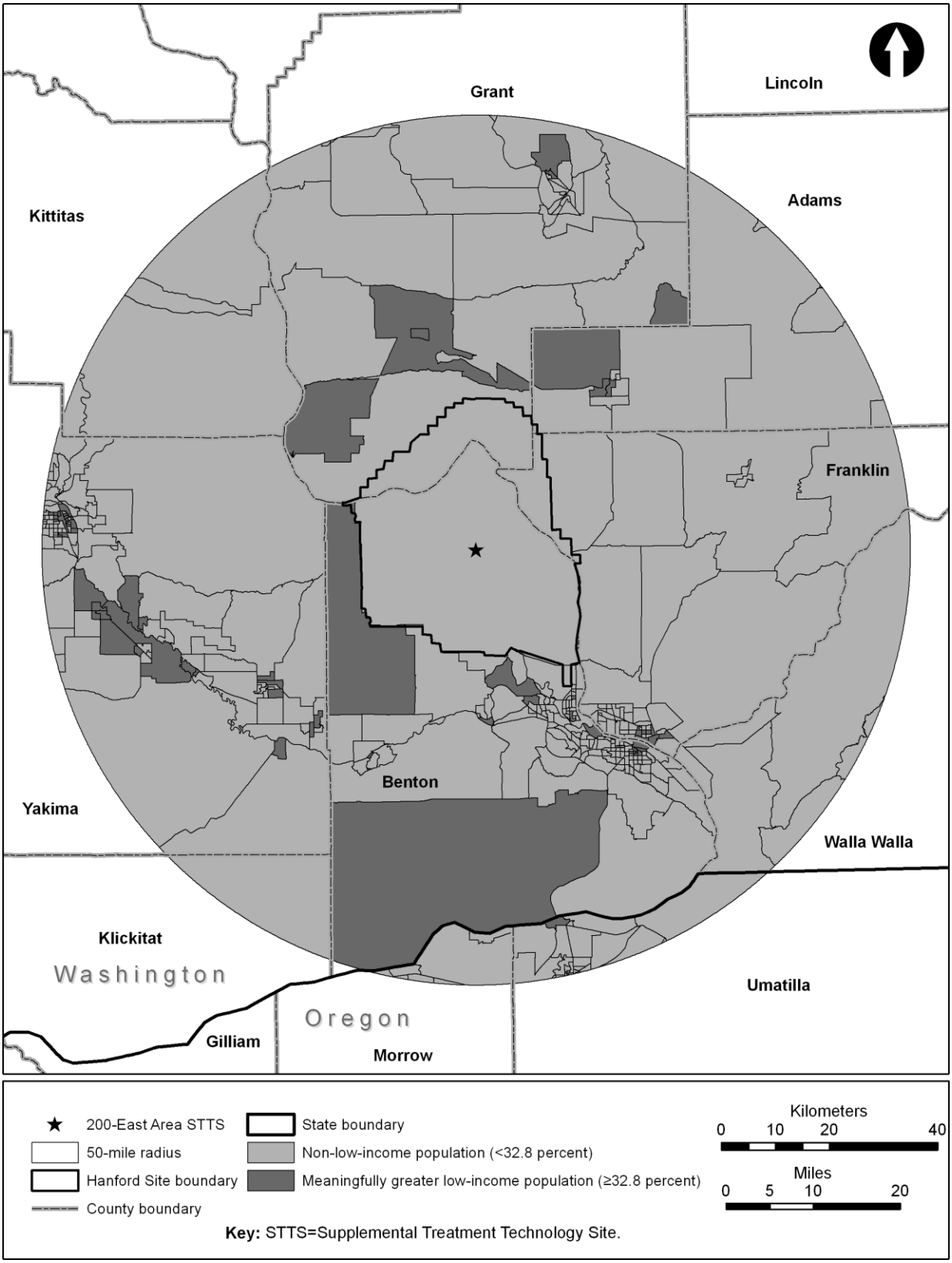

Figure J–12. Meaningfully Greater Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the 200-East Area Supplemental Treatment Technology Site

As indicated in Table J–7, approximately 43 percent of the potentially affected low-income population lives in Yakima County, and approximately 90 percent of the potentially affected low-income population lives in the counties of Benton, Franklin, Grant, and Yakima. Low-income persons constitute approximately 20 percent of the total population living in the potentially affected area. Due to the close proximity of the WTP and STTS-East, data for the low-income population as a function of distance from STTS-East are nearly identical to those for the low-income population as a function of distance from the WTP in Figure J–10 in Section J.5.2. Low-income populations surrounding STTS-East show patterns of growth similar to those reflected in Figure J–10, increasing near the outskirts of the population centers of Richland, Kennewick/Pasco, and the city of Yakima.

Table J–7. Low-Income Populations Living in Potentially Affected Counties Surrounding the 200-East Area Supplemental Treatment Technology Site

County (State)	Total County Population[a]	Total Low-Income Population[a]	Potentially Affected Total Population	Potentially Affected Low-Income Population	Percentage of the Potentially Affected Low-Income Population Total
Adams (Washington)	17,537	4,395	13,916	3,742	3.7
Benton (Washington)	165,026	20,962	165,021	20,960	20.9
Franklin (Washington)	70,208	14,000	70,045	13,968	13.9
Grant (Washington)	83,907	17,120	60,456	12,261	12.2
Kittitas (Washington)	37,409	7,942	3,137	375	0.4
Klickitat (Washington)	19,861	3,865	240	52	0.1
Walla Walla (Washington)	53,173	9,314	5,336	676	0.7
Yakima (Washington)	232,438	50,608	167,135	43,170	43.0
Morrow (Oregon)	11,089	1,700	5,277	998	1.0
Umatilla (Oregon)	69,838	11,000	23,317	4,273	4.3
Total	**760,486**	**140,906**	**513,879**	**100,475**	**100.0**

[a] Census 2011c.

J.5.4 Minority and Low-Income Populations Surrounding the Fast Flux Test Facility

Figure J–13 shows minority and nonminority populations living in block groups surrounding FFTF, which is located in the 400 Area at Hanford. Of the 323 block groups that surround FFTF, an estimated 111 contain meaningfully greater minority populations. Potentially affected counties include eight counties in Washington (Adams, Benton, Franklin, Grant, Kittitas, Klickitat, Walla Walla, and Yakima) and two counties in Oregon (Morrow and Umatilla).

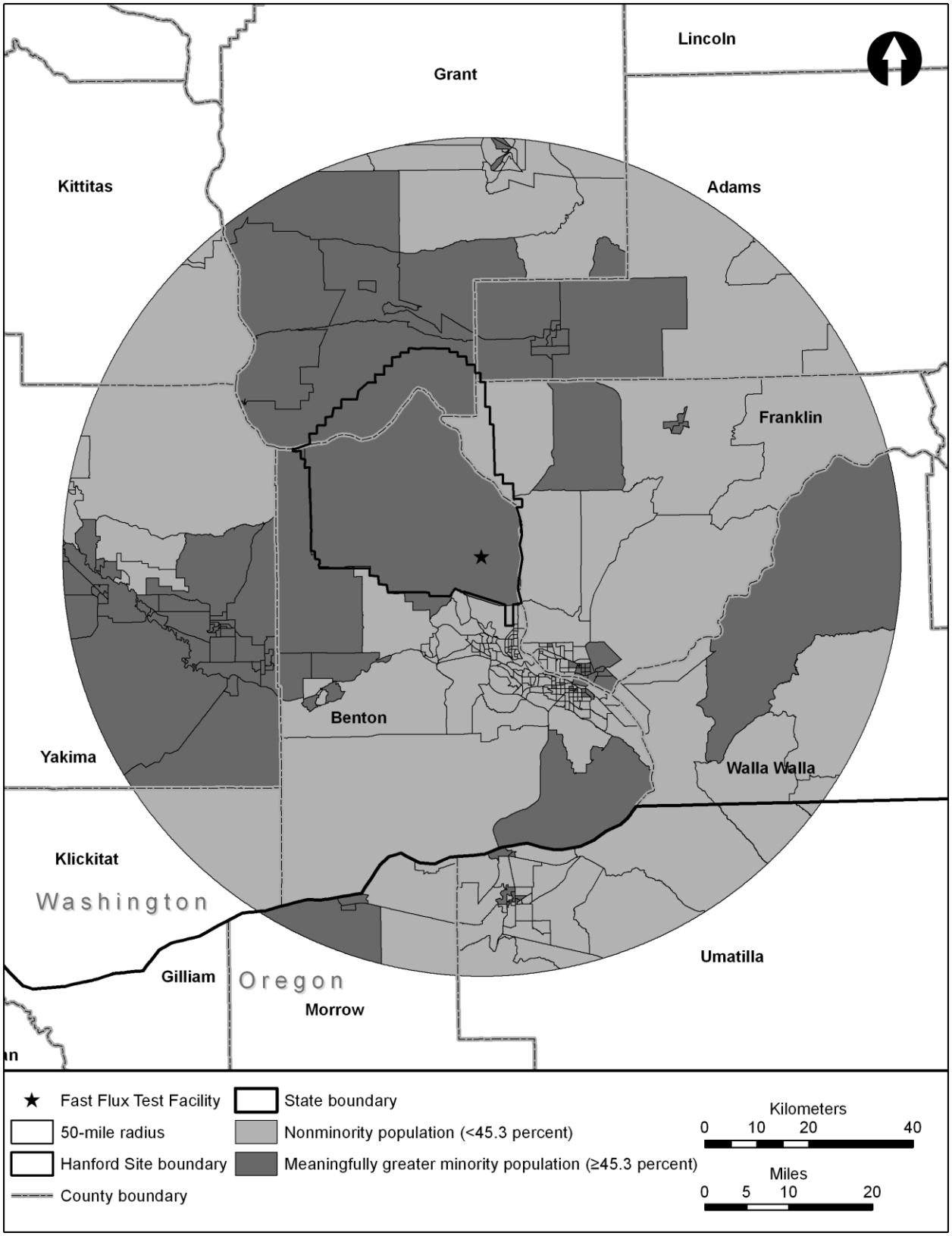

Figure J–13. Meaningfully Greater Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Fast Flux Test Facility

As indicated in Table J–8, approximately 28 percent of the potentially affected minority population resides in Yakima County, and approximately 92 percent of the potentially affected minority population lives in five counties: Benton, Franklin, Grant, and Yakima Counties in Washington and Umatilla County in Oregon.

Table J–8. Minority Populations Living in Potentially Affected Counties Surrounding the Fast Flux Test Facility

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population[b]	Potentially Affected Minority Population[b]	Percentage of the Potentially Affected Minority Population Total
Adams (Washington)	18,728	11,466	15,123	11,138	5.6
Benton (Washington)	175,177	44,740	175,177	44,740	22.6
Franklin (Washington)	78,163	44,359	78,065	44,350	22.4
Grant (Washington)	89,120	38,054	49,468	24,288	12.3
Kittitas (Washington)	40,915	5,701	1,004	125	0.1
Klickitat (Washington)	20,318	3,296	229	70	0.0
Walla Walla (Washington)	58,781	15,177	6,884	1,761	0.9
Yakima (Washington)	243,231	127,207	73,915	54,581	27.5
Morrow (Oregon)	11,173	3,955	6,886	2,971	1.5
Umatilla (Oregon)	75,889	23,198	38,255	14,194	7.2
Total	**811,495**	**317,153**	**445,006**	**198,218**	**100.0**

[a] Census 2011a.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.2.11.1.3, due to rounding.

The total population of the potentially affected area surrounding FFTF is estimated to be approximately 445,000 persons. The significant reduction in population compared with other areas at Hanford that are analyzed in this EIS can be attributed to the city of Yakima's location beyond the reach of the 80-kilometer (50-mile) radius of the potentially affected area. Figures J–14 and J–15 show cumulative minority populations as a function of distance from FFTF. Values along the vertical axes of these figures show minority populations living within a given distance from FFTF. Moving outward from FFTF, sharp increases in the cumulative minority populations can still be seen near the outskirts of the population centers of Richland and Kennewick/Pasco, Washington; however, they occur roughly 16 kilometers (10 miles) closer than similar increases observed in the potentially affected area surrounding the 200 Area facilities. An additional population spurt can be observed approximately 64 kilometers (40 miles) from FFTF, most likely attributed to the population center of Hermiston, Oregon. Additional increases in population are attributed to the outlying areas in Yakima County, Washington. Approximately 30 percent of the potentially affected minority population lives within about 31 kilometers (19 miles) of the facility, and 50 percent resides within about 45 kilometers (28 miles). The potentially affected total minority population surrounding FFTF is approximately 198,000 persons, accounting for approximately 45 percent of the total population. Approximately 88 percent of the minority population surrounding FFTF is Hispanic or Latino.

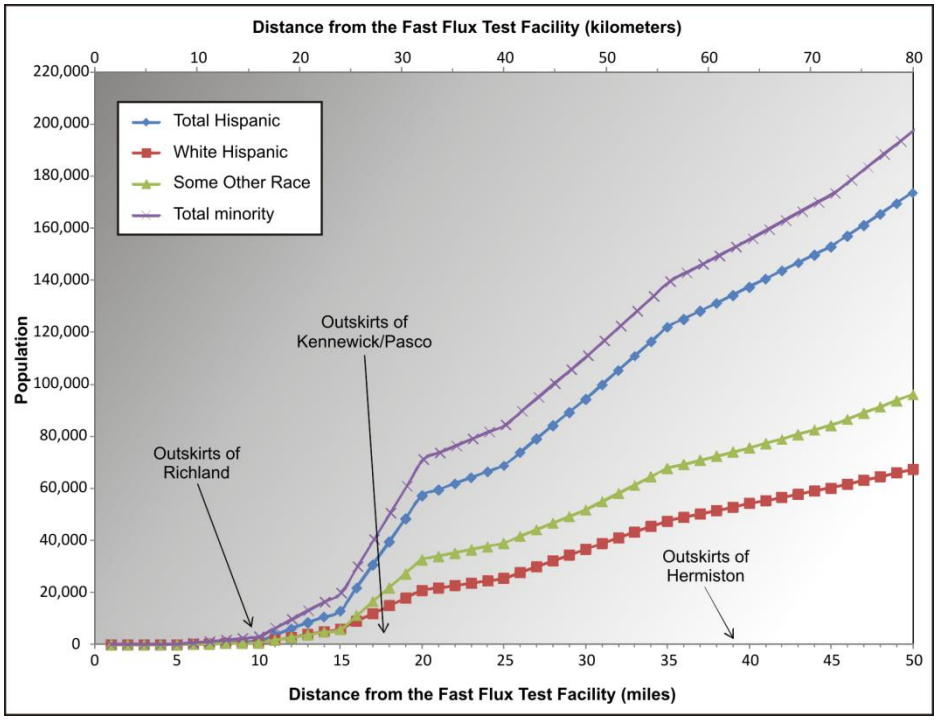

Figure J–14. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Fast Flux Test Facility

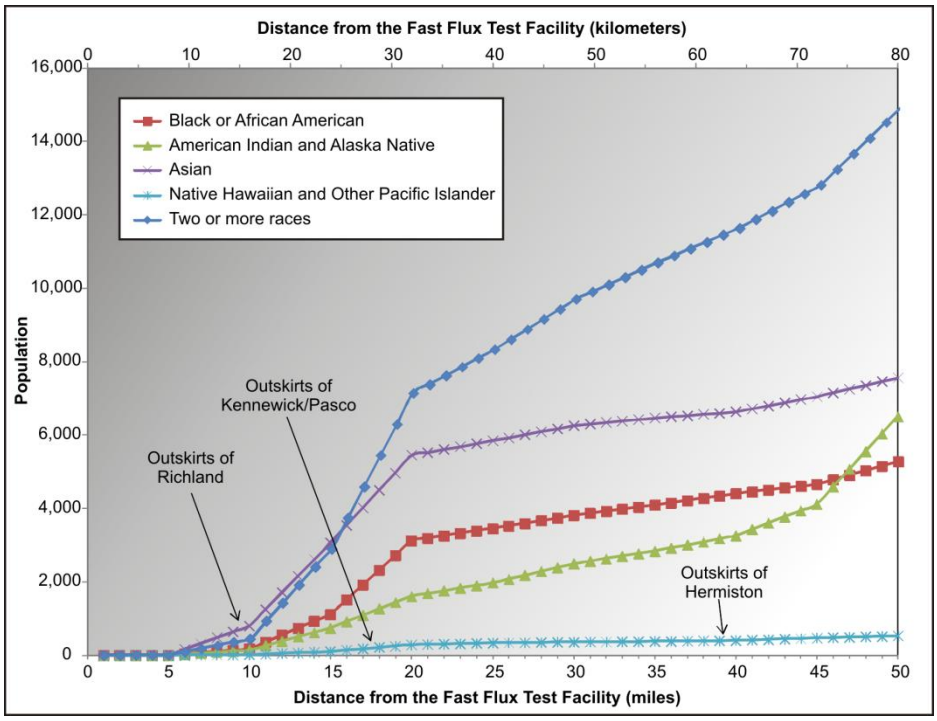

Figure J–15. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Fast Flux Test Facility

Figure J–16 shows block groups surrounding FFTF and low-income and non-low-income populations living in the potentially affected area. Of the 323 block groups that surround FFTF, an estimated 51 contain meaningfully greater low-income populations.

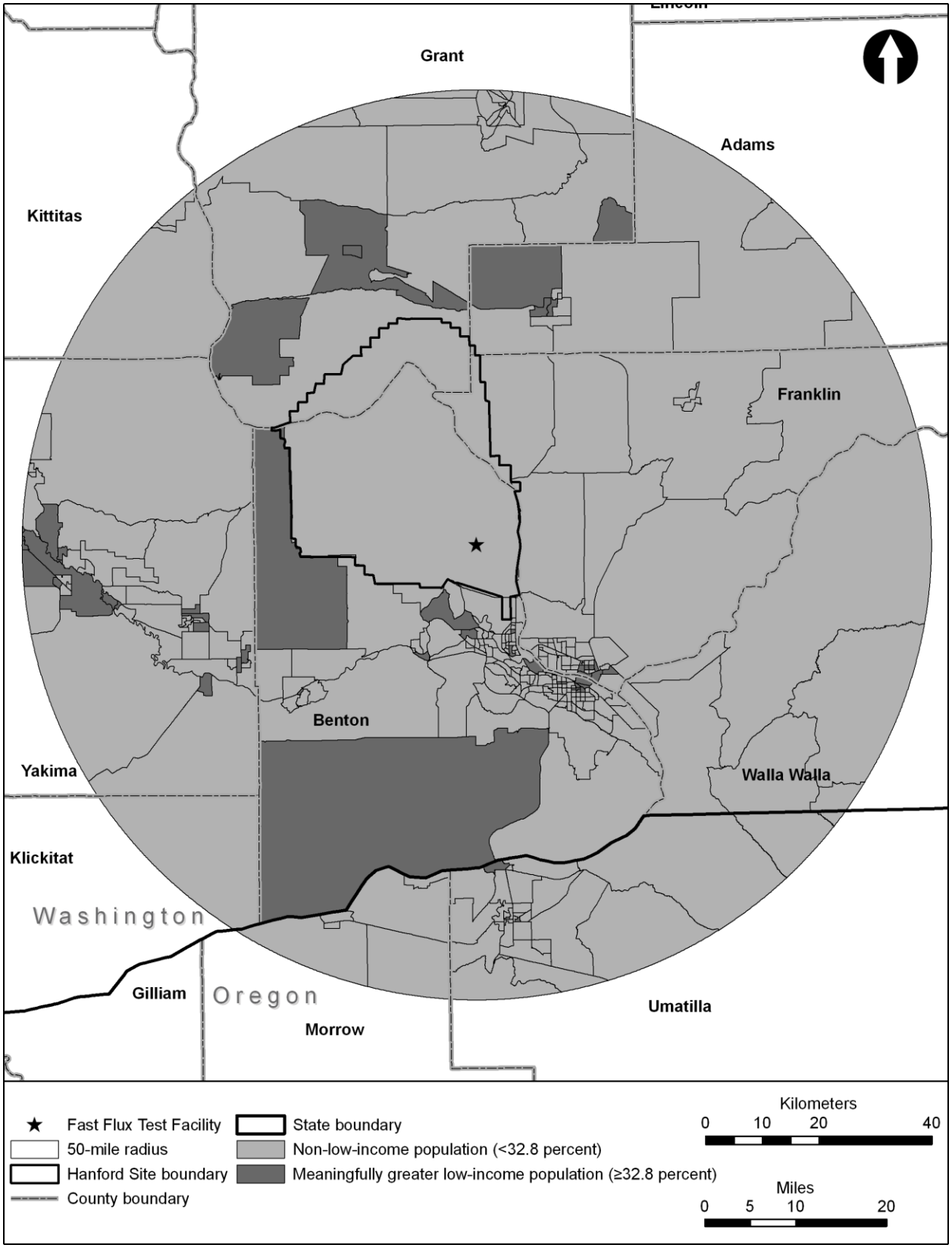

Figure J–16. Meaningfully Greater Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Fast Flux Test Facility

As indicated in Table J–9, approximately 25 percent of the potentially affected low-income population lives in Yakima County, and approximately 92 percent of the potentially affected low-income population lives in five counties: Benton, Franklin, Grant, and Yakima Counties in Washington and Umatilla County in Oregon. Low-income persons constitute approximately 18 percent of the total population living in the potentially affected area.

Table J–9. Low-Income Populations Living in Potentially Affected Counties Surrounding the Fast Flux Test Facility

County (State)	Total County Population[a]	Total Low-Income Population[a]	Potentially Affected Total Population[b]	Potentially Affected Low-Income Population[b]	Percentage of the Potentially Affected Low-Income Population Total
Adams (Washington)	17,537	4,395	13,937	3,746	5.0
Benton (Washington)	165,026	20,962	165,026	20,962	28.1
Franklin (Washington)	70,208	14,000	70,117	13,982	18.7
Grant (Washington)	83,907	17,120	46,589	8,805	11.8
Kittitas (Washington)	37,409	7,942	984	91	0.1
Klickitat (Washington)	19,861	3,865	298	64	0.1
Walla Walla (Washington)	53,173	9,314	7,244	936	1.3
Yakima (Washington)	232,438	50,608	69,414	18,948	25.4
Morrow (Oregon)	11,089	1,700	6,609	1,105	1.5
Umatilla (Oregon)	69,838	11,000	33,904	5,956	8.0
Total	**760,486**	**140,906**	**414,122**	**74,596**	**100.0**

[a] Census 2011c.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.2.11.2.3, due to rounding.

Figure J–17 shows cumulative low-income populations as a function of distance from FFTF. The cumulative low-income populations surrounding FFTF show patterns of growth similar to those reflected in Figures J–14 and J–15, increasing near the outskirts of the population centers of Richland, Kennewick/Pasco, and Hermiston, Oregon.

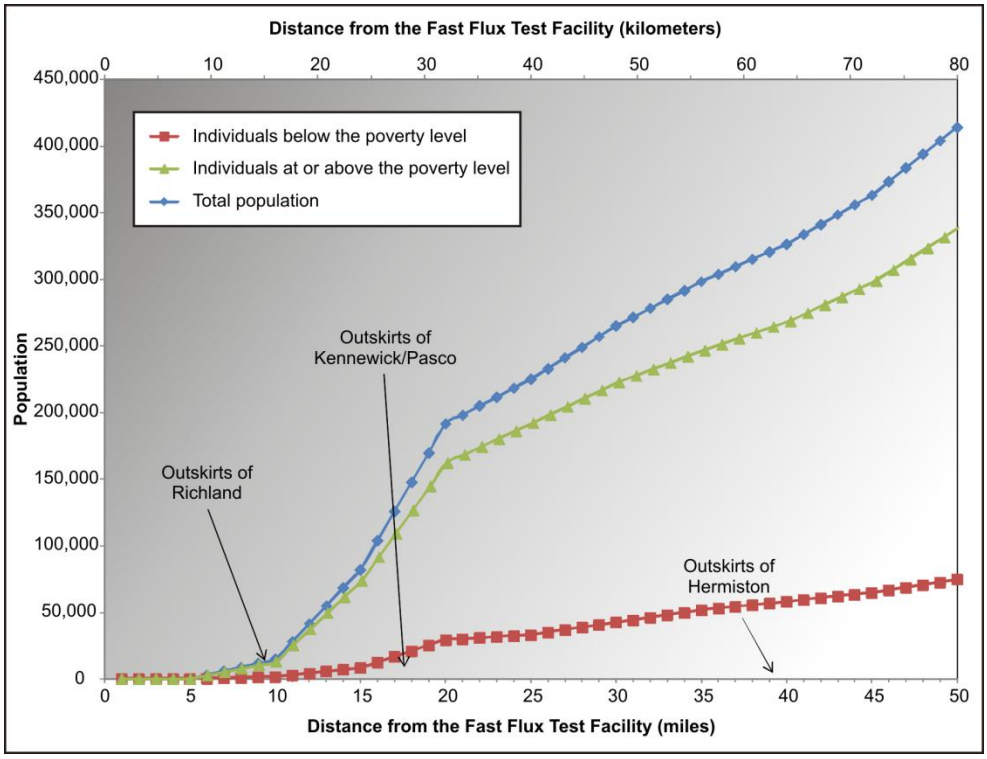

Figure J–17. Cumulative Low-Income Populations as a Function of Distance from the Fast Flux Test Facility

J.5.5 Minority and Low-Income Populations Surrounding the Materials and Fuels Complex at Idaho National Laboratory

Figure J–18 shows minority and nonminority populations living in block groups surrounding INL. Of the 184 block groups that surround the MFC within INL, an estimated 11 contain meaningfully greater minority populations. Potentially affected counties include 14 counties in Idaho (Bannock, Bingham, Blaine, Bonneville, Butte, Caribou, Clark, Custer, Fremont, Jefferson, Lemhi, Madison, Minidoka, and Power). As indicated in Table J–10, approximately 67 percent of the potentially affected minority population resides in Bingham and Bonneville Counties, while another 30 percent of the potentially affected minority population lives in Bannock, Jefferson, and Madison Counties.

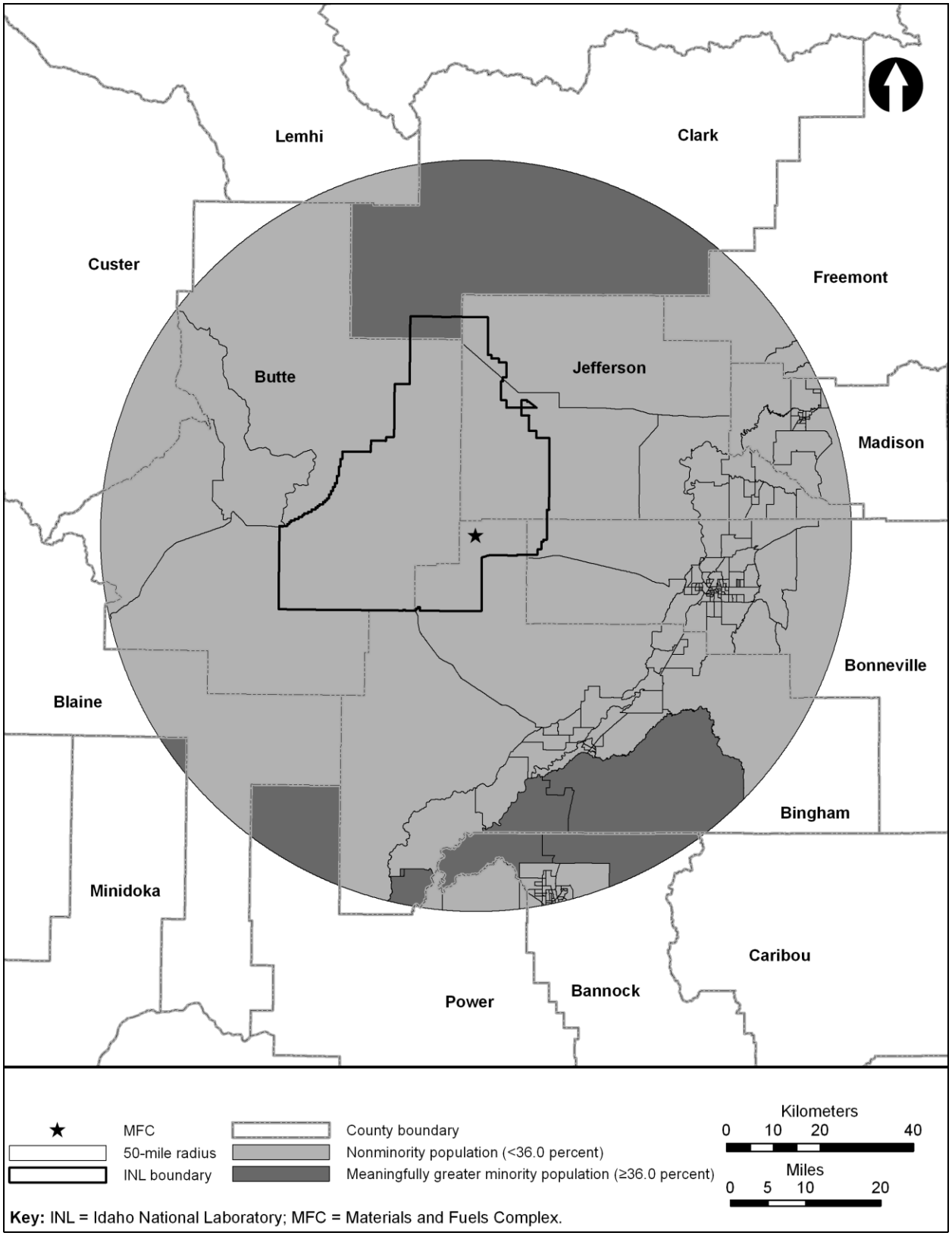

Figure J–18. Meaningfully Greater Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Materials and Fuels Complex

Table J–10. Minority Populations Living in Potentially Affected Counties Surrounding the Materials and Fuels Complex

County (Idaho)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population[b]	Potentially Affected Minority Population[b]	Percentage of the Potentially Affected Minority Population Total
Bannock	82,839	11,273	37,909	5,690	14.5
Bingham	45,607	11,431	44,416	11,176	28.4
Blaine	21,376	4,707	314	49	0.1
Bonneville	104,234	15,361	103,102	15,327	39.0
Butte	2,891	178	2,731	170	0.4
Caribou	6,963	482	0	0	0.0
Clark	982	424	441	190	0.5
Custer	4,368	260	177	9	0.0
Fremont	13,242	1,969	1,492	264	0.7
Jefferson	26,140	3,215	25,859	3,197	8.1
Lemhi	7,936	393	24	1	0.0
Madison	37,536	3,318	33,935	3,071	7.8
Minidoka	20,069	6,974	14	8	0.0
Power	7,817	2,653	428	138	0.4
Total	**382,000**	**62,638**	**250,842**	**39,293**	**100.0**

[a] Census 2011a.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.3.11.1.2, due to rounding.

Figures J–19 and J–20 show cumulative minority populations as a function of distance from the MFC at INL. Values along the vertical axes of these figures show minority populations living within a given distance from the MFC. Moving outward from the MFC, the cumulative minority populations increase sharply near the outskirts of large population centers. Unlike the candidate facilities at Hanford, these large spikes do not occur until a distance of approximately 48 kilometers (30 miles), where the outskirts of Idaho Falls start. The next significant jump in population occurs at approximately 72 kilometers (45 miles), near Pocatello. Approximately 10 percent of the potentially affected minority population lives within about 47 kilometers (29 miles) of the MFC, and 50 percent resides within about 56 kilometers (35 miles). The potentially affected total minority population surrounding the MFC is approximately 39,000 persons, accounting for approximately 16 percent of the total population. Approximately 70 percent of the minority population surrounding the MFC is Hispanic or Latino.

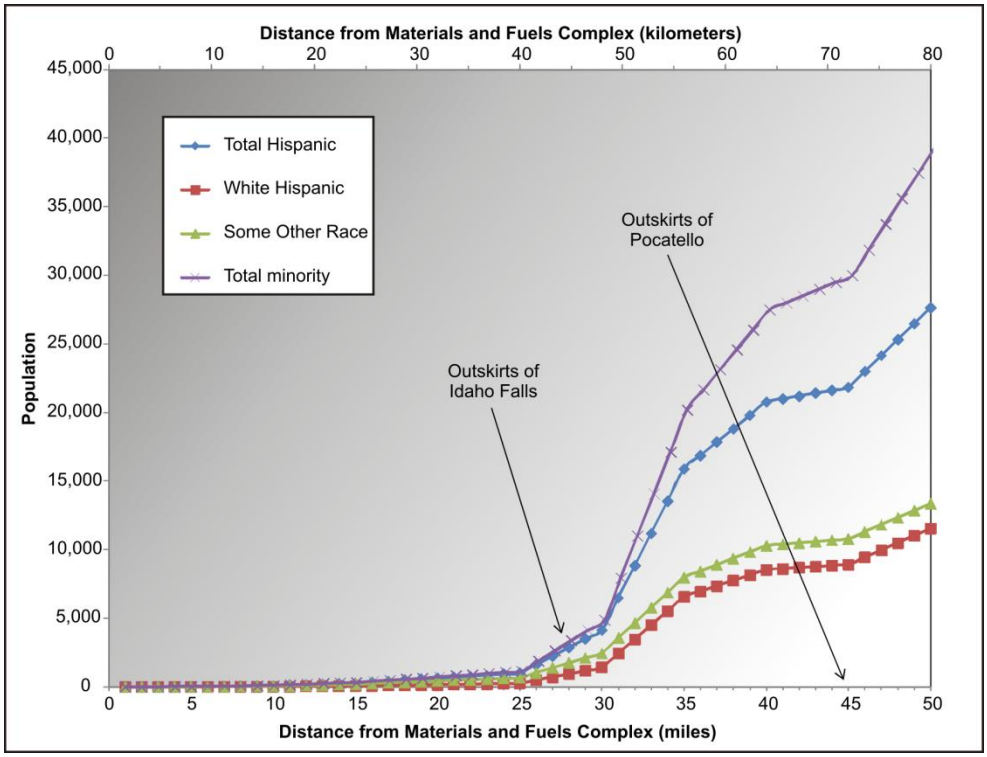

Figure J–19. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Materials and Fuels Complex

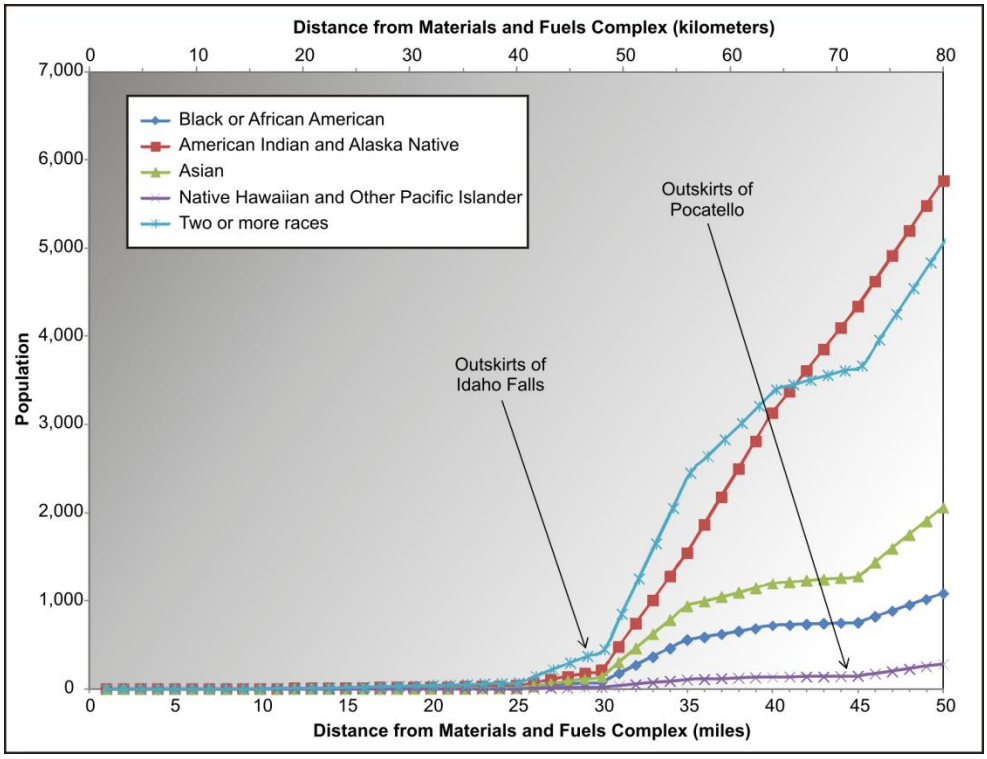

Figure J–20. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Materials and Fuels Complex

Figure J–21 shows the block groups surrounding INL and the low-income and non-low-income populations living in the potentially affected area. Of the 184 block groups that surround the MFC within INL, it is estimated that 13 contain meaningfully greater low-income populations. As indicated in Table J–11, approximately 61 percent of the potentially affected low-income population lives in Bonneville and Madison Counties. Another 30 percent of the potentially affected low-income population lives in Bannock and Bingham Counties. Low-income persons constitute approximately 14 percent of the total population living in the potentially affected area. Figure J–22 shows cumulative low-income populations as a function of distance from the MFC. Low-income populations surrounding the MFC are concentrated in the Fort Hall, Idaho Falls, and Rexburg areas.

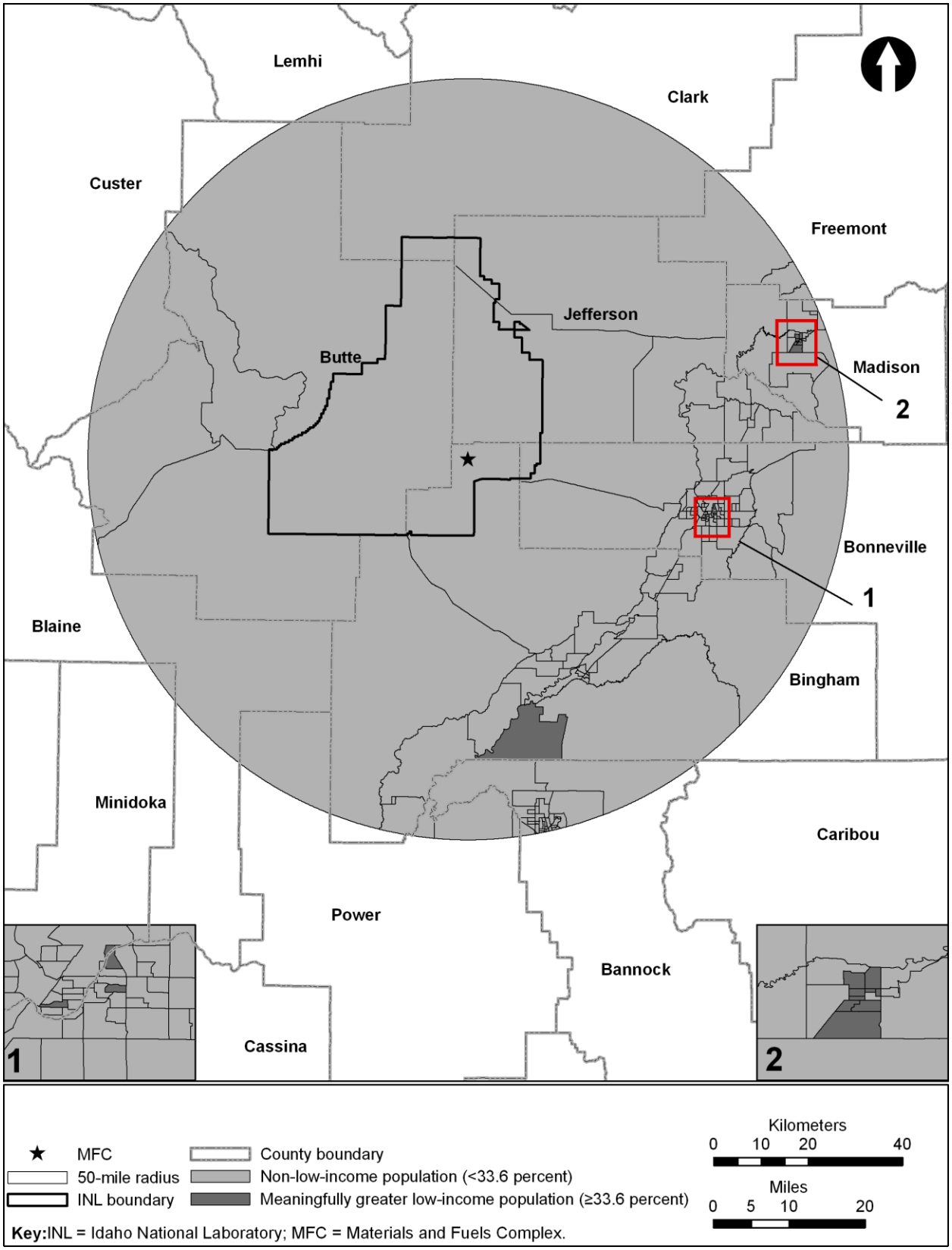

Figure J–21. Meaningfully Greater Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Materials and Fuels Complex

Table J–11. Low-Income Populations Living in Potentially Affected Counties Surrounding the Materials and Fuels Complex

County (Idaho)	Total County Population[a]	Total Low-Income Population[a]	Potentially Affected Total Population[b]	Potentially Affected Low-Income Population[b]	Percentage of the Potentially Affected Low-Income Population Total
Bannock	79,103	11,098	36,616	4,041	11.8
Bingham	44,125	6,498	42,946	6,299	18.3
Blaine	21,172	1,979	378	34	0.1
Bonneville	99,305	10,882	98,389	10,745	31.3
Butte	2,768	381	2,609	363	1.1
Caribou	6,794	569	0	0	0.0
Clark	857	97	385	44	0.1
Custer	4,277	592	162	17	0.0
Fremont	12,960	1,104	1,593	114	0.3
Jefferson	24,411	2,479	24,138	2,453	7.1
Lemhi	7,753	1,553	22	2	0.0
Madison	34,372	11,082	31,302	10,223	29.7
Minidoka	19,254	2,518	17	1	0.0
Power	7,633	848	473	36	0.1
Total	**364,784**	**51,680**	**239,029**	**34,371**	**100.0**

[a] Census 2011c.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.3.11.2.2, due to rounding.

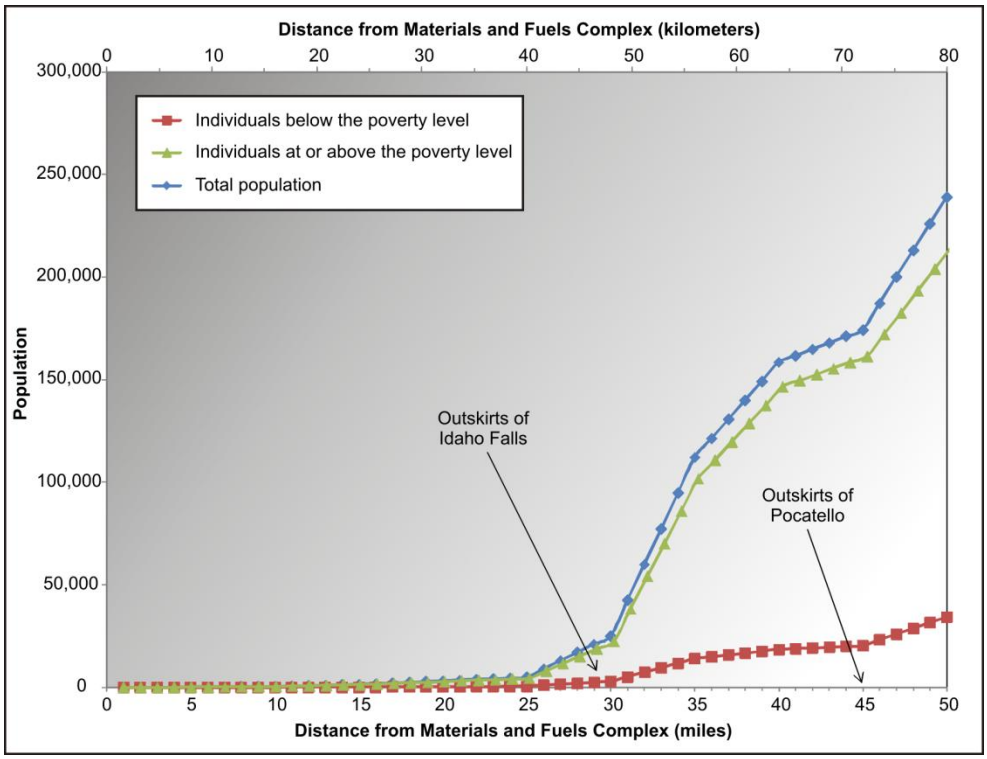

Figure J–22. Cumulative Low-Income Populations as a Function of Distance from the Materials and Fuels Complex

J.5.6 Minority and Low-Income Populations Surrounding the Idaho Nuclear Technology and Engineering Center at Idaho National Laboratory

Figure J–23 shows minority and nonminority populations living in block groups surrounding INTEC at INL. Of the 127 block groups that surround INTEC, an estimated 11 contain meaningfully greater minority populations. Potentially affected counties include 14 counties in Idaho (Bannock, Bingham, Blaine, Bonneville, Butte, Clark, Custer, Fremont, Jefferson, Lemhi, Lincoln, Madison, Minidoka, and Power). As indicated in Table J–12, approximately 87 percent of the potentially affected minority population resides in Bingham and Bonneville Counties.

Table J–12. Minority Populations Living in Potentially Affected Counties Surrounding the Idaho Nuclear Technology and Engineering Center

County (Idaho)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population[b]	Potentially Affected Minority Population[b]	Percentage of the Potentially Affected Minority Population Total
Bannock	82,839	11,273	7,238	1,403	4.9
Bingham	45,607	11,431	43,572	10,733	37.8
Blaine	21,376	4,707	1,024	122	0.4
Bonneville	104,234	15,361	87,263	14,038	49.4
Butte	2,891	178	2,888	178	0.6
Clark	982	424	281	122	0.4
Custer	4,368	260	723	38	0.1
Fremont	13,242	1,969	4	0	0.0
Jefferson	26,140	3,215	8,607	1,426	5.0
Lemhi	7,936	393	34	2	0.0
Lincoln	5,208	1,601	15	3	0.0
Madison	37,536	3,318	21	1	0.0
Minidoka	20,069	6,974	256	153	0.5
Power	7,817	2,653	575	190	0.7
Total	**380,245**	**63,757**	**152,502**	**28,409**	**100.0**

[a] Census 2011a.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.3.11.1.1, due to rounding.

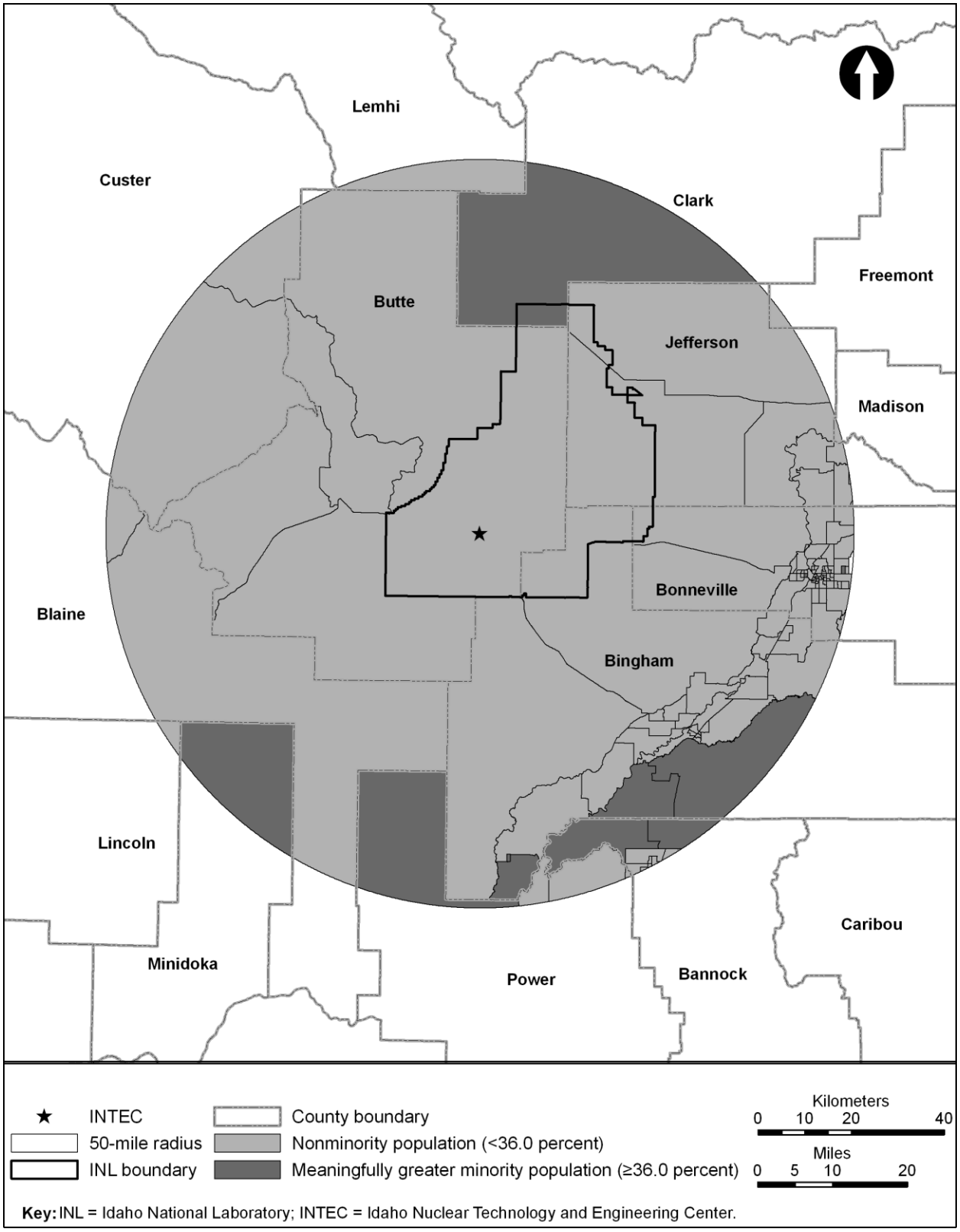

Figure J–23. Meaningfully Greater Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Idaho Nuclear Technology and Engineering Center

Figures J–24 and J–25 show cumulative minority populations as a function of distance from INTEC at INL. Values along the vertical axes of these figures show minority populations living within a given distance from INTEC. Moving outward from INTEC, the cumulative minority populations increase sharply near the outskirts of large population centers. These large spikes occur at approximately 64 kilometers (40 miles), near the outskirts of Idaho Falls, and again at approximately 76 kilometers (47 miles), near Pocatello. Approximately 15 percent of the potentially affected minority population lives within about 58 kilometers (36 miles) of INTEC, and approximately 54 percent resides within about 71 kilometers (44 miles). The potentially affected total minority population surrounding INTEC is approximately 28,000 persons, accounting for approximately 19 percent of the total population. Approximately 74 percent of the minority population surrounding INTEC is Hispanic or Latino.

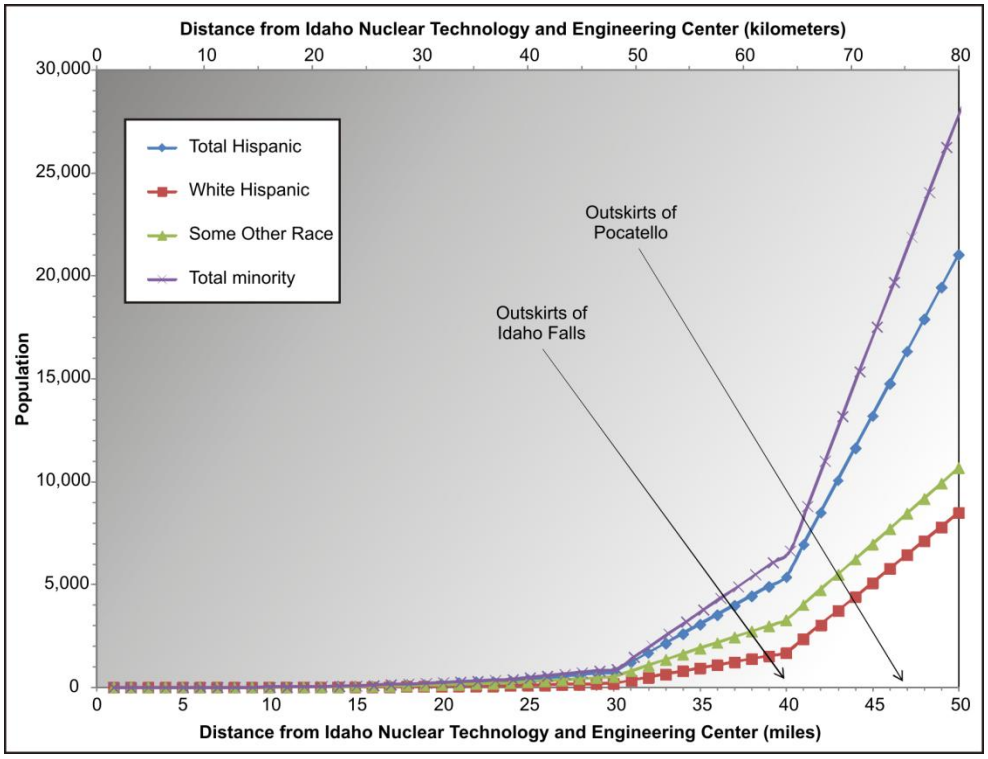

Figure J–24. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Idaho Nuclear Technology and Engineering Center

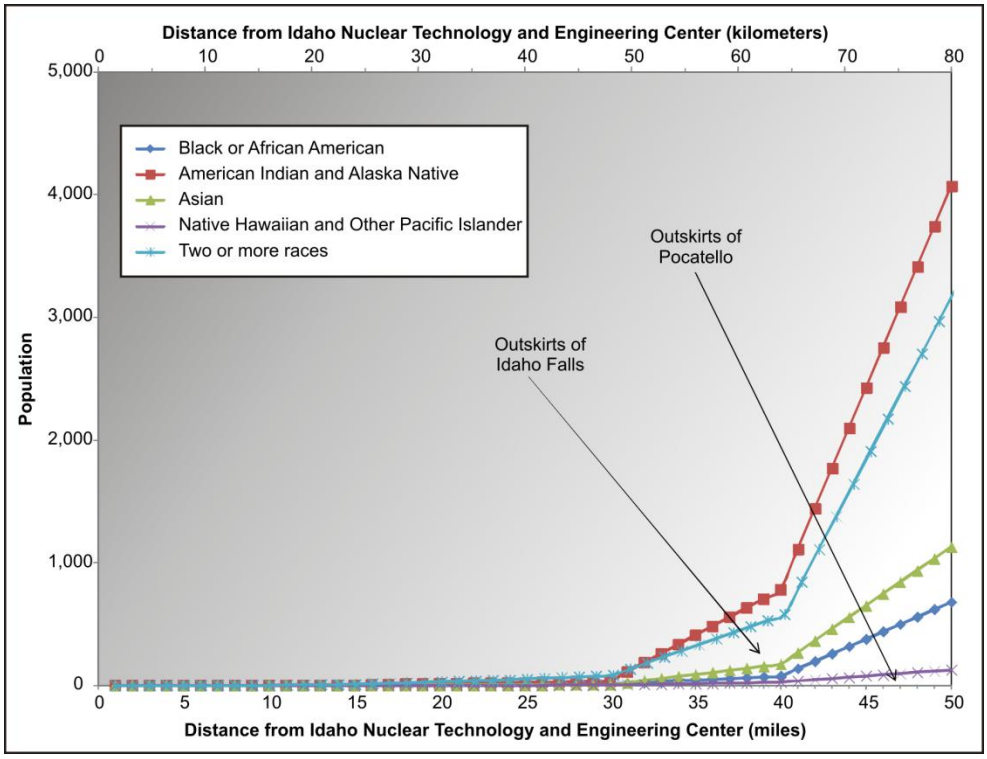

Figure J–25. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Idaho Nuclear Technology and Engineering Center

Figure J–26 shows the block groups surrounding INTEC at INL, as well as the low-income and non-low-income populations living in the potentially affected area. Of the 127 block groups that surround INTEC, an estimated 4 contain meaningfully greater low-income populations. As indicated in Table J–13, approximately 90 percent of the potentially affected low-income population lives in Bingham and Bonneville Counties. Low-income persons constitute approximately 12 percent of the total population living in the potentially affected area. Figure J–27 shows cumulative low-income populations as a function of distance from INTEC. Low-income populations surrounding INL are concentrated in the Blackfoot and Idaho Falls areas.

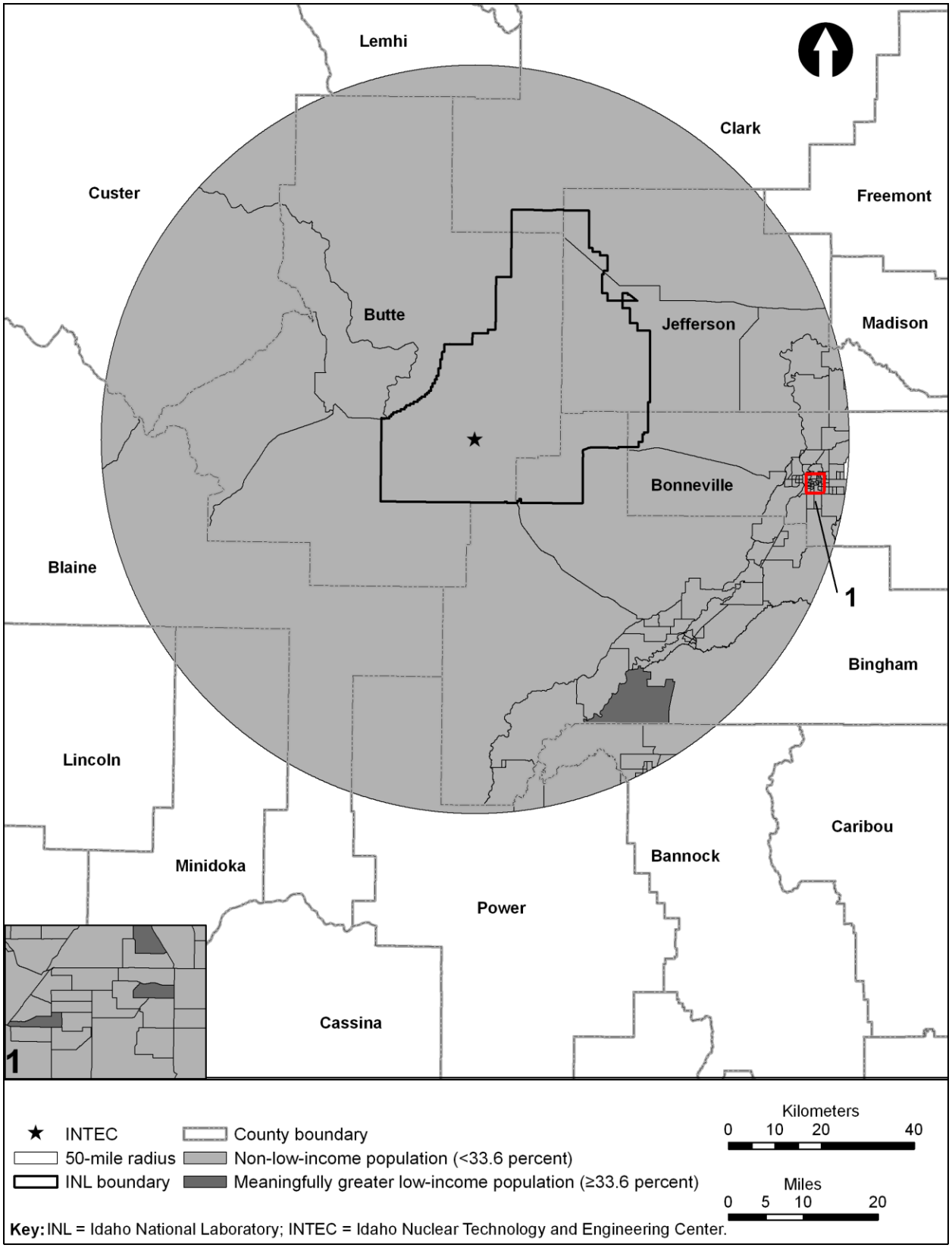

Figure J–26. Meaningfully Greater Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Idaho Nuclear Technology and Engineering Center

Table J–13. Low-Income Populations Living in Potentially Affected Counties Surrounding the Idaho Nuclear Technology and Engineering Center

County (Idaho)	Total County Population[a]	Total Low-Income Population[a]	Potentially Affected Total Population[b]	Potentially Affected Low-Income Population[b]	Percentage of the Potentially Affected Low-Income Population Total
Bannock	79,103	11,098	6,696	491	2.7
Bingham	44,125	6,498	42,238	6,254	35.0
Blaine	21,172	1,979	1,147	89	0.5
Bonneville	99,305	10,882	83,967	9,771	54.7
Butte	2,768	381	2,765	381	2.1
Clark	857	97	246	28	0.2
Custer	4,277	592	668	79	0.4
Fremont	12,960	1,104	4	0	0.0
Jefferson	24,411	2,479	8,095	721	4.0
Lemhi	7,753	1,553	31	2	0.0
Lincoln	4,935	757	11	0	0.0
Madison	34,372	11,082	19	1	0.0
Minidoka	19,254	2,518	313	18	0.1
Power	7,633	848	631	32	0.2
Total	**362,925**	**51,868**	**146,832**	**17,867**	**100.0**

[a] Census 2011c.

[b] Potentially affected population totals may differ slightly from those presented in Chapter 3, Section 3.2.11.2.1, due to rounding.

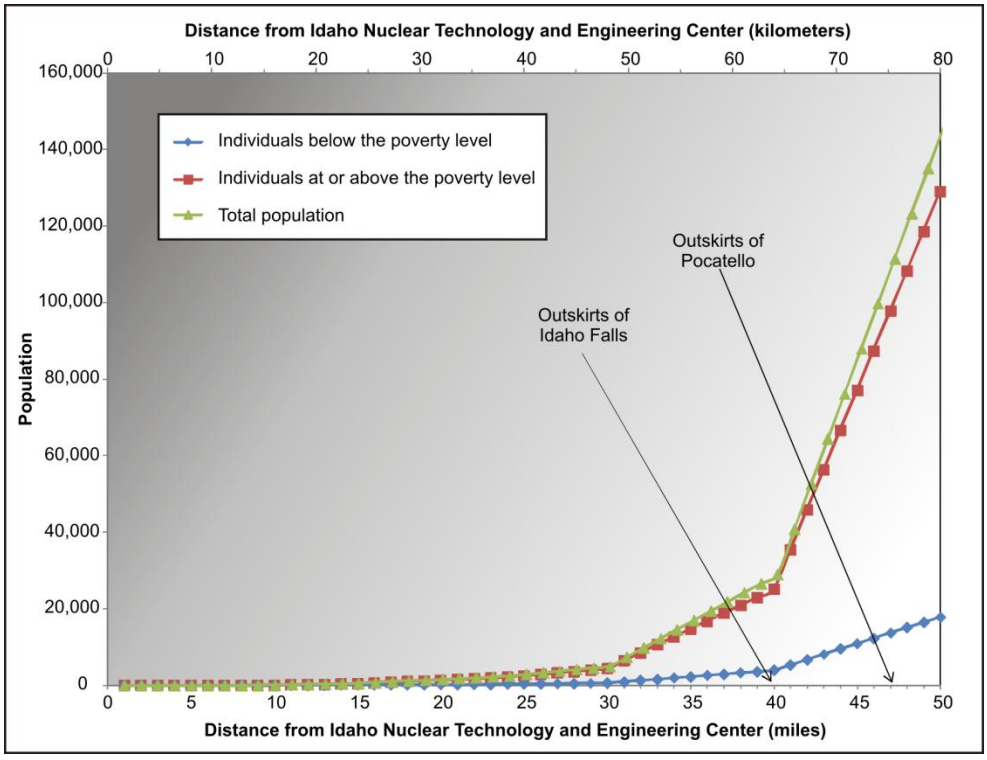

Figure J–27. Cumulative Low-Income Populations as a Function of Distance from the Idaho Nuclear Technology and Engineering Center

J.5.7 Impacts on Minority and Low-Income Populations

This environmental justice analysis is based on assessment of the impacts reported in Chapter 4 of this *TC & WM EIS*. Initially, all resource areas were examined to identify those with the potential for disproportionately high and adverse health or environmental impacts on minority and low-income populations. Access to Hanford is restricted, so the majority of impacts would be associated with onsite activities and would not affect populations residing off site; thus the potential for environmental justice concerns is small. Resource areas that could be impacted and that may affect populations residing off site include public health and safety due to normal operations and facility accidents, air quality, groundwater resources, and long-term human health. These areas were further analyzed because they have the potential to pose environmental justice concerns.

J.5.7.1 Normal Operations and Facility Accidents

Radiological impacts of normal operations on minority, Hispanic, American Indian, and low-income populations were determined by applying the same methodology used to determine impacts of normal operations on the general public (total population). Concentrations of radioactive air emissions originating from the appropriate facilities under each alternative were modeled using meteorological data and population distributions relative to the release sites to determine the impacts on each subset population. This approach is discussed in detail in Appendix K, Sections K.2.1.1.1, K.2.2.1.1, and K.2.3.1.1. Note that the exposure scenarios used to model the minority, Hispanic, American Indian, and low-income populations assume that these individuals would be exposed in the same manner as the general population, that is, by external exposure to the plume and deposited radioactive materials and by internal exposure from inhalation of contaminated air and deposited radioactive materials and ingestion of contaminated food, including homegrown produce and animal products from regional livestock.

For purposes of evaluating the potential for disproportionately high and adverse impacts caused by radioactive emissions from normal operations, the average dose to an individual of the minority or low-income population is compared with the average dose to an individual of the remainder of the population. Data relative to income from the 2006–2010 ACS 5-year estimates, Table C17002 (Census 2011c), are not directly comparable to the total populations from the 2010 census, Table P5 (Census 2011a). The data relative to income from the ACS are estimated using multiyear sample data from a smaller sample universe (population for whom poverty status is determined) than is used for data relative to race and ethnicity (total population). Therefore, estimates of the low-income population have been scaled up to be directly comparable to the total population from the 2010 census by applying the distribution of the population identified to be low-income from the ACS to the total population from the 2010 census of corresponding geographic areas. Table J–14 shows the population values used for this environmental justice analysis. The maximum annual dose (the maximum estimated dose in a single year of a particular alternative) and the project lifetime dose (the estimated dose received over the duration of a particular alternative) are used for this comparison. A maximum annual dose and a project lifetime dose were calculated for each subset of the population being evaluated (minority, Hispanic, American Indian, and low-income). The average dose to an individual of the population subset being evaluated is derived by dividing the population dose for the subset by the number of people in the subset, as follows:

$$D_{is} = \frac{D_{ps}}{n_s}$$

where:

D_{is} = average dose to an individual in the population subset *s*, millirem
D_{ps} = population dose received by the population subset *s*, person-rem
n_s = number of people in the population subset *s*

Table J–14. Potentially Affected Populations[a]

Facility Site	Total Population[b]	Total Minority Population	Hispanic Population[c]	American Indian Population	Low-Income Population[d]
WTP	542,324	252,134	219,632	10,739	106,374
STTS-East	546,746	253,334	220,513	10,839	107,032
STTS-West	589,668	264,483	228,660	11,933	111,310
FFTF	445,002	198,216	173,540	6,504	80,254
INTEC	152,493	28,408	21,006	4,068	18,556
MFC	250,838	39,297	27,634	5,763	36,309

a Reflects populations living within an 80-kilometer (50-mile) radius of the indicated facility sites.

b Populations in this table may vary slightly from those presented in Sections J.5.1 through J.5.6 due to rounding.

c Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

d Low-income population values are based on data from a smaller sample universe than data on race and ethnicity; therefore, the distribution of low-income populations have been scaled up to be directly comparable to the total population of corresponding geographic areas.

Key: FFTF=Fast Flux Test Facility; INTEC=Idaho Nuclear Technology and Engineering Center; MFC=Materials and Fuels Complex; STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

The result is then compared with the average dose to an individual who is not a member of the subset being evaluated. The average dose to a member of the remaining population is derived by dividing the population dose to the remainder of the population (population dose to the total population minus the population dose to the subset population) by the number of people in the remainder of the population (living within 80 kilometers [50 miles] of the candidate facilities that are not in the population subset), as follows:

$$D_{ir} = \frac{D_{pr}}{n_r}$$

where:

D_{ir} = average dose to an individual in the remainder of the population (not a member of population subset *s*), millirem

D_{pr} = population dose received by the remainder of the population (the population that is not a member of subset *s*), person-rem

n_r = number of people in the remainder of the population (total population minus population of subset *s*)

J.5.7.1.1 Tank Closure Alternatives

Table J–15 compares average individual doses to minority and nonminority populations under each Tank Closure alternative to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to a minority individual and a nonminority individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–15. Tank Closure Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	4.0×10^{-1}	7.2×10^{-4}	1.7×10^{-1}	6.7×10^{-4}	2.3×10^{-1}	7.7×10^{-4}
STTS-West	3.9×10^{-1}	6.6×10^{-4}	1.5×10^{-1}	5.9×10^{-4}	2.3×10^{-1}	7.2×10^{-4}
Total	**7.8×10^{-1}**	**1.4×10^{-3}**	**3.2×10^{-1}**	**1.3×10^{-3}**	**4.6×10^{-1}**	**1.5×10^{-3}**
Alternative 2A						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	6.4×10^{-8}	1.2×10^{-10}	2.6×10^{-8}	1.0×10^{-10}	3.7×10^{-8}	1.3×10^{-10}
STTS-West	0	0	0	0	0	0
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**1.1×10^{2}**	**4.6×10^{-1}**	**1.6×10^{2}**	**5.6×10^{-1}**
Alternative 2B						
WTP	3.3×10^{2}	6.1×10^{-1}	1.4×10^{2}	5.5×10^{-1}	1.9×10^{2}	6.6×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	1.1×10^{-2}	4.2×10^{-5}	1.5×10^{-2}	5.1×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	9.1×10^{-3}	3.5×10^{-5}	1.6×10^{-2}	4.9×10^{-5}
Total	**3.3×10^{2}**	**6.1×10^{-1}**	**1.4×10^{2}**	**5.5×10^{-1}**	**1.9×10^{2}**	**6.6×10^{-1}**
Alternative 3A						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	1.0	1.8×10^{-3}	4.3×10^{-1}	1.7×10^{-3}	5.7×10^{-1}	1.9×10^{-3}
STTS-West	9.0×10^{-1}	1.5×10^{-3}	3.7×10^{-1}	1.4×10^{-3}	5.3×10^{-1}	1.6×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**1.2×10^{2}**	**4.6×10^{-1}**	**1.6×10^{2}**	**5.6×10^{-1}**
Alternative 3B						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	4.1×10^{-5}	7.4×10^{-8}	1.7×10^{-5}	6.7×10^{-8}	2.4×10^{-5}	8.0×10^{-8}
STTS-West	7.4×10^{-4}	1.2×10^{-6}	2.7×10^{-4}	1.0×10^{-6}	4.7×10^{-4}	1.4×10^{-6}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**1.1×10^{2}**	**4.6×10^{-1}**	**1.6×10^{2}**	**5.6×10^{-1}**
Alternative 3C						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	1.1	2.1×10^{-3}	4.9×10^{-1}	1.9×10^{-3}	6.5×10^{-1}	2.2×10^{-3}
STTS-West	1.0	1.7×10^{-3}	4.1×10^{-1}	1.6×10^{-3}	6.1×10^{-1}	1.9×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**1.2×10^{2}**	**4.6×10^{-1}**	**1.6×10^{2}**	**5.6×10^{-1}**

Table J–15. Tank Closure Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses in Year of Maximum Impact *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
Alternative 4						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	4.8×10^{-3}	8.9×10^{-6}	2.0×10^{-3}	7.9×10^{-6}	2.8×10^{-3}	9.7×10^{-6}
STTS-West	4.9×10^{-3}	8.2×10^{-6}	1.8×10^{-3}	6.7×10^{-6}	3.1×10^{-3}	9.4×10^{-6}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{1.1\times10^{2}}$	$\mathbf{4.6\times10^{-1}}$	$\mathbf{1.6\times10^{2}}$	$\mathbf{5.6\times10^{-1}}$
Alternative 5						
WTP	2.8×10^{2}	5.1×10^{-1}	1.2×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	1.9×10^{-5}	3.5×10^{-8}	8.1×10^{-6}	3.2×10^{-8}	1.1×10^{-5}	3.8×10^{-8}
STTS-West	1.1	1.9×10^{-3}	4.6×10^{-1}	1.8×10^{-3}	6.7×10^{-1}	2.1×10^{-3}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{1.2\times10^{2}}$	$\mathbf{4.6\times10^{-1}}$	$\mathbf{1.6\times10^{2}}$	$\mathbf{5.6\times10^{-1}}$
Alternative 6A, Base Case						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	4.1×10^{-2}	7.6×10^{-5}	1.7×10^{-2}	6.8×10^{-5}	2.4×10^{-2}	8.2×10^{-5}
STTS-West	3.9×10^{-2}	6.7×10^{-5}	1.4×10^{-2}	5.5×10^{-5}	2.5×10^{-2}	7.6×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{1.1\times10^{2}}$	$\mathbf{4.6\times10^{-1}}$	$\mathbf{1.6\times10^{2}}$	$\mathbf{5.6\times10^{-1}}$
Alternative 6A, Option Case						
WTP	2.8×10^{2}	5.1×10^{-1}	1.1×10^{2}	4.6×10^{-1}	1.6×10^{2}	5.6×10^{-1}
STTS-East	5.2×10^{-2}	9.4×10^{-5}	2.1×10^{-2}	8.4×10^{-5}	3.0×10^{-2}	1.0×10^{-4}
STTS-West	5.0×10^{-2}	8.4×10^{-5}	1.8×10^{-2}	6.9×10^{-5}	3.1×10^{-2}	9.6×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{1.1\times10^{2}}$	$\mathbf{4.6\times10^{-1}}$	$\mathbf{1.6\times10^{2}}$	$\mathbf{5.6\times10^{-1}}$
Alternative 6B, Base Case						
WTP	3.2×10^{2}	6.0×10^{-1}	1.3×10^{2}	5.3×10^{-1}	1.9×10^{2}	6.5×10^{-1}
STTS-East	5.0×10^{-1}	9.2×10^{-4}	2.1×10^{-1}	8.2×10^{-4}	2.9×10^{-1}	1.0×10^{-3}
STTS-West	4.7×10^{-1}	7.9×10^{-4}	1.7×10^{-1}	6.5×10^{-4}	2.9×10^{-1}	9.0×10^{-4}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{1.4\times10^{2}}$	$\mathbf{5.4\times10^{-1}}$	$\mathbf{1.9\times10^{2}}$	$\mathbf{6.5\times10^{-1}}$
Alternative 6B, Option Case						
WTP	3.2×10^{2}	6.0×10^{-1}	1.3×10^{2}	5.3×10^{-1}	1.9×10^{2}	6.5×10^{-1}
STTS-East	6.5×10^{-1}	1.2×10^{-3}	2.7×10^{-1}	1.1×10^{-3}	3.8×10^{-1}	1.3×10^{-3}
STTS-West	5.7×10^{-1}	9.6×10^{-4}	2.1×10^{-1}	7.9×10^{-4}	3.6×10^{-1}	1.1×10^{-3}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{1.3\times10^{2}}$	$\mathbf{5.4\times10^{-1}}$	$\mathbf{1.9\times10^{2}}$	$\mathbf{6.5\times10^{-1}}$
Alternative 6C						
WTP	3.2×10^{2}	6.0×10^{-1}	1.3×10^{2}	5.3×10^{-1}	1.9×10^{2}	6.5×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	1.1×10^{-2}	4.2×10^{-5}	1.5×10^{-2}	5.1×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	9.1×10^{-3}	3.5×10^{-5}	1.6×10^{-2}	4.9×10^{-5}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{1.3\times10^{2}}$	$\mathbf{5.3\times10^{-1}}$	$\mathbf{1.9\times10^{2}}$	$\mathbf{6.5\times10^{-1}}$

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–16 compares average individual doses to American Indian and non–American Indian populations under each Tank Closure alternative to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to an American Indian individual and a non–American Indian individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–16. Tank Closure Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	4.0×10^{-1}	7.2×10^{-4}	4.9×10^{-3}	4.5×10^{-4}	3.9×10^{-1}	7.3×10^{-4}
STTS-West	3.9×10^{-1}	6.6×10^{-4}	5.2×10^{-3}	4.3×10^{-4}	3.8×10^{-1}	6.6×10^{-4}
Total	**7.8×10^{-1}**	**1.4×10^{-3}**	**1.0×10^{-2}**	**8.9×10^{-4}**	**7.7×10^{-1}**	**1.4×10^{-3}**
Alternative 2A						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	6.4×10^{-8}	1.2×10^{-10}	6.3×10^{-10}	5.8×10^{-11}	6.3×10^{-8}	1.2×10^{-10}
STTS-West	0	0	0	0	0	0
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**2.8**	**2.6×10^{-1}**	**2.7×10^{2}**	**5.1×10^{-1}**
Alternative 2B						
WTP	3.3×10^{2}	6.1×10^{-1}	3.4	3.2×10^{-1}	3.3×10^{2}	6.2×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	2.5×10^{-4}	2.3×10^{-5}	2.5×10^{-2}	4.7×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	2.7×10^{-4}	2.2×10^{-5}	2.5×10^{-2}	4.3×10^{-5}
Total	**3.3×10^{2}**	**6.1×10^{-1}**	**3.4**	**3.2×10^{-1}**	**3.3×10^{2}**	**6.2×10^{-1}**
Alternative 3A						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	1.0	1.8×10^{-3}	1.3×10^{-2}	1.2×10^{-3}	9.8×10^{-1}	1.8×10^{-3}
STTS-West	9.0×10^{-1}	1.5×10^{-3}	1.3×10^{-2}	1.1×10^{-3}	8.9×10^{-1}	1.5×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**2.8**	**2.6×10^{-1}**	**2.8×10^{2}**	**5.2×10^{-1}**
Alternative 3B						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	4.1×10^{-5}	7.4×10^{-8}	4.4×10^{-7}	4.0×10^{-8}	4.0×10^{-5}	7.5×10^{-8}
STTS-West	7.4×10^{-4}	1.2×10^{-6}	7.9×10^{-6}	6.6×10^{-7}	7.3×10^{-4}	1.3×10^{-6}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**2.8**	**2.6×10^{-1}**	**2.7×10^{2}**	**5.1×10^{-1}**
Alternative 3C						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	1.1	2.1×10^{-3}	1.5×10^{-2}	1.4×10^{-3}	1.1	2.1×10^{-3}
STTS-West	1.0	1.7×10^{-3}	1.4×10^{-2}	1.2×10^{-3}	1.0	1.7×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**2.8**	**2.6×10^{-1}**	**2.8×10^{2}**	**5.2×10^{-1}**
Alternative 4						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	4.8×10^{-3}	8.9×10^{-6}	4.8×10^{-5}	4.4×10^{-6}	4.8×10^{-3}	9.0×10^{-6}
STTS-West	4.9×10^{-3}	8.2×10^{-6}	5.2×10^{-5}	4.4×10^{-6}	4.8×10^{-3}	8.3×10^{-6}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**2.8**	**2.6×10^{-1}**	**2.7×10^{2}**	**5.1×10^{-1}**

Table J–16. Tank Closure Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses in Year of Maximum Impact *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 5						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.8×10^{2}	5.2×10^{-1}
STTS-East	1.9×10^{-5}	3.5×10^{-8}	2.1×10^{-7}	1.9×10^{-8}	1.9×10^{-5}	3.6×10^{-8}
STTS-West	1.1	1.9×10^{-3}	1.6×10^{-2}	1.4×10^{-3}	1.1	1.9×10^{-3}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	**2.8**	$\mathbf{2.6\times10^{-1}}$	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.2\times10^{-1}}$
Alternative 6A, Base Case						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	4.1×10^{-2}	7.6×10^{-5}	4.2×10^{-4}	3.9×10^{-5}	4.1×10^{-2}	7.6×10^{-5}
STTS-West	3.9×10^{-2}	6.7×10^{-5}	4.3×10^{-4}	3.6×10^{-5}	3.9×10^{-2}	6.7×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	**2.8**	$\mathbf{2.6\times10^{-1}}$	$\mathbf{2.7\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$
Alternative 6A, Option Case						
WTP	2.8×10^{2}	5.1×10^{-1}	2.8	2.6×10^{-1}	2.7×10^{2}	5.1×10^{-1}
STTS-East	5.2×10^{-2}	9.4×10^{-5}	5.3×10^{-4}	4.9×10^{-5}	5.1×10^{-2}	9.5×10^{-5}
STTS-West	5.0×10^{-2}	8.4×10^{-5}	5.5×10^{-4}	4.6×10^{-5}	4.9×10^{-2}	8.5×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	**2.8**	$\mathbf{2.6\times10^{-1}}$	$\mathbf{2.7\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$
Alternative 6B, Base Case						
WTP	3.2×10^{2}	6.0×10^{-1}	3.3	3.1×10^{-1}	3.2×10^{2}	6.0×10^{-1}
STTS-East	5.0×10^{-1}	9.2×10^{-4}	5.1×10^{-3}	4.7×10^{-4}	5.0×10^{-1}	9.3×10^{-4}
STTS-West	4.7×10^{-1}	7.9×10^{-4}	5.1×10^{-3}	4.2×10^{-4}	4.6×10^{-1}	8.0×10^{-4}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	**3.3**	$\mathbf{3.1\times10^{-1}}$	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$
Alternative 6B, Option Case						
WTP	3.2×10^{2}	6.0×10^{-1}	3.3	3.1×10^{-1}	3.2×10^{2}	6.0×10^{-1}
STTS-East	6.5×10^{-1}	1.2×10^{-3}	6.6×10^{-3}	6.1×10^{-4}	6.4×10^{-1}	1.2×10^{-3}
STTS-West	5.7×10^{-1}	9.6×10^{-4}	6.2×10^{-3}	5.2×10^{-4}	5.6×10^{-1}	9.7×10^{-4}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	**3.3**	$\mathbf{3.1\times10^{-1}}$	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$
Alternative 6C						
WTP	3.2×10^{2}	6.0×10^{-1}	3.3	3.1×10^{-1}	3.2×10^{2}	6.0×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	2.5×10^{-4}	2.3×10^{-5}	2.5×10^{-2}	4.7×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	2.7×10^{-4}	2.2×10^{-5}	2.5×10^{-2}	4.3×10^{-5}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	**3.3**	$\mathbf{3.1\times10^{-1}}$	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–17 compares average individual doses to Hispanic and non-Hispanic populations under each Tank Closure alternative to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to a Hispanic individual and a non-Hispanic individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic populations surrounding each facility site.

Table J–17. Tank Closure Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	4.0×10^{-1}	7.2×10^{-4}	1.4×10^{-1}	6.6×10^{-4}	2.5×10^{-1}	7.7×10^{-4}
STTS-West	3.9×10^{-1}	6.6×10^{-4}	1.3×10^{-1}	5.7×10^{-4}	2.6×10^{-1}	7.2×10^{-4}
Total	**7.8×10^{-1}**	**1.4×10^{-3}**	**2.8×10^{-1}**	**1.2×10^{-3}**	**5.1×10^{-1}**	**1.5×10^{-3}**
Alternative 2A						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	6.4×10^{-8}	1.2×10^{-10}	2.2×10^{-8}	1.0×10^{-10}	4.1×10^{-8}	1.3×10^{-10}
STTS-West	0	0	0	0	0	0
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**9.8×10^{1}**	**4.5×10^{-1}**	**1.8×10^{2}**	**5.5×10^{-1}**
Alternative 2B						
WTP	3.3×10^{2}	6.1×10^{-1}	1.2×10^{2}	5.3×10^{-1}	2.1×10^{2}	6.6×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	9.0×10^{-3}	4.1×10^{-5}	1.7×10^{-2}	5.1×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	7.5×10^{-3}	3.3×10^{-5}	1.7×10^{-2}	4.8×10^{-5}
Total	**3.3×10^{2}**	**6.1×10^{-1}**	**1.2×10^{2}**	**5.3×10^{-1}**	**2.1×10^{2}**	**6.6×10^{-1}**
Alternative 3A						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	1.0	1.8×10^{-3}	3.7×10^{-1}	1.7×10^{-3}	6.3×10^{-1}	1.9×10^{-3}
STTS-West	9.0×10^{-1}	1.5×10^{-3}	3.1×10^{-1}	1.4×10^{-3}	5.9×10^{-1}	1.6×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**9.8×10^{1}**	**4.5×10^{-1}**	**1.8×10^{2}**	**5.6×10^{-1}**
Alternative 3B						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	4.1×10^{-5}	7.4×10^{-8}	1.5×10^{-5}	6.6×10^{-8}	2.6×10^{-5}	8.0×10^{-8}
STTS-West	7.4×10^{-4}	1.2×10^{-6}	2.2×10^{-4}	9.7×10^{-7}	5.1×10^{-4}	1.4×10^{-6}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**9.8×10^{1}**	**4.5×10^{-1}**	**1.8×10^{2}**	**5.5×10^{-1}**
Alternative 3C						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	1.1	2.1×10^{-3}	4.2×10^{-1}	1.9×10^{-3}	7.2×10^{-1}	2.2×10^{-3}
STTS-West	1.0	1.7×10^{-3}	3.5×10^{-1}	1.5×10^{-3}	6.7×10^{-1}	1.9×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**9.9×10^{1}**	**4.5×10^{-1}**	**1.8×10^{2}**	**5.6×10^{-1}**

Table J–17. Tank Closure Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses in Year of Maximum Impact *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 4						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	4.8×10^{-3}	8.9×10^{-6}	1.7×10^{-3}	7.7×10^{-6}	3.1×10^{-3}	9.6×10^{-6}
STTS-West	4.9×10^{-3}	8.2×10^{-6}	1.5×10^{-3}	6.5×10^{-6}	3.4×10^{-3}	9.4×10^{-6}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{9.8\times10^{1}}$	$\mathbf{4.5\times10^{-1}}$	$\mathbf{1.8\times10^{2}}$	$\mathbf{5.5\times10^{-1}}$
Alternative 5						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.6×10^{-1}
STTS-East	1.9×10^{-5}	3.5×10^{-8}	6.9×10^{-6}	3.2×10^{-8}	1.2×10^{-5}	3.8×10^{-8}
STTS-West	1.1	1.9×10^{-3}	3.9×10^{-1}	1.7×10^{-3}	7.4×10^{-1}	2.0×10^{-3}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{9.9\times10^{1}}$	$\mathbf{4.5\times10^{-1}}$	$\mathbf{1.8\times10^{2}}$	$\mathbf{5.6\times10^{-1}}$
Alternative 6A, Base Case						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	4.1×10^{-2}	7.6×10^{-5}	1.5×10^{-2}	6.6×10^{-5}	2.7×10^{-2}	8.2×10^{-5}
STTS-West	3.9×10^{-2}	6.7×10^{-5}	1.2×10^{-2}	5.2×10^{-5}	2.7×10^{-2}	7.6×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{9.8\times10^{1}}$	$\mathbf{4.5\times10^{-1}}$	$\mathbf{1.8\times10^{2}}$	$\mathbf{5.5\times10^{-1}}$
Alternative 6A, Option Case						
WTP	2.8×10^{2}	5.1×10^{-1}	9.8×10^{1}	4.5×10^{-1}	1.8×10^{2}	5.5×10^{-1}
STTS-East	5.2×10^{-2}	9.4×10^{-5}	1.8×10^{-2}	8.3×10^{-5}	3.3×10^{-2}	1.0×10^{-4}
STTS-West	5.0×10^{-2}	8.4×10^{-5}	1.5×10^{-2}	6.7×10^{-5}	3.4×10^{-2}	9.5×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{9.8\times10^{1}}$	$\mathbf{4.5\times10^{-1}}$	$\mathbf{1.8\times10^{2}}$	$\mathbf{5.5\times10^{-1}}$
Alternative 6B, Base Case						
WTP	3.2×10^{2}	6.0×10^{-1}	1.1×10^{2}	5.2×10^{-1}	2.1×10^{2}	6.5×10^{-1}
STTS-East	5.0×10^{-1}	9.2×10^{-4}	1.8×10^{-1}	8.1×10^{-4}	3.3×10^{-1}	1.0×10^{-3}
STTS-West	4.7×10^{-1}	7.9×10^{-4}	1.4×10^{-1}	6.2×10^{-4}	3.2×10^{-1}	9.0×10^{-4}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{1.2\times10^{2}}$	$\mathbf{5.2\times10^{-1}}$	$\mathbf{2.1\times10^{2}}$	$\mathbf{6.5\times10^{-1}}$
Alternative 6B, Option Case						
WTP	3.2×10^{2}	6.0×10^{-1}	1.1×10^{2}	5.2×10^{-1}	2.1×10^{2}	6.5×10^{-1}
STTS-East	6.5×10^{-1}	1.2×10^{-3}	2.3×10^{-1}	1.0×10^{-3}	4.2×10^{-1}	1.3×10^{-3}
STTS-West	5.7×10^{-1}	9.6×10^{-4}	1.7×10^{-1}	7.6×10^{-4}	3.9×10^{-1}	1.1×10^{-3}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{1.2\times10^{2}}$	$\mathbf{5.2\times10^{-1}}$	$\mathbf{2.1\times10^{2}}$	$\mathbf{6.5\times10^{-1}}$
Alternative 6C						
WTP	3.2×10^{2}	6.0×10^{-1}	1.1×10^{2}	5.2×10^{-1}	2.1×10^{2}	6.5×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	9.0×10^{-3}	4.1×10^{-5}	1.7×10^{-2}	5.1×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	7.5×10^{-3}	3.3×10^{-5}	1.7×10^{-2}	4.8×10^{-5}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{1.1\times10^{2}}$	$\mathbf{5.2\times10^{-1}}$	$\mathbf{2.1\times10^{2}}$	$\mathbf{6.5\times10^{-1}}$

[a] Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–18 compares average individual doses to low-income and non-low-income populations under each Tank Closure alternative to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to a low-income individual and a non-low-income individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–18. Tank Closure Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	4.0×10^{-1}	7.2×10^{-4}	7.0×10^{-2}	6.5×10^{-4}	3.3×10^{-1}	7.4×10^{-4}
STTS-West	3.9×10^{-1}	6.6×10^{-4}	6.3×10^{-2}	5.7×10^{-4}	3.3×10^{-1}	6.8×10^{-4}
Total	**7.8×10^{-1}**	**1.4×10^{-3}**	**1.3×10^{-1}**	**1.2×10^{-3}**	**6.5×10^{-1}**	**1.4×10^{-3}**
Alternative 2A						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	6.4×10^{-8}	1.2×10^{-10}	1.1×10^{-8}	1.0×10^{-10}	5.3×10^{-8}	1.2×10^{-10}
STTS-West	0	0	0	0	0	0
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**4.7×10^{1}**	**4.4×10^{-1}**	**2.3×10^{2}**	**5.3×10^{-1}**
Alternative 2B						
WTP	3.3×10^{2}	6.1×10^{-1}	5.7×10^{1}	5.3×10^{-1}	2.7×10^{2}	6.3×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	4.4×10^{-3}	4.1×10^{-5}	2.1×10^{-2}	4.8×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	3.8×10^{-3}	3.4×10^{-5}	2.1×10^{-2}	4.4×10^{-5}
Total	**3.3×10^{2}**	**6.1×10^{-1}**	**5.7×10^{1}**	**5.3×10^{-1}**	**2.7×10^{2}**	**6.3×10^{-1}**
Alternative 3A						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	1.0	1.8×10^{-3}	1.8×10^{-1}	1.7×10^{-3}	8.2×10^{-1}	1.9×10^{-3}
STTS-West	9.0×10^{-1}	1.5×10^{-3}	1.5×10^{-1}	1.4×10^{-3}	7.5×10^{-1}	1.6×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**4.8×10^{1}**	**4.5×10^{-1}**	**2.3×10^{2}**	**5.3×10^{-1}**
Alternative 3B						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	4.1×10^{-5}	7.4×10^{-8}	7.1×10^{-6}	6.6×10^{-8}	3.3×10^{-5}	7.6×10^{-8}
STTS-West	7.4×10^{-4}	1.2×10^{-6}	1.1×10^{-4}	1.0×10^{-6}	6.2×10^{-4}	1.3×10^{-6}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**4.7×10^{1}**	**4.4×10^{-1}**	**2.3×10^{2}**	**5.2×10^{-1}**
Alternative 3C						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	1.1	2.1×10^{-3}	2.0×10^{-1}	1.9×10^{-3}	9.3×10^{-1}	2.1×10^{-3}
STTS-West	1.0	1.7×10^{-3}	1.7×10^{-1}	1.5×10^{-3}	8.5×10^{-1}	1.8×10^{-3}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**4.8×10^{1}**	**4.5×10^{-1}**	**2.3×10^{2}**	**5.3×10^{-1}**
Alternative 4						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	4.8×10^{-3}	8.9×10^{-6}	8.3×10^{-4}	7.8×10^{-6}	4.0×10^{-3}	9.1×10^{-6}
STTS-West	4.9×10^{-3}	8.2×10^{-6}	7.4×10^{-4}	6.6×10^{-6}	4.1×10^{-3}	8.6×10^{-6}
Total	**2.8×10^{2}**	**5.1×10^{-1}**	**4.7×10^{1}**	**4.4×10^{-1}**	**2.3×10^{2}**	**5.3×10^{-1}**

Table J–18. Tank Closure Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses in Year of Maximum Impact *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
Alternative 5						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.5×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	1.9×10^{-5}	3.5×10^{-8}	3.4×10^{-6}	3.2×10^{-8}	1.6×10^{-5}	3.6×10^{-8}
STTS-West	1.1	1.9×10^{-3}	1.9×10^{-1}	1.7×10^{-3}	9.4×10^{-1}	2.0×10^{-3}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{4.8\times10^{1}}$	$\mathbf{4.5\times10^{-1}}$	$\mathbf{2.3\times10^{2}}$	$\mathbf{5.3\times10^{-1}}$
Alternative 6A, Base Case						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	4.1×10^{-2}	7.6×10^{-5}	7.1×10^{-3}	6.7×10^{-5}	3.4×10^{-2}	7.8×10^{-5}
STTS-West	3.9×10^{-2}	6.7×10^{-5}	6.0×10^{-3}	5.4×10^{-5}	3.3×10^{-2}	7.0×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{4.7\times10^{1}}$	$\mathbf{4.4\times10^{-1}}$	$\mathbf{2.3\times10^{2}}$	$\mathbf{5.3\times10^{-1}}$
Alternative 6A, Option Case						
WTP	2.8×10^{2}	5.1×10^{-1}	4.7×10^{1}	4.4×10^{-1}	2.3×10^{2}	5.3×10^{-1}
STTS-East	5.2×10^{-2}	9.4×10^{-5}	8.9×10^{-3}	8.3×10^{-5}	4.3×10^{-2}	9.7×10^{-5}
STTS-West	5.0×10^{-2}	8.4×10^{-5}	7.6×10^{-3}	6.8×10^{-5}	4.2×10^{-2}	8.8×10^{-5}
Total	$\mathbf{2.8\times10^{2}}$	$\mathbf{5.1\times10^{-1}}$	$\mathbf{4.7\times10^{1}}$	$\mathbf{4.4\times10^{-1}}$	$\mathbf{2.3\times10^{2}}$	$\mathbf{5.3\times10^{-1}}$
Alternative 6B, Base Case						
WTP	3.2×10^{2}	6.0×10^{-1}	5.5×10^{1}	5.2×10^{-1}	2.7×10^{2}	6.1×10^{-1}
STTS-East	5.0×10^{-1}	9.2×10^{-4}	8.7×10^{-2}	8.1×10^{-4}	4.2×10^{-1}	9.5×10^{-4}
STTS-West	4.7×10^{-1}	7.9×10^{-4}	7.1×10^{-2}	6.4×10^{-4}	3.9×10^{-1}	8.2×10^{-4}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{5.5\times10^{1}}$	$\mathbf{5.2\times10^{-1}}$	$\mathbf{2.7\times10^{2}}$	$\mathbf{6.2\times10^{-1}}$
Alternative 6B, Option Case						
WTP	3.2×10^{2}	6.0×10^{-1}	5.5×10^{1}	5.2×10^{-1}	2.7×10^{2}	6.1×10^{-1}
STTS-East	6.5×10^{-1}	1.2×10^{-3}	1.1×10^{-1}	1.0×10^{-3}	5.3×10^{-1}	1.2×10^{-3}
STTS-West	5.7×10^{-1}	9.6×10^{-4}	8.7×10^{-2}	7.8×10^{-4}	4.8×10^{-1}	1.0×10^{-3}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{5.6\times10^{1}}$	$\mathbf{5.2\times10^{-1}}$	$\mathbf{2.7\times10^{2}}$	$\mathbf{6.2\times10^{-1}}$
Alternative 6C						
WTP	3.2×10^{2}	6.0×10^{-1}	5.5×10^{1}	5.2×10^{-1}	2.7×10^{2}	6.1×10^{-1}
STTS-East	2.6×10^{-2}	4.7×10^{-5}	4.4×10^{-3}	4.1×10^{-5}	2.1×10^{-2}	4.8×10^{-5}
STTS-West	2.5×10^{-2}	4.2×10^{-5}	3.8×10^{-3}	3.4×10^{-5}	2.1×10^{-2}	4.4×10^{-5}
Total	$\mathbf{3.2\times10^{2}}$	$\mathbf{6.0\times10^{-1}}$	$\mathbf{5.5\times10^{1}}$	$\mathbf{5.2\times10^{-1}}$	$\mathbf{2.7\times10^{2}}$	$\mathbf{6.1\times10^{-1}}$

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–19 compares the average individual doses to minority and nonminority populations under each Tank Closure alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to a minority individual and a nonminority individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–19. Tank Closure Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	3.7×10^{1}	6.8×10^{-2}	1.6×10^{1}	6.3×10^{-2}	2.1×10^{1}	7.3×10^{-2}
STTS-West	3.7×10^{1}	6.2×10^{-2}	1.5×10^{1}	5.5×10^{-2}	2.2×10^{1}	6.8×10^{-2}
Total	**7.4×10^{1}**	**1.3×10^{-1}**	**3.1×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 2A						
WTP	1.6×10^{3}	3.0	6.9×10^{2}	2.7	9.4×10^{2}	3.2
STTS-East	3.9×10^{1}	7.2×10^{-2}	1.7×10^{1}	6.6×10^{-2}	2.2×10^{1}	7.7×10^{-2}
STTS-West	3.9×10^{1}	6.5×10^{-2}	1.5×10^{1}	5.8×10^{-2}	2.3×10^{1}	7.1×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**7.2×10^{2}**	**2.9**	**9.8×10^{2}**	**3.4**
Alternative 2B						
WTP	1.6×10^{3}	3.0	7.0×10^{2}	2.8	9.5×10^{2}	3.3
STTS-East	9.3×10^{-1}	1.7×10^{-3}	3.8×10^{-1}	1.5×10^{-3}	5.4×10^{-1}	1.9×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	3.3×10^{-1}	1.3×10^{-3}	5.7×10^{-1}	1.8×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**7.0×10^{2}**	**2.8**	**9.5×10^{2}**	**3.3**
Alternative 3A						
WTP	1.2×10^{3}	2.2	4.9×10^{2}	2.0	6.8×10^{2}	2.3
STTS-East	2.2×10^{2}	4.1×10^{-1}	9.6×10^{1}	3.8×10^{-1}	1.3×10^{2}	4.3×10^{-1}
STTS-West	2.0×10^{2}	3.4×10^{-1}	8.3×10^{1}	3.1×10^{-1}	1.2×10^{2}	3.7×10^{-1}
Total	**1.6×10^{3}**	**2.9**	**6.7×10^{2}**	**2.6**	**9.2×10^{2}**	**3.1**
Alternative 3B						
WTP	1.2×10^{3}	2.2	4.9×10^{2}	2.0	6.8×10^{2}	2.3
STTS-East	1.1	1.9×10^{-3}	4.4×10^{-1}	1.7×10^{-3}	6.2×10^{-1}	2.1×10^{-3}
STTS-West	9.8×10^{-1}	1.7×10^{-3}	3.6×10^{-1}	1.4×10^{-3}	6.2×10^{-1}	1.9×10^{-3}
Total	**1.2×10^{3}**	**2.2**	**4.9×10^{2}**	**2.0**	**6.8×10^{2}**	**2.3**
Alternative 3C						
WTP	1.2×10^{3}	2.2	4.9×10^{2}	2.0	6.8×10^{2}	2.3
STTS-East	2.5×10^{2}	4.6×10^{-1}	1.1×10^{2}	4.3×10^{-1}	1.4×10^{2}	4.9×10^{-1}
STTS-West	2.3×10^{2}	3.9×10^{-1}	9.2×10^{1}	3.5×10^{-1}	1.4×10^{2}	4.2×10^{-1}
Total	**1.7×10^{3}**	**3.0**	**6.9×10^{2}**	**2.7**	**9.6×10^{2}**	**3.2**
Alternative 4						
WTP	1.2×10^{3}	2.2	5.0×10^{2}	2.0	6.8×10^{2}	2.4
STTS-East	2.2	3.9×10^{-3}	8.9×10^{-1}	3.5×10^{-3}	1.3	4.3×10^{-3}
STTS-West	2.0×10^{2}	3.5×10^{-1}	8.4×10^{1}	3.2×10^{-1}	1.2×10^{2}	3.7×10^{-1}
Total	**1.4×10^{3}**	**2.5**	**5.8×10^{2}**	**2.3**	**8.0×10^{2}**	**2.7**
Alternative 5						
WTP	1.2×10^{3}	2.3	5.2×10^{2}	2.1	7.1×10^{2}	2.5
STTS-East	8.8×10^{-1}	1.6×10^{-3}	3.6×10^{-1}	1.4×10^{-3}	5.1×10^{-1}	1.8×10^{-3}
STTS-West	1.8×10^{2}	3.1×10^{-1}	7.5×10^{1}	2.9×10^{-1}	1.1×10^{2}	3.3×10^{-1}
Total	**1.4×10^{3}**	**2.6**	**5.9×10^{2}**	**2.3**	**8.2×10^{2}**	**2.8**

Table J–19. Tank Closure Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses over the Life of the Project *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
Alternative 6A, Base Case						
WTP	1.7×10^{3}	3.1	7.2×10^{2}	2.9	9.8×10^{2}	3.4
STTS-East	3.6×10^{1}	6.6×10^{-2}	1.5×10^{1}	5.9×10^{-2}	2.1×10^{1}	7.2×10^{-2}
STTS-West	5.5×10^{-1}	9.3×10^{-4}	2.0×10^{-1}	7.6×10^{-4}	3.5×10^{-1}	1.1×10^{-3}
Total	**1.7×10^{3}**	**3.2**	**7.3×10^{2}**	**2.9**	**1.0×10^{3}**	**3.4**
Alternative 6A, Option Case						
WTP	1.7×10^{3}	3.1	7.1×10^{2}	2.8	9.8×10^{2}	3.4
STTS-East	4.5×10^{1}	8.2×10^{-2}	1.9×10^{1}	7.4×10^{-2}	2.6×10^{1}	9.0×10^{-2}
STTS-West	4.5×10^{1}	7.7×10^{-2}	1.7×10^{1}	6.3×10^{-2}	2.9×10^{1}	8.8×10^{-2}
Total	**1.8×10^{3}**	**3.3**	**7.5×10^{2}**	**3.0**	**1.0×10^{3}**	**3.6**
Alternative 6B, Base Case						
WTP	1.6×10^{3}	3.0	6.9×10^{2}	2.7	9.4×10^{2}	3.2
STTS-East	3.3×10^{1}	6.1×10^{-2}	1.4×10^{1}	5.4×10^{-2}	1.9×10^{1}	6.6×10^{-2}
STTS-West	3.4×10^{1}	5.7×10^{-2}	1.2×10^{1}	4.7×10^{-2}	2.1×10^{1}	6.5×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**7.2×10^{2}**	**2.8**	**9.8×10^{2}**	**3.4**
Alternative 6B, Option Case						
WTP	1.6×10^{3}	3.0	6.9×10^{2}	2.7	9.5×10^{2}	3.3
STTS-East	4.2×10^{1}	7.7×10^{-2}	1.7×10^{1}	6.9×10^{-2}	2.5×10^{1}	8.4×10^{-2}
STTS-West	4.2×10^{1}	7.2×10^{-2}	1.6×10^{1}	5.9×10^{-2}	2.7×10^{1}	8.2×10^{-2}
Total	**1.7×10^{3}**	**3.2**	**7.2×10^{2}**	**2.8**	**1.0×10^{3}**	**3.4**
Alternative 6C						
WTP	1.6×10^{3}	3.0	6.9×10^{2}	2.7	9.4×10^{2}	3.2
STTS-East	9.3×10^{-1}	1.7×10^{-3}	3.8×10^{-1}	1.5×10^{-3}	5.4×10^{-1}	1.9×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	3.3×10^{-1}	1.3×10^{-3}	5.7×10^{-1}	1.8×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**6.9×10^{2}**	**2.7**	**9.4×10^{2}**	**3.2**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–20 compares the average individual doses to American Indian and non–American Indian populations under each Tank Closure alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to an American Indian individual and a non–American Indian individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–20. Tank Closure Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	3.7×10^{1}	6.8×10^{-2}	4.7×10^{-1}	4.3×10^{-2}	3.7×10^{1}	6.8×10^{-2}
STTS-West	3.7×10^{1}	6.2×10^{-2}	4.9×10^{-1}	4.1×10^{-2}	3.6×10^{1}	6.3×10^{-2}
Total	**7.4×10^{1}**	**1.3×10^{-1}**	**9.6×10^{-1}**	**8.4×10^{-2}**	**7.3×10^{1}**	**1.3×10^{-1}**
Alternative 2A						
WTP	1.6×10^{3}	3.0	1.9×10^{1}	1.7	1.6×10^{3}	3.0
STTS-East	3.9×10^{1}	7.2×10^{-2}	4.9×10^{-1}	4.5×10^{-2}	3.9×10^{1}	7.2×10^{-2}
STTS-West	3.9×10^{1}	6.5×10^{-2}	5.1×10^{-1}	4.3×10^{-2}	3.8×10^{1}	6.6×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**2.0×10^{1}**	**1.8**	**1.7×10^{3}**	**3.2**
Alternative 2B						
WTP	1.6×10^{3}	3.0	1.9×10^{1}	1.7	1.6×10^{3}	3.1
STTS-East	9.3×10^{-1}	1.7×10^{-3}	9.2×10^{-3}	8.5×10^{-4}	9.2×10^{-1}	1.7×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	9.7×10^{-3}	8.1×10^{-4}	9.0×10^{-1}	1.6×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**1.9×10^{1}**	**1.7**	**1.6×10^{3}**	**3.1**
Alternative 3A						
WTP	1.2×10^{3}	2.2	1.2×10^{1}	1.2	1.2×10^{3}	2.2
STTS-East	2.2×10^{2}	4.1×10^{-1}	3.0	2.8×10^{-1}	2.2×10^{2}	4.1×10^{-1}
STTS-West	2.0×10^{2}	3.4×10^{-1}	2.9	2.4×10^{-1}	2.0×10^{2}	3.4×10^{-1}
Total	**1.6×10^{3}**	**2.9**	**1.8×10^{1}**	**1.7**	**1.6×10^{3}**	**2.9**
Alternative 3B						
WTP	1.2×10^{3}	2.2	1.2×10^{1}	1.2	1.2×10^{3}	2.2
STTS-East	1.1	1.9×10^{-3}	1.0×10^{-2}	9.7×10^{-4}	1.0	1.9×10^{-3}
STTS-West	9.8×10^{-1}	1.7×10^{-3}	1.0×10^{-2}	8.8×10^{-4}	9.7×10^{-1}	1.7×10^{-3}
Total	**1.2×10^{3}**	**2.2**	**1.2×10^{1}**	**1.2**	**1.2×10^{3}**	**2.2**
Alternative 3C						
WTP	1.2×10^{3}	2.2	1.2×10^{1}	1.2	1.2×10^{3}	2.2
STTS-East	2.5×10^{2}	4.6×10^{-1}	3.3	3.0×10^{-1}	2.5×10^{2}	4.7×10^{-1}
STTS-West	2.3×10^{2}	3.9×10^{-1}	3.2	2.6×10^{-1}	2.2×10^{2}	3.9×10^{-1}
Total	**1.7×10^{3}**	**3.0**	**1.9×10^{1}**	**1.7**	**1.6×10^{3}**	**3.0**
Alternative 4						
WTP	1.2×10^{3}	2.2	1.3×10^{1}	1.2	1.2×10^{3}	2.2
STTS-East	2.2	3.9×10^{-3}	2.1×10^{-2}	2.0×10^{-3}	2.1	4.0×10^{-3}
STTS-West	2.0×10^{2}	3.5×10^{-1}	2.9	2.4×10^{-1}	2.0×10^{2}	3.5×10^{-1}
Total	**1.4×10^{3}**	**2.5**	**1.5×10^{1}**	**1.4**	**1.4×10^{3}**	**2.5**
Alternative 5						
WTP	1.2×10^{3}	2.3	1.3×10^{1}	1.3	1.2×10^{3}	2.3
STTS-East	8.8×10^{-1}	1.6×10^{-3}	8.7×10^{-3}	8.0×10^{-4}	8.7×10^{-1}	1.6×10^{-3}
STTS-West	1.8×10^{2}	3.1×10^{-1}	2.6	2.2×10^{-1}	1.8×10^{2}	3.1×10^{-1}
Total	**1.4×10^{3}**	**2.6**	**1.6×10^{1}**	**1.5**	**1.4×10^{3}**	**2.6**

Table J–20. Tank Closure Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses over the Life of the Project *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 6A, Base Case						
WTP	1.7×10^{3}	3.1	1.9×10^{1}	1.8	1.7×10^{3}	3.2
STTS-East	3.6×10^{1}	6.6×10^{-2}	3.6×10^{-1}	3.4×10^{-2}	3.6×10^{1}	6.6×10^{-2}
STTS-West	5.5×10^{-1}	9.3×10^{-4}	5.9×10^{-3}	5.0×10^{-4}	5.4×10^{-1}	9.4×10^{-4}
Total	**1.7×10^{3}**	**3.2**	**2.0×10^{1}**	**1.8**	**1.7×10^{3}**	**3.2**
Alternative 6A, Option Case						
WTP	1.7×10^{3}	3.1	1.9×10^{1}	1.8	1.7×10^{3}	3.2
STTS-East	4.5×10^{1}	8.2×10^{-2}	4.6×10^{-1}	4.2×10^{-2}	4.5×10^{1}	8.3×10^{-2}
STTS-West	4.5×10^{1}	7.7×10^{-2}	5.0×10^{-1}	4.2×10^{-2}	4.5×10^{1}	7.8×10^{-2}
Total	**1.8×10^{3}**	**3.3**	**2.0×10^{1}**	**1.9**	**1.8×10^{3}**	**3.3**
Alternative 6B, Base Case						
WTP	1.6×10^{3}	3.0	1.9×10^{1}	1.7	1.6×10^{3}	3.0
STTS-East	3.3×10^{1}	6.1×10^{-2}	3.4×10^{-1}	3.1×10^{-2}	3.3×10^{1}	6.1×10^{-2}
STTS-West	3.4×10^{1}	5.7×10^{-2}	3.7×10^{-1}	3.1×10^{-2}	3.3×10^{1}	5.7×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**1.9×10^{1}**	**1.8**	**1.7×10^{3}**	**3.2**
Alternative 6B, Option Case						
WTP	1.6×10^{3}	3.0	1.9×10^{1}	1.7	1.6×10^{3}	3.0
STTS-East	4.2×10^{1}	7.7×10^{-2}	4.3×10^{-1}	4.0×10^{-2}	4.2×10^{1}	7.8×10^{-2}
STTS-West	4.2×10^{1}	7.2×10^{-2}	4.7×10^{-1}	3.9×10^{-2}	4.2×10^{1}	7.3×10^{-2}
Total	**1.7×10^{3}**	**3.2**	**1.9×10^{1}**	**1.8**	**1.7×10^{3}**	**3.2**
Alternative 6C						
WTP	1.6×10^{3}	3.0	1.9×10^{1}	1.7	1.6×10^{3}	3.0
STTS-East	9.3×10^{-1}	1.7×10^{-3}	9.2×10^{-3}	8.5×10^{-4}	9.2×10^{-1}	1.7×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	9.7×10^{-3}	8.1×10^{-4}	9.0×10^{-1}	1.6×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**1.9×10^{1}**	**1.7**	**1.6×10^{3}**	**3.0**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–21 compares the average individual doses to Hispanic and non-Hispanic populations under each Tank Closure alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to a Hispanic individual and a non-Hispanic individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic populations surrounding each facility site.

Table J–21. Tank Closure Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	3.7×10^{1}	6.8×10^{-2}	1.4×10^{1}	6.2×10^{-2}	2.4×10^{1}	7.2×10^{-2}
STTS-West	3.7×10^{1}	6.2×10^{-2}	1.2×10^{1}	5.4×10^{-2}	2.4×10^{1}	6.7×10^{-2}
Total	**7.4×10^{1}**	**1.3×10^{-1}**	**2.6×10^{1}**	**1.2×10^{-1}**	**4.8×10^{1}**	**1.4×10^{-1}**
Alternative 2A						
WTP	1.6×10^{3}	3.0	5.9×10^{2}	2.7	1.0×10^{3}	3.2
STTS-East	3.9×10^{1}	7.2×10^{-2}	1.4×10^{1}	6.5×10^{-2}	2.5×10^{1}	7.6×10^{-2}
STTS-West	3.9×10^{1}	6.5×10^{-2}	1.3×10^{1}	5.7×10^{-2}	2.6×10^{1}	7.1×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**6.1×10^{2}**	**2.8**	**1.1×10^{3}**	**3.4**
Alternative 2B						
WTP	1.6×10^{3}	3.0	5.9×10^{2}	2.7	1.1×10^{3}	3.3
STTS-East	9.3×10^{-1}	1.7×10^{-3}	3.3×10^{-1}	1.5×10^{-3}	6.0×10^{-1}	1.8×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	2.7×10^{-1}	1.2×10^{-3}	6.3×10^{-1}	1.8×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**5.9×10^{2}**	**2.7**	**1.1×10^{3}**	**3.3**
Alternative 3A						
WTP	1.2×10^{3}	2.2	4.2×10^{2}	1.9	7.5×10^{2}	2.3
STTS-East	2.2×10^{2}	4.1×10^{-1}	8.3×10^{1}	3.8×10^{-1}	1.4×10^{2}	4.3×10^{-1}
STTS-West	2.0×10^{2}	3.4×10^{-1}	7.0×10^{1}	3.1×10^{-1}	1.3×10^{2}	3.6×10^{-1}
Total	**1.6×10^{3}**	**2.9**	**5.7×10^{2}**	**2.6**	**1.0×10^{3}**	**3.1**
Alternative 3B						
WTP	1.2×10^{3}	2.2	4.2×10^{2}	1.9	7.5×10^{2}	2.3
STTS-East	1.1	1.9×10^{-3}	3.7×10^{-1}	1.7×10^{-3}	6.8×10^{-1}	2.1×10^{-3}
STTS-West	9.8×10^{-1}	1.7×10^{-3}	3.0×10^{-1}	1.3×10^{-3}	6.9×10^{-1}	1.9×10^{-3}
Total	**1.2×10^{3}**	**2.2**	**4.2×10^{2}**	**1.9**	**7.5×10^{2}**	**2.3**
Alternative 3C						
WTP	1.2×10^{3}	2.2	4.2×10^{2}	1.9	7.5×10^{2}	2.3
STTS-East	2.5×10^{2}	4.6×10^{-1}	9.4×10^{1}	4.3×10^{-1}	1.6×10^{2}	4.9×10^{-1}
STTS-West	2.3×10^{2}	3.9×10^{-1}	7.8×10^{1}	3.4×10^{-1}	1.5×10^{2}	4.1×10^{-1}
Total	**1.7×10^{3}**	**3.0**	**5.9×10^{2}**	**2.7**	**1.1×10^{3}**	**3.2**
Alternative 4						
WTP	1.2×10^{3}	2.2	4.2×10^{2}	1.9	7.6×10^{2}	2.3
STTS-East	2.2	3.9×10^{-3}	7.6×10^{-1}	3.4×10^{-3}	1.4	4.3×10^{-3}
STTS-West	2.0×10^{2}	3.5×10^{-1}	7.1×10^{1}	3.1×10^{-1}	1.3×10^{2}	3.7×10^{-1}
Total	**1.4×10^{3}**	**2.5**	**4.9×10^{2}**	**2.2**	**8.9×10^{2}**	**2.7**
Alternative 5						
WTP	1.2×10^{3}	2.3	4.4×10^{2}	2.0	7.9×10^{2}	2.4
STTS-East	8.8×10^{-1}	1.6×10^{-3}	3.1×10^{-1}	1.4×10^{-3}	5.7×10^{-1}	1.7×10^{-3}
STTS-West	1.8×10^{2}	3.1×10^{-1}	6.4×10^{1}	2.8×10^{-1}	1.2×10^{2}	3.3×10^{-1}
Total	**1.4×10^{3}**	**2.6**	**5.0×10^{2}**	**2.3**	**9.1×10^{2}**	**2.8**

Table J–21. Tank Closure Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses over the Life of the Project *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 6A, Base Case						
WTP	1.7×10^{3}	3.1	6.1×10^{2}	2.8	1.1×10^{3}	3.4
STTS-East	3.6×10^{1}	6.6×10^{-2}	1.3×10^{1}	5.8×10^{-2}	2.3×10^{1}	7.1×10^{-2}
STTS-West	5.5×10^{-1}	9.3×10^{-4}	1.7×10^{-1}	7.3×10^{-4}	3.8×10^{-1}	1.1×10^{-3}
Total	**1.7×10^{3}**	**3.2**	**6.2×10^{2}**	**2.8**	**1.1×10^{3}**	**3.4**
Alternative 6A, Option Case						
WTP	1.7×10^{3}	3.1	6.1×10^{2}	2.8	1.1×10^{3}	3.4
STTS-East	4.5×10^{1}	8.2×10^{-2}	1.6×10^{1}	7.2×10^{-2}	2.9×10^{1}	8.9×10^{-2}
STTS-West	4.5×10^{1}	7.7×10^{-2}	1.4×10^{1}	6.1×10^{-2}	3.2×10^{1}	8.7×10^{-2}
Total	**1.8×10^{3}**	**3.3**	**6.4×10^{2}**	**2.9**	**1.1×10^{3}**	**3.5**
Alternative 6B, Base Case						
WTP	1.6×10^{3}	3.0	5.9×10^{2}	2.7	1.0×10^{3}	3.2
STTS-East	3.3×10^{1}	6.1×10^{-2}	1.2×10^{1}	5.3×10^{-2}	2.1×10^{1}	6.5×10^{-2}
STTS-West	3.4×10^{1}	5.7×10^{-2}	1.0×10^{1}	4.5×10^{-2}	2.3×10^{1}	6.5×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**6.1×10^{2}**	**2.8**	**1.1×10^{3}**	**3.4**
Alternative 6B, Option Case						
WTP	1.6×10^{3}	3.0	5.9×10^{2}	2.7	1.0×10^{3}	3.2
STTS-East	4.2×10^{1}	7.7×10^{-2}	1.5×10^{1}	6.7×10^{-2}	2.7×10^{1}	8.3×10^{-2}
STTS-West	4.2×10^{1}	7.2×10^{-2}	1.3×10^{1}	5.7×10^{-2}	2.9×10^{1}	8.1×10^{-2}
Total	**1.7×10^{3}**	**3.2**	**6.1×10^{2}**	**2.8**	**1.1×10^{3}**	**3.4**
Alternative 6C						
WTP	1.6×10^{3}	3.0	5.9×10^{2}	2.7	1.0×10^{3}	3.2
STTS-East	9.3×10^{-1}	1.7×10^{-3}	3.3×10^{-1}	1.5×10^{-3}	6.0×10^{-1}	1.8×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	2.7×10^{-1}	1.2×10^{-3}	6.3×10^{-1}	1.8×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**5.9×10^{2}**	**2.7**	**1.0×10^{3}**	**3.2**

[a] Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–22 compares average individual doses to low-income and non-low-income populations under each Tank Closure alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to a low-income individual and a non-low-income individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–22. Tank Closure Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	3.7×10^{1}	6.8×10^{-2}	6.6	6.2×10^{-2}	3.1×10^{1}	7.0×10^{-2}
STTS-West	3.7×10^{1}	6.2×10^{-2}	6.0	5.4×10^{-2}	3.1×10^{1}	6.4×10^{-2}
Total	**7.4×10^{1}**	**1.3×10^{-1}**	**1.3×10^{1}**	**1.2×10^{-1}**	**6.1×10^{1}**	**1.3×10^{-1}**
Alternative 2A						
WTP	1.6×10^{3}	3.0	2.8×10^{2}	2.6	1.3×10^{3}	3.1
STTS-East	3.9×10^{1}	7.2×10^{-2}	6.9	6.5×10^{-2}	3.2×10^{1}	7.3×10^{-2}
STTS-West	3.9×10^{1}	6.5×10^{-2}	6.3	5.7×10^{-2}	3.2×10^{1}	6.8×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**3.0×10^{2}**	**2.8**	**1.4×10^{3}**	**3.2**
Alternative 2B						
WTP	1.6×10^{3}	3.0	2.8×10^{2}	2.7	1.4×10^{3}	3.1
STTS-East	9.3×10^{-1}	1.7×10^{-3}	1.6×10^{-1}	1.5×10^{-3}	7.7×10^{-1}	1.7×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	1.4×10^{-1}	1.2×10^{-3}	7.7×10^{-1}	1.6×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**2.9×10^{2}**	**2.7**	**1.4×10^{3}**	**3.1**
Alternative 3A						
WTP	1.2×10^{3}	2.2	2.0×10^{2}	1.9	9.7×10^{2}	2.2
STTS-East	2.2×10^{2}	4.1×10^{-1}	4.0×10^{1}	3.7×10^{-1}	1.8×10^{2}	4.2×10^{-1}
STTS-West	2.0×10^{2}	3.4×10^{-1}	3.4×10^{1}	3.0×10^{-1}	1.7×10^{2}	3.5×10^{-1}
Total	**1.6×10^{3}**	**2.9**	**2.7×10^{2}**	**2.6**	**1.3×10^{3}**	**3.0**
Alternative 3B						
WTP	1.2×10^{3}	2.2	2.0×10^{2}	1.9	9.7×10^{2}	2.2
STTS-East	1.1	1.9×10^{-3}	1.8×10^{-1}	1.7×10^{-3}	8.7×10^{-1}	2.0×10^{-3}
STTS-West	9.8×10^{-1}	1.7×10^{-3}	1.5×10^{-1}	1.3×10^{-3}	8.3×10^{-1}	1.7×10^{-3}
Total	**1.2×10^{3}**	**2.2**	**2.1×10^{2}**	**1.9**	**9.7×10^{2}**	**2.2**
Alternative 3C						
WTP	1.2×10^{3}	2.2	2.0×10^{2}	1.9	9.7×10^{2}	2.2
STTS-East	2.5×10^{2}	4.6×10^{-1}	4.5×10^{1}	4.2×10^{-1}	2.1×10^{2}	4.7×10^{-1}
STTS-West	2.3×10^{2}	3.9×10^{-1}	3.8×10^{1}	3.4×10^{-1}	1.9×10^{2}	4.0×10^{-1}
Total	**1.7×10^{3}**	**3.0**	**2.8×10^{2}**	**2.6**	**1.4×10^{3}**	**3.1**
Alternative 4						
WTP	1.2×10^{3}	2.2	2.0×10^{2}	1.9	9.8×10^{2}	2.2
STTS-East	2.2	3.9×10^{-3}	3.7×10^{-1}	3.5×10^{-3}	1.8	4.1×10^{-3}
STTS-West	2.0×10^{2}	3.5×10^{-1}	3.4×10^{1}	3.1×10^{-1}	1.7×10^{2}	3.6×10^{-1}
Total	**1.4×10^{3}**	**2.5**	**2.4×10^{2}**	**2.2**	**1.1×10^{3}**	**2.6**
Alternative 5						
WTP	1.2×10^{3}	2.3	2.1×10^{2}	2.0	1.0×10^{3}	2.3
STTS-East	8.8×10^{-1}	1.6×10^{-3}	1.5×10^{-1}	1.4×10^{-3}	7.3×10^{-1}	1.7×10^{-3}
STTS-West	1.8×10^{2}	3.1×10^{-1}	3.1×10^{1}	2.8×10^{-1}	1.5×10^{2}	3.2×10^{-1}
Total	**1.4×10^{3}**	**2.6**	**2.4×10^{2}**	**2.3**	**1.2×10^{3}**	**2.7**

Table J–22. Tank Closure Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses over the Life of the Project *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
Alternative 6A, Base Case						
WTP	1.7×10^{3}	3.1	2.9×10^{2}	2.8	1.4×10^{3}	3.2
STTS-East	3.6×10^{1}	6.6×10^{-2}	6.2	5.8×10^{-2}	3.0×10^{1}	6.8×10^{-2}
STTS-West	5.5×10^{-1}	9.3×10^{-4}	8.4×10^{-2}	7.5×10^{-4}	4.7×10^{-1}	9.7×10^{-4}
Total	**1.7×10^{3}**	**3.2**	**3.0×10^{2}**	**2.8**	**1.4×10^{3}**	**3.3**
Alternative 6A, Option Case						
WTP	1.7×10^{3}	3.1	2.9×10^{2}	2.8	1.4×10^{3}	3.2
STTS-East	4.5×10^{1}	8.2×10^{-2}	7.8	7.3×10^{-2}	3.7×10^{1}	8.5×10^{-2}
STTS-West	4.5×10^{1}	7.7×10^{-2}	6.9	6.2×10^{-2}	3.8×10^{1}	8.0×10^{-2}
Total	**1.8×10^{3}**	**3.3**	**3.1×10^{2}**	**2.9**	**1.5×10^{3}**	**3.4**
Alternative 6B, Base Case						
WTP	1.6×10^{3}	3.0	2.8×10^{2}	2.7	1.3×10^{3}	3.1
STTS-East	3.3×10^{1}	6.1×10^{-2}	5.7	5.3×10^{-2}	2.7×10^{1}	6.2×10^{-2}
STTS-West	3.4×10^{1}	5.7×10^{-2}	5.1	4.6×10^{-2}	2.8×10^{1}	6.0×10^{-2}
Total	**1.7×10^{3}**	**3.1**	**2.9×10^{2}**	**2.8**	**1.4×10^{3}**	**3.2**
Alternative 6B, Option Case						
WTP	1.6×10^{3}	3.0	2.8×10^{2}	2.7	1.3×10^{3}	3.1
STTS-East	4.2×10^{1}	7.7×10^{-2}	7.3	6.8×10^{-2}	3.5×10^{1}	7.9×10^{-2}
STTS-West	4.2×10^{1}	7.2×10^{-2}	6.5	5.8×10^{-2}	3.6×10^{1}	7.5×10^{-2}
Total	**1.7×10^{3}**	**3.2**	**3.0×10^{2}**	**2.8**	**1.4×10^{3}**	**3.2**
Alternative 6C						
WTP	1.6×10^{3}	3.0	2.8×10^{2}	2.7	1.3×10^{3}	3.1
STTS-East	9.3×10^{-1}	1.7×10^{-3}	1.6×10^{-1}	1.5×10^{-3}	7.7×10^{-1}	1.7×10^{-3}
STTS-West	9.1×10^{-1}	1.5×10^{-3}	1.4×10^{-1}	1.2×10^{-3}	7.7×10^{-1}	1.6×10^{-3}
Total	**1.6×10^{3}**	**3.0**	**2.8×10^{2}**	**2.7**	**1.4×10^{3}**	**3.1**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

As discussed in Appendix K, Section K.2.1.1.1.1, normal operations would result in impacts on a maximally exposed individual (MEI) southeast of the 200 Areas under all tank closure alternatives except Alternative 1, under which the MEI would be northeast of the 200 Areas. Several regional tribes have expressed concerns regarding the potential for the proposed alternatives to impact the health of tribal members and their communities. These concerns are further elaborated in Appendix W, "American Indian Tribal Perspectives and Scenarios." To explore potential American Indian environmental justice concerns associated with normal operations, impacts on a hypothetical individual residing at the boundary of the Yakama Reservation were evaluated, similar to the MEI for the general population. Table J–23 presents the maximum annual dose and cancer fatality risk to an MEI located there.

The results of this analysis show that the probability of an individual at this location developing an LCF from radionuclide releases during normal operations would essentially be zero. In addition, the maximum annual dose to an MEI residing at the reservation boundary would be the equivalent of less than one-sixth the maximum annual dose to an MEI at the Hanford boundary under all alternatives.

Table J–23. Tank Closure Alternatives – Maximum Annual Dose and Risk to the Maximally Exposed Individual Located at the Boundary of the Yakama Reservation

Alternative	WTP	STTS-East	STTS-West	Total	Risk[a]
	Dose (millirem)				
1	0	2.82×10^{-3}	3.15×10^{-3}	5.98×10^{-3}	3.59×10^{-9}
2A	1.23	8.35×10^{-10}	0	1.23	7.41×10^{-7}
2B	1.45	3.52×10^{-4}	3.95×10^{-4}	1.45	8.72×10^{-7}
3A	1.23	3.39×10^{-3}	3.86×10^{-3}	1.24	7.45×10^{-7}
3B	1.23	4.19×10^{-7}	1.11×10^{-5}	1.23	7.41×10^{-7}
3C	1.23	5.41×10^{-3}	5.85×10^{-3}	1.25	7.48×10^{-7}
4	1.23	7.42×10^{-5}	8.67×10^{-5}	1.24	7.41×10^{-7}
5	1.24	2.01×10^{-7}	4.88×10^{-3}	1.25	7.47×10^{-7}
6A, Base	1.23	5.49×10^{-4}	6.01×10^{-4}	1.24	7.42×10^{-7}
6A, Option	1.23	6.70×10^{-4}	7.42×10^{-4}	1.24	7.42×10^{-7}
6B, Base	1.41	7.12×10^{-3}	7.38×10^{-3}	1.42	8.53×10^{-7}
6B, Option	1.41	9.03×10^{-3}	8.79×10^{-3}	1.43	8.55×10^{-7}
6C	1.41	3.53×10^{-4}	3.96×10^{-4}	1.41	8.45×10^{-7}

[a] Cancer risk is the probability of developing a latent cancer fatality, which is estimated by multiplying the dose by the risk factor of 0.0006 latent cancer fatalities per rem (DOE 2003).

Key: Base=Base Case; Option=Option Case; STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–24 presents the dose and cancer fatality risk over the lifetime of the project to an MEI located at the boundary of the Yakama Reservation. The duration of exposure under several alternatives would far exceed the life expectancy of any person. Therefore, the doses presented in Table J–24 are conservative and the actual dose received by the hypothetical MEI at this location over his or her lifetime would likely be much lower.

Table J–24. Tank Closure Alternatives – Dose and Risk to the Maximally Exposed Individual Located at the Boundary of the Yakama Reservation over the Life of the Project

Alternative	Duration of Exposure (years)	WTP	STTS-East	STTS-West	Total	Risk[a]
		Dose (millirem)				
1	102	0	2.50×10^{-1}	2.79×10^{-1}	5.29×10^{-1}	3.17×10^{-7}
2A	188	6.34	2.78×10^{-1}	3.11×10^{-1}	6.93	4.16×10^{-6}
2B	40	6.43	1.28×10^{-2}	1.44×10^{-2}	6.46	3.88×10^{-6}
3A	37	4.89	7.66×10^{-1}	8.71×10^{-1}	6.53	3.92×10^{-6}
3B	37	4.89	1.45×10^{-2}	1.55×10^{-2}	4.92	2.95×10^{-6}
3C	37	4.89	1.22	1.31	7.42	4.45×10^{-6}
4	40	4.93	3.26×10^{-2}	9.04×10^{-1}	5.86	3.52×10^{-6}
5	31	5.02	1.21×10^{-2}	8.02×10^{-1}	5.83	3.50×10^{-6}
6A, Base	163	6.65	4.90×10^{-1}	9.61×10^{-3}	7.15	4.29×10^{-6}
6A, Option	163	6.65	6.05×10^{-1}	7.04×10^{-1}	7.96	4.77×10^{-6}
6B, Base	95	6.35	4.51×10^{-1}	5.26×10^{-1}	7.32	4.39×10^{-6}
6B, Option	95	6.35	5.63×10^{-1}	6.55×10^{-1}	7.56	4.54×10^{-6}
6C	40	6.35	1.28×10^{-2}	1.44×10^{-2}	6.37	3.82×10^{-6}

[a] Cancer risk is the probability of developing a latent cancer fatality, which is estimated by multiplying the dose by the risk factor of 0.0006 latent cancer fatalities per rem **(**DOE 2003).

Key: Base=Base Case; Option=Option Case; STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

The results of this analysis show that the probability of an individual at this location developing an LCF from radionuclide releases during normal operations would essentially be zero. In addition, the dose to an MEI residing at the reservation boundary over the life of the project would be the equivalent of less than one-sixth the dose to an MEI at the Hanford boundary under all alternatives.

In addition, a scenario was analyzed for an individual living at or near the Hanford boundary who subsists predominantly on the consumption of homegrown produce, animal products from a family farm, and foodstuffs harvested from the wild (e.g., fruits, vegetables, fish, and game) to determine a maximum potential dose. For this scenario, the hypothetical individual was assumed to live at the same location as the MEI analyzed for the general public and could represent a member of a minority group who lives a subsistence lifestyle. This individual was assumed to get all of his or her food from the sources listed above. It was further conservatively assumed that all food came from an environment that was radioactively contaminated from air deposition. Irrigation water for crops and livestock and drinking water was assumed to come from radioactively contaminated surface waters. In contrast, the general population MEI was assumed to consume only a portion of his or her diet from regional food contaminated by radioactive emissions. Table J–25 presents comparative data on the food consumption rates for the subsistence consumer and the general population MEI.

Table J–25. Comparative Food Consumption Rates for the Subsistence Consumer and the General Population Maximally Exposed Individual

Ingestion Exposure Pathway	General Population MEI[a] (kilograms per year except as noted)	Subsistence Consumer (kilograms per year except as noted)	Reference
Leafy vegetable	65	65	Beyeler et al. 1999; DOE and Ecology 1996
Other vegetable	120	120	DOE 1995; DOE and Ecology 1996
Fruit	120	120	DOE 1995; DOE and Ecology 1996
Grain	90	90	Beyeler et al. 1999
Meat/game	27.8	154	DOE 1995; DOE and Ecology 1996
Poultry	28.5	28.5	Beyeler et al. 1999
Eggs	19	19	Beyeler et al. 1999
Fish	0	62	EPA 1997
Dairy	110 liters	219 liters	DOE 1995; DOE and Ecology 1996
Surface water	0	730 liters	DOE 1995

[a] From Appendix K of this *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington.* The general population MEI is assumed to consume no surface water or fish.

Note: To convert kilograms to pounds, multiply by 2.2046; liters to gallons, by 0.26417.

Key: MEI=maximally exposed individual.

For purposes of analysis and comparison, the dose to this subsistence consumer was analyzed for increased exposure to radioactive materials as a result of increased consumption of contaminated foodstuffs and milk, as well as the consumption of contaminated drinking water under Tank Closure Alternative 2B. This alternative resulted in the highest dose to the general population MEI of 10 millirem in the year of maximum impact. This dose would only be applicable to the one year in which cesium and strontium capsules are processed. The dose to an individual practicing a subsistence lifestyle exposed to the same releases as the general population MEI for the whole year could increase to as much as 26 millirem. The dose to the subsistence consumer would not result in a total effective dose greater than

the DOE limit of 100 millirem per year from all radiation sources and all pathways (DOE Order 458.1). The subsistence consumer scenario is conservative due to the large amount of fish in the diet, the assumption that the fish was raised in the area, the assumption that surface water is used for drinking and irrigation, and the assumption that this individual remains at the point of greatest impact along the site boundary for the entire year. In reality, the dose to an individual practicing a subsistence lifestyle would likely be much lower. Considering that both the MEI and the subsistence consumer would also be receiving a dose in excess of 311 millirem per year from natural background radiation, there would be no appreciable differences between these two doses. The alternatives analyzed in this EIS would therefore not pose a disproportionately high and adverse impact on an individual with a subsistence diet.

Appendix K, Section K.3.4, discusses the radiological and chemical consequences of facility accidents under each Tank Closure alternative. Examination of the risks under each alternative shows that there would be essentially no LCFs per year for the offsite population, including minority and low-income populations, from radioactive emissions. Hazardous chemical impacts are not expected to affect offsite populations. Therefore, these alternatives would not pose disproportionately high and adverse impacts on the minority and low-income populations.

J.5.7.1.2 FFTF Decommissioning Alternatives

Table J–26 compares average individual doses to minority and nonminority populations under each FFTF Decommissioning alternative to examine the potential for disproportionately high and adverse impacts. The Idaho Option for disposition of remote-handled special components (RH-SCs) and disposition of bulk sodium under Alternative 2 or 3 would result in the average dose to a minority individual slightly exceeding the average dose to a nonminority individual. However, the values show that there are no appreciable differences between average doses (4.8×10^{-7} millirem or less). Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–26. FFTF Decommissioning Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses in Year of Maximum Impact

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
No Action						
1	2.7×10^{-4}	6.1×10^{-7}	1.0×10^{-4}	5.2×10^{-7}	1.7×10^{-4}	6.8×10^{-7}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	2.5×10^{-7}	1.3×10^{-9}	4.3×10^{-7}	1.7×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.3×10^{-4}	2.1×10^{-7}	4.6×10^{-5}	1.7×10^{-7}	8.0×10^{-5}	2.5×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	3.2×10^{-5}	2.1×10^{-7}	6.3×10^{-6}	2.2×10^{-7}	2.6×10^{-5}	2.1×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	9.9×10^{-3}	2.2×10^{-5}	3.7×10^{-3}	1.9×10^{-5}	6.2×10^{-3}	2.5×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	1.1×10^{-3}	4.2×10^{-6}	1.8×10^{-4}	4.6×10^{-6}	8.7×10^{-4}	4.1×10^{-6}

Key: FFTF=Fast Flux Test Facility.

Table J–27 compares average individual doses to American Indian and non–American Indian populations under each FFTF Decommissioning alternative to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to an American Indian individual and a non–American Indian individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–27. FFTF Decommissioning Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses in Year of Maximum Impact

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
No Action						
1	2.7×10^{-4}	6.1×10^{-7}	2.6×10^{-6}	4.0×10^{-7}	2.7×10^{-4}	6.1×10^{-7}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	6.0×10^{-9}	9.3×10^{-10}	6.7×10^{-7}	1.5×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.3×10^{-4}	2.1×10^{-7}	1.3×10^{-6}	1.1×10^{-7}	1.2×10^{-4}	2.2×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	3.2×10^{-5}	2.1×10^{-7}	7.0×10^{-7}	1.7×10^{-7}	3.1×10^{-5}	2.1×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	9.9×10^{-3}	2.2×10^{-5}	9.1×10^{-5}	1.4×10^{-5}	9.8×10^{-3}	2.2×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	1.1×10^{-3}	4.2×10^{-6}	2.3×10^{-5}	3.9×10^{-6}	1.0×10^{-3}	4.2×10^{-6}

Key: FFTF=Fast Flux Test Facility.

Table J–28 compares average individual doses to Hispanic and non-Hispanic populations under each FFTF Decommissioning alternative to examine the potential for disproportionately high and adverse impacts. The Idaho Option for disposition of RH-SCs and the Idaho Reuse Option for disposition of bulk sodium under Alternative 2 or 3 would result in the average dose to a Hispanic individual slightly exceeding the average dose to a non-Hispanic individual. However, the values show that there are no appreciable differences between average doses (7.3×10^{-7} millirem or less). Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic or Latino populations surrounding each facility site.

Table J–28. FFTF Decommissioning Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses in Year of Maximum Impact

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
No Action						
1	2.7×10^{-4}	6.1×10^{-7}	8.5×10^{-5}	4.9×10^{-7}	1.9×10^{-4}	6.8×10^{-7}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	2.0×10^{-7}	1.2×10^{-9}	4.7×10^{-7}	1.7×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.3×10^{-4}	2.1×10^{-7}	3.8×10^{-5}	1.7×10^{-7}	8.8×10^{-5}	2.4×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	3.2×10^{-5}	2.1×10^{-7}	4.9×10^{-6}	2.3×10^{-7}	2.7×10^{-5}	2.1×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	9.9×10^{-3}	2.2×10^{-5}	3.0×10^{-3}	1.8×10^{-5}	6.8×10^{-3}	2.5×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	1.1×10^{-3}	4.2×10^{-6}	1.3×10^{-4}	4.9×10^{-6}	9.2×10^{-4}	4.1×10^{-6}

[a] Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

Key: FFTF=Fast Flux Test Facility.

Table J–29 compares average individual doses to low-income and non-low-income populations under each FFTF Decommissioning alternative to examine the potential for disproportionately high and adverse impacts. The Idaho Reuse Option for disposition of bulk sodium under Alternative 2 or 3 would result in the average dose to a low-income individual slightly exceeding the average dose to a non-low-income individual; however, there are no appreciable differences in average individual doses under any of the alternatives (6.1×10^{-8} millirem). Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–29. FFTF Decommissioning Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses in Year of Maximum Impact

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
No Action						
1	2.7×10^{-4}	6.1×10^{-7}	4.3×10^{-5}	5.4×10^{-7}	2.3×10^{-4}	6.2×10^{-7}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	1.1×10^{-7}	1.3×10^{-9}	5.7×10^{-7}	1.6×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.3×10^{-4}	2.1×10^{-7}	1.9×10^{-5}	1.7×10^{-7}	1.1×10^{-4}	2.2×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	3.2×10^{-5}	2.1×10^{-7}	4.0×10^{-6}	2.1×10^{-7}	2.8×10^{-5}	2.1×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	9.9×10^{-3}	2.2×10^{-5}	1.6×10^{-3}	2.0×10^{-5}	8.3×10^{-3}	2.3×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	1.1×10^{-3}	4.2×10^{-6}	1.5×10^{-4}	4.3×10^{-6}	9.0×10^{-4}	4.2×10^{-6}

Key: FFTF=Fast Flux Test Facility.

Table J–30 compares average individual doses to minority and nonminority populations under each FFTF Decommissioning alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. The Idaho Option for disposition of RH-SCs and the Idaho Reuse Option for disposition of bulk sodium under Alternative 2 or 3 would result in the average dose to a minority individual slightly exceeding the average dose to a nonminority individual. However, the values show that there are no appreciable differences between average doses (9.6×10^{-7} millirem or less). Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–30. FFTF Decommissioning Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses over the Life of the Project

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose person-rem)	Nonminority Individual Average Dose (millirem)
No Action						
1	2.7×10^{-2}	6.1×10^{-5}	1.0×10^{-2}	5.2×10^{-5}	1.7×10^{-2}	6.8×10^{-5}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	2.5×10^{-7}	1.3×10^{-9}	4.3×10^{-7}	1.7×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.9×10^{-4}	3.2×10^{-7}	6.9×10^{-5}	2.6×10^{-7}	1.2×10^{-4}	3.7×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	4.8×10^{-5}	3.2×10^{-7}	9.5×10^{-6}	3.3×10^{-7}	3.9×10^{-5}	3.1×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	2.2×10^{-2}	4.9×10^{-5}	8.1×10^{-3}	4.1×10^{-5}	1.4×10^{-2}	5.5×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	2.1×10^{-3}	8.4×10^{-6}	3.6×10^{-4}	9.2×10^{-6}	1.7×10^{-3}	8.3×10^{-6}

Key: FFTF=Fast Flux Test Facility.

Table J–31 compares average individual doses to American Indian and non–American Indian populations under each FFTF Decommissioning alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. There are no appreciable differences between the average dose to an American Indian individual and a non–American Indian individual. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–31. FFTF Decommissioning Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses over the Life of the Project

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
No Action						
1	2.7×10^{-2}	6.1×10^{-5}	2.6×10^{-4}	4.0×10^{-5}	2.7×10^{-2}	6.1×10^{-5}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	6.0×10^{-9}	9.3×10^{-10}	6.7×10^{-7}	1.5×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.9×10^{-4}	3.2×10^{-7}	2.0×10^{-6}	1.7×10^{-7}	1.9×10^{-4}	3.2×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	4.8×10^{-5}	3.2×10^{-7}	1.1×10^{-6}	2.6×10^{-7}	4.7×10^{-5}	3.2×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	2.2×10^{-2}	4.9×10^{-5}	2.0×10^{-4}	3.1×10^{-5}	2.2×10^{-2}	4.9×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	2.1×10^{-3}	8.4×10^{-6}	4.5×10^{-5}	7.8×10^{-6}	2.1×10^{-3}	8.4×10^{-6}

Key: FFTF=Fast Flux Test Facility.

Table J–32 compares average individual doses to Hispanic and non-Hispanic populations under each FFTF Decommissioning alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. The Idaho Option for disposition of RH-SCs and the Idaho Reuse Option for disposition of bulk sodium under Alternative 2 or 3 would result in the average dose to a Hispanic individual slightly exceeding the average dose to a non-Hispanic individual. However, the values show that there are no appreciable differences between average doses (1.5×10^{-6} millirem or less). Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic or Latino populations surrounding each facility site.

Table J–32. FFTF Decommissioning Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses over the Life of the Project

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
No Action						
1	2.7×10^{-2}	6.1×10^{-5}	8.5×10^{-3}	4.9×10^{-5}	1.9×10^{-2}	6.8×10^{-5}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	2.0×10^{-7}	1.2×10^{-9}	4.7×10^{-7}	1.7×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.9×10^{-4}	3.2×10^{-7}	5.7×10^{-5}	2.5×10^{-7}	1.3×10^{-4}	3.6×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	4.8×10^{-5}	3.2×10^{-7}	7.4×10^{-6}	3.5×10^{-7}	4.1×10^{-5}	3.1×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	2.2×10^{-2}	4.9×10^{-5}	6.7×10^{-3}	3.9×10^{-5}	1.5×10^{-2}	5.5×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	2.1×10^{-3}	8.4×10^{-6}	2.7×10^{-4}	9.7×10^{-6}	1.8×10^{-3}	8.2×10^{-6}

[a] Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

Key: FFTF=Fast Flux Test Facility.

Table J–33 compares average individual doses to low-income and non-low-income populations under each FFTF Decommissioning alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. The Idaho Reuse Option for disposition of bulk sodium under Alternative 2 or 3 would result in the average dose to a low-income individual slightly exceeding the average dose to a non-low-income individual. However, the values show that there are no appreciable differences between average doses (1.2×10^{-7} millirem). Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–33. FFTF Decommissioning Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses over the Life of the Project

Alternative	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
No Action						
1	2.7×10^{-2}	6.1×10^{-5}	4.3×10^{-3}	5.4×10^{-5}	2.3×10^{-2}	6.2×10^{-5}
Facility Disposition						
2	6.7×10^{-7}	1.5×10^{-9}	1.1×10^{-7}	1.3×10^{-9}	5.7×10^{-7}	1.6×10^{-9}
3	0	0	0	0	0	0
Disposition of Remote-Handled Special Components – Hanford Option						
2 or 3	1.9×10^{-4}	3.2×10^{-7}	2.9×10^{-5}	2.6×10^{-7}	1.6×10^{-4}	3.3×10^{-7}
Disposition of Remote-Handled Special Components – Idaho Option						
2 or 3	4.8×10^{-5}	3.2×10^{-7}	5.9×10^{-6}	3.2×10^{-7}	4.2×10^{-5}	3.2×10^{-7}
Disposition of Bulk Sodium – Hanford Reuse Option						
2 or 3	2.2×10^{-2}	4.9×10^{-5}	3.5×10^{-3}	4.3×10^{-5}	1.8×10^{-2}	5.0×10^{-5}
Disposition of Bulk Sodium – Idaho Reuse Option						
2 or 3	2.1×10^{-3}	8.4×10^{-6}	3.1×10^{-4}	8.5×10^{-6}	1.8×10^{-3}	8.4×10^{-6}

Key: FFTF=Fast Flux Test Facility.

Appendix K, Section K.2.2.1.1, discusses the approach used to model the FFTF Decommissioning alternatives. The same MEIs modeled under the Tank Closure alternatives are used for emissions from the 200 Area. An offsite MEI was identified for emissions from the 400 Area. This MEI is located to the southeast, across the river from the 300 Area. Similar to the Tank Closure alternatives, an MEI at the boundary of the Yakama Reservation is analyzed to explore potential environmental justice concerns surrounding Hanford. Some FFTF Decommissioning alternatives include options to process materials at the INL's MFC and INTEC. One offsite MEI is identified to be southwest of the MFC to explore impacts of bulk sodium disposition and another to be south of INTEC to explore impacts of the disposition of RH-SCs. Several regional tribes have expressed concerns regarding the potential for the proposed alternatives to impact the health of tribal members and their communities. These concerns are further elaborated in Appendix W, "American Indian Tribal Perspectives and Scenarios." To explore potential American Indian environmental justice concerns associated with normal operations under these alternatives, impacts on a hypothetical individual residing at the boundary of the Fort Hall Reservation were evaluated, similar to the MEI for the general population.

Table J–34 presents the maximum annual dose and cancer fatality risk to an MEI located at the appropriate reservation boundary. The results of this analysis show that the probability of such an individual developing an LCF from radionuclide releases during normal operations would essentially be zero. In addition, the maximum annual dose to an MEI residing at a reservation boundary would be less than approximately one-fifth that to an MEI at each respective site boundary under all FFTF Decommissioning alternatives.

Table J–34. FFTF Decommissioning Alternatives – Maximum Annual Dose and Risk to a Maximally Exposed Individual Located at the Appropriate Reservation Boundary

	Yakama Reservation					Fort Hall Reservation			
Alternative	Facility Disposition	Disposition of Bulk Sodium	Disposition of RH-SCs	Hanford Site Total	Cancer Risk[a]	Disposition of Bulk Sodium	Disposition of RH-SCs	INL Total	Cancer Risk[a]
	Dose (millirem)								
1	1.0×10^{-6}	0	0	1.0×10^{-6}	6.1×10^{-13}	0	0	0	0
2 Hanford Site	3.2×10^{-9}	2.6×10^{-5}	1.3×10^{-6}	2.8×10^{-5}	1.7×10^{-11}	0	0	0	0
2 INL	3.2×10^{-9}	0	0	3.2×10^{-9}	1.9×10^{-15}	3.6×10^{-5}	3.6×10^{-7}	3.7×10^{-5}	2.2×10^{-11}
3 Hanford Site	0	2.6×10^{-5}	1.3×10^{-6}	2.8×10^{-5}	1.7×10^{-11}	0	0	0	0
3 INL	0	0	0	0	0	3.6×10^{-5}	3.6×10^{-7}	3.7×10^{-5}	2.2×10^{-11}

[a] Cancer risk is the probability of developing a latent cancer fatality, which is estimated by multiplying the dose by the risk factor of 0.0006 latent cancer fatalities per rem (DOE 2003).

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory; RH-SC=remote-handled special component.

Table J–35 presents the dose and cancer fatality risk over the lifetime of the project to an MEI located at the appropriate reservation boundary. The results of this analysis show that the probability of such an individual developing an LCF from radionuclide releases during normal operations would essentially be zero. In addition, the dose to an MEI residing at a reservation boundary over the life of the project would be less than approximately one-fifth that to an MEI at each respective site boundary over the life of the project.

Table J–35. FFTF Decommissioning Alternatives – Dose and Risk to a Maximally Exposed Individual Located at the Appropriate Reservation Boundary over the Life of the Project

		Yakama Reservation					Fort Hall Reservation			
Alternative	Duration of Exposure (years)	Facility Disposition	Disposition of Bulk Sodium	Disposition of RH-SCs	Hanford Site Total	Cancer Risk[a]	Disposition of Bulk Sodium	Disposition of RH-SCs	INL Total	Cancer Risk[a]
		Dose (millirem)								
1	100	7.1×10^{-5}	0	0	7.1×10^{-5}	4.3×10^{-11}	0	0	0	0
2 Hanford Site	3	3.2×10^{-9}	5.8×10^{-5}	2.0×10^{-6}	6.0×10^{-5}	3.6×10^{-11}	0	0	0	0
2 INL	4	3.2×10^{-9}	0	0	3.2×10^{-9}	1.9×10^{-15}	7.2×10^{-5}	5.4×10^{-7}	7.3×10^{-5}	4.4×10^{-11}
3 Hanford Site	3	0	5.8×10^{-5}	2.0×10^{-6}	6.0×10^{-5}	3.6×10^{-11}	0	0	0	0
3 INL	4	0	0	0	0	0	7.2×10^{-5}	5.4×10^{-7}	7.3×10^{-5}	4.4×10^{-11}

[a] Cancer risk is the probability of developing a latent cancer fatality, which is estimated by multiplying the dose by the risk factor of 0.0006 latent cancer fatalities per rem (DOE 2003).

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory; RH-SC=remote-handled special component.

Appendix K, Section K.3.5, discusses the radiological and chemical consequences of facility accidents under each FFTF Decommissioning alternative. Examination of the risks under each alternative shows that there would be essentially no LCFs per year for the offsite population, including minority and low-income populations, due to radioactive emissions. The most severe chemical impacts would be the result of a Hanford sodium storage tank failure scenario, which could result in a hazardous plume slightly exceeding the site boundary to the east of the 400 Area; however, it is not be expected to reach the far side of the Columbia River. The potentially affected area is located in Franklin County, Washington, census tract 206.01, block group 2. This block group has not been identified to contain minority or low-income populations. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority or low-income populations.

J.5.7.1.3 Waste Management Alternatives

Table J–36 compares average individual doses to minority and nonminority populations under each Waste Management alternative to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to a minority individual and a nonminority individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–36. Waste Management Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	7.5×10^{-7}	2.8×10^{-9}	1.3×10^{-6}	3.9×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**7.5×10^{-7}**	**2.8×10^{-9}**	**1.3×10^{-6}**	**3.9×10^{-9}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	7.5×10^{-7}	2.8×10^{-9}	1.3×10^{-6}	3.9×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**7.5×10^{-7}**	**2.8×10^{-9}**	**1.3×10^{-6}**	**3.9×10^{-9}**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–37 compares average individual doses to American Indian and non–American Indian populations under each Waste Management alternative to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to an American Indian individual and a non–American Indian individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–37. Waste Management Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	2.2×10^{-8}	1.8×10^{-9}	2.0×10^{-6}	3.5×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**2.2×10^{-8}**	**1.8×10^{-9}**	**2.0×10^{-6}**	**3.5×10^{-9}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	2.2×10^{-8}	1.8×10^{-9}	2.0×10^{-6}	3.5×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**2.2×10^{-8}**	**1.8×10^{-9}**	**2.0×10^{-6}**	**3.5×10^{-9}**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–38 compares average individual doses to Hispanic and non-Hispanic populations under each Waste Management alternative to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to a Hispanic individual and a non-Hispanic individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic or Latino populations surrounding each facility site.

Table J–38. Waste Management Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	6.2×10^{-7}	2.7×10^{-9}	1.4×10^{-6}	3.9×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**6.2×10^{-7}**	**2.7×10^{-9}**	**1.4×10^{-6}**	**3.9×10^{-9}**

Table J–38. Waste Management Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses in Year of Maximum Impact *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	6.2×10^{-7}	2.7×10^{-9}	1.4×10^{-6}	3.9×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**6.2×10^{-7}**	**2.7×10^{-9}**	**1.4×10^{-6}**	**3.9×10^{-9}**

[a] Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–39 compares average individual doses to low-income and non-low-income populations under each Waste Management alternative to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to a low-income individual and a non-low-income individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–39. Waste Management Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses in Year of Maximum Impact

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0.	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	3.1×10^{-7}	2.8×10^{-9}	1.7×10^{-6}	3.6×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**3.1×10^{-7}**	**2.8×10^{-9}**	**1.7×10^{-6}**	**3.6×10^{-9}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	2.0×10^{-6}	3.4×10^{-9}	3.1×10^{-7}	2.8×10^{-9}	1.7×10^{-6}	3.6×10^{-9}
Total	**2.0×10^{-6}**	**3.4×10^{-9}**	**3.1×10^{-7}**	**2.8×10^{-9}**	**1.7×10^{-6}**	**3.6×10^{-9}**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–40 compares the average individual doses to minority and nonminority populations under each Waste Management alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to a minority individual and a nonminority individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–40. Waste Management Alternatives – Total, Minority, and Nonminority Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Minority Population Dose (person-rem)	Minority Individual Average Dose (millirem)	Nonminority Population Dose (person-rem)	Nonminority Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	2.8×10^{-5}	1.1×10^{-7}	4.9×10^{-5}	1.5×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**2.8×10^{-5}**	**1.1×10^{-7}**	**4.9×10^{-5}**	**1.5×10^{-7}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	2.8×10^{-5}	1.1×10^{-7}	4.9×10^{-5}	1.5×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**2.8×10^{-5}**	**1.1×10^{-7}**	**4.9×10^{-5}**	**1.5×10^{-7}**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–41 compares the average individual doses to American Indian and non–American Indian populations under each Waste Management alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to an American Indian individual and a non–American Indian individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–41. Waste Management Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**

Table J–41. Waste Management Alternatives – Total, American Indian, and Non–American Indian Population and Average Individual Doses over the Life of the Project *(continued)*

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	American Indian Population Dose (person-rem)	American Indian Individual Average Dose (millirem)	Non–American Indian Population Dose (person-rem)	Non–American Indian Individual Average Dose (millirem)
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	8.3×10^{-7}	7.0×10^{-8}	7.6×10^{-5}	1.3×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**8.3×10^{-7}**	**7.0×10^{-8}**	**7.6×10^{-5}**	**1.3×10^{-7}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0.	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	8.3×10^{-7}	7.0×10^{-8}	7.6×10^{-5}	1.3×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**8.3×10^{-7}**	**7.0×10^{-8}**	**7.6×10^{-5}**	**1.3×10^{-7}**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–42 compares the average individual doses to Hispanic and non-Hispanic populations under each Waste Management alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of the disposal groups. There are no appreciable differences between the average dose to a Hispanic individual and a non-Hispanic individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on American Indian populations surrounding each facility site.

Table J–42. Waste Management Alternatives – Total, Hispanic, and Non-Hispanic Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Hispanic Population Dose[a] (person-rem)	Hispanic Individual Average Dose[a] (millirem)	Non-Hispanic Population Dose (person-rem)	Non-Hispanic Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	2.4×10^{-5}	1.0×10^{-7}	5.3×10^{-5}	1.5×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**2.4×10^{-5}**	**1.0×10^{-7}**	**5.3×10^{-5}**	**1.5×10^{-7}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	2.4×10^{-5}	1.0×10^{-7}	5.3×10^{-5}	1.5×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**2.4×10^{-5}**	**1.0×10^{-7}**	**5.3×10^{-5}**	**1.5×10^{-7}**

[a] Includes all individuals, regardless of race, who identified themselves as Hispanic or Latino.

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–43 compares the average individual doses to low-income and non-low-income populations under each Waste Management alternative over the lifetime of the project to examine the potential for disproportionately high and adverse impacts. These impacts would be the same regardless of disposal group. There are no appreciable differences between the average dose to a low-income individual and a non-low-income individual under any of the alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–43. Waste Management Alternatives – Total, Low-Income, and Non-Low-Income Population and Average Individual Doses over the Life of the Project

Facility Site	Total Population Dose (person-rem)	Individual Average Dose (millirem)	Low-Income Population Dose (person-rem)	Low-Income Individual Average Dose (millirem)	Non-Low-Income Population Dose (person-rem)	Non-Low-Income Individual Average Dose (millirem)
Alternative 1						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	1.2×10^{-5}	1.1×10^{-7}	6.5×10^{-5}	1.4×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**1.2×10^{-5}**	**1.1×10^{-7}**	**6.5×10^{-5}**	**1.4×10^{-7}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	7.7×10^{-5}	1.3×10^{-7}	1.2×10^{-5}	1.1×10^{-7}	6.5×10^{-5}	1.4×10^{-7}
Total	**7.7×10^{-5}**	**1.3×10^{-7}**	**1.2×10^{-5}**	**1.1×10^{-7}**	**6.5×10^{-5}**	**1.4×10^{-7}**

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–44 presents the maximum annual dose and cancer fatality risk to an MEI located at the boundary of the Yakama Reservation. The results of this analysis show that the probability of an individual at this location developing an LCF from radionuclide releases during normal operations would essentially be zero. In addition, the maximum annual dose to an MEI residing at the reservation boundary would be approximately one-fourth that to an MEI at the Hanford boundary under all Waste Management alternatives.

Table J–44. Waste Management Alternatives – Maximum Annual Dose and Risk to the Maximally Exposed Individual at the Boundary of the Yakama Reservation

Alternative	WTP	STTS-East	STTS-West	Total	Risk[a]
	Dose (millirem)				
1	0	0	0	0	0
2	0	0	3.2×10^{-8}	3.2×10^{-8}	1.9×10^{-14}
3	0	0	3.2×10^{-8}	3.2×10^{-8}	1.9×10^{-14}

[a] Cancer risk is the probability of developing a latent cancer fatality, which is estimated by multiplying the dose by the risk factor of 0.0006 latent cancer fatalities per rem (DOE 2003).

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Table J–45 presents the dose and cancer fatality risk over the lifetime of the project to an MEI located at the boundary of the Yakama Reservation. The results of this analysis show that the probability of an individual at this location developing an LCF from radionuclide releases during normal operations would essentially be zero. In addition, the dose to an MEI residing at the reservation boundary over the life of the project would be approximately one-fourth that to an MEI at the Hanford boundary over the life of the project under all Waste Management alternatives.

Table J–45. Waste Management Alternatives – Dose and Risk to the Maximally Exposed Individual Located at the Boundary of the Yakama Reservation over the Life of the Project

Alternative	Duration of Exposure (years)	WTP	STTS-East	STTS-West	Total	Risk[a]
		Dose (millirem)				
1	0[b]	0	0	0	0	0
2	39	0	0	1.2×10^{-6}	1.2×10^{-6}	7.3×10^{-10}
3	39	0	0	1.2×10^{-6}	1.2×10^{-6}	7.3×10^{-10}

[a] Cancer risk is the probability of developing a latent cancer fatality, which is estimated by multiplying the dose by the risk factor of 0.0006 latent cancer fatalities per rem (DOE 2003).

[b] There would be no incremental radioactive air releases above current facility operations reported as part of the baseline in the affected environment section of this *Tank Closure and Waste Management Environmental Impact Statement for the Hanford Site, Richland, Washington.*

Key: STTS-East=200-East Area Supplemental Treatment Technology Site; STTS-West=200-West Area Supplemental Treatment Technology Site; WTP=Waste Treatment Plant.

Appendix K, Section K.3.6, discusses the radiological and chemical consequences of facility accidents under each Waste Management alternative. Examination of the risks under each alternative shows that there would be essentially no LCFs per year for the offsite population, including minority and low-income populations due to radioactive emissions. Potential risks from hazardous chemical impacts from reasonably foreseeable accidents would be encompassed by those discussed in Section J.5.7.1.2 under the FFTF Decommissioning alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority or low-income populations.

J.5.7.2 Air Quality

Air quality impacts were not analyzed separately for each subset population because the results would be similar to those for radiological impacts (see Section J.5.7.1); because there were no disproportionately high and adverse health or environmental impacts on minority, American Indian, Hispanic, or low-income populations due to radioactive air releases during normal operations, the same would be true for nonradioactive air emissions.

J.5.7.3 Groundwater Resources: Long-Term Human Health Impacts

Appendix Q, Section Q.3, evaluated groundwater impacts and associated potential long-term human health effects for each Tank Closure, FFTF Decommissioning, and Waste Management alternative. Receptors analyzed with a potential for environmental justice concerns include a resident farmer, an American Indian resident farmer, and an American Indian hunter-gatherer. The hypothetical resident farmer and American Indian resident farmer were both assumed to use either groundwater or surface water, but not both, for drinking water ingestion and crop irrigation, depending on the location of the receptors. While only a portion of the food consumed by the resident farmer was assumed to come from crops and animal products exposed to contaminated groundwater, all of the food consumed by the American Indian resident farmer was assumed to be exposed to contaminated groundwater. The American Indian hunter-gatherer was assumed to have a subsistence consumption pattern that differs from that of the American Indian resident farmer. The American Indian hunter-gatherer would not cultivate crops but rather would gather food from indigenous plants and harvest fish from the

Columbia River; thus, this receptor is assumed to be exposed to a combination of surface water and groundwater. Given these assumptions, the two American Indian receptors would be most at risk from contaminated groundwater. These receptors were used to develop exposure scenarios at several on- and offsite locations identified in Appendix O, Section O.2.4, and Appendix Q, Section Q.2.2. Due to dependence on surface water, the American Indian hunter-gatherer receptor is only reported at the Columbia River nearshore location.

J.5.7.3.1 Tank Closure Alternatives

Results of the analysis of groundwater contamination under the Tank Closure alternatives for the American Indian receptors are presented in Appendix Q, Tables Q–22 through Q–241. Long-term human health impacts of tank closure proposed actions would be greatest under Tank Closure Alternative 1. Radionuclide releases under this alternative would result in doses at the A, B, and S Barriers and the Core Zone Boundary that would exceed regulatory limits for the resident farmer and the American Indian resident farmer. None of the hypothetical receptors at the Columbia River nearshore or surface-water locations, including the American Indian hunter-gatherer, would be exposed to a dose in excess of regulatory limits. Chemical releases under this alternative would result in exceedance of the Hazard Index for chromium and nitrate at the A, B, S, T, and U Barriers and the Core Zone Boundary for the resident farmer and the American Indian resident farmer, as well as exceedance of the Hazard Index for nitrate at the Columbia River nearshore location for those same receptors. The American Indian hunter-gatherer at the Columbia River nearshore location would be exposed to a collective Hazard Index in excess of regulatory limits from acetonitrile, chromium, nitrate, and uranium releases. None of the receptors at the Columbia River surface-water location would experience a Hazard Index in excess of regulatory limits from chemical releases. The analysis determined that the greatest impact of any alternative on long-term human health would result in radiation doses in excess of regulatory limits and chemical exposures with a Hazard Index greater than 1 for receptors located on site at the A, B, S, T, or U Barriers; the Core Zone Boundary; or the Columbia River nearshore. There are no such onsite receptors currently at Hanford. The onsite exposure scenarios do not currently exist and have never existed during Hanford operations. Therefore, the estimated high health risks for past years are hypothetical risks only; no persons were ever exposed at these levels. While it is possible for these receptor scenarios to develop in the future, none are expected within a reasonably foreseeable timeframe because the Core Zone is designated for Industrial-Exclusive land use, the Columbia River nearshore location is designated for Preservation (Hanford Reach National Monument), and the area between them is designated for Conservation (Mining) (DOE 1999). It is unlikely, therefore, that any of the Tank Closure alternatives would pose a disproportionately high and adverse long-term human health risk to the American Indian population at offsite locations. The greatest risk would be to the American Indian resident farmer at the Core Zone Boundary. During the year of peak dose, this receptor would receive a radiation dose of 2.6×10^2 millirem. During the year of peak Hazard Index, this receptor would be exposed to chemicals resulting in a Hazard Index greater than 1. The adverse impacts would also be applicable to the non–American Indian receptors at the same locations, but to a lesser extent.

J.5.7.3.2 FFTF Decommissioning Alternatives

Results of the analysis of groundwater contamination under the FFTF Decommissioning alternatives for the American Indian receptors are presented in Appendix Q, Tables Q–246 through Q–251. Long-term human health impacts of FFTF decommissioning proposed actions would be greatest under FFTF Decommissioning Alternative 1. Under this alternative, none of the hypothetical receptors at any of the assessment boundaries would receive a radiation dose in excess of regulatory limits or a chemical exposure with a Hazard Index greater than 1. The greatest risk would be to the American Indian resident farmer at the FFTF boundary. During the year of peak dose, this receptor would receive a radiation dose of 3.8 millirem, compared with the regulatory limit of 100 millirem from all sources. During the year of peak Hazard Index, this receptor would be exposed to chemicals resulting in a Hazard Index less than 1.

Therefore, none of the FFTF Decommissioning alternatives would pose a disproportionately high and adverse long-term human health risk to the American Indian population at offsite locations.

J.5.7.3.3 Waste Management Alternatives

Results of the analysis of groundwater contamination under the Waste Management alternatives for the American Indian receptors are presented in Appendix Q, Tables Q–253 through Q–391. Long-term human health impacts of waste management proposed actions would be greatest under Waste Management Alternative 3, Disposal Group 1, Subgroup 1-C. Radionuclide releases under this alternative would result in doses at the 200-West Area Integrated Disposal Facility (IDF-West) barrier exceeding regulatory limits for the resident farmer and the American Indian resident farmer. None of the hypothetical receptors at the 200-East Area Integrated Disposal Facility (IDF-East) barrier, the Core Zone Boundary, the River Protection Project Disposal Facility (RPPDF) barrier, the Columbia River nearshore, or the Columbia River surface-water location, including the American Indian hunter-gatherer, would be exposed to a dose in excess of regulatory limits. Chemical releases under this alternative would result in exceedance of the Hazard Index for chromium at the IDF-East barrier for the resident farmer and the American Indian resident farmer, and at the Core Zone Boundary for the American Indian resident farmer. Exceedances of the Hazard Index for nitrate occur at the IDF-East barrier, the Core Zone Boundary, and the Columbia River nearshore for the resident farmer and the American Indian resident farmer. None of the hypothetical receptors at the RPPDF barrier or the Columbia River surface-water location would be exposed to a Hazard Index in excess of regulatory limits. The analysis determined that the greatest impact of any alternative on long-term human health would result in radiation doses in excess of regulatory limits and chemical exposures with a Hazard Index greater than 1 for receptors located on site at the IDF-West barrier, IDF-East barrier, the Core Zone Boundary, or the Columbia River nearshore. There are no such onsite receptors currently at Hanford. The onsite exposure scenarios do not currently exist and have never existed during Hanford operations. Therefore, the estimated high health risks for past years are hypothetical risks only; no persons were ever exposed at these levels. While it is possible for these receptor scenarios to develop in the future, none are expected within a reasonably foreseeable timeframe because the Core Zone is designated for Industrial-Exclusive land use, the Columbia River nearshore location is designated for Preservation (Hanford Reach National Monument), and the area between them is designated for Conservation (Mining) (DOE 1999). It is unlikely, therefore, that any of the Waste Management alternatives would pose a disproportionately high and adverse long-term human health risk to the American Indian population. The greatest risk would be to the American Indian resident farmer at the IDF-West barrier. During the year of peak dose, this receptor would receive a radiation dose of 131 millirem. During the year of peak Hazard Index, this receptor would not be exposed to chemicals resulting in a Hazard Index greater than 1; however, the risk from the radiation dose at this location outweighs the nonradiological risk from chemical releases identified at the Core Zone Boundary and the Columbia River nearshore. The adverse impacts would also be applicable to non–American Indian receptors at the same locations, but to a lesser extent.

J.6 REFERENCES

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