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, 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 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 2000 census, approximately 2 percent of the population identified themselves as members of more than one race (Grieco and Cassidy 2001). Approximately two-thirds of those designated themselves as members of at least one minority race.

> **Minority populations.** Minority populations should be identified where either (1) the minority population of the affected area exceeds 50 percent 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. In identifying minority communities, agencies may consider a community 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 2000 were extracted from the Census Bureau's Summary File 1 (Census 2007a). The CEQ guidance recommends that impacts on the minority population be examined, as well as those specific to American Indian tribes (CEQ 1997). Due to the large number of minority Hispanics, impacts on that specific population were also examined.

In the discussions of environmental justice in this *TC & WM EIS*, people self-designated 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 in the analysis in this EIS are from the Census Bureau's Current Population Reports, Series P60-210 on Consumer Income, Poverty in the United States: 1999 (Dalaker and Proctor 2000).

Data for the analysis of low-income populations were extracted from the Census Bureau's Summary File 3 (Census 2007b).

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 community that is significant (as defined by NEPA) or appreciably exceeds the environmental impact on the larger community. 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 2000 census, the Census Bureau subdivided the United States and its territories into 8,205,582 blocks (Census 2007c). For comparison, the number of counties, census tracts, and block groups used in the 2000 census were 3,141; 65,443; and 208,790; 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 below, block-group-level resolution was used to identify minority and low-income populations.

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 Site in the 200-East Area and the 200-West Area (STTS-East and STTS-West), the Waste Treatment Plant (WTP) facilities, 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. A potential release location at INL, the Materials and Fuels Complex (MFC), was 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 the facility site would not coincide with boundaries used by the Census Bureau for enumeration of the population in the potentially affected area. Some blocks or 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 9.0. ArcMap 9.0 allows 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 re-projected to the North American Standard 1983 projection to prevent potential data misalignment. Additional shapefiles either were developed as necessary using ArcMap 9.0 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 Oregon and Washington.

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 populations and low-income communities surrounding the sites (Census 2007a, 2007b). Minority populations and low-income communities were identified where the percentage of minority and low-income population in the impacted areas significantly exceeded the general population percentage in other reasonable geographic areas of comparison, defined here as the potentially affected counties and states in which the impacted areas are located. The U.S. Nuclear Regulatory Commission considers such percentages "significant" when the total minority or low-income population percentage exceeds the general population by 20 points, or when either the minority or low-income population percentage exceeds 50 percent (69 FR 52040). Table J–1 displays the thresholds used to determine minority and low-income populations.

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

Site	Minority (percent)	Low-Income (percent)
Hanford Site	50.0	36.2
Idaho National Laboratory	32.7	33.6

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

[2] Data for Washington and Oregon.

Chapter 3, Sections 3.2.11 and 3.3.11 discuss 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 372 block groups within the 80-kilometer (50-mile) potentially affected radius. Out of these block groups, 130 were determined to contain 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 one-half of the potentially affected minority population resides in Yakima County, and over 90 percent of the potentially affected minority population lives in four Washington counties: Benton, Franklin, Grant, and Yakima.

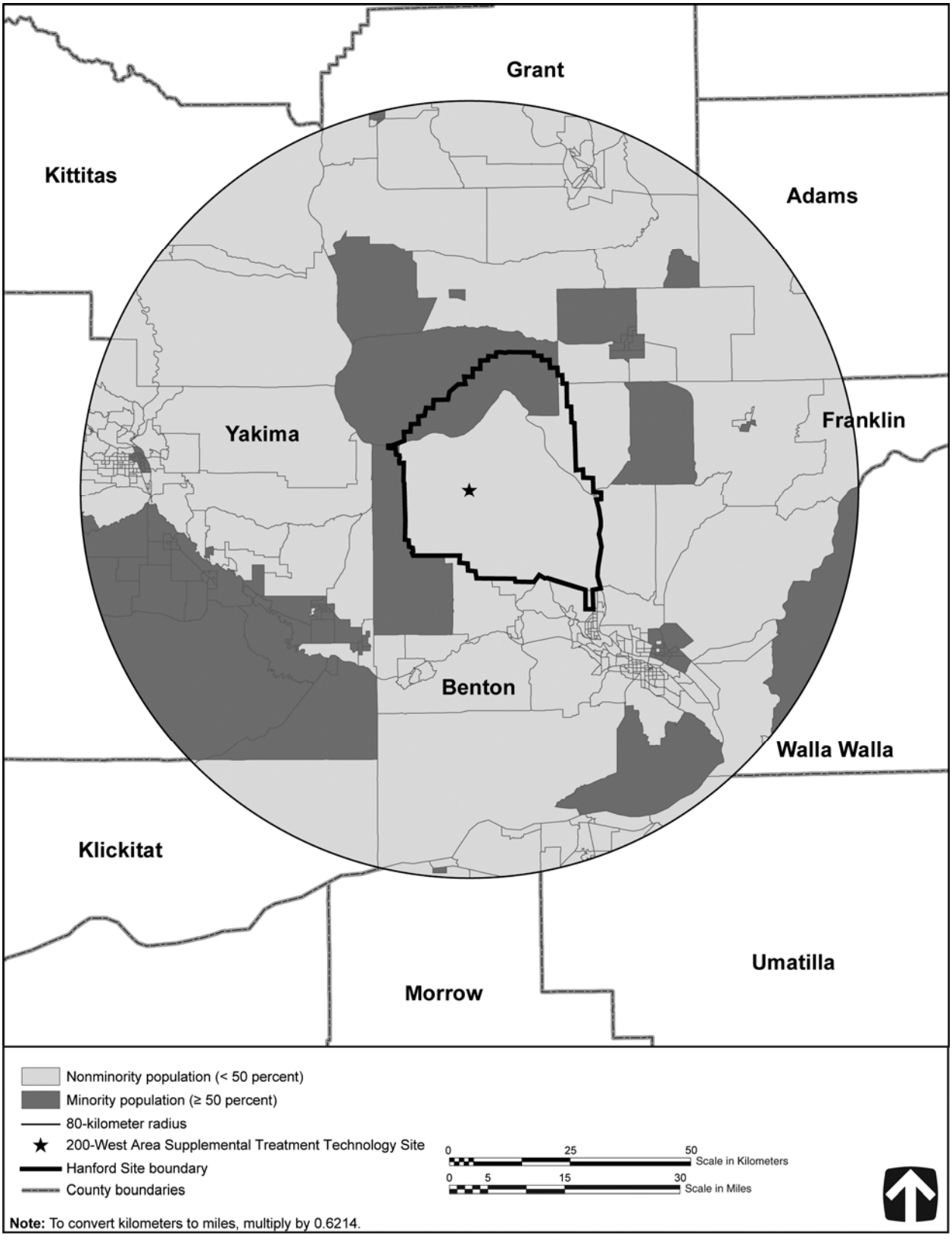

Figure J–1. Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the 200-West Area Supplemental Treatment Technology Site (2000)

Table J–2. Minority Populations Living in Potentially Affected Counties Surrounding the 200-West Area Supplemental Treatment Technology Site (2000)

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Population Total
Adams (Washington)	16,428	8,062	12,296	7,750	4.3
Benton (Washington)[b]	142,475	26,018	142,464	26,027	14.4
Franklin (Washington)	49,347	25,877	49,039	25,845	14.3
Grant (Washington)	74,698	25,815	55,421	22,775	12.6
Kittitas (Washington)	33,362	3,537	3,643	365	0.2
Klickitat (Washington)	19,161	2,832	264	78	0.0
Walla Walla (Washington)	55,180	11,678	4,213	769	0.4
Yakima (Washington)	222,581	96,848	203,306	91,164	50.4
Morrow (Oregon)	10,995	3,084	6,224	2,323	1.3
Umatilla (Oregon)	70,548	15,878	12,027	3,698	2.0
Total	**694,775**	**219,629**	**488,897**	**180,794**	**100.0**

[a] Census 2007d.

[b] Potentially affected populations may not equal total populations 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 axis 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 near the outskirts of the population centers of Richland, Kennewick/Pasco, and Yakima. Approximately 18 percent of the potentially affected minority population lives within about 40 kilometers (25 miles) of the facility, and 55 percent resides within about 56 kilometers (35 miles). The potentially affected total minority population surrounding STTS-West is approximately 181,000 persons, accounting for approximately 37 percent of the total potentially affected population of approximately 489,000. Approximately 84 percent of the minority population surrounding STTS-West is Hispanic or Latino.

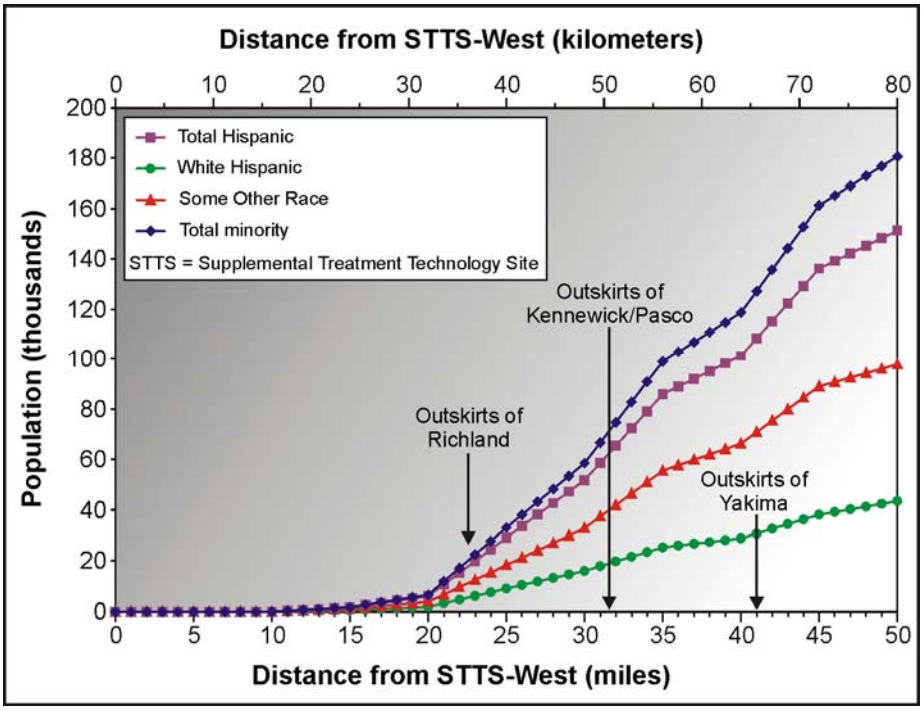

Figure J–2. Cumulative Larger-Scale Minority Populations as a Function of Distance from the 200-West Area Supplemental Treatment Technology Site

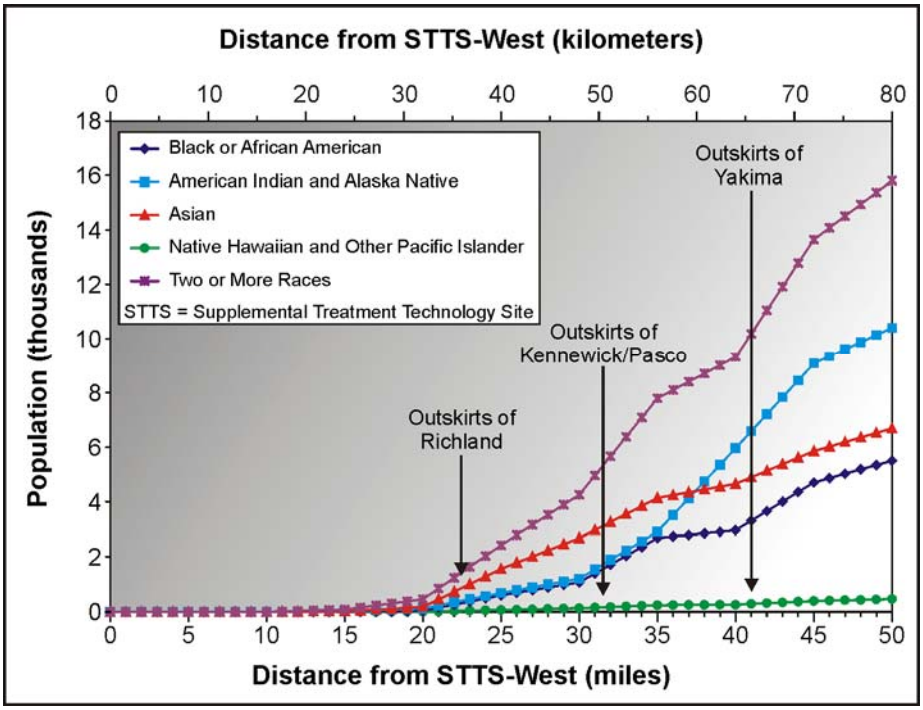

Figure J–3. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the 200-West Area Supplemental Treatment Technology Site

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 372 block groups surrounding STTS-West, an estimated 27 block groups contain low-income populations. As indicated in Table J–3, approximately one-half 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 compose approximately 17 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 (2000)

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)	16,217	2,951	12,222	2,403	3.0
Benton (Washington)	141,232	14,517	141,219	14,515	18.2
Franklin (Washington)	48,307	9,280	48,006	9,230	11.5
Grant (Washington)	73,591	12,809	54,826	9,888	12.4
Kittitas (Washington)	31,177	6,122	3,657	365	0.5
Klickitat (Washington)	18,983	3,236	251	55	0.1
Walla Walla (Washington)	50,245	7,567	4,208	334	0.4
Yakima (Washington)	218,966	43,070	199,747	40,444	50.6
Morrow (Oregon)	10,919	1,617	6,190	1,198	1.5
Umatilla (Oregon)	67,329	8,524	11,024	1,532	1.9
Total	**676,966**	**109,693**	**481,350**	**79,964**	**100.0**

[a] Census 2007e.

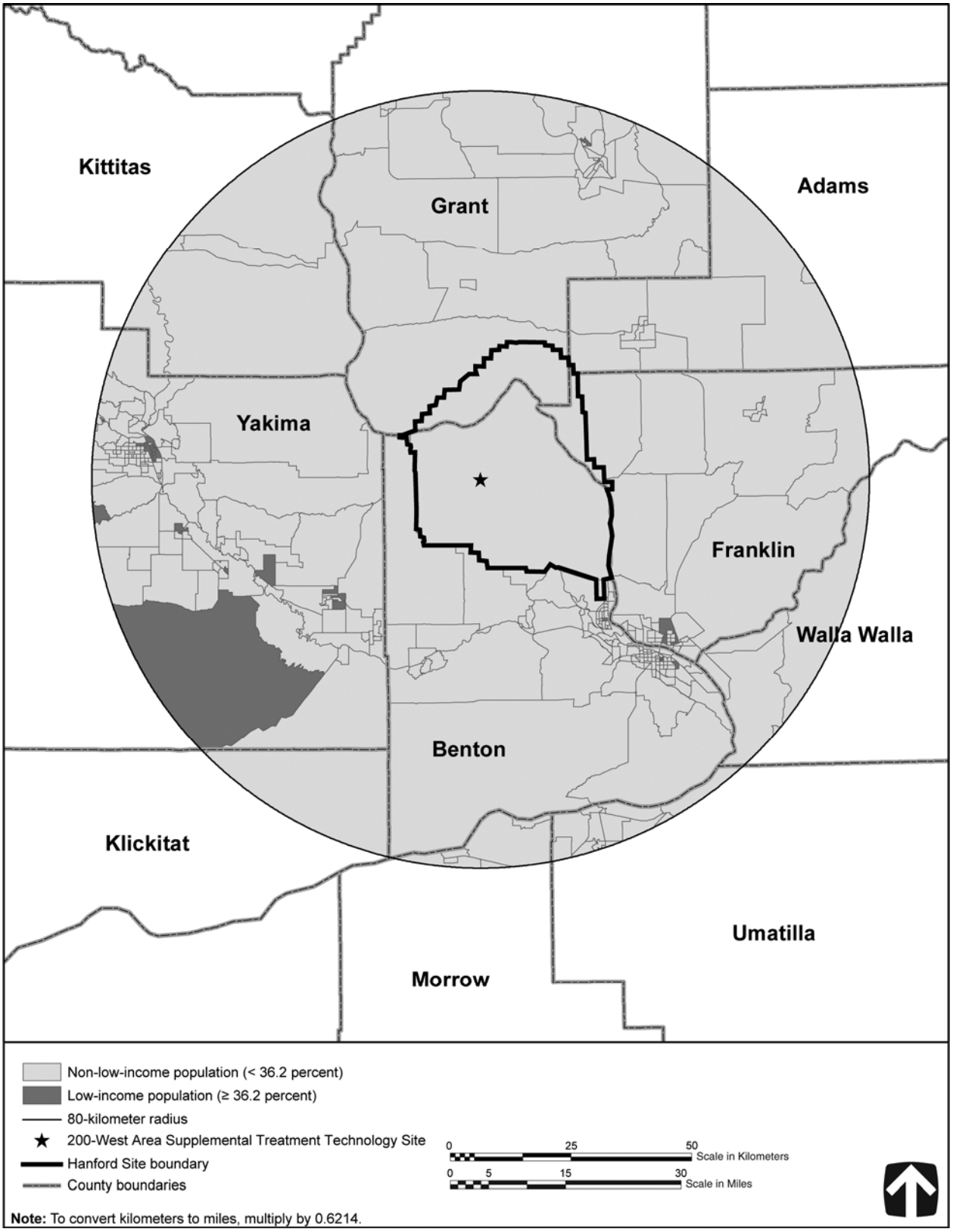

Figure J–4. Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the 200-West Area Supplemental Treatment Technology Site (2000)

Figure J–5 shows cumulative low-income populations as a function of distance from STTS-West. Low-income populations surrounding STTS-West are concentrated in the Tri-Cities area and Yakima County.

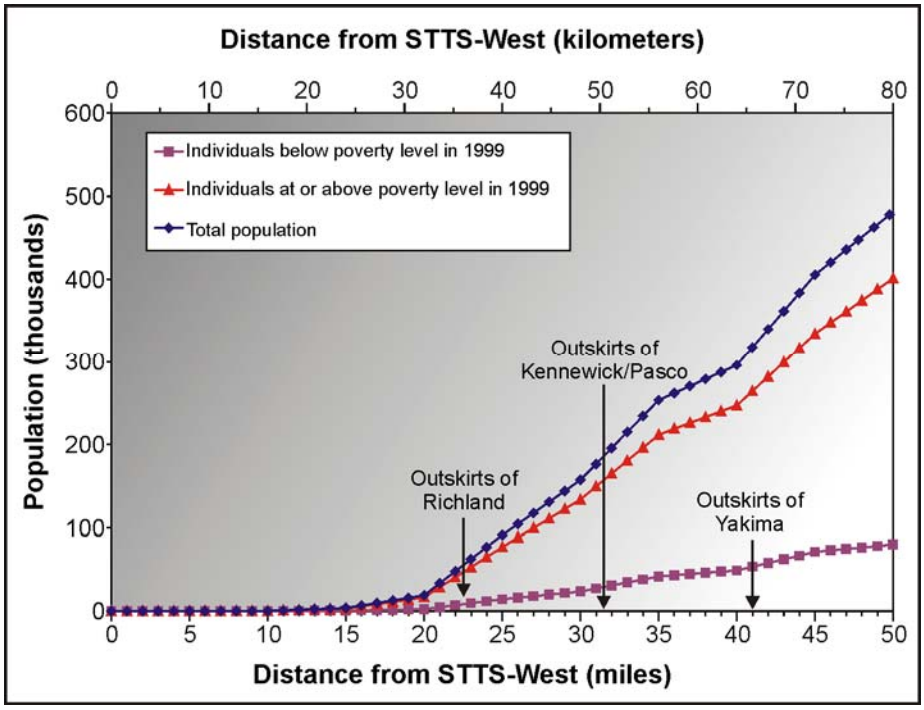

Figure J–5. Cumulative Low-Income Populations as a Function of Distance from the 200-West Area Supplemental Treatment Technology Site

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 360 block groups that surround the WTP, an estimated 84 contain 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).

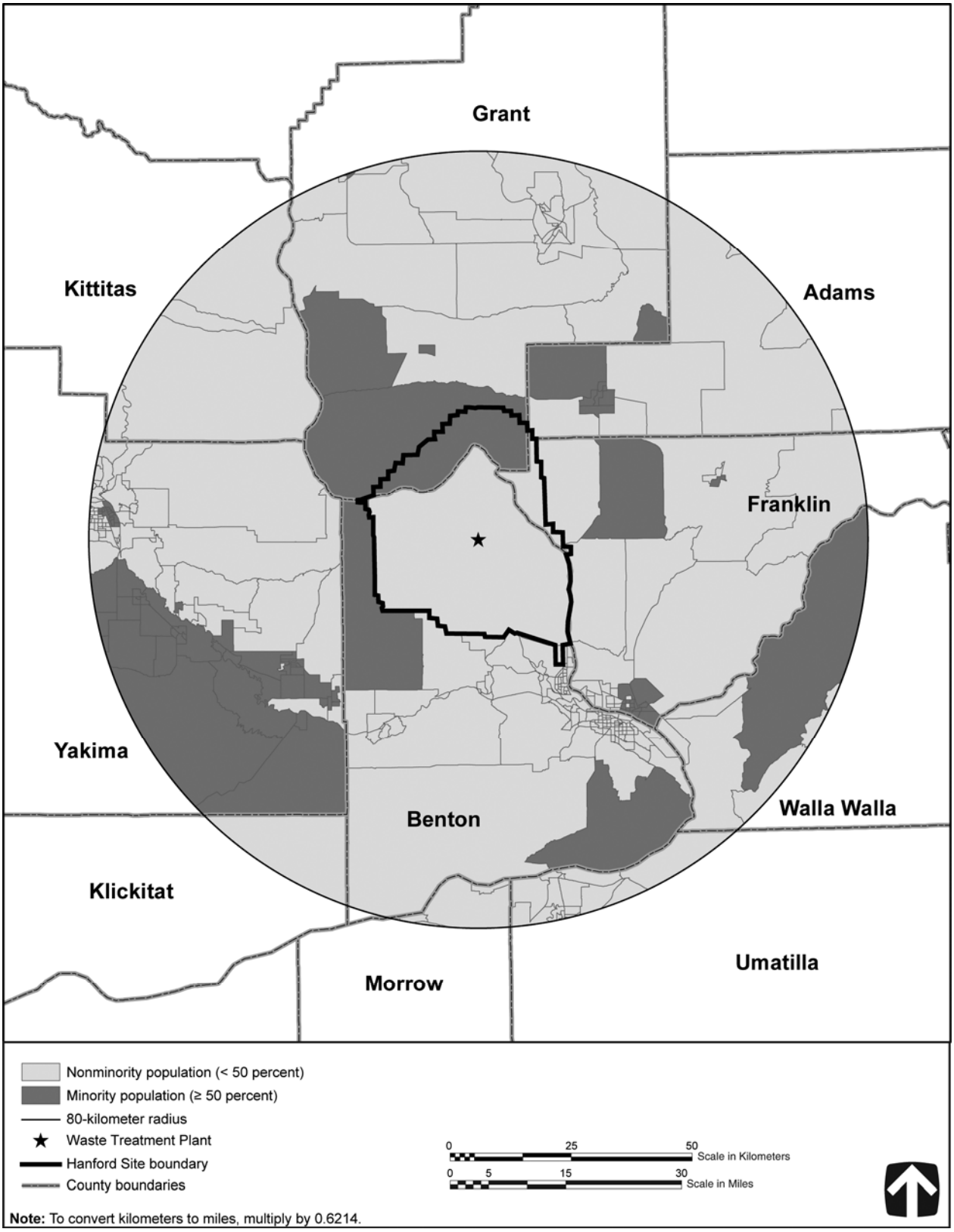

Figure J–6. Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Waste Treatment Plant (2000)

As indicated in Table J–4, approximately one-half of the potentially affected minority population resides in Yakima County, and over 90 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 (2000)

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Population Total
Adams (Washington)	16,428	8,062	12,574	7,791	4.5
Benton (Washington)	142,475	26,018	142,456	26,000	15.0
Franklin (Washington)	49,347	25,877	49,139	25,855	14.9
Grant (Washington)	74,698	25,815	53,849	21,314	12.3
Kittitas (Washington)	33,362	3,537	2,546	262	0.2
Klickitat (Washington)	19,161	2,832	162	48	0.0
Walla Walla (Washington)	55,180	11,678	5,068	1,087	0.6
Yakima (Washington)	222,581	96,848	159,157	83,793	48.4
Morrow (Oregon)	10,995	3,084	4,588	1,370	0.8
Umatilla (Oregon)	70,548	15,878	17,815	5,527	3.2
Total	**694,775**	**219,629**	**447,354**	**173,047**	**100.0**

[a] Census 2007d.

Figures J–7 and J–8 show cumulative minority populations as a function of distance from the WTP. Values along the vertical axis of this figure 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 Yakima. Approximately 20 percent of the potentially affected minority population lives within about 39 kilometers (24 miles) of the facility, and 50 percent resides within about 53 kilometers (33 miles). The potentially affected total minority population surrounding the WTP is approximately 173,000 persons, accounting for approximately 39 percent of the total potentially affected population of approximately 447,000. Approximately 84 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 360 block groups that surround WTP, an estimated 30 contain low-income populations.

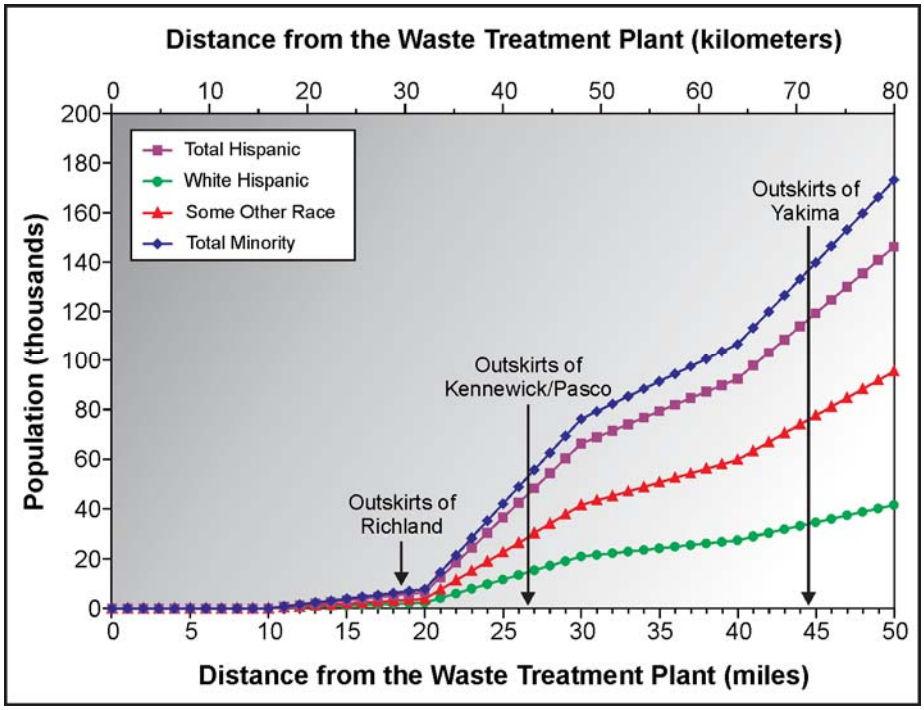

Figure J–7. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Waste Treatment Plant

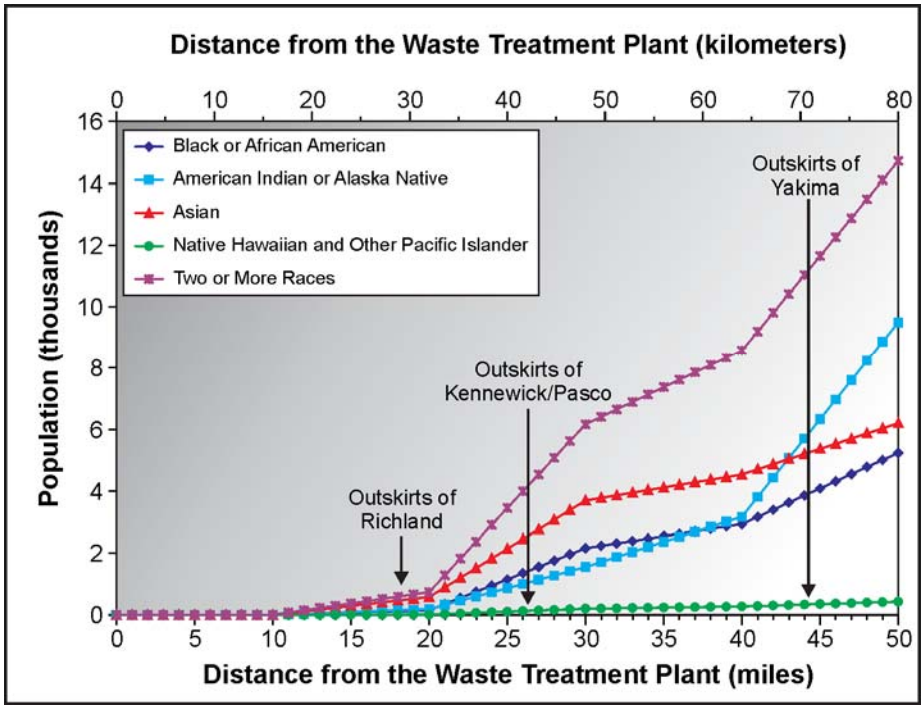

Figure J–8. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Waste Treatment Plant

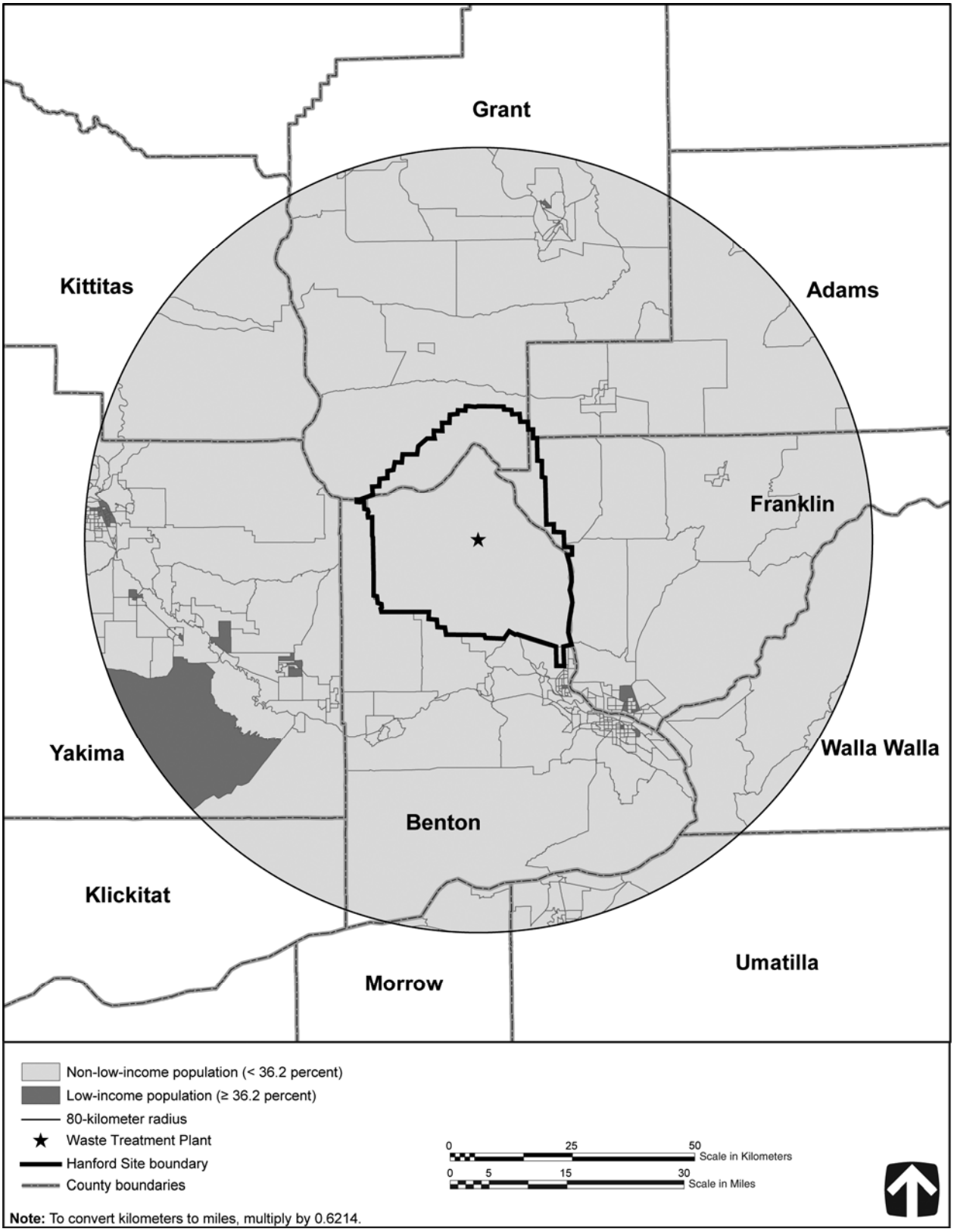

Figure J–9. Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Waste Treatment Plant (2000)

As indicated in Table J–5, approximately one-half 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 compose approximately 17 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 (2000)

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)	16,217	2,951	12,506	2,433	3.2
Benton (Washington)	141,232	14,517	141,217	14,513	18.8
Franklin (Washington)	48,307	9,280	48,104	9,245	12.0
Grant (Washington)	73,591	12,809	53,292	9,496	12.3
Kittitas (Washington)	31,177	6,122	2,559	251	0.3
Klickitat (Washington)	18,983	3,236	154	34	0.0
Walla Walla (Washington)	50,245	7,567	5,052	475	0.6
Yakima (Washington)	218,966	43,070	156,394	37,462	48.6
Morrow (Oregon)	10,919	1,617	4,559	832	1.1
Umatilla (Oregon)	67,329	8,524	16,746	2,305	3.0
Total	**676,966**	**109,693**	**440,583**	**77,046**	**100.0**

[a] Census 2007e.

Figure J–10 shows cumulative low-income populations as a function of distance from the WTP. Low-income populations surrounding the WTP are concentrated in the Tri-Cities area and Yakima County.

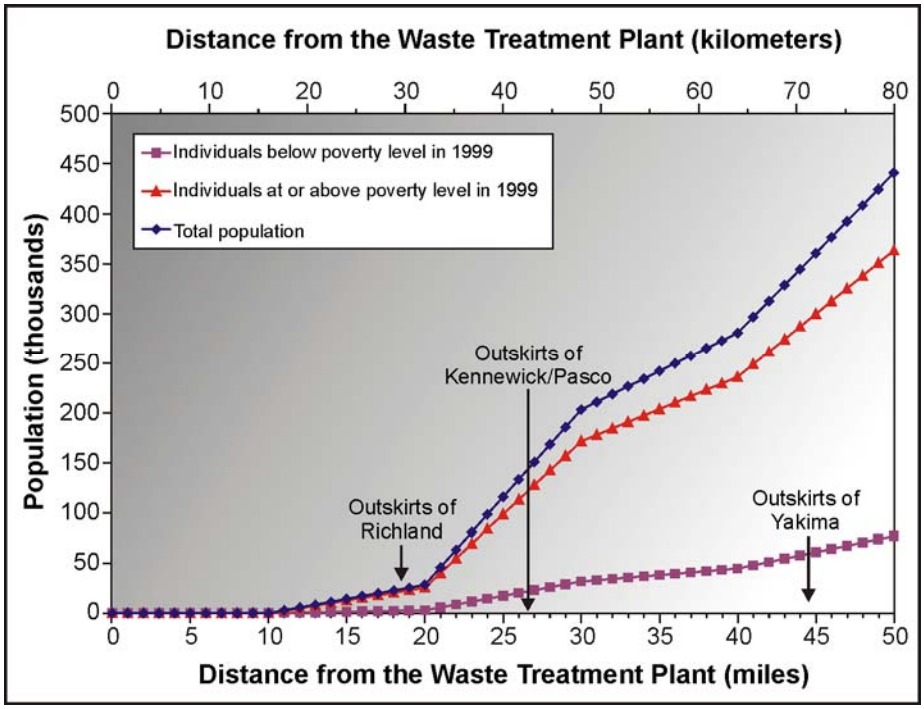

Figure J–10. Cumulative Low-Income Populations as a Function of Distance from the Waste Treatment Plant

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 364 block groups that surround STTS-East, an estimated 86 contain 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 one-half of the potentially affected minority population resides in Yakima County, and over 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, respectively, in Section J.5.2.

Table J–6. Minority Populations Living in Potentially Affected Counties Surrounding the 200-East Area Supplemental Treatment Technology Site (2000)

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Population Total
Adams (Washington)	16,428	8,062	12,550	7,789	4.5
Benton (Washington)	142,475	26,018	142,442	26,001	15.0
Franklin (Washington)	49,347	25,877	49,137	25,855	14.9
Grant (Washington)	74,698	25,815	52,071	20,293	11.7
Kittitas (Washington)	33,362	3,537	2,510	260	0.1
Klickitat (Washington)	19,161	2,832	173	51	0.0
Walla Walla (Washington)	55,180	11,678	5,090	1,087	0.6
Yakima (Washington)	222,581	96,848	160,443	84,050	48.4
Morrow (Oregon)	10,995	3,084	5,373	1,808	1.0
Umatilla (Oregon)	70,548	15,878	21,777	6,635	3.8
Total	**694,775**	**219,629**	**451,556**	**173,829**	**100.0**

[a] Census 2007d.

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 364 block groups that surround STTS-East, an estimated 32 contain low-income populations.

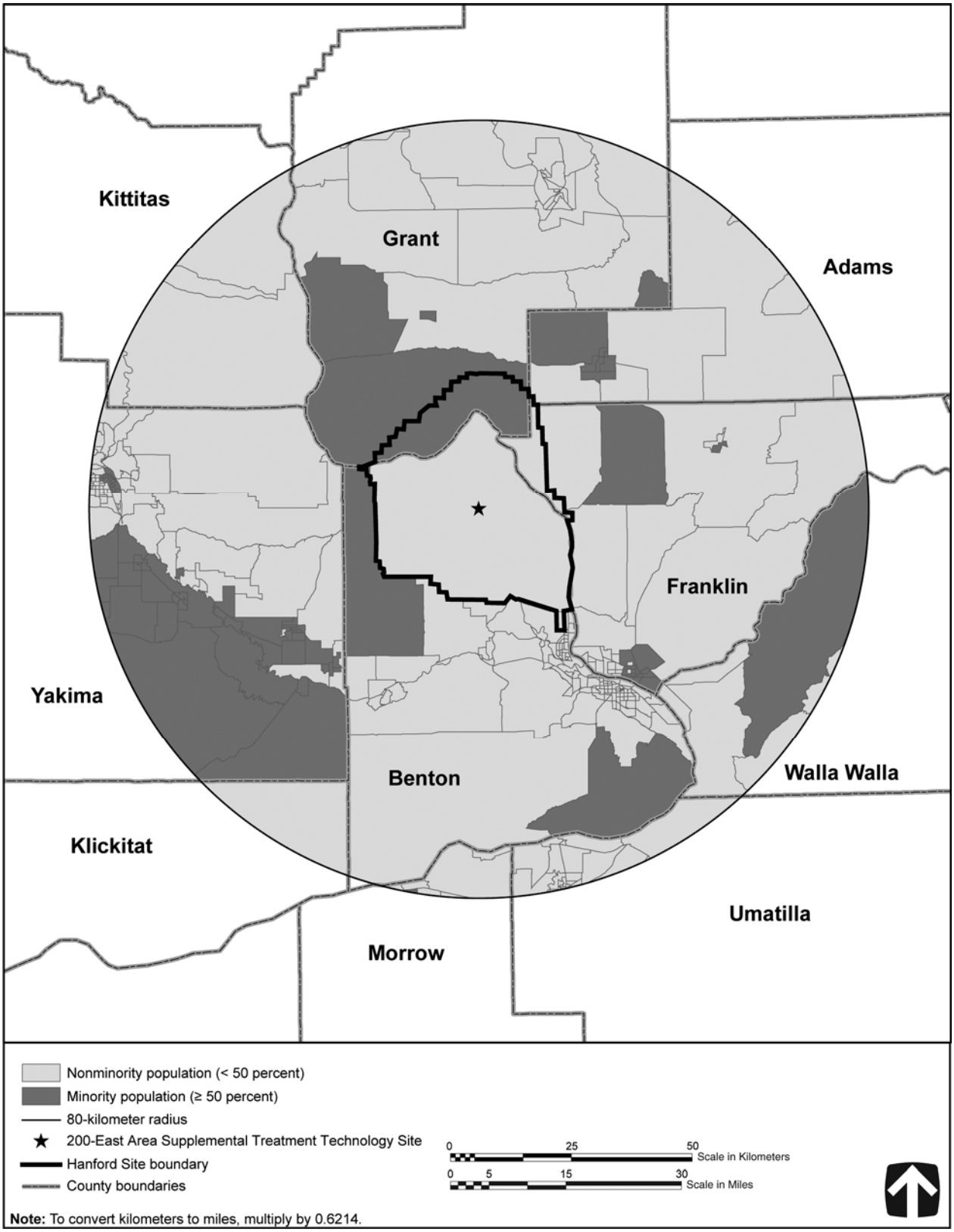

Figure J–11. Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the 200-East Area Supplemental Treatment Technology Site (2000)

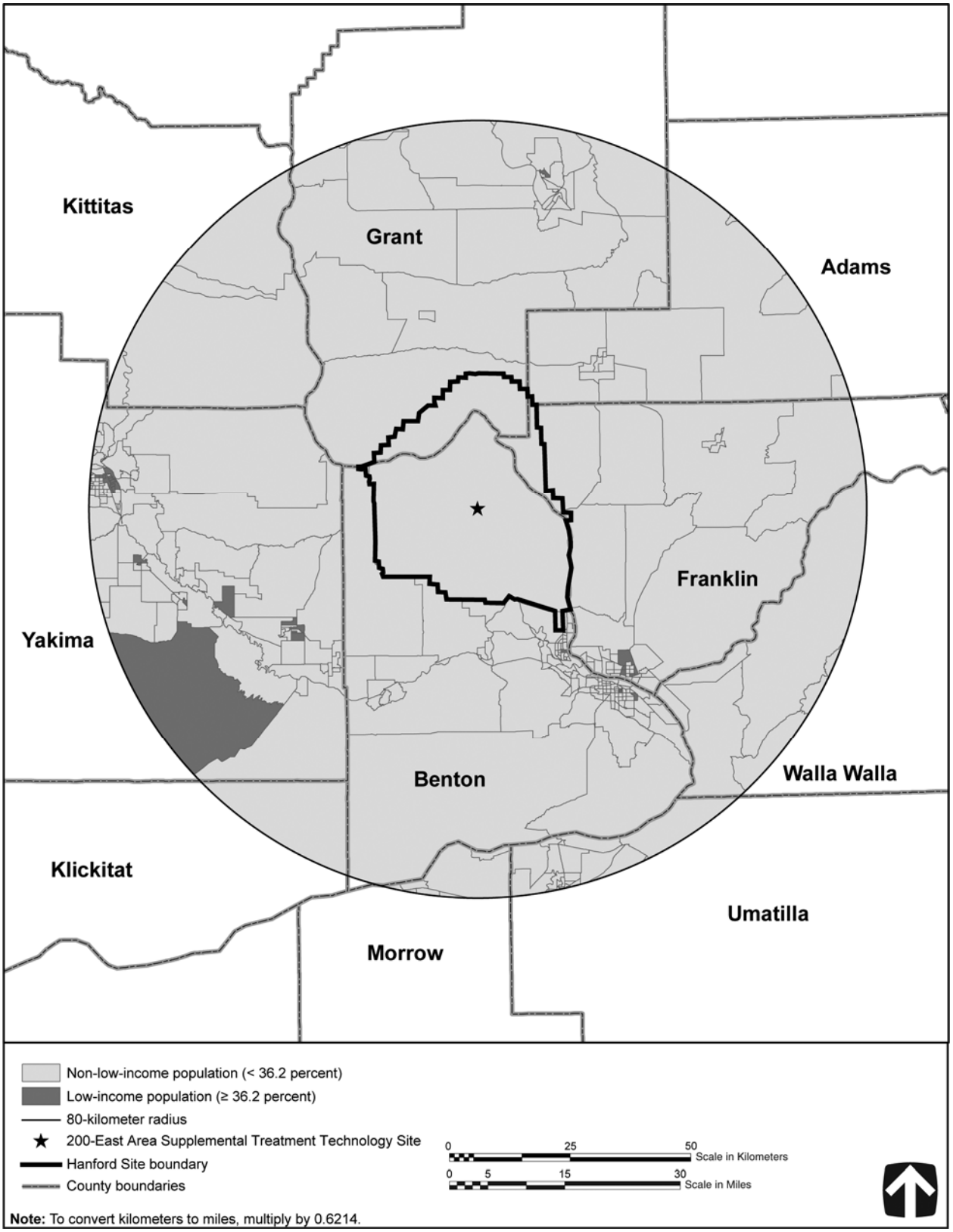

Figure J–12. Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the 200-East Area Supplemental Treatment Technology Site (2000)

As indicated in Table J–7, approximately one-half 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 compose approximately 17 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 are concentrated in the Tri-Cities area and Yakima County.

Table J–7. Low-Income Populations Living in Potentially Affected Counties Surrounding the 200-East Area Supplemental Treatment Technology Site (2000)

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Population Total
Adams (Washington)	16,217	2,951	12,485	2,429	3.1
Benton (Washington)	141,232	14,517	141,203	14,512	18.7
Franklin (Washington)	48,307	9,280	48,097	9,247	11.9
Grant (Washington)	73,591	12,809	51,502	9,141	11.8
Kittitas (Washington)	31,177	6,122	2,528	248	0.3
Klickitat (Washington)	18,983	3,236	164	37	0.0
Walla Walla (Washington)	50,245	7,567	5,078	476	0.6
Yakima (Washington)	218,966	43,070	157,596	37,585	48.5
Morrow (Oregon)	10,919	1,617	5,341	1,003	1.3
Umatilla (Oregon)	67,329	8,524	20,795	2,859	3.7
Total	**676,966**	**109,693**	**444,789**	**77,537**	**100.0**

[a] Census 2007e.

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 298 block groups that surround FFTF, an estimated 60 contain 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).

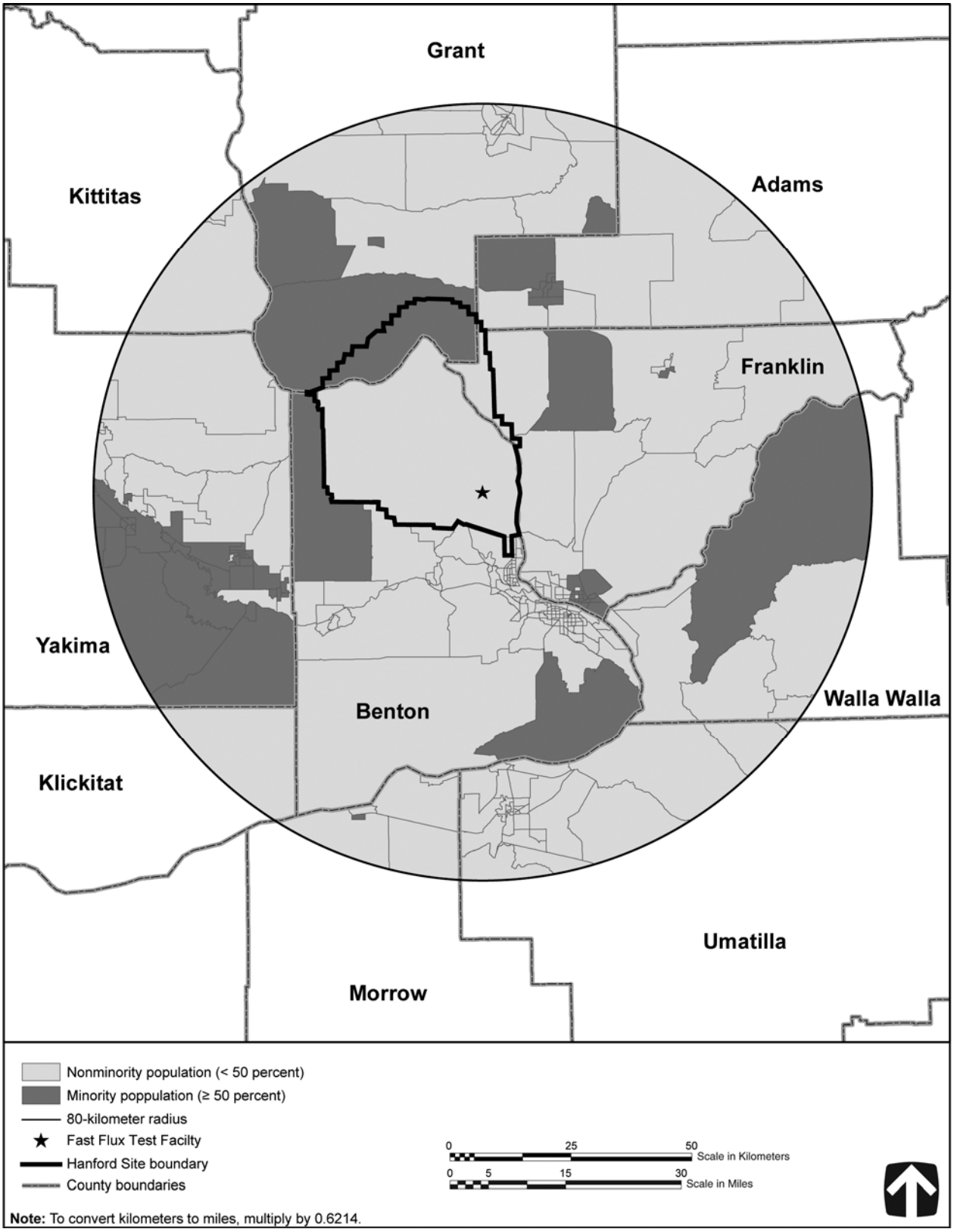

Figure J–13. Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Fast Flux Test Facility (2000)

As indicated in Table J–8, approximately 33 percent of the potentially affected minority population resides in Yakima County, and over 90 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 (2000)

County (State)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Population Total
Adams (Washington)	16,428	8,062	12,579	7,793	5.9
Benton (Washington)	142,475	26,018	142,465	26,016	19.7
Franklin (Washington)	49,347	25,877	49,232	25,864	19.6
Grant (Washington)	74,698	25,815	39,353	16,172	12.3
Kittitas (Washington)	33,362	3,537	787	99	0.1
Klickitat (Washington)	19,161	2,832	215	65	0.0
Walla Walla (Washington)	55,180	11,678	6,984	1,570	1.2
Yakima (Washington)	222,581	96,848	66,206	42,819	32.5
Morrow (Oregon)	10,995	3,084	6,749	2,485	1.9
Umatilla (Oregon)	70,548	15,878	32,821	8,903	6.8
Total	**694,775**	**219,629**	**357,391**	**131,786**	**100.0**

[a] Census 2007d.

The total population of the potentially affected area surrounding FFTF is estimated to be approximately 357,000. The significant reduction in population compared to other areas at Hanford that are analyzed in this EIS can be attributed to Yakima City'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 axis of this figure show minority populations living within a given distance from FFTF. Moving outward from the facilities, 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 toward the outer rim of 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 32 kilometers (20 miles) of the facility, and 50 percent resides within about 47 kilometers (29 miles). The potentially affected total minority population surrounding FFTF is approximately 132,000 persons, accounting for approximately 37 percent of the total population. Approximately 86 percent of the minority population surrounding FFTF is Hispanic or Latino.

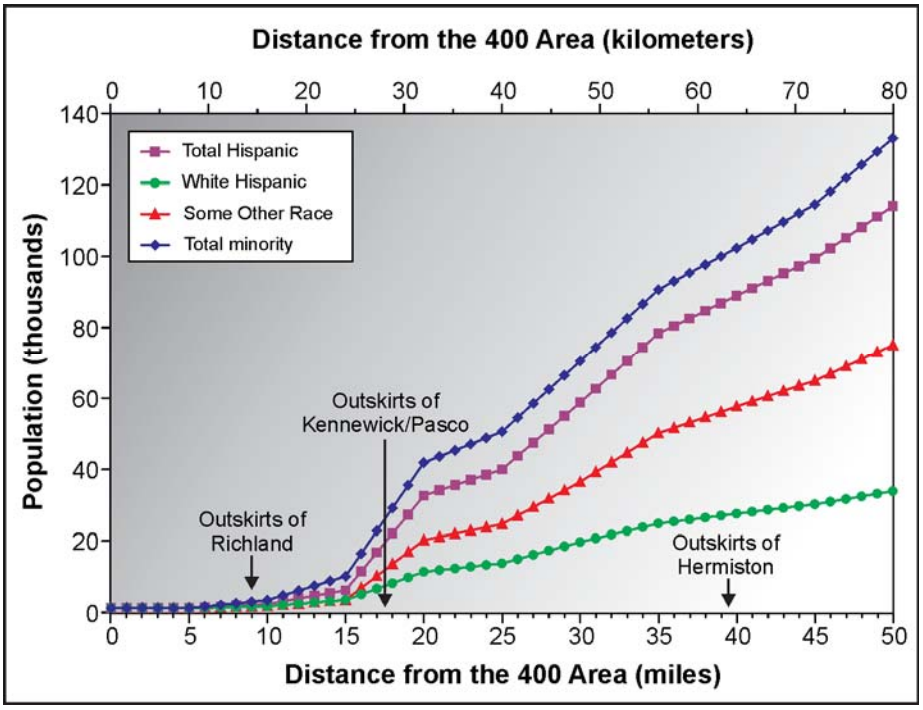

Figure J–14. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Fast Flux Test Facility

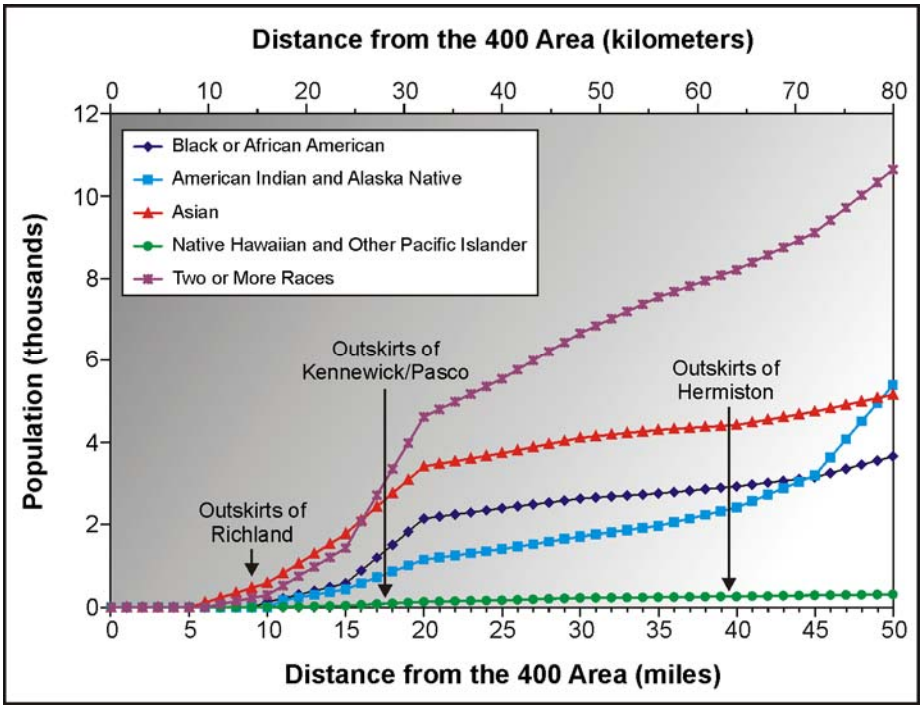

Figure J–15. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Fast Flux Test Facility

Figure J–16 shows block groups surrounding FFTF and low-income and non-low-income populations living in the potentially affected area. Of the 298 block groups that surround FFTF, an estimated 17 contain low-income populations.

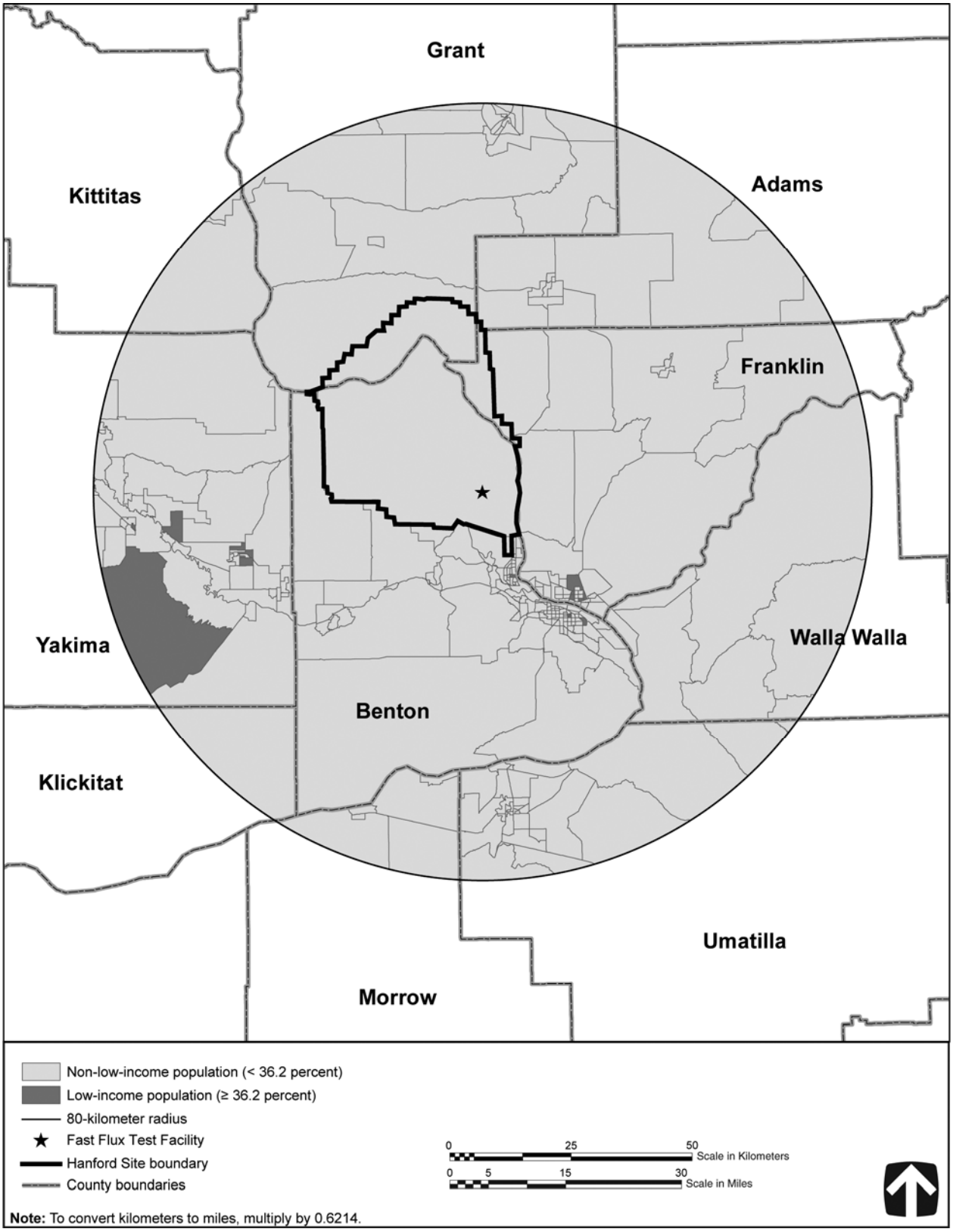

Figure J–16. Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Fast Flux Test Facility (2000)

As indicated in Table J–9, approximately 30 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 five counties: Benton, Franklin, Grant, and Yakima Counties in Washington and Umatilla County in Oregon. Low-income persons compose approximately 16 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 (2000)

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)	16,217	2,951	12,508	2,431	4.4
Benton (Washington)[b]	141,232	14,517	141,219	14,521	26.3
Franklin (Washington)	48,307	9,280	48,183	9,256	16.8
Grant (Washington)	73,591	12,809	38,966	6,376	11.5
Kittitas (Washington)	31,177	6,122	799	67	0.1
Klickitat (Washington)	18,983	3,236	204	45	0.1
Walla Walla (Washington)	50,245	7,567	6,955	748	1.4
Yakima (Washington)	218,966	43,070	65,394	16,747	30.3
Morrow (Oregon)	10,919	1,617	6,718	1,242	2.2
Umatilla (Oregon)	67,329	8,524	30,940	3,801	6.9
Total	**676,966**	**109,693**	**351,886**	**55,234**	**100.0**

[a] Census 2007e.

[b] Potentially affected populations may not equal total populations due to rounding.

Figure J–17 shows cumulative low-income populations as a function of distance from FFTF. Low-income populations surrounding FFTF are concentrated in the Tri-Cities area and Yakima County in Washington and in Hermiston, Oregon.

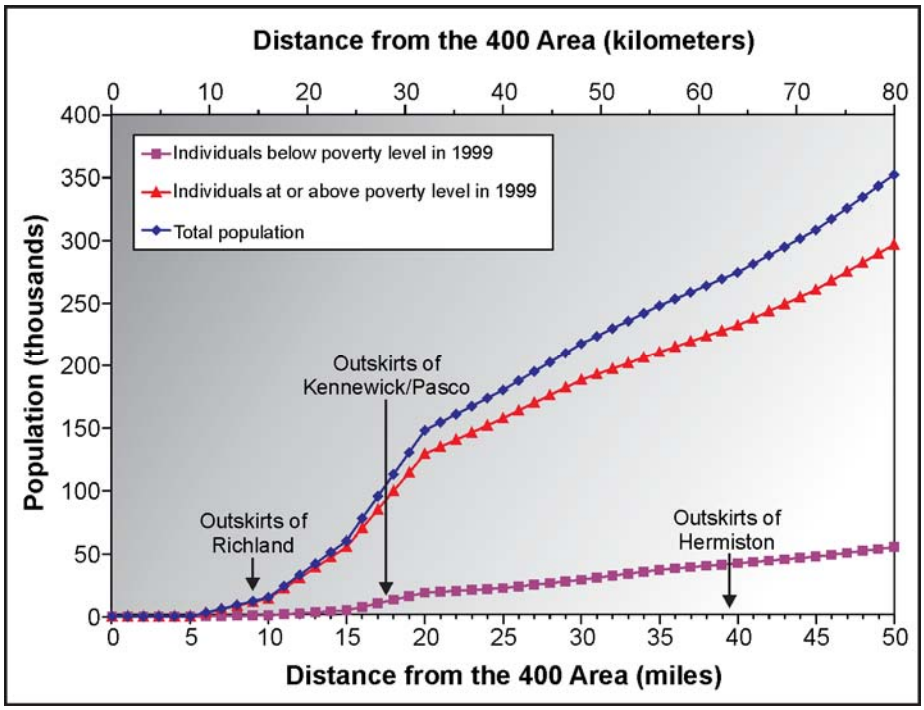

Figure J–17. Cumulative Low-Income Populations as a Function of Distance from the Fast Flux Test Facility

J.5.5 Minority and Low-Income Populations Surrounding Idaho National Laboratory

Figure J–18 shows minority and nonminority populations living in block groups surrounding INL. Of the 189 block groups that surround INL, an estimated 12 contain 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 66 percent of the potentially affected minority population resides in Bingham and Bonneville County, while another 30 percent of the potentially affected minority population lives in Bannock, Jefferson, and Madison Counties.

Table J–10. Minority Populations Living in Potentially Affected Counties Surrounding the Materials and Fuels Complex (2000)

County (Idaho)	Total County Population[a]	Total Minority Population[a]	Potentially Affected Total Population	Potentially Affected Minority Population	Percentage of the Potentially Affected Minority Population Total
Bannock	75,565	7,929	32,697	3,875	15.4
Bingham	41,735	8,911	40,557	8,724	34.7
Blaine	18,991	2,460	275	42	0.2
Bonneville	82,522	8,061	81,520	8,029	31.9
Butte	2,899	193	2,742	182	0.7
Caribou	7,304	375	0	0	0.0
Clark	1,022	369	625	233	0.9
Custer	4,342	242	160	8	0.0
Fremont	11,819	1,499	1,237	177	0.7
Jefferson	19,155	2,200	18,928	2,181	8.7
Lemhi	7,806	354	24	1	0.0
Madison	27,467	1,611	26,730	1,582	6.3
Minidoka	20,174	5,622	18	9	0.0
Power	7,538	1,946	449	132	0.5
Total	**328,339**	**41,772**	**205,962**	**25,175**	**100.0**

[a] Census 2007d.

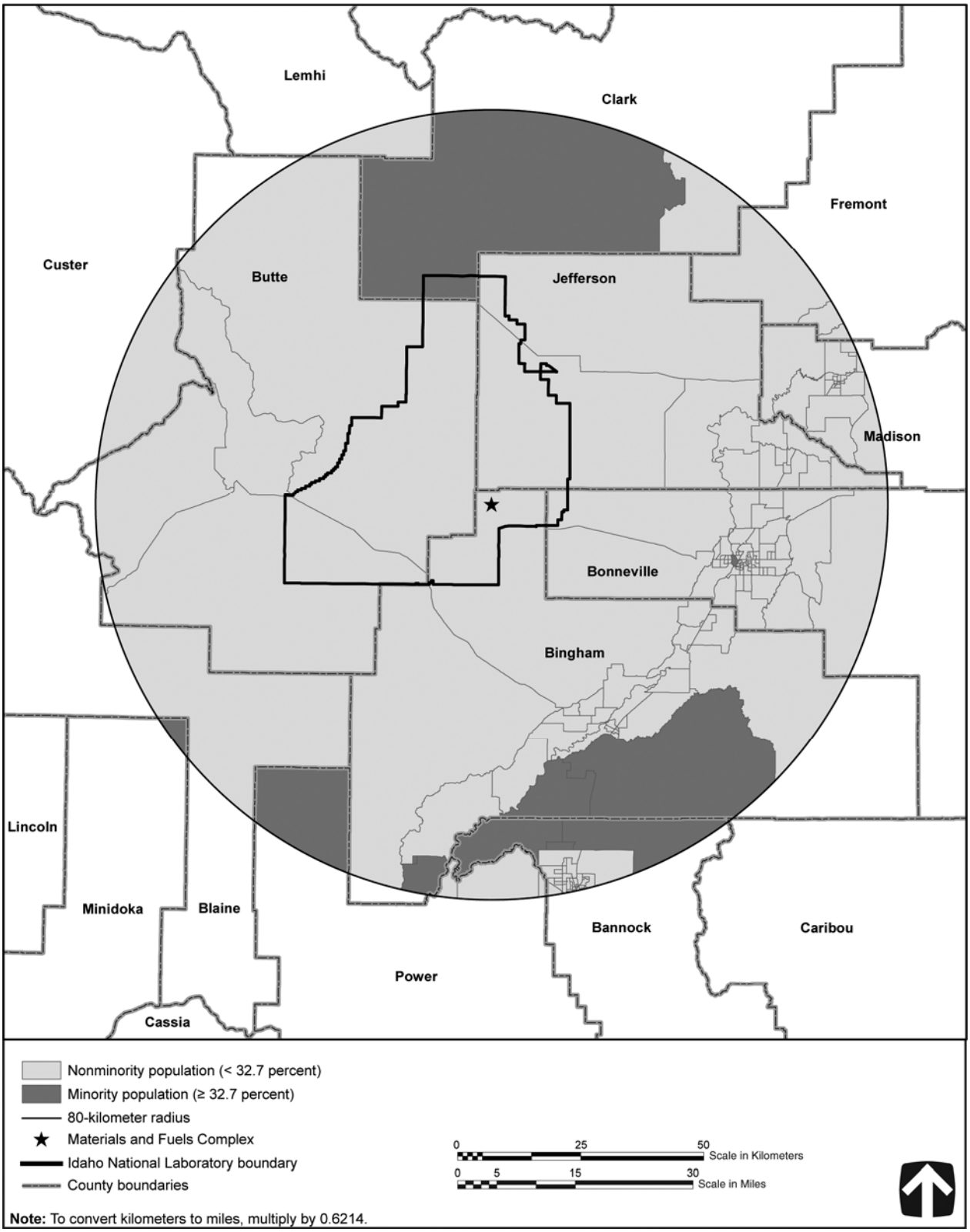

Figure J–18. Minority and Nonminority Populations Living in Potentially Affected Block Groups Surrounding the Materials and Fuels Complex (2000)

Figures J–19 and J–20 show cumulative minority populations as a function of distance from the MFC at INL. Values along the vertical axis of this figure 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 Idaho Falls is located. 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 45 kilometers (28 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 25,000 persons, accounting for approximately 12 percent of the total population. Approximately 65 percent of the minority population surrounding the MFC is Hispanic or Latino.

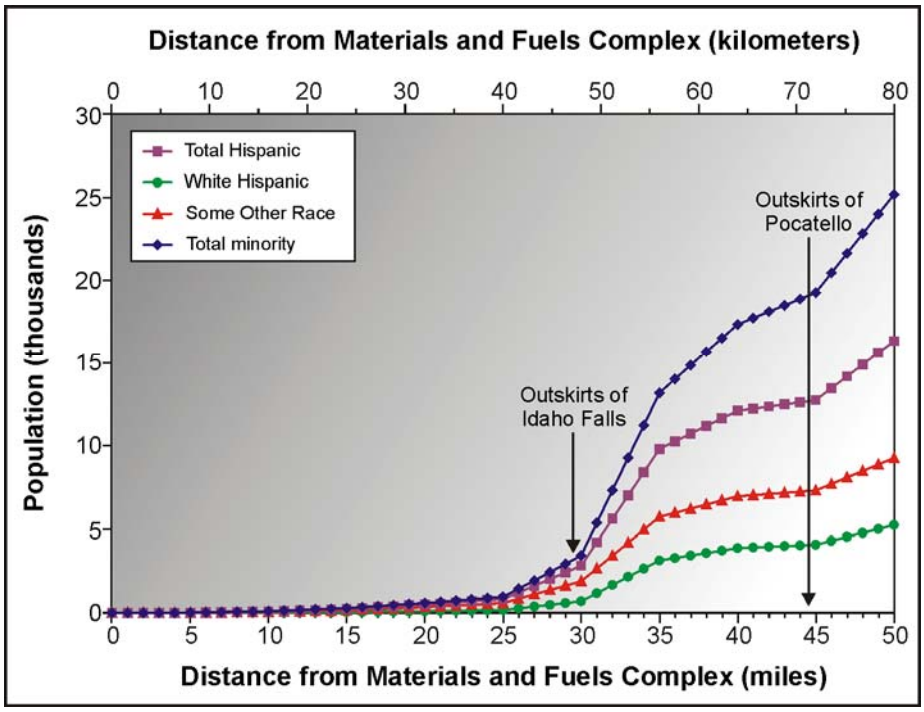

Figure J–19. Cumulative Larger-Scale Minority Populations as a Function of Distance from the Materials and Fuels Complex

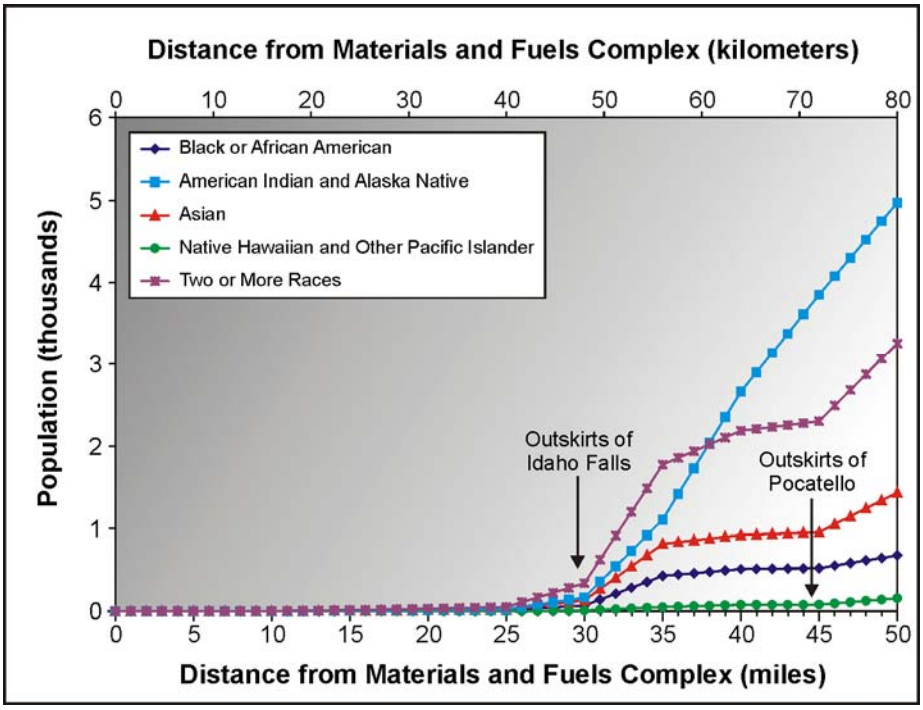

Figure J–20. Cumulative Smaller-Scale Minority Populations as a Function of Distance from the Materials and Fuels Complex

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 189 block groups that surround the MFC, it is estimated that 9 contain low-income populations. As indicated in Table J–11, approximately 60 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 compose 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 INL are concentrated in the Idaho Falls and Pocatello areas.

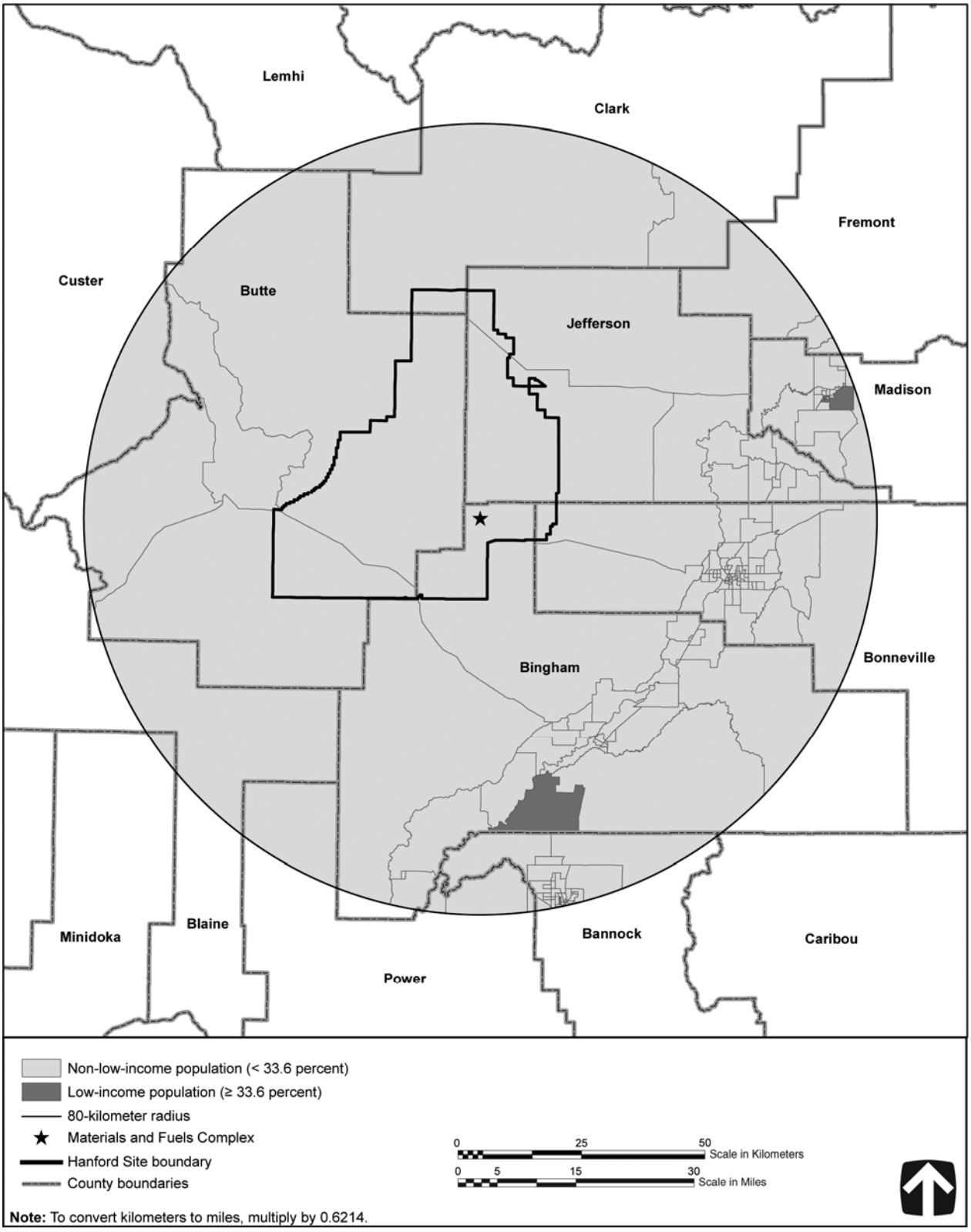

Figure J–21. Low-Income and Non-Low-Income Populations Living in Potentially Affected Block Groups Surrounding the Materials and Fuels Complex (2000)

Table J–11. Low-Income Populations Living in Potentially Affected Counties Surrounding the Materials and Fuels Complex (2000)

County (Idaho)	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
Bannock	73,414	10,181	32,435	3,719	13.5
Bingham	41,342	5,137	40,136	4,997	18.1
Blaine	18,868	1,469	274	24	0.1
Bonneville	81,532	8,260	80,521	8,178	29.6
Butte	2,869	522	2,707	498	1.8
Caribou	7,226	694	0	0	0.0
Clark	1,017	202	621	119	0.4
Custer	4,330	619	160	22	0.1
Fremont	11,530	1,633	1,218	106	0.4
Jefferson	19,090	1,984	18,867	1,946	7.0
Lemhi	7,736	1,185	24	5	0.0
Madison	26,051	7,948	25,297	7,922	28.7
Minidoka	19,992	2,960	20	4	0.0
Power	7,446	1,200	438	66	0.2
Total	**322,443**	**43,994**	**202,718**	**27,606**	**100.0**

[a] Census 2007e.

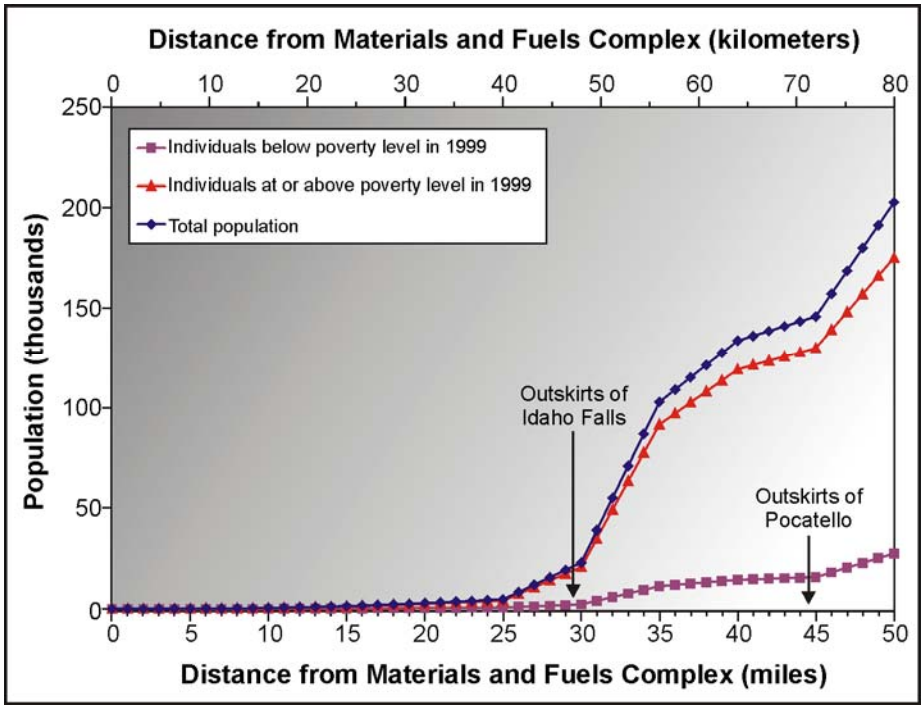

Figure J–22. Cumulative Low-Income Populations as a Function of Distance from the Materials and Fuels Complex

J.5.6 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 do have the potential to pose environmental justice concerns.

J.5.6.1 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 radiological 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 radiological emissions from normal operations, the average dose to an individual of the minority or low-income population is compared to the average dose to an individual of the remainder of the population. Table J–12 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.

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

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, and
n_s = number of people in the population subset s

Table J–12. Potentially Affected Populations[a]

Facility Site	Total Population[b]	Total Minority Population	Hispanic Population[c]	American Indian Population	Low-Income Population[d]
WTP	447,354	173,047	146,208	9,496	77,046
STTS-East	451,556	173,829	146,755	9,544	77,537
STTS-West	488,897	180,794	151,487	10,418	79,964
FFTF	357,391	131,786	112,899	5,383	55,234
INL	205,962	25,175	16,329	4,972	27,606

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

b Total population values used to compare with low-income populations are based on sample data. The values are 440,583; 444,789; 481,350; 351,886; and 202,718 for the WTP, STTS-East, STTS-West, FFTF, and INL, respectively.

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

d Low-income population values are based on sample data.

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory; 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 to 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).

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

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*), and person-rem

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

J.5.6.1.1 Tank Closure Alternatives

Table J–13 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–13. 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	3.2	7.1×10^{-3}	1.1	6.4×10^{-3}	2.1	7.6×10^{-3}
STTS-West	3.1	6.3×10^{-3}	9.9×10^{-1}	5.5×10^{-3}	2.1	6.8×10^{-3}
Total	**6.3**	**1.3×10^{-2}**	**2.1**	**1.2×10^{-2}**	**4.2**	**1.4×10^{-2}**
Alternative 2A						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	5.3×10^{-7}	1.2×10^{-9}	1.8×10^{-7}	1.0×10^{-9}	3.5×10^{-7}	1.3×10^{-9}
STTS-West	0	0	0	0	0	0
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**3.9×10^{1}**	**1.4×10^{-1}**
Alternative 2B						
WTP	7.6×10^{1}	1.7×10^{-1}	2.6×10^{1}	1.5×10^{-1}	4.9×10^{1}	1.8×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	5.6×10^{-2}	3.2×10^{-4}	1.1×10^{-1}	4.0×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	5.1×10^{-2}	2.8×10^{-4}	1.1×10^{-1}	3.6×10^{-4}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**2.6×10^{1}**	**1.5×10^{-1}**	**5.0×10^{1}**	**1.8×10^{-1}**
Alternative 3A						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	1.5×10^{-1}	8.5×10^{-4}	2.8×10^{-1}	1.0×10^{-3}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	1.4×10^{-1}	7.9×10^{-4}	3.0×10^{-1}	9.8×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**4.0×10^{1}**	**1.5×10^{-1}**
Alternative 3B						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	6.2×10^{-5}	1.4×10^{-7}	2.1×10^{-5}	1.2×10^{-7}	4.1×10^{-5}	1.5×10^{-7}
STTS-West	1.8×10^{-3}	3.7×10^{-6}	5.8×10^{-4}	3.2×10^{-6}	1.2×10^{-3}	4.0×10^{-6}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**3.9×10^{1}**	**1.4×10^{-1}**
Alternative 3C						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	1.5×10^{-1}	8.5×10^{-4}	2.8×10^{-1}	1.0×10^{-3}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	1.4×10^{-1}	7.9×10^{-4}	3.0×10^{-1}	9.8×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**4.0×10^{1}**	**1.5×10^{-1}**
Alternative 4						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	2.3×10^{-2}	5.2×10^{-5}	7.9×10^{-3}	4.6×10^{-5}	1.5×10^{-2}	5.6×10^{-5}
STTS-West	2.3×10^{-2}	4.8×10^{-5}	7.4×10^{-3}	4.1×10^{-5}	1.6×10^{-2}	5.2×10^{-5}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**3.9×10^{1}**	**1.4×10^{-1}**
Alternative 5						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	3.0×10^{-5}	6.6×10^{-8}	1.0×10^{-5}	5.8×10^{-8}	2.0×10^{-5}	7.0×10^{-8}
STTS-West	5.6×10^{-1}	1.2×10^{-3}	1.8×10^{-1}	1.0×10^{-3}	3.8×10^{-1}	1.2×10^{-3}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**4.0×10^{1}**	**1.5×10^{-1}**

Table J–13. 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 6A, Base Case						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	9.7×10^{-2}	2.2×10^{-4}	3.3×10^{-2}	1.9×10^{-4}	6.4×10^{-2}	2.3×10^{-4}
STTS-West	7.6×10^{-2}	1.6×10^{-4}	2.4×10^{-2}	1.3×10^{-4}	5.2×10^{-2}	1.7×10^{-4}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**3.9×10^{1}**	**1.4×10^{-1}**
Alternative 6A, Option Case						
WTP	6.0×10^{1}	1.3×10^{-1}	2.1×10^{1}	1.2×10^{-1}	3.9×10^{1}	1.4×10^{-1}
STTS-East	1.6×10^{-1}	3.6×10^{-4}	5.6×10^{-2}	3.2×10^{-4}	1.1×10^{-1}	3.9×10^{-4}
STTS-West	1.4×10^{-1}	2.9×10^{-4}	4.6×10^{-2}	2.5×10^{-4}	9.7×10^{-2}	3.2×10^{-4}
Total	**6.0×10^{1}**	**1.4×10^{-1}**	**2.1×10^{1}**	**1.2×10^{-1}**	**4.0×10^{1}**	**1.4×10^{-1}**
Alternative 6B, Base Case						
WTP	7.4×10^{1}	1.6×10^{-1}	2.6×10^{1}	1.5×10^{-1}	4.8×10^{1}	1.8×10^{-1}
STTS-East	1.3	2.9×10^{-3}	4.5×10^{-1}	2.6×10^{-3}	8.8×10^{-1}	3.2×10^{-3}
STTS-West	1.1	2.3×10^{-3}	3.6×10^{-1}	2.0×10^{-3}	7.7×10^{-1}	2.5×10^{-3}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**2.6×10^{1}**	**1.5×10^{-1}**	**5.0×10^{1}**	**1.8×10^{-1}**
Alternative 6B, Option Case						
WTP	7.4×10^{1}	1.7×10^{-1}	2.6×10^{1}	1.5×10^{-1}	4.8×10^{1}	1.8×10^{-1}
STTS-East	2.2	4.8×10^{-3}	7.4×10^{-1}	4.2×10^{-3}	1.4	5.2×10^{-3}
STTS-West	1.8	3.7×10^{-3}	5.7×10^{-1}	3.2×10^{-3}	1.2	4.0×10^{-3}
Total	**7.8×10^{1}**	**1.7×10^{-1}**	**2.7×10^{1}**	**1.6×10^{-1}**	**5.1×10^{1}**	**1.9×10^{-1}**
Alternative 6C						
WTP	7.4×10^{1}	1.6×10^{-1}	2.6×10^{1}	1.5×10^{-1}	4.8×10^{1}	1.8×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	5.6×10^{-2}	3.2×10^{-4}	1.1×10^{-1}	4.0×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	5.1×10^{-2}	2.8×10^{-4}	1.1×10^{-1}	3.6×10^{-4}
Total	**7.4×10^{1}**	**1.7×10^{-1}**	**2.6×10^{1}**	**1.5×10^{-1}**	**4.8×10^{1}**	**1.8×10^{-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–14 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–14. 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	3.2	7.1×10^{-3}	3.9×10^{-2}	4.0×10^{-3}	3.2	7.2×10^{-3}
STTS-West	3.1	6.3×10^{-3}	3.9×10^{-2}	3.8×10^{-3}	3.1	6.4×10^{-3}
Total	**6.3**	**1.3×10^{-2}**	**7.8×10^{-2}**	**7.8×10^{-3}**	**6.2**	**1.4×10^{-2}**
Alternative 2A						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	5.3×10^{-7}	1.2×10^{-9}	6.2×10^{-9}	6.5×10^{-10}	5.2×10^{-7}	1.2×10^{-9}
STTS-West	0	0	0	0	0	0
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**7.8×10^{-1}**	**8.2×10^{-2}**	**5.9×10^{1}**	**1.4×10^{-1}**
Alternative 2B						
WTP	7.6×10^{1}	1.7×10^{-1}	9.8×10^{-1}	1.0×10^{-1}	7.5×10^{1}	1.7×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	1.9×10^{-3}	2.0×10^{-4}	1.7×10^{-1}	3.7×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	2.0×10^{-3}	1.9×10^{-4}	1.6×10^{-1}	3.3×10^{-4}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**9.8×10^{-1}**	**1.0×10^{-1}**	**7.5×10^{1}**	**1.7×10^{-1}**
Alternative 3A						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	4.9×10^{-3}	5.2×10^{-4}	4.2×10^{-1}	9.5×10^{-4}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	5.5×10^{-3}	5.3×10^{-4}	4.4×10^{-1}	9.2×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**7.9×10^{-1}**	**8.3×10^{-2}**	**6.0×10^{1}**	**1.4×10^{-1}**
Alternative 3B						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	6.2×10^{-5}	1.4×10^{-7}	7.1×10^{-7}	7.5×10^{-8}	6.1×10^{-5}	1.4×10^{-7}
STTS-West	1.8×10^{-3}	3.7×10^{-6}	2.2×10^{-5}	2.2×10^{-6}	1.8×10^{-3}	3.8×10^{-6}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**7.8×10^{-1}**	**8.2×10^{-2}**	**5.9×10^{1}**	**1.4×10^{-1}**
Alternative 3C						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	4.9×10^{-3}	5.2×10^{-4}	4.2×10^{-1}	9.5×10^{-4}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	5.5×10^{-3}	5.3×10^{-4}	4.4×10^{-1}	9.2×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**7.9×10^{-1}**	**8.3×10^{-2}**	**6.0×10^{1}**	**1.4×10^{-1}**
Alternative 4						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	2.3×10^{-2}	5.2×10^{-5}	2.7×10^{-4}	2.8×10^{-5}	2.3×10^{-2}	5.2×10^{-5}
STTS-West	2.3×10^{-2}	4.8×10^{-5}	2.9×10^{-4}	2.8×10^{-5}	2.3×10^{-2}	4.8×10^{-5}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**7.8×10^{-1}**	**8.2×10^{-2}**	**5.9×10^{1}**	**1.4×10^{-1}**
Alternative 5						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	6.0×10^{1}	1.4×10^{-1}
STTS-East	3.0×10^{-5}	6.6×10^{-8}	3.4×10^{-7}	3.6×10^{-8}	2.9×10^{-5}	6.6×10^{-8}
STTS-West	5.6×10^{-1}	1.2×10^{-3}	7.0×10^{-3}	6.7×10^{-4}	5.6×10^{-1}	1.2×10^{-3}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**7.9×10^{-1}**	**8.3×10^{-2}**	**6.0×10^{1}**	**1.4×10^{-1}**

Table J–14. 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 6A, Base Case						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	9.7×10^{-2}	2.2×10^{-4}	1.1×10^{-3}	1.2×10^{-4}	9.6×10^{-2}	2.2×10^{-4}
STTS-West	7.6×10^{-2}	1.6×10^{-4}	9.3×10^{-4}	9.0×10^{-5}	7.5×10^{-2}	1.6×10^{-4}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**7.8×10^{-1}**	**8.2×10^{-2}**	**6.0×10^{1}**	**1.4×10^{-1}**
Alternative 6A, Option Case						
WTP	6.0×10^{1}	1.3×10^{-1}	7.8×10^{-1}	8.2×10^{-2}	5.9×10^{1}	1.4×10^{-1}
STTS-East	1.6×10^{-1}	3.6×10^{-4}	1.9×10^{-3}	2.0×10^{-4}	1.6×10^{-1}	3.7×10^{-4}
STTS-West	1.4×10^{-1}	2.9×10^{-4}	1.8×10^{-3}	1.7×10^{-4}	1.4×10^{-1}	2.9×10^{-4}
Total	**6.0×10^{1}**	**1.4×10^{-1}**	**7.8×10^{-1}**	**8.2×10^{-2}**	**6.0×10^{1}**	**1.4×10^{-1}**
Alternative 6B, Base Case						
WTP	7.4×10^{1}	1.6×10^{-1}	9.5×10^{-1}	1.0×10^{-1}	7.3×10^{1}	1.7×10^{-1}
STTS-East	1.3	2.9×10^{-3}	1.5×10^{-2}	1.6×10^{-3}	1.3	3.0×10^{-3}
STTS-West	1.1	2.3×10^{-3}	1.4×10^{-2}	1.3×10^{-3}	1.1	2.3×10^{-3}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**9.8×10^{-1}**	**1.0×10^{-1}**	**7.5×10^{1}**	**1.7×10^{-1}**
Alternative 6B, Option Case						
WTP	7.4×10^{1}	1.7×10^{-1}	9.5×10^{-1}	1.0×10^{-1}	7.3×10^{1}	1.7×10^{-1}
STTS-East	2.2	4.8×10^{-3}	2.5×10^{-2}	2.6×10^{-3}	2.2	4.9×10^{-3}
STTS-West	1.8	3.7×10^{-3}	2.2×10^{-2}	2.1×10^{-3}	1.8	3.7×10^{-3}
Total	**7.8×10^{1}**	**1.7×10^{-1}**	**1.0**	**1.0×10^{-1}**	**7.7×10^{1}**	**1.8×10^{-1}**
Alternative 6C						
WTP	7.4×10^{1}	1.6×10^{-1}	9.5×10^{-1}	1.0×10^{-1}	7.3×10^{1}	1.7×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	1.9×10^{-3}	2.0×10^{-4}	1.7×10^{-1}	3.7×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	2.0×10^{-3}	1.9×10^{-4}	1.6×10^{-1}	3.3×10^{-4}
Total	**7.4×10^{1}**	**1.7×10^{-1}**	**9.5×10^{-1}**	**1.0×10^{-1}**	**7.3×10^{1}**	**1.7×10^{-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–15 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–15. 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	3.2	7.1×10^{-3}	9.2×10^{-1}	6.3×10^{-3}	2.3	7.5×10^{-3}
STTS-West	3.1	6.3×10^{-3}	8.1×10^{-1}	5.4×10^{-3}	2.3	6.7×10^{-3}
Total	**6.3**	**1.3×10^{-2}**	**1.7**	**1.2×10^{-2}**	**4.6**	**1.4×10^{-2}**
Alternative 2A						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	5.3×10^{-7}	1.2×10^{-9}	1.5×10^{-7}	1.0×10^{-9}	3.8×10^{-7}	1.2×10^{-9}
STTS-West	0	0	0	0	0	0
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**1.7×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 2B						
WTP	7.6×10^{1}	1.7×10^{-1}	2.2×10^{1}	1.5×10^{-1}	5.4×10^{1}	1.8×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	4.7×10^{-2}	3.2×10^{-4}	1.2×10^{-1}	3.9×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	4.2×10^{-2}	2.7×10^{-4}	1.2×10^{-1}	3.5×10^{-4}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**2.2×10^{1}**	**1.5×10^{-1}**	**5.4×10^{1}**	**1.8×10^{-1}**
Alternative 3A						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	1.2×10^{-1}	8.5×10^{-4}	3.0×10^{-1}	9.9×10^{-4}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	1.2×10^{-1}	7.8×10^{-4}	3.3×10^{-1}	9.7×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**1.8×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 3B						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	6.2×10^{-5}	1.4×10^{-7}	1.7×10^{-5}	1.2×10^{-7}	4.4×10^{-5}	1.4×10^{-7}
STTS-West	1.8×10^{-3}	3.7×10^{-6}	4.8×10^{-4}	3.2×10^{-6}	1.3×10^{-3}	4.0×10^{-6}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**1.7×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 3C						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	1.2×10^{-1}	8.5×10^{-4}	3.0×10^{-1}	9.9×10^{-4}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	1.2×10^{-1}	7.8×10^{-4}	3.3×10^{-1}	9.7×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**1.8×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 4						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	2.3×10^{-2}	5.2×10^{-5}	6.6×10^{-3}	4.5×10^{-5}	1.7×10^{-2}	5.5×10^{-5}
STTS-West	2.3×10^{-2}	4.8×10^{-5}	6.2×10^{-3}	4.1×10^{-5}	1.7×10^{-2}	5.1×10^{-5}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**1.7×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 5						
WTP	6.0×10^{1}	1.3×10^{-1}	1.8×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	3.0×10^{-5}	6.6×10^{-8}	8.4×10^{-6}	5.7×10^{-8}	2.1×10^{-5}	7.0×10^{-8}
STTS-West	5.6×10^{-1}	1.2×10^{-3}	1.5×10^{-1}	9.9×10^{-4}	4.1×10^{-1}	1.2×10^{-3}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**1.8×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 6A, Base Case						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	9.7×10^{-2}	2.2×10^{-4}	2.8×10^{-2}	1.9×10^{-4}	7.0×10^{-2}	2.3×10^{-4}
STTS-West	7.6×10^{-2}	1.6×10^{-4}	2.0×10^{-2}	1.3×10^{-4}	5.6×10^{-2}	1.7×10^{-4}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**1.8×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**

Table J–15. 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 6A, Option Case						
WTP	6.0×10^{1}	1.3×10^{-1}	1.7×10^{1}	1.2×10^{-1}	4.3×10^{1}	1.4×10^{-1}
STTS-East	1.6×10^{-1}	3.6×10^{-4}	4.6×10^{-2}	3.2×10^{-4}	1.2×10^{-1}	3.9×10^{-4}
STTS-West	1.4×10^{-1}	2.9×10^{-4}	3.8×10^{-2}	2.5×10^{-4}	1.1×10^{-1}	3.1×10^{-4}
Total	**6.0×10^{1}**	**1.4×10^{-1}**	**1.8×10^{1}**	**1.2×10^{-1}**	**4.3×10^{1}**	**1.4×10^{-1}**
Alternative 6B, Base Case						
WTP	7.4×10^{1}	1.6×10^{-1}	2.1×10^{1}	1.5×10^{-1}	5.2×10^{1}	1.7×10^{-1}
STTS-East	1.3	2.9×10^{-3}	3.7×10^{-1}	2.6×10^{-3}	9.6×10^{-1}	3.1×10^{-3}
STTS-West	1.1	2.3×10^{-3}	3.0×10^{-1}	2.0×10^{-3}	8.3×10^{-1}	2.5×10^{-3}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**2.2×10^{1}**	**1.5×10^{-1}**	**5.4×10^{1}**	**1.8×10^{-1}**
Alternative 6B, Option Case						
WTP	7.4×10^{1}	1.7×10^{-1}	2.1×10^{1}	1.5×10^{-1}	5.2×10^{1}	1.7×10^{-1}
STTS-East	2.2	4.8×10^{-3}	6.1×10^{-1}	4.2×10^{-3}	1.6	5.1×10^{-3}
STTS-West	1.8	3.7×10^{-3}	4.7×10^{-1}	3.1×10^{-3}	1.3	3.9×10^{-3}
Total	**7.8×10^{1}**	**1.7×10^{-1}**	**2.3×10^{1}**	**1.5×10^{-1}**	**5.5×10^{1}**	**1.8×10^{-1}**
Alternative 6C						
WTP	7.4×10^{1}	1.6×10^{-1}	2.1×10^{1}	1.5×10^{-1}	5.2×10^{1}	1.7×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	4.7×10^{-2}	3.2×10^{-4}	1.2×10^{-1}	3.9×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	4.2×10^{-2}	2.7×10^{-4}	1.2×10^{-1}	3.5×10^{-4}
Total	**7.4×10^{1}**	**1.7×10^{-1}**	**2.2×10^{1}**	**1.5×10^{-1}**	**5.3×10^{1}**	**1.7×10^{-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–16 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–16. 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	3.2	7.1×10^{-3}	4.8×10^{-1}	6.2×10^{-3}	2.7	7.3×10^{-3}
STTS-West	3.1	6.3×10^{-3}	4.2×10^{-1}	5.3×10^{-3}	2.7	6.5×10^{-3}
Total	**6.3**	**1.3×10^{-2}**	**9.0×10^{-1}**	**1.1×10^{-2}**	**5.4**	**1.4×10^{-2}**
Alternative 2A						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	5.3×10^{-7}	1.2×10^{-9}	7.9×10^{-8}	1.0×10^{-9}	4.5×10^{-7}	1.2×10^{-9}
STTS-West	0	0	0	0	0	0
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**9.3**	**1.2×10^{-1}**	**5.1×10^{1}**	**1.4×10^{-1}**

Table J–16. 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 2B						
WTP	7.6×10^{1}	1.7×10^{-1}	1.2×10^{1}	1.5×10^{-1}	6.4×10^{1}	1.7×10^{-1}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	2.5×10^{-2}	3.2×10^{-4}	1.4×10^{-1}	3.8×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	2.2×10^{-2}	2.7×10^{-4}	1.4×10^{-1}	3.4×10^{-4}
Total	**7.6×10^{1}**	**1.7×10^{-1}**	**1.2×10^{1}**	**1.5×10^{-1}**	**6.4×10^{1}**	**1.7×10^{-1}**
Alternative 3A						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	6.2×10^{-2}	8.0×10^{-4}	3.6×10^{-1}	9.7×10^{-4}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	6.0×10^{-2}	7.4×10^{-4}	3.9×10^{-1}	9.4×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**9.4**	**1.2×10^{-1}**	**5.2×10^{1}**	**1.4×10^{-1}**
Alternative 3B						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	6.2×10^{-5}	1.4×10^{-7}	9.1×10^{-6}	1.2×10^{-7}	5.3×10^{-5}	1.4×10^{-7}
STTS-West	1.8×10^{-3}	3.7×10^{-6}	2.5×10^{-4}	3.1×10^{-6}	1.6×10^{-3}	3.9×10^{-6}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**9.3**	**1.2×10^{-1}**	**5.1×10^{1}**	**1.4×10^{-1}**
Alternative 3C						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	4.2×10^{-1}	9.4×10^{-4}	6.2×10^{-2}	8.0×10^{-4}	3.6×10^{-1}	9.7×10^{-4}
STTS-West	4.5×10^{-1}	9.1×10^{-4}	6.0×10^{-2}	7.4×10^{-4}	3.9×10^{-1}	9.4×10^{-4}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**9.4**	**1.2×10^{-1}**	**5.2×10^{1}**	**1.4×10^{-1}**
Alternative 4						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	2.3×10^{-2}	5.2×10^{-5}	3.5×10^{-3}	4.5×10^{-5}	2.0×10^{-2}	5.3×10^{-5}
STTS-West	2.3×10^{-2}	4.8×10^{-5}	3.1×10^{-3}	3.9×10^{-5}	2.0×10^{-2}	4.9×10^{-5}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**9.3**	**1.2×10^{-1}**	**5.1×10^{1}**	**1.4×10^{-1}**
Alternative 5						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	3.0×10^{-5}	6.6×10^{-8}	4.4×10^{-6}	5.6×10^{-8}	2.5×10^{-5}	6.8×10^{-8}
STTS-West	5.6×10^{-1}	1.2×10^{-3}	7.5×10^{-2}	9.4×10^{-4}	4.9×10^{-1}	1.2×10^{-3}
Total	**6.1×10^{1}**	**1.4×10^{-1}**	**9.4**	**1.2×10^{-1}**	**5.2×10^{1}**	**1.4×10^{-1}**
Alternative 6A, Base Case						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	9.7×10^{-2}	2.2×10^{-4}	1.4×10^{-2}	1.9×10^{-4}	8.3×10^{-2}	2.2×10^{-4}
STTS-West	7.6×10^{-2}	1.6×10^{-4}	1.0×10^{-2}	1.3×10^{-4}	6.6×10^{-2}	1.6×10^{-4}
Total	**6.0×10^{1}**	**1.3×10^{-1}**	**9.3**	**1.2×10^{-1}**	**5.1×10^{1}**	**1.4×10^{-1}**
Alternative 6A, Option Case						
WTP	6.0×10^{1}	1.3×10^{-1}	9.3	1.2×10^{-1}	5.1×10^{1}	1.4×10^{-1}
STTS-East	1.6×10^{-1}	3.6×10^{-4}	2.4×10^{-2}	3.1×10^{-4}	1.4×10^{-1}	3.7×10^{-4}
STTS-West	1.4×10^{-1}	2.9×10^{-4}	1.9×10^{-2}	2.4×10^{-4}	1.2×10^{-1}	3.0×10^{-4}
Total	**6.0×10^{1}**	**1.4×10^{-1}**	**9.3**	**1.2×10^{-1}**	**5.1×10^{1}**	**1.4×10^{-1}**

Table J–16. 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 6B, Base Case						
WTP	7.4×10^{1}	1.6×10^{-1}	1.1×10^{1}	1.5×10^{-1}	6.2×10^{1}	1.7×10^{-1}
STTS-East	1.3	2.9×10^{-3}	2.0×10^{-1}	2.5×10^{-3}	1.1	3.0×10^{-3}
STTS-West	1.1	2.3×10^{-3}	1.5×10^{-1}	1.9×10^{-3}	9.7×10^{-1}	2.4×10^{-3}
Total	**7.6×1^{1}**	**1.7×10^{-1}**	**1.2×10^{1}**	**1.5×10^{-1}**	**6.5×10^{1}**	**1.7×10^{-1}**
Alternative 6B, Option Case						
WTP	7.4×10^{1}	1.7×10^{-1}	1.1×10^{1}	1.5×10^{-1}	6.3×10^{1}	1.7×10^{-1}
STTS-East	2.2	4.8×10^{-3}	3.2×10^{-1}	4.2×10^{-3}	1.9	5.0×10^{-3}
STTS-West	1.8	3.7×10^{-3}	2.4×10^{-1}	3.0×10^{-3}	1.6	3.8×10^{-3}
Total	**7.8×10^{1}**	**1.7×10^{-1}**	**1.2×10^{1}**	**1.5×10^{-1}**	**6.6×10^{1}**	**1.8×10^{-1}**
Alternative 6C						
WTP	7.4×10^{1}	1.6×10^{-1}	1.1×10^{1}	1.5×10^{-1}	6.2×10^{1}	1.7×10^{-3}
STTS-East	1.7×10^{-1}	3.7×10^{-4}	2.5×10^{-2}	3.2×10^{-4}	1.4×10^{-1}	3.8×10^{-4}
STTS-West	1.6×10^{-1}	3.3×10^{-4}	2.2×10^{-2}	2.7×10^{-4}	1.4×10^{-1}	3.4×10^{-4}
Total	**7.4×10^{1}**	**1.7×10^{-1}**	**1.1×10^{1}**	**1.5×10^{-1}**	**6.3×10^{1}**	**1.7×10^{-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 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–17. 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	3.1×10^{2}	6.8×10^{-1}	1.1×10^{2}	6.1×10^{-1}	2.0×10^{2}	7.2×10^{-1}
STTS-West	2.9×10^{2}	6.0×10^{-1}	9.4×10^{1}	5.2×10^{-1}	2.0×10^{2}	6.5×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**2.0×10^{2}**	**1.1**	**4.0×10^{2}**	**1.4**
Alternative 2A						
WTP	4.5×10^{2}	1.0	1.5×10^{2}	8.9×10^{-1}	2.9×10^{2}	1.1
STTS-East	3.2×10^{2}	7.1×10^{-1}	1.1×10^{2}	6.4×10^{-1}	2.1×10^{2}	7.5×10^{-1}
STTS-West	3.1×10^{2}	6.3×10^{-1}	9.8×10^{1}	5.4×10^{-1}	2.1×10^{2}	6.8×10^{-1}
Total	**1.1×10^{3}**	**2.3**	**3.6×10^{2}**	**2.1**	**7.1×10^{2}**	**2.5**
Alternative 2B						
WTP	4.5×10^{2}	1.0	1.6×10^{2}	9.0×10^{-1}	3.0×10^{2}	1.1
STTS-East	6.0	1.3×10^{-2}	2.0	1.2×10^{-2}	4.0	1.4×10^{-2}
STTS-West	5.7	1.2×10^{-2}	1.8	1.0×10^{-2}	3.9	1.3×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**1.6×10^{2}**	**9.2×10^{-1}**	**3.0×10^{2}**	**1.1**

Table J–17. 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 3A						
WTP	3.6×10^{2}	8.1×10^{-1}	1.3×10^{2}	7.3×10^{-1}	2.4×10^{2}	8.7×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	3.5×10^{1}	2.0×10^{-1}	6.6×10^{1}	2.4×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	3.3×10^{1}	1.8×10^{-1}	7.1×10^{1}	2.3×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**1.9×10^{2}**	**1.1**	**3.7×10^{2}**	**1.3**
Alternative 3B						
WTP	3.6×10^{2}	8.1×10^{-1}	1.3×10^{2}	7.3×10^{-1}	2.4×10^{2}	8.7×10^{-1}
STTS-East	7.2	1.6×10^{-2}	2.4	1.4×10^{-2}	4.8	1.7×10^{-2}
STTS-West	5.6	1.1×10^{-2}	1.8	9.8×10^{-3}	3.8	1.2×10^{-2}
Total	**3.8×10^{2}**	**8.4×10^{-1}**	**1.3×10^{2}**	**7.5×10^{-1}**	**2.5×10^{2}**	**9.0×10^{-1}**
Alternative 3C						
WTP	3.6×10^{2}	8.1×10^{-1}	1.3×10^{2}	7.3×10^{-1}	2.4×10^{2}	8.7×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	3.5×10^{1}	2.0×10^{-1}	6.6×10^{1}	2.4×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	3.3×10^{1}	1.8×10^{-1}	7.1×10^{1}	2.3×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**1.9×10^{2}**	**1.1**	**3.7×10^{2}**	**1.3**
Alternative 4						
WTP	3.7×10^{2}	8.2×10^{-1}	1.3×10^{2}	7.3×10^{-1}	2.4×10^{2}	8.7×10^{-1}
STTS-East	1.2×10^{1}	2.6×10^{-2}	4.8	2.7×10^{-2}	6.8	2.5×10^{-2}
STTS-West	1.1×10^{2}	2.3×10^{-1}	3.4×10^{1}	1.9×10^{-1}	7.6×10^{1}	2.5×10^{-1}
Total	**4.9×10^{2}**	**1.1**	**1.7×10^{2}**	**9.5×10^{-1}**	**3.2×10^{2}**	**1.1**
Alternative 5						
WTP	3.6×10^{2}	7.9×10^{-1}	1.2×10^{2}	7.1×10^{-1}	2.3×10^{2}	8.5×10^{-1}
STTS-East	6.0	1.3×10^{-2}	2.0	1.2×10^{-2}	4.0	1.4×10^{-2}
STTS-West	9.5×10^{1}	2.0×10^{-1}	3.0×10^{1}	1.7×10^{-1}	6.5×10^{1}	2.1×10^{-1}
Total	**4.6×10^{2}**	**1.0**	**1.6×10^{2}**	**8.9×10^{-1}**	**3.0×10^{2}**	**1.1**
Alternative 6A, Base Case						
WTP	4.6×10^{2}	1.0	1.6×10^{2}	9.3×10^{-1}	3.0×10^{2}	1.1
STTS-East	9.3×10^{1}	2.1×10^{-1}	5.2×10^{1}	3.0×10^{-1}	4.2×10^{1}	1.5×10^{-1}
STTS-West	1.8	3.7×10^{-3}	3.9×10^{-1}	2.2×10^{-3}	1.4	4.6×10^{-3}
Total	**5.6×10^{2}**	**1.2**	**2.1×10^{2}**	**1.2**	**3.5×10^{2}**	**1.3**
Alternative 6A, Option Case						
WTP	4.6×10^{2}	1.0	1.6×10^{2}	9.3×10^{-1}	3.0×10^{2}	1.1
STTS-East	1.5×10^{2}	3.3×10^{-1}	8.8×10^{1}	5.1×10^{-1}	6.2×10^{1}	2.2×10^{-1}
STTS-West	1.5×10^{2}	3.1×10^{-1}	1.3×10^{1}	6.9×10^{-2}	1.4×10^{2}	4.5×10^{-1}
Total	**7.6×10^{2}**	**1.7**	**2.6×10^{2}**	**1.5**	**5.0×10^{2}**	**1.8**
Alternative 6B, Base Case						
WTP	4.5×10^{2}	1.0	1.5×10^{2}	8.9×10^{-1}	2.9×10^{2}	1.1
STTS-East	7.5×10^{1}	1.7×10^{-1}	4.5×10^{1}	2.6×10^{-1}	3.0×10^{1}	1.1×10^{-1}
STTS-West	7.5×10^{1}	1.5×10^{-1}	5.2	2.9×10^{-2}	7.0×10^{1}	2.3×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**2.1×10^{2}**	**1.2**	**3.9×10^{2}**	**1.4**
Alternative 6B, Option Case						
WTP	4.5×10^{2}	1.0	1.6×10^{2}	9.0×10^{-1}	2.9×10^{2}	1.1
STTS-East	1.3×10^{2}	2.9×10^{-1}	8.2×10^{1}	4.7×10^{-1}	5.0×10^{1}	1.8×10^{-1}
STTS-West	1.3×10^{2}	2.7×10^{-1}	6.5	3.6×10^{-2}	1.2×10^{2}	4.0×10^{-1}
Total	**7.1×10^{2}**	**1.6**	**2.4×10^{2}**	**1.4**	**4.7×10^{2}**	**1.6**
Alternative 6C						
WTP	4.5×10^{2}	1.0	1.5×10^{2}	8.9×10^{-1}	2.9×10^{2}	1.1
STTS-East	6.0	1.3×10^{-2}	2.0	1.2×10^{-2}	4.0	1.4×10^{-2}
STTS-West	5.70	1.2×10^{-2}	1.8	1.0×10^{-2}	3.9	1.3×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**1.6×10^{2}**	**9.2×10^{-1}**	**3.0×10^{2}**	**1.1**

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–18 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–18. 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	3.1×10^{2}	6.8×10^{-1}	3.7	3.9×10^{-1}	3.0×10^{2}	6.9×10^{-1}
STTS-West	2.9×10^{2}	6.0×10^{-1}	3.8	3.6×10^{-1}	2.9×10^{2}	6.1×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**7.5**	**7.5×10^{-1}**	**5.9×10^{2}**	**1.3**
Alternative 2A						
WTP	4.5×10^{2}	1.0	5.7	6.0×10^{-1}	4.4×10^{2}	1.0
STTS-East	3.2×10^{2}	7.1×10^{-1}	3.8	4.0×10^{-1}	3.2×10^{2}	7.2×10^{-1}
STTS-West	3.1×10^{2}	6.3×10^{-1}	3.9	3.8×10^{-1}	3.0×10^{2}	6.3×10^{-1}
Total	**1.1×10^{3}**	**2.3**	**1.3×10^{1}**	**1.4**	**1.1×10^{3}**	**2.4**
Alternative 2B						
WTP	4.5×10^{2}	1.0	5.8	6.1×10^{-1}	4.5×10^{2}	1.0
STTS-East	6.0	1.3×10^{-2}	6.6×10^{-2}	7.0×10^{-3}	5.9	1.3×10^{-2}
STTS-West	5.7	1.2×10^{-2}	7.0×10^{-2}	6.7×10^{-3}	5.7	1.2×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**5.9**	**6.2×10^{-1}**	**4.6×10^{2}**	**1.0**
Alternative 3A						
WTP	3.6×10^{2}	8.1×10^{-1}	4.6	4.9×10^{-1}	3.6×10^{2}	8.2×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	1.2	1.2×10^{-1}	1.0×10^{2}	2.3×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	1.3	1.2×10^{-1}	1.0×10^{2}	2.1×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**7.1**	**7.3×10^{-1}**	**5.6×10^{2}**	**1.3**
Alternative 3B						
WTP	3.6×10^{2}	8.1×10^{-1}	4.6	4.9×10^{-1}	3.6×10^{2}	8.2×10^{-1}
STTS-East	7.2	1.6×10^{-2}	8.1×10^{-2}	8.5×10^{-3}	7.1	1.6×10^{-2}
STTS-West	5.6	1.1×10^{-2}	6.8×10^{-2}	6.5×10^{-3}	5.5	1.2×10^{-2}
Total	**3.8×10^{2}**	**8.4×10^{-1}**	**4.8**	**5.0×10^{-1}**	**3.7×10^{2}**	**8.5×10^{-1}**
Alternative 3C						
WTP	3.6×10^{2}	8.1×10^{-1}	4.6	4.9×10^{-1}	3.6×10^{2}	8.2×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	1.2	1.2×10^{-1}	1.0×10^{2}	2.3×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	1.3	1.2×10^{-1}	1.0×10^{2}	2.1×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**7.1**	**7.3×10^{-1}**	**5.6×10^{2}**	**1.3**
Alternative 4						
WTP	3.7×10^{2}	8.2×10^{-1}	4.7	4.9×10^{-1}	3.6×10^{2}	8.2×10^{-1}
STTS-East	1.2×10^{1}	2.6×10^{-2}	1.6×10^{-1}	1.7×10^{-2}	1.1×10^{1}	2.6×10^{-2}
STTS-West	1.1×10^{2}	2.3×10^{-1}	1.3	1.3×10^{-1}	1.1×10^{2}	2.3×10^{-1}
Total	**4.9×10^{2}**	**1.1**	**6.2**	**6.4×10^{-1}**	**4.8×10^{2}**	**1.1**

Table J–18. 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 5						
WTP	3.6×10^{2}	7.9×10^{-1}	4.5	4.8×10^{-1}	3.5×10^{2}	8.0×10^{-1}
STTS-East	6.0	1.3×10^{-2}	6.8×10^{-2}	7.1×10^{-3}	6.0	1.3×10^{-2}
STTS-West	9.5×10^{1}	2.0×10^{-1}	1.2	1.1×10^{-1}	9.4×10^{1}	2.0×10^{-1}
Total	$\mathbf{4.6\times10^{2}}$	**1.0**	**5.8**	$\mathbf{6.0\times10^{-1}}$	$\mathbf{4.5\times10^{2}}$	**1.0**
Alternative 6A, Base Case						
WTP	4.6×10^{2}	1.0	5.9	6.2×10^{-1}	4.6×10^{2}	1.0
STTS-East	9.3×10^{1}	2.1×10^{-1}	1.7	1.8×10^{-1}	9.2×10^{1}	2.1×10^{-1}
STTS-West	1.8	3.7×10^{-3}	1.5×10^{-2}	1.5×10^{-3}	1.8	3.7×10^{-3}
Total	$\mathbf{5.6\times10^{2}}$	**1.2**	**7.7**	$\mathbf{8.1\times10^{-1}}$	$\mathbf{5.5\times10^{2}}$	**1.3**
Alternative 6A, Option Case						
WTP	4.6×10^{2}	1.0	5.9	6.2×10^{-1}	4.6×10^{2}	1.0
STTS-East	1.5×10^{2}	3.3×10^{-1}	3.0	3.2×10^{-1}	1.5×10^{2}	3.3×10^{-1}
STTS-West	1.5×10^{2}	3.1×10^{-1}	4.9×10^{-1}	4.7×10^{-2}	1.5×10^{2}	3.1×10^{-1}
Total	$\mathbf{7.6\times10^{2}}$	**1.7**	**9.4**	$\mathbf{9.9\times10^{-1}}$	$\mathbf{7.5\times10^{2}}$	**1.7**
Alternative 6B, Base Case						
WTP	4.5×10^{2}	1.0	5.7	6.0×10^{-1}	4.4×10^{2}	1.0
STTS-East	7.5×10^{1}	1.7×10^{-1}	1.5	1.6×10^{-1}	7.3×10^{1}	1.7×10^{-1}
STTS-West	7.5×10^{1}	1.5×10^{-1}	2.0×10^{-1}	1.9×10^{-2}	7.5×10^{1}	1.6×10^{-1}
Total	$\mathbf{6.0\times10^{2}}$	**1.3**	**7.5**	$\mathbf{7.8\times10^{-1}}$	$\mathbf{5.9\times10^{2}}$	**1.3**
Alternative 6B, Option Case						
WTP	4.5×10^{2}	1.0	5.7	6.0×10^{-1}	4.4×10^{2}	1.0
STTS-East	1.3×10^{2}	2.9×10^{-1}	2.8	2.9×10^{-1}	1.3×10^{2}	2.9×10^{-1}
STTS-West	1.3×10^{2}	2.7×10^{-1}	2.6×10^{-1}	2.5×10^{-2}	1.3×10^{2}	2.7×10^{-1}
Total	$\mathbf{7.1\times10^{2}}$	**1.6**	**8.8**	$\mathbf{9.2\times10^{-1}}$	$\mathbf{7.0\times10^{2}}$	**1.6**
Alternative 6C						
WTP	4.5×10^{2}	1.0	5.7	6.0×10^{-1}	4.4×10^{2}	1.0
STT-East	6.0	1.3×10^{-2}	6.6×10^{-2}	7.0×10^{-3}	5.9	1.3×10^{-2}
STTS-West	5.7	1.2×10^{-2}	7.0×10^{-2}	6.7×10^{-3}	5.7	1.2×10^{-2}
Total	$\mathbf{4.6\times10^{2}}$	**1.0**	**5.9**	$\mathbf{6.2\times10^{-1}}$	$\mathbf{4.5\times10^{2}}$	**1.0**

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–19 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–19. 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	3.1×10^{2}	6.8×10^{-1}	8.8×10^{1}	6.0×10^{-1}	2.2×10^{2}	7.2×10^{-1}
STTS-West	2.9×10^{2}	6.0×10^{-1}	7.8×10^{1}	5.1×10^{-1}	2.2×10^{2}	6.4×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**1.7×10^{2}**	**1.1**	**4.4×10^{2}**	**1.4**
Alternative 2A						
WTP	4.5×10^{2}	1.0	1.3×10^{2}	8.9×10^{-1}	3.2×10^{2}	1.1
STTS-East	3.2×10^{2}	7.1×10^{-1}	9.1×10^{1}	6.2×10^{-1}	2.3×10^{2}	7.5×10^{-1}
STTS-West	3.1×10^{2}	6.3×10^{-1}	8.1×10^{1}	5.3×10^{-1}	2.3×10^{2}	6.7×10^{-1}
Total	**1.1×10^{3}**	**2.3**	**3.0×10^{2}**	**2.0**	**7.7×10^{2}**	**2.5**
Alternative 2B						
WTP	4.5×10^{2}	1.0	1.3×10^{2}	9.0×10^{-1}	3.2×10^{2}	1.1
STTS-East	6.0	1.3×10^{-2}	1.7	1.1×10^{-2}	4.3	1.4×10^{-2}
STTS-West	5.7	1.2×10^{-2}	1.5	9.8×10^{-3}	4.3	1.3×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**1.3×10^{2}**	**9.2×10^{-1}**	**3.3×10^{2}**	**1.1**
Alternative 3A						
WTP	3.6×10^{2}	8.1×10^{-1}	1.1×10^{2}	7.2×10^{-1}	2.6×10^{2}	8.5×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	3.0×10^{1}	2.0×10^{-1}	7.2×10^{1}	2.4×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	2.8×10^{1}	1.8×10^{-1}	7.6×10^{1}	2.3×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**1.6×10^{2}**	**1.1**	**4.1×10^{2}**	**1.3**
Alternative 3B						
WTP	3.6×10^{2}	8.1×10^{-1}	1.1×10^{2}	7.2×10^{-1}	2.6×10^{2}	8.5×10^{-1}
STTS-East	7.2	1.6×10^{-2}	2.0	1.4×10^{-2}	5.2	1.7×10^{-2}
STTS-West	5.6	1.1×10^{-2}	1.5	9.6×10^{-3}	4.2	1.2×10^{-2}
Total	**3.8×10^{2}**	**8.4×10^{-1}**	**1.1×10^{2}**	**7.5×10^{-1}**	**2.7×10^{2}**	**8.8×10^{-1}**
Alternative 3C						
WTP	3.6×10^{2}	8.1×10^{-1}	1.1×10^{2}	7.2×10^{-1}	2.6×10^{2}	8.5×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	3.0×10^{1}	2.0×10^{-1}	7.2×10^{1}	2.4×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	2.8×10^{1}	1.8×10^{-1}	7.6×10^{1}	2.3×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**1.6×10^{2}**	**1.1**	**4.1×10^{2}**	**1.3**
Alternative 4						
WTP	3.7×10^{2}	8.2×10^{-1}	1.1×10^{2}	7.3×10^{-1}	2.6×10^{2}	8.6×10^{-1}
STTS-East	1.2×10^{1}	2.6×10^{-2}	4.0	2.7×10^{-2}	7.7	2.5×10^{-2}
STTS-West	1.1×10^{2}	2.3×10^{-1}	2.9×10^{1}	1.9×10^{-1}	8.2×10^{1}	2.4×10^{-1}
Total	**4.9×10^{2}**	**1.1**	**1.4×10^{2}**	**9.5×10^{-1}**	**3.5×10^{2}**	**1.1**

Table J–19. 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 5						
WTP	3.6×10^{2}	7.9×10^{-1}	1.0×10^{2}	7.1×10^{-1}	2.5×10^{2}	8.4×10^{-1}
STTS-East	6.0	1.3×10^{-2}	1.7	1.1×10^{-2}	4.3	1.4×10^{-2}
STTS-West	9.5×10^{1}	2.0×10^{-1}	2.5×10^{1}	1.7×10^{-1}	7.0×10^{1}	2.1×10^{-1}
Total	**4.6×10^{2}**	**1.0**	**1.3×10^{2}**	**8.9×10^{-1}**	**3.3×10^{2}**	**1.1**
Alternative 6A, Base Case						
WTP	4.6×10^{2}	1.0	1.3×10^{2}	9.2×10^{-1}	3.3×10^{2}	1.1
STTS-East	9.3×10^{1}	2.1×10^{-1}	4.3×10^{1}	2.9×10^{-1}	5.1×10^{1}	1.7×10^{-1}
STTS-West	1.8	3.7×10^{-3}	3.3×10^{-1}	2.1×10^{-3}	1.5	4.4×10^{-3}
Total	**5.6×10^{2}**	**1.2**	**1.8×10^{2}**	**1.2**	**3.8×10^{2}**	**1.3**
Alternative 6A, Option Case						
WTP	4.6×10^{2}	1.0	1.3×10^{2}	9.2×10^{-1}	3.3×10^{2}	1.1
STTS-East	1.5×10^{2}	3.3×10^{-1}	7.3×10^{1}	5.0×10^{-1}	7.7×10^{1}	2.5×10^{-1}
STTS-West	1.5×10^{2}	3.1×10^{-1}	1.0×10^{1}	6.8×10^{-2}	1.4×10^{2}	4.1×10^{-1}
Total	**7.6×10^{2}**	**1.7**	**2.2×10^{2}**	**1.5**	**5.4×10^{2}**	**1.8**
Alternative 6B, Base Case						
WTP	4.5×10^{2}	1.0	1.3×10^{2}	8.9×10^{-1}	3.2×10^{2}	1.1
STTS-East	7.5×10^{1}	1.7×10^{-1}	3.8×10^{1}	2.6×10^{-1}	3.7×10^{1}	1.2×10^{-1}
STTS-West	7.5×10^{1}	1.5×10^{-1}	4.3	2.8×10^{-2}	7.1×10^{1}	2.1×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**1.7×10^{2}**	**1.2**	**4.2×10^{2}**	**1.4**
Alternative 6B, Option Case						
WTP	4.5×10^{2}	1.0	1.3×10^{2}	8.9×10^{-1}	3.2×10^{2}	1.1
STTS-East	1.3×10^{2}	2.9×10^{-1}	6.8×10^{1}	4.6×10^{-1}	6.4×10^{1}	2.1×10^{-1}
STTS-West	1.3×10^{2}	2.7×10^{-1}	5.4	3.6×10^{-2}	1.3×10^{2}	3.7×10^{-1}
Total	**7.1×10^{2}**	**1.6**	**2.0×10^{2}**	**1.4**	**5.1×10^{2}**	**1.6**
Alternative 6C						
WTP	4.5×10^{2}	1	1.3×10^{2}	8.9×10^{-1}	3.2×10^{2}	1.1
STTS-East	6.0	1.3×10^{-2}	1.70	1.1×10^{-2}	4.3	1.4×10^{-2}
STTS-West	5.7	1.2×10^{-2}	1.50	9.8×10^{-3}	4.3	1.3×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**1.3×10^{2}**	**9.1×10^{-1}**	**3.3×10^{2}**	**1.1**

[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–20 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–20. 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	3.1×10^{2}	6.8×10^{-1}	4.6×10^{1}	5.9×10^{-1}	2.6×10^{2}	7.0×10^{-1}
STTS-West	2.9×10^{2}	6.0×10^{-1}	4.0×10^{1}	5.0×10^{-1}	2.5×10^{2}	6.2×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**8.6×10^{1}**	**1.1**	**5.2×10^{2}**	**1.3**
Alternative 2A						
WTP	4.5×10^{2}	1.0	6.7×10^{1}	8.8×10^{-1}	3.8×10^{2}	1.0
STTS-East	3.2×10^{2}	7.1×10^{-1}	4.8×10^{1}	6.2×10^{-1}	2.7×10^{2}	7.3×10^{-1}
STTS-West	3.1×10^{2}	6.3×10^{-1}	4.2×10^{1}	5.2×10^{-1}	2.7×10^{2}	6.5×10^{-1}
Total	**1.1×10^{3}**	**2.3**	**1.6×10^{2}**	**2.0**	**9.2×10^{2}**	**2.4**
Alternative 2B						
WTP	4.5×10^{2}	1.0	6.8×10^{1}	8.8×10^{-1}	3.8×10^{2}	1.0
STTS-East	6.0	1.3×10^{-2}	8.8×10^{-1}	1.1×10^{-2}	5.1	1.4×10^{-2}
STTS-West	5.7	1.2×10^{-2}	7.8×10^{-1}	9.8×10^{-3}	5.0	1.2×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**7.0×10^{1}**	**9.1×10^{-1}**	**3.9×10^{2}**	**1.1**
Alternative 3A						
WTP	3.6×10^{2}	8.1×10^{-1}	5.5×10^{1}	7.1×10^{-1}	3.1×10^{2}	8.3×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	1.5×10^{1}	1.9×10^{-1}	8.7×10^{1}	2.3×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	1.4×10^{1}	1.7×10^{-1}	9.0×10^{1}	2.2×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**8.4×10^{1}**	**1.1**	**4.8×10^{2}**	**1.3**
Alternative 3B						
WTP	3.6×10^{2}	8.1×10^{-1}	5.5×10^{1}	7.1×10^{-1}	3.1×10^{2}	8.3×10^{-1}
STTS-East	7.2	1.6×10^{-2}	1.1	1.4×10^{-2}	6.1	1.6×10^{-2}
STTS-West	5.6	1.1×10^{-2}	7.6×10^{-1}	9.6×10^{-3}	4.8	1.2×10^{-2}
Total	**3.8×10^{2}**	**8.4×10^{-1}**	**5.7×10^{1}**	**7.4×10^{-1}**	**3.2×10^{2}**	**8.6×10^{-1}**
Alternative 3C						
WTP	3.6×10^{2}	8.1×10^{-1}	5.5×10^{1}	7.1×10^{-1}	3.1×10^{2}	8.3×10^{-1}
STTS-East	1.0×10^{2}	2.2×10^{-1}	1.5×10^{1}	1.9×10^{-1}	8.7×10^{1}	2.3×10^{-1}
STTS-West	1.0×10^{2}	2.1×10^{-1}	1.4×10^{1}	1.7×10^{-1}	9.0×10^{1}	2.2×10^{-1}
Total	**5.7×10^{2}**	**1.2**	**8.4×10^{1}**	**1.1**	**4.8×10^{2}**	**1.3**
Alternative 4						
WTP	3.7×10^{2}	8.2×10^{-1}	5.5×10^{1}	7.2×10^{-1}	3.1×10^{2}	8.4×10^{-1}
STTS-East	1.2×10^{1}	2.6×10^{-2}	2.1	2.7×10^{-2}	9.5	2.5×10^{-2}
STTS-West	1.1×10^{2}	2.3×10^{-1}	1.4×10^{1}	1.8×10^{-1}	9.6×10^{1}	2.3×10^{-1}
Total	**4.9×10^{2}**	**1.1**	**7.2×10^{1}**	**9.2×10^{-1}**	**4.2×10^{2}**	**1.1**
Alternative 5						
WTP	3.6×10^{2}	7.9×10^{-1}	5.4×10^{1}	7.0×10^{-1}	3.0×10^{2}	8.1×10^{-1}
STTS-East	6.0	1.3×10^{-2}	8.9×10^{-1}	1.2×10^{-2}	5.1	1.4×10^{-2}
STTS-West	9.5×10^{1}	2.0×10^{-1}	1.3×10^{1}	1.6×10^{-1}	8.3×10^{1}	2.0×10^{-1}
Total	**4.6×10^{2}**	**1.0**	**6.7×10^{1}**	**8.7×10^{-1}**	**3.9×10^{2}**	**1.0**
Alternative 6A, Base Case						
WTP	4.6×10^{2}	1.0	7.0×10^{1}	9.1×10^{-1}	3.9×10^{2}	1.1
STTS-East	9.3×10^{1}	2.1×10^{-1}	2.2×10^{1}	2.9×10^{-1}	7.1×10^{1}	1.9×10^{-1}
STTS-West	1.8	3.7×10^{-3}	1.7×10^{-1}	2.1×10^{-3}	1.6	4.0×10^{-3}
Total	**5.6×10^{2}**	**1.2**	**9.3×10^{1}**	**1.2**	**4.7×10^{2}**	**1.3**

Table J–20. Tank Closure Alternatives – Total, Low-Income, and Non-Low-Income Population and Individual Average Doses *(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, Option Case						
WTP	4.6×10^{2}	1.0	7.0×10^{1}	9.1×10^{-1}	3.9×10^{2}	1.1
STTS-East	1.5×10^{2}	3.3×10^{-1}	3.9×10^{1}	5.0×10^{-1}	1.1×10^{2}	3.0×10^{-1}
STTS-West	1.5×10^{2}	3.1×10^{-1}	5.4	6.7×10^{-2}	1.4×10^{2}	3.5×10^{-1}
Total	**7.6×10^{2}**	**1.7**	**1.1×10^{2}**	**1.5**	**6.5×10^{2}**	**1.7**
Alternative 6B, Base Case						
WTP	4.5×10^{2}	1.0	6.8×10^{1}	8.8×10^{-1}	3.8×10^{2}	1.0
STTS-East	7.5×10^{1}	1.7×10^{-1}	2.0×10^{1}	2.5×10^{-1}	5.5×10^{1}	1.5×10^{-1}
STTS-West	7.5×10^{1}	1.5×10^{-1}	2.2	2.8×10^{-2}	7.3×10^{1}	1.8×10^{-1}
Total	**6.0×10^{2}**	**1.3**	**8.9×10^{1}**	**1.2**	**5.1×10^{2}**	**1.4**
Alternative 6B, Option Case						
WTP	4.5×10^{2}	1.0	6.8×10^{1}	8.8×10^{-1}	3.8×10^{2}	1.0
STTS-East	1.3×10^{2}	2.9×10^{-1}	3.6×10^{1}	4.6×10^{-1}	9.6×10^{1}	2.6×10^{-1}
STTS-West	1.3×10^{2}	2.7×10^{-1}	2.8	3.5×10^{-2}	1.3×10^{2}	3.1×10^{-1}
Total	**7.1×10^{2}**	**1.6**	**1.1×10^{2}**	**1.4**	**6.0×10^{2}**	**1.6**
Alternative 6C						
WTP	4.5×10^{2}	1.0	6.8×10^{1}	8.8×10^{-1}	3.8×10^{2}	1.0
STTS-East	6.0	1.3×10^{-2}	8.8×10^{-1}	1.1×10^{-2}	5.1	1.4×10^{-2}
STTS-West	5.7	1.2×10^{-2}	7.9×10^{-1}	9.8×10^{-3}	5.0	1.2×10^{-2}
Total	**4.6×10^{2}**	**1.0**	**6.9×10^{1}**	**9.0×10^{-1}**	**3.9×10^{2}**	**1.1**

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) directly east of the 200 Areas in most cases and east-southeast along the Ringold section of the Columbia River and across the river from the Hanford 300 Area in a few cases. 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. Table J–21 presents the maximum annual dose and cancer fatality risk to an MEI located there.

The results of this analysis show that the probability for an individual at this location to develop an LCF from radioactive 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 order of magnitude less than the maximum annual dose to an MEI at the Hanford boundary.

Table J–21. 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	3.6×10^{-3}	4.2×10^{-3}	7.9×10^{-3}	5×10^{-9}
2A	1.3×10^{-1}	5.5×10^{-10}	0	1.3×10^{-1}	8×10^{-8}
2B	1.6×10^{-1}	2.8×10^{-4}	3.2×10^{-4}	1.6×10^{-1}	1×10^{-7}
3A	1.3×10^{-1}	1.0×10^{-3}	1.1×10^{-3}	1.3×10^{-1}	8×10^{-8}
3B	1.3×10^{-1}	9.5×10^{-8}	3.0×10^{-6}	1.3×10^{-1}	8×10^{-8}
3C	1.3×10^{-1}	1.0×10^{-3}	1.1×10^{-3}	1.3×10^{-1}	8×10^{-8}
4	1.3×10^{-1}	3.1×10^{-5}	3.6×10^{-5}	1.3×10^{-1}	8×10^{-8}
5	1.3×10^{-1}	4.6×10^{-8}	1.4×10^{-3}	1.3×10^{-1}	8×10^{-8}
6A Base	1.3×10^{-1}	1.4×10^{-4}	1.4×10^{-4}	1.3×10^{-1}	8×10^{-8}
6A Option	1.3×10^{-1}	2.2×10^{-4}	2.3×10^{-4}	1.3×10^{-1}	8×10^{-8}
6B Base	1.5×10^{-1}	2.1×10^{-3}	2.1×10^{-3}	1.6×10^{-1}	9×10^{-8}
6B Option	1.5×10^{-1}	3.1×10^{-3}	3.0×10^{-3}	1.6×10^{-1}	1×10^{-7}
6C	1.5×10^{-1}	2.8×10^{-4}	3.2×10^{-4}	1.5×10^{-1}	9×10^{-8}

[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–22 presents the dose and cancer fatality risk over the lifetime of the project to an MEI located at the boundary of the Yakama Reservation.

Table J–22. 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	3.4×10^{-1}	3.9×10^{-1}	7.3×10^{-1}	4×10^{-7}
2A	188	8.4×10^{-1}	3.6×10^{-1}	4.2×10^{-1}	1.6	1×10^{-6}
2B	40	7.4×10^{-1}	8.1×10^{-3}	9.5×10^{-3}	7.6×10^{-1}	5×10^{-7}
3A	37	6.5×10^{-1}	2.3×10^{-1}	2.6×10^{-1}	1.1	7×10^{-7}
3B	37	6.5×10^{-1}	1.1×10^{-2}	1.1×10^{-2}	6.8×10^{-1}	4×10^{-7}
3C	37	6.5×10^{-1}	2.3×10^{-1}	2.6×10^{-1}	1.1	7×10^{-7}
4	40	6.6×10^{-1}	1.8×10^{-2}	2.7×10^{-1}	9.5×10^{-1}	6×10^{-7}
5	31	6.6×10^{-1}	9.3×10^{-3}	2.4×10^{-1}	9.1×10^{-1}	5×10^{-7}
6A Base	163	7.6×10^{-1}	1.2×10^{-1}	2.7×10^{-3}	8.8×10^{-1}	5×10^{-7}
6A Option	163	8.7×10^{-1}	2.2×10^{-1}	2.5×10^{-1}	1.3	8×10^{-7}
6B Base	95	8.4×10^{-1}	1.2×10^{-1}	1.4×10^{-1}	1.1	7×10^{-7}
6B Option	95	8.4×10^{-1}	1.8×10^{-1}	2.1×10^{-1}	1.2	7×10^{-7}
6C	40	7.3×10^{-1}	8.1×10^{-3}	9.5×10^{-3}	7.5×10^{-1}	4×10^{-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: 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 for an individual at this location to develop an LCF from radioactive 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 order of magnitude less than the dose to an MEI at the Hanford boundary over the life of the project.

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 radiologically contaminated from air deposition. Irrigation water for crops and livestock and drinking water was assumed to come from radiologically 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 radiological emissions. Table J–23 presents comparative data on the food consumption rates for the subsistence consumer and the general population MEI.

Table J–23. Comparative Food Consumption Rates for 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	125	DOE 1995; DOE and Ecology 1996
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*.

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

Key: MEI=maximally exposed individual.

For the purposes of analysis and comparison, the dose to this subsistence consumer was analyzed for radiological airborne releases under Alternative 2B, which resulted in the highest MEI dose of 1.7 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 this individual exposed to the same releases under Alternative 2B for the whole year would be 3.1 millirem. Both of these doses are well below the National Emission Standards for Hazardous Air Pollutants limit of 10 millirem per year (40 CFR 61.90–61.97). Considering that both the MEI and this individual would also be receiving a dose in excess of 300 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 radiological 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.5.6.1.2 FFTF Decommissioning Alternatives

Table J–24 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 under Alternatives 2 and 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. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–24. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	9.9×10^{-4}	7.5×10^{-6}	2.3×10^{-3}	1.0×10^{-5}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	2.9×10^{-5}	1.6×10^{-7}	6.1×10^{-5}	2.0×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{1.0\times10^{-3}}$	$\mathbf{7.6\times10^{-6}}$	$\mathbf{2.4\times10^{-3}}$	$\mathbf{1.0\times10^{-5}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	3.0×10^{-7}	2.3×10^{-9}	7.0×10^{-7}	3.1×10^{-9}
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	2.8×10^{-5}	1.1×10^{-6}	1.9×10^{-4}	1.0×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{2.9\times10^{-5}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{1.9\times10^{-4}}$	$\mathbf{1.0\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	9.9×10^{-4}	7.5×10^{-6}	2.3×10^{-3}	1.0×10^{-5}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	2.9×10^{-5}	1.6×10^{-7}	6.1×10^{-5}	2.0×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{1.0\times10^{-3}}$	$\mathbf{7.6\times10^{-6}}$	$\mathbf{2.4\times10^{-3}}$	$\mathbf{1.0\times10^{-5}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	2.8×10^{-5}	1.1×10^{-6}	1.9×10^{-4}	1.0×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{2.8\times10^{-5}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{1.9\times10^{-4}}$	$\mathbf{1.0\times10^{-6}}$

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–25 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–25. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	2.9×10^{-5}	5.4×10^{-6}	3.3×10^{-3}	9.3×10^{-6}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	1.1×10^{-6}	1.1×10^{-7}	8.9×10^{-5}	1.9×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{3.0\times10^{-5}}$	$\mathbf{5.5\times10^{-6}}$	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.5\times10^{-6}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	8.8×10^{-9}	1.6×10^{-9}	9.9×10^{-7}	2.8×10^{-9}
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	5.0×10^{-6}	1.0×10^{-6}	2.1×10^{-4}	1.1×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{5.0\times10^{-6}}$	$\mathbf{1.0\times10^{-6}}$	$\mathbf{2.1\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	2.9×10^{-5}	5.4×10^{-6}	3.3×10^{-3}	9.3×10^{-6}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	1.1×10^{-6}	1.1×10^{-7}	8.9×10^{-5}	1.9×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{3.0\times10^{-5}}$	$\mathbf{5.5\times10^{-6}}$	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.5\times10^{-6}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	5.0×10^{-6}	1.0×10^{-6}	2.1×10^{-4}	1.1×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{5.0\times10^{-6}}$	$\mathbf{1.0\times10^{-6}}$	$\mathbf{2.1\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–26 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 under Alternatives 2 and 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. Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic or Latino populations surrounding each facility site.

Table J–26. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	8.0×10^{-4}	7.1×10^{-6}	2.5×10^{-3}	1.0×10^{-5}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	2.4×10^{-5}	1.6×10^{-7}	6.6×10^{-5}	2.0×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{8.2\times10^{-4}}$	$\mathbf{7.2\times10^{-6}}$	$\mathbf{2.6\times10^{-3}}$	$\mathbf{1.0\times10^{-5}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	2.4×10^{-7}	2.1×10^{-9}	7.6×10^{-7}	3.1×10^{-9}
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.0×10^{-6}	2.0×10^{-5}	1.2×10^{-6}	2.0×10^{-4}	1.0×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.0\times10^{-6}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{1.2\times10^{-6}}$	$\mathbf{2.0\times10^{-4}}$	$\mathbf{1.0\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	8.0×10^{-4}	7.1×10^{-6}	2.5×10^{-3}	1.0×10^{-5}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	2.4×10^{-5}	1.6×10^{-7}	6.6×10^{-5}	2.0×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{8.2\times10^{-4}}$	$\mathbf{7.2\times10^{-6}}$	$\mathbf{2.6\times10^{-3}}$	$\mathbf{1.0\times10^{-5}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	2.0×10^{-5}	1.2×10^{-6}	2.0×10^{-4}	1.0×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{1.2\times10^{-6}}$	$\mathbf{2.0\times10^{-4}}$	$\mathbf{1.0\times10^{-6}}$

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

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–27 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. 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–27. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	4.3×10^{-4}	7.7×10^{-6}	2.9×10^{-3}	9.5×10^{-6}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	1.2×10^{-5}	1.5×10^{-7}	7.8×10^{-5}	1.9×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{4.4\times10^{-4}}$	$\mathbf{7.9\times10^{-6}}$	$\mathbf{3.0\times10^{-3}}$	$\mathbf{9.7\times10^{-6}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	1.3×10^{-7}	2.4×10^{-9}	8.7×10^{-7}	2.9×10^{-9}
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	2.9×10^{-5}	1.0×10^{-6}	1.9×10^{-4}	1.1×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{2.9\times10^{-5}}$	$\mathbf{1.0\times10^{-6}}$	$\mathbf{1.9\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	3.3×10^{-3}	9.2×10^{-6}	4.3×10^{-4}	7.7×10^{-6}	2.9×10^{-3}	9.5×10^{-6}
200-West Area	9.0×10^{-5}	1.8×10^{-7}	1.2×10^{-5}	1.5×10^{-7}	7.8×10^{-5}	1.9×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{3.4\times10^{-3}}$	$\mathbf{9.4\times10^{-6}}$	$\mathbf{4.4\times10^{-4}}$	$\mathbf{7.9\times10^{-6}}$	$\mathbf{3.0\times10^{-3}}$	$\mathbf{9.7\times10^{-6}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	2.2×10^{-4}	1.1×10^{-6}	2.9×10^{-5}	1.6×10^{-6}	1.9×10^{-4}	1.1×10^{-6}
Total	$\mathbf{2.2\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$	$\mathbf{2.9\times10^{-5}}$	$\mathbf{1.6\times10^{-6}}$	$\mathbf{1.9\times10^{-4}}$	$\mathbf{1.1\times10^{-6}}$

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–28 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 under Alternatives 2 and 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. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority populations surrounding each facility site.

Table J–28. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	2.2×10^{-3}	1.6×10^{-5}	5.0×10^{-3}	2.2×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	4.3×10^{-5}	2.4×10^{-7}	9.7×10^{-5}	3.1×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{2.2\times10^{-3}}$	$\mathbf{1.7\times10^{-5}}$	$\mathbf{5.1\times10^{-3}}$	$\mathbf{2.3\times10^{-5}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	3.0×10^{-7}	2.3×10^{-9}	7.0×10^{-7}	3.1×10^{-9}
200-Area West	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	5.8×10^{-5}	2.3×10^{-6}	3.7×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{5.9\times10^{-5}}$	$\mathbf{2.3\times10^{-6}}$	$\mathbf{3.7\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	2.2×10^{-3}	1.6×10^{-5}	5.0×10^{-3}	2.2×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	4.3×10^{-5}	2.4×10^{-7}	9.7×10^{-5}	3.1×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{2.2\times10^{-3}}$	$\mathbf{1.7\times10^{-5}}$	$\mathbf{5.1\times10^{-3}}$	$\mathbf{2.3\times10^{-5}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	5.8×10^{-5}	2.3×10^{-6}	3.7×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{5.8\times10^{-5}}$	$\mathbf{2.3\times10^{-6}}$	$\mathbf{3.7\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–29 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–29. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	6.4×10^{-5}	1.2×10^{-5}	7.1×10^{-3}	2.0×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	1.7×10^{-6}	1.6×10^{-7}	1.4×10^{-4}	2.9×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{6.5\times10^{-5}}$	$\mathbf{1.2\times10^{-5}}$	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.1\times10^{-5}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	8.8×10^{-9}	1.6×10^{-9}	9.9×10^{-7}	2.8×10^{-9}
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	1.0×10^{-5}	2.1×10^{-6}	4.2×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{1.0\times10^{-5}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{4.2\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	6.3×10^{-5}	1.2×10^{-5}	7.1×10^{-3}	2.0×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	1.7×10^{-6}	1.6×10^{-7}	1.4×10^{-4}	2.9×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{6.5\times10^{-5}}$	$\mathbf{1.2\times10^{-5}}$	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.1\times10^{-5}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	1.0×10^{-5}	2.1×10^{-6}	4.2×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{1.0\times10^{-5}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{4.2\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–30 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 under Alternatives 2 and 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. Therefore, these alternatives would not pose disproportionately high and adverse impacts on Hispanic or Latino populations surrounding each facility site.

Table J–30. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	1.8×10^{-3}	1.6×10^{-5}	5.4×10^{-3}	2.2×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	3.6×10^{-5}	2.4×10^{-7}	1.0×10^{-4}	3.1×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{1.8\times10^{-3}}$	$\mathbf{1.6\times10^{-5}}$	$\mathbf{5.6\times10^{-3}}$	$\mathbf{2.3\times10^{-5}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	2.4×10^{-7}	2.1×10^{-9}	7.6×10^{-7}	3.1×10^{-9}
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	4.1×10^{-5}	2.5×10^{-6}	3.9×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{4.1\times10^{-5}}$	$\mathbf{2.5\times10^{-6}}$	$\mathbf{3.9\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	1.8×10^{-3}	1.6×10^{-5}	5.4×10^{-3}	2.2×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	3.6×10^{-5}	2.4×10^{-7}	1.0×10^{-4}	3.1×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{1.8\times10^{-3}}$	$\mathbf{1.6\times10^{-5}}$	$\mathbf{5.6\times10^{-3}}$	$\mathbf{2.3\times10^{-5}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	4.1×10^{-5}	2.5×10^{-6}	3.9×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{4.1\times10^{-5}}$	$\mathbf{2.5\times10^{-6}}$	$\mathbf{3.9\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$

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

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–31 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 Option under Alternatives 2 and 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. Therefore, these alternatives would not pose disproportionately high and adverse impacts on low-income populations surrounding each facility site.

Table J–31. FFTF Decommissioning 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						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**
Alternative 2 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	9.4×10^{-4}	1.7×10^{-5}	6.3×10^{-3}	2.1×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	1.8×10^{-5}	2.3×10^{-7}	1.2×10^{-4}	3.0×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{9.6\times10^{-4}}$	$\mathbf{1.7\times10^{-5}}$	$\mathbf{6.4\times10^{-3}}$	$\mathbf{2.1\times10^{-5}}$
Alternative 2 Idaho National Laboratory						
FFTF	1.0×10^{-6}	2.8×10^{-9}	1.3×10^{-7}	2.4×10^{-9}	8.7×10^{-7}	2.9×10^{-9}
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	5.9×10^{-5}	2.2×10^{-6}	3.7×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{6.0\times10^{-5}}$	$\mathbf{2.2\times10^{-6}}$	$\mathbf{3.7\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$
Alternative 3 Hanford Site						
FFTF	7.2×10^{-3}	2.0×10^{-5}	9.3×10^{-4}	1.7×10^{-5}	6.3×10^{-3}	2.1×10^{-5}
200-West Area	1.4×10^{-4}	2.9×10^{-7}	1.8×10^{-5}	2.3×10^{-7}	1.2×10^{-4}	3.0×10^{-7}
INL	0	0	0	0	0	0
Total	$\mathbf{7.3\times10^{-3}}$	$\mathbf{2.0\times10^{-5}}$	$\mathbf{9.6\times10^{-4}}$	$\mathbf{1.7\times10^{-5}}$	$\mathbf{6.4\times10^{-3}}$	$\mathbf{2.1\times10^{-5}}$
Alternative 3 Idaho National Laboratory						
FFTF	0	0	0	0	0	0
200-West Area	0	0	0	0	0	0
INL	4.3×10^{-4}	2.1×10^{-6}	5.9×10^{-5}	2.1×10^{-6}	3.7×10^{-4}	2.1×10^{-6}
Total	$\mathbf{4.3\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{5.9\times10^{-5}}$	$\mathbf{2.1\times10^{-6}}$	$\mathbf{3.7\times10^{-4}}$	$\mathbf{2.1\times10^{-6}}$

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory.

Table J–32 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 to develop an LCF from radioactive releases during normal operations would essentially be zero. In addition, the maximum annual dose to an MEI residing at a reservation boundary would be approximately one order of magnitude less than the maximum annual dose to an MEI at each respective site boundary under all FFTF Decommissioning alternatives.

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 MFC. An offsite MEI from this location is identified to be south-southeast of the MFC. To explore potential American Indian environmental justice concerns associated with normal operations under these alternatives, impacts to a hypothetical individual residing at the boundary of the Fort Hall Reservation were evaluated.

Table J–32. FFTF Decommissioning Alternatives – Maximum Annual Dose and Risk to a Maximally Exposed Individual Located at the Appropriate Reservation Boundary

	Yakama Reservation				Fort Hall Reservation	
	FFTF	STTS-West	Hanford Site Total	Risk[a]	INL	Risk[a]
Alternative	Dose (millirem)					
1	0	0	0	0	0	0
2 Hanford Site	3.0×10^{-6}	1.6×10^{-7}	3.1×10^{-6}	1.9×10^{-12}	0	0
2 INL	7.9×10^{-10}	0	7.9×10^{-10}	4.7×10^{-16}	2.9×10^{-6}	2.0×10^{-12}
3 Hanford Site	3.0×10^{-6}	1.6×10^{-7}	3.1×10^{-6}	1.9×10^{-12}	0	0
3 INL	0	0	0	0	2.9×10^{-6}	2.0×10^{-12}

[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; STTS-West=200-West Area Supplemental Treatment Technology Site.

Table J–33 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 to develop an LCF from radioactive 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 approximately one order of magnitude less than the dose to an MEI at each respective site boundary over the life of the project.

Table J–33. FFTF Decommissioning Alternatives – Dose and Risk to a Maximally Exposed Individual Located at the Appropriate Reservation Boundary Over the Life of the Project

Alternative	Duration of Exposure (years)	Yakama Reservation				Fort Hall Reservation	
		FFTF	STTS-West	Hanford Total	Risk[a]	INL	Risk[a]
		Dose (millirem)					
1	0[b]	0	0	0	0	0	0
2 Hanford Site	3	6.6×10^{-6}	2.4×10^{-7}	6.8×10^{-6}	4.1×10^{-12}	0	0
2 INL	4	7.9×10^{-10}	0	7.9×10^{-10}	4.7×10^{-16}	5.9×10^{-6}	3.5×10^{-12}
3 Hanford Site	3	6.6×10^{-6}	2.4×10^{-7}	6.8×10^{-6}	4.1×10^{-12}	0	0
3 INL	4	0	0	0	0	5.9×10^{-6}	3.5×10^{-12}

[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 radiological air releases above current facility operations reported as part of the baseline in the affected environment section of this *TC & WM EIS*.

Key: FFTF=Fast Flux Test Facility; INL=Idaho National Laboratory; STTS-West=200-West Area Supplemental Treatment Technology Site.

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 radiological 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.5.6.1.3 Waste Management Alternatives

Table J–34 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–34. 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	1.8×10^{-5}	3.7×10^{-8}	5.6×10^{-6}	3.1×10^{-8}	1.2×10^{-5}	4.0×10^{-8}
Total	**1.8×10^{-5}**	**3.7×10^{-8}**	**5.6×10^{-6}**	**3.1×10^{-8}**	**1.2×10^{-5}**	**4.0×10^{-8}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	1.8×10^{-5}	3.7×10^{-8}	5.6×10^{-6}	3.1×10^{-8}	1.2×10^{-5}	4.0×10^{-8}
Total	**1.8×10^{-5}**	**3.7×10^{-8}**	**5.6×10^{-6}**	**3.1×10^{-8}**	**1.2×10^{-5}**	**4.0×10^{-8}**

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–35 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–35. 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	1.8×10^{-5}	3.7×10^{-8}	2.2×10^{-7}	2.1×10^{-8}	1.8×10^{-5}	3.7×10^{-8}
Total	**1.8×10^{-5}**	**3.7×10^{-8}**	**2.2×10^{-7}**	**2.1×10^{-8}**	**1.8×10^{-5}**	**3.7×10^{-8}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	1.8×10^{-5}	3.7×10^{-8}	2.2×10^{-7}	2.1×10^{-8}	1.8×10^{-5}	3.7×10^{-8}
Total	**1.8×10^{-5}**	**3.7×10^{-8}**	**2.2×10^{-7}**	**2.1×10^{-8}**	**1.8×10^{-5}**	**3.7×10^{-8}**

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–36 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–36. 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	1.8×10^{-5}	3.7×10^{-8}	4.6×10^{-6}	3.1×10^{-8}	1.3×10^{-5}	4.0×10^{-8}
Total	$\mathbf{1.8\times10^{-5}}$	$\mathbf{3.7\times10^{-8}}$	$\mathbf{4.6\times10^{-6}}$	$\mathbf{3.1\times10^{-8}}$	$\mathbf{1.3\times10^{-5}}$	$\mathbf{4.0\times10^{-8}}$
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	1.8×10^{-5}	3.7×1^{-8}	4.6×10^{-6}	3.1×10^{-8}	1.3×10^{-5}	4.0×10^{-8}
Total	$\mathbf{1.8\times10^{-5}}$	$\mathbf{3.7\times1^{-8}}$	$\mathbf{4.6\times10^{-6}}$	$\mathbf{3.1\times10^{-8}}$	$\mathbf{1.3\times10^{-5}}$	$\mathbf{4.0\times10^{-8}}$

[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–37 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–37. 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	1.8×10^{-5}	3.7×10^{-8}	2.3×10^{-6}	2.9×10^{-8}	1.6×10^{-5}	3.8×10^{-8}
Total	$\mathbf{1.8\times10^{-5}}$	$\mathbf{3.7\times10^{-8}}$	$\mathbf{2.3\times10^{-6}}$	$\mathbf{2.9\times10^{-8}}$	$\mathbf{1.6\times10^{-5}}$	$\mathbf{3.8\times10^{-8}}$
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	1.8×10^{-5}	3.7×10^{-8}	2.3×10^{-6}	2.9×10^{-8}	1.6×10^{-5}	3.8×10^{-8}
Total	$\mathbf{1.8\times10^{-5}}$	$\mathbf{3.7\times10^{-8}}$	$\mathbf{2.3\times10^{-6}}$	$\mathbf{2.9\times10^{-8}}$	$\mathbf{1.6\times10^{-5}}$	$\mathbf{3.8\times10^{-8}}$

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 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–38. 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	6.7×10^{-4}	1.4×10^{-6}	2.1×10^{-4}	1.2×10^{-6}	4.6×10^{-4}	1.5×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**2.1×10^{-4}**	**1.2×10^{-6}**	**4.6×10^{-4}**	**1.5×10^{-6}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	6.7×10^{-4}	1.4×10^{-6}	2.1×10^{-4}	1.2×10^{-6}	4.6×10^{-4}	1.5×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**2.1×10^{-4}**	**1.2×10^{-6}**	**4.6×10^{-4}**	**1.5×10^{-6}**

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 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–39. 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**
Alternative 2						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	6.7×10^{-4}	1.4×10^{-6}	8.3×10^{-6}	8.0×10^{-7}	6.6×10^{-4}	1.4×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**8.3×10^{-6}**	**8.0×10^{-7}**	**6.6×10^{-4}**	**1.4×10^{-6}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0.	0	0
STTS-West	6.7×10^{-4}	1.4×10^{-6}	8.3×10^{-6}	8.0×10^{-7}	6.6×10^{-4}	1.4×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**8.3×10^{-6}**	**8.0×10^{-7}**	**6.6×10^{-4}**	**1.4×10^{-6}**

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 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–40. 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	6.7×10^{-4}	1.4×10^{-6}	1.8×10^{-4}	1.2×10^{-6}	4.9×10^{-4}	1.5×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**1.8×10^{-4}**	**1.2×10^{-6}**	**4.9×10^{-4}**	**1.5×10^{-6}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	6.7×10^{-4}	1.4×10^{-6}	1.8×10^{-4}	1.2×10^{-6}	4.9×10^{-4}	1.5×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**1.8×10^{-4}**	**1.2×10^{-6}**	**4.9×10^{-4}**	**1.5×10^{-6}**

[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–41 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–41. 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	6.7×10^{-4}	1.4×10^{-6}	8.9×10^{-5}	1.1×10^{-6}	5.8×10^{-4}	1.4×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**8.9×10^{-5}**	**1.1×10^{-6}**	**5.8×10^{-4}**	**1.4×10^{-6}**
Alternative 3						
WTP	0	0	0	0	0	0
STTS-East	0	0	0	0	0	0
STTS-West	6.7×10^{-4}	1.4×10^{-6}	8.9×10^{-5}	1.1×10^{-6}	5.8×10^{-4}	1.4×10^{-6}
Total	**6.7×10^{-4}**	**1.4×10^{-6}**	**8.9×10^{-5}**	**1.1×10^{-6}**	**5.8×10^{-4}**	**1.4×10^{-6}**

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 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 to develop an LCF from radioactive releases during normal operations would essentially be zero. In addition, the maximum annual dose to a MEI residing at the reservation boundary would be approximately one order of magnitude less than the maximum annual dose to an MEI at the Hanford boundary under all Waste Management alternatives.

Table J–42. 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	2.1×10^{-8}	2.1×10^{-8}	1×10^{-14}
3	0	0	2.1×10^{-8}	2.1×10^{-8}	1×10^{-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–43 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 to develop an LCF from radioactive 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 order of magnitude less than the dose to an MEI at the Hanford boundary over the life of the project under all Waste Management alternatives.

Table J–43. 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	8.1×10^{-7}	8.1×10^{-7}	5×10^{-13}
3	39	0	0	8.1×10^{-7}	8.1×10^{-7}	5×10^{-13}

[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 radiological air releases above current facility operations reported as part of the baseline in the affected environment section of this *TC & WM EIS.*

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 radiological emissions. Potential risks from hazardous chemical impacts from reasonably foreseeable accidents would be encompassed by those discussed in Section J.5.6.2.2 under the FFTF Decommissioning alternatives. Therefore, these alternatives would not pose disproportionately high and adverse impacts on minority or low-income populations.

J.5.6.2 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.5.6.2); because there were no disproportionately high and adverse health or environmental impacts on minority, American Indian, Hispanic, or low-income populations due to radiological air releases during normal operations, the same would be true for nonradioactive air emissions.

J.5.6.3 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 only groundwater for drinking water ingestion and crop irrigation. 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 does not cultivate crops but gathers food from indigenous plants, harvests fish from the Columbia River, and is 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.1.2.2 and Appendix Q, Section Q.2.2.

J.5.6.3.1 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–20 through Q–208. Long-term human health impacts of Tank Closure actions would be greatest under Tank Closure Alternative 1. Radiological releases under this alternative would result in the doses at the A and B Barriers and the Core Zone Boundary exceeding regulatory limits for the resident farmer, American Indian resident farmer, and the American Indian hunter-gatherer; the dose at the S Barrier would exceed regulatory limits for the American Indian resident farmer and American Indian hunter-gatherer; at the T Barrier, for the American Indian hunter-gatherer. None of the hypothetical receptors at the Columbia River nearshore or surface-water locations would be exposed to a dose in excess of regulatory limits. Nonradiological releases under this alternative would result in exceedance of the Hazard Index for chromium and nitrate at all onsite locations analyzed for the resident farmer, American Indian resident farmer, and American Indian hunter-gatherer. The analysis determined that the greatest impact of any alternative on long-term human health would result in radiological 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 radiological dose of 3.4 rem. 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.5.6.3.2 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–213 through Q–218. Long-term human health impacts of FFTF decommissioning 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 radiological 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 radiological dose of 3.8 millirem, compared to 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.5.6.3.3 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–220 through Q–358. Long-term human health impacts of waste management actions would be greatest under Waste Management Alternative 2, Disposal Group 1, Subgroup 1-D. Radiological releases under this alternative would result in the doses at the 200-East Area Integrated Disposal Facility (IDF-East) Barrier and the Core Zone Boundary exceeding regulatory limits for the resident farmer and the American Indian resident farmer. None of the hypothetical receptors at the River Protection Project Disposal Facility Barrier, the Columbia River nearshore, or the Columbia River surface-water location would be exposed to a dose in excess of regulatory limits. Nonradiological releases under this alternative would result in exceedance of the Hazard Index for chromium at the IDF-East Barrier, Core Zone Boundary, and Columbia River nearshore for the resident farmer and the American Indian resident farmer. The analysis determined that the greatest impact of any alternative on long-term human health would result in radiological doses in excess of regulatory limits and chemical exposures with a Hazard Index greater than 1 for receptors located on site at the 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-East boundary. During the year of peak dose, this receptor would receive a radiological dose of 281 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 non-American Indian receptors at the same locations, but to a lesser extent.

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